# **Nuclear War=Extinction**

## **Nuclear Die Off (Generic)**

### Nuclear war causes a massive human die off.

Nissani 92 (Nissani, Moti. (1992). Lives in the Balance: the Cold War and American Politics, 1945-1991, chapter 2, Department of Interdisciplinary Studies / Department of Biological Sciences, Wayne State University, <http://www.is.wayne.edu/mnissani/PAGEPUB/CH2.html>)phol

VI. Human Populations. The direct effects of war on human populations have already been discussed. Here I shall only superimpose the war's indirect effects on projection IV above, a projection which entailed one billion deaths in targeted countries as a result of near-term effects of nuclear bombs: blast, heat, initial radiation, and local fallout (the effects of the other three projections would be correspondingly lighter). The death toll will continue to climb for years after the war, as a consequence of widespread famine in targeted nations, famine in numerous non-targeted Third World countries whose people partly depend for survival on food or food-related imports from targeted nations, general deterioration of the health care and disease prevention system, lingering radioactivity, paucity of shelters, temporary but severe climatic changes, and the likelihood that some grief-stricken survivors will prefer death to a prolonged struggle for sheer physical survival. Several years after the war, the world's population may go down by another billion people. The longer-term impact of total war on human populations depends in part on whether social conditions resembling our own are re-established. If not, human populations could keep declining for decades. But even if such conditions are re-created, further reductions seem likely during the first few decades because young children, infants, and fetuses are more vulnerable to the stresses of a post-nuclear world (radiation, starvation, death of parents, etc.), and so proportionately more individuals in these age brackets will die. In addition, many people may refrain for years after from having children, so the death rate is likely to be higher than the birth rate. (I have confined the discussion here to dry statistics not because they are the most interesting, but because books like this one cannot possibly convey the countless individual tragedies these numbers imply.) It must be admitted that all this will be a nasty Malthusian solution to overpopulation and rapid population growth. Consequently, for at least half a century after the war, overpopulation and rapid population growth will no longer make appreciable contributions to such ills as environmental deterioration, species extinction, nationalism, and over-organization.

## Nuclear Winter

### Nuclear war leads to ice age, extinction.

Starr no date (Deadly Climate Change From Nuclear War: A threat to human existence, Steven Starr, Senior Scientist with Physicians for Social Responsibility, and Director of the Clinical Laboratory Science Program at the University of Missouri, <http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/effects/PDFs/starr_climate_change.pdf>, posted to nucleardarkness.org)phol

If 1% of the nuclear weapons now ready for war were detonated in large cities, they would utterly devastate the environment, climate, ecosystems and inhabitants of Earth. A war fought with thousands of strategic nuclear weapons would leave the Earth uninhabitable.

Nuclear Famine: In a nuclear war, immense nuclear firestorms in burning cities would create millions of tons of thick, black, radioactive smoke. This smoke would rise above cloud level and quickly surround and engulf the entire Earth. The smoke would form a stratospheric smoke layer that would block sunlight from reaching the surface of Earth for a period of about ten years.

Heated smoke in the stratosphere would cause massive destruction of the protective ozone layer. Huge amounts of harmful Ultraviolet light would penetrate the smoke and reach the surface of the Earth.

Warming sunlight would be blocked by the smoke layer and cause the Earth to rapidly cool. In a matter of days, Ice Age weather conditions would descend upon all peoples and nations.

Prolonged cold, decreased sunlight and rainfall, and massive increases in harmful UV light would shorten or eliminate growing seasons for a decade or longer. Nuclear famine would result for the 800 million people who already suffering from hunger and malnutrition.

A war fought with 1% of the deployed and operational nuclear weapons could cause up to a billion people to die from nuclear famine. A large nuclear war, fought with the nuclear arsenals of the U.S. and Russia, would surely kill most humans and many other complex forms of life on Earth. Nuclear Haze: Nuclear war between India and Pakistan could put 5 million tons of smoke in the stratosphere and produce a global Nuclear Haze that would block 7-10% of warming sunlight from reaching the surface of Earth and cause the blue skies of Earth to appear grey. Nuclear Twilight & Nuclear Darkness: The U.S and Russia keep more than 2000 strategic nuclear weapons on high-alert. These weapons are 7 to 85 times more powerful than the atomic bomb that destroyed Hiroshima. They are mounted on many hundreds of missiles that can be launched with 30 seconds to 3 minutes warning. Scientists predict that urban firestorms ignited by a nuclear war fought with 4400 US and Russian strategic nuclear weapons could loft 180 million tons of smoke into the stratosphere. The resulting global smoke layer would block 35% of sunlight from reaching the surface of the Southern Hemisphere, creating a Nuclear Twilight on Earth. In the Northern Hemisphere, 70% of sunlight would be absorbed by the stratospheric smoke layer. Beneath the smoke there would be Nuclear Darkness. Nuclear arsenals must be eliminated, because if they are left intact, they will eventually be used. Nuclear weapons must be outlawed, dismantled and abolished. A draft treaty, or Model Nuclear Weapons Convention, has been prepared by civil society organizations and submitted to the United Nations. Nuclear weapon states are obligated (under the terms of the Nuclear Non-Proliferation Treaty) to negotiate in good faith to achieve such a treaty to eliminate their nuclear arsenals.

### Massive death would result from nuclear winter.

LibraryIndex.com no date (Environmental Consequences of Nuclear War, Ecological and Agricultural Effects, Physical and Atmospheric Effects, http://www.libraryindex.com/pages/3360/Nuclear-Winter.html#ixzz1SrepB96R)phol

Nuclear winter comprises a constellation of physical and chemical effects associated with the wholesale detonation of nuclear weapons ( Robock et al., 2007 ). Aside from the extensive direct destruction and intense radioactive fallout accompanying nuclear explosions, it has been postulated that accompanying changes in the atmosphere and climate might prove worse. Massive emissions of smoke and dust would lead to unprecedented pollution of the troposphere, strong attenuation of sunlight, strong surface cooling in continental areas—up to 10–20°C in the northern midlatitudes—heating of the atmosphere, sharply reduced rainfall in some regions, accelerated interhemispheric transport of nuclear debris, and global stratospheric ozone depletion. Our knowledge of these potential widespread environmental impacts of a nuclear war has advanced considerably since the earliest work on this subject (e.g., Crutzen and Birks, 1982 ; Turco et al., 1983 ; NRC, 1985 ; Pittock et al., 1986 ). The basic mechanisms that occur in nuclear winter have been studied and modified through increasingly sophisticated theoretical and experimental analyses. The magnitude of predicted land-temperature perturbations has decreased from original estimates, as values of key physical parameters have been refined over time. Meanwhile, the severity of other effects—such as potential ozone depletion and exposure to radioactivity—have been projected to be greater. While the most recent forecasts of a nuclear winter are not as dire as the earlier ones, they nevertheless point to enormous global human casualties—probably greater than those from the direct effects of the nuclear detonations, owing in large part to disruptions in food production and distribution, and the destruction of health facilities and services ( Harwell and Hutchinson , 1985 ; Solomon and Marston, 1986 ). Significant uncertainties will always remain in such analyses, and these forecasts should be considered merely as qualitative or indicative. The demise of the Soviet Union as a superpower has reduced concerns about global nuclear warfare, but thousands of nuclear weapons remain at the ready and continue to pose a threat. Moreover, new nations are achieving nuclear capability, most recently India, Pakistan, Iran, and, North Korea. Thus, none of the dangers associated with existing nuclear arsenals regarding national security or nuclear winter—either from the viewpoint of national security or of nuclear winter—have been resolved. Indeed, to avoid the possibility of nuclear winter, it has been suggested that almost total disarmament is needed ( Sagan and Turco , 1990 ). In this regard, it is debatable whether the realization of nuclear winter has stimulated a fundamental reevaluation of strategic policy and doctrine or played a role in the recent movement toward nuclear arms reductions, although their coincidence is apparent. Effects comparable to nuclear winter have been associated with historical volcanic explosions (“volcanic winter”) and large meteor impacts on t78he Earth (“meteorite winter”), both of which inject large quantities of particles into the upper atmosphere. For example, following the eruption of the Indonesian volcano Tambora in 1815 , the weather in the Northern Hemisphere was highly unusual, and 1815 is remembered as the “year without a summer” ( Stommel and Stommel , 1979 ). Farmers in the northeastern United States suffered frosts throughout the spring; in western North America, the unseasonable weather was recorded as frost damage to tree rings in the hearty bristlecone pines. Across Europe, crops failed under stressful climatic conditions. Anecdotal evidence from China testifies to strange weather and poor agricultural output. [See Volcanoes.] These events are thought to reflect the impacts of a mild nuclear winter. In another related phenomena, the smoke palls from forest fires and other large fires (such as those in Kuwait during the Persian Gulf War of 1991 ) have been shown to cool land surfaces rapidly, and often strongly, by tens of degrees Celsius. In the case of nuclear detonations (and the resultant firestorms in cities), such cooling could be exacerbated by the larger extent of the smoke clouds and their greater height of injection.

### A nuclear war would cause massive starvation and extinction of species, Cretaceous extinction proves.

Roland 84’ (Jon Roland, 1984, Vanguard Institute, founder and president of vanguard institute, Nuclear Winter and Other Scenarios, <http://pynthan.com/vri/nwaos.htm>)phol

The closest thing we have to an experimental test of these models is the terminal Cretaceous event. Although there are significant differences between the various nuclear scenarios and impact by an asteroid or comet, there are some important similarities. Emiliani et al have suggested that 70 percent of animal genera and 30 percent of plant genera vanished during this period and that the pattern of extinctions indicates the cause was elevated temperatures. They calculated that a sea impact would loft enough H2O vapor to raise temperatures 8-10ºC. Considering how much it would take to wipe out 70 percent of the animal genera then living, and the similarities with a nuclear war, the models that predict catastrophic cooling or heating [see Box - Nuclear Summer] following a nuclear war can be said to have persuasive experimental support. However, Hickey has pointed out that the pattern of plant extinctions does not fit the model: they occurred over several million years, and mostly in northern temperate latitudes14. Tropical species were not affected as much as might be expected from either cooling or warming. Indeed, most of the extinctions seem to have occurred in Asia east of the Ural Mountains and in North America west of the Rockies, which Emiliani suggested might have been the result of a giant tidal wave from an impact in the Bering Sea area5. Hickey does say, however, that signs of ecological instability in plant communities seem to support the impact hypothesis. Emiliani has argued15 that the fossil record shows most evolutionary successions involved not the victory of a new competitor for the same niche over an old one, but extinction of a species from other causes, perhaps disease, leaving a vacuum which was not always filled by a better-adapted species. He suggested that this might be the explanation for the disappearance of Neanderthal Man. We can speculate that the rate of extinction may have accelerated during this period, not directly from the short-term physical effects of the impact event, but by it creating conditions favorable to the development of plagues. What would happen in the United States and other nations if there was a distant nuclear war or nuclear winter was triggered deliberately [see Box - How it Might Happen]? A preliminary analysis of USDA data indicates that stocks of food in pantries and supermarkets could feed U.S. residents for about 30 days, and stocks in warehouses another 60-90 days. After that, they would have to live on feed stocks, which might last a year with tight rationing. Such feed stocks are not well distributed, and converting them to human consumption would present processing problems. Other nations would be in much worse shape. FAO estimates world food reserves at about 33 days now. A nuclear winter could wipe out all of one year of agricultural production, and severely impair production during the second. Much livestock might not survive, and seed stocks needed for replanting might be lost. It might take up to three years to get agricultural production to a level sufficient to feed everyone now living. By the time it could be done, there would not be nearly as many people to have to feed. The process of desertification might be accelerated and run to completion within a few years, especially if the nuclear summer scenario is valid, which could make modern civilization impossible to sustain, and reduce humanity to scattered bands of nomads. When well-fed people look upon the people suffering from famine in Africa, they could be looking at where they will be some day.

### Nuclear wars create nuclear winter which leads to extinction. Most important impact in this round.

Sagan 83’ (Nuclear winter, Carl Sagan, physicist you are an idiot if you don’t know, 1983, <http://www.bibliotecapleyades.net/ciencia/ciencia_uranium16.htm)phol>

There are some who think that a nuclear war can be "contained," bottled up before it runs away to involve much of the world's arsenals. But a number of detailed analyses, war games run by the U.S. Department of Defense, and official Soviet pronouncements all indicate that this containment may be too much to hope for: Once the bombs begin exploding, communications failures, disorganization, fear, the necessity of making in minutes decisions affecting the fates of millions, and the immense psychological burden of knowing that your own loved ones may already have been destroyed are likely to result in a nuclear paroxysm. Many investigations, including a number of studies for the U.S. government, envision the explosion of 5,000 to 10,000 megatons - the detonation of tens of thousands of nuclear weapons that now sit quietly, inconspicuously, in missile silos, submarines and long-range bombers, faithful servants awaiting orders. The World Health Organization, in a recent detailed study chaired by Sune K. Bergstrom (the 1982 Nobel laureate in physiology and medicine), concludes that 1.1 billion people would be killed outright in such a nuclear war, mainly in the United States, the Soviet Union, Europe, China and Japan. An additional 1.1 billion people would suffer serious injuries and radiation sickness, for which medical help would be unavailable. It thus seems possible that more than 2 billion people - almost half of all the humans on Earth - would be destroyed in the immediate aftermath of a global thermonuclear war. This would represent by far the greatest disaster in the history of the human species and, with no other adverse effects, would probably be enough to reduce at least the Northern Hemisphere to a state of prolonged agony and barbarism. Unfortunately, the real situation would be much worse. In technical studies of the consequences of nuclear weapons explosions, there has been a dangerous tendency to underestimate the results. This is partly due to a tradition of conservatism which generally works well in science but which is of more dubious applicability when the lives of billions of people are at stake. In the Bravo test of March 1, 1954, a 15-megaton thermonuclear bomb was exploded on Bikini Atoll. (below image) It had about double the yield expected, and there was an unanticipated last-minute shift in the wind direction. As a result, deadly radioactive fallout came down on Rongelap in the Marshall Islands, more than 200 kilometers away. Most all the children on Rongelap subsequently developed thyroid nodules and lesions, and other long-term medical problems, due to the radioactive fallout. Likewise, in 1973, it was discovered that high-yield airbursts will chemically burn the nitrogen in the upper air, converting it into oxides of nitrogen; these, in turn, combine with and destroy the protective ozone in the Earth's stratosphere. The surface of the Earth is shielded from deadly solar ultraviolet radiation by a layer of ozone so tenuous that, were it brought down to sea level, it would be only 3 millimeters thick. Partial destruction of this ozone layer can have serious consequences for the biology of the entire planet. These discoveries, and others like them, were made by chance. They were largely unexpected. And now another consequence - by far the most dire - has been uncovered, again more or less by accident. The U.S. Mariner 9 spacecraft, the first vehicle to orbit another planet, arrived at Mars in late 1971. The planet was enveloped in a global dust storm. As the fine particles slowly fell out, we were able to measure temperature changes in the atmosphere and on the surface. Soon it became clear what had happened: The dust, lofted by high winds off the desert into the upper Martian atmosphere, had absorbed the incoming sunlight and prevented much of it from reaching the ground. Heated by the sunlight, the dust warmed the adjacent air. But the surface, enveloped in partial darkness, became much chillier than usual. Months later, after the dust fell out of the atmosphere, the upper air cooled and the surface warmed, both returning to their normal conditions. We were able to calculate accurately, from how much dust there was in the atmosphere, how cool the Martian surface ought to have been. Afterwards, I and my colleagues, James B. Pollack and Brian Toon of NASA's Ames Research Center, were eager to apply these insights to the Earth. In a volcanic explosion, dust aerosols are lofted into the high atmosphere. We calculated by how much the Earth's global temperature should decline after a major volcanic explosion and found that our results (generally a fraction of a degree) were in good accor4 with actual measurements. Joining forces with Richard Turco, who has studied the effects of nuclear weapons for many years, we then began to turn our attention to the climatic effects of nuclear war. [The scientific paper, "Global Atmospheric Consequences of Nuclear War," was written by R. P. Turco, 0. B. Toon, T. P. Ackerman, J. B. Pollack and Carl Sagan. From the last names of the authors, this work is generally referred to as "TTAPS."] We knew that nuclear explosions, particularly ground-bursts, would lift an enormous quantity of fine soil particles into the atmosphere (more than 100,000 tons of fine dust for every megaton exploded in a surface burst). Our work was further spurred by Paul Crutzen of the Max Planck Institute for Chemistry in Mainz, West Germany, and by John Birks of the University of Colorado, who pointed out that huge quantities of smoke would be generated in the burning of cities and forests following a nuclear war. Groundburst - at hardened missile silos, for example - generate fine dust. Airbursts - over cities and unhardened military installations - make fires and therefore smoke.

