

Consequences of Nuclear Disasters

**HEALTH CONSEQUENCES OF CHERNOBYL:
THE NEW YORK ACADEMY OF SCIENCES PUBLISHES
AN ANTIDOTE TO THE NUCLEAR
ESTABLISHMENT'S PSEUDO-SCIENCE**

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In February 2010, the New York Academy of Sciences published the most complete and up-to-date collection of evidence, from independent, scientific sources all over the world, on the health and environmental consequences of the Chernobyl accident. For 24 years, through a high-level, internationally coordinated cover-up of the world's most serious industrial accident, the nuclear lobby has deprived the world of a unique and critically important source of scientific information. The International Atomic Energy Agency (IAEA), mouthpiece of the nuclear establishment, has coordinated the cover-up through the dissemination and imposition of crude pseudo-science. Regrettably, the World Health Organization, a U.N. agency on which the world's people rely for guidance, is subordinate to the IAEA in matters of radiation and health, has participated in the cover-up, and stands accused of non-assistance to populations in danger. The new book on Chernobyl makes available huge amounts of evidence from independent studies undertaken in the affected countries, unique and valuable data that have been ignored by the international health establishment. This comprehensive account of the full dimensions of the catastrophe reveals the shameful inadequacy of current international assistance to the affected populations. It also demonstrates, once more, that future energy options cannot include nuclear power.

With the cover-up of the health and environmental consequences of the Chernobyl accident, the nuclear establishment—which includes, most notably, the nuclear powers and therefore the leaders of the Western world—has deprived the world's people of a unique and critically important source of scientific information. It is

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part of a general cover-up that serves the nuclear industry, both civil and military, and has done so for more than 50 years. Above all, it serves the geopolitical ambitions of a handful of nations,¹ allowing them to maintain a position of overwhelming power in the world—itsself the major source of global insecurity and violence. The cover-up has disserved humanity and all other life forms and has damaged their life-support system—the environment—for tens of thousands of years and their genetic inheritance, irrevocably.

There could be no clearer illustration of the nihilism of unfettered power. As the unknown author of “Abyss” pointed out, as early as August 1986, in relation to the cover-up: “the demand for life has now become a revolutionary programme; . . . carried farther and farther into madness by the necessities of their dominance, those social forces which would once have been described as conservative *are no longer concerned even with the conservation of the biological bases for the survival of the species*” (1, emphasis added).

NOT THE FIRST ANTIDOTE, BUT A HIGHLY “RESPECTABLE” ONE

Independent scientists and health and environmental activists have made heroic efforts over the past 24 years to expose the cover-up and to provide the public with reliable evidence from independent scientific studies (2–6). Progress has been slow—because they have faced the world’s most powerful lobby—but it has been steady.

The recent book, entitled *Chernobyl: Consequences of the Catastrophe for People and the Environment* (7), is written by Professor Alexey Yablokov, Professor Vassili Nesterenko, and Dr. Alexey Nesterenko,² independent scientists from the affected countries who have devoted their lives to the victims of Chernobyl, through scientific study, international, collaborative efforts to expose the truth, and the care and treatment of affected populations.

The book provides the most complete and up-to-date collection of evidence, from independent researchers all over the world, of the nature and extent of the damage to human beings and the environment of the Chernobyl accident, which occurred on April 26, 1986, in Ukraine, in the former Soviet Union. It makes powerful reading and is accessible to interested citizens, health professionals, and scientists alike. It represents a considerable challenge to the pro-nuclear authorities, all the more so because the strategies routinely used

¹ Before 1989, this handful of nations included the USSR. Today, by and large, the independent states of the former Soviet Union continue to toe the nuclear industry line, under pressure from the powerful nations, through the IAEA.

² Prof. Yablokov, ecological scientist, Russian Academy of Sciences, Moscow; Prof. Nesterenko (deceased), nuclear physicist, Institute of Radiation Safety (BELRAD), Minsk, Belarus; Dr. Nesterenko, Chief Scientist, Institute of Radiation Safety (BELRAD), Minsk, Belarus.

to discredit independent studies on Chernobyl (discussed below) will not be available. The book is published by the New York Academy of Sciences, and the nuclear establishment will be hard pressed to dismiss a publication emanating from such a venerable institution.

Serious, scientific evaluation of the consequences of the Chernobyl accident has two major implications. The first relates to international assistance to populations of the territories most affected by Chernobyl. Current policy and support, based on establishment pseudo-science, are shamefully inadequate and can be qualified as failure to assist populations in need. The second implication relates to current international policy and negotiations on future energy options, and in particular to the opportunistic, aggressive, and high-profile promotion of nuclear power as a solution to global warming.

