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Beste Theo,

Bij deze een paar artikelen die referenties bevatten over hormesis. Ik zag op de website van de International Radiation Protection Association (www.irpa.net) ook een aantal documenten die bij een zoektocht via google (zoek op "hormesis" alleen in domein www.irpa.net) eruit kwamen. Helaas loopt de computer er hier op vast, dus kan ik ze verder niet beoordelen. Misschien kun je er zelf wel iets mee.

Er zijn nog twee websites die ik aanbeveel als het om lage stralingsdosis en gevolg gaat. Dat zijn www.euradcom.org, waarop een exectuve summary van een rapport staat wat in 2003 uitkwam. Het gehele rapport is in ons documentatiecentrum. De low Level Radiation Campaign (www.lrc.org) is een Organistie in de UK die onderzoek doet naar lage dosis straling. Beiden websites gaan niet specifiek over hormesis, maar de discusie over hormesis is toch altijd nauw verbonden geweest met de vraag hoe gevaarlijk lage doses straling zijn.

We hebben hier in ons documentatiecentrum veel boeken en knipsels over het onderwerp straling. Je kunt altijd zelf langskomen voor onderzoek (maar alleen op afspraak).

Met vriendelijke groeten,

Robert Jan van den Berg

published by WISE News Communique on June 9, 2000

Controversial change in radiation standards rejected

Proposals for a drastic change in the international regime of radiation standards were rejected at the May 2000 congress of the International Radiation Protection Association (IRPA) in Hiroshima, Japan. Members of the international rad protection community said the proposals would not resolve problems that exist in the current regime, and this could cause trouble among regulators and the public.

(531.5181) WISE Amsterdam - The proposals came from Roger Clarke, chairman of the International Commission on Radiological Protection (ICRP) (see also *WISE News Communique* **527.5151**: Safety standards under threat in US & UK, and elsewhere?). In his proposals, among others, the principle of "*Collective dose*", the means by which a total dose to a population is measured, would be scrapped and replaced by a system of controlling the exposure of the most at risk. If those are protected, then so is everyone else. He also proposed to give up the present dose limits for individuals (in a lot of countries, this being 1 milliSievert a year) and replace it with "investigation levels" of a few milliSieverts and "action levels" at 20-30 milliSieverts. According to Clarke, working with collective dose could lead to inequities in protection among individuals, i.e., a small group of individuals receiving a high dose of radiation does not necessarily result in a high collective dose. He would rather prefer a more individual approach. He came to his proposals as a consequence of the controversial discussion that low doses of radiation would be less harmful than presently assumed.

At the 10th International Congress of the IRPA, a lot of attention was drawn to the discussion about the effects of low-dose radiation. Dale Preston, chief statistician of the Radiation Effects Research Foundation, a Japan-US venture that has been studying the radiological consequences of the Hiroshima and Nagasaki bombings, said he had no reasons to doubt the existing Linear Non-Treshold (LNT) hypothesis, which assumes that any additional exposure to radiation leads to an equivalent additional risk. Other speakers claimed the contrary, i.e., that low doses would not be harmful or might even be beneficial (known as the "*hormosis*" phenomenon or "*adaptive response*").

The group of adaptive-response believers is opposed to the group of scientists that believe in the theory of genomic instability, a phenomenon in which a cell remains initially normal after being irradiated but later leads to chromosomal aberrations after several cell divisions. This phenomenon is the reason that a group of scientists plead for more stringent radiation standards. Both factions of scientists lay claim to scientific truth.

The proposal of Roger Clarke was discussed in the IRPA conference to seek the formal advice of the rad protection community before the ICRP itself adopts new recommendations. The IRPA conference actually showed

UNSCEAR rejects threshold believers. In a draft report by the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), which contents were presented at the IRPA Conference, it is concluded that there is no scientific basis to discard the linear non-threshold model of radiation effects. According to UNSCEAR chairman Lars-Erik Holm, ongoing and future studies will not solve the uncertainties surrounding the effects of low-dose radiation. He thinks that "The statistical power is insufficient, and it is not scientifically valid to equate the absence of a statistically observable effect at low doses with the absence of risk." With this, UNSCEAR considers radiation guilty until proven innocent. UNSCEAR maintains its position that as long as single radiation tracks can cause (double-stranded) DNA breaks, the cause of cell damage and cancer, the

that there was no basis to abandon the present system of separate public and worker dose limits, collective dose justification, and optimization. Representatives of major countries warned that the ICRP might lose its credibility if it dropped the dose limits that it had recommended in 1991.

