Downplaying and denial of health effects

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Note

In this document the references are coded by Q-numbers (e.g. Q6). Each reference has a unique number in this coding system, which is consistently used throughout all publications by the author. In the list at the back of the document the references are sorted by Q-number. The resulting sequence is not necessarily the same order in which the references appear in the text.

Contents

IAEA

Statute and mission statement

The International Atomic Energy Agency (IAEA) is an international organisation that seeks to promote the peaceful use of nuclear energy, and to inhibit its use for any military purpose, including nuclear weapons. The IAEA was established as an autonomous organization on 29 July 1957. Though established independently of the United Nations through its own international treaty, the IAEA Statute [http://www.iaea.org/About/statute.html], the IAEA reports to both the UN General Assembly and Security Council. Eighteen ratifications were required to bring the IAEA's Statute into force on 29 July 1957.
Total Membership: 159 (as of February 2013). The Democratic People's Republic of Korea (DPRK), which joined the IAEA in 1974, withdrew its membership of the IAEA in 1994 [http://www.iaea.org/About/Policy/MemberStates/]. Official publications of the IAEA have to be approved by all member states of the IAEA.

The Mission Statement of the International Atomic Energy Agency reads, the IAEA:

* is an independent intergovernmental, science and technology-based organization, in the United Nations family, that serves as the global focal point for nuclear cooperation;
* assists its Member States, in the context of social and economic goals, in planning for and using nuclear science and technology for various peaceful purposes, including the generation of electricity, and facilitates the transfer of such technology and knowledge in a sustainable manner to developing Member States;
* develops nuclear safety standards and, based on these standards, promotes the achievement and maintenance of high levels of safety in applications of nuclear energy, as well as the protection of human health and the environment against ionizing radiation;
* verifies through its inspection system that States comply with their commitments, under the Non-Proliferation Treaty and other non-proliferation agreements, to use nuclear material and facilities only for peaceful purposes.

The mandates of the IAEA: conflict of interest

Communication between the nuclear industry and the national governments is dominated by the IAEA. The IAEA has two mandates: one as watchdog to prevent malicious use of nuclear technology – a role primarily restricted to guarding against illegal nuclear weapons production and proliferation risk –, the other as *promotor* of nuclear power. Moreover, official publications of the IAEA have to be approved by all member states of the IAEA.
For these reasons the IAEA cannot be regarded as an independent scientific institute. No agency can be a true watchdog for an industry it is tasked with promoting.
Political and economic interests may play a role in the decision processes concerning nuclear issues.

ICRP and UNSCEAR

Two other international nuclear institutions, the International Commission on Radiological Protection (ICRP) and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the authorities who formulate the recommendations and standards regarding allowable radiation doses, have strong connections with the IAEA [Bertell 2002] Q420.
The main task of the ICRP seems to be the formulation of a legal framework for authorities and politicians on how to cope with liabilities which may arise from exposure of people to radiation and/or radioactive materials from medical and industrial sources [ICRP *103* 2007] Q544 and [ICRP *111* 2009] Q535.

Limited scope of UNSCEAR

In the text of the report [UNSCEAR 2010] Q531 virtually no mention is made of human-made radioactivity: radiation sources generated by the fission process in nuclear reactors, only sources of natural radiation and radiation from the atomic bombings in Japan are mentioned.
Also missing from the text are:

- references to nuclear power stations, let alone as sources of radiation exposures.
- large nuclear accidents, e.g. Chernobyl
- routine emissions of nuclear power plants, reprocessing plants and uranium mining
- releases of (human-made) radioactive materials into the environment from deteriorating waste storage facilities, leaking pipes and, storage tanks.