This article examines the implications of the high-level cover-up of the world's most serious industrial accident, including the dissemination of crude pseudo-science by the nuclear establishment, chiefly through the International Atomic Energy Agency (IAEA) and then, faithfully reproduced, through the World Health Organization (WHO). I argue that exposing this cover-up and showing the general public and the public health community that they have been deprived of critically important scientific information is the first and essential step toward consideration of the evidence from independent scientific studies. The article briefly outlines the contents of the section of the book on health consequences, and compares the nature and scope of this evidence with that provided by the nuclear establishment.

NUCLEAR POWER IS INCOMPATIBLE WITH DEMOCRACY AND INDEPENDENT SCIENCE

If free and full information about the health implications of all aspects and stages of civil and military nuclear activities were available to the public, nuclear power would have been abandoned in the immediate aftermath of Hiroshima and Nagasaki. Tragically, for the Japanese people and the rest of the world, the real health consequences of the atomic bombs have been shrouded in secrecy since August 6, 1945, and even today, most people are unaware of the nature and extent of the horror (8, 9).

There are striking similarities between the cover-up of Hiroshima and Nagasaki and that of Chernobyl. Data are collected and research is undertaken, in particular by the nuclear powers, in ways that are far from transparent and often under conditions of secrecy, justified by national “interest” and national “security”—national, in this case, referring to powerful nations that were not the immediate victims of the catastrophe. Public information is carefully controlled and dissent is repressed. Care and support for the victims is inadequate and takes second place, if any place at all, to other interests—chiefly military and strategic research (10).

Democracy is one victim of nuclear power, and independent science is another. It is through the control, management, and *manipulation of scientific research*,

research institutes, and researchers that the nuclear establishment has managed to convince the world's people of the safety, acceptability, and even desirability of the technology. There are dozens of excellent historical accounts of the corruption of science and the cover-up of the health and environmental consequences of nuclear activities between the 1940s and now, and the reader is referred to a small selection (10–15).

INDEPENDENT RESEARCH DEBUNKS THE MYTH OF “ATOMS FOR PEACE”

Serious, scientific studies of the health and environmental consequences of nuclear activities undertaken by independent researchers reveal, first and foremost, that there is no such thing as “atoms for peace.”³ Nuclear power is not and cannot be anything other than violent, whether exploited in the civil or military context. Use of a technology that involves emission of substances for which no safe threshold is known, that is not only uncontrollable but is *knowingly not controlled* (16, 17),⁴ and that is imposed on populations who have not been adequately informed about its health and environmental implications is, by definition, violent.

Victims of this violence include all those affected by atmospheric and underground nuclear weapons testing, Pacific Islanders in particular (18); those living downwind of nuclear power stations and nuclear research centers (19); those living in coastal areas contaminated by legal and illegal dumping of toxic nuclear waste into the sea (20); the populations of the most affected territories around Chernobyl and inhabitants of areas close to the site of any and all reactor accidents, whether or not reported (7, 21); communities affected by uranium mining (22), miners themselves, and nuclear industry employees; the populations of Hiroshima and Nagasaki (23); in most recent history, the populations affected by the use of nuclear weapons (i.e., those containing depleted uranium) in Iraq, the former Yugoslavia, Afghanistan, and Palestine (24; see also www.cadu.org and www.umrc.net); and finally, the ever-growing number of people who are victims of the cancer epidemic (25). As discussed below, the accumulation of radionuclides, which have spread gradually through the earth's atmosphere over six decades of nuclear activity, implies that the victims of nuclear violence include the whole of humanity and all other life forms.

Independent evaluations also reveal, of course, that civil and military uses of nuclear power are inseparable and that nuclear power as a source of electricity is

³ Atoms for Peace was a program launched by President Eisenhower in 1953. The concept was taken up in the IAEA mandate to promote “peaceful use of the atom.”

⁴ For example, the criteria used in radiation protection to set acceptable exposure levels “as low as reasonably achievable” (ALARA) appear to be determined by cost considerations rather than known health risks.

of no interest. In addition to the fatal combination of danger and uncontrollability, it is prohibitively expensive when the real costs of *all* activities from extraction to decommissioning, and massive public subsidies, are included (26; see also www.sortirdunucleaire.org). As a source of plutonium, of course, despite the enormous quantities already produced, nuclear power is of great interest.

THE INTERNATIONAL ATOMIC ENERGY AGENCY:
U.N. AGENCY OR MILITARY-INDUSTRIAL LOBBY?

An independent evaluation would reveal, above all, that the nuclear establishment has constructed and maintained a false front of respectable, authoritative, serious science and is responsible for a cover-up of colossal dimensions. Governments, national and international authorities, academic and research institutions, *and the United Nations system* are all involved.

