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15 September 1995

The Registrar
International Court of Justice
The Peace Palace
THE HAGUE

Your Excellency

I enclose the answers of New Zealand to the questions it was asked on Tuesday, 12 September 1995, in the course of the public sittings relating to the New Zealand Request for an Examination of the Situation in accordance with Paragraph 63 of the Court's 1974 Judgment in the case concerning Nuclear Tests (New Zealand v France).

Accept, Your Excellency, the assurances of my highest consideration.

D J MacKay
Co-Agent of New Zealand

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REPLY OF NEW ZEALAND TO JUDGE SCHWEBEL'S FIRST QUESTION

The Question:

Paragraph 63 of the 1974 Judgment provides that "if the basis of the Judgment were to be affected, the Applicant could request an examination of the situation in accordance with the provisions of the Statute." What meaning is to be given to the words "in accordance with the provision of the Statute"?

The Answer:

1. The terms of the 1974 Judgment are to be interpreted by analogy with the principles applicable to the interpretation of treaties, as set out in Article 31 of the Vienna Convention on the Law of Treaties. Thus, the Judgment must be read in good faith in accordance with the ordinary meaning to be given to its terms in their context and in the light of its object and purpose.

2. New Zealand notes that, as used in paragraph 63, the expression "in accordance with the provisions of the Statute" could qualify or condition either the word "request" or the words "an examination of". Thus, in the first alternative, the correct reading of the whole phrase would be: "... the Applicant could request, in accordance with the provisions of the Statute,

an examination of the situation". If this had been the intention of the Court, obviously it could easily have said so - in just that way. But it did not.

3. Instead the Court added the words "in accordance with the provisions of the Statute" at the only place in which they could be located if it had been the Court's intention to use them in relation to the second alternative, the idea of "examination of the situation". The position is the same in the French version of the paragraph.

4. An additional important literal and grammatical indicator that the Court had in mind the second alternative is that the words "in accordance with the provisions of the Statute" are immediately followed not by a full stop and a new sentence, possibly containing a different thought, but by a semi-colon introducing a dependent clause. This clause refers to an aspect of the jurisdiction of the Court - a matter which is, of course, regulated by the Statute, Article 36. This emphasises that the words "in accordance with the provisions of the Statute", involving as they also do questions of jurisdiction, are related to "an examination of the situation" rather than to the form of the "request".

5. Thus, it is the second alternative - that which must be "in accordance with the provisions of the Statute" is the "examination of the situation" - that should be looked at more closely.

6. New Zealand has, from the commencement of its initiative in the present phase of these proceedings, acted on the basis that the procedure which both it and the Court must follow is one that adheres as strictly as possible to the prescriptions of the Statute and the Rules of the Court. It is, of course, true that there is no express provision in the Statute to support the course for which the Court provided in paragraph 63. However, it cannot be concluded that the Court therefore acted illegally or without purpose. As New Zealand has pointed out on several occasions, the Court was acting in the exercise of its inherent power, derived from its very existence under Article 1 of the Statute as "the principal judicial organ of the United Nations", from the fact that it is its duty, under Article 38(1) of the Statute, "to decide in accordance with international law such disputes as are submitted to it" and from the power granted to it in Article 48 to make orders for the conduct of the case.

7. But the fact that the Court exercised its inherent or reserve powers under the Statute to provide for the continuity mentioned in paragraph 63

does not mean that the Court's procedures thereafter were themselves to be freed from regulation by the Statute and the Rules. It is the view of New Zealand that when the Court in 1974 used the words "an examination of the situation in accordance with the provisions of the Statute", it meant that, if the circumstances contemplated in the words "if the basis of the Judgment were to be affected" should arise, New Zealand should, hanging its request upon the very terms of paragraph 63 itself, do exactly what that paragraph said, namely, "request an examination of the situation". Having regard to the manifest connection between the request and the terms of the 1974 Judgment of the Court, the Court would then receive that request and process it in the same manner as it would any other request or application made to it by a State Party to the Statute. It would not in any way be influenced by the recollection that it had on occasion dismissed without a hearing applications which themselves expressly acknowledged that they had been made in the absence of any jurisdictional link with the named Respondent State. The Request would then be dealt with in a procedurally predictable way. If there were no request for interim measures of protection, the Court would proceed forthwith to make an order for such written or oral proceedings on the matter as it might deem appropriate. If France were to think that the Court lacked competence or jurisdiction to deal with the matter it would either appear and so argue, just as it was to

do on 11 and 12 September 1995, or it would refrain from attending and, as a non-participant, could send a letter or memorandum just as it did when the case was started in 1973.