> assumption of anything but a linear dose-effect relationship down to zero is unwarranted. The final conclusions of UNSCEAR are to be reported to the U.N. General Assembly this fall.
> **Nucleonics Week**, 1 June 2000

Clarke's idea to introduce a "*trivial risk*" dose also faced criticism. IRPA members said that the public would not accept the idea of a trivial risk, and that regulators need numerical limits on which to base decisions.

Clarke said he would take IRPA members' suggestions back to ICRP's Main Commission for use in formulating new draft recommendations that would be put out for comment. A task group is expected to release a draft position paper by 2002. After a consultation period, new recommendations could be adopted in 2005.

Source: *Nucleonics Week*, 18 and 25 May 2000
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Incorporating NUCLEONICS

NUCLEONICS WEEK

Vol. 41 No. 22 June 1, 2000

SWEDISH REGULATORS THREATEN TO SHUT FORSMARK OVER SECURITY

Saying physical protection at Forsmark is so poor that the nuclear plant is open to break-in and sabotage, Swedish regulators have ordered plant managers to make emergency improvements no later than June 18. They warn that if permanent improvements are not made before June 30, 2001 the plant will lose its operating license.

The problems were discovered during inspections in the fall and winter, culminating in intensive interviews in mid-May with 27 plant employees responsible for physical protection. While there are technical shortcomings, such as old alarm systems, regulators are particularly concerned about the lack of training and poor motivation of employees responsible for physical protection. Forsmark is owned by Vattenfall, which is owned by the Swedish state.

Forsmark has had a decentralized physical protection system for several years. In 1998, it got temporary permission from the Swedish Nuclear Power Inspectorate (SKI) to use the system. Unlike other plants in Sweden, security is handled by each reactor's operators. The idea was that operators' technical competence could help improve the physical

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UNSCEAR CLOSES DOOR TO BELIEVERS IN THRESHOLD FOR RADIATION HARM

In a verdict bound to raise hackles among those who believe in a threshold for radiation damage, the United Nations Scientific Committee on the Effects of Atomic Radiation (Unscear) concludes in its latest draft report that there is no scientific basis to discard the linear no-threshold (LNT) model of radiation health effects.

Moreover, as Unscear chairman Lars-Erik Holm stated the committee's position, "ongoing and future studies in animal sciences and epidemiology will not solve the uncertainties surrounding the effects in humans of low-dose radiation. The statistical power is insufficient, and it is not scientifically valid to equate the absence of a statistically observable effect at low doses with the absence of risk."

For those who contest the alleged detrimental effect of low doses, it means they have been overruled again by the mainstream officials on Unscear for whom, in essence, radiation is guilty until proven innocent.

Notwithstanding the mountain of experimental data indicating the existence of an "adaptive response" to radiation—whereby cells or animals given small doses are more resistant to later, larger doses than those not so inoculated—Unscear maintains its position that as long as single radiation tracks have the potential to cause double-strand DNA breaks—the main initiating event by which radiation causes cell damage, cancer and hereditary effects—the assumption of anything but a linear dose-effect relationship down to zero is unwarranted.

Unscear also says that cancer epidemiology data, notably

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NUCLEAR ASSOCIATION'S PAY EXECS MORE THAN $5-MILLION IN 1999

The Nuclear Energy Institute (NEI) compensated its top seven officers a total of more than $2.02-million last year, while the Institute of Nuclear Power Operations' (INPO) 16 highest-ranking executives earned more than $4.76-million. About $1.3-million of INPO officers' 1999 earnings were deferred bonuses that were not part of their year's take-home pay.

The compensation figures are the latest reported on the companies' Form 990, the financial disclosure form required to be filed by tax-exempt organizations with the Internal Revenue Service. NEI is the industry association that publicly promotes nuclear energy; INPO's activities, confined mostly to members, focus on boosting the levels of safety and reliability in the nuclear industry.

INSIDE NUCLEONICS WEEK

the Ministry of Public Health in Bangkok said last month, is confidential, despite the deaths of three men who handled the Co-60 source.

But Thai experts involved in the case have disclosed to Nucleonics Week that the three victims, two 18-year-old workers in a scrapyard in Samut Prakan, near Bangkok, and a 44-year-old owner of the scrap yard, received doses of up 15 Gy. Experts said the estimated lethal dose to 50% of an affected population from Co-60 exposure is 4.5 Gy, meaning half a sample population receiving 4.5 Gy would die within 30 days if they were untreated.