The World Health Organization has been accused of silence, lies, and complicity in this scientific crime (27, 28), and in particular of failure to assist populations in danger. The WHO is subordinate to the IAEA in matters of radiation and health, even though the latter has no public health competence or mandate. The statutes of the IAEA specify that its goal is “to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world.” It is, in fact, a commercial lobby (covertly serving military interests) that has no role to play in public health policymaking or research. Furthermore, the IAEA reports to the U.N. Security Council, where the abuse of veto power ensures obedience to the United States and its close allies, whereas the WHO reports only to the Economic and Social Council of the United Nations, lower in the U.N. hierarchy—and insignificant in terms of geopolitical power.

The 1959 Agreement between the WHO and the IAEA (as of 1999 in its 42nd edition; 29) is the major source of disinformation on the health consequences of nuclear activities, including the Chernobyl catastrophe. Public health research on radioactivity by the WHO must be agreed upon by the IAEA and, indeed, the WHO may undertake no independent initiative in nuclear matters without prior IAEA agreement. The agency has vetoed conferences planned by the WHO on radioactivity and public health and, in turn, the international health authority has endorsed the nuclear lobby’s ludicrous statistics on death and disease resulting from the Chernobyl accident: 56 deaths and 4,000 thyroid cancers (30).

Article 1.3 of the Agreement states: “Whenever either organization proposes to initiate a programme or activity on a subject in which the other organization has or may have a substantial interest, the first party shall consult with the other with a view to adjusting the matter by mutual agreement.”

For the nuclear powers, research indicating harm from ionizing radiation must be averted at all costs, partly because it represents a commercial threat, but more significantly because it represents a threat to their military and geopolitical strategy, and therefore their supremacy.

PROVING THE HIGH-LEVEL, INSTITUTIONAL
COVER-UP: FIRST STEP IN RAISING
PUBLIC AWARENESS

It is essential for the public to grasp that the nuclear “lobby” includes the world’s highest authorities and is of incomparably greater power than *industrial and commercial* lobbies. The term nuclear “establishment” rather than nuclear “lobby” is used in this article because, unlike industrial lobbies, the interests of the nuclear establishment extend well beyond commerce and profit into the geopolitical, military, and strategic spheres and *include national governments and national and international authorities* (10, 31, 32).

The nuclear establishment, therefore, carries tremendous authority in the public mind, and the WHO, in particular, enjoys considerable prestige. This is a major obstacle to understanding and accepting that there has been a cover-up and, in turn, to an open-minded consideration of independent studies. Despite the veneer of respectability, however, the general public appears to suspect that the *whole truth has not been told* in relation to the safety and real interests of nuclear activities. This healthy cynicism, which is a precious seed to be carefully cultivated, is critical to the development of public awareness and to citizen demands for serious scientific studies on this subject.

SILENCE, LIES, AND COMPLICITY:
THE WORLD HEALTH ORGANIZATION COVER-UP

IndependentWHO, a collective formed in 2007, calls for the complete independence of the WHO in matters of radiation and health, including revision of the 1959 Agreement with the IAEA, which has made it impossible for the international health authority to fulfill its constitutional mandate as “the directing and coordinating authority on international health work.” IndependentWHO has maintained a permanent protest outside WHO headquarters in Geneva, every working day from 8 a.m. until 6 p.m., since 2007. Beyond this symbolic vigil, the collective is working on various fronts, including discussions with member states’ U.N. missions to push for presentation of a resolution at the World Health Assembly, collaboration with the U.N. Human Rights Council on the Right to Food and the Right to Health, and media coverage, among other activities (see www.independentwho.info).

The many unanswered questions relating to the WHO’s lack of independence and its subservience to the IAEA in the area of radiation and health include the following:

1. *Where are the proceedings of two major international conferences, held in Geneva (1995) and Kiev (2001),⁵ on the health consequences of Chernobyl?* The WHO claims that these were duly published but is unable to produce them. Hundreds of scientific papers, many emanating from independent scientists and medical doctors working in the contaminated territories, have been withheld from the scientific community and the public. Challenged by a journalist in 2007, the WHO repeated the false claim,⁶ stated that “the reports of both these conferences were published,” and provided references to a collection of abstracts and a selection of 12 of 700 papers, presentations, and other abstracts (33, 34). These are, of course, neither proceedings nor reports of the Geneva and Kiev conferences. The conference documents were not published; they were censored. The WHO has lied on this point, and the world’s people need to know why.

2. *Why was the WHO absent (with a couple of minor exceptions) from Chernobyl for five years after the accident?* This extraordinary neglect is in violation of the WHO’s constitutional mandate to provide health advice and assistance to populations in need. In early 1990, the Russian Federation submitted a request to the WHO for an action plan. In 1995, at the Geneva conference mentioned above, it transpired that the IAEA designed and produced the plan in 1991 (35), which the WHO subsequently executed.