Natural radiation sources and human-made sources

Averaged over its full cradle-to-grave period a nuclear power plant of 1 GWe consumes 26 g/kWh of uranium ore (grade 0.1% U) and displaces 130 g/kWh of rock, part of which is weakly radioactive. By processing 26 g/kWh uranium ore, some 3900 Bq/kWh (becquerel per kilowatthour) of highly toxic radioactive elements (U, Th, Po, Bi, Pb, Rn, Ra and Pa) are mobilised from their host rock and released into the environment as dust or dissolved in groundwater [Diehl 2011] Q618.
Important is the fact that a nuclear power plant *generates* massive amounts of human-made radioactivity: fission products and activation products. The amount of human-made radioactivity leaving the nuclear reactor is a *billionfold* greater than the amount of natural radioactivity of the uranium entering the reactor.

The work of UNSCEAR seems to be focused on exposure to external radiation chiefly from natural sources. The impression is given that UNSCEAR (and also ICRP) cares more about radiation from natural sources than from human-made sources. Is natural radioactivity more dangerous than human-made radioactivity? If we have to worry about natural radioactivity, why not about radioactivity from nuclear power plants? The human-made amounts present in the human environment are a billionfold greater than the mobilised natural amounts and involve dozens of hazardous radionuclides not occurring in nature, a number of which can easily enter the food chain and drinking water when released into the environment.

Role of the WHO

The World Health Organization (WHO) also reports on the health aspects of nuclear power, especially in case of large accidents (Chernobyl, Fukushima). Although the WHO is an independent UN organization, its reports on nuclear matters are subject to IAEA's approval. According to an agreement between the International Atomic Energy Agency and the World Health Organization [UN Res. WHA12-40, 28 May 1959] the WHO cannot operate independently of the IAEA on nuclear matters, see also [Tickell 2009] Q527, [WHO 2009] Q562, [Sinaï 2013] Q526 and the preface of [WHO 2013a] Q553. The IAEA ranks higher in the UN hierarchy than the WHO.
Concerning health effects of radioactivity the IAEA, ICRP, UNSCEAR and WHO speak with one voice.

Downplaying and denial of health hazards

From the reports of the IAEA, UNSCEAR and WHO on the subject of health effects of the disasters of Chernobyl (1986) and Fukushima (2011), a picture emerges of the nuclear industry marked by downplaying and even denying health effects caused by exposure to radiation and contamination by radioactive materials. The Mayak (Kyshtym) disaster in the East Ural in 1957 has long been kept secret and is still being concealed (see report m13 *Nuclear disaster at Mayak in 1957*).
Apparently the nuclear industry takes the view that if the relationship between exposure to radiation and a specific health effect in a particular person cannot directly be proven within a short timespan, the cause of the observed disease *must* be non-nuclear. This view is not backed by any epidemiological proof nor other evidence. Non-cancerous diseases are not recognized as radiation-induced health effects, attention is paid mainly to acute radiation syndrome (ARS, radiation sickness).
According to IAEA/UNSCEAR/WHO the death toll of the disaster at Chernobyl was 31, later raised to 'less than 50'. This indicates that only the victims of deterministic (non-stochastic) effects, who died within days, weeks or months have been counted.

An independent assessment estimated the death toll world wide of the Chernobyl disaster at nearly one million people [Yablokov *et al.* 2009] Q419. This estimate is based on numerous publications from Russia, Belarus and Ukraine, publications the IAEA and WHO did not include in their studies. In addition to the casualties there are innumerable people with incurable diseases and malformations following the disaster in 1986, all of whom are ignored by the IAEA and WHO without investigation. The findings of Yablokov et al. are broadly endorsed by the elaborate study of the German Affiliate of Nobel Prize winner International Physicians for the Prevention of Nuclear War (IPPNW) and of the Gesellschaft für Strahlenschutz [IPPNW 2011] Q452.
According to an analysis based on radiological data provided by UNSCEAR, the Union of Concerned Scientists estimates that, among the hundreds of millions of people living in broader geographical areas, there will be 50 000 excess cancer cases resulting in 25 000 excess cancer deaths [UCS 2011] Q522. For this broader group, the report [TORCH 2006] Q521 predicts 30 000 to 60 000 excess cancer deaths. A Greenpeace report puts the figure at 200 000 or more [Greenpeace 2006] Q519. These estimates are not discussed by the IAEA and WHO; the reports are not even mentioned in their official reports.