The Thai government in February invited an IAEA expert team and Japanese physicians who had been treating radiation victims of last fall's Tokaimura criticality accident to consult on the Co-60 exposure victims. But experts involved complained that Thai public health officials denied the foreigners access to patients, to the doctors who were treating them, and to key medical data including blood samples (NW, 16 March, 1).

Before the invited Japanese physicians arrived in Thailand just after the accident, Thai doctors had taken blood samples and estimated doses received by victims, but the data was kept under wraps, Japanese officials said. The Japanese doctors nonetheless made their own calculations based on their observations and what knowledge of the events they could obtain on the scene. While Thai public health officials remained silent about the actual condition of the patients, foreign experts independently determined that the most badly burned victims would die (NW, 9 March, 1).

Shielding on the 600-curie Co-60 source was broken open by victims, who didn't know what it was, and they then handled the source. Japanese experts said that, using data known about the source, it was possible to calculate the estimated absorbed doses only very approximately. Only after their departure were they able to establish personal contact with doctors treating the patients. Nonetheless, visiting experts had enough general information to be "fairly certain" that the accident involving the source would prove fatal, one expert said this month.

Since then, three victims have died. Five more victims of the accident are still under intensive medical care and some of these may have to suffer amputations because of gangrene, but it is not expected that there will be any more deaths, Thai officials said last week.

IAEA Returns To Bangkok

Separately, two experts from the IAEA are going to Bangkok to discuss the case with Thai authorities.

According to officials, the IAEA and the Office of Atomic Energy for Peace (OAEP), Thailand's regulator, will discuss procedures for writing up an account of the accident which will be made public. According to the IAEA, similar public records of serious source accidents in Brazil, Estonia, Spain, and elsewhere were previously drafted by the Vienna agency.

Thai officials reiterated this month that OAEP will not file a report on the accident under the IAEA International Nuclear Event Scale (INES). Thailand has never joined the INES system, and Thai officials don't accept the magnitude the current system would assign to the Samut Prakan fatalities. Experts outside Thailand have said that under reporting rules strengthened during the 1990s in response to a rash of source accidents, the Thai event would be classified as level 4 of the seven INES levels (NW, 6 April,). Thai officials maintain the INES system was developed to categorize events at nuclear power plants and is "not appropriate" for rating a source accident. They assert the accident "should be rated only as level 3 or level 2."

Officials from OAEP and from the Ministry of Public Health also deny that there has been any lack of cooperation with any foreign experts consulted in the matter, from either the IAEA or Japan.—*Mark Hibbs, Tokyo*

UNSCEAR REPORT — *From page 1*

data from the Japanese bomb survivors, "are consistent with a linear or linear-quadratic dose response over a wide range of doses." And though it recognizes that quantifying risks at low doses is "less certain," the committee says "epidemiology alone will not be able to resolve the issue of whether there are low dose thresholds."

The latter response dismisses the import of studies presented by the anti-LNT community showing a lack of excess cancer among residents of large areas of China, India, Iran and Brazil where the annual dose from background radiation can rise to as much as 100 milliSievert (10 rem)—five times the annual dose limit recommended for workers by the International Commission on Radiological Protection (ICRP) in 1990 and 100 times the limit recommended for members of the public.

Opponents of the LNT model had hoped that Unscear would be more receptive to data on adaptive response that have emerged since the committee's 1994 report on the subject, but that was not the case.

The committee's conclusions, which are to be reported in final form to the UN General Assembly this fall, were outlined to the recent 10th international congress of the International Radiation Protection Association (IRPA-10) in Hiroshima by Abel Gonzalez. Gonzalez, the IAEA's director for radiation and waste safety and a member of Unscear from Argentina, presented the report on behalf of Holm.

Unscear, which has reported to the General Assembly since its creation to track worldwide radiation and its effects, is in a period of uncertainty, as some countries want to move it out of the General Assembly and into a more specialized UN agency such as the IAEA or the World Health Organization. At IRPA-10, Gonzalez argued for maintaining Unscear within the General Assembly, to give it higher political visibility.

Anti-LNT Forces Assert Benefits

The Unscear conclusions were in contrast to the enthusiasm of the anti-LNT scientists in Hiroshima, who presented several papers they said demonstrated the reality of adaptive response (NW, 18 May, 14). Among them was a summary by Myron Pollycove, an advisor to the U.S. NRC, and Ludwig Feinendegen of the U.S. National Institutes of

Health, of the results of recent biological, epidemiological and medical studies of low-dose radiation.