The amount of dust and soot generated depends on the conduct of the war, the yields of the weapons employed and the ratio of ground-bursts to airbursts. So we ran computer models for several dozen different nuclear war scenarios. Our baseline case, as in many other studies, was a 5000-megaton war with only a modest fraction of the yield (20 percent) expended on urban or industrial targets. Our job, for each case, was to follow the dust and smoke generated, see how much sunlight was absorbed and by how much the temperatures changed, figure out how the particles spread in longitude and latitude, and calculate how long before it all fell out in the air back onto the surface. Since the radioactivity would be attached to these same fine particles, our calculations also revealed the extent and timing of the subsequent radioactive fallout. Some of what I am about to describe is horrifying. I know, because it horrifies me. There is a tendency - psychiatrists call it "denial" - to put it out of our minds, not to think about it. But if we are to deal intelligently, wisely, with the nuclear arms race, then we must steel ourselves to contemplate the horrors of nuclear war. The results of our calculations astonished us. In the baseline case, the amount of sunlight at the ground was reduced to a few percent of normal-much darker, in daylight, than in a heavy overcast and too dark for plants to make a living from photosynthesis. At least in the Northern Hemisphere, where the great preponderance of strategic targets lies, an unbroken and deadly gloom would persist for weeks. Even more unexpected were the temperatures calculated. In the baseline case, land temperatures, except for narrow strips of coastline, dropped to minus 250 Celsius (minus 13 degrees Fahrenheit) and stayed below freezing for months - even for a summer war. (Because the atmospheric structure becomes much more stable as the upper atmosphere is heated and the low air is cooled, we may have severely underestimated how long the cold and the dark would last.) The oceans, a significant heat reservoir, would not freeze, however, and a major ice age would probably not be triggered. But because the temperatures would drop so catastrophically, virtually all crops and farm animals, at least in the Northern Hemisphere, would be destroyed, as would most varieties of uncultivated or domesticated food supplies. Most of the human survivors would starve. In addition, the amount of radioactive fallout is much more than expected. Many previous calculations simply ignored the intermediate time-scale fallout. That is, calculations were made for the prompt fallout - the plumes of radioactive debris blown downwind from each target-and for the long-term fallout, the fine radioactive particles lofted into the stratosphere that would descend about a year later, after most of the radioactivity had decayed. However, the radioactivity carried into the upper atmosphere (but not as high as the stratosphere) seems to have been largely forgotten. We found for the baseline case that roughly 30 percent of the land at northern mid-latitudes could receive a radioactive dose greater than 250 rads, and that about 50 percent of northern mid-latitudes could receive a dose greater than 100 rads. A 100-rad dose is the equivalent of about 1000 medical X-rays. A 400-rad dose will, more likely than not, kill you. The cold, the dark and the intense radioactivity, together lasting for months, represent a severe assault on our civilization and our species. Civil and sanitary services would be wiped out. Medical facilities, drugs, the most rudimentary means for relieving the vast human suffering, would be unavailable. Any but the most elaborate shelters would be useless, quite apart from the question of what good it might be to emerge a few months later. Synthetics burned in the destruction of the cities would produce a wide variety of toxic gases, including carbon monoxide, cyanides, dioxins and furans. After the dust and soot settled out, the solar ultraviolet flux would be much larger than its present value. Immunity to disease would decline. Epidemics and pandemics would be rampant, especially after the billion or so unburied bodies began to thaw. Moreover, the combined influence of these severe and simultaneous stresses on life are likely to produce even more adverse consequences - biologists call them synergisms - that we are not yet wise enough to foresee. So far, we have talked only of the Northern Hemisphere. But it now seems - unlike the case of a single nuclear weapons test - that. The in a real nuclear war, the heating of the vast quantities of atmospheric dust and soot in northern mid-latitudes will transport these fine particles toward and across the Equator. We see just this happening in Martian dust stormsSouthern Hemisphere would experience effects that, while less severe than in the Northern Hemisphere, are nevertheless extremely ominous. The illusion with which some people in the Northern Hemisphere reassure themselves - catching an Air New Zealand flight in a time of serious international crisis, or the like - is now much less tenable, even on the narrow issue of personal survival for those with the price of a ticket. But what if nuclear wars can be contained, and much less than 5000 megatons is detonated? Perhaps the greatest surprise in our work was that even small nuclear wars can have devastating climatic effects. We considered a war in which a mere 100 megatons were exploded, less than one percent of the world arsenals, and only in low-yield airbursts over cities. This scenario, we found, would ignite thousands of fires, and the smoke from these fires alone would be enough to generate an epoch of cold and dark almost as severe as in the 5000 megaton case. The threshold for what Richard Turco has called The Nuclear Winter is very low. Could we have overlooked some important effect? The carrying of dust and soot from the Northern to the Southern Hemisphere (as well as more local atmospheric circulation) will certainly thin the clouds out over the Northern Hemisphere. But, in many cases, this thinning would be insufficient to render the climatic consequences tolerable - and every time it got better in the Northern Hemisphere, it would get worse in the Southern. Our results have been carefully scrutinized by more than 100 scientists in the United States, Europe and the Soviet Union. There are still arguments on points of detail. But the overall conclusion seems to be agreed upon: There are severe and previously unanticipated global consequences of nuclear war-subfreezing temperatures in a twilit radioactive gloom lasting for months or longer. Scientists initially underestimated the effects of fallout, were amazed that nuclear explosions in space disabled distant satellites, had no idea that the fireballs from high-yield thermonuclear explosions could deplete the ozone layer and missed altogether the possible climatic effects of nuclear dust and smoke. What else have we overlooked? Nuclear war is a problem that can be treated only theoretically. It is not amenable to experimentation. Conceivably, we have left something important out of our analysis, and the effects are more modest than we calculate. On the other hand, it is also possible-and, from previous experience, even likely-that there are further adverse effects that no one has yet been wise enough to recognize. With billions of lives at stake, where does conservatism lie-in assuming that the results will be better than we calculate, or worse? Many biologists, considering the nuclear winter that these calculations describe, believe they carry somber implications for life on Earth. Many species of plants and animals would become extinct. Vast numbers of surviving humans would starve to death. The delicate ecological relations that bind together organisms on Earth in a fabric of mutual dependency would be torn, perhaps irreparably. There is little question that our global civilization would be destroyed. The human population would be reduced to prehistoric levels, or less. Life for any survivors would be extremely hard. And there seems to be a real possibility of the extinction of the human species. It is now almost 40 years since the invention of nuclear weapons. We have not yet experienced a global thermonuclear war - although on more than one occasion we have come tremulously close. I do not think our luck can hold forever. Men and machines are fallible, as recent events remind us. Fools and madmen do exist, and sometimes rise to power. Concentrating always on the near future, we have ignored the long-term consequences of our actions. We have placed our civilization and our species in jeopardy. Fortunately, it is not yet too late. We can safeguard the planetary civilization and the human family if we so choose. There is no more important or more urgent issue.

## Genetics

### Nuclear war erodes the human gene pool and causes genetic twilight.

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I. Genetic Risks. We have noted earlier that nuclear war may cause harmful mutations and other genetic defects, thereby causing millions of individual tragedies for centuries after the war. In this section I would like to draw attention to the implications of these defects to the human gene pool as a whole. Two modern developments (which have nothing to do with nuclear war) need to be mentioned in this context. First, owing to medical advances, genetically unfit individuals are more likely to survive and reproduce now than in former ages. Second, the modern environment contains many mutation-causing substances. Both developments may gradually raise the incidence of deleterious genes in the human gene pool and thereby bring about a gradual decline in its quality. Some geneticists go as far as to prophesy a genetic twilight, in which the quality of the human gene pool erodes to the point where everyone is "an invalid, with his own special familial twists."23 Now, if it turns out that nuclear war increases the number of genetic defects, war might reduce the quality of the human gene pool to some unknown extent. Moreover, if the specter of genetic twilight is real (many geneticists believe that it is not), nuclear war might hasten its coming.

## Biodiversity

### Most of the worlds species will go extinct after a nuclear war.

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II. Environmental Consequences. In view of the complexity and interdependence of ecological systems, efforts to forecast the effects of nuclear war on particular ecosystems and on the biosphere as a whole are plagued by uncertainties and controversies. For instance, some by-product of nuclear war-of which we are now totally ignorant-might destroy or seriously damage the biosphere's capacity to support human life. Bearing these doubts and unforeseen consequences in mind, we must turn now to the mixture of facts, inferences, and guesswork which make up this subject. There will be fewer people and less industrial and commercial activity long after the war, hence some serious environmental threats will be ameliorated. By killing billions and destroying industrial infrastructures, nuclear war might, for instance, halt or slow down the suspected trend of global warming. On balance, however, the war's overall environmental impact will almost certainly be on the negative side. Radioactive fallout will contaminate soils and waters. We shall probably learn to adjust to these new conditions, perhaps by shunning certain regions or by carrying radioactivity meters everywhere we go the way our ancestors carried spears. Still, this will lower the quality of human life. Nuclear explosions might create immense quantities of dust and smoke. The dust and smoke might blanket, darken, and cool the entire planet. Although the extent of the damage is unclear,24 it would be far more severe during the growing season-late spring and summer in the northern latitudes. One Cassandran and controversial prediction sounds a bit like the eerie twilight described in H. G. Wells' The Time Machine. This "nuclear winter" projection forecasts freezing summertime temperatures,25 temporary climatic changes (e.g., violent storms, dramatic reductions in rainfall), lower efficiencies of plant photosynthesis, disruption of ecosystems and farms, loss of many species, and the death of millions of people from starvation and cold. However, even these pessimists expect a return to normal climatic conditions within a few years.26a. To appreciate the next environmental effect of nuclear war, we must say a few words about the ozone layer. Ozone is a naturally occurring substance made up of oxygen atoms. Unlike an ordinary oxygen molecule (which is comprised of two atoms and is fairly stable) an ozone molecule is comprised of three atoms and it breaks down more readily. Most atmospheric ozone is found some 12 to 30 miles above the earth's surface (in the stratosphere). Stratospheric concentrations of ozone are minuscule, occupying less than one-fifth of one-millionth the volume of all other gases in the stratosphere. If all this ozone could be gathered somehow at sea level to form a single undiluted shield around the earth, this shield would be as wide as the typical cover of a hardcover book (one-eighth of an inch).28 However, minuscule as its concentrations are, the ozone layer occupies a respectable place in nature's scheme of things. Some chemicals which are produced routinely by modern industrial society may react with stratospheric ozone, break it down, and lower its levels. Such depletion may have two adverse consequences. First, stratospheric ozone selectively absorbs sunlight in certain portions of the ultraviolet and infrared spectrums, so its depletion will cause more of this radiation to reach the earth and change global temperature and rainfall patterns. Second, by absorbing more than 99 percent of the sun's ultraviolet radiation, stratospheric ozone shields life on earth from its harmful effects (some scientists feel that terrestrial life could not evolve before this protective shield took its place). Ozone depletion might allow more ultraviolet radiation to reach the earth's surface, thereby disrupting natural ecosystems, lowering agricultural productivity, suppressing the human immune system, and raising the incidence of skin cancer and cataracts.28 Since 1985, extensive temporary reductions of the ozone layer have been observed in polar regions, but their causes (man-made or natural) and implications remain uncertain.29 From 1981 to 1991, the ozone shield over the Northern Hemisphere has been depleted by 5 percent, thereby allowing a 10 percent increase in ultraviolet radiation on the ground. The connection between nuclear war and the ozone layer is simple: the heat created by nuclear explosions produces huge quantities of nitrogen oxides in the surrounding air.25 In addition, the launch of solid-fuel missiles may release huge quantities of chlorine and nitrogen compounds.30 These, in turn, are precisely among the chemicals that could cause significant depletion of the ozone layer and lead to the two adverse consequences described above. In the first days and weeks after the war, smoke and dust will prevent the increased ultraviolet radiation from reaching the earth's surface. But ozone levels will reach their nadir in 6 to 24 months, long after most of the smoke and dust have settled back to earth.25,26b Ozone levels will probably be restored to above 90 percent of former levels within five years after the war.26b Hence, "nuclear winter" and ozone depletions are not expected to appreciably offset each other. Under the altered conditions created by a nuclear war, as many as 50 percent of the earth's species might become extinct,26c some pest populations might temporarily increase,26d and most natural communities might undergo radical transformations.

## Diseases

### Human health and life expectancy would deteriorate after a nuclear war. Diseases would be widespread.

Nissani 92 (Nissani, Moti. (1992). Lives in the Balance: the Cold War and American Politics, 1945-1991, chapter 2, Department of Interdisciplinary Studies / Department of Biological Sciences, Wayne State University, <http://www.is.wayne.edu/mnissani/PAGEPUB/CH2.html>)phol

V. Human Health. When we look at our health from a historical perspective, one fact clearly stands out from all the rest: Westerners today are healthier than ever before. In 1900, tuberculosis alone accounted for some 11 percent of all American deaths. Now tuberculosis has practically disappeared from the American scene.31 Other infectious, communicable, and debilitating diseases, including gastroenteritis, diphtheria, poliomyelitis, typhoid, smallpox, plague, malaria, pellagra, and scurvy, have been reduced or eliminated. Statistics fail to convey the impact of these advances on our world outlook, society, history, or quality of life. But statistics do give us some idea of how much better our health is here and now than it was at any time in the past or than it is in many less developed countries now. In the United States, a baby born in 1987 was expected to live on average 75 years, some 28 years longer than an American baby born in 190032 or an African baby born in 1975.17b On average, Westerners today are freer from a host of debilitating diseases and their chances of realizing their biological potential are higher. These remarkable differences between us and our ancestors, and between us and many of our less fortunate contemporaries in poor nations, are not for the most part attributable to better cures. They spring from advances in our understanding of the causes of diseases and, consequently, in our ability to combat them effectively by preventing their occurrence. Prevention strategies include such things as sanitation, widespread immunization, nutritional supplements, chlorination of drinking water, and drying or spraying swamps as part of the fight against malaria. In contrast, in past centuries people were more susceptible to disease because of poor nutrition, poor education, and inadequate shelter. No complex infrastructure for controlling epidemics existed. Owing to poor sanitation, typhoid, cholera, plague, and many other epidemics spread unabated. In the absence of antibiotics, deaths from diseases like pneumonia and syphilis were commonplace. It follows that modern advances in health are ascribable to new knowledge and to the development of a complex infrastructure of prevention and health-care delivery. After a nuclear war the knowledge may remain. But much of the infrastructure will be destroyed, precisely at the point when it is most sorely needed by the irradiated, starved, and emotionally and physically stressed survivors. At least for a few years, survivors of warring nations might revert to the good old days of their forebears, or to the good contemporary days of their less fortunate brothers and sisters in the Third World. Epidemics of all sorts might break out. Many people who depend for survival on medical help (like diabetics and regular users of dialysis machines) will be dead in a short time. We do not know whether it would take years, decades, or centuries to rebuild the health system, nor even whether anything like it will ever be put together again. We do, however, know that for the first few years after the war the health of most survivors will be adversely affected.

