

Formal Report to the UNHRC, United Nations Human Rights Council

Immediate

The following report to the 21st Session of the United Nations Human Rights Council was written by Prof Christopher Busby and submitted by the Union of Arab Jurists and other organisations. The version submitted contained fewer references since there is a word count issue at the UNHCR. This is the fully referenced version. Prof Busby will attend the UNHCR and is to present this issue in connection with the Marshall Islands exposures to the USA Atmospheric Tests at the invitation of the American Anthropological Association and will also be speaking at a meeting set aside for this issue by the Union of Arab Jurists at the Palais des Nations Geneva mid-day on the 13th September.

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UN Human Rights Council September 13th 2012

Agenda Item 3

Submitted by the following ECOSOC NGOs

The Indian Movement “*Tupaj Amaru*”, The United Towns Agency for the North-South Cooperation, Union of Arab Jurists, General Arab Women Federation (GAWF), Organisation pour la Communication en Afrique et de Promotion de la Coopération Economique Internationale - OCAPROCE International, non-governmental organizations in special consultative status, and International Educational Development, Inc. (IED), a non-governmental organization on the Roster

NGOs Signed as supporting this submission

BRussels Tribunal, Arab Lawyers Association- UK, Association of Humanitarian Lawyers (AHL), International Lawyers.org, The International League of Iraqi Academics (ILIA), Geneva International Centre for Justice (GICJ), The Iraqi Commission on Human Rights (ICHR), Women Will Association (WWA), Organization for Widows and Orphans (OWO), Ikraam Center for Human Rights, Belgian Peace Movement, Ligue camerounaise des droits de l'homme, Monitoring Net of Human Rights in Iraq (MHRI), Women Solidarity for an Independent and Unified Iraq, Geneva Global Media Centre, International Coalition against War Criminals (ICAWC), Medical Aid for the Third World, Association of Iraqi Diplomats (AID), The African Association of Human Rights (AAHR), Protection of Human Rights Defenders in the Arab World, General Federation of Iraqi Women (GFIW), The International Action Center (IAC), Association of Iraqi Intellectuals and Academics, The International Network of Arab Human Rights NGOs, Iraq Solidarity Association in Stockholm, Association of Human Rights Defenders in Iraq (AHRDI), The African Center for Human Rights (ACHR), Arab Lawyers Network-UK, Conservative Centre of Environmental & Reserves in Fallujah (CCERF), Studies Centre for Human Rights and Democracy, The Iraqi Centre for Human Rights

The Current Radiation Risk Model and its affects on Human Rights

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for the Union of Arab Jurists**

This is the fully referenced version

We thank the Special Rapporteur for his Report on Hazardous Substances and Waste, and his report and recommendations on his Mission to the Marshall Islands and the United States. In his reports reference is made to scientific controversies concerning methods for determining the health effects of radiation exposure. Here we provide further detail on this issue. Our comment and recommendations are also relevant to the historic and on-going exposures of a large proportion of the human race living in contaminated areas.

I Principal Facts

There are emerging issues relating to the safety of ionizing radiation exposure safety norms.¹ This is of critical importance in the retrospective evaluation of the radioactive exposures and health of the inhabitants of the Marshall Islands. More serious is the historic and on-going exposures of a large proportion of the human race, in areas contaminated from releases from nuclear sites, from accidents and from exposures to Uranium through mining, processing and from weapons. Historically, exposure to ionizing radiation has been assessed though a risk model associated with the International Commission on Radiological Protection (ICRP). The generic risk model methodology was developed in the 1950s and despite significant new discoveries in the area has not been reviewed and is now clearly unsafe. A current Petition to the European Parliament, supported by a very large number of scientific experts, refers to evidence of this and requires the Parliament to ask the European Commission to order a re-Justification of all practices involving radiation exposures.²