8. The Court would then hear the case "in accordance with the terms of the Statute". Either it would sustain the French objections, in which event the proceedings would come to an end, or it would reject them and the case would proceed in the normal way. The situation thus parallels in procedural terms a case in which an issue of jurisdiction might be raised, whether by the Respondent State or, in its absence, by the Court itself.

9. The fact that the imminence of the resumption of testing by France might oblige New Zealand to request provisional measures of protection would make no difference to the basic procedural situation. The request for provisional measures would merely raise more immediately the same question of competence or jurisdiction. The Court has a well-established practice for resolving threshold question of jurisdiction or competence at the provisional measures stage; and that practice could be followed. France could object to the jurisdiction - as it did in May 1973 - and the Court could then decide whether or not jurisdiction exists prima facie. The Statute provides in Article 41 for a Request for Provisional Measures and

the Rules provide that such a request shall have priority over all other cases and shall be treated as a matter of urgency.

10. There exists, therefore, a clear set of prescriptions enabling the Court to examine the situation in accordance with the provisions of the Statute. In the submission of New Zealand it was this kind of predictable procedure, founded in the Statute and its subordinate Rules, to which the Court in 1974 was referring by the use of the words "in accordance with the provisions of the Statute" in paragraph 63.

REPLY OF NEW ZEALAND
TO JUDGE SCHWEBEL'S SECOND QUESTION

The Question:

After the rendering of the Judgment of the Court in the *Nuclear Tests* case in 1974, and before June 1995, did New Zealand indicate, and, if so, how, that it understood the 1974 Judgment to relate to the possibility of nuclear contamination deriving from nuclear tests other than atmospheric tests? It is appreciated that the statement by the Prime Minister of New Zealand of 21 December 1974 is relevant to this question.

The Answer:

1. Immediately after the Judgment of 20 December 1974 the Court's judgment was analysed with great care by the Government lawyers, and careful note was taken of paragraph 63. The New Zealand Prime Minister referred expressly to paragraph 63 in his statement of 21 December 1974. As he said:

> "... New Zealand's concern about nuclear testing had never been confined to the particular case of the tests conducted by France - or, indeed, to the question of testing in the atmosphere."

2. This wider concern had been clear from New Zealand's Application and had not been addressed in the Judgment; hence the Prime Minister, having referred expressly to paragraph 63, commented that the Judgment achieves "in large measure the immediate object for which these proceedings were brought" (emphasis added).

3. New Zealand did not expressly state, for the public record, that paragraph 63 would, or could, be utilised in respect of future non-atmospheric nuclear testing. Until such time as New Zealand had evidence that a clear risk of nuclear contamination was created by such testing, a statement of that kind might have been seen as provocative and irresponsible. Such evidence as New Zealand has is of relatively recent origin. The Court in paragraph 63 placed no limit of time on New Zealand's rights.

4. But New Zealand continuously sought information, or evidence, from France in bilateral, regional and multilateral contexts. Those requests include the following:

3 December 1979	Request by New Zealand Minister of Foreign Affairs during meeting in Paris with French Foreign Minister
22 April 1980	Request to France to allow visit to Mururoa

	test site by New Zealand scientists
9 December 1981	Further request for information
24 March 1982	New Zealand request for independent verification of French safety-measures
23 August 1982	New Zealand repeated request for access to site by New Zealand scientists (Atkinson visit allowed October/ November 1983)
25 November 1986	Noumea Convention signed following negotiations over some years involving New Zealand and France and other South Pacific States

There were no tests between July 1991 and September 1995, a period largely covered by the moratorium on testing. New Zealand has never regarded the few visits of independent scientists (Tazieff, June 1982; Atkinson, October/November 1983; Cousteau, June 1987) as reliable evidence, one way or the other. Vincent's article, renewing fears for a release of radioactive material was published only in July 1995.

5. From this record it will be clear why New Zealand did not have the evidence to justify a public threat of renewal of its case against France under paragraph 63. And it is for this reason that, even today, New Zealand seeks in the alternative to have the Court require France to carry out an Environmental Impact Assessment.

6. There can be no question of "acquiescence" by New Zealand during this period. The record contains repeated protests by New Zealand and, of course, the 1986 Noumea Convention was also in large part based on the concerns of New Zealand and other South Pacific States over the French underground testing.

REPLY OF NEW ZEALAND TO JUDGE SHAHABUDDEEN'S FIRST QUESTION

The Question:

Bearing in mind that France has withdrawn her optional clause declaration and has denounced the 1928 Treaty:

(a) Would a request for an examination of the situation within the meaning of paragraph 63 of the 1974 Judgment extend to include a request for reliefs in respect of the current series of nuclear tests, such as declarations as to their legality?