## **Value to Life**

### **Nuclear war would lead to massive social upheaval and a collapse of value to life.**

Nissani 92 (Nissani, Moti. (1992). Lives in the Balance: the Cold War and American Politics, 1945-1991, chapter 2, Department of Interdisciplinary Studies / Department of Biological Sciences, Wayne State University, <http://www.is.wayne.edu/mnissani/PAGEPUB/CH2.html>)phol

VII. Social Consequences. Like other cataclysmic events, nuclear war might bring about radical social alterations. It is impossible to foretell what directions these changes will take. Behavioral norms might change and human life might be held in greater or lesser esteem. Pride in our humanity, in our rationality, in our superiority over the beasts, might decline. Scientists and politicians might be lynched. Books might be burned. Laws decreeing all free inquiries punishable by death might be enacted. Machines might be outlawed or confined to museums. On the other hand, war might come to an end and enlightened humanitarianism might surge at last. Organized social systems might be broken down and replaced by anarchies, tribal groups, or small decentralized communities. Some of these communities might be open, like ancient Athens, and some closed, like Sparta. Perhaps the most ironic possibility is the emergence of totalitarianism from the ashes of the once-free world. This might happen, for instance, if the military or police are given broad powers to handle the crisis, and if they retain and expand those powers. At any rate, freedom in this new world might have few defenders. Would anyone think democracy worth defending if it contributed to such carnage? Alternatively, authoritarian political systems might become freer.

## Volcanoes/Earthquakes

### Nuclear war could cause earthquakes and volcanoes.

Babst and Krieger 97’ (Consequences of Using Nuclear Weapons, Dean Babst is a retired government scientist and Coordinator of the Nuclear Age Peace Foundation's Accidental Nuclear War Studies program. David Krieger is President of the Nuclear Age Peace Foundation, 1997, <http://www.wagingpeace.org/articles/1997/00/00_babst_consequences.php)phol>

Earthquake and Volcanic Activity - The continuous pounding of the earth's crust with a thousand nuclear explosions might greatly increase earthquake and volcanic activities. In the early 1980s, the world had its greatest volcanic activity in 70 years, with the eruption of volcanoes in the U.S., Mexico, and Indonesia. At this time, many nuclear tests were being carried out by the U.S. and U.S.S.R. The explosion of Mount St. Helens in 1980 was the first volcanic eruption in the continental U.S. in 60 years.(13) In 1978 an earthquake killed 25,000 persons in Tabas, Iran. Thirty-six hours before the earthquake, Russia had tested a large nuclear bomb at Semipalatinsk, about 1,500 miles away. The Iranian quake was shallow like the Russian test. The Tabas quake differed from most natural earthquakes in that there were no apparent after-shocks.(14) In summary, it can be seen that if a nuclear explosive force of 100 megatons was used it could destroy civilization. It could turn our world into a dark, cold, radioactively polluted planet with few survivors

## Dehumanization

### The threat of nuclear war leads to dehumanization.

Abraham 83’ (THE YALE JOURNAL OF BIOLOGY AND MEDICINE 56 (1983), 67-78, Inching Toward Armageddon: A Psychiatric View, HENRY DAVID ABRAHAM, M.D, Departments of Psychiatry, Harvard Medical, Massachusetts General Hospital, and St. Elizabeth's Hospital, March 30, 1983, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2589715/pdf/yjbm00104-0008.pdf>)phol

But dehumanization may also be maladaptive, as in the behavior of concentration camp officials or the bureaucratic mores of nuclear war planners. A striking example of dehumanization in wartime is to be found in the personal journal of President Truman, who wrote shortly before the bombing of Hiroshima and described the enemy as "savages, ruthless, merciless and fanatic . . ." [19]. Dehumanization of the enemy freed the president from the moral qualms of the indiscriminate killing of 100,000 persons at a single blow. Historians may debate whether such an act was justifiable, but the process of dehumanization goes on and appears to serve a prominent role in the psychological basis of contemporary animosities. Maladaptive dehumanization and the putatively physiological paranoia it springs from appear to be global in scope. Paranoid thinking as part of international policy has even come to be reflected in the technology used to promote that policy. The North American Air Defense (NORAD) system of enemy missile detection, for example, is intentionally designed to react to a large number of false positive events signifying a nuclear attack against the U.S. In the 18 months of 1980 and 1981 this system reported 147 false alarms which required rapid, high-level adjudication to decide if the U.S. should begin a nuclear counterattack. The ostensible reason for designing a detection system to overreact to stimuli is to prevent a failure in detecting an attack when one is actually under way. But, for any given sample of data, decreasing the magnitude of an error of detection failure increases the magnitude of error in false positive responses [20]. This system of data processing is strikingly analogous to the thought processes of the paranoid psychotic, whose burden it is to scan the environment incessantly for hostile cues. The result of this behavior is not infrequently the unwarranted assault on an innocent person. The analogy has limited usefulness, however, since neither of the superpowers is likely to regard each other as innocent, poised as both are to destroy each other on a moment's notice.

## Prior Question

### **We can’t experiment with the consequences of nuclear war. If there is a chance it might cause extinction we need to prevent it.**

Weart 09’ (Wintery Doom, june 2009, in “the discovery of global warming”, Spencer weart, Director of the Center for History of Physics of the American Institute of Physics, http://www.aip.org/history/climate/Winter.htm)phol

In 1939 the physicists Leo Szilard and Enrico Fermi had joined forces to see if they could create a chain reaction that would release the nuclear power in uranium. "Fermi thought the conservative thing was to play down the possibility," Szilard later recalled, "...and I thought the conservative thing was to assume that it would happen and take the necessary precautions." As the historian Lawrence Badash remarks, "Fermi was thinking of a scientific phenomenon, while Szilard had progressed to the political consequences." The same divergence on what it means to be "conservative" permeated the debate about controlling greenhouse gases. As with nuclear winter, so with global warming, scientists could only estimate the size of the problem by using computer models, standing on a pile of uncertain assumptions. As with nuclear winter, so with global warming, many people thought it would be foolish to introduce radically new policies just because a bunch of scientists had come up with a hypothesis as unlikely-sounding as anything in science fiction. Only a few scientists were prepared to reply that the scientific uncertainty itself was an argument for action. As Sagan said in reference to nuclear war, injuring the atmosphere was "an experiment that can be performed once, at most

#### Nuclear war is a prior issue to warming.

Robock and harrel 09’ (interview for Time magazine, Regional Nuclear War and the Environment, Eben Harrell Thursday, Jan. 22, 2009, <http://www.time.com/time/health/article/0,8599,1873164,00.html#ixzz1TLCNzE4F>, Alan Robock, a Professor in the Department of Environmental Sciences at Rutgers University who participated in the original nuclear winter research)phol

Your study predicts mass cooling. With all the heat and radioactivity of the explosions, why wouldn't nuclear war warm the planet?

It has nothing to do with the radioactivity of the explosions — although that would be devastating to nearby populations. The explosions would set off massive fires, which would produce plumes of black smoke. The sun would heat the smoke and lift it into the stratosphere — that's the layer above the troposphere, where we live — where there is no rain to clear it out. It would be blown across the globe and block the sun. The effect would not be a nuclear winter, but it would be colder than the little ice age [in the 17th and 18th centuries] and the change would happen very rapidly — over the course of a few weeks.

Would you be able to see the smoke?

The sky would not be blue. It would be grey.

And what would the results be for humanity?

We calculated that there would be a shortening of the growing season in the mid-latitudes — that includes Europe and America in the Northern Hemisphere — by a couple of weeks. The growing season is defined as the period between the last frost in spring and first frost in the fall. Some crops that need the whole growing season would not reach fruition and there would be no yield. Others would grow more slowly and produce a small yield. In addition there would be less precipitation and it would be darker, also damaging yield. You compound that with [the shutdown of] the current global network of food trading — countries would likely stop shipping food and focus on feeding their own populations — and it's a big crisis. We don't have the resources to do detailed analyses on the impacts of crops in different farming regimes but this suggests it could be a very serious problem.

How confident are you that your modeling is correct?

We used ModelE, designed by NASA's Goddard Institute for Space Studies, and one of the models used to produce the results of the Intergovernmental Panel on Climate Change (IPCC). The model does an excellent job of simulating climate change that resulted from volcanic eruptions in the past. That gave us confidence. What's more, a group repeated the calculations for the Pakistan-India scenario with a different model at the National Center for Atmospheric Research in Boulder, Colo., and the results almost exactly agreed. Their research showed how the smoke from the fires would open up holes in the ozone, which would cause even more problems for humanity. We'd like other people to test the calculations with their models, but we're pretty confident that they'll get the same answer.

So we get a clue of the climatic effects of nuclear war from volcanic eruptions?

Yes. 1816 was known as the "year without summer." It followed the Tambora Volcano eruption in Indonesia in 1815. It was sudden climate change on a similar scale, and it resulted in a severe famine in Europe, food riots and mass emigrations. Volcanic aerosols have a lifetime of about a year in the stratosphere. The lifetime of soot from nuclear fires is about five years. It's obviously much harder for a society to recover from such an extended cooling.

Some scientists, most notably Freeman Dyson of The Institute for Advanced Study in Princeton, have stirred controversy by arguing that nuclear weapons are a more urgent environmental threat than global warming. Do you agree?

Yes. If India and Pakistan engaged in nuclear war, they would use about 0.3% of the global nuclear stockpile. And still the effects on the climate would be dramatic. Our calculations on nuclear winter from the early 1980s have been confirmed by modern climate models. And fundamentally the situation hasn't changed — even with reduced stockpiles there still exists enough weapons to cause nuclear winter. That's something that maybe people don't realize.

I think we have to solve the problem of the existence of all these weapons before we have the luxury of worrying about global warming.

## Turns Econ

### Nuclear war turns the economy

Nissani 92 (Nissani, Moti. (1992). Lives in the Balance: the Cold War and American Politics, 1945-1991, chapter 2, Department of Interdisciplinary Studies / Department of Biological Sciences, Wayne State University, <http://www.is.wayne.edu/mnissani/PAGEPUB/CH2.html>)phol

III. Economic Consequences. To see the complexity of modern industrial economies, ask yourself how self-sufficient you are, in comparison, say, to a native North American of some 500 years ago. Most likely you depend on a highly complex web for sheer physical survival, let alone travel, leisure, education, and similar luxuries. Your food, water, heating fuel, and other necessities often come from outside sources, and their continuous arrival depends on an intricate, finely tuned network. In the event of total war, this network would be blown to smithereens in minutes.The pool of workers and skilled professionals will be reduced by death and illness to a fraction of its pre-war levels. Oil refineries, power plants, factories, food production facilities, and other industrial and commercial facilities will be destroyed. Fallout will render immediate reconstruction impossible, for the survivors in the combatant countries will have to spend the first weeks or months indoors, underground, or in shelters. Without enough fuel to run tractors, fertilizers and pesticides to grow crops, and people to work the fields; without adequate means of shipping raw materials to farms and factories and of shipping food and industrial products to consumers; and without money or some other accepted standard of exchange; national economies may be in shambles. Some areas may be highly contaminated. Many regions may be frozen solid during the first growing season after the war. The survivors may be physically ill or sick at heart. They may not possess the necessary strength and courage, like Job, to start all over again. Why, they may wonder, should they work like slaves to rebuild a modern society that might end again in death? The present complex system of international trade will almost certainly vanish. International aid, including grain and food exports, might cease. Millions of people in countries which depend on food imports or specialized exports will suffer a great deal. It is impossible to predict the long-term consequences of all this. Perhaps a modern economic system similar to our own could be re-created in 20 to 50 years, bringing much of the anguish and chaos to an end. Perhaps recovery would never take place, the world sinking instead to something like the decentralized economies of the Dark Ages.

## Turns IR

### Nuclear war will fundamentally change international relations.

Nissani 92 (Nissani, Moti. (1992). Lives in the Balance: the Cold War and American Politics, 1945-1991, chapter 2, Department of Interdisciplinary Studies / Department of Biological Sciences, Wayne State University, <http://www.is.wayne.edu/mnissani/PAGEPUB/CH2.html>)phol

IV. International Consequences. The combatant countries might never recover their international standings. They could terrorize the world for a while with whatever remained of their nuclear arsenals, but with social and economic collapse these arsenals might fall into disrepair. In the long run, moreover, a nation's international position depends on factors such as human resources, economic performance, moral fiber, and education, all of which could be irreversibly weakened after an all-out war. So one hundred years after the war, people in what was Russia may speak Chinese or Urdu. If descendants of the people who used to live there a century earlier are around, their social status may resemble that of Japanese bomb survivors. The same forecast might apply to North Americans, Japanese, or Germans, and their neighbors. It is also possible that nation-states everywhere will collapse or, alternatively, that they will survive and that eventually major partners to the nuclear exchange will regain their international standing.

