



SOUTH AFRICAN NUCLEAR ENERGY CORPORATION (Necsa)

Response to the article 'What's wrong with Harties' published in The Farmers

Weekly on 07 May 2010

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On 7 May in Farmers Weekly Abrie Steyn wrote movingly about the death of his friend, Mike Elliot. One must commiserate with Mr Steyn and with Mr Elliot's family and other close friends.

In his column, Mr Steyn attributes his friend's death to radioactivity in the water of Hartbeespoort Dam and specifically to effluent from Pelindaba. NECSA therefore owes it to readers of Farmers Weekly to discuss the situation.

To begin with, Mr Steyn makes three assumptions. Firstly, he assumes that his friend's cancer was caused by radiation. In fact it is impossible to tell whether a particular cancer has been caused by radiation or not. One in four of us is fated to die of cancer – without ever coming into contact with radioactive material. Secondly, Mr Steyn attributes the current sorry state of the dam to radioactivity. He also tells us, however, that the dam is 'filthy', that there is an on-going 'massive inflow of sewerage' and that the feeder Rietvlei Dam 'is dangerously polluted with toxic waste, pesticides and heavy metals'. It is not clear why he then goes on to attribute the shocking condition and demise of numbers of blue kurper, for example, to radioactivity.

Thirdly, Mr Steyn implicitly assumes that there is a conspiracy involving Necsa, the Department of Water Affairs, the National Nuclear Regulator (the national nuclear safety authority), Wits University and the University of Pretoria to conceal some awful truth from the South African public. To those of us who know the nuclear industry such a conspiracy is inconceivable.

In what follows, we explain the measures routinely taken to safeguard the public. We then deal point by point and in the order in which he raises them, with specific issues that concern Mr Steyn.

X-rays were discovered in 1895 and radioactivity a year later. After a century of research the medical effects of radiation are well understood. The International Commission on Radiological Protection (ICRP) periodically reviews the evidence and recommends safe levels of exposure. Their recommendation for members of the public is 1000 microsieverts (uSv) per year. These recommendations guide national safety authorities, for example our own National Nuclear Regulator, in establishing legal limits for radiation exposure in their own countries. The NNR has decided to impose a more restrictive limit of 250 uSv per year for current facilities at Pelindaba. This limit applies, for example, to people who drink water from the Crocodile River, swim in the dam, eat local fish or eat crops irrigated with dam water.

The American Electric Power Research Institute (EPRI) has recently published a report on the effects of low levels of radiation which shows that 'significant adverse health effects' have never been observed below exposures around 100 000 uSv. Needless to say, this conclusion is disputed by people who oppose nuclear power but it does help to put matters into perspective. The average natural background radiation level to which we are all inescapably exposed due, in part, to cosmic radiation from outer space, is around 2400 uSv per year.

Coming back to the local situation, the staff of the NNR ensures that local people cannot be exposed to more than the 250 uSv limit by imposing further limits on the discharge of all radioactive materials in Pelindaba effluent. They then monitor the Pelindaba procedures and records to see what is actually discharged. It turns out that the actual discharge is much less than allowed limits. No one using Crocodile River or Hartbeespoort Dam water is exposed to more than about 10 uSv per year. This is a hundred times less than the international limit, over two hundred times less than the natural background level of radiation and 10 000 times less than the lowest exposure known in practice to be harmful. It does not seem too unreasonable to call such exposure negligible.

One interesting aspect of all this has been a steady decline over past decades in the measured radioactivity levels in the river and dam water. This is a universal phenomenon and is due to diminishing levels of radioactive fall-out from atmospheric nuclear weapons testing in the 1960s.

Turning to specific issues raised by Mr Steyn, he refers to the accidental release in 1992 of 100 kg of uranium hexafluoride gas, actually into the atmosphere via the site's 80m stack. It's necessary to keep a sense of proportion. Uranium is a relatively common element and, depending on the acidity of the water, is slightly soluble. Upstream and downstream of Pelindaba, water in the Crocodile River naturally contains about two milligrams per cubic metre. This means that, with an average flow rate of some 20 cubic metres per second, the river puts about 100 kg of uranium into the dam every month. The accidental release of somewhat less than 100 kg, therefore, while absolutely not to be repeated, was by no means catastrophic. The material dispersed without causing any harm.

Mr Steyn also worries about the amount of effluent released into the river, currently about 350 cubic metres per day. That is indeed a lot of water but the flow-rate is immaterial. The critical factor is the radioactive content – and that is minuscule. He then refers to the calculation error picked up in 2002 by the NNR. That was indeed regrettable but did not lead to transgression of any radiation control limits.

Concerning radioactivity in fish in the dam, as discussed above, it can be calculated that if one were to eat 40 kg of fish per year, drink dam water and use the dam for recreational purposes, one might receive a few microsieverts, a far cry from the 250 microsievert per year limit. Necsa's environmental survey programme which includes regular measurements of radioactivity in fish, sediment and water gives no reason to doubt this conclusion.

The words 'radiation' and 'radioactivity' conjure up all manner of fears in otherwise entirely rational people although we are all exposed to it all the time and don't in the least mind having X-rays. In an industrial society, radioactive materials are perhaps the most easily controlled of industrial effluents. They can be controlled because they are easily detected and can be measured at levels far below what can reasonably be considered harmful. Fishermen and other users have every right to be concerned about the condition of Hartbeespoort but that condition is certainly not due to radioactivity.

NECSA

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