One of those studies, from research at Tohoku University, Sendai, Japan, showed that human cancer patients treated with low-dose radiation (a total of 300 rem spread over at least 10 weeks) had a 12-year survival rate of 84%, compared to 50% survival for patients treated with chemotherapy. The authors argued it's "rational and very promising" to use low-dose radiation therapy to stimulate the human immune system for control not only of cancer, but also of other infectious diseases like HIV, and even to prevent such diseases by vaccination.

The anti-LNT camp, whose most vocal organization is the militant Radiation, Science & Health in the U.S., accuses the international radiation protection community—including Unscear and the ICRP—of ignoring the vast body of evidence supporting the existence of a threshold and, indeed, of the beneficial effect of low levels of radiation. They charge that huge amounts of money are being expended to protect the public against tiny doses which haven't been shown to do harm.

Unscear, however, isn't biting. As it did in its first report on adaptive response in 1994, the committee acknowledges that the phenomenon has been seen in many systems, including human lymphocytes and a variety of mouse cells, and that it seems to work with some chemical agents as well as with radiation. But the effect is not generally reproducible, Unscear says in the most recent report. "Apparently, the range of priming doses is limited, the time for presenting the challenge dose is critical, and the challenge dose needs to be of a reasonable magnitude. The response varies greatly" between individuals as well, it says.

Too, the mechanisms of DNA repair, or error in that repair, argue against adaptive response or any "other process that might provide for a dose threshold for radiation effects," the committee said. It recognizes that protective mechanisms like cell apoptosis (programmed death) and differentiation that can protection against cancer development "are efficient," but says they "can be bypassed."

Finally, Unscear defends the continued use of the linear dose-effect relationship model at low doses, saying it is "consistent with most of the available mechanistic and quantitative data." A linear dose response without threshold has been obtained over the dose range 10 milliGray to 1 Gray, Gonzalez noted.

For the Japanese bomb survivors, a significant increase in the risk of fatal solid cancers is indicated for doses over 50 mSv, but an increased incidence is seen only above 200 mSv. The Japanese data are the largest body of solid epidemiological data available and a mainstay of radiation health effects evaluation. But there are still uncertainties over the doses received by the survivors, and there are questions whether the effects of acute radiation such as that received in Hiroshima and Nagasaki can be extrapolated to the effects of low-level chronic radiation.

Because the damaging effect of doses below 100 mSv (10 rem) has never been demonstrated, the anti-LNT camp has argued that should be a threshold below which risks are either assumed not to exist or are not quantified. The position of the influential U.S. Health Physics Society, the world's largest professional radiation protection society, is that risk estimates should not be used below doses of 50 mSv (5 rem) per year, and 10 rem over a lifetime, but rather expressions of risk at low doses should be qualitative only and indicate that "zero health effects is the most likely outcome."

Getting agreement on the lack of demonstrable health effects below 100 mSv was the goal of some participants in the international meeting on "Briefing Radiation Policy and Science" in Airlie, Va. last December (NW, 23 Dec. '99, 7) attended by 80 radiation protection professionals, scientists and policymakers. The final conference document, which organizers said represented a consensus and other participants said was at best an awkward compromise, noted only the absence of a "statistically significant risk" below 100 mSv, but added, "This does not imply the existence of a threshold."

Unscear's opinion in its latest report says, "The inability to detect increased risks at very low doses does not mean that these increases in risk do not exist."

—Ann MacLachlan, Hiroshima

ICRP PLUNGES INTO NEW WORLD OF ENVIRONMENTAL PROTECTION

After decades of concentrating exclusively on protection of humankind, the International Commission on Radiological Protection (ICRP) has decided to consider principles for protecting other species from radiation harm.

The new approach is consistent with the modern view of humans and nature as a holistic system. But it poses a series of problems, such as what unit of dose to apply to thousands of species of flora and fauna, how to calculate exposure, and how to measure damage.

Further down the road, application of a new environmental rad protection system could have important repercussions for activities like reprocessing or waste disposal, which are justified on the basis of low dose to humans but whose potential harmful impact on local flora and fauna hasn't been calculated up to now.