## **A2: No extinction (U.S. Russia War)**

### **A nuclear war between the U.S. and Russia alone would leave the earth uninhabitable.**

Starr 10’(<http://www.thebulletin.org/web-edition/op-eds/the-climatic-consequences-of-nuclear-war>, The climatic consequences of nuclear war, STEVEN STARR, director of the University of Missouri's Clinical Laboratory Science Program, bulletin of atomic scientists, march 12, 2010)phol

This isn't a question to be avoided. Recent scientific studies PDF have found that a war fought with the deployed U.S. and Russian nuclear arsenals would leave Earth virtually uninhabitable. In fact, NASA computer models have shown that even a "successful" first strike by Washington or Moscow would inflict catastrophic environmental damage that would make agriculture impossible and cause mass starvation. Similarly, in the January Scientific American, Alan Robock and Brian Toon, the foremost experts on the climatic impact of nuclear war, warn that the environmental consequences of a "regional" nuclear war would cause a global famine that could kill one billion people. Their article, "Local Nuclear War: Global Suffering," PDF predicts that the detonation of 100 15-kiloton nuclear weapons in Indian and Pakistani megacities would create urban firestorms that would loft 5 million tons of thick, black smoke above cloud level. (This smoke would engulf the entire planet within 10 days.) Because the smoke couldn't be rained out, it would remain in the stratosphere for at least a decade and have profoundly disruptive effects. Specifically, the smoke layer would block sunlight, heat the upper atmosphere, and cause massive destruction of protective stratospheric ozone. A 2008 study PDF calculated ozone losses (after the described conflict) of 25-45 percent above mid-latitudes and 50-70 percent above northern high latitudes persisting for five years, with substantial losses continuing for another five years. Such severe ozone depletion would allow intense levels of harmful ultraviolet light to reach Earth's surface--even with the stratospheric smoke layer in place. Beneath the smoke, the loss of warming sunlight would produce average surface temperatures colder than any experienced in the last 1,000 years. There would be a corresponding shortening of growing seasons by up to 30 days and significant reductions in average rainfall in many areas, with a 40-percent decrease of precipitation in the Asian monsoon region. Basically, the Earth's surface would become cold, dark, and dry. Humans have had some experience with this sort of deadly global climate change. In 1815, the largest volcanic eruption in recorded history took place in Indonesia. Mount Tambora exploded and created a stratospheric layer of sulfuric acid droplets that blocked sunlight from reaching Earth. During the following year, which was known as "The Year without Summer," the northeastern United States experienced snowstorms in June and debilitating frosts every month of the year. In an earlier study PDF, Robock, Toon, and their colleagues predicted that the decreases in average surface temperatures following the nuclear conflict described above would be 2-3 times colder than those experienced in 1816 and that the black soot produced by subsequent nuclear firestorms would remain in the stratosphere five times longer than the acid clouds from volcanic eruptions. In other words, 10 years after a regional nuclear war, Earth's average surface temperatures would still be as cold, or colder, than they were in 1816. Most likely, the long-lived smoke layer would produce a "decade without a summer." Here it's important to point out that the 100 Hiroshima-size weapons detonated in Robock and Toon's regional war scenario contain less than 1 percent of the combined explosive power in the 7,000 or so operational and deployed nuclear weapons the United States and Russia possess. If even one-half of these weapons were detonated in urban areas, Robock and Toon have predicted that the resulting nuclear darkness would cause daily minimum temperatures to fall below freezing in the largest agricultural areas of the Northern Hemisphere for a period of between one to three years. Meanwhile, average global surface temperatures would become colder than those experienced 18,000 years ago at the height of the last Ice Age.

## **A2: No Extinction (Middle East/Indo Pak War)**

### An indo pak war or middle east war would devastate the world with only .03 % of the global stockpile used.

Robock 09’ (Nuclear winter, January 6, 2009, Alan Robock, a Professor in the Department of Environmental Sciences at Rutgers University who participated in the original nuclear winter research, http://www.eoearth.org/article/Nuclear\_winter)

Based on new work published in 2007 and 2008 by some of the pioneers of nuclear winter research who worked on the original studies, we now can say several things about this topic. New Science:A minor nuclear war (such as between India and Pakistan or in the Middle East), with each country using 50 Hiroshima-sized atom bombs as airbursts on urban areas, could produce climate change unprecedented in recorded human history. This is only 0.03% of the explosive power of the current global arsenal. This same scenario would produce global ozone depletion, because the heating of the stratosphere would enhance the chemical reactions that destroy ozone. A nuclear war between the United States and Russia today could produce nuclear winter, with temperatures plunging below freezing in the summer in major agricultural regions, threatening the food supply for most of the planet. The climatic effects of the smoke from burning cities and industrial areas would last for several years, much longer than we previously thought. New climate model simulations, that have the capability of including the entire atmosphere and oceans, show that the smoke would be lofted by solar heating to the upper stratosphere, where it would remain for years. New Policy Implications: The only way to eliminate the possibility of this climatic catastrophe is to eliminate the nuclear weapons. If they exist, they can be used. The spread of nuclear weapons to new emerging states threatens not only the people of those countries, but the entire planet. Rapid reduction of the American and Russian nuclear arsenals will set an example for the rest of the world that nuclear weapons cannot be used and are not needed.

## A2: Deterrence Prevents

### Even a small nuclear conflict could cause extinction and turn warming. Plus nuclear deterrence fails.

Starr no date (Deadly Climate Change From Nuclear War: A threat to human existence, Steven Starr, Senior Scientist with Physicians for Social Responsibility, and Director of the Clinical Laboratory Science Program at the University of Missouri, <http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/effects/PDFs/starr_climate_change.pdf>, posted to nucleardarkness.org)phol

The scientific studies summarized in this paper make it clear that the environmental consequences of a “regional” nuclear conflict could kill hundreds of millions of people far from the war zone. Deadly climate change caused by a war fought with the strategic nuclear arsenals of the U.S. and Russia would threaten the continued survival of the human species.Yet neither the U.S., nor Russia, nor any other nuclear weapons state has ever officially evaluated what effects a war fought with their nuclear arsenals would have upon the Earth’s climate and ecosystems.Surely it is time for such evaluations to be openly conducted and made subject to public discussion. Nations with nuclear weapons should be required to create Environmental. Impact Statements on the likely results of the detonation of their arsenals in conflict. Deadly climate change from nuclear war must become a primary topic in the debate about the need for “a world without nuclear weapons”. This discussion must include the dangers posed by the nuclear arsenals of all nations, including those in the U.S. and Russia. A failure to recognize and describe the omnicidal potential of strategic nuclear arsenals will prevent the abolition discussion from developing the sense of urgency needed to bring about fundamental change in the nuclear status quo. The nuclear weapons which are kept ready for virtually instant use constitute a well-maintained self-destruct mechanism for the human race. What political or national goals can possibly justify the existence of such a threat? There can be no “victory” in universal suicide. Therefore, the U.S. and Russia must recognize the senselessness of continued preparations for a nuclear war, or a “successful” nuclear first-strike, which would make the whole world – including their own country – uninhabitable. It is imperative that they renounce the first use of nuclear weapons, stand-down their high-alert nuclear forces (which make accidental nuclear war possible through launch-on-warning postures),and dismantle the tens of thousands of nuclear weapons in their active and reserve arsenals. Nuclear weapons cannot ultimately provide “national security” when a single failure of nuclear deterrence can end human history. Unless deterrence works perfectly forever, nuclear arsenals will eventually be used in conflict. We must abolish these arsenals – before they abolish us.

## A2: MAD

### MAD is a one sided game. It’s a figment of the United State’s imagination.

Zutell 88’ (NUCLEAR WINTER AND OTHER MYTHS OF SELF-DETERRENCE, Eugene G. Zutell, 06/19/88, Arizona Dept. of Emergency and Military Affairs, Division of Emergency Services, http://www.fortfreedom.org/s05.htm)phol

MAD as it is popularly called is actually based on mutual vulnerability. The theory is that if each side is vulnerable to it's opponents weapons, each side will be deterred from initiating a nuclear exchange because it, in turn, would suffer totally unacceptable damage. I hate to be a spoil; sport, but it just isn't working out that way. For Mutual Assured Destruction to work, both sides must play the game. The myth here is that the Soviets believe in and adhere to the MAD theory. Actually, they picked up their marbles and went home a long time ago. In fact, they never even started playing the game. They believe that with proper preparation, they can reduce the effects of a nuclear conflict to a level that is acceptable to them. The Soviet civil defense system is more than 50 years old and even now it is an on-going and expanding effort through which they are demonstrating that they at least believe a nuclear war to be survivable. MAD is a figment of U.S. imagination. The Soviets are notoriously unimaginative. They just look at the facts and proceed accordingly. None of these comments are in any way intended to denigrate the cataclysmic consequences of a nuclear conflict -- the worst conceivable disaster facing mankind -- they are meant instead to help avoid compounding the effects of that disaster by providing evidence against theories or myths which, through great publicity, have gained the status of half-truths and which tend to discourage people from taking even the simplest precautions to survive.

# AT: Nuclear War = Extinction

## A2: Firestorms

### Firestorms would be rare during a nuclear war.

Kearny 82’ (Cresson H. Kearny, Oak Ridge civil defense project and Army's Decoration for Distinguished Civilian Service in 1972, Nuclear War Survival Skills, 1982, Oak Ridge National Laboratory, a Facility of the U.S. Department of Energy, Published by the Oregon Institute of Science and Medicine, <http://www.oism.org/nwss/s73p912.htm>)phol

° Myth: A heavy nuclear attack would set practically everything on fire, causing "firestorms" in cities that would exhaust the oxygen in the air. All shelter occupants would be killed by the intense heat.

° Facts: On aclear day, thermal pulses (heat radiation that travels at the speed of light) from an air burst can set fire to easily ignitable materials (such as window curtains, upholstery, dry newspaper, and dry grass) over about as large an area as is damaged by the blast. It can cause second-degree skin burns to exposed people who are as far as ten miles from a one-megaton (1 MT) explosion. (See Fig. 1.4.) (A 1-MT nuclear explosion is one that produces the same amount of energy as does one million tons of TNT.) If the weather is very clear and dry, the area of fire danger could be considerably larger. On a cloudy or smoggy day, however, particles in the air would absorb and scatter much of the heat radiation, and the area endangered by heat radiation from the fireball would be less than the area of severe blast damage."Firestorms" could occur only when the concentration of combustible structures is very high, as in the very dense centers of a few old American cities. At rural and suburban building densities, most people in earth- covered fallout shelters would not have their lives endangered by fires.

## A2: Food Shortage

### Food sources would not be affected by fallout.

Kearny 82’ (Cresson H. Kearny, Oak Ridge civil defense project and Army's Decoration for Distinguished Civilian Service in 1972, Nuclear War Survival Skills, 1982, Oak Ridge National Laboratory, a Facility of the U.S. Department of Energy, Published by the Oregon Institute of Science and Medicine, <http://www.oism.org/nwss/s73p912.htm>)phol

° Myth: So much food and water will be poisoned by fallout that people will starve and die even in fallout areas where there is enough food and water.

° Facts: If the fall out particles do not become mixed with the parts of food that are eaten, no harm is done. Food and water in dust-tight containers are not contaminated by fallout radiation. Peeling fruits and vegetables removes essentially all fallout, as does removing the uppermost several inches of stored grain onto which fallout particles have fallen. Water from many sources -- such as deep wells and covered reservoirs, tanks, and containers -- would not be contaminated. Even water containing dissolved radioactive elements and compounds can be made safe for drinking by simply filtering it through earth, as described later in this book.

## A2: Genetics

### There would be little genetic damage to humanity.

Kearny 82’ (Cresson H. Kearny, Oak Ridge civil defense project and Army's Decoration for Distinguished Civilian Service in 1972, Nuclear War Survival Skills, 1982, Oak Ridge National Laboratory, a Facility of the U.S. Department of Energy, Published by the Oregon Institute of Science and Medicine, <http://www.oism.org/nwss/s73p912.htm>)phol

° Myth: Most of the unborn children and grandchildren of people who have been exposed to radiation from nuclear explosions will be genetically damaged will be malformed, delayed victims of nuclear war.

° Facts: The authoritative study by the National Academy of Sciences, A Thirty Year Study of the Survivors qf Hiroshima and Nagasaki, was published in 1977. It concludes that the incidence of abnormalities is no higher among children later conceived by parents who were exposed to radiation during the attacks on Hiroshima and Nagasaki than is the incidence of abnormalities among Japanese children born to un-exposed parents.This is not to say that there would be no genetic damage, nor that some fetuses subjected to large radiation doses would not be damaged. But the overwhelming evidence does show that the exaggerated fears of radiation damage to future generations are not supported by scientific findings.

## A2: Overkill

### Overkill is a myth and relies on flawed logic.

Kearny 82’ (Cresson H. Kearny, Oak Ridge civil defense project and Army's Decoration for Distinguished Civilian Service in 1972, Nuclear War Survival Skills, 1982, Oak Ridge National Laboratory, a Facility of the U.S. Department of Energy, Published by the Oregon Institute of Science and Medicine, <http://www.oism.org/nwss/s73p912.htm>)phol

° Myth: Overkill would result if all the U.S. and U.S.S.R, nuclear weapons were used meaning not only that the two superpowers have more than enough weapons to kill all of each other's people, but also that they have enough weapons to exterminate the human race.

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° Facts: Statements that the U.S. and the Soviet Union have the power to kill the world's population several times over are based on misleading calculations. One such calculation is to multiply the deaths produced per kiloton exploded over Hiroshima or Nagasaki by an estimate of the number of kilotons in either side's arsenal. (A kiloton explosion is one that produces the same amount of energy as does 1000 tons of TNT.) The unstated assumption is that somehow the world's population could be gathered into circular crowds, each a few miles in diameter with a population density equal to downtown Hiroshima or Nagasaki, and then a small (Hiroshima-sized) weapon would be exploded over the center of each crowd. Other misleading calculations are based on exaggerations of the dangers from long-lasting radiation and other harmful effects of a nuclear war.

### The concept of overkill 24 is based on faulty logic.

Martin 80’ (Mobilising against nuclear war: the insufficiency of knowledge and logic,

Published in Social Alternatives, Vol. 1, Nos. 6-7, June 1980, pp. 6-11. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/80sa.html)phol

Many people believe a major nuclear war would exterminate human life on earth, perhaps in the style of On the beach. Opponents of nuclear war sometimes say that there are enough nuclear weapons in the world to kill everyone 24 times over (or whatever is the current figure). The reference to 'overkill 24' is based on a faulty extrapolation from the number killed at Hiroshima per unit of nuclear explosive power. Available studies[17] suggest that a major nuclear war might kill 'only' several hundred million people, mostly in the United States, the Soviet Union and Europe, around a tenth of the world's population. The numbers killed depend on the nuclear targeting strategies adopted and of course on the firepower used. They could be smaller in a limited nuclear war or larger if war were followed by epidemic infectious disease or social breakdown. Nuclear war in the northern hemisphere would directly affect the health of Australians mainly through a long term increase in cancers and genetic due to increased radioactive fallout. Indirect effects could include a collapse in imports and an influx of refugees from Europe and North America. However, nuclear strikes at Australia itself might well be expected due to the presence of U.S. bases. Even if it does not wipe out the human species, nuclear war is so horrific that it would seem that there is no need to exaggerate its consequences. And presumably opponents of nuclear war can be more effective if they are accurate and realistic in their assessments of the likely course of a possible nuclear war.

## A2: Ozone

### The ozone won’t be affected by nuclear war and even if it is UV radiation won’t do much.

Kearny 82’ (Cresson H. Kearny, Oak Ridge civil defense project and Army's Decoration for Distinguished Civilian Service in 1972, Nuclear War Survival Skills, 1982, Oak Ridge National Laboratory, a Facility of the U.S. Department of Energy, Published by the Oregon Institute of Science and Medicine, <http://www.oism.org/nwss/s73p912.htm>)phol

° Myth: Blindness and a disastrous increase of cancers would be the fate of survivors of a nuclear war, because the nuclear explosions would destroy so much of the protective ozone in the stratosphere that far too much ultraviolet light would reach the earth's surface. Even birds and insects would be blinded. People could not work outdoors in daytime for years without dark glasses, and would have to wear protective clothing to prevent incapacitating sunburn. Plants would be badly injured and food production greatly reduced.

° Facts: Large nuclear explosions do inject huge amounts of nitrogen oxides (gasses that destroy ozone) into the stratosphere. However, the percent of the stratospheric ozone destroyed by a given amount of nitrogen oxides has been greatly overestimated in almost all theoretical calculations and models. For example, the Soviet and U.S. atmospheric nuclear test explosions of large weapons in 1952-1962 were calculated by Foley and Ruderman to result in a reduction of more than 10 percent in total ozone. (See M. H. Foley and M. A. Ruderman, 'Stratospheric NO from Past Nuclear Explosions", Journal of Geophysics, Res. 78, 4441-4450.) Yet observations that they cited showed no reductions in ozone. Nor did ultraviolet increase. Other theoreticians calculated sizable reductions in total ozone, but interpreted the observational data to indicate either no reduction, or much smaller reductions than their calculated ones.