(b) Or, would the object of such a request be limited to a reopening of any issues which were before the Court in 1974 and securing their re-examination in the light of the new situation?

The Answer:

1. It should be recalled that the Court in 1974 did not reach the point of examining the issue of the illegality of nuclear testing that was raised by New Zealand in its Application of 9 May 1973. The only issues considered by the Court were, in 1973, that of interim measures of protection and, in 1974, those of jurisdiction and admissibility.

2. In the view of New Zealand, when the Court contemplated that the basis of the Judgment might be affected by some subsequent development

and that the Applicant could then request an examination of the situation in accordance with the provisions of the Statute, it could not have been on the basis that the Applicant could not ask the Court to provide, in accordance with the provisions of the Statute and the Rules, some relief responsive to the new situation. It is not conceivable that the Court would have intended to provide New Zealand with an opportunity to do no more than request the Court to examine the situation in abstracto.

3. As paragraph 111 of the main Request indicates, New Zealand had contemplated that once the Court had examined the situation it should make appropriate procedural orders in respect of the New Zealand application of May 1973 with a view to according New Zealand the relief referred to in paragraph 113 of the main Request. As a matter of priority and urgency, however, New Zealand would first be requesting provisional measures to protect its rights.

4. As the Court could not, in 1974, have foreseen all the circumstances in which New Zealand might have to request an examination of the situation, it would have been impossible for the Court to have been specific in its statement of the remedies New Zealand might seek without taking the risk that it might omit a possibly pertinent contingency. In line

with the policies of prudence and of protection of the rights of an applicant under the Statute to seek appropriate relief, the Court included paragraph 63. To ensure its effectiveness it maintained its generality.

5. New Zealand proceeded on this assumption in formulating the request for relief that appears in paragraph 113 of the main Request. At the same time, New Zealand took care to remain within the scope of the Application of 9 May 1973. The request made in that Application was:

> "...New Zealand asks the Court to adjudge and declare: That the conduct by the French Government of nuclear tests in the South Pacific region that give rise to radioactive fallout constitutes a violation of New Zealand's rights under international law, and that these rights will be violated by any further tests."

6. The difference in wording between this request for relief and the one which appears in paragraph 113 of the main Request is to be explained as follows:

(i) The relief requested in paragraph 113 is prospective only from the date of the Request. That sought in May 1973 was both prospective and retrospective;

(ii) While the terms of the May 1973 Application referred to "radioactive fallout", the main Request refers to "radioactive

contamination". This is simply a more appropriate expression of the result of the leakage or spread of radioactive material through water into the marine environment whether in large or small quantities;

(iii) The expression in the main Request of the rights of other States, in addition to New Zealand, that would be violated was descriptive of the likely situation, but did not limit the assertion of New Zealand's own rights;

(iv) The references, in sub-paragraph (ii) of paragraph 113 of the main Request, to the carrying out by France of an environmental impact assessment has been seen by New Zealand as a specific step falling short of an immediate determination by the Court that the proposed tests would violate New Zealand's rights under international law. It was intended to enable the Court to provide France with an opportunity to carry out a proper Environmental Impact Assessment in accordance with international standards and, if such an assessment were to establish that the tests would not give rise, directly or indirectly, to radioactive contamination of the marine environment, then France would, in effect, no longer be enjoined from conducting the proposed tests.

7 According to New Zealand's understanding of the process that would follow the Court's examination of the situation, the Court would provide relief appropriate to the facts (including the possible physical consequences of the resumed nuclear tests) and in accordance with the law (including aspects of international environmental law which have developed since 1974). That is to say, some of the matters of fact and law would be such that they could not have been brought before the Court in 1974; they would still fall within the scope of the 1973 application. The answer to Judge Shahabuddeen's second question is pertinent to the issues raised in this paragraph.

REPLY OF NEW ZEALAND TO JUDGE SHAHABUDDEEN'S SECOND QUESTION

The Question:

I understand New Zealand's position to be that the precautionary principle became part of customary international law after the Judgment was given on 20 December 1974. Can the Court now act on the basis of law which was not in existence on that date?

The Answer:

1. The answer is Yes. The Court can act on the basis of law which was not in existence on the date of the Judgment, or indeed on 9 May 1973, the date the Application was filed.