Regarding the effects of US atomic tests in the Marshall Islands, the discussions presented in the Document A/66/378 are invalidated by this issue of the failure of the ICRP radiation Risk Model. The problem is that UNSCEAR, in considering UN resolution 65/96 Para 14 specifically applied and cited the radiation risk model of the ICRP as the basis of its response. Thus the discourse was framed in terms of the concept of radiation “absorbed dose”. However, it has been clear for at least 20 years and particularly since Chernobyl that “absorbed dose” cannot be safely employed for assessing the health effects of internal exposures of the type received by the inhabitants of the Marshall Islanders. The reason is that internal radiation exposure results from the decay of specific radionuclides with chemical properties and affinities which make local energy density near critical organelles and structures near the nuclide very high. The averaging process leading to “absorbed dose”, whilst possibly accurate for external exposures, cannot be employed for internal exposures especially to nuclides with chemical affinity for chromosomal components. This has been accepted by the ICRP in its latest report ICRP 103 and regulators are advised

¹ References numbered in this contribution can be found together with the full article at <www.nuclearjustice.org> where they can be downloaded

² The Petition to the European Parliament in English and French on this issue of Human Rights, the Environment, and Radiation Risk can be found at <www.nuclearjustice.org>

to employ different methodology for these internal exposure situations. Such methodology has indeed been developed by the ECRR and the use of the radiation risk model of the ECRR (recently incorporated into Japanese law) leads to accurate prediction of the results of such exposures (ECRR2010 see www.euradcom.org) Since UNSCEAR in its reports on the Marshall Island exposures relies on this incorrect model its views must be set aside together with its supporting documents.

II Some failures of ICRP/ UNSCEAR risk model

1. Childhood cancer near nuclear installations

There is increased risk of childhood leukemia within 5km of nuclear sites in Europe. A list and discussion may be found in ECRR2010. Child leukemia excesses are found near all the sites examined [1-12] Taken together these studies define an error of upwards of 1000-fold.

2. Infant leukemia after Chernobyl

Five different groups [13-18] reported a significant increase in infant leukemia in those children who were in the womb at the time of the Chernobyl fallout as measured by whole body monitoring. Thus the Chernobyl exposure is the only explanation for the increase. This occurred and was reported from Greece, Germany, Scotland, Wales, Belarus, USA and the error this shows in the ICRP model is greater than 400-fold.[17-19]

3. Cancer following Chernobyl in Northern Sweden

Recent studies in Sweden show an 11% increase in cancer for every 100kBq/sq metre of Cs-137 from Chernobyl [20]. This is associated with a dose of 3mSv [22] The ICRP model [21] predicts 0.05 cancer risk per Sv, so would predict a risk of $0.05 \times 3 \times 10^{-3} = 0.015 \%$. The error is $11/0.015 = 733$ -fold.

4. Human sex ratio at birth perturbed by low doses of internal fission-product ionizing radiation

Studies [24, 27] reveal statistically significant alterations in the human sex ratio at birth (the number of boys born to girls) after (a) atmospheric bomb testing, (b) Chernobyl and (c) near nuclear facilities. This supports earlier evidence of increases in infant mortality during the period of atmospheric weapons testing [25, 26]. Sex ratio has been accepted as a measure of genetic damage with the preferential killing of one or other sex depending on the type of exposure (mothers or fathers). According to the authors millions of babies were killed by these effects [27].

5. Cancer, leukemia/lymphoma and heart disease in Uranium workers

Studies of nuclear workers [29-31] show that Uranium exposure by inhalation causes increased hazards of developing lung cancer, lymphoma/leukaemia and heart disease. The severity of the risk is related to the type of Uranium. The error in the ICRP model shown by these studies is of the order of 2400-fold [29,30]. This supports the discoveries in Iraq and the Balkans of Uranium effects in those exposed to weaponised Uranium.

6. Secondary Photoelectron Effect (SPE)

There is recent interest in the ability of high atomic number (Z) elements in the body to act as antennas for natural background gamma radiation [32-35]. Briefly, the physical absorption of gamma radiation by elements is proportional to the fourth power of their atomic number Z. Therefore nanoparticles of insoluble high Z elements (Gold, Platinum, Uranium) absorb background radiation thousands of times more effectively than living tissue (mainly water) and then release this energy into tissue as local photoelectrons. The radiation dose near such particles is extremely high [36-40]. Since Uranium, which has the highest Z of any element also has a strong affinity for DNA, enhancement of genetic hazard [41,42] is predicted. The SPE has not been incorporated into ICRP risk modelling and these discoveries (and others relating to Uranium hazards [43, 44] reported since 1996) falsify the ICRP risk model.