On 31 May 2013 the UN Information Service published a press release [UNIS 2013] Q532 stating:

> "Radiation exposure following the nuclear accident at Fukushima-Daiichi did not cause any immediate health effects. It is unlikely to be able to attribute any health effects in the future among the general public and the vast majority of workers," concluded the 60 th session of the Vienna-based United Nations Scientific Committee on the Effect of Atomic Radiation (UNSCEAR).

UNSCEAR in its report [UNSCEAR 2013b] Q573 stated concerning the Fukushima disaster:

> "No discernible increased incidence of radiation-related health effects are expected among exposed members of the public or their descendants."

IAEA, UNSCEAR and WHO place full reliance on radiological models for assessment of exposure doses and of dose-effect relationships, with little or no input of empirical evidence that became available after the conception of the models in the 1940s and 1950s. Biochemical behaviour of radionuclides inside the human body are not included. No investigations are reported concerning chronic exposure to radionuclides inside the body, via ingestion (food and water) and inhalation (gases, dust), as little as investigations of exposure to a broad gamut of different radionuclides.
Illustrative of the downplaying and unscientific attitude of the IAEA with regard to the disaster at Chernobyl is the statement of Hans Blix in 1986, then chief of the IAEA:

> "The atomic industry could take a catastrophe like Chernobyl every year."

No reliable investigations

The reliability of the assessments by the IAEA/UNSCEAR/WHO of the health effects of the Chernobyl and Fukushima disasters is questionable due to several factors, such as:

- poor detectability of many dangerous radionuclides
- long latency period of health effects from exposure to radioactivity, coupled to a short time horizon of the investigations
- limited measurements of radioactive contamination
- limited scope of the IAEA and WHO investigations
- absence of adequate epidemiological studies
- secrecy of medical data
- short time horizon of the nuclear institutions
- economic interests.

Fairlie [Fairlie 2016a] Q683 points out that care is required concerning the interpretation of studies after the Chernobyl disaster because of:

- differing diagnostic criteria used
- insufficient/poorly matched control groups
- small numbers – low statistical power
- confounding factors and biases
- nil or poor dose estimates

In addition people move away, cases disappear. Political decisions may be made not to do studies that might provide undesired results.

In its critical report [Rosen 2013] Q561 of the WHO assessment of the Fukushima disaster [WHO 2013a] Q553 the IPPNW concludes:

As doctors and scientists, we are fully aware of the difficulties in calculating comprehensive health risks of a large catastrophe for such a large population and know of the problems that naturally arise in such an attempt.

- It is extremely important to base calculations such as these on reliable and valid data, which has been approved by a scientific consensus either through an impartial expert panel composed of scientists with contrary views, or through a critical peer review process.
- The possibility of a manipulation of data by a group, organization or industry with vested interests should be avoided at all costs.
- The calculations should encompass the entire population affected by the catastrophe and should give special consideration to groups with heightened vulnerability.
- Clinical findings should be thoroughly assessed and included in the final considerations.

The reports of the IAEA, UNSCEAR and WHO on the disasters of Chernobyl and Fukushima do not mention epidemiological studies, nor the intention to perform such investigations in the future; even the word ‘epidemiological’ is extremely rare in these reports.

Why have the IAEA, UNSCEAR and WHO been allowed to systematically avoid disussion on epidemiological studies?

If it is possible to prove the relationship between consumption of red and processed meat and the incidence of cancer [IARC/WHO 2015] Q636, why should it be impossible to prove a relationship between contamination by radioactive materials and health effects?

