

Comments of Nuclear Information and Resource Service
on ICRP's proposed 2006 recommendations
DRAFT RECOMMENDATIONS
OF THE INTERNATIONAL COMMISSION ON
RADIOLOGICAL PROTECTION
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Nuclear Information and Resource Service appreciates having had the opportunity to provide input to the North American meeting 28-29 August 2006 of the Organization for Economic Cooperation and Development Nuclear Energy Agency to gather input on the 2006 recommendations. We request that our presentation and verbal participation will be considered as part of our comments. This written portion supplements more detailed written comments from NIRS previously submitted.

REMOVE RECOMMENDATIONS FOR 'EXEMPTIONS'
Refuting ICRP legitimacy and authority to make societal assumptions

Radiation from human-made nuclear waste should not be "exempted" from regulatory control at any level. Please remove Section 2.4 Exclusion and Exemption from the recommendations. Since no level will be the total exempted level or amount a person could receive, the level is somewhat meaningless. The recommendation of the Exemption concept and "suggesting starting point" for choosing a release level in the draft recommendations is a blank check for unlimited releases and dilution for release. We oppose this.

Your recommendations on Exemption will clearly lead to unlimited, un-recordable, untraceable, unverifiable, irreversible releases of radioactivity and radiation into the human and nonhuman environment, living space for all and workspace for non-nuclear, uninformed, non-consenting workers. The public opposes deregulating, releasing, dispersing radioactive materials into the marketplace and environment or disposal to regular or hazardous trash dumps or incineration into air and ash.

ICRP's proposed recommendation that some level of radiation is too low to worry about or "trivial" or doesn't warrant regulation is inappropriate. ICRP is making a societal, political, unethical and unnecessary judgment. ICRP is taking on the role of "justifying" unlimited and unknown numbers of unnecessary and preventable, involuntary, potentially continuous public exposures. ICRP is mixing its self-designated role as provider of scientific information with that of a judge on acceptable societal risk. One important reason ICRP is not suited for this role is that it is a closed, self-perpetuating body, without nuclear power critics. ICRP has no moral or representative authority for making assumptions about the acceptability of risks from involuntary doses to members of the public from the nuclear power fuel chain. ICRP simply does not have public representation thus has no authority to assess what additional, unnecessary radiation risks members of the public around the world in this and future generations consider "trivial" or acceptable. Referring to reports or opinions of other closed radiation organizations (some with overlapping membership, and likewise void of public authority and without independent voices) that make such statements about public acceptability, is insufficient to justify ICRP making such judgmental assumptions or for recommending ANY lower bound for regulation of industrial generated nuclear materials and wastes.

HYPOCRACY RE: UNCERTAINTIES AT "LOW-DOSES"

ICRP claims it does not have enough certainty about the effects of low dose radiation on large populations (termed "collective dose" estimates) **to estimate the number of cancers** that will result in that population now or in the distant future, **yet ICRP thinks it has enough scientific and socio-political information to actually release radiation to large populations** – with no limit on the number of worldwide releases or "exemptions"— with no limit on the number of exemptions per facility or to a community—without their consent or knowledge. ICRP makes a self-determination that the risks are trivial and acceptable by the public (at the same time it discourages estimating what those risks are). ICRP does not know how much total radiation will be released or received when it, across-the-board, recommends not only that countries adopt release levels but also specifies a suggested level or range. There is absolutely no scientific justification for this recommendation – it is purely economic for the sake of the industry. The whole concept of exemptions should be deleted from the ICRP 2006 Recommendations.

Furthermore, the ICRP should remove the lower bound (essentially an exemption level) from the radiation levels throughout its text and in its charts on "constraints," doses, and bands of regulatory control (including Section 5.8.2 para (204) and Table 4, p. 61). Industries should be responsible for and protect the public from all the radioactive waste and materials they generate—preventing, using the precautionary principle, even low projected doses, not just those above an ICRP-selected level.

ICRP suggests governments decide what they want to regulate and what they don't, then establish **"what could be exempted from some regulatory requirements because regulatory action is unwarranted...the legislative framework should provide the regulator with the authority to exempt situations from regulatory requirements, particularly from those of an administrative nature such as notification and authorization...Exemption...relates to the power of regulators to release from specific regulatory obligations...waiving...legal obligation."** [page 17, paragraph (42) of Section 2.4] We suggest ICRP completely get rid of this strongly objectionable and unacceptable recommendation and all of Section 2.4.