3. *Why was it the IAEA that produced an action plan that was requested of the WHO by one of its member states? Why was research on damage to the human genome omitted and research on dental caries made a priority?* It is important to recall that in 1956, before the Agreement with the IAEA was signed, the WHO convened a group of experts in the field of genetics, including the Nobel Prize laureate H. J. Muller, who stated (36):

the genome is the most valuable treasure of human kind. It determines the life of our descendants and the harmonious development of the future generations. As experts, we confirm, that the health of future generations is threatened by the expansion of the nuclear industry and the growth of the quantity of radioactive sources. We also consider the fact of appearance of new mutations observed in people to be fatal for them and for their descendants.

No scientific evidence has emerged since 1956 to contradict this position. On the contrary, subsequent studies indicate that the dangers have been underestimated.⁷

⁵ International Conference on the Health Consequences of the Chernobyl and Other Radiological Accidents, Geneva, November 1995; Third International Conference on Health Effects of the Chernobyl Accident: Results of 15 Year Follow up Studies, Kiev, June 2001.

⁶ An e-mailed reply to the medical correspondent of a major British newspaper; copy available from the author on request.

⁷ The ICRP-recommended permissible doses of radiation, however inadequate for public protection they may be, have steadily decreased over the decades.

4. *Was a former director-general of the WHO mistaken in attributing the censorship to the legal Agreement binding the WHO and the IAEA?* Dr. Hiroshi Nakajima, former director-general of the WHO, stated on Swiss Italian television in Kiev, in 2001, that the obstacle to publication of the proceedings of the Geneva conference in 1995 was the legal agreement binding the WHO to the IAEA (37). To their shame, current WHO officeholders disavow their former director-general, dismiss the significance of the Agreement, and strenuously deny that the IAEA exerts any influence whatsoever on the WHO (38).

5. *Given that the WHO is “the directing and coordinating authority on international health work,” what competence does the WHO have today at its headquarters in Geneva for setting norms and standards in radiation and health?* After two years of IndependentWHO’s permanent protest, a delegation from the collective finally obtained an interview in July 2009 with WHO staff responsible for radiation and health. Of the five WHO staff members present, only one (very junior and very young) had any qualification in radiation science, two were medical doctors with public health qualifications, one was an epidemiologist, and one was an information officer. When asked who within the WHO was responsible for the setting of norms and standards in radiation and health, the answer was “the people in this room.” Aware of the absurdity of this assertion, a qualification was quickly added: “with experts from the IAEA and UNSCEAR [U.N. Scientific Committee on the Effects of Atomic Radiation] of course.” Two points need to be made here. First, it is the mandate of the WHO, not of the IAEA or of UNSCEAR, to set norms and standards in health. Second, if the people who were in that room do indeed constitute the WHO’s competence in radiation and health, then *the world has no credible international health authority in this critically important area.*

WHO’S AFRAID OF THE CHILDREN OF CHERNOBYL?

Senior staff at the WHO, including the director-general, have reacted to IndependentWHO with undisguised hostility. The U.N. agency’s initial response on April 26, 2007, to the silent, nonviolent presence of three middle-aged people wearing sandwich boards in front of its headquarters, and a handful of peaceful protesters arriving from downtown, was disproportionately repressive—involving barricades and several anti-riot vans of the Geneva police.

In July 2009, when the delegation of IndependentWHO (three other middle-aged people) arrived at headquarters for its meeting with WHO staff responsible for radiation and health, it was provided with an unusual escort. A secretary was at reception to greet and accompany the group through underground corridors to the shabby annex that houses the department, but the delegation was preceded and followed by two security guards, who were duly summoned two hours later to escort the group out of the building. Whether the intention was to impress or

discourage, these highly exceptional “security measures” are clumsy in the context of a meeting of concerned citizens with international public servants. Such inappropriate displays of naked power detract from the legitimate authority of a U.N. agency and reinforce the impression that the WHO has something to hide and that public knowledge in this area represents a serious threat.

Director-General Margaret Chan, at various meetings with her staff, has made clear that contact with the protesters is not encouraged and, according to informal reports, a variety of inaccurate statements have been made that disinform staff and discredit the action. None of this should come as a surprise. The nuclear powers that make up the U.N. Security Council and direct the United Nations and its specialized agencies, including the WHO, would not tolerate a director-general who had not grasped *the geopolitics of public health in relation to the atom*.

DISCREPANCIES IN ESTIMATES OF MORBIDITY AND MORTALITY CAN NO LONGER BE IGNORED

The official estimates of the health problems (morbidity and mortality) in the regions affected by Chernobyl differ from those of various independent researchers by a factor of 100, sometimes even 1,000 (7). These massive discrepancies—well in excess of the normal scientific margin of uncertainty—make imperative an independent, transparent, and publicly accountable investigation. The discrepancies exactly parallel the source of the “science”—that is, whether it emanates from the nuclear establishment (including the academic and research institutions it controls) or from independent researchers.