Limited scope of the radiological models

The radiological models used by the nuclear industry are based on the effects of gamma- and X-ray radiation from sources *outside* the human body. Probably for that reason the nuclear industry is speaking invariably about effects due to exposure to *radiation* and not about effects due to contamination by *radioactive materials*.
Biomedical behaviour is not included in the radiological models, let alone the synergistic behaviour of a number of radionuclides of different chemical elements simultaneously. In the case of large nuclear accidents dozens of different types of radionuclides are released into the human environment and consequently residents become contaminated not just by one type of radionuclide but with a number of different radionuclides.

The Committee [UNSCEAR 2010] Q531 stated:

> "the single most informative set of data on whole-body radiation exposure comes from studies of the survivors of the atomic bombings in Japan in 1945. The atomic bombing exposures were predominantly high-dose-rate gamma radiation with a small contribution of neutrons."

In his analysis of the World Health Organization report [WHO 2013a] Q553 on the Fukushima disaster [Rosen 2013] Q561 discusses eight objections to that report, one of them reads:

> "The authors explain this procedure, by basing their assumptions on the Lifetime Span Studies (LSS), performed on the survivors of the nuclear bombings of Hiroshima and Nagasaki – studies that were only started in 1950, five years after the events occurred. How studies on the survivors of the mostly external radioactive exposure of the nuclear bombs, without any scientific knowledge from the first five years, including no records of miscarriages, neonatal mortality or congenital defects, could be transferred to a scenario where children and fetuses were exposed to mostly internal radioactivity after a nuclear catastrophe is not adequately addressed by the report's authors."

Which assumptions form the basis of the currently used radiological models? Which phenomena are included in the models and which are not?
What was the original purpose of these 60 years old models, developed in a time only military nuclear facilities were in operation? These studies started about five years after the bombings, so the deaths during these first five years are not counted [CERRIE 2004] Q414. More on questionable aspects of the way of constructing the radiological model are discussed by [Hoffmann 2016] Q681.
Was the purpose to estimate the acute radiological risks for military personel in wartime, during the 1940s and 1950s, the Cold War, or to estimate the health risks for millions of people in the 21st century posed by chronic exposure to a number of radionuclides from failing civilian nuclear power stations? The global nuclear generating capacity grew from tens of megawatts in the 1950s to hundreds of gigawatts today, a factor of 10 000..
During the disaster of Fukushima amounts of radioactivity equivalent to thousands of Hiroshima bombs have been discharged, and are still being discharged into the environment.

In the publications of IAEA/UNSCEAR/WHO no indications are found of awareness of the implications of the German [KiKK 2007] Q392 and French [Geocap 2012] Q494 epidemiological investigations, and many other studies [Koerblein & Fairlie 2012], that found a significant connection between the incidence of childhood cancer and the proximity of normally operating nuclear power plants. These incontestable results cannot be explained by the models and way of reasoning of the nuclear industry. From a scientific point of view the conclusion should be: the models are inadequate and have to be rivised.

Elementary scientific flaws

When dicussing the health effects caused by exposure to radioactive materials as a result of the disasters of Chernobyl and Fukushima, the IAEA, UNSCEAR and WHO commit elementary scientific flaws in their reports. The lethal effects of contamination with radioactivity lower than causing acute radiation syndrome (ARS) generally have long latency periods, often years to decades, a well-known fact within the IAEA and WHO. In addition the registration of victims during the hectic time after a disaster usually is imperfect or even absent. The effects of chronic exposure to low doses of radionuclides via food and water are unknown.
For above reasons it is untrustworthy and unscientific to state without reservations a definite number of casualities shortly after the disaster and to present that number as if it were a conclusive and indisputable figure.
The World Health Organization in its Joint News Release WHO/IAEA/UNDP [WHO 2005] Q498 states :

> 'As of mid-2005, however, fewer than 50 deaths had been directly attributed to radiation from the disaster, almost all being highly exposed rescue workers, many who died within months of the accident but others who died as late as 2004'

Also this number of 'fewer than 50', quoted at the UN Chernobyl Forum in Vienna in September 2005 [Chernobyl Forum 2008] Q497, cannot be true according to [IPPNW 2011] Q452.