2. The principal reason for that answer is that the conduct which is the subject of the Application and, accordingly, of the Request for an Examination of the Situation is continuing and proposed conduct (see especially the submission at the end of the Application, I.C.J. Pleadings, Nuclear Tests Vol II, p9 (paragraph 28), and paragraphs 1, 112 and 113 of the Request). Similarly the Court in its 1974 Judgment emphasized the concern of New Zealand with further tests (see paragraphs 31, 33, 54

("there is no occasion for a pronouncement in respect of rights and obligations of the Parties concerning the past"), 57 and 59).

3. The lawfulness or unlawfulness of conduct must be determined by reference to the law in force at the time of the conduct, in this case conduct occurring in 1995 and 1996. If for the sake of argument France had become party to the Partial Test Ban Treaty after the commencement of the case or the Judgment of 20 December 1974, can there be any doubt that the Court would have assessed the legality of its conduct after that accession by reference to those treaty obligations?

4. The answer of course applies only to the issues which are still at large following the Judgment of 20 December 1974. The matters decided by that Judgment are res judicata. They cannot be questioned. But the matters decided by that Judgment fall within a very narrow compass. They do not include the central matters raised by the 1973 application - including the unlawfulness of French nuclear testing which causes the contamination of the marine environment, by the addition of artificially created radioactive material. These matters can be brought back to the Court under the provisions of paragraph 63.

5. The applicable law is to be determined by reference to the critical date, a date which has nothing at all to do with the date the case was initiated. Thus the date of the Application or the Special Agreement initiating the proceedings and the date of the law to be applied by the Court are two completely distinct matters. That is clear for instance for many territorial disputes when the date on which the jurisdiction of the Court is established or when the Court is seized with a matter may be decades or even centuries after the date of the law which is to be applied.

6. The principles underlying the developing law relating to the environment were well established when the Application was filed on 9 May 1973. Among these principles are those developed in the Stockholm Declaration on the Human Environment which was annexed to the 1973 Request for the Indication of Interim Measures and those developed by the International Commission on Radiological Protection, referred to in paragraph 24 of the 1973 Application, I.C.J. Pleadings, Nuclear Tests, Vol II, pp79 and 7.

7. It is inconceivable, New Zealand submits, that the Court would decide a case relating to conduct affecting the environment in 1995 other than by reference to the law of 1995.

REPLY OF NEW ZEALAND TO JUDGE KOROMA'S QUESTION

The Question:

New Zealand contends that its Request for an Examination of the Situation in accordance with paragraph 63 of the Court's 1974 Judgment is not an application for revision, as the Request is not in relation to new facts within the context of Article 61 of the Statute, but relates to new events.

I would welcome further clarification on the difference or differences between an application based on Article 61 of the Statute and the present Request by New Zealand.

The Answer:

1. When New Zealand decided that it was necessary to request the Court to resume its consideration of the case begun in 1973 and suspended in 1974, it, of course, thought carefully about the proper form of such a request. The only forms of initiating proceedings in the Court that are expressly referred to in the Statute are those mentioned in Article 40, Article 60 and Article 61.

2. New Zealand took the view that none of these forms was appropriate. New Zealand considered that it had not been the intention of the Court that New Zealand should have to attempt to squeeze a request for an examination of the new situation into the straight-jacket of an application instituting new proceedings or of an application for

interpretation or revision. It seemed to New Zealand that the Court was breaking new ground in opening up the right to return to the Court if the basis of the Judgment were to be affected. Just as the Court had the inherent right under its Statute to establish the possibility of continuance that it envisaged in paragraph 63, so equally the Court had the right to accept a request from New Zealand thus to return in a form not specifically laid down in the Statute.

3. In any case, as is made clear in New Zealand's reply to Judge Schwebel's first question, the reference in paragraph 63 to "in accordance with the provisions of the Statute" must refer, not to the manner of making the request, but to the procedure for examining the situation, to the situation thereafter, and to the question of the Court's jurisdiction. This point is also touched on in the answer to the first question by Judge Shahabuddeen (para. 3).

4. That is not to say that New Zealand could not have framed its request in terms of an application under Article 40, invoking the same jurisdictional grounds as it did in the original application of May 1973, coupled with the extension in time and operation thereof accorded by the reference in paragraph 63 to the ineffectiveness, in this connection, of the

French denunciation of the 1928 Geneva Act. In logic, what the Court said about the General Act should equally apply to the French Declaration under the Optional Clause.

5. Nor is it excluded that New Zealand could have framed its request in terms of an application for interpretation under Article 60 of the Statute. It is quite evident that the argument that has been conducted before the Court in recent weeks has centred on the meaning to be accorded to paragraph 63 of the 1974 Judgment.