In the US, to its credit, the Nuclear Regulatory Commission has delayed its rulemaking that would generically deregulate much radioactive waste and material. Unfortunately from the public

health perspective, NRC is taking applications for case-by-case exemptions such as those from owners of nuclear reactors undergoing decommissioning —giving permission for some of the nuclear waste to go to sites without radioactive licenses, permits or controls. The US public actively opposes and challenges these. We oppose ICRP's support of the release/clearance/exemption concepts and the US federal and (some) state to allow generic and case-by-case exemptions. We are working to prevent all efforts to allow industry-generated radioactive materials and wastes to be exempted or excluded from nuclear regulation with the goal of preventing public release and exposure. We suggest ICRP acknowledge, accept and incorporate this precautionary and preventive perspective on public protection from radiation.

ICRP should immediately cease this recommended abrogation of regulatory responsibility by removing all of Section 2.4 from the 2006 recommendations and all subsequent documents.

It was good to see that ICRP acknowledges that the existence of naturally occurring radioactivity does not justify release and exposure to additional, human-made sources and practices. ICRP's emphasizing this more could help prevent use of this illogical "justification" for exempting anthropogenic radioactive materials and wastes.

REPLACE ICRP's 3 BASIC PRINCIPLES WITH THE 'PRECAUTIONARY PRINCIPLE' Protect the Most Vulnerable

ICRP should officially adopt the Precautionary Principle. When there is uncertainty or doubt, err on the side of caution, prevent unnecessary radiation exposures.

ICRP should restructure its framework to incorporate or replace its basic principles with the Precautionary Principle. ICRP should stop pretending its *value* judgments have a technical scientific or even a sociological basis.

ICRP's composition is completely one-sided; its mission is promotional not protective of human health and other living beings or biosystems. As ICRP claims to attempt to open up —become more transparent, it must include members who are not fully committed to the continuation of all nuclear activities as there is no objectivity, balance, credibility when those risking the dose are not even represented. ICRP should be clear about which of its assertions are scientific and cite the sources for those statements, and just as clear about which are value judgments (such as the misguided claim that there is a trivial or acceptable dose that can be exempted, below which resources are not justified to regulate, or a lower band of constraint dose that does not need to be regulated). Removing the unjustified or one-sided societal judgments could potentially help the credibility of the ICRP.

There is not an international consensus supporting ICRP's 3 basic principles for radiation exposure.

(1) Justification: A government body (such as the national legislatures or nuclear agencies) or the nuclear industry licensee/operator decides that an activity which releases radioactivity and exposes people to radiation is "justified." The general public which is exposed does not get to

decide but does receive the doses. This is clearly unethical, immoral, unfair and unacceptable. Yet ICRP sees it as a basis for permitting doses and proceeds to provide ranges of acceptable doses in various situations...all the way up to 10,000 millirads per year! A level that will give cancer to 1 in 3 exposed for 30 years. (This is the ICRP-recommended level that US Department of Homeland Security adopted in January 2006 as acceptable for moving people back in after a dirty bomb.) Justification is a good concept in theory but when the exposed person is excluded from the decision it is unjust, inequitable and unwarranted. When those exposed have no say, but those making and controlling the potential hazard decide, there is no meaningful “justification.” This is even more objectionable in non-Democratic societies, more and more of which are establishing nuclear power and weapons industries right now.

(2) Optimization: This is a convoluted process (carried out by those that profit from and promote nuclear technology) by which the nuclear promoters determine how much it is worth to regulate and reduce exposures and safety margins. It could be used as a justification for exposing people in all situations. There is no guarantee or mechanism for the exposed individuals to determine if or how much radiation is imposed on their bodies. Includes the concept of ALARA – as low as reasonably achievable – taking the industry’s economic factors into consideration in deciding what is “reasonable.” When optimization is calculated by “balancing” costs and benefits, but there is no economic value placed on lost health and quality of life (the very assets radiation robs from its victims) all that is “optimized” is the nuclear industry profit.

(3) Limitation of Dose: The assumption is that the radiation establishment chooses protective dose limits. A major fault with this concept is that public doses are not simply, economically and practically measurable thus are not verifiable or enforceable. Another serious flaw is that low, chronic doses are potentially more harmful per unit dose than single higher doses so simply limiting doses does not necessarily protect people. In addition, doses are calculated based on standard man or, as this update encourages, “gender-averaging” and a “representative individual” who does not have “extreme” habits. Thus, doses are not based on risks to the more vulnerable like women, fetuses, older adults, children, people with AIDS or other reduced immunity or preexisting high cumulative doses. Unnecessary radiation doses should be prevented and avoided, not permitted at low or continuous rates. If they are to be set, they should protect the most susceptible taking uncertainties including synergistic effects into account.