In 2005 the WHO published a publication [WHO 2005] Q498 titled: *Chernobyl: the true scale of the accident. 20 Years Later a UN Report Provides Definitive Answers and Ways to Repair Lives*. This media document refers to the ChernobylForum.
What is the 'true scale'?
Are definitive answers possible without large-scale independent medical investigations during an appropiate number of years?

Ignoring studies with diverging results

The conclusions of the IAEA and WHO seem hardly compatible with those of many other studies. Why do these international institutions ignore the divergent results of other studies? If other studies are wrong, the results should be refuted by means of scientific arguments, not by ignoring them or by qualifying them as 'not relevant' or as 'unscientific'. Only then is a genuine scientific and transparent discussion on nuclear hazards possible.
Ignoring evidence not compatible with your own opinion is a fundamental scientific flaw. When confronted with diverging results of other investigations of the same subject there are three options for a genuine scientist:

- the results of the other studies are wrong and you have to prove that using scientific arguments,
- your own conclusions are wrong and you have to modify your theory and conclusions, incorporating the results of the other studies,
- studies on both sides are wrong or incomplete and should be revised.

Apparently the IAEA and WHO did not consider it necessary to comply with this elementary scientific rule of conduct. One of the findings of the study [IPPNW 2011] Q452 is:

> The United Nations pro-nuclear organs such as the IAEA are attempting – with the use of questionable scientific methods – to minimise the effects of the catastrophe by inaccurate use of Chernobyl data. From a scientific point of view, this is unacceptable.

The credibility of the IAEA and WHO suffered further when it turned out that both institutes had seriously manipulated the data their presentations were based on at the Chernobyl Forum. As [IPPNW 2011] put it:

> . . . it can be rationally concluded that the official statements of the IAEA and the WHO have manipulated their own data. Their representation of the effects of Chernobyl has little to do with reality.

Missing proofs

The conclusions of the reports of the IAEA/UNSCEAR/WHO are lacking references to empirical evidence. Detrimental health effects are attributed to 'radiophobia', 'fear of unknowns', 'bad lifestyle'. In the reports the proofs of above assertions are missing: no investigations are reported which would underpin these statements.
According to the IAEA/UNSCEAR/WHO non-cancerous diseases are not considered as possible ill effects caused by radioactive contamination, but are attributed to other factors. The [IPPNW 2011] Q452 study concludes:

> An inadmissable chain of argument is often applied: non-cancerous – therefore not induced by radiation – therefore not a result of Chernobyl – end of debate.

Models prevailing over empirical evidence

Empirical data that deviate from conclusions based on the applied radiological models are ignored and observations of detrimental effects are attributed to non-nuclear causes, without further explanation. If the nuclear industry cannot *prove* by unambiguous empirical evidence that no detrimental health effects can be attributed to exposure to radioactive materials and radiation, a reasoning based on models is *not* a scientific proof. Illustrative is the following quote from [WHO 2005] Q498, also published in [Chernobyl Forum 2006] Q497:

> Because of the relatively low doses to residents of contaminated territories, no evidence or likelihood of decreased fertility has been seen among males or females. Also, because the doses were so low, there was no evidence of any effect on the number of stillbirths, adverse pregnancy outcomes, delivery complications or overall health of the childern.

With this statement the WHO commits a fundamental scientific flaw: reversal of argumentation by adapting the observations to the models the WHO believes in. This may remind the reader a famous scene in the play *Leben des Galilei* by Bertolt Brecht, when the cardinals said to Galileo Galilei:

> *We do not need to look* (in your telescope) *because it cannot be true*.