A realistic simplified estimate of the increased ultraviolet light dangers to American survivors of a large nuclear war equates these hazards to moving from San Francisco to sea level at the equator, where the sea level incidence of skin cancers (seldom fatal) is highest- about 10 times higher than the incidence at San Francisco. Many additional thousands of American survivors might get skin cancer, but little or no increase in skin cancers might result if in the post-attack world deliberate sun tanning and going around hatless went out of fashion. Furthermore, almost all of today's warheads are smaller than those exploded in the large- weapons tests mentioned above; most would inject much smaller amounts of ozone-destroying gasses, or no gasses, into the stratosphere, where ozone deficiencies may persist for years. And nuclear weapons smaller than 500 kilotons result in increases (due to smog reactions) in upper tropospheric ozone. In a nuclear war, these increases would partially compensate for the upper-level tropospheric decreases-as explained by Julius S. Chang and Donald J. Wuebbles of Lawrence Livermore National Laboratory.

## A2: Nuclear Winter

### Nuclear winter is a myth, firestorms don’t inject smoke into the atmosphere, Tokyo and Dresden prove.

Kearny 82’ (Cresson H. Kearny, Oak Ridge civil defense project and Army's Decoration for Distinguished Civilian Service in 1972, Nuclear War Survival Skills, 1982, Oak Ridge National Laboratory, a Facility of the U.S. Department of Energy, Published by the Oregon Institute of Science and Medicine, <http://www.oism.org/nwss/s73p912.htm>)phol

° Myth: Unsurvivable "nuclear winter" surely will follow a nuclear war. The world will be frozen if only 100 megatons (less than one percent of all nuclear weapons) are used to ignite cities. World-enveloping smoke from fires and the dust from surface bursts will prevent almost all sunlight and solar heat from reaching the earth's surface. Universal darkness for weeks! Sub-zero temperatures, even in summertime! Frozen crops, even in the jungles of South America! Worldwide famine! Whole species of animals and plants exterminated! The survival of mankind in doubt!

° Facts: Unsurvivable "nuclear winter" is a discredited theory that, since its conception in 1982, has been used to frighten additional millions into believing that trying to survive a nuclear war is a waste of effort and resources, and that only by ridding the world of almost all nuclear weapons do we have a chance of surviving. Non-propagandizing scientists recently havecalculated that the climatic and other environmental effects of even an all-out nuclear war would be much less severe than the catastrophic effects repeatedly publicized by popular astronomer Carl Sagan and his fellow activist scientists, and by all the involved Soviet scientists. Conclusions reached from these recent, realistic calculations are summarized in an article, "Nuclear Winter Reappraised", featured in the 1986 summer issue of Foreign Affairs, the prestigious quarterly of the Council on Foreign Relations. The authors, Starley L. Thompson and Stephen H. Schneider, are atmospheric scientists with the National Center for Atmospheric Research. They showed " that on scientific grounds the global apocalyptic conclusions of the initial nuclear winter hypothesis can now be relegated to a vanishing low level of probability." Their models indicate that in July (when the greatest temperature reductions would result) the average temperature in the United States would be reduced for a few days from about 70 degrees Fahrenheit to approximately 50 degrees. (In contrast, under the same conditions Carl Sagan, his associates, and the Russian scientists predicted a resulting average temperature of about 10 degrees below zero Fahrenheit, lasting for many weeks!) Persons who want to learn more about possible post-attack climatic effects also should read the Fall 1986 issue of Foreign Affairs. This issue contains a long letter from Thompson and Schneider which further demolishes the theory of catastrophic "nuclear winter." Continuing studies indicate there will be even smaller reductions in temperature than those calculated by Thompson and Schneider.Soviet propagandists promptly exploited belief in unsurvivable "nuclear winter" to increase fear of nuclear weapons and war, and to demoralize their enemies. Because raging city firestorms are needed to inject huge amounts of smoke into the stratosphere and thus, according to one discredited theory, prevent almost all solar heat from reaching the ground, the Soviets changed their descriptions of how a modern city will burn if blasted by a nuclear explosion. Firestorms destroyed the centers of Hamburg, Dresden, and Tokyo. The old-fashioned buildings of those cities contained large amounts of flammable materials, were ignited by many thousands of small incendiaries, and burned quickly as standing structures well supplied with air. No firestorm has ever injected smoke into the stratosphere, or caused appreciable cooling below its smoke cloud. The theory that smoke from burning cities and forests and dust from nuclear explosions would cause worldwide freezing temperatures was conceived in 1982 by the German atmospheric chemist and environmentalist Paul Crutzen, and continues to be promoted by a worldwide propaganda campaign. This well funded campaign began in 1983 with televised scientific-political meetings in Cambridge and Washington featuring American and Russian scientists. A barrage of newspaper and magazine articles followed, including a scaremongering article by Carl Sagan in the October 30, 1983 issue of Parade, the Sunday tabloid read by millions. The most influential article was featured in the December 23,1983 issue of Science (the weekly magazine of the American Association for the Advancement of Science): "Nuclear winter, global consequences of multiple nuclear explosions," by five scientists, R. P. Turco, O. B. Toon, T. P. Ackerman, J. B. Pollack, and C. Sagan. Significantly, these activists listed their names to spell TTAPS, pronounced "taps," the bugle call proclaiming "lights out" or the end of a military funeral.

Until 1985, non-propagandizing scientists did not begin to effectively refute the numerous errors, unrealistic assumptions, and computer modeling weakness' of the TTAPS and related "nuclear winter" hypotheses. A principal reason is that government organizations, private corporations, and most scientists generally avoid getting involved in political controversies, or making statements likely to enable antinuclear activists to accuse them of minimizing nuclear war dangers, thus undermining hopes for peace. Stephen Schneider has been called a fascist by some disarmament supporters for having written "Nuclear Winter Reappraised," according to the Rocky Mountain News of July 6, 1986. Three days later, this paper, that until recently featured accounts of unsurvivable "nuclear winter," criticized Carl Sagan and defended Thompson and Schneider in its lead editorial, "In Study of Nuclear Winter, Let Scientists Be Scientists." In a free country, truth will out - although sometimes too late to effectively counter fast-hittingpropaganda. Effective refutation of "nuclear winter" also was delayed by the prestige of politicians and of politically motivated scientists and scientific organizations endorsing the TTAPS forecast of worldwide doom. Furthermore, the weakness' in the TTAPS hypothesis could not be effectively explored until adequate Government funding was made available to cover costs of lengthy, expensive studies, including improved computer modeling of interrelated, poorly understood meteorological phenomena. Serious climatic effects from a Soviet-U.S. nuclear war cannot be completely ruled out. However, possible deaths from uncertain climatic effects are a small danger compared to the incalculable millions in many countries likely to die from starvation caused by disastrous shortages of essentials of modern agriculture sure to result from a Soviet-American nuclear war, and by the cessation of most international food shipments.

## A2: SAG/TTAPS

### Sagan used his nuclear winter report as a political tool and it was based off of flawed models.

Thompson 06’ (August 24, 2006, Bruce Thompson, former member of the Council of the American Educational Research Association, Climate of Fear: From Nuclear Winter to Global Warming, American Thinker, http://www.americanthinker.com/2006/08/climate\_of\_fear\_from\_nuclear\_w.html)phol

Before there was Global Warming Theory to scare the public into rash action, there was Nuclear Winter Theory. The two theories are contradictory, but both were peddled by the political left, and both used some similar rhetorical and political tactics. This year is the 25th anniversary of Carl Sagan's Cosmos series on public television, a landmark in the public's awareness and interest in science issues. Sagan achieved a degree of celebrity few if any scientists today enjoy, particularly among the bon pensantswho tend to treat anything produced by PBS as holy writ. It is a fitting time to look back at the genesis of today's climate debates, for Sagan became one of the first politicizers of fear of catastrophic climate change. By 1983, Sagan and others had formed a group known as TTAPS (Turco, Toon, Ackerman, Pollack & Sagan). They proposed that a consequence of nuclear war would be a major cooling of the Earth's atmosphere, an effect they called 'Nuclear Winter.' This was the first great politicized debate over climate. Sagan even appeared with Walter Mondale on the campaign trail in 1984 to promote the Nuclear Freeze Movement as an alternative to Ronald Reagan's 'Star Wars' missile defense initiatives. Reagan was building up our armed forces and positioning Pershing missiles in Europe. History has proven Reagan's policies superior to Sagan/Mondale. So could it also be that Sagan & TTAPS need re—evaluation from a historical point of view? Let us make an attempt at a few aspects of a very complex issue. Given that the issue of climate is extremely complex, the public and the politicians are inclined to rely on 'expert opinion.' Simply put, they do not have the knowledge base to make a coherent criticism of something this technical. Science relies on getting a new idea published in refereed journals and then letting skeptics blast away at the hypothesis. TTAPS instead relied on a public relations effort, a 'Conference on the Long—Term Worldwide Biological Consequences of Nuclear War' (1983 : Washington, DC). The conference transcript forms a part of Sagan's book, The Cold and the Dark, the World after Nuclear War, published by W. W. Norton & Company, New York, N.Y., a work which will be quoted extensively herein. Despite the complexity of the issue, anyone is entitled to challenge the assumptions and/or fallacies within. This need for open—minded questioning is why we re—tell our children the story of The Emperor's New Clothes. So here are some questions and comments the interested novice might have posed to that august collection of luminaries who first used fear of climate change as a political weapon. TTAPS (and nowadays the global warming crowd) liked to make statements to the effect that 'most credible scientists agree....' Yet the scientific conventional wisdom can be wrong. What do you think the global warming crowd would say to the following Sagan statement? Let me stress that the CO2 greenhouse effect is a long—term trend. There is no undoing it on time scales of decades. (pg. 31) Not exactly a hearty endorsement of the Kyoto Treaty is it? But Carl Sagan was a media star, the most famous scientist of the day. The point is that at that time Sagan was trying to peddle his 'Nuclear Winter' scenario and he could not allow the CO2 from the combustion of cities to mitigate the horror of the world freezing in the dark. He wanted the maximum panic by the public to push through his political agenda. He was more politician than scientist.The principal culprit in the 'Nuclear Winter' scenario was soot in the smoke form burning cities. As we've just seen, TTAPS downplayed the CO2. The other major constituent of smoke is water vapor. Indeed, it is the condensing water which becomes visible to the naked eye, that most people would identify as 'smoke.' Sagan dismisses the effects of water and clouds, ...in our calculations we assumed that rainout of fine particles occurred through the entire troposphere. But under realistic circumstances, at least the upper troposphere may be very dry, and any dust or soot carried there initially may take much longer to rainout' (pg. 21).

Those following the global warming debate will find that the issue of clouds is still a very hot topic of debate. Note that by eliminating the two major products of combustion TTAPS can focus the discussion exclusively on soot. For a hypothesis to advance toward acceptance, it needs to enhance our basic understanding of natural processes. We ought to be able to draw new insight into old observations. So let us look at some unrelated situations and try to draw analogies.

Smudge Pots: the dense sooty smoke from burning cities has another name, smudge. Back in the days before the EPA, citrus growers used smudge pots to keep their groves from freezing during cold nights. This was a proven, successful way to prevent freezes. So how does Sagan's smudge result in 'nuclear winter'? This question exposes a critical failing of the TTAPS scenario. They used a climate model based on a time—averaged solar input. Their model never sees a cycle of day followed by night, just a constant dim sunlight.

If a cloud blocks the rays of the sun, we notice a cooling effect. But at night, clouds prevent the loss of infrared radiation to deep space and we feel warmer. The coldest nights are those where a snow cover under a clear sky reflects the day's sunlight out to space, followed by a clear night allowing unimpeded infrared radiation. The lower solar input combined with enhanced radiation leads to frigid nights.

Planetary Comparisons: the TTAPS modelers used Mars for the basis of much of their theorizing. But Mars'atmosphere is largely composed of CO2 and contains little water. There are only occasional cirrus ice clouds on Mars. So let us create our own simple planetary modelwith clouds. To keep it simple, let's start with a planet about the size of Earth. We'll enshroud it in a cloud layer covering the whole planet. We set the amount of solar energy at the surface at about 1—2% of that which normally reaches the surface of Earth. What does our model reveal? A pronounced cooling , a small +/— effect or pronounced heating?

Made your choice? The answer is pronounced heating, because I've just described the planet, Venus. Its surface temperature is high enough to melt lead! So maybe clouds do matter after all.

A Three Dimensional World: the TTAPS model was a one—dimensional radiation—convective model. The limitations of then current computational capabilities precluded using a three—dimensional model. To quote Sagan,

the detailed TTAPS calculations described here are one—dimensional; that is, they assume the fine particles to move vertically by all the appropriate laws of physics, but neglect the spreading in latitude and longitude.

There are many fine illusionists who delight the public by presenting a two—dimensional view to them, while acting in the third dimension. A one—dimensional model is hopelessly inadequate, but that did not restrain the boasts of Sagan et al.

### Sagan was wrong, Nuclear winter is impossible and even if it did happen it would be more akin to a short nuclear autumn.

Slade 11’ (Stuart Slade, senior aerospace and defense analyst at a US-based defense think tank, Nuclear Winter Is Bunk, <http://warreview.blogspot.com/2011/04/nuclear-winter-is-bunk.html>, no specific date)phol