Replace gender and age “averaging” of radiation risks with protection of the most vulnerable. It is time that ICRP acknowledged and accounted for non-cancer health risks from radiation like cardiovascular diseases, reduced immunity, as well as cancer, that ICRP consider radiation risks along with risks of other carcinogens and pollutants in the environment, workplace and body, that ICRP make a mathematical effort to account for (relatively new) biological knowledge, like the bystander effect and other uncertainties about the impact of radiation at low doses to incorporate them into existing radiation standards.

Rather than attempting to protect the most vulnerable, ICRP estimates averages risks to men and women and among age groups to protect the average rather than the most vulnerable of those studies...ignoring those groups and individuals. ICRP also ignores non-cancer health effects--- how much longer can the connections between radiation and other diseases and conditions including cardiovascular and immune deficiencies be ignored by the Commission that claims to

be comprised of international experts. ICRP also needs to acknowledge and account for the large potential for much greater health damage from multiple exposures to radiation and other hazardous materials and conditions in the environment. Radiation damage is multiple, additive, cumulative and synergistic and should be considered such by ICRP. Some of these concerns are addressed with suggestions for quantifying the risks and uncertainties in the European Committee on Radiation Risk (ECRR) in its *2003 Recommendations of the ECRR: The Health Effects of Ionising Radiation Exposure at Low Doses and Low Dose Rates for Radiation Protection Purposes: Regulators' Edition*. We recommend ICRP more carefully review this report before proceeding with new recommendations.

BIOTA: SUPPORT PRECAUTION/PREVENTION OF RADIATION EXPOSURE OF NONHUMAN SPECIES AND ECOSYSTEMS

ICRP should NOT set “acceptable” radiation levels (above natural background) for BIOTA (animals, plants and the environment). Again the precautionary principle should be incorporated to prevent exposing and contaminating animals, plants and ecological systems.

We are glad to see that ICRP is acknowledging that protecting humans does not de-facto protect other species or ecosystems (as has been the mantra of the radiation hierarchy until now—and some still espouse it), however, we oppose the legalization or setting of acceptable contamination levels for animals, plants and environments. The motivation is clearly to relieve radiation polluters of liability and should be replaced with the precautionary principle approach. ICRP should be asking the question “How can we prevent radiation exposure of nonhuman species?” rather than relieving of liability those that cause contamination and exposure.

ICRP suggests it will follow the same framework as it has for human beings—we repeat our call for replacing that framework with precaution—not spreading it to other species who have absolutely no way of participating in “justification” or “optimization” decisions. ICRP, ignoring all previous complaints about the “standard man” now “reference person,” is pursuing the untenable concept of identifying and using reference animals and plants, when there is such immense diversity at the cellular and organismic level that such efforts are almost laughable. The complexity of cells, tissues, individuals, populations, species, interaction of species, and ecosystems cannot be simplified to a reference mammal, reference duck or reference fish. Synergistic effects will further compound the equations. These increased uncertainties should be accounted for with increased conservatism and the goal of preventing exposures. ICRP has not proceeded very far in this effort, but we repeat our concern that our nominations of highly qualified members of the public interest community to work on the ICRP committee on this topic were completely ignored by the ICRP.

ADDITIONAL CONCERNS

Some additional areas about which we have concerns:

→setting exempt and excluded levels of radiation exposure that no longer need regulatory control (something many of us have been fighting for decades and essentially outlawed in some US states);

→discouraging projection of “collective” or population doses— preventing estimation of harm to populations now or in the future from radiation exposures—supposedly due to the uncertainty of health effects at low doses and into the future.—ex: recommending against calculations of the numbers of cancers from allowable cleanup levels from dirty bombs or from releasing radioactive materials into commerce from regulatory control or from exposures to populations in 10,000 to a million years from the proposed Yucca Mountain site if it were to be used a nuclear waste dump. Unfortunately not guessing the damage does not prevent the damage. Hypocritically, that same uncertainty does not stop ICRP from recommending actually releasing the radioactivity in its Exemption and Exclusion section;

→setting legal radiation exposure levels for animals, plants, and ecosystems—in order help radiation polluters escape liability for environmental contamination and exposure to non-human species;

→continuing to recommend the same public and worker exposures even though known cancer incidence risks have increased somewhat (by a third in National Academies of Science BEIR VII report from 8.46 to 11.41 cancers per 10,000 person rads or 100 person grays) and new (since the mid-1990s) biology indicating that radiation damages more cells in the current and future generations of cells than those directly hit by radiation (bystander effect);

→ averaging radiation damage over age and gender, leaving the most vulnerable humans unprotected. This may be an improvement to protecting the hardiest members of the population but ICRP should adopt the precautionary approach and protect us all;

→ continuing its precedent of disregarding radiation damage to future generations beyond the first 2 generations

→ allowing “low-level” releases of radiation while claiming not to know exactly what damage is done at these doses.