6. The question which the Court conveyed to the Parties on 8 September 1995, and within the framework of which the hearings of 11 and 12 September have been conducted, asked whether the Requests submitted by New Zealand "fall within the provisions of paragraph 63" of the 1974 Judgment. The precise way in which New Zealand identifies the manner in which its Requests fall within the provisions of paragraph 63 should not be regarded as of controlling importance. As the Court has often said, it does not attach dominant importance to matters of form. Some may take the view that the correct way to implement paragraph 63 is the one which New Zealand has actually followed; others may see it as a matter for an application under Article 40, with jurisdiction resting on the

basis mentioned in paragraph 4 above; yet others may see it as a case for interpretation under Article 60. But the one thing that is clear is that in paragraph 63 of the 1974 Judgment the Court did something that cannot now be denied effect solely by reference to a purely formal consideration that does not alter the essential substance of the matter. In paragraph 63 the Court made a certain promise which New Zealand is entitled to invoke. The form in which the promise is invoked is subsidiary, provided that the substance of the request falls within the scope of the words "if the basis of this Judgment were to be affected".

7. Therefore, without in any way resiling from its view that the form in which it has expressed its request for an examination of the situation is correct and sufficient, New Zealand must emphasise that the dominant question before the Court is the substance of the Request and that the Members of the Court remain free to approach the Request for an Examination of the Situation from any point of view that they wish, provided that they ultimately reach agreement upon the main question which is: "Has the basis of the 1974 Judgment been affected by the facts and developments set out in the main Request and elaborated in the oral proceedings just concluded?" So to approach this matter would not give rise to a situation of ultra petita.

8. Having explained the background in this way, New Zealand can now turn to the specific question put by Judge Koroma. There is one approach to the matter that may not properly be adopted, namely, that the New Zealand request is really an application for revision - or at any rate a request for revision within the scope of Article 61 of the Statute. In 1974 the Court was of course fully aware that Article 61, paragraph 5, of the Statute excluded any application for revision after a lapse of ten years from the date of the judgment. There was no reason why the Court would have wished to limit the effective duration of the French undertakings to ten years. Indeed, the same point can be put positively: there was good reason why the Court should not wish to limit the effective duration of the French undertakings to ten years. That reason was that the Court could not have been certain in 1974 that the situations in respect of which it was seeking to protect New Zealand in paragraph 63 would necessarily occur (if at all) within ten years. It is also relevant to this matter that the Court made an express finding "that the unilateral undertaking resulting from these statements cannot be interpreted as having been made in implicit reliance on an arbitrary power of reconsideration" (paragraph 53).

9. This factor - the known existence of the time limit in Article 61 - is itself a full and sufficient reason why the Court must in 1974 tacitly have excluded the idea of resumption via the route of revision. In the circumstances, if the Court had wished to place a time limit upon the operation of paragraph 63, it could easily have said so by expressing itself in different and clearer language. Instead of saying that "the Applicant could request an examination of the situation" it could have said that "the Applicant could apply for the revision of the Judgment". The obvious inference of the Court's not having said so is that it foresaw a different mode of proceeding.

10. The reply to the second paragraph of Judge Koroma's question is that revision as prescribed by Article 61 is available "only when it is based upon the discovery of some fact.... which fact was when the judgment was given unknown to the Court..." (emphasis added). These words stipulate that the fact giving rise to the request for revision was one in existence at the time of the Judgment, but undiscovered and unknown.

11. Paragraph 63 is rather concerned with authorising further consideration of the subject matter of the case if a future event having the effect described in the paragraph occurs after the Judgment. Such new

facts would not be within the scope of an application for revision under Article 61.

13. The difference can be demonstrated by assuming that subsequent to delivery of the 1974 Judgment France recommenced atmospheric testing. Such a new fact would not have fit the requirements of Article 61. News of it would not be a "discovery" of a matter in 1974 "unknown" to the Court. And it is "only" in that situation that Article 61 applies. Paragraph 63 however is drafted to cover such future conduct, indeed any future actions by France such as would affect the basis of the judgment.

REPLY OF NEW ZEALAND TO JUDGE WEERAMANTRY'S FIRST QUESTION

The Question:

What are the principal radioactive wastes resulting from a nuclear explosion? What is the half life of each of them?

The Answer:

The following table lists all of the radionuclides produced by an underground nuclear explosion that have a half-life of greater than four hours. The table lists the name of the element, the specific radionuclide, the half life of that radionuclide, and the method of formation of the radionuclide.