Bunk is a pretty fair description (of nuclear winter). The "nuclear winter" theory was predicated on a series of hypothetical models that had been constructed by a group of "concerned scientists" lead by Carl Sagan who constructed a computerized model of earth, cranked in a series of hypothetical statistics on the effects of nuclear weapons and then claimed that the results from that model constituted "facts". There were a number of serious problems with this process. One of them was that, when the hypothetical effects of nuclear initiations were cranked into other models of earth, they didn't produce the results Sagan had reported. In fact, the results reported by Sagan's group were only achieved when his particular model of the earth was used. This was a remarkable thing so people looked at Sagan's model to see how it differed from the rest. The answer turned out to be quite simple. The model Sagan had shown to the world press to “prove” the danger of “nuclear winter,” depicted the earth as being a barren ball of rock with no mountains and no oceans. Oceans, as Sagan well knew, act as gigantic energy flywheels that moderate temperature, helping cool adjacent continents in summer and warm them in winter. Sagan, in other words, knowingly committed deliberate scientific fraud. He cooked up a phony computer model to concoct the phony “nuclear winter” results he wanted for political reasons. It subsequently became apparent that he had avoided using the already-available NCAR computer climate model precisely because he knew it would not produce the “nuclear winter” he wanted to sell to gullible journalists and an ignorant public. Once that point had been realized, Sagan's assumptions were examined in greater depth. It turned out that none of the people in his group of "concerned scientists" were nuclear weapons experts. What they'd done was taken some generalist public sources, cherry-picked the ones that suited them and used them without examining how the various nuclear weapons effects interacted. Again, there was a healthy dollop of deliberate scientific fraud here. Where effects didn't give the results required, they were exagerrated or morphed until they did. By the time the critique was over, "nuclear winter" as a concept was totally discredited; today its a touchstone. If somebody starts to spout forth on the dangers of "nuclear winter" they're nutcases. Sagan's credibility never recovered; he never got another hearing from the serious nuclear weapons and policy community. However, one useful thing did come out of all this. In order to examine the probability of Sagan's fairy stories, people cranked real data on nuclear weapons into real atmospheric models. The results were actually quite interesting (there is a novel currently being posted in HPCA called "Anvil of Necessity" which draws on that work). For those who like grim details, the following was the nuclear exchange used as a basis for these studies. The US was presumed to have been hit by 5,800 warheads witha total yield of 3,900 megatons. Nuclear devices initiated in Europe totalled 3,300 with a total yield of 1,200 megatons The USSR was deemed to have been hit by 6,100 devices having a total yield of 1,900 megatons. China got hit by 900 devices witha total yield of 1,300 megatons. By way of comparison in TBO, Germany got hit by 232 devices totalling 8.6 megatons. Other areas receiving at least a dozen warheads include Canada, North and South Korea, Japan, Taiwan, Greenland, Puerto Rico, India, Israel, Australia, Guam, Cuba, Syria, and Egypt. Other countries got single devices, mostly on their capitals. Nobody didn't get hit by something. This massive exchange used about half the global strategic and theater nuclear arsenal; about 10% was launched but did not reach a target and 30% was destroyed on the ground. By the time we finished there were 10,000 nuclear weapons left in the arsenals out of the 67,000 that we started with. Initial casualties were 400 million dead; by the time things had worked out, this increased to 1.2 billion. Welcome to my world. The smoke clouds from the fires etc peak three days after the exchange. Essentially, they would spread to form a doughnut shaped band around the world that would essentially cover North America, Europe and the USSR. This smoke (actually, its particulates rather than smoke) cloud consisted of 1,500 million tons of dust, 25 million tons of smoke from vegetation, and 80 million tons of smoke from cities and other manmade sources. It is very important to note that the last type of smoke has the greatest impact: smoke from petroleum and petroleum products is particularly effective at absorbing sunlight. Altogether, about 0.4 cubic km (0.1 cu. mi.) of dust and smoke is in the stratosphere. The general effect (and this is the peak remember) would be to reduce sunlight intensity and temperature by a degree comparable to an overcast day. That's a general comment, if the observer is downwind of a stricken target, the intense plume from the smoke generated by large continuing fires will reduced mid-day light levels to that of twilight. The average peak temperature will be reduced by around 13 degrees F. However, there is a peculiar effect here; average trough temperatures will be increased by roughly the same amount (for exactly the same reason that a cloudy night is warmer than a clear one; the smoke clouds also tend to hold warm air in. That was an effect that Sagan and his crew deliberately suppressed.Within ten days, the smoke/particulate concentration would decline rapidly although smoke in the upper atmosphere still absorbs much sunlight. The primary effect ceased to become temperature and the gross temperature changes would already be a thing of the past. Instead, the patchyness of the initiation effects would cause unusual weather conditions including strong winds in some coastal areas (in effect we've dumped huge amounts of energy into the climatoscene and that starts to work its way out). A curious predictable phenomena is that dense fogs would develop over the oceans and along waterways. Another interesting effect is that the ozone layer would be reduced by nearly half yet nearly all of the Earth's surface would receive less solar ultraviolet radiation than before the war. The reason is curious; although smoke levels would be dropping rapidly, there would now be a thin veil of very fine high altitude particulates that effectively act as a block to UV radiation. The sunsets will be incredibly beautiful. Twenty days after the nuclear exchange climatic effects would have peaked. By this time, areas alongside seas, oceans and other large bodies of water would have effectively returned to their pre-exchange temperature sets. High-altitude areas woudl actually be warmer than before the exchange, sometimes dramatically so. At an altitude of 40,000 feet, the air termperature would be no less than 70 degrees F higher than normal (!!!) Surface temperatures far inland will drop by around 20 degrees F but this is a transient phenomena. The critical thing is light level; although the veil of fine high-altitude dust doesn't have a critical temperature effect, it cuts light levels by around 25 percent, ensuring that crops fail. Within three months, temperature effects are virtually over. Worldwide, peak temperatures will have been reduced by, at most, 2 degrees F while trough will be increased by the same amount. This will shorten crop growing seasons a bit but since the crops are failing anyway it won't make much difference. This temperature change will persist for two or three years. by which time the atmosphere will have been purged of dust and smoke. The best way to describe the real climate change would be that a state of "nuclear autumn" would become widespread. In other words both the high and low ends of the temperature spectrum would be shaved so that things tend to the "median" situation."

## A2: Nuclear War Unwinnable

### Nuclear war is winnable.

Zutell 88’ (NUCLEAR WINTER AND OTHER MYTHS OF SELF-DETERRENCE, Eugene G. Zutell, 06/19/88, Arizona Dept. of Emergency and Military Affairs, Division of Emergency Services, http://www.fortfreedom.org/s05.htm)phol

The defenders of this simple faith tend to explain it with equally simple math -- a 12.5 kiloton blast at Hiroshima killed approximately 70,000 people, which is a casualty rate of 5600 per kiloton. A nu-clear war today could result in some 10,000 megatons of force being released. That is equal to ten million kilotons. Ten million times 5600 equals 56 billion casualties, more than enough to take care of the slightly more than 6 billion inhabitants of the earth today. Referring back to our earlier discussion of nuclear winter, it is a fact that most nuclear weapons are targeted against other nuclear weapons and against military installations. While these are excellent counterforce military targets, they are poor population targets, except in those instances where military installations are in or closely adjacent to population centers. The OVERKILL theory presupposes that every man, woman and child on earth will be within the lethal range of a nuclear explosion. Given the size of this planet and the distribution of people throughout the hemispheres, not to mention the many factors that act to attenuate the effects of nuclear weapons, the OVERKILL contention is a gross, even criminal simplification and misstatement because it implies that there is no defense against nuclear weapons. This in turn leads to the incorrect and fatalistic assumption that any attempt at establishing a civil defense system is futile, a waste of time and effort since we're all going to die anyway. The Soviets, through their increasingly sophisticated civil defense program, are sending a very clear signal that they at least, do not believe in the OVERKILL theory. They, in fact, believe that a nuclear war is not only survivable but also winnable. One of the main reasons for the proliferation of the belief that a nuclear war cannot be survived is that people who are well known to the public and rightfully respected for their in one area of endeavor, sometimes get involved in other areas about which they know very little. A Perfect example of that condition came out of the Cuban missile crisis of October, 1962. Robert Kennedy wrote a book in which he referred to the crisis as --"A CONFRONTATION BETWEEN THE TWO GIANT ATOMIC NATIONS, THE U.S. AND THE U.S.S.R., WHICH BROUGHT THE WORLD TO THE ABYSS OF NUCLEAR DESTRUCTION AND THE END OF MANKIND. “At that time, the U.S. had fewer than 5000 nuclear warheads and the Soviets less than 500. Today, there are an estimated 50,000 nuclear warheads in the arsenals of the five major nuclear powers. And, al-though a nuclear exchange would be an absolutely cataclysmic event, no one who is knowledgeable of weapons effects claims that the end of mankind is at hand.

## Individual Action Solves Better

### People use inevitable death as a justification for inaction. We should focus on individual action to solve their impacts.

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(a) Exaggeration to justify inaction. For many people, nuclear war is seen as such a terrible event, and as something that people can do so little about, that they can see no point in taking action on peace issues and do not even think about the danger. For those who have never been concerned or taken action on the issue, accepting an extreme account of the effects of nuclear war can provide conscious or unconscious justification for this inaction. In short, one removes from one's awareness the upsetting topic of nuclear war, and justifies this psychological denial by believing the worst.This suggests two things. First, it may be more effective in mobilising people against nuclear war to describe the dangers in milder terms. Some experiments have shown that strong accounts of danger - for example, of smoking[17] - can be less effective than weaker accounts in changing behaviour. Second, the peace movement should devote less attention to the dangers of nuclear war and more attention to what people can do to oppose it in their day-to-day lives.

## Exaggerations

### Fear of death makes us exaggerate the effects of nuclear war.

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(b) Fear of death. Although death receives a large amount of attention in the media, the consideration of one's own death has been one of the most taboo topics in western culture, at least until recently.[18] Nuclear war as an issue raises the topic insistently, and unconsciously many people may prefer to avoid the issue for this reason. The fear of and repression of conscious thoughts about personal death may also lead to an unconscious tendency to exaggerate the effects of nuclear war. One's own personal death - the end of consciousness - can be especially threatening in the context of others remaining alive and conscious. Somehow the death of everyone may be less threatening. Robert Lifton[19] argues that children who learn at roughly the same age about both personal death and nuclear holocaust may be unable to separate the two concepts, and as a result equate death with annihilation, with undesirable consequences for coping individually with life and working collectively against nuclear war. Another factor here may be a feeling of potential guilt at the thought of surviving and having done nothing, or not enough or not the right thing, to prevent the deaths of others. Again, the idea that nearly everyone will die in nuclear war does not raise such disturbing possibilities.

### We exaggerate the effects of nuclear war so we do not have to think about picking up the pieces. This attitude only leads to war.

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

Planning and defeatism. People may identify thinking about and planning for an undesirable future - namely the occurrence and aftermath of nuclear war - with accepting its inevitability (defeatism) or even actually wanting it. By exaggerating the effects of nuclear war and emphasising the worst possible case, there becomes no post-war future at all to prepare for, and so this difficulty does not arise. The limitations of this response are apparent in cases other than nuclear war. Surely it is not defeatism to think about what will happen when a labour strike is broken, when a social revolution is destroyed (as in Chile) or turns bad (as in the Soviet Union), or when political events develop in an expected though unpleasant way (as Nazism in the 1920s and 1930s). Since, I would argue, some sort of nuclear war is virtually inevitable unless radical changes occur in industrialised societies, it is realism rather than defeatism to think about and take account of the likely aftermath of nuclear war. An effective way to deal with the feeling or charge of defeatism is to prepare for the political aftermath of nuclear war in ways which reduce the likelihood of nuclear war occurring in the first place. This can be done for example by developing campaigns for social defence, peace conversion and community self-management in ways which serve both as preparation to resist political repression in time of nuclear crisis or war, and as positive steps to build alternatives now to war-linked institutions.[21]

### Nuclear extinction is a product of the media

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(k) Media. The media tend to promote drama and death, and hence promote exaggeration and emphasis on worst cases in relation to nuclear war, and promote those who make these emphases. This arises partly from the lack of continuity and social context in most media stories, and from providing sufficient bad news (death, destruction) so that the consumers of the media can delight in the 'good' news (advertising of products, one's own ordinary untraumatic life). These tendencies in the media are accentuated by centralised control over the form and content of the media.

### Humans focus on cataclysms and often exaggerate them. Nuclear war is viewed as the worst form of cataclysm.

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(l) Cataclysm. Cataclysms are usually seen as more significant than constant or routine processes which have the same net effect. Large airplane crashes receive intense publicity, whereas the road toll - or the toll of starvation, disease and poverty - less often rates attention. Although there may be an innate tendency to notice unusual events, social mechanisms could readily be developed to focus appropriate attention on non-spectacular problems. The emphasis on cataclysm is reinforced by the media and by the conservative nature of day-to-day routine. Nuclear war is seen as the ultimate cataclysm, and this leads to emphasis on worst cases. The challenge for peace activists is to shift the focus of attention from the cataclysm of nuclear war to the routine efforts needed to build opposition to the war system - itself a routine operation.

## Exaggeration/Causes Political Paralysis

### The aff’s fear mongering about nuclear war only leads to political paralysis. And the threat of nuclear war is constructed by peace movements.

Martin 83’ (The Fate of Extinction Arguments, 1983, Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/83fea.html)phol

Fear-mongering: One of the approaches used by some people in the peace movement and other social movements is the generation of fear, whether this is over nuclear war, nuclear reactor accidents or overpopulation. The implicit premise behind much fear-mongering is that if people are not taking action on the issue, they must not perceive it as threatening enough. Perhaps if the thought of 500 million people dying in a nuclear war is not enough to stimulate action, then the thought of extinction will. Indeed, Schell explicitly advocates use of the fear of extinction as the basis for inspiring the "complete rearrangement of world politics" (p. 221). The popularity of the politics of fear may partly explain the popularity of Schell's treatment. The fear-mongering approach is deeply flawed. It leaves out consideration of how people can take action, how social change can come about, and of what motivates people to act. It can cause paralysis rather than action. Furthermore, fear is a poor basis on which to build long term commitment to fundamental change in society.

## Nuclear War is Racist

### Concern about nuclear war is tied up in western thinking insofar as we fear for the death of ‘civilization’ when poverty has killed more people then any war would in the past 100 years.

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(g) White, western orientation. Most of the continuing large-scale suffering in the world - caused by poverty, starvation, disease and torture - is borne by the poor, non-white peoples of the third world. A global nuclear war might well kill fewer people than have died of starvation and hunger-related disease in the past 50 or 100 years.[22] Smaller nuclear wars would make this sort of contrast greater.[23] Nuclear war is the one source of possible deaths of millions of people that would affect mainly white, rich, western societies (China and Japan are the prime possible exceptions). By comparison, the direct effect of global nuclear war on nonwhite, poor, third world populations would be relatively small. White westerners may tend to identify their own plight with that of the rest of the world, and hence exaggerate the threat of destruction wreaked on their own societies into one for all of humanity. White westerners may also tend to see the rest of the world as vitally dependent on themselves for survival, and hence see catastrophe for all as a result of a nuclear war which destroys 'civilisation'. In practice, poor non-white populations arguably would be better off without the attentions of white, western 'civilisation' - although nuclear war is hardly the way to achieve this. These considerations suggest the importance of strengthening links between peace struggles and struggles for justice, equality and freedom from exploitation in poor countries.

## Nuclear War is Political

### Nuclear war doomsdaysing is an attempt to justify political change at the top and kill grass root movements.

Martin 83’ (The Fate of Extinction Arguments, 1983, Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/83fea.html)phol

Reformism:A second reason why the effects of nuclear war are often exaggerated is linked with the idea that nuclear war will be avoided when national decision makers realise the danger and decide to start disarming. The idea seems to be that once people - including national elites - realise the 'true' dangers, then they will take action. In reality, elites are mainly motivated by political and economic interests, not the dangers of nuclear war. Their very power and privilege, and the ideology which justifies this, are based on the institutions which give rise to the nuclear threat. So elites are the least likely to take fundamental action against the nuclear threat. In addition, if the danger from nuclear war is believed to be enormous, immediate and final, then policy change at the top too often is assumed to be the only hope. There simply doesn't seem to be enough time for struggles for social change at the grassroots lasting decades or centuries. Exaggeration of the effects of nuclear war thus promotes the approach of appealing to the decision-makers. On the other hand, lack of a long term grassroots strategy against war, and disinclination to undertake such a path, tends to lead to ever greater extermination rhetoric. Doomsdayism has often been linked with political reformism,[6] and this seems to be the case with much of the peace movement

### The aff is justifying their refusal to engage in political action by exaggerating the threat of nuclear war

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(e) Exaggeration to justify concern (I). People involved with any issue or activity tend to exaggerate its importance so as to justify and sustain their concern and involvement. Nuclear war is only one problem among many pressing problems in the world, which include starvation, poverty, exploitation, racial and sexual inequality and repressive governments. By concentrating on peace issues, one must by necessity give less attention to other pressing issues. An unconscious tendency to exaggerate the effects of nuclear war has the effect of reducing conscious or unconscious guilt at not doing more on other issues. Guilt of this sort is undoubtedly common, especially among those who are active on social issues and who become familiar with the wide range of social problems needing attention. The irony is that those who feel guilt for this reason tend to be those who have least cause to feel so. One politically effective way to overcome this guilt may be to strengthen and expand links between anti-war struggles and struggles for justice, equality and the like.