No falsification of an alternative explanation

Questionable are statements in which observed ill effects in radioactive contaminated areas are attributed to other than radiogenic causes without any scientific proof, while definitively excluding radioactivity as a cause, without any scientific proof.
From a scientific viewpoint the assertions of the WHO quoted in the previous section are fundamentally flawed. If it is not possible to unambiguously prove that radioactivity *is* the cause of adverse health effects observed at a given time in a given region, and these ill effects are attributed to another cause, then it still has to be *proven* by means of sound scientific arguments that radioactivity cannot be the cause. Any assertion without restriction that radioactivity is not the cause but other factors are, has to be based on a sound scientific falsification procedure.

No scientific discourse, no dialogue

What the nuclear industry terms the 'negative perception of nuclear power' by the general public, many politicians, and scientists outside of the nuclear world is not improved by the practice of the nuclear industry and associated institutions of ignoring critical publications or dismissing them as 'unscientific', 'erroneous' or as 'myths', thus avoiding any discussion of the scientific arguments presented in these publications. Critical studies are not even mentioned in the reports of the IAEA, UNSCEAR and WHO.
The above cited designations are striking in view of the fundamental scientific flaws made by the nuclear industry in their reports on radioactive waste management, safety and consequences of the Chernobyl and Fukushima disasters.
Epidemiological studies are needed to analyse the health effects of permanent exposure to low doses of radionuclides via water and food in contaminated areas, not only after a large accident, but also near normally operating nuclear power plants and reprocessing plants. Such an investigation should be continued for many years, because of the long incubation periods of diseases caused by exposure to radionuclides.
Major independent epidemiological studies in Germany and France [KiKK 2007] Q392 and [GeoCap 2012] Q494 found a strong connection between the incidence of cancers in young childern and how close they lived to normally functioning nuclear power plants. The existing models of dose-effect relationships cannot explain the empirical results of these studies, so the models are inadequate. Nevertheless the nuclear industry ignores these studies and still sticks to outdated, biased radiological models. Publications of the World Nuclear Association (WNA) do not even mention the KiKK and GeoCap studies.

Downplaying critiques: 'ignorance' and 'fear of the unknown'

The nuclear industry attributes objections to nuclear power to 'ignorance' and the 'fear of unknown': the invisibility of radioactivity and radiation and its insidious health effects". People with objections to nuclear power are inferred to be ignorant of the safety and robustness of nuclear technology and its benefits. This view is often substantiated by arguments such as:

- Fear of radiation hazards is unjust, because nuclear plants would release only a fraction of what everyone gets from natural sources in the environment.
- Risks everyone faces in daily life are hundreds of times greater than those from nuclear power, according to nuclear advocates.
- The small number of casualties from even the worst accidents, a small fraction of the deaths from other energy technologies, endorses the outstanding safety record of nuclear power.
- Cost escalations of nuclear power plants are attributed to unrealistic safety standards, bureaucracy or even to actions of environmentalists.

The above views are in sharp contrast with the empirical evidence and independent reports, as pointed out in the previous sections. In its promotional publications the nuclear industry does not shy away from unscientific methods.

Fear of the unknown may be a well-founded and appropiate feeling, because long-term health effects of radioactive contamination are unknown and are not investigated. The IAEA/UNSCEAR/WHO and the nuclear industry suggest to know everything about radioactivity and health effects.

Figure 1

Difference in width of tree rings in pine logs from Chernobyl. The year of the accident in 1986 is clearly visible from the change in color of the wood. This figure is identical to figure 3 in the publication [Mousseau et al. 2013] Q615.

The consequences of the radioactivity for the plant and animal life in the contaminated regions after the Chernobyl disaster are investigated by a small number of scientists from the USA. One of the findings are the adverse effects on the growth of pine trees in the contaminated areas, see the photograph in Figure 1. One may wonder what are the long-term effects of radioactive contamination for humans, in view of the pronounced effects in trees? It seems extremely improbable that chronic exposure to many different radionuclides, even at 'low' levels, would not have human health effects.

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