Element	Radionuclide	Half-life	Origin[1]
Tritium	^{3}H	12 years	fission, fusion, activation
Sodium	^{24}Na	15 hours	activation
Chlorine	^{36}Cl	300,000 years	activation
Manganese	^{54}Mn	313 days	activation
Iron	^{55}Fe	2.7 years	activation
Iron	^{59}Fe	45 days	activation
Cobalt	^{60}Co	5 years	activation
Krypton	^{85m}Kr	4.5 hours	fission
Krypton	^{85}Kr	10.8 years	fission
Strontium	^{89}Sr	54 days	fission
Strontium	^{90}Sr	29 years	fission
Yttrium	^{91}Y	59 days	fission
Niobium	^{95}Nb	35 days	fission
Zirconium	^{95}Zr	64 days	fission
Zirconium	^{97}Zr	17 hours	fission
Molybdenum	^{99}Mo	2.9 days	fission
Technetium	^{99}Tc	210,000 years	fission
Ruthenium	^{103}Ru	39 days	fission
Ruthenium	^{106}Ru	372 days	fission
Rhenium	^{105}Re	35 hours	fission
Antimony	^{125}Sb	2.7 years	fission
Tellurium	^{129m}Te	34 days	fission
Iodine	^{129}I	16 million years	fission
Iodine	^{131}I	8 days	fission
Iodine	^{133}I	21 hours	fission
Xenon	^{131m}Xe	12 days	fission
Xenon	^{133m}Xe	2 days	fission
Xenon	^{133}Xe	5 days	fission
Xenon	^{135}Xe	9 hours	fission
Caesium	^{135}Cs	3 million years	fission
Caesium	^{137}Cs	30 years	fission
Barium	^{140}Ba	13 days	fission
Cerium	^{141}Ce	33 days	fission
Cerium	^{143}Ce	33 hours	fission
Cerium	^{144}Ce	285 days	fission
Neodymium	^{147}Nd	11 days	fission
Europium	^{155}Eu	4.8 years	fission
Uranium	^{235}U	700 million years	weapon
Uranium	^{237}U	7 days	activation
Uranium	^{238}U	4.5 billion years	weapon
Neptunium	^{237}Np	2 million years	activation
Neptunium	^{239}Np	2.4 days	activation
Plutonium	^{238}Pu	86 years	activation
Plutonium	^{239}Pu	24,000 years	weapon
Plutonium	^{240}Pu	6540 years	weapon, activation
Plutonium	^{241}Pu	15 years	weapon, activation
Americium	^{241}Am	433 years	weapon

[1] The origins of the radionuclides are as follows:

activation: the element was formed by neutron irradiation of materials in the weapon or the surroundings

fission: the element was formed by fission of uranium or plutonium in the primary (fission) stage of the weapon

fusion: the element was formed by fusion in the secondary (thermonuclear) stage of the weapon

weapon: the element was part of the primary material of the weapon

REPLY OF NEW ZEALAND TO JUDGE WEERAMANTRY'S SECOND QUESTION

The Question:

Are there internationally accepted criteria for the selection of geological repositories for radioactive wastes? If so, please list them briefly.

The Answer:

Part 1.

1. The International Atomic Energy Agency Safety Standard "Safety Principles and Technical Criteria for the Underground Disposal of High Level Radioactive Wastes" (Safety Series No. 99, 1989[1]) is the internationally agreed document which defines technical criteria for the underground disposal of high level wastes. (It is this type of waste that most closely approximates to the radioactive debris resulting from an underground nuclear test.)

2. The safety of a waste disposal repository depends not only on the barrier to movement of radioactive material inherent in the geological repository site itself but also on barriers determined by:

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[1] This document is being superceded by a number of more detailed studies, including the one cited in Part 2 of this answer. Nevertheless, the criteria it specifies are still relevant to the selection of a waste disposal system.

- the physical form of the waste;
- the containers in which the waste is placed;
- the method used to seal the waste containers; and
- the physical and chemical properties of the rock and surrounding geological formations.

The IAEA document lays down technical criteria for each of these.

3. Because high level wastes present a potential hazard for very long times and because the difficulty of long term predictions may lead to large uncertainties, it is necessary that the safety of waste disposal does not rest on one single component or barrier, but rather on the combined effectiveness of all of them. It may be that a weakness in one part of the overall system may be compensated for by the containment capabilities of other parts. Thus, the component parts of the waste disposal system must be considered as a whole; the characteristics of the repository site itself are not the sole determinant.

4. We nevertheless confine ourselves to answering the question posed by listing only the technical criteria relevant to the selection of the waste repository site itself.

Criterion No. 1: Overall systems approach

The long term safety of high level radioactive waste disposal shall be based on the multibarrier concept, and shall be assessed on the basis of the performance of the disposal system as a whole.