### Exaggeration of nuclear war is a tactic by the current political system to prevent any sort of violent reform.

Martin 82’ (Critique of nuclear extinction, Journal of Peace Research, Vol. 19, No. 4, 1982, pp. 287-300. Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/82jpr.html)phol

(j) Reformist political analysis. Closely linked with exaggeration of the efforts of nuclear war and emphasis on worst cases is a political strategy that provides little fundamental challenge to prevailing social institutions. The bulk of efforts for peace are based on the assumed power of knowledge and logic to convince decision-makers to change policies. This includes many of the efforts to influence directly the opinions of decision-makers (e.g. negotiation, lobbying), to influence their opinions through public pressure (e.g. generated through education campaigns) and even through direct action (e.g. mass demonstrations, civil disobedience). The solution promoted by many such efforts is essentially disarmament within the framework of present social, political and economic structures. The institutional structures in which corporate managers, party bureaucrats and political leaders are dominant would still be intact: only the bombs would be gone. It can be argued[25] that efforts based on the assumed power of knowledge and logic are insufficient, since the actions of decision-makers are mainly determined not by opinions but by interests rooted in current institutional arrangements. Furthermore, disarmament is an inadequate goal in as much as it leaves intact the structural forms which are linked with the use of organised violence, including hierarchical organisational forms, large differences in power, prestige and wealth, and the nation-state system. If these structures are the source of the nuclear threat, then it might be asked, why should disarmament be pursued in a way which leaves them intact? The apparent answer is the very magnitude of the nuclear threat itself. One false step by one's own leaders, so the conventional wisdom decrees, and the holocaust may be upon us - initiated by the enemy, of course. In these circumstances, any destabilising challenges to the power structures on either side are dangerous, and to be avoided. This becomes a prescription for reformism, rather than promotion of more fundamental changes, as the road to peace. The greater the magnitude of disaster that nuclear war poses, the greater the injunction to avoid dangerous destabilising tactics and strategies. It may be for this reason that governments have not made greater attempts to disabuse people of the notion that nuclear war is the end of civilisation or life on earth. The more extreme the disaster, the more apathetic people become and the less likely they are to challenge the powers that be. Military and political planners do not think in these terms, naturally, and so on occasion publicly promote measures for civil defence or for fighting limited nuclear wars, so stimulating a hornet's nest of citizen concern and opposition. Doomsdayism has often been linked with conservative or reformist politics, as in the case of claims of environmental doom.[26] A more realistic assessment of the consequences of nuclear war needs to be accompanied by a non-reformist political strategy for challenging the war system. Such a strategy might for example be built around campaigns for social defence, for peace conversion, for freedom, justice and equality, and for creating nonhierarchical political and economic institutions.[27] At the same time, present campaigns based on the power of knowledge and logic would remain important: although insufficient, they are still necessary.

## Warhead Design

### A significant shift in warhead designs has made nuclear extinction improbable.

Martin 83’ (The Fate of Extinction Arguments, 1983, Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/83fea.html)phol

For several decades many people have believed that major nuclear war could lead to the death of most or all people on earth. Yet, surprising as it may seem, there has been no detailed scientific argument presented to support this belief. In fact, Schell's treatment is the first carefully argued presentation that concludes that extinction is a significant possibility from nuclear war. For this reason alone his treatment deserves close attention. At the end of the first of the three essays which comprise The Fate of the Earth, entitled "A Republic of Insects and Grass", Schell summarises some of the possible consequences of the explosion of thousands of megatonnes of nuclear weapons. These include "the blinding of insects, birds, and beasts all over the world; the extinction of many ocean species, among them some at the base of the food chain; the temporary or permanent alteration of the climate of the globe, with the outside chance of 'dramatic' and 'major' alterations in the structure of the atmosphere; the pollution of the whole ecosphere with oxides of nitrogen; the incapacitation in ten minutes of unprotected people who go out into the sunlight; the blinding of people who go out into the sunlight; a significant decrease in photosynthesis in plants around the world; the scalding and killing of many crops; the increase in rates of cancer and mutation around the world, but especially in the targeted zones, and the attendant risk of global epidemics; the possible poisoning of all vertebrates by sharply increased levels of Vitamin D in their skin as a result of increased ultraviolet light" (p. 93). When nuclear weapons are exploded, the high temperatures cause nitrogen in the air to react with oxygen, producing oxides of nitrogen. In explosions larger than about one megatonne, the fireball of the explosion rises the 10 or 15 kilometres necessary to deposit much of these oxides of nitrogen in the stratosphere, where the oxides of nitrogen destroy ozone. Since stratospheric ozone absorbs ultraviolet light from the sun, the net consequence of large nuclear explosions is an increase in ultraviolet light at the earth's surface. All the effects listed by Schell in the above quotation are possible consequences of large increases in ultraviolet light. Scientific studies in the mid 1970s showed that stratospheric ozone in the northern hemisphere could be reduced by 50 percent for more for a few years by the explosion of 10,000Mt (megatonnes) of nuclear weapons. These are the studies on which Schell relies. But trends in nuclear weaponry over the past decade or so have reduced the likely effect on ozone. Instead of relying so much on multimegatonne warheads, the United States and the Soviet Union have been and are continuing to convert the payloads of their strategic ballistic missiles to larger numbers of smaller warheads, usually each less than one megatonne. Numerous smaller warheads can cause more destruction at ground level, but they don't deposit oxides of nitrogen in the stratosphere in any quantity. So at least at the moment, the threats to human life from increases in ultraviolet light following nuclear war appear to be negligible.[2] But even if stratospheric ozone were reduced by 50 percent or more, few of the consequences portrayed by Schell would result. For example, permanent blinding of humans or other animals seems very unlikely. Stratospheric ozone levels vary considerably from place to place and time to time. Ultraviolet light passes through only about half as much ozone at the equator as at mid-latitudes, yet blindness in humans and other animals is not known to be more common at the equator than elsewhere. In addition, if ozone reductions did occur as a result of nuclear war, they would mainly occur in the northern mid-latitudes where ozone levels are higher to start with. So widespread blindness from ultraviolet light seems an unlikely possibility on two counts. Similar comments apply to the other dangers from ultraviolet light listed by Schell.

## Won’t Kill Everyone

### A worst-case nuclear war could only kill a small population of the worlds population.

Martin 83’ (The Fate of Extinction Arguments, 1983, Brian Martin, Professor of Social Sciences at the University of Wollongong, Australia, http://www.bmartin.cc/pubs/83fea.html)phol

According to the published scientific literature on the effects of nuclear war, in a worst case a large fraction of the population in the US, Soviet Union and Europe could die, with many additional millions of deaths in Japan and China. But relatively few people would die in South America, Africa, India, South-East Asia and Australia, unless for some reason these areas were directly bombed. (Some of them may well be bombed, such as US military bases and possibly other targets in Australia.) In a worst case, the direct effects of nuclear attacks could kill perhaps 500 million people, and conceivably several hundred million more could die if this were followed by agricultural or economic breakdown. This would leave alive, and mostly uninjured, some 4000 million. No one has demonstrated any effects of nuclear war which could kill more than a tiny fraction of people who live far from the immediate attacks.[3] But surely the possibility of 500 million deaths is enough reason to oppose preparations for nuclear war? I was perplexed after hearing about Schell's conclusions and about the sources he had used to reach them, since I had already read the same sources and had come across nothing that indicated that extinction was more than a remote possibility. The perplexity is explained by Schell's process of continually taking worst interpretations and bending the evidence to give the worst impression. For example, Schell implies that a nuclear attack is inevitably followed by a firestorm or conflagration, always gives the maximum time for people having to remain in shelters from fallout, and takes a pessimistic view throughout of the potential for ecological resilience to radiation exposure and for human resourcefulness in a crisis. And usually when he spells out a worst case as a possibility - for example, the average 10,000 rad radiation dose from a 10,000Mt attack on the US - this becomes implicitly a certainty for later discussion, with qualifications dropped. 'Pushing' of an argument to support a particular conclusion is a common phenomenon in science,[4] and Schell perhaps should not be blamed overly much for doing this, especially since in many of his arguments he relies heavily on quotes from specialists who do the same thing. What is more important are the political implications of a conclusion about the likelihood of extinction from nuclear war. There are many potential reasons why the effects of nuclear war are exaggerated.[5] Here I will mention only two: the fear-mongering approach and a link with political reformism.

# Impact Calc

## Probability Comes First

### Probability comes first

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

We can distinguish six qualitatively distinct types of risks based on their scope and intensity (figure 1). The third dimension, probability, can be superimposed on the two dimensions plotted in the figure. Other things equal, a risk is more serious if it has a substantial probability and if our actions can make that probability significantly greater or smaller.

## Magnitude Comes First

### Magnitude comes first

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

Risks in this sixth category are a recent phenomenon. This is part of the reason why it is useful to distinguish them from other risks. We have not evolved mechanisms, either biologically or culturally, for managing such risks. Our intuitions and coping strategies have been shaped by our long experience with risks such as dangerous animals, hostile individuals or tribes, poisonous foods, automobile accidents, Chernobyl, Bhopal, volcano eruptions, earthquakes, draughts, World War I, World War II, epidemics of influenza, smallpox, black plague, and AIDS. These types of disasters have occurred many times and our cultural attitudes towards risk have been shaped by trial-and-error in managing such hazards. But tragic as such events are to the people immediately affected, in the big picture of things – from the perspective of humankind as a whole – even the worst of these catastrophes are mere ripples on the surface of the great sea of life. They haven’t significantly affected the total amount of human suffering or happiness or determined the long-term fate of our species.

### Magnitude comes first – less probable big nuke war > more probably small nuke war

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

A much greater existential risk emerged with the build-up of nuclear arsenals in the US and the USSR. An all-out nuclear war was a possibility with both a substantial probability and with consequences that might have been persistent enough to qualify as global and terminal. There was a real worry among those best acquainted with the information available at the time that a nuclear Armageddon would occur and that it might annihilate our species or permanently destroy human civilization.4 Russia and the US retain large nuclear arsenals that could be used in a future confrontation, either accidentally or deliberately. There is also a risk that other states may one day build up large nuclear arsenals. Note however that a smaller nuclear exchange, between India and Pakistan for instance, is not an existential risk, since it would not destroy or thwart humankind’s potential permanently. Such a war might however be a local terminal risk for the cities most likely to be targeted. Unfortunately, we shall see that nuclear Armageddon and comet or asteroid strikes are mere preludes to the existential risks that we will encounter in the 21st century.

### Magnitude comes first – no trial and error approach

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

Our approach to existential risks cannot be one of trial-and-error. There is no opportunity to learn from errors. The reactive approach – see what happens, limit damages, and learn from experience – is unworkable. Rather, we must take a proactive approach. This requires foresightto anticipate new types of threats and a willingness to take decisive *preventive action* and to bear the costs (moral and economic) of such actions.

### Reducing existential risk outweighs every other impact -- Math

**Bostrom 11** (Nick, Professor in the Faculty of Philosophy at Oxford, Ph.D. in Philosophy from the London School of Economics, “The Concept of Existential Risk,” Draft of a Paper published on ExistentialRisk.com, <http://www.existentialrisk.com/concept.html>, Accessed 07-04-2011, JG)

Holding probability constant, risks become more serious as we move toward the upper-right region of figure 2. For any fixed probability, existential risks are thus more serious than other risk categories. But just how much more serious might not be intuitively obvious. One might think we could get a grip on how bad an existential catastrophe would be by considering some of the worst historical disasters we can think of—such as the two world wars, the Spanish flu pandemic, or the Holocaust—and then imagining something just a bit worse. Yet if we look at global population statistics over time, we find that these horrible events of the past century fail to register But even this reflection fails to bring out the seriousness of existential risk. What makes existential catastrophes especially bad is not that they would show up robustly on a plot like the one in figure 3, causing a precipitous drop in world population or average quality of life. Instead, their significance lies primarily in the fact that they would destroy the future. The philosopher Derek Parfit made a similar point with the following thought experiment: I believe that if we destroy mankind, as we now can, this outcome will be much worse than most people think. Compare three outcomes: (1) Peace. (2) A nuclear war that kills 99% of the world’s existing population. (3) A nuclear war that kills 100%. (2) would be worse than (1), and (3) would be worse than (2). Which is the greater of these two differences? Most people believe that the greater difference is between (1) and (2). I believe that the difference between (2) and (3) is very much greater. … The Earth will remain habitable for at least another billion years. Civilization began only a few thousand years ago. If we do not destroy mankind, these few thousand years may be only a tiny fraction of the whole of civilized human history. The difference between (2) and (3) may thus be the difference between this tiny fraction and all of the rest of this history. If we compare this possible history to a day, what has occurred so far is only a fraction of a second. (10: 453-454) To calculate the loss associated with an existential catastrophe, we must consider how much value would come to exist in its absence. It turns out that the ultimate potential for Earth-originating intelligent life is literally astronomical. One gets a large number even if one confines one’s consideration to the potential for biological human beings living on Earth. If we suppose with Parfit that our planet will remain habitable for at least another billion years, and we assume that at least one billion people could live on it sustainably, then the potential exist for at least 1018 human lives. These lives could also be considerably better than the average contemporary human life, which is so often marred by disease, poverty, injustice, and various biological limitations that could be partly overcome through continuing technological and moral progress. However, the relevant figure is not how many people could live on Earth but how many descendants we could have in total. One lower bound of the number of biological human life-years in the future accessible universe (based on current cosmological estimates) is 1034 years.[10] Another estimate, which assumes that future minds will be mainly implemented in computational hardware instead of biological neuronal wetware, produces a lower bound of 1054 human-brain-emulation subjective life-years (or 1071 basic computational operations).(4)[11] If we make the less conservative assumption that future civilizations could eventually press close to the absolute bounds of known physics (using some as yet unimagined technology), we get radically higher estimates of the amount of computation and memory storage that is achievable and thus of the number of years of subjective experience that could be realized.[12] Even if we use the most conservative of these estimates, which entirely ignores the possibility of space colonization and software minds, we find that the expected loss of an existential catastrophe is greater than the value of 1018 human lives. This implies that the expected value of reducing existential risk by a mere one millionth of one percentage point is at least ten times the value of a billion human lives. The more technologically comprehensive estimate of 1054 human-brain-emulation subjective life-years (or 1052 lives of ordinary length) makes the same point even more starkly. Even if we give this allegedly lower bound on the cumulative output potential of a technologically mature civilization a mere 1% chance of being correct, we find that the expected value of reducing existential risk by a mere one billionth of one billionth of one percentage point is worth a hundred billion times as much as a billion human lives. One might consequently argue that even the tiniest reduction of existential risk has an expected value greater than that of the definite provision of any “ordinary” good, such as the direct benefit of saving 1 billion lives. And, further, that the absolute value of the indirect effect of saving 1 billion lives on the total cumulative amount of existential risk—positive or negative—is almost certainly larger than the positive value of the direct benefit of such an action.[13]

### Their impact is terrible but it’s not existential — humanity will survive.

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

Existential risks are distinct from global endurable risks. Examples of the latter kind include: threats to the biodiversity of Earth’s ecosphere, moderate global warming, global economic recessions (even major ones), and possibly stifling cultural or religious eras such as the “dark ages”, even if they encompass the whole global community, provided they are transitory (though see the section on “Shrieks” below). To say that a particular global risk is endurable is evidently not to say that it is acceptable or not very serious. A world war fought with conventional weapons or a Nazi-style Reich lasting for a decade would be extremely horrible events even though they would fall under the rubric of endurable global risks since humanity could eventually recover. (On the other hand, they could be a local terminal risk for many individuals and for persecuted ethnic groups.) I shall use the following definition of existential risks: Existential risk – One where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential. An existential risk is one where humankind as a whole is imperiled. Existential disasters have major adverse consequences for the course of human civilization for all time to come.