7. Cancer and genotoxic effects in Iraq following DU exposure

A series of studies of the population of Fallujah Iraq shown to have been exposed to Uranium following the 2003-2004 battles have revealed extremely high rates of congenital malformation at birth and cancer and leukemia/lymphoma in adults [45-47].

8. Chernobyl effects reported in the Russian peer-reviewed literature

Chernobyl exposure effects have been reported in Russian-language peer review literature since 1996. These results have been reviewed [48-50] but have been largely ignored by UNSCEAR and ICRP. They constitute a very large body evidence of effects ranging through cancer and leukemia to heart and other disease [50, 51] including transgenerational conditions and are reported in animals and plants which cannot be affected by psychological processes (radiophobia). Objective measures include germline mutations found by minisatellite tests [53] in humans were also associated with real morphological effects and fitness loss in birds [54] and were found to have caused significant population effects [55] supporting the birth findings in humans [24-26].

9. The Japanese pale grass blue butterfly

A new paper shows major contamination related genetic and genomic damage to a Japanese butterfly in the Fukushima contaminated areas at doses which the ICRP would consider trivial. [56].

III Conclusions

UN Resolution 45/94: "Recognises that all individuals are entitled to live in an environment adequate for the health and well-being and calls upon member states and intergovernmental and nongovernmental organizations to enhance their efforts towards a better and healthier environment." Failure of the current radiation risk norms to protect individuals living in radioactively contaminated areas, including the Marshall Islands, is therefore a clear Human Rights issue. We call for an independent and transparent re-evaluation of the ICRP radiation risk model. For the Marshall Islands, we recommend urgent and remedial action to restore the right to health and meaningful remedy resulting from historical failures to revise scientific methods of assessment of the full spectrum of injuries, including transgenerational effects resulting from the nuclear weapons testing program. There should be an immediate health survey of the Marshallese population with an emphasis on contamination analysis, particularly for Uranium. The evaluation of

historic radiation harm must not be discounted on the basis of deductive mathematical modeling based on absorbed dose since this approach is not scientifically valid. US compensation approaches for individuals should be presumptive and consistent with the eligibility requirements of its own atomic veterans, workers, and downwinder compensation programs.

References

- [1] ECRR (2010) *The 2010 Recommendations of the European Committee on Radiation Risk. The Health Effects of Ionizing Radiation at Low Doses and Low Dose Rates*. Eds-- Busby C, Yablolov AV, Schmitz Feuerhake I, Bertell R and Scott Cato M Brussels: ECRR; Aberystwyth Green Audit
- [2] Gardner M J, Snee M P, Hall A J, Powell C A, Downes S, Terrell J D, (1990) *Results of case-control study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria, British Medical Journal 300:423-429.*
- [3] Heasman M A, Kemp I W, Urquhart J D, Black R, (1986) *Childhood leukaemia in northern Scotland, The Lancet; 1:266.*
- [4] Viel J-F, Pobel D, (1997) *Case control study of leukaemia among Young People near La Hague Nuclear Reprocessing Plant: The Environmental Hypothesis Revisited, British Medical Journal, 14, 101-6.*
- [5] Roman E, Watson A, Beral V, Buckle S, Bull D, Ryder H, Barton C, (1993) *Case control study of leukaemia and non-Hodgkin lymphoma among children aged 0-4 years in West Berkshire and North Hampshire Health Districts British Medical Journal, 306, 615-21.*
- [6] Busby C, Scott Cato M, (1997) *Death Rates from Leukaemia are Higher than Expected in Areas around Nuclear Sites in Berkshire and Oxfordshire, British Medical Journal, 315: 309.*
- [7] Bowie C, Ewings P D, (1988) *Leukaemia incidence in Somerset with particular reference to Hinkley Point, Taunton: Somerset Health Authority.*
- [8] Kaatsch P, Spix C, Schulze-Rath R, Schmiedel S, Blettner M, (2008) *Leukaemias in young children living in the vicinity of German nuclear power plants. Int J Cancer 122 , pp. 721-726.*
- [9] Spix C, Schmiedel S, Kaatsch P, Schulze-Rath R, Blettner M, (2008) *Case-control study on childhood cancer in the vicinity of nuclear power plants in Germany 1980-2003. Eur J Cancer 44, pp. 275-284.*
- [10] Sermage-Faure Claire, Laurier Dominique, Goujon-Bellec Stéphanie, Chartier Michel, Guyot-Goubin, Aurélie, Rudant Jérémie, Hémon Denis, Clavel Jacqueline (2012) *Childhood leukemia around French nuclear power plants—The geocap study, 2002–2007 nternational Journal of Cancer Volume 131 (5) E769–E780 DOI: 10.1002/ijc.27425*
- [11] *Independent Advisory Group (1984), Investigation of the Possible Increased Incidence of Cancer in West Cumbria, The Black Report, (London: HMSO).*