Criterion No. 5: Repository design and construction

A high level waste repository shall be designed, constructed, operated and closed in such a way that the post-sealing safety functions of the host rock and its relevant surroundings are preserved.

Criterion 7: Site geology

The repository shall be located at sufficient depth to protect adequately the emplaced waste from external events and processes, in a host rock having properties that adequately restrict the deterioration of physical barriers and the transport of radionuclides from the repository to the environment.

New Zealand comment:

The IAEA observes with respect to this criterion that

The location of the waste repository is of great importance to its long term safe functioning. The size of the selected host medium shall be large enough to accommodate the repository and that part of the surrounding medium which is necessary for safety.

The most likely way radionuclides can migrate from the repository to the biosphere is by groundwater transport. For that reason, special emphasis must be placed on the hydrogeological and geochemical transport of the host medium to restrict nuclide transport by groundwater.

It is evident from this observation that Mururoa atoll fails to meet the standard laid down in this criterion.

Criterion No. 8: Consideration of natural resources

The repository site shall be selected, to the extent practicable, to avoid proximity to valuable natural resources or materials which are not readily available from other sources.

Part 2

5. The International Atomic Energy Agency Safety Guide "Safety of Geological Disposal Facilities" (Safety Series No. 111-G-4.1, 1994) specifies more detailed criteria to be used in selecting sites for the disposal of high level radioactive wastes (known as high-level wastes). Relevant extracts from this report follow.

General

401. Owing to the predominance of factors and processes which may be highly site specific and interactive, only general guidelines can be identified that will govern the suitability of potential sites to host a repository..... It is necessary, therefore, that implementation of these guidelines and the development of any subsidiary criteria in a siting process be done in consideration of long term safety, technical feasibility and social, economic and environmental concerns. Criteria so developed should translate technical and institutional concerns into practical measures.

402. Guidelines can be helpful in the overall decision making process but they are not intended to be strict preconditions. To assess whether a disposal system meets its performance goals, the system of natural and engineered barriers has to be considered as a whole. Flexibility in the disposal system is important and the possibility to compensate for uncertainties in the performance of one component by placing more reliance on another should be retained.

403. The following text provides an example of the different siting factors that will have to be considered in a siting process. They are not meant to be a complete set of guidelines and their application will have to take into account the options available and the limitations within each country. Further, these guidelines should not be applied in isolation but will have to be used in an integrated fashion for an overall optimisation of site selection.

GEOLOGICAL SETTING

404. Guideline:

The geological setting of a repository should be amenable to overall characterisation and have geometrical, physical and chemical characteristics that combine to inhibit the movement of radionuclides from the repository to the environment during the time periods of concern.

405. The depth and dimensions of the host rock should be sufficient for hosting the repository and provide sufficient distance from geological discontinuities that could provide a rapid pathway for radionuclide transport, such as brecciated fault zones....

FUTURE NATURAL CHANGES

408. Guideline:

The host rock should not be liable to be affected by future geodynamic phenomena (climatic changes, neotectonics,

seismicity, volcanism, diapirism) to such an extent that these could unacceptably impair the isolation capability of the overall disposal system.

409. Future climatic evolution (external geodynamic) represented by interglacial and glacial cycles may result in fundamental changes in the Earth's hydrosphere, such as sea level fluctuations, changes in erosion/sedimentation processes, transitions in glacial or periglacial conditions, and variations in the surface and subsurface hydrological balance. Internal geodynamic activities such as ground motion associated with earthquakes, land subsidence and uplift, volcanism and diapirism may also induce changes in the Earth's crust conditions and processes. Both types of events, which can be in some cases interrelated, may affect the overall disposal system through disturbances in the site integrity or modifications of groundwater fluxes and pathways. A preliminary assessment of the predictability and effects of these phenomena should be made for the required periods of time at an early stage of the siting process. The site should be located in a geological and geographical setting where these geodynamic processes or

events will not be likely to lead to unacceptable radionuclide release.

HYDROGEOLOGY

412. Guideline:

The hydrogeological characteristics and setting of the geological environment should tend to restrict groundwater flow within the repository and should support safe waste isolation for the required times.

413. An evaluation of the mechanisms of groundwater movement, as well as an analysis of the direction and rate of flow will be an important input to the safety assessment of any site because the most likely mode of radionuclide release is by groundwater flow. Irrespective of the nature of the waste or the disposal option, a geological environment capable of restricting flow to, through and from the repository will contribute to preventing unacceptable radionuclide releases. Natural features such as aquifers or fracture zones are potential release pathways for radionuclides.