### Non-existential impacts cannot compare (magnitude comes first)

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

2 The unique challenge of existential risks Risks in this sixth category are a recent phenomenon. This is part of the reason why it is useful to distinguish them from other risks. We have not evolved mechanisms, either biologically or culturally, for managing such risks. Our intuitions and coping strategies have been shaped by our long experience with risks such as dangerous animals, hostile individuals or tribes, poisonous foods, automobile accidents, Chernobyl, Bhopal, volcano eruptions, earthquakes, draughts, World War I, World War II, epidemics of influenza, smallpox, black plague, and AIDS. These types of disasters have occurred many times and our cultural attitudes towards risk have been shaped by trial-and-error in managing such hazards. But tragic as such events are to the people immediately affected, in the big picture of things – from the perspective of humankind as a whole – even the worst of these catastrophes are mere ripples on the surface of the great sea of life. They haven’t significantly affected the total amount of human suffering or happiness or determined the long-term fate of our species.

### Extinction is like a diamond, it lasts forever

**Bostrom 11** (Nick, Professor in the Faculty of Philosophy at Oxford, Ph.D. in Philosophy from the London School of Economics, “The Concept of Existential Risk,” Draft of a Paper published on ExistentialRisk.com, <http://www.existentialrisk.com/concept.html>, Accessed 07-04-2011, JG)

Finally, when considering existential-risk probabilities, we must recognize that one existential catastrophe can preempt another. If a meteor wipes us out next year, the existential risk from future machine superintelligence drops to zero. The sum of all-things-considered probabilities of disjoint (mutually exclusive) existential risks cannot exceed 100%. Yet conditional probabilities of disjoint existential risks (conditional, that is to say, on no other existential disaster occurring preemptively) could well add up to more than 100%. For example, some pessimist might coherently assign an 80% probability to humanity being destroyed by machine superintelligence, and a 70% conditional probability to humanity being destroyed by nanotechnological warfare given that humanity is not destroyed by machine superintelligence. However, if the unconditional (all-things-considered) probability of our being eradicated by superintelligence is 80%, then the unconditional probability of our being eradicated by nanotech war must be no greater than 20%, since we can only be eradicated once.

## Magnitude Outweighs Probability

### Magnitude O/W Probability

**Bostrom 11** (Nick, Professor in the Faculty of Philosophy at Oxford, Ph.D. in Philosophy from the London School of Economics, “The Concept of Existential Risk,” Draft of a Paper published on ExistentialRisk.com, <http://www.existentialrisk.com/concept.html>, Accessed 07-04-2011, JG)

We can explicate the seriousness of a risk as the expected loss associated with it. That is, [equation omitted — without using graphics, closest version is this: Seriousness(R) = E[Loss(R)] = P(R)Loss(R)] If some particular risk is defined in terms of how much value is lost as a consequence of an untoward event—e.g., the risk “lightning kills one person”—then Loss(R) can be straightforwardly read off from the definition (in this case, the value of the loss of one life).[4] Often, however, risks are defined without explicit reference to the value of the loss they would cause. For example, the risk “there is a smallpox outbreak” materializes if and only if there is a smallpox outbreak; but the value lost as a result of such an event ranges over a wide interval: The outbreak might kill nobody or it might produce hundreds of millions of casualties. In such a case, Loss(R) is itself an expectation value: [equation omitted — without using graphics, closest version is this: Loss(R)=E Loss (R, hi)P(h1)] The sum here is over a partition of specific hypotheses, H = {hi}, about the specific ways in which the unfavorable event might unfold. **A risk of some event X occurring can** therefore **be serious even if** (a) **X is unlikely to occur and** (b) **it is unlikely that much harm would result if X does occur. Such a risk can still be serious if the potential harm is sufficiently great**. Thus, for example, the risk of theft of a nuclear weapon from a military installation is fairly serious, even though it may be unlikely that any such weapon will be stolen or, if stolen, successfully detonated. The worst-case scenario is sufficiently bad that it is worth taking precautions even against this double unlikelihood. For this reason, nuclear weapons are not only kept under lock and key, protected by armed guards, but are also equipped with specialized security features such as permissive action links.

### Magnitude O/W Probability

**Bostrom 11** (Nick, Professor in the Faculty of Philosophy at Oxford, Ph.D. in Philosophy from the London School of Economics, “The Concept of Existential Risk,” Draft of a Paper published on ExistentialRisk.com, <http://www.existentialrisk.com/concept.html>, Accessed 07-04-2011, JG)

Probability can be understood in different senses, but most relevant here is the epistemic sense in which probability is construed as (something like) the credence that an ideally reasonable observer should assign to the risk’s materializing based on currently available evidence.[5] If something is not known to be objectively safe, it is risky at least in the subjective sense relevant to decision making. Consider the hypothetical risk from particle collider experiments. It is very likely that these experiments have no potential whatsoever for causing global disaster; and that therefore the objective risk is zero, as most experts believe. But just how confident can we be that there is no objective risk? An empty cave is likewise unsafe in the relevant sense if you cannot tell whether or not it is home to a hungry bear. It would be rational for you to avoid the cave if you reasonably judge that the expected harm of entry outweighs the expected benefit. Assessing risk probabilities is often difficult. The uncertainty and error-proneness of our first-order assessments of risk is itself something we must factor into our all-things-considered probability assignments. This factor often dominates in low-probability, high-consequence risks—especially those involving poorly understood natural phenomena, complex social dynamics, or new technology, or those that are difficult to assess for other reasons. Suppose that some scientific analysis A indicates that some catastrophe X has an extremely small probability P(X) of occurring. Then the probability that A has some hidden crucial flaw may easily be much greater than P(X).[6] Furthermore, the conditional probability of X given that A is crucially flawed, P(X |¬A), may be fairly high. We may then find that most of the risk of X resides in the uncertainty of our scientific assessment that P(X) was small (figure 1).(9)

## Solvency

### The plan is the most cost-effective way to reduce existential risk—it saves 8 billion life-years at a cost of $2.50 per life-year.

Matheny 7 (Jason, Research Associate at the Future of Human Institute at Oxford University “Reducing the Risk of Human Extinction,” *Risk Analysis*, Volume 27, Issue 5, October, http://jgmatheny.org/matheny\_extinction\_risk.htm)

6. COST EFFECTIVENESS AND UNCERTAINTY To establish the priority of delaying human extinction among other public projects, we need to know not only the value of future lives but also the costs of extinction countermeasures and how to account for their uncertain success. Cost-effectiveness analysis (CEA) is often used to prioritize public projects (Jamison, 1993 ). The ethical premise behind CEA is we should deliver the greatest good to the greatest number of people. With finite resources, this implies investing in projects that have the lowest marginal cost per unit of value—life-year saved, case of disease averted, etc. (McKie et al., 1998). Even when CEA employs distributional constraints or weights to account for fairness or equity, cost effectiveness is typically seen as an essential aspect of the fair distribution of finite resources (Williams, 1997).10 The effects of public projects are uncertain. Some projects may not work and some may address problems that never emerge. The typical way of dealing with these uncertainties in economics is to use expected values. The expected value of a project is the sum of the probability of each possible outcome of the project multiplied by each outcome's respective value. 7. EXAMPLE: THE COST EFFECTIVENESS OF REDUCING EXTINCTION RISKS FROM ASTEROIDS Even if extinction events are improbable, the expected values of countermeasures could be large, as they include the value of all future lives. This introduces a discontinuity between the CEA of extinction and nonextinction risks. Even though the risk to any existing individual of dying in a car crash is much greater than the risk of dying in an asteroid impact, asteroids pose a much greater risk to the existence of future generations (we are not likely to crash all our cars at once) (Chapman, 2004 ). The "death-toll" of an extinction-level asteroid impact is the population of Earth, plus all the descendents of that population who would otherwise have existed if not for the impact. There is thus a discontinuity between risks that threaten 99% of humanity and those that threaten 100%. As an example, consider asteroids. Let p be the probability of a preventable extinction event occurring in this century: p = pa + po where pa is the probability of an asteroid-related extinction event occurring during the century, and po is the probability of any other preventable extinction event occurring. The (reducible) extinction risk is: Lp = L(pa + po) where L is the expected number of future human life-years in the absence of preventable extinction events during the century. The expected value of reducing pa by 50% is thus: L(pa + po) - L(0.5pa + po) = 0.5Lpa Suppose humanity would, in the absence of preventable extinction events during the century, survive as long as our closest relative, homo erectus, and could thus survive another 1.6 million years (Avise et al., 1998 ).11 Further suppose humanity maintains a population of 10 billion persons.12 Then, L = 1.6 million years x 10 billion lives = 1.6 x 1016 life-years. Based on the frequency of previous asteroid impacts, the probability of an extinction-level (=10 km) asteroid impact in this century is around one in 1 million (Chapman, 2004; NASA, 2007). Thus, 0.5Lpa = 0.5 x 1.6 x 1016 life-years x 10-6 = 8 billion life-years. A system to detect all large, near-Earth asteroids would cost between $300 million and $2 billion (Chapman, 2004; NASA, 2006 , pp. 251–254), while a system to deflect large asteroids would cost between $1 and 20 billion to develop (Gritzner, 1997, p. 156; NASA, 2006 , pp. 251–254; Sommer, 2005 , p. 121; Urias et al., 1996 ).13 Suppose a detect-and-deflect system costing a total of $20 billion would buy us a century of protection, reducing the probability of an extinction-level impact over the next century by 50%.14 Further suppose this cost is incurred even if the deflection system is never used, and the system offers no benefit besides mitigating extinction-level asteroid impacts.15 Then the cost effectiveness of the detect-and-deflect system is $20 billion/8 billion life-years = $2.50 per life-year. By comparison, it is common for U.S. health programs to spend, and for U.S. policies and citizens to value, more than $100,000 per life-year (Kenkel, 2001; Neumann et al., 2000 ; Viscusi & Aldy, 2003 ).16 Even if one is less optimistic and believes humanity will certainly die out in 1,000 years, asteroid defense would be cost effective at $4,000 per life-year.

### The plan reduces the existential risk from asteroids.

**Bostrom 11** (Nick, Professor in the Faculty of Philosophy at Oxford, Ph.D. in Philosophy from the London School of Economics, “The Concept of Existential Risk,” Draft of a Paper published on ExistentialRisk.com, <http://www.existentialrisk.com/concept.html>, Accessed 07-04-2011, JG)

There are some obvious actions that would probably reduce existential risk by a tiny amount. For example, increasing funding for ongoing efforts to map large asteroids in order to check if any of them is on collision course with our planet (in which case countermeasures could be devised) would probably reduce the asteroid risk by a modest fraction. Since asteroids pose only a small existential risk to begin with (on a time scale of, say, a century) this is unlikely to be the most cost-effective way to reduce existential risk. Nevertheless, it might dominate conventional philanthropic causes in terms of expected amount of good achieved. (This is not obvious because conventional philanthropy likely has some indirect effects on the level of existential risk—for instance by changing the probability of future war and oppression, promoting international collaboration, or affecting the rate of technological advance.)

## Risk High Now

### Risk of extinction is high—experts

Matheny 7 (Jason, Research Associate at the Future of Human Institute at Oxford University “Reducing the Risk of Human Extinction,” *Risk Analysis*, Volume 27, Issue 5, October, http://jgmatheny.org/matheny\_extinction\_risk.htm)

It is possible for humanity (or its descendents) to survive a million years or more, but we could succumb to extinction as soon as this century. During the Cuban Missile Crisis, U.S. President Kennedy estimated the probability of a nuclear holocaust as "somewhere between one out of three and even" (Kennedy, 1969 , p. 110). John von Neumann, as Chairman of the U.S. Air Force Strategic Missiles Evaluation Committee, predicted that it was "absolutely certain (1) that there would be a nuclear war; and (2) that everyone would die in it" (Leslie, 1996 , p. 26). More recent predictions of human extinction are little more optimistic. In their catalogs of extinction risks, Britain's Astronomer Royal, Sir Martin Rees (2003) , gives humanity 50-50 odds on surviving the 21st century; philosopher Nick Bostrom argues that it would be "misguided" to assume that the probability of extinction is less than 25%; and philosopher John Leslie (1996) assigns a 30% probability to extinction during the next five centuries. The "Stern Review" for the U.K. Treasury (2006) assumes that the probability of human extinction during the next century is 10%. And some explanations of the "Fermi Paradox" imply a high probability (close to 100%) of extinction among technological civilizations (Pisani, 2006 ).4 Estimating the probabilities of unprecedented events is subjective, so we should treat these numbers skeptically. Still, even if the probability of extinction is several orders lower, because the stakes are high, it could be wise to invest in extinction countermeasures.

## Colo Key To Solve

### Space colonization is key to reduce the risk of extinction.

Matheny 7 (Jason, Research Associate at the Future of Human Institute at Oxford University “Reducing the Risk of Human Extinction,” *Risk Analysis*, Volume 27, Issue 5, October, http://jgmatheny.org/matheny\_extinction\_risk.htm)

As for astronomical risks, to escape our sun's death, humanity will eventually need to relocate. If we survive the next century, we are likely to build self-sufficient colonies in space. We would be motivated by self-interest to do so, as asteroids, moons, and planets have valuable resources to mine, and the technological requirements for colonization are not beyond imagination (Kargel, 1994 ; Lewis, 1996 ). Colonizing space sooner, rather than later, could reduce extinction risk (Gott, 1999 ; Hartmann, 1984 ; Leslie, 1999 ), as a species' survivability is closely related to the extent of its range (Hecht, 2006 ). Citing, in particular, the threat of new biological weapons, Stephen Hawking has said, "I don't think the human race will survive the next thousand years, unless we spread into space. There are too many accidents that can befall life on a single planet" (Highfield, 2001 ). Similarly, NASA Administrator, Michael Griffin (2006) , recently remarked: "The history of life on Earth is the history of extinction events, and human expansion into the Solar System is, in the end, fundamentally about the survival of the species."

## AT: No Extinction – History Prooves

### The fact that we haven’t gone extinct yet isn’t a reason that we won’t in the future

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

Other anthropic arguments may be more successful: the argument based on the Fermi-paradox is one example and the next section provides another. In general, one lesson is that we should be careful not to use the fact that life on Earth has survived up to this day and that our humanoid ancestors didn’t go extinct in some sudden disaster to infer that that Earth-bound life and humanoid ancestors are highly resilient. Even if on the vast majority of Earth-like planets life goes extinct before intelligent life forms evolve, we should still expect to find ourselves on one of the exceptional planets that were lucky enough to escape devastation.[15] In this case, our past success provides no ground for expecting success in the future

## Preventative Action Good

### Preventative action is necessary—we don’t get a second chance.

Bostrom 02 (Professor in the Faculty of Philosophy at Oxford, “Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards,” *Journal of Evolution and Technology*, Volume 9, Number 1, Available Online at http://www.nickbostrom.com/existential/risks.html, Accessed 07-04-2011, JG)

Our approach to existential risks cannot be one of trial-and-error. There is no opportunity to learn from errors. The reactive approach – see what happens, limit damages, and learn from experience – is unworkable. Rather, we must take a proactive approach. This requires foresight to anticipate new types of threats and a willingness to take decisive preventive action and to bear the costs (moral and economic) of such actions.