- [12] *Committee on Medical Aspects of Radiation in the Environment (COMARE). Fourth Report. The incidence of cancer and leukaemia in young people in the vicinity of the Sellafield site, West Cumbria: Further studies and an update of the situation since the publication of the report of the Black Advisory Group in 1984. Department of Health: Wetherby, 1996.*
- [13] *Petridou E, Trichopoulos D, Dessypris N, Flytzani V, Haidas S, Kalmanti M, Kolioukas D, Kosmidis H, Piperolou F, Tzortzatos F, (1996) Infant Leukaemia after in utero exposure to radiation from Chernobyl, Nature, 382:25, 352.*
- [14] *Michaelis J, Kaletsch U, Burkart W and Grosche B, (1997) Infant leukaemia after the Chernobyl Accident Nature 387, 246.*
- [15] *Gibson B E S, Eden O B, Barrett A, et al., (1988) Leukaemia in young children in Scotland, The Lancet, 630.*
- [16] *Ivanov E P, Tolochko G V, Shuvaeva L P, Ivanov V E, Iaroshevich R F, Becker S, Nekolla E, Kellner A M, (1998), Infant leukaemia in Belarus after the Chernobyl accident. Radiat. Environ. Biophys. 37:1, 53-55.*
- [17] *Busby C C, Scott Cato M, (2000) Increases in leukaemia in infants in Wales and Scotland following Chernobyl: evidence for errors in risk estimates Energy and Environment 11(2) 127-139.*
- [18] *Mangano J, (1997) Childhood leukaemia in the US may have risen due to fallout from Chernobyl, British Medical Journal, 314: 1200.*
- [19] *Busby C.C. (2009) Very Low Dose Fetal Exposure to Chernobyl Contamination Resulted in Increases in Infant Leukemia in Europe and Raises Questions about Current Radiation Risk Models. International Journal of Environmental Research and Public Health.; 6(12):3105-3114. <http://www.mdpi.com/1660-4601/6/12/3105>*
- [20] *Tondel M, Hjalmarsson P, Hardell L, Carisson G, Axelson A, (2004) Increase in regional total cancer incidence in Northern Sweden. J Epidem. Community Health. 58 1011-1016.*
- [21] *ICRP, (2007) The 2007 recommendations of the International Commission on Radiological Protection. ICRP 103 Orlando USA: Elsevier.*
- [22] *Handbook of Radiological Protection. London: HMSO 1972; alternatively US EPA FGR 12 Part 2.*
- [23] *Savchenko V K, (1995) The Ecology of the Chernobyl Catastrophe: Scientific Outlines of an International Programme of Collaborative Research (Paris: UNESCO).*
- [24] *Scherb H and Voigt K (2010) The human sex odds ratio at birth after the atmospheric bomb tests, Chernobyl, and in the vicinity of nuclear facilities. Env.Sci.Pollut.Res. Int 18 (5) 697-707*
- [25] *Sternglass E J, (1971) Environmental Radiation and Human Health, in Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability, ed. J. Neyman (Berkeley, Calif.: University of California Press).*

