

INTERNATIONAL STUDY OF THE RADIOLOGICAL SITUATION AT THE ATOLLS OF MURUROA AND FANGATAUFA

THE MURUROA STUDY

BY E. GAIL DE PLANQUE

Results are in from one of the largest international environmental assessments ever done: the Study that the IAEA organized over the past three years to evaluate the radiological conditions at the Atolls of Mururoa and Fangataufa in the South Pacific. The Government of France had conducted nuclear experiments there from 1966-96. I had the unique experience of heading this global project, serving as the Chairman of the Study's International Advisory Committee (IAC).

Following a request by the French Government — and once the Government had declared the termination of all testing at the atolls — the IAEA embarked upon the Study in April 1996. The IAC was established by former IAEA Director General, Dr. Hans Blix, to supervise the Study, and I was appointed as its Chairman.

By way of background, the atolls are located on the eastern edge of French Polynesia, some 100 kilometers from Tahiti, and are about equidistant from the west coast of the United States and Latin America and the east coast of Australia. There were essentially two types of experiments carried out at Mururoa and Fangataufa: 178 nuclear-

weapon tests in which nuclear devices were exploded with release of fission energy, and nuclear-weapon safety trials — these involved nuclear devices that were subjected to simulated accident conditions and nuclear-weapon cores that were destroyed by conventional explosives with no or very little release of fission energy.

Most of the tests were conducted at Mururoa, the larger of the two atolls, and the rest, mostly the larger tests, were conducted at Fangataufa. Both the tests and the trials were conducted in the atmosphere as well as underground. There were 41 tests conducted in the atmosphere, 37 at Mururoa and four at Fangataufa, most of them by hanging the device from a balloon at a considerable elevation above the ground. There were 137 underground tests — 127 at Mururoa and ten at Fangataufa, the majority of which were conducted with devices lowered into holes drilled into the rock beneath either the rim or the lagoon of the atolls. There were fifteen safety trials in all — five conducted in the atmosphere and ten underground.

Since the effects of weapons testing is a scientifically difficult as well as a politically charged issue, the Study faced several enormous challenges.

They included the need for independence, the need for a large number of competent scientists with an unusually wide range of skill and expertise, and the need for an organizational structure and efficiency required to complete the task in a thorough and timely manner. To that end, the IAC, providing policy and scientific guidance for the Study, was composed of fourteen members from various countries around the world and four *ex officio* representatives of the European Commission, the South Pacific Forum, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the World Health Organization. (See box, next page.) Apart from the IAC and the IAEA staff, there were 55 experts from 21 countries involved in the Study. The work went far beyond a desk exercise as it also involved a campaign of measurements and sampling at the atolls, whereby residual

Dr. de Planque, a former Commissioner of the US Nuclear Regulatory Commission and now an Independent Consultant, served as Chairman of the International Advisory Committee heading the Study on the Radiological Situation at the Atolls of Mururoa and Fangataufa.

radioactive materials both in the terrestrial and in the aquatic environment were evaluated. Altogether, there were 18 laboratories in 12 countries involved in this campaign, which was led by the IAEA laboratories at Seibersdorf and Monaco.

The aims of the Study, as defined in the Terms of Reference, were to assess prospectively the situation at the two atolls and in the involved areas from the point of view of radiological safety, to ascertain whether there are any radiological hazards to people, and to make recommendations on the form, scale and duration of any remedial action, monitoring, or any other follow-up action that might be required. The specific objectives of the Study were to assess the residual radiological conditions at the atolls after the end of the nuclear testing and to cover both the present radiological situation and the potential long-term radiological situation.

It is important to understand these objectives because the Study was not designed to look retrospectively at past radiological situations, e.g., exposures caused by fallout during testing — (this is routinely done by UNSCEAR), or occupational exposures of workers and military personnel during the testing period (it is the understanding of the IAC that the French authorities will be publishing a report on this subject).