To cite one of the most obvious examples, between 600,000 and 800,000 liquidators participated in the Chernobyl clean-up, and many were subjected, often without protection, to horrifying levels of radiation and minute dust particles rich in uranium isotopes. The WHO-IAEA-UNDP (U.N. Development Programme) in 2005 still presented a final total of about 50 deaths (30), whereas the chief medical officer of the Russian Federation noted in 2001 that 10 percent of its 184,000 liquidators had already died (10, p. 28); Ukraine has provided similar figures.

The discrepancies are not only among nongovernmental organizations, country experts, independent scientists, and “official” estimates but also within international organizations themselves. In 2000, U.N. Secretary-General Kofi Annan stated that more than 7 million people were still suffering and the exact number of victims may never be known, but 3 million children required treatment and many would die prematurely (39). In the same year, the International Federation of Red Cross and Red Crescent Societies, on the basis of medical screening in the three countries, found that 83.1 percent of adults and 76.8 percent of children were ill (40). The 2006 Greenpeace report, produced with contributions from hundreds of independent scientists from the three countries, concluded that in these three countries alone, the accident resulted in an estimated 200,000 additional deaths between 1990 and 2004 (3). Yablokov, Nesterenko, and Nesterenko (7) present a

table showing estimates, from 13 different sources, of deaths from cancer. These range from 4,000 (30) to between 899,310 and 1,786,657 worldwide (41).

FLAWS IN THE SCIENCE AND RESEARCH OF THE NUCLEAR ESTABLISHMENT

As a general point, since the 1950s, health professionals have been largely excluded from the organizations responsible for health assessment and protection policies in matters of radiation. These matters are decided by the nuclear establishment made up of the International Commission on Radiological Protection (ICRP), the IAEA, and UNSCEAR at the international level, and agencies such as the NCRP (National Council on Radiation Protection, U.K.), BEIR (Biological Effects of Ionizing Radiation, U.S.), and EURATOM (European Community of Atomic Energy, E.U.) at the national and regional levels. These entities are closely interlinked, with overlapping and *often closed* membership, and they fund, direct, and control the vast majority of studies undertaken in academic and research institutions (11).

Specifically, the health effects of chronic, low-level irradiation of certain organs that accumulate radionuclides have been denied, and inappropriate models based on a one-time, external, high-level radiation event (as in Hiroshima) have been applied. Both national and international authorities have recognized that there is no safe, risk-free dose of ionizing radiation (42), and it is being conceded that the model on which the ICRP bases its recommendations for radioprotection (a single, massive, mostly external radiation event as in Hiroshima) is irrelevant to internal, low-dose exposure (43–46).

The science that has informed the nuclear debate in general and Chernobyl in particular is corporate science, and the flaws in this pseudo-science range from the flagrant and preposterous to the subtle and dishonest. The first category includes falsification and suppression of data, failure to undertake regular, whole-body measurements and to correlate these with development of cancer or any other health problems, attacks on independent researchers and their institutions,⁸ censorship of studies that reveal adverse effects, discounting of thousands of untranslated studies from the three most affected countries, and exclusion from conference agendas of entire scientific domains (such as the health effects of chronic, low-dose, internal radiation, accounting for most of the contamination in populations around Chernobyl).

The second, more subtle category includes averaging exposures over entire populations and ignoring local sources of concentrated contamination; ending studies after 10 years, thereby excluding long latency problems (10 to 30 years) as

⁸ The attacks include, for example, the imprisonment of Prof. Bandachevsky (who demonstrated the link between various pathologies and levels of radionuclides in specific organs), adopted as a Prisoner of Conscience by Amnesty International and released in 2005.

well as long-term morbidity and mortality; qualifying five-year survival as “cure”; only considering cancer; only considering those still alive; only considering the three most affected countries; claiming decreases in childhood cancers when, in fact, children have become adults with cancer and therefore no longer appear in that database; and dozens of other shameful manipulations of data (47).

THE INTERNATIONAL COMMISSION ON RADIOLOGICAL
PROTECTION: A CLOSED CLUB OF USERS OF RADIATION,
NOT A BODY OF INDEPENDENT SCIENTIFIC EXPERTS

At the pinnacle of the nuclear establishment is the ICRP, which recommends the radiation standards and practices that are generally accepted and implemented throughout the world. Rosalie Bertell explains (11, p. 174.):

Membership of the ICRP is highly selective and controlled. Prospective members must be recommended either by current ICRP members or by members of the International Congress of Radiology and then approved by the ICRP International Executive Committee. Through this structure, participation in standard setting has been dominated by colleagues from the military, the civilian nuclear establishment and the medical radiological societies who nominate one another. Participation of physicians in ICRP is limited to medical radiologists. . . . There is no independent body, even the WHO, which can place a person on the ICRP.

