Will new Ionizing Radiation Directive increase worker and public safety?

by Jean-Claude ZERBIB*

* *Radiation hygiene engineer, CFDT delegate, France, Member of the Occupational Diseases Committee of the Council for Occupational Risk Prevention.*

The first European Directive to set basic standards of protection against radiation was adopted in 1959, based on the earliest standards published by the International Commission on Radiological Protection - ICRP.

It was the first time a scientific body's guidelines for the protection of workers exposed to ionizing radiations had been translated into national legal systems in Europe through a Directive passed under a Treaty obligation. This European Directive was regularly updated, then entirely rewritten in 1980[1] to include the new radiation standards put forward by the ICRP in 1977.

This second Ionizing Radiation Directive was further supplemented in 1984 and 1990, then put back on the drawing board in 1990, even before the ICRP's official publication of its third version of the Basic Radiation Protection Standards in April 1991.

The new European Directive had anything but an easy passage. The first draft, sent for the preliminary opinion of the Economic and Social Committee[2], was severely criticised on a number of counts.

The Council of the European Union adopted a new version on 13 May 1996[3] after consulting the European Parliament but without re-consulting the Economic and Social Committee. This new Directive must be transposed by the Member States before 13 May 2000.

Why are new basic standards needed?

The Euratom Treaty lays down a procedure for revising the basic radiation protection standards in the light of advances in scientific knowledge.

Since the ICRP's previous basic standards (known as ICRP Publication 26) were published in 1977, two signal events have produced new scientific knowledge and a welter of questions:

- Hiroshima and Nagasaki;
- the Chernobyl accident.

The impact of epidemiological data

The epidemiologic studies on the survivors of the Hiroshima and Nagasaki atomic bombs in follow-up studies on the cohorts between 1950 and 1985 showed a significantly higher incidence of deaths from ionizing radiation-induced cancers than those observed when the previous basic standards were being drafted.

While the vast excess of leukaemia deaths observed in the immediate aftermath (3 to 8 years) had gradually diminished (although not come to an end), solid organ cancers had appeared on previously unaffected organs and become invasive for others during the second half of this 40 year observation period.
For adults (20 to 65 years) the ICRP deduced from these data a dose-response relationship 3.2 times higher than that chosen using the data of the time when the previous basic standards were drafted.

New dose limits
The ICRP then proposed reducing the 5-year average dose limit for workers from 50 millisieverts a year to 20 mSv/a, and for the general public, from 5 to 1 millisieverts.

This dual reduction of dose limits adopted by the ICRP and included in the Directive to protect the public and workers will significantly change the categories of people considered as being occupationally exposed.

The Chernobyl accident
Following the incident at the Three Mile Island nuclear power station (USA) in March 1979, the accident which caused serious damage to the Chernobyl power plant (former USSR), allowing wind-borne radioactive contamination to spread over a thousand km radius, showed the need for detailed national and international contingency planning for the possibility of a radiation leak.

Decommissioning nuclear power plants
The problems referred to are compounded by concerns about the planned dismantling of nuclear power plants in the first 25 years of the next century.

Hundreds of thousands of cubic metres of earth, rubble, concrete and scrap metal from the destruction of nuclear reactors and power stations - most of it very low-level (VLL) waste - will have to be disposed of. Activity concentration thresholds based on the radiotoxicity of the radioactive substances present in these materials will have to be set in order to sort out the waste needing specific treatment from that with a negligible residual burden.

What does the Directive add?

The problems posed are not just scientific and technical, but also - perhaps mainly - social, economic and political.

The relative influence of science and technology
The basic standards produced by the ICRP (a non-governmental organization) are primarily based on the data gathered and collated by the experts of a UN scientific committee (UNSCEAR[4]). Those standards were in turn enshrined in a European Directive by government experts appointed by the signatory States to the Euratom Treaty.

The singular nature of nuclear power means that the same experts tend to be found on both and sometimes all three scientific bodies. This makes impartiality a difficult balancing act.

The Directives are not the result of scientific considerations alone; they are also the product of socio-political trade-offs between Member States whose interests or problems in nuclear power are not necessarily the same.

A critical look at the new Directive

The first thing to note is that it always a lapse of about ten years between new ICRP basic standards and the first implementing legislation.

Without going into the nuts and bolts of the Directive, which re-enacts various aspects of the 1980 Directive, the most salient pluses and minuses are:

- lowering the annual effective dose limit for the public from 5 to 1 millisieverts is a positive step. This will have a knock-on effect in more extensive monitoring of occupational exposure, but will raise thorny problems of dose assessments:
  - the protection of occupationally exposed pregnant women and assessment of the dose received by the unborn child;
  - the case of air crew who, because cosmic radiation increases with altitude, will exceed the 1 millisievert a year dose set for the public after 400 to 500 hours of long haul flying.

Two major failings:

- the 1996 Directive sets no standards for uranium miners who are exposed to a series of radiation risks[5] when a dozen epidemiologic studies conducted world-wide point to an undeniable increase in lung cancer deaths.

- the first two Directives set annual intake limits by inhalation and ingestion for 257 then 730 radioactive substances, respectively. The 1996 Directive merely provides the data by which for employers to calculate the legal exposure standards. This reversal of the burden of proof is unprecedented in Europe. The employer no longer has to prove that he has complied with the law and regulations; the (often under-resourced) enforcement authority and inspectorate must prove that the employer has made the wrong choices. This dropping of statutory numerical values is an unquestioned setback for all those whose job it is to ensure protection against radiation in laboratories and factories.

Conclusion

Europe's trade unionists must act to make sure that their respective States transpose - as the Directive permits (article 9/1) - into their national laws an annual limit equal to 20 millisieverts a year, instead of the existing alternative of 100 mSv over 5 years coupled to a maximum effective dose of 50 mSv in any single year.

Also, the latest epidemiological data on the survivors of Hiroshima and Nagasaki has demonstrated that the increased incidence of deaths from cancer caused by ionizing radiation had become statistically significant for doses ranging between 50 and 200 millisieverts[6].

This, coupled to the current casualisation of nuclear power plant workers, suggests that no time should be lost in setting much more stringent standards than Europe currently has, and extending them to uranium miners.

The relevant public authorities of the Member States must also set annual intake limits for the inhalation of radioactive substances based on the ICRP's work. This responsibility must not be

left to the individual power plant operator, which Directive 96/29/EURATOM as currently drafted does.

---

[1] Council Directive 80/836/Euratom of 15 July 1980 amending the Directives laying down the basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation, *OJ* No L 246 of 17 September 1980, p.1.

[2] Specific procedure for the preliminary consultation of the Committee on basic standards (article 31 of the Euratom Treaty) which is the only form of consultation of the two sides of industry. Opinion of the Economic and Social Committee in *OJ* No C 128 of 19 April 1993, p. 48.

[3] Council Directive 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation, *OJ* No L 159 of 29 June 1996, p. 1

[4] United Nations Scientific Committee one the Effects of Atomic Radiation

[5] Uranium miners are exposed to ionizing radiation in three ways:

- external exposure to gamma radiation from the radioactive substances present in uranium ore;
- inhalation of ore dust;
- inhalation of radon (radioactive noble gas) and its alpha-emitting daughter products.

It is this latter component which is responsible for the increased incidence of lung cancer. As all miners, they also inhale the carcinogenic fumes given off by diesel-powered machines.

[6] See Jean-Claude Zerbib, "Faibles doses de rayonnements ionisants: un excès de cancers statistiquement significatif", *Santé et Travail*, No 19, April 1997, INRS, France.