Basically the Study concluded the following:

- There will be no radiation health effects which could be either medically diagnosed in

THE STUDY'S INTERNATIONAL ADVISORY COMMITTEE

Chairman: Dr. E. Gail de Planque (*photo*), former Commissioner of the US Nuclear Regulatory Commission and presently Independent Consultant, United States

Members from IAEA Member States:

Argentina: D. J. Beninson, former Chairman, International Commission on Radiological Protection, and, at the time of the Study, President of the Argentine Nuclear Regulatory Authority, Buenos Aires

United Kingdom: R. Clarke, National Radiological Protection Board, and present Chairman of the International Commission on Radiological Protection

Australia: H. Garnett, Australian Nuclear Science and Technology Organization

Sweden: G.E.G. Holm, Radiation Physics Department, Lund University Hospital

Indonesia: H.S. Karyono, Nuclear Minerals Development Centre, National Atomic Energy Agency



Germany: A. Kaul, Federal Office of Radiation Protection

Russian Federation: A. Matuschenko, Russian Commission for Radiation Protection

Japan: T. Numakunai, Institute of Radiation Measurements

New Zealand: A. Poletti, Department of Physics, University of Auckland

Ex-officio Members:

United Nations Scientific Committee on the Effects of Atomic Radiation: B. Bennett, Vienna

European Commission: G. Fraser, Directorate General XI/C/1, Luxembourg

South Pacific Forum: V.A. Fuavao, South Pacific Regional Environment Programme, Apia, Western Samoa

an individual or epidemiologically discerned in a group of people and which would be attributable to the estimated radiation doses which are being received or which would be received in the future by people as a result of the residual radioactive material at Mururoa and Fangataufa.

- Overall, the expected radiation dose rates and mode of

exposure are such that no effects on biota population groups could arise, although occasionally individual members of species might be harmed, but not to the extent of endangering the whole species or creating imbalances between species.

- Given the measured and predicted radionuclide activity levels, and the low dose levels

PUBLICATIONS & REPORTS

Results of the Study of the Radiological at the Atolls of Mururoa and Fangataufa are available in a comprehensive series of publications and reports. Detailed results are presented in four separate publications: the Main Report, the Executive Summary; the Summary Report; and the Technical Report.

The Main Report is the primary publication of the Study and provides a comprehensive scientific account, together with findings, conclusions and recommendations. It is supported by the detailed Technical Report in six volumes intended for the scientific specialist. The

Executive Summary is reproduced from the original document presented to the IAEA Board of Governors. The Summary Report provides an extended synopsis of the Study for the benefit of a wider audience, and includes its findings, conclusions and recommendations.

Also being issued by the IAEA are the Proceedings of the International Conference on the Study convened in Vienna 29 June to 3 July 1998.

The reports may be ordered from the IAEA Division of Publications, Sales and Promotion Unit. See the *Bulletin's* section on IAEA Books in this edition for ordering information.

estimated for the present and for the future, and with account taken of international guidance, no remedial action at Mururoa and Fangataufa Atolls is needed on radiological protection grounds, either now or in the future.

■ Similarly, no further environmental monitoring at Mururoa and Fangataufa Atolls is needed for purposes of radiological protection.

■ Although many assumptions were made in the modelling of systems, the findings are robust: i.e. the expected extent of changes in the conclusions due to uncertainties in the parameters used in the modelling is slight. Furthermore, the predicted doses are so low that large errors (even of an order of magnitude) would not affect the conclusions.

The Study further noted "that a scientific programme of

monitoring of the radionuclide concentrations in the rock and the nuclear test cavity-chimneys is under way at Mururoa and Fangataufa Atolls. Should this programme continue, the Study recommends that emphasis be placed on monitoring the migration behaviour of long-lived and relatively mobile radionuclides and radiocolloids because of its particular scientific interest. The scientific programme, supplemented by some monitoring of radionuclide levels in the biosphere, may also be useful in assuring the public about the continuing radiological safety of the atolls".

The Study took about two years to complete. It eventually engaged about 100 people in the effort and culminated in the production of about ten centimeters of reports (*see box*), special seminars in French

Polynesia and Fiji on the results, and a conference in Vienna (30 June to 3 July 1998) to enable the scientific community to review the work and its conclusions.

I feel very privileged to have worked with so many dedicated experts from around the world and from the IAEA. The IAC and the Study group are indebted to former IAEA Director General, Hans Blix, and the current Director General, Mohamed ElBaradei, for their encouragement, support and commitment of the resources necessary for carrying out the Study, and to the IAEA staff involved for their untiring efforts.

The total cooperation of the Government of France in this effort was most commendable and appreciated. They provided a tremendous amount of material, including everything requested and deemed necessary for the conduct of the Study. Their help and logistical support during the campaign of measurements and sampling at Mururoa and Fangataufa was superb, and without their co-operation the Study would not have been possible.

From the scientific viewpoint, the Study was a wonderful learning experience for all of those involved. I hope that it has added to the fundamental knowledge base of science and technology. I also hope that on a more practical level, the expertise and information developed as a result of the Study will help our societies to face various technical challenges. These challenges include designing and constructing safe facilities for the disposal of radioactive waste. □