Furthermore, Bertell points out that “in its functioning since the 1950s, *the ICRP has never taken a public position in favour of protecting public health* in any of the controversial radiation-related problems encountered” (11, emphasis added). In short, there is no credible international authority responsible for the public health implications of nuclear activities, in research, in dissemination of reliable information to the public, or in implementation of radioprotective measures.

THE CHERNOBYL FORUM: A PSEUDO-SCIENTIFIC
ASSAULT ON THE VICTIMS OF CHERNOBYL

In the face of contradictory evidence, public uncertainty, and mistrust in relation to official assessments of the health and environmental consequences of the accident, in 2003 the director-general of the IAEA established the Chernobyl Forum with eight other U.N. agencies in order to present a consensual and authoritative “final verdict” on Chernobyl. The Forum’s final report, *Chernobyl’s Legacy*, was published in 2005 (48).

The conclusions of the Forum’s Expert Group on Health are as follows (48, pp. 36, 37):

The mental health impact of Chernobyl is the largest public health problem unleashed by the impact on individual and community behaviour. Populations

in the affected areas exhibit strongly negative attitudes in self-assessments of health and wellbeing and a strong sense of lack of control over their own lives. Associated with these perceptions is an exaggerated sense of the dangers to health of exposure to radiation. . . . Many residents of the affected areas neglect the role of personal behaviour in maintaining health. . . . The most pressing concerns for the affected areas thus lie in poor diet and life style factors such as alcohol and tobacco use, as well as poverty and limited access to health care.

This summary from the health experts' report for the Chernobyl Forum is not merely a pseudo-scientific insult, it is a pseudo-scientific assault. Any reader who experiences the slightest discomfort on reading the summary may consult the myriad sources of information in the public domain on the Internet—and will be hard pressed to find a statement as outrageous, and *literally unbelievable*, as this one. The source of the summary of the health consequences of the Chernobyl catastrophe, to its eternal shame, is the United Nations family, under the leadership of the IAEA.⁹

There is no adequate response to this unspeakable dishonesty, but the following observation is useful—if terrifying: “Never in the past has a ruling class been able to press such vast means into service of such a *total contempt for life*” (1, emphasis in original).

Let's turn now to the antidote, in the form of serious science, the collection of evidence from independent scientists just published by the New York Academy of Sciences (7), compare it with evidence provided by the nuclear establishment, and examine some of the grounds for doubting the validity of the latter's assessments.

ONE NUCLEAR REACTOR IS CAPABLE OF DANGEROUSLY CONTAMINATING THE GLOBE

The radioactive cloud from Chernobyl passed at least twice around the globe at a height of between 1,500 and 10,000 meters, leaving its trace mainly in the Northern hemisphere. The greater part of the radionuclides (*up to 57%*) fell in countries outside the USSR. Although there is still controversy over the amount of radionuclides expelled, it is clear that the output contained several hundred times the quantity released from Hiroshima and Nagasaki. In 13 European countries, more than 50 percent of the territory was dangerously contaminated by radionuclides, and in 8 others the figure is 30 percent. Between 150 and 230 million people living in areas outside Europe were contaminated to some degree. Studies from all over the world report health effects of Chernobyl, even

⁹ These include the IAEA, WHO, UNDP, FAO (Food and Agriculture Organization), UNEP (U.N. Environment Programme), UN-OCHA (U.N. Office for the Coordination of Humanitarian Affairs), UNSCEAR, World Bank, and the governments of Belarus, the Russian Federation, and Ukraine.

in the United States, although the Americas were one of the least contaminated continents (49).

Despite these facts about the *global* nature of the catastrophe, and in particular the significant contamination of vast areas of Europe, the Chernobyl Forum focuses exclusively on the worst affected areas of Belarus, Ukraine, and the Russian Federation, and exclusively on three groups: the liquidators, populations living in the most contaminated areas, and populations that were evacuated. There is no scientific or moral justification for the failure to present any evidence on the health and environmental consequences of Chernobyl for the rest of the population in the three above-mentioned countries, populations elsewhere in Europe, and populations everywhere in the path of the fallout.

The authors of the new book present evidence from independent studies undertaken in countries worldwide: Europe, of course; Asia, which received 10 percent of all fallout; Africa, which received more than 5 percent; the Americas, which received 1 percent; and even Arctic regions.

Restricting consideration to the three most affected countries (not to mention dismissing the problems there as radiophobia) is just one of the gross omissions in the nuclear establishment's assessments of the consequences of Chernobyl. Another gross omission relates to the nature and dimension of health problems experienced. Consideration has been restricted from the start to cancer (with belated inclusion of leukemia) and certain, carefully defined birth defects—even though it has been known for more than 50 years that radioactive contamination has multiple health effects. Indeed, because of its effects on the immune system, every organ system is affected, resulting in increases in all kinds of known illnesses in addition to illnesses specific to radiocontamination (7, 50).