→ recommending use of a “representative individual” or “representative person” that is who appears to be designed to prevent anything but average assumptions in dose calculations, appears to be evolving from the standard man, the most exposed individual, the average member of the critical group, all created by the radiation establishment to enable mathematical manipulations which in many recent cases, allow more radiation contamination and reduce real public protection, prevention and precaution.

Submitted by Cindy Folkers

Nuclear Information and Resource Service

September 15, 2006

Thank you for the opportunity to comment (a second time) on the ICRP document *Draft Recommendations of the International Commission on Radiological Protection*, released on 5 June, 2006. In sum, ICRP is making recommendations which ignore new scientific data in favor of doing nothing and essentially ensuring that national radiation regulators have inadequately protective radiation standards. ICRP averages radiation damage over age and gender, leaving the most vulnerable humans unprotected. ICRP has completely disregarded radiation damage to future generations past the second one. ICRP is allowing low-level releases of radiation while claiming not to know exactly what damage is done at these doses. ICRP is washing its hands of responsibility for its inadequate recommendations and any regulations which follow.

NIRS recommends that ICRP members read *Late lessons from Early warnings: the precautionary principle 1896-2000* written by the European Environment Agency. Upon reviewing *Late lessons*, one finds a comparison between actual use of precaution and the ICRP principles of justification, optimization and limitation (now called constraint). The agency looks briefly at how these principles, adopted in 1977, have increased protection from radiation exposure and found that, in general, these principles have not been protective enough even for controlled circumstances such as medical radiation applications. To quote the Agency:

For instance, the risk rate for radiation-induced cancer was perceived (by ICRP) as four to five times higher in 1990 as compared to 1977. This resulted in changes in dose limits but was a belated response to mounting incontrovertible evidence, a situation which has been a recurring theme in the history of radiation protection, where precaution has sometimes been lacking despite the clear warnings given from the discovery of radiation to the present day.

Not that “mounting incontrovertible evidence” is required to take precautionary action. *Late Lessons* also points out that the case studies it reviews, including the one on radiation, all create a key question:

...how to acknowledge and respond not only to scientific uncertainty but also to ignorance, a state of not knowing from which springs both scientific discoveries and unpleasant surprises...

ICRP has chosen to acknowledge and respond to the dangerous uncertainties of radiation doses at lower levels by ignoring them. Clearly, ICRP is not practicing precaution in its recommendations, all protests and claims to the contrary.

Many of the comments below were introduced in previous NIRS comments on both the first draft *Recommendations* and *Annexes A & B* and, sadly, ICRP has not reflected these concerns in their current recommendations. ICRP is indeed running into a clash between

what science is unable to tell us and the political and philosophical systems we must erect to fill this gap. Instead of washing its hands of responsibility for the role it plays in setting national radiation standards, ICRP must find a way to address the potentially damaging unknowns of radiation exposure at low doses. The Precautionary Principle is one way to address this, at least in part.

Areas of concern include:

- 1) Collective Dose; exemption/Exclusion. ICRP recognizes that the Linear-no-Threshold model is still favored by recommending and standard-setting bodies. Despite this, ICRP is willing to risk the uncertainty they claim exists at low dose levels by both inclusion of a DDREF and their recommendation to release or allow exposures at low dose levels below a dose limit. If science is so uncertain what is happening at these lower dose levels, how can ICRP condone either releases or a DDREF? On the other hand, ICRP is unwilling to risk the uncertainty of using collective dose for assessing harm at these low doses. In both cases the same methods, formulas and assumptions are often used. This is obviously hypocritical and certainly not protective.
- 2) Gender Averaging and age averaging. We note that for protection purposes, ICRP uses averages and judgments which do not fully account for particularly susceptible individuals. This favoring of the group rather than the individual results in the most vulnerable such as children, fetuses and the immune-compromised not being protected at lower doses. To remedy this, ICRP should base effective dose for protection purposes on the most vulnerable for cancer and genetic effects. Since there is no recognized radiation dose that will surely not result in some damage, this will be challenging, but ICRP could adjust the standards to be more protective rather than ignoring the “no threshold” premise and the new science at low, cellular doses.
- 3) Genetic impacts/Heritable disease
ICRP reduces the impact of radiation on heritable disease by increasing the amount of baseline mutations. This naturally makes radiation exposure contribute less to the total number of mutations, hence ICRP has lowered the mutation risk of radiation. ICRP predicts that there would be a total of 738,000 genetic diseases from baseline. Per gray of exposure per 1 million people there would be at most 4,700 additional genetic diseases in the first generation after exposure and an additional 6,700 to the second generation at most over baseline occurrences. ICRP does not address synergistic effects at all which means that of the baseline diseases, they have no idea what part radiation played, if any; or which diseases would have occurred at all without radiation exposure. We have no idea if radiation enhances the deleterious effect of other substances, whether or not they are recognized as dangerous (see caffeine study below). ICRP will not predict genetic disease past the second generation because they claim the information we have is not adequate and these predictions would be useless. But ICRP is also making a short-sighted, unscientific and potentially detrimental value judgment that children and grandchildren are who we care most about. Devaluing future generations simply because the mathematical

