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GENERAL AND COMPLETE DISARMAMENT

Notification of nuclear tests

Note by the Secretary-General

Addendum

Pursuant to General Assembly resolutions 41/59 N of 3 December 1986 and 42/38 C of 30 November 1987, communications have been received from Australia and New Zealand, dated 5 and 31 May 1989, respectively, which are reproduced in the annex to the present note.

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* A/44/50/Rev.1.

ANNEX

Information provided by States

AUSTRALIA

[Original: English]

[5 May 1989]

1. I have the honour to refer to General Assembly resolution 42/38 C, entitled "Notification of nuclear tests", paragraph 3 of which requests States that, while not themselves conducting nuclear explosions, possess data on such events to make such data available to the Secretary-General.

2. In accordance with that request, I have the honour to attach details of nuclear explosions detected by Australia, carried out from October to December 1988 (see appendix I), as well as an explanatory memorandum (appendix II).

APPENDIX I

Quarterly report on presumed underground nuclear explosions

(October-December 1988)

Month 1988	Day	Universal time h min	Locality	Estimated body-wave magnitude	Estimated yield kilotonnes	Sequence number
October	13	1400	Nevada	5.9	40-150	88/26
October	18	0340	East Kazakhstan	4.9	0-10	88/27
October	25	1700	Mururoa	4.2*	0-10	88/28
November	5	1830	Mururoa	5.4	40	88/29
November	12	0330	East Kazakhstan	5.2	10-40	88/30
November	23	0357	East Kazakhstan	5.3	10-40	88/31
November	23	1701	Mururoa	5.4	20-80	88/32
November	30	1755	Fangataufa	5.5	20-80	88/33
December	04	0520	Novaya Zemlya	5.9	40-150	88/34
December	10	2030	Nevada	5.0	10-40	88/35
December	17	0418	East Kazakhstan	5.9	20-80	88/36
December	28	0528	East Kazakhstan		0-10	88/37

* Magnitude estimated using New Zealand seismic data only.

Notes:

Information in this bulletin was derived from Australian seismological facilities and from institutions in other countries co-operating in the monitoring of earthquakes and nuclear explosions.

Unless otherwise noted, the estimated body-wave magnitude is that published by the United States National Earthquake Information Center and is based on observations of magnitude obtained from around the world, including from Australia.

The yields are estimated using empirical equations, but there is no single agreed formula for the determination of yields.

The yields estimated from these relations are not sufficiently accurate to determine compliance with international treaties.

APPENDIX II

Explanatory note

When a nuclear device is detonated underground, seismic waves radiate out in all directions. In order to establish that an underground nuclear explosion has taken place, pinpoint its location and estimate the size or yield of the blast, seismologists attempt to detect and analyse the several distinct types of seismic waves generated by the blast. Many factors affect the strength and clarity of these seismic waves, particularly the efficiency with which the explosion transmits energy to the surrounding earth. This efficiency is, in turn, dependent on local geological conditions such as the hardness and water content of the rock surrounding the explosion. Knowledge of the path through the earth which the seismic signals have travelled is also important.

An international network of seismic stations would add significantly to confidence in the ability to detect and locate the source of underground nuclear explosions, whenever conducted. Australia is actively engaged in the international effort to create such a network and, in addition, has established a number of bilateral links for seismic co-operation. Experts estimate that confidence in an international seismic network would extend to coupled explosions with yields down to about 5 kilotonnes and possibly as low as 1 kilotonne: beyond this, distinguishing nuclear explosions from earthquakes and other seismic "noise" becomes a more difficult task and supplementary measures may be necessary.

Estimating the yield of an underground explosion by remote seismic means is especially difficult on the basis of available data. The relationship between seismic signals and yield is not fixed, but is subject to the vagaries of geology and a number of other unknown factors. At the present time we do not have openly available the large and authoritative data base of explosions of known yield in various locations and geological conditions necessary to define the relationship with maximum confidence. This is why the footnotes to the tables in this report stress that the estimated yields are not sufficiently reliable to determine compliance with international treaties. All these questions are being actively addressed in international forums.

NEW ZEALAND

[Original: English]

[31 May 1989]

1. I have the honour to refer to resolution 42/38 C, adopted by the General Assembly on 30 November 1987, entitled "Notification of nuclear tests", paragraph 3 of which requests States that, while not themselves conducting nuclear explosions, possess data on such events to make such data available to the Secretary-General.

2. In accordance with that request, I have the honour to attach, in an appendix, details of nuclear test explosions carried out by France in the South Pacific in the course of 1988. The testing took place at Mururoa Atoll and, for the first time since 1975, probably also at Fangataufa Atoll. Estimates of the yield of each explosion are based on hydroacoustic signals recorded by the New Zealand Seismic Observatory in Rarotonga, Cook Islands.