THE REAL DIMENSIONS OF THE HEALTH CONSEQUENCES OF CHERNOBYL

The table of contents of the book published by the New York Academy of Sciences (7) provides an indication of the real dimensions of the health and environmental consequences of the Chernobyl accident. Part II of the book, which is devoted to population health, presents evidence on the following: general morbidity and invalidity, radiation-induced premature aging, circulatory and lymphatic system disorders, genetic alterations, endocrine system disorders, dysfunction of immune and lymphoid systems, respiratory system disorders, urogenital and reproductive system disorders, bone and muscular system disorders, nervous system and sensory organ disorders, disorders of the digestive system and other internal organs, disorders of skin and subcutaneous organs, infections, and congenital abnormalities. Then, in two separate sections, it covers cancer morbidity, and mortality.

This 330-page collection of evidence, with about 800 references, draws on 5,000 scientific articles accessible on the Internet, published for the most part

in Slavic languages. This is just part of the enormous scientific literature devoted to the consequences of the disaster, which includes more than 30,000 texts and articles (available on the Internet).

The overall conclusions can be summarized as follows: Thousands of independent studies in Ukraine, Belarus, and the Russian Federation, and in many other countries contaminated to varying degrees by radionuclides from Chernobyl, have established that there has been a significant increase in all types of cancer; in diseases of the respiratory, cardiovascular, gastrointestinal, urogenital, endocrine, immune, lymphoid, and nervous systems; prenatal, perinatal, infant, and child mortality; spontaneous abortion; deformities and genetic anomalies; disturbance and retardation of mental development; neuropsychological illness; and blindness.

The increases are not trivial and cannot be dismissed. They are not increases of a few percent, as suggested by the Chernobyl Forum. Rates of illness have doubled, tripled, quadrupled, or more, for certain conditions. The frequency of cancer, for example, increased by 40 percent in Belarus between 1990 and 2000. Children's health continues to deteriorate, and this includes, of course, children born since the accident to parents who suffered radioactive contamination.

ACCORDING TO ICRP'S OWN CALCULATIONS,
MORE THAN 100,000 ADDITIONAL CANCER
DEATHS ARE EXPECTED

The area of radiation and health as presented by our national and international authorities is full of internal contradictions. One of these relates to expected cancer deaths from various levels of contamination. Alex Rosen, of International Physicians for the Prevention of Nuclear War (IPPNW), has pointed out the ICRP's own calculations would predict well over 100,000 cancer deaths from a meltdown such as occurred at Chernobyl (47). He explains this as follows: The ICRP calculated in 1977 that 125 additional cancer deaths would be caused by each 1 million man-rem of radiation (a man-rem is a unit of absorbed radiation equal to one rem absorbed by one person). Taking the official statistics from Annex 7 of the report of the USSR to the IAEA in August 1986 (51), 240.6 million man-rem were released at Chernobyl, which would imply 30,075 additional cancer deaths. However, in 1990, in its 60th report, the ICRP corrected its original risk factor to 500 additional cancer deaths per 1 million man-rem, bringing the total to 120,300. In 2000, after reviewing statistical evidence and new scientific research, UNSCEAR corrected this risk factor once more and published the figure of 11,000 cancer deaths per 1 million man-rem, bringing the figure of additional cancer deaths due to Chernobyl to 264,660. These estimates accord very well with estimates and reports from independent researchers.

The nuclear establishment will retort that the Soviet estimates were inflated. If anything, of course, the opposite is true. The curious disappearance of Annex 7 and the IAEA decision—with no scientific justification—to dismiss

Soviet estimates of the amount of radiation released and simply divide them by 10 are recounted by Tchertkoff and Belbeoch, among others (10, 52).

In this regard, it is worth recalling that there was and still is disagreement on the amount of radiation released from the reactor at Chernobyl and that strikingly contradictory figures were issued even from establishment sources. The USSR initially claimed that 50 to 80 million curies were released; the U.S. Lawrence Livermore National Laboratory put forward a figure of 4.5 billion curies, corresponding to half the core radioactivity; and the chief scientific supervisor of the USSR clean-up team *and* the former chair of the U.S. Nuclear Regulatory Commission both concluded that the full inventory of volatile fission products from the reactor was released, amounting therefore to 9 billion curies (53).

These are unimaginably huge amounts of radioactivity. They put into perspective the blithe assurances from the nuclear establishment that contamination from Chernobyl corresponds approximately to levels of natural background radiation. Even the lowest figure would correspond to an immediate doubling of background radiation, and the highest figure to 180 times background levels.