The ICRP has long stood by the official view that if man is adequately protected, other living things are also likely to be sufficiently protected against ionizing radiation. But as Per Strand, general secretary of the International Union of Radiology (IUR), put it, "This statement is based on a belief, is not documented, and it may not always be true." For example, ocean dumping of radioactive waste, practiced for decades particularly in the North Atlantic, was justified on the basis it did no harm to humans because of the great dilution of radionuclide concentrations. Under an environmental protection approach, the impact on certain nearby biota would have to be assessed.

Environmentalists and radiation biologists tend to stand the ICRP's credo on its head: If the environment is protected, they postulate, man will be, too.

Some countries, such as Sweden and Norway, have already introduced environmental protection into their radia-

published by WISE News Communique on April 7, 2000

Safety standards under threat in U.S. & U.K.; and elsewhere?

The ICRP is going to publish two documents that may become the start of a new individual-risk-based approach. The two studies will adress long-term protection around solid waste repositories and protection from prolonged exposure to both background and artificial radiation. In the US the BEIR VII panel is reviewing radiation protection standards. Not much to look forward to, as we will see.

(527.5151) WISE/NIRS/NFLA - Measured at statements by Roger Clarke, the chairman of the ICRP (International Commission on Radiological Protection - an important but rather biased pro-nuclear commission) the ICRP will come up with something new. Clarke, who is also the director of the National Radiological Protection Board in the UK, has raised the prospect of effectively scrapping the existing radiological protection framework. Clarke's remarks challenge the foundation of current radiological protection and come before the European Basic Safety Standards Directive (BBS) (Council Directive 96/29/Euratom), designed to implement the last round of ICRP recommendations, is even fully implemented in the UK. The BSS itself opens the door for more contaminated materials and radiological practices to escape regulation altogether (see also story in *WISE News Communique* **526.5145**: "UK: campaign blocks recycling of rad-waste).

Writing in the *Journal of Radiological Protection* last year (Vol. 19 No.2) Clarke suggests "dropping the principle of Justification...since radiological protection plays such a minor part in the Government's decision making". Justification is the first principle of radiological protection. It requires a judgement to be made about whether the benefit of a nuclear practice will outweigh the harm. It is the principle which has enabled critical public examination of many practices which impose a burden of risk on society.

Clarke also suggests recasting the principle of optimisation B meaning that all radiation doses be as low as reasonably achievable. '*Collective dose*', the means by which dose to a population over time is calculated (and mortality rates determined), would also be scrapped. On existing radiological protection criteria the NRPB in 1993 advised that the '*collective dose*' from the Sellafield THORP plant was about 4000 man Sieverts per year and calculated that the added radiation burden would induce 200 extra fatalities in the global population annually. Clarke proposes doing away with this kind of calculation in favour of controlling the exposure of the most at risk individual. Clarke argues that if the most at risk individual is protected then so is everyone else.

Finally, Clarke suggests we do away with the current dose limits (in the UK 1 milliSievert per year for members of the public and 20 milliSieverts per year for radiation workers). Dose limits would be replaced by 'investigation levels' around a few milliSieverts to see if dose could be reduced, and 'action levels' between 20-30 milliSieverts when exposure must be reduced. Clarke says "within this scheme, exposures of a fraction of a milliSievert would be the most that could ever be allowed to a member of the public from a single source".

Clarke makes his proposals because he sees the theory which is most credible is that any radiological exposure at any level involves some risk and the higher the dose the higher the risk, and there is no safe dose of ionizing radiation (no threshold) is under attack. This theory is called Linear No Threshold (LNT) theory which informs current standards of radiological protection, is now being challenged because of the constraints its implementation places on nuclear economic activity. Clarke, instead of defending the existing system of radiological protection which flows from LNT, proposes a new

framework which retains LNT but permits low dose sources of radioactivity to pr liferate.

The strongest challenge to LNT is currently being mounted in the US where the EIR VII panel appears to be returning to an earlier theory of 'safe threshold' or even 'hormesis' the idea that a little bit of radiation is good for you.

US: BEIR VII

Since 1969 federal agencies have requested assessments of the health effects of ow-dose ionizing radiation by the National Academy of Sciences (NAS). The NAS has formed a tot of seven panels, including the recent Biological Effects of Ionizing Radiation (BEIR) VII panel. Sinc their inception, these panels have been fraught with charges of scientific bias and incomplete or isrepresentative use of available data. One panel report, that of BEIR III in 1980, even was scand ously pulled after the release of the final version, and rewritten by a minority group of the original anel.