prediction of disease is difficult or incorrect is inequitable at best, detrimental to health at worst.

- 4) Synergism. There are hardly any studies on synergistic effects of radiation and other toxins such as organochlorides, heavy metals and even common substances. True to form, ICRP does not account for any of these potential effects and in fact doesn't even mention or recognize this scientific shortcoming. This issue would be particularly fertile ground for using precaution. There are some studies on synergistic effects of radiation and common substances such as caffeine. Consider research at Colorado State University which shows that caffeine increases the damage radiation can cause in hamster cells. This raises the question of synergistic effects which BEIR VII panelists (USNAS radiation & health panel) have admitted are hardly known.
- 5) Weighting factors. Tissue weighting factors are used as one factor by ICRP in determining effective dose. Tissue weighting factors are (unfortunately), derived almost exclusively from the Hiroshima Nagasaki radiation health studies. As quoted from *Recommendations Draft* :“With a few exceptions, the parameters in the risk models are estimated using cancer incidence data from the studies of the Japanese atomic bomb survivors”. Since these studies were largely health effects from bomb radiation, one cannot just assume without explanation that their risk can be equated with internal doses to organs. ICRP has the responsibility to explain why they feel they can equate radiation from a nuclear bomb explosion to internally incorporated radionuclides like strontium-90, tritium or cesium-137 from nuclear reactors and other “civilian” processes. Perhaps ICRP has accounted for this difference, but this is unclear from reading of the related Annex. ICRP has additional shortcomings because they include tissue weighting factors that are gender averaged; and ICRP feels that there is at present insufficient data for prenatal health so they choose to ignore this damage altogether.
- 6) Bystander Effect & Genomic Instability. ICRP argues that these effects are shown in epidemiological studies and do not need to be understood further for protection measures. This may indeed NOT be the case for several reasons. First, many epidemiological studies deal with external dose. Epidemiological studies of inhalation and ingestion need a full accounting to get a valid picture of actual damage. Additionally, many epidemiological studies which do examine internal dose do so not from actual measurements of material ingested or inhaled which is then equated to disease incidence, but from dose formulas that are full of judgment calls, errors and predictions which may not be right (see tissue weighting factors above). Accepted scientific practice often makes health effect assumptions based on the amount of radiation released NOT the actual increase in disease. In these studies a level of damage is presumed before an accounting of disease incidence. Authors often argue, despite increasing disease, that only a fraction of the disease increase could be from radiation because the doses simply weren't high enough. Yet, ICRP itself concludes that we don't know enough about the low-dose ranges to predict what damage there may be. Assuming one believes this (there is evidence that we do know something about low dose harm) then it makes no sense to discount “extra” diseases as due to

other phantom factors when radiation is a perfectly good, often the only, explanation. The power of studying the bystander effect and genomic instability is that these mechanisms are *precisely* what could give us insight into health effects at lower doses: the effects ICRP says we don't know enough about to protect against. To use epidemiology to discount genomic instability and the bystander effect is therefore, folly. These "unknowns" of radiation science are exactly why the precautionary approach needs introduction into this process. As the gene pool weakens from chemical and radiological insults, epidemiological data may have to be reevaluated since population susceptibilities are likely to change to favor more easily-induced damage.

- 7) Non-cancer effects, especially heart disease, need to be reevaluated. They are not accounted for fully in these recommendations. For instance, heart disease can be both heritable from radiation damage to parent AND a result of current generation irradiation.