French Nuclear Tests: An Impact Assessment

Several scientific teams have been invited to confirm French claims that their nuclear testing program in the South Pacific has so far been harmless to the environment of French Polynesia and its inhabitants. However, these investigations have left major questions and uncertainties unanswered. None of the scientific missions addressed the effects of future testing or evaluated large-scale and possible leaking events, nor have they estimated the probable transport of radioactivity throughout the South Pacific.

A recent environmental impact assessment by me and M. Tomczak of the Ocean Sciences Institute of the University of Sydney, addresses the long-term and large-scale dispersion of radioactivity from Moruroa and Fangataufa atolls. A computer model was applied to two possible scenarios. The first, the ‘worst case’, investigated an instantaneous release of the total radioactivity currently stored in the interior of the atolls. The transport of the contaminated water mass was calculated for a period of ten years. The second scenario, ‘the realistic case’, examined a constant leaking of radioactivity over the same period of ten years. In both scenarios the radionuclide cesium-137 was traced. The study revealed that in either a single discharge or a constant release, French Polynesia would be the worst affected region of the South Pacific. However, in the ‘worst case’ scenario the marine environment of most South Pacific nations would be contaminated. Radioactivity well above the background level from atmospheric nuclear weapon tests would be detected as far as northwest of New Zealand.

French scientific experts have not criticised the scientific and technical methods of the study, as these are scientifically well established. However, they claim that the likelihood of the assumed first scenario is nonexistent, and there is no ‘evidence of anything even remotely similar to the second scenario’. The French response culminates in the statement that ‘the authors of the report, who are independent scientists and who can hardly be suspected of being favourably biased toward French policy, confirm that the people from neighbouring countries in the South Pacific do not run any health risks from our nuclear experiments’.

This conclusion is derived from an estimate of the annual cesium-137 absorption using data obtained from our impact assessment. The annual limit is set by the French authorities at 400,000 becquerels [units of radioactivity] of cesium-137 for countries in the South Pacific. According to the French reaction, ‘there would be no ill-effects suffered by a person who was to drink up to 5,000 cubic metres of the "polluted" water in one year’. The amount of water to be consumed is calculated using an averaged cesium-137 activity concentration of 80 becquerels per cubic metre. This value was estimated in the ‘worst case’ study to be what remained ten years after the initial radioactivity was released.

The French scientists overlooked, however, that our impact assessment estimated activity concentrations far above this for most of the monitored 10-year period. For instance, during the first year after discharge, the cesium-137 activity concentration in French Polynesia was estimated to range from 2,000 to 50,000 becquerels per cubic metre.

Clearly it is virtually impossible to drink the amount of water required to absorb the annual cesium-137 limit of 400,000 becquerels per day for a year. Even an activity concentration of 50,000 becquerels per cubic metre requires the consumption of 8 cubic metres or 22 litres of sea water a day.

But there is more than one way to be exposed to radioactivity. It may be concentrated via the food chain. Fish, crustaceans and molluscs represent a main food source for the South Pacific people. The possible activity concentration in fish, crustaceans and molluscs based on our impact assessment can