GAPING HOLES IN ESTABLISHMENT SCIENCE

In addition to the two major omissions already cited (in terms of geographic spread and the range of health conditions considered), there are further limitations in scope in the nuclear establishment's assessments of the health consequences of Chernobyl. Most significantly, the role of chronic, internal, low-dose radiation has been denied, allowing the nuclear establishment to ignore 95 percent of the contamination of populations ingesting radionuclides through food (50). Total exposures over time, *past, present, and future*, and in particular the initial massive dose received at the time of the accident, are rarely considered when "safe levels" are calculated. The role of hot particles is ignored, as is the interaction between chemical and radioactive pollution and, in particular, in the area of Chernobyl, the effect of the thousands of tons of lead used to extinguish the fire. The list of omissions is long, and readers are referred to other sources (7, 54, 55).

The WHO insists that it bases its conclusions on the world's experts and takes into account only peer-reviewed studies of the highest scientific quality, thus implying that 688 of the 700 presentations at the 1995 Geneva conference were of unacceptably low quality, as only 12 were published (34). Three points need to be made. First, references listed in independent evaluations include hundreds of studies published in peer-reviewed journals. Second, as mentioned above, the nuclear establishment funds, directs, and controls most academic and research institutes. Third, whether or not studies are methodologically weak, the raw data are of enormous value, and the WHO should offer technical assistance in the design of research protocols to make use of this unique source of information, for the good of humankind.

To what extent does the WHO itself rely on peer-reviewed studies? The chapter on mortality in the report of the Chernobyl Forum's Expert Group on Health (56) is revealing. It lists a scant 11 references, 5 from one author (a WHO expert), 3 from the nuclear establishment (IAEA, ICRP, and UNSCEAR), 1 from the Ministry of Health of the Russian Federation, and 2 personal communications. *Just 2 of these 11 references are studies published in the peer-reviewed literature.* From this raft of expertise, the WHO concludes that "epidemiological studies of residents of areas contaminated with radionuclides in Belarus, Russia and Ukraine performed since 1986, so far have not revealed any strong evidence for radiation induced increase in general population mortality" (56, p. 107). Readers are referred to Belbeoch (52) for a comprehensive critique of the report.

AN INDICTMENT OF CAPITALISM OR CONTAMINATION?

From many points of view, the nuclear establishment was extraordinarily lucky that the inevitable, major accident happened in the USSR. Not only was it able to claim (falsely) that such a catastrophe could never happen in the West, but the collapse of communism provided a convenient explanation for subsequent increases in health problems, with the destruction of health services and deterioration in social welfare. These have indeed produced a health crisis and an unprecedented fall in life expectancy, which puts the nuclear powers in the uncomfortable position of indicting either the savage capitalism imposed on populations after 1989 or radioactive contamination from Chernobyl.

Fortunately, they have been able to roll out the usual suspects: the victims themselves, who indulge in radiophobia, irresponsible behavior, apathy, and even parasitism (or state assistance), though it is conceded that social and economic factors have been unfavorable. It is, of course, entirely possible to separate out and control for these factors, as independent researchers have done in studies comparing the health of populations in territories with high, medium, and low contamination. The latest U.N. action plan for Chernobyl cynically qualifies the nuclear disaster as a "low-dose event," thus reproducing two lies: the harmlessness of low-dose radiation and the very small number of victims. Problems are qualified as psychological, as populations have lapsed into apathy, helplessness, and "dependency syndrome" (57).

THE NEW YORK ACADEMY OF SCIENCES CHAMPIONS INDEPENDENT SCIENCE

We have been brought to the brink of destruction by allowing a few nations and their conglomerates (no more than a few thousand people) not only to determine public policy but, *most dangerously, to determine the very evidence base on which this policy is formulated*, through control of research itself and dissemination of the "results" through the IAEA and then through the WHO.

The publication of a comprehensive, up-to-date collection of evidence on Chernobyl from independent researchers, under the auspices of the New York Academy of Sciences, sends a strong signal to our national and international authorities that the credibility of the nuclear establishment's pseudo-science is rapidly evaporating.

Citizen science in the public interest has been critical in revealing the high-level cover-up and scientific crime, and the example of France is worth noting in this regard. The French government lied outrageously to its people about the Chernobyl accident, claiming that the radioactive cloud had miraculously stopped at the frontiers. Almost immediately, independent scientists and citizens set up an organization (Commission pour la Recherche et l'Information Indépendante sur la Radioactivité; www.criirad.org) to undertake independent measurements and research and to inform the public. This organization has become the de facto French national authority on radioactive pollution and is called upon routinely as expert witness on nuclear matters, including to undertake evaluations and provide guidance in other countries. The majority of French people would not dream of relying on France's various nuclear "authorities" for reliable evaluation of nuclear hazards.

Citizen involvement allowing a degree of public oversight and control in the production and dissemination of scientific knowledge is the first step toward independent science and responsible decision-making. Beyond that lies the long struggle to establish the structures and institutions required for publicly controlled, independent science and research, providing the evidence base to national and international authorities acting in the public interest. The major challenge in addressing the dangerous democratic deficit that nuclear pseudo-science represents is strict respect for avoidance of conflict of interest and publicly funded science and research.

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