APPENDIX

Data on nuclear explosions at Mururoa Atoll, 1988

Geographic co-ordinates: 21°50'S latitude
138°55'W longitude

Date	Time (New Zealand standard time) (hours)	Yield estimate (Kilotonnes)
12 May	0500	20
26 May	0501	80
17 June	0515	5
24 June	0531	30
26 October	0500	1
6 November	0430	50
24 November	0501	40

Data on nuclear explosions at Fangataufa Atoll, 1988

Geographic co-ordinates: 22°15'S latitude
138°45'W longitude

Date	Time (New Zealand standard time) (hours)	Yield estimate (Kilotonnes)
1 December	0355	100

Geological structure of Mururoa Atoll

The following description is from "Report of a New Zealand, Australian, and Papua New Guinea Scientific Mission to Mururoa Atoll" (New Zealand Ministry of Foreign Affairs, Wellington, 1984, 2.1.2.2.):

"2.1.2.2. The Geological Development of Mururoa

"The structure of the Atoll of Mururoa has been elucidated from a data base, which includes: detailed aeromagnetic and detailed seismic reflection and refraction studies supported by confirmatory data from between 200 to 300 shallow and deep drill holes. Further support is provided by a detailed and accurate bathymetric study of the flanks of the atoll. Some of the data is published, but much of it is not: by any standards the available data base for the French interpretation of the structure of Mururoa is impressive. It undoubtedly represents the most extensively studied coral atoll in any of the world's oceans. The following is a summary gleaned from all available usable sources.

"Seismic refraction and reflection profiling indicate that the subsurface structure of Mururoa may be divided into five units, with the following mean velocities:

Reef carbonates	2.2 km s^{-1}
Aerial volcanics	3.8 km s^{-1}
Submarine volcanics	3.68 km s^{-1}
Deep volcanics	4.5 km s^{-1}
Mantle volcanics	5.27-5.6 km s^{-1}

"The total edifice rises from depths of greater than 3,000 m, with slopes on the south side of 12 to 40 degrees above 1,000 m, contrasting with slopes locally as high as 66 degrees on the north side ... The aeromagnetic studies indicate three linear positive features trending west to east across the north, centre and south of the atoll; such features probably represent the margins of deep-seated crustal fracture or rift zones. Seismic studies suggest a volcanic vent in a central position beneath the lagoon and elongated in a NW-SE direction. The top of the volcanics is deepest to the north, and shallower and more irregular in the south. This is corroborated in drill holes which intersect volcanics at 430 to 450 m in the north and 300 m in the south. Beneath the lagoon, the tops of the volcanics are at a depth of 180 to 200 m and slope gently and regularly (1 to 2 degrees) in the direction of the ocean.

"The volcanics down to a depth of 1,600 m or so are comprised of two sequences, the lower submarine volcanics and the upper subaerial volcanics. The submarine volcanics are considered to be more homogeneous than the subaerial volcanics. The submarine volcanics are defined as autoclastites and hyaloclastites, i.e., submarine flows that have cracked and broken as a result of rapid cooling in the sea water. Fracturing is most intense in the hyaloclastites. Dykes of varying thickness penetrate the sequence.

"This stratigraphic base was recently greatly amplified by the work of Danielle Buigues (1982) in her study of five drill holes through the southern and northern margins and the lagoon. Dr. Buigues' work documents an evolution in the growth of the reef, whereby fringing/barrier reefs are succeeded by the

platform environment and finally by an atoll, the evolution occurring on the gradually subsiding volcanic base and within the framework of fluctuating global sea level. Periods of high sea level and reef growth alternated with the low sea-level period of weathering, and reef destruction. The dolomitized lower part of the sequence was caused by climatic alternations in the low sea-level period. Significantly also, Dr. Buigues recognized the massive effects of karst erosion, i.e., the development of megaporosity. The previously published porosity figures of Reppelin and Trichert (1975) had suggested that the limestones were of variable porosity. Not only has Buigues confirmed this, but she has also shown that zones of megaporosity occur as a result of subaerial weathering of exposed limestones, with the likely development of cave systems. She identifies such karsting as occurring in boreholes below 330 m, between 280 to 290 m, between 230 to 260 m, between 120 to 150 m, and around 90 m."

References:

Buigues, D. Sedimentation et diagénèse des formations carbonates de l'Atoll de Mururoa (Polynésie française). Thèse docteur 3ème cycle, Université de Paris-sud, Centre D'orsay, 1982, 2 Vol., 309 p.

Reppelin, P. and Trichet, J. Un example de diagénèse de carbonates recifaux (Atoll de Mururoa, Polynésie française), IX Congrès international de sedimentologie, Nice, 1975, Theme 7, 179-186 p.

Geological structure of Fangataufa Atoll

It is assumed by the New Zealand authorities that the geology of Fangataufa atoll is similar to that of Mururoa Atoll because of their related geological origin. It has not yet, however, been described in available literature.

Depth of tests

Authoritative depths for each nuclear test experiment are not provided by the French authorities. In November 1987, the then French Secretary of State for the South Pacific, M. Gaston Flosse, quoted a depth range of 500 to 700 metres for tests under the lagoon. M. Flosse observed that, as these test shafts were drilled further from the outside wall of the atoll, their depth was not as great as previously.

In a 1988 report, the Cousteau Foundation ("Mission scientifique de la Calypso sur le site d'experimentations nucleaires de Mururoa", report published by the Cousteau Foundation, Paris, November 1988, p. 16) suggested a depth range of 800 to 1,000 metres for tests under the lagoon.