- [26] Whyte R K, (1992) *First Day Neonatal Mortality since 1935: A Re-examination of the Cross Hypothesis*, *British Medical Journal*, 304: 343-6.
- [27] Scherb H and Voigt K (2011) in Busby C, Busby J, Rietuma D and de Messieres M Eds. (2011) *Fukushima: What to Expect. Proceedings of the 3rd International Conference of the European Committee on Radiation Risk May 5/6th Lesvos Greece*. Brussels: ECRR; Aberystwyth UK: GreenAudit
- [28] Padmanabhan VT (2011) in Busby C, Busby J, Rietuma D and de Messieres M Eds. (2011) *Fukushima: What to Expect. Proceedings of the 3rd International Conference of the European Committee on Radiation Risk May 5/6th Lesvos Greece*. Brussels: ECRR; Aberystwyth UK: GreenAudit
- [29] Guseva Canu I, Laurier D, Caër-Lorho S, Samson E, Timarche M, Auriol B, Bérard P, Collomb P, Quesned B, Blanchardone E (2010) *Characterisation of protracted low-level exposure to uranium in the workplace: A comparison of two approaches*. *International Journal of Hygiene and Environmental Health* 213 (2010) 270–277
- [30] Guseva Canu, Irina, Garsi, Jerome-Philippe, Caër-Lorho Sylvaine, Jacob Sophie Collomb, Philippe, Acker Alain, Laurier Dominique (2012) *Does uranium induce circulatory system problems ? First results from a French cohort of uranium workers* *Occup. Envir. Med. OEM Online First*, published on March 3, 2012 as 10.1136/oemed-2011-100495
- [31] Guseva Canu I, Jacob S Cardis E, Wild P Caër-Lorho S, Auriol B, Garsi JP, Tirmarche M, Laurier D (2010) *Uranium carcinogenicity in humans might depend on the physical and chemical nature of uranium and its isotopic composition: results from pilot epidemiological study of French nuclear workers*. *Cancer Causes Control* DOI 10.1007/s10552-011-9833-5
- [32] Busby C, (2005) *Depleted uranium weapons, metal particles and radiation dose. Considerations of radiation exposure in tissue containing small dense particles of chemical elements of high atomic number as a consequence of secondary radiation fields resulting from scattering and photoelectron excitation*. *Eur. J. Biol. Bioelectromagn. 1*: 82-93.
- [33] Busby C C, (2005) *Does uranium contamination amplify natural background radiation dose to the DNA?* *European J. Biology and Bioelectromagnetics. 1* (2) 120-131.
- [34] Busby C, Schnug E (2008) *Advanced biochemical and biophysical aspects of uranium contamination*. In- LJ de Kok and E Schnug *Loads and fate of fertiliser derived uranium* Leiden: Backhuys.
- [35] Tickell O, (2008) *How war debris could cause cancer*. *New Scientist* 6th September 2008 www.newscientist.com/article/mg19926723.800-how-war-debris-could-cause-cancer.html
- [36] Pattison J E, Hugtenburg R P, Green S, (2009) *Enhancement of natural background gamma-radiation dose around uranium micro-particles in the human body*. *J.Royal Society Interface* doi:

10.1098/rsif.2009.0300. <http://rsif.royalsocietypublishing.org/content/early/2009/09/23/rsif.2009.0300.abstract>

