Bikini Atoll (Marshall Islands)
No 1339

Official name as proposed by the State Party:

Bikini Atoll

Location:

Bikini Atoll,
Republic of the Marshall Islands

Brief description:

In the wake of World War II, in a move closely related to the beginnings of the Cold War, the United States of America decided to resume nuclear testing in the Pacific Ocean, on Bikini Atoll in the Marshall archipelago. After the displacement of the local inhabitants, 67 nuclear tests were carried out from 1946 to 1958, including the explosion of the first H-bomb (1952). Equivalent to 7,000 times the force of the Hiroshima bomb, the tests had major consequences on the geology and natural environment of Bikini Atoll and on the health of those who were exposed to radiation. These tests generated a set of symbolic values of international significance, leaving a lasting imprint on the history of the 20th century.

Category of property:

In terms of categories of cultural property set out in Article 1 of the 1972 World Heritage Convention, this is a *site.*

1. BASIC DATA

Included in the Tentative List: 24 October 2005

International Assistance from the World Heritage Fund for preparing the Nomination: 2006

Date received by World Heritage Centre: 28 January 2009

Background: This is a new nomination.

Consultations: ICOMOS consulted its International Scientific Committees on the Pacific Islands, on Underwater Cultural Heritage, and on Intangible Cultural Heritage.

Literature consulted (selection):

Delgado, J.P., Lenihan, D.J., and Murphy, L., *The Archeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons*. Submerged Resources Center Professional Report No. 11, National Park Service, Santa Fe, New Mexico, 1991.

Fontaine, A., *Histoire de la guerre froide*, Paris, Fayard, 1967.

Lips-Dumas, F., "7000 Hiroshima, les îles Marshall ont été sacrifiées 'pour le bien de l'humanité'," *XXI-Vingt et un*, n° 7, 2009, pp. 34-45.

Lokan, K., *et al.*, *Radiological Conditions at Bikini Atoll: Prospects for Resettlement, Report of an Advisory Group of the International Atomic Energy Agency*, Vienna, Austria: IAEA, 1998.

Niedenthal, J., *For the Good of Mankind: A History of the People of Bikini and their Islands*, Majuro: Bravo Publishers, 2002.

Smith, A., and Jones, K. L., *Cultural Landscapes of the Pacific Islands*, ICOMOS Thematic Study, December 2007.

Technical Evaluation Mission: 7-17 September 2009

Additional information requested and received from the State Party: ICOMOS sent a letter to the State Party on 17 December 2009 about the following points:

- The involvement of the Historic Preservation Office in the conservation and management of the property;
- The projected conservation and management plan and the setting up of the Bikini Atoll Conservation and Management Office;
- A study to evaluate the risks arising from the presence of conventional bombs and fuel in the sunken vessels and wrecks;
- The awareness of the community of Bikini of the implications of inscription on the World Heritage List, which include the necessity of preserving remains linked with the nuclear tests;
- Changing the name of the property to link it to the theme of the nomination, for example to 'Bikini Atoll nuclear test site.'

The State Party replied on 2 February 2010. The analysis of this documentation is included in this evaluation.

Date of ICOMOS approval of this report: 17 March 2010

2. THE PROPERTY

Description

Bikini Atoll is located in the north-west of the Marshall Islands archipelago, which forms part of the western Micronesian group of islands in the Pacific Ocean. It consists of a long annular coral reef, linking together 23 main islets whose total surface area is less than 720ha. The main islet of Bikini has given its name to the whole atoll.

The central lagoon, which is basically elliptical in form,

opens widely to the ocean in its southern part. Its largest diameter is about 40km and its smallest some 22km. The lagoon is easily accessible by large-tonnage ships, opening up a possibility which was exploited for the nuclear tests.

Today the atoll at first sight offers the idyllic image of a natural island and lagoon landscape in the heart of the Pacific, with its vegetation, its coral reefs, the waters of the lagoon, and its pleasant climate. Bikini is also striking for the diversity of its fauna and flora, both on land and in the sea.

However, a number of specific tangible and landscape features of Bikini Atoll are linked to the various American nuclear test campaigns carried out from 1946 until 1958. Various types of evidence have been left behind: excavations and disappearances of islets, vessels sunk in the lagoon, bunkers and land installations, and radioactive residues in the soil.

Explosion craters and disappearances of islets:

The Bravo explosion (1954), in the Castle series, was to test the second hydrogen bomb, the strongest ever carried out by the Americans, equivalent to 15,000 kilotonnes (kt) of TNT. The crater opened up by the Bravo surface explosion destroyed two of the 25 islets in the atoll at the time and partially destroyed a third. The crater is over 2km wide and 80m deep. This is the largest and most visible crater on Bikini, clearly to be seen on aerial photographs and by satellite observation.
More generally, the nuclear tests affected the islands and the coral reef in several places, in a way that is more widespread and less immediately visible today than the Bravo crater. It has affected the atoll's morphological structure, the underwater geography, and the plant and underwater environment.

The sunken vessels:

In Operation Crossroads (July 1946) ten major warships, nine secondary vessels, and five aircraft were subjected twice to nuclear blasts, in the same location, once by aerial bombing and once by a submarine blast. The remains of this fleet lie at the bottom of the lagoon, at a depth of around 60m, in the underwater blast crater or nearby. Amongst them were the aircraft carrier *Saratoga*, the battleship *Arkansas*, the Japanese battleship *Nagato*, two submarines, and an Avenger bomber. As the test was intended to simulate a war situation, some of the vessels and aircraft still contain their fuel reserves, and in some cases their stocks of unexploded munitions as well. Together they form a unique series of battleships and military materiel, built in both the United States and Japan, from 1912 until the end of World War II. The shapes and the general structures of the vessels have been conserved or can be easily identified, although the superstructures were largely destroyed by the explosions.

Remains of bunkers and buildings:

Eneu Island in the south-east