Such paths should be limited in the repository host rock so that the protective functions of the geological and engineered barrier system remain compatible. The dilution capacity of the hydrogeological system may also be important and should be evaluated. Siting should be optimised in such a way as to favour long and slow moving groundwater pathways from the repository to the environment.

414. Possible consequences for the hydrogeology resulting from processes caused by the disposal of radioactive waste (e.g. thermal and radiation effects, increased hydraulic conductivity due to mining, etc.) should be taken into account.

GEOCHEMISTRY

416. Guidelines:

The physicochemical and geochemical characteristics of the geological and hydrogeological environment should tend to limit the release of radionuclides from the disposal facility to the accessible environment.

417. The choice of a host rock and of a surrounding geological environment that has suitable geochemical characteristics and good retardation properties for long lived radionuclides is particularly important in the disposal of long lived waste. In a formation where groundwater movement through fissures and pores occurs, retardation by minerals both within the rock matrix and on the rock surfaces could be important to ensure satisfactory long term performance of the repository system. The retention or retardation processes which govern the consequent rate and quantity of radionuclide migration include processes such as dispersion, diffusion, precipitation, sorption, ion exchange and chemical interaction. The ability of groundwater to transport radioactive colloids may be important and should also be taken into account.

EVENTS RESULTING FROM HUMAN ACTIVITIES

420. Guideline:

The siting of a disposal facility should be made with consideration of actual and potential human activities at or near the site. The likelihood that such activities could affect the isolation capability of the disposal system and cause unacceptable consequences should be minimised.

CONSTRUCTION AND ENGINEERING CONDITIONS

425. Guideline:

The surface and underground characteristics of the site should permit application of an optimised plan of surface facilities and underground workings and the construction of all excavations in compliance with appropriate mining rules.

TRANSPORTATION OF WASTE

429. Guideline:

The site should be located such that radiation exposures of the public and the environmental impacts of transporting the waste to the site are within acceptable limits.

PROTECTION OF THE ENVIRONMENT

432. Guideline:

The site should be located such that the quality of the environment will be adequately protected and the potentially adverse impacts can be mitigated to an acceptable degree, taking into account technical, economic, social and environmental factors.

LAND USE

435. Guideline:

In the selection of suitable sites, land use and ownership of land should be considered in connection with possible future development and regional planning in the area of interest.

SOCIAL IMPACTS

438. Guideline:

The site should be located so that the overall societal impact of implementing a repository system at the site is acceptable. Beneficial effects of the siting of a repository in a region or area should be enhanced whenever feasible and any negative societal impacts should be minimized.

REPLY OF NEW ZEALAND TO JUDGE WEERAMANTRY'S THIRD QUESTION

The Question:

Was there any disturbance of the ocean surface alongside Mururoa in consequence of the nuclear test of 5 September? If so, what were its causes?

The Answer:

1. New Zealand has no information on whether there was any disturbance of the ocean outside Mururoa.

2. The surface waters of the lagoon are always disturbed by the seismic shock wave created by a test taking place under the lagoon. The strong shock wave causes surface water over a considerable area of the lagoon to rise some metres into the air and to form isolated geysers as it collapses. These effects were visible on the French video of the test.

3. When testing took place under the rim of the atoll, the shock wave used to cause subsidence of the land surface of the atoll around the testing point, and on several occasions caused slumping of sediments and limestone blocks down the outer flanks of the atoll. These effects were described in the New Zealand main request and in its oral presentation.

REPLY OF NEW ZEALAND TO JUDGE WEERAMANTRY'S FOURTH QUESTION

The Question:

76 of the 134 nuclear explosions on Mururoa took place, according to New Zealand, in holes drilled through the coral crown of the atoll and 50 in shafts drilled through the central part of the atoll. Are the radioactive wastes of the first group of explosions still contained in the holes drilled in the coral crown of the atoll?

The Answer:

The 76 tests that took place under the rim (or coral crown) of the atoll, like the 50 tests that took place under the lagoon, were conducted within the volcanic rock (basalt) that forms the core of Mururoa. Radioactivity created by an explosion is initially located within the vicinity of the explosion, but it soon begins to be transported by water circulating through the atoll away from the site and up towards the surface. All three independent scientific missions that have visited Mururoa (led by Tazieff, Atkinson and Cousteau) have agreed that water carrying the radioactivity will reach the atoll's lagoon or the open ocean. But France has not released sufficient information to enable an accurate assessment to be made of the probable time-scale of this leakage. Commander Cousteau was given some general information, on the basis of which he estimated

that leakage would occur on a time-scale of 100 to 300 years. New Zealand has no independent means of confirming this estimate.