- [37] Eakins, JS, Jansen J. Th. M. and Tanner R. J. (2011) A Monte Carlo analysis of possible cell dose enhancements effects by Uranium microparticles in photon fields *Radiation Protection Dosimetry* (2011), Vol. 143, No. 2–4, pp. 177–180
doi:10.1093/rpd/ncq398
- [38] Regulla D F, Hieber L B, Seidenbusch M, (1998) Physical and biological interface dose effects in tissue due to X-ray induced release of secondary radiation from metallic gold surfaces. *Radiat. Res.* 150: 92-100.
- [39] Hainfeld J F, Slatkin D N, Smilowitz H M, (2004) The use of gold nanoparticles to enhance radiotherapy in mice. *Phys. Med. Biol.* 49: N309-N315.
- [40] Howard C V, Elsaesser A, Busby C, (2009) The biological implications of radiation induced photoelectron production, as a function of particle size and composition. *International Conference; Royal Society for Chemistry NanoParticles 2009.*
- [41] Huxley H E, Zubay G, (1961) Preferential staining of nucleic acid containing structures for electron microscopy. *Biophys. Biochem. Cytol.* 11: 273.
- [42] Nielsen P E, Hiort C, Soennischsen S O, Buchardt O, Dahl O, Norden B, (1992) DNA binding and photocleavage by Uranyl VI salts. *J. Am. Chem. Soc.* 114: 4967-4975.
- [43] Busby C (2010) The health effects of exposure to uranium and uranium weapons. *Documents of the ECRR 2010 No 2.* Brussels: ECRR download free from www.euradcom.org
- [44] Busby C (2009) Uranium Weapons—Why all the fuss? *United Nations Disarmament Forum Vol 3 25-66 Geneva: UNIDIR* www.unidir.ch/pdf/articles/pdf-art2758.pdf
- [45] Alaani Samira, Tafash Muhammed, Busby Christopher, Hamdan Malak and Blaurock-Busch Eleonore (2011) Uranium and other contaminants in hair from the parents of children with congenital anomalies in Fallujah, Iraq *Conflict and Health* 2011, 5:15 doi:10.1186/1752-1505-5-15
- [46] Busby, Chris; Hamdan, Malak; Ariabi, Entesar. (2010) Cancer, Infant Mortality and Birth Sex-Ratio in Fallujah, Iraq 2005–2009. *Int. J. Environ. Res. Public Health* 7, no. 7: 2828-2837. doi:[10.3390/ijerph7072828](https://doi.org/10.3390/ijerph7072828)
- [47] Alaani S, Al Fallouji M, Busby C and Hamdan M (2012) Pilot study of congenital rates at birth in Fallujah, Iraq, 2010 *J. Islam. Med. Assoc. N. Amer.* Accepted for publication May 2012
- [48] Busby C, Yablokov A V (2006, 2009) *ECRR 2006. Chernobyl 20 years On. The health Effects of the Chernobyl Accident* Aberystwyth: Green Audit
- [49] Yablokov A V, Nesterenko V B, Nesterenko A V, (2009) *Chernobyl: Consequences of the Catastrophe for people and the environment.* *Annals of the New York Academy of Sciences.* Vol 1181 Massachusetts USA: Blackwell

- [50] Busby C, Busby J, Rietuma D and de Messieres M Eds. (2011) *Fukushima: What to Expect. Proceedings of the 3rd International Conference of the European Committee on Radiation Risk* May 5/6th Lesvos Greece. Brussels: ECRR; Aberystwyth UK: GreenAudit
- [51] Malko M V, (1998) *Chernobyl accident: the crisis of the international radiation community in Imanaka T: Research activities about the radiological consequences of the Chernobyl NPS accident and social activities to assist the sufferers of the accident.* (Kyoto University: Research Reactor Institute).
- [52] Goncharova R I, Smolich I I, (1998) *Chronic irradiation over many generations induces cytogenetic effects in populations of small mammals, Proc. Int. Conf. "Agricultural Biotechnology", December 14 - 17, Gorki, pp. 216 - 219.*
- [53] Dubrova Y E, Nesterov V N, Jeffreys A J et al., (1997) *Further evidence for elevated human minisatellite mutation rate in Belarus eight years after the Chernobyl accident. Mutation Research 381 267-278.*
- [54] Ellegren H, Lindgren G, Primmer C R, Moeller A P, (1997), *Fitness loss and Germline mutations in Barn Swallows breeding in Chernobyl, Nature 389/9, 583-4.*
- [55] Møller AP, Bonisoli-Alquati A, Rudolfsen G, Mousseau TA (2012) *Elevated Mortality among Birds in Chernobyl as Judged from Skewed Age and Sex Ratios. PLoS ONE 7(4): e35223. doi:10.1371/journal.pone.0035223*
- [56] Hiyama Atsuki , Nohara Chiyo , Kinjo Seira, Taira Wataru, Gima Shinichi, Tanahara Akira, Otaki Joji M. *The biological impacts of the Fukushima nuclear accident on the pale grass blue butterfly Nature SCIENTIFIC REPORTS | 2 : 570 | DOI: 10.1038/srep00570*