The current BEIR VII, was requested by the Environmental Protection Agency, Nu ear Regulatory Commission and the Department of Energy. The BEIR VII assessment should cost little less than one million dollars and take three years, concluding late in 2001. Like past BEIR nels, BEIR VII also suffers under the contention that the panel is stacked to benefit the nuclear indus y.

In recent years, agencies like NRC and DOE argue that the money it takes to clea up very low doses of radiation is apparent and large, but the benefit of this clean-up to public health not equally apparent. This implies that agencies like DOE (not to mention the commercial nuc ar industry) would save a lot of money if radiation exposure were found to carry less risk than curren y expected.

Consequently, the scientists chosen for BEIR VII almost exclusively interpret their ata to the benefit of industry and government by stating that ionizing radiation exposure to humans less dangerous than previously thought. This does not imply that these scientists are for sale or la credibility; rather, industry and government seek out and fund scientists who are more likely draw conclusions which save them money. By choosing scientists from only one side of the scientific ebate, the NAS staff has put the committee in an awkward, and ultimately untenable scientific pos on, by asking panel members to defend scientific theories and interpretations with which they mi t not agree.

There are seventeen members on BEIR VII. All fairly accessible evidence indicates t at no one chosen for this panel supports the strict *Linear-No-Threshold* (LNT) model. Additionally, no ne on the panel seems to support a *Supralinear Model*. This model states that as your dose of radia on rises, your risk of getting a disease from your exposure decreases *per unit dose*. You still have mo total damage from high doses, but the damage per unit of radiation is less at higher doses. Unfor nately, all BEIR VII members specializing in radiation appear to support a *Dose-Rate Effectiveness ctor (DREF)*. This means they think low doses are **less** effective at causing disease per unit dose tha high doses. So according to the DREF, if you get a high dose of radiation all at once, this is more li ly to harm you than the same total dose of radiation given to you in lower doses over time. The ma rity of valid human evidence supports either a LNT or Supralinear curve shape, depending on th disease. DREF is not supported by a wide swath of human evidence. Instead, to derive this number, ientists often ignore valid human data in favor of evidence from animal or cell studies. These mod s are generally, but not always, used to indicate cancer risk. Some panel members seem to support e hormesis theory: a little radiation is good for you.

The US Department of Energy too is currently sponsoring research on cell 'adaptive sponses' and other radiation tolerance research in the hope of establishing that there is a low leve of exposure which does not carry a risk.

Again, there is very little valid human evidence for a threshold dose - the energy lev at which radiation rips through cells is much too high compared to the energy levels of our na ral life/cellular processes and body repair systems are not flawless.

NIRS, Committee to Bridge the Gap (CBG) and many other US groups have used the scientific studies and comments of BEIR VII panel members to illustrate the contention that the panel is one-sided. They are not criticizing the integrity of the chosen scientists, nor their right to hold a professional opinion. They are simply asking that more scientists be added to the panel to correct the flawed composition. NAS staff has not corrected this lack of balance although they have had ample opportunity. Since BEIR VII already has started research/writing for its final report, we can only conclude that the scientists participating on the panel have consented to its lopsided composition. And, with the panel as presently constituted Cand as NIRS warned the NAS months ago - it will be impossible for anyone outside the nuclear industry, including policymakers and the general public, to take their conclusions seriously.

Why?

Using DREF, the nuclear industry could release a damaging amount of radiation over a longer period of time in lower doses, rather than all at once, and claim that it isn't harming anyone. Even better for the industry would be the acceptance of a threshold dose below which radiation purportedly causes no damage. Acceptance of a threshold by a well-respected scientific committee would result in the industry exposing people to even more of their radioactive contamination without any monitoring or restriction at all.

The current assault on radiation standards has only one reason: money. Money the nuclear industry would rather not spend to fully clean up its contaminated nuclear reactor sites. Money that has to be paid for every kg radioactive waste that has to be stored. Avoiding large amounts of radioactive waste (by declaring it 'Below Regulatory Concern') is therefore very much in the interest of the nuclear industry (and governments). Then a significant portion of what is now considered radioactive waste will no longer be considered as such. Instead, this radioactive contaminated material, under this scheme, could be considered non-radioactive and "recycled" into consumer goods or treated as normal garbage. It's a long-sought nuclear industry goal, but one that is taking on particular urgency as the decommissioning of the atomic age is beginning in earnest.

Sources:

- *Nucleonics Week*, 9 March 2000
- Nuclear Free Local Authorities Bulletin, February 2000
- *Nuclear Monitor* (special issue: The new assault on radiation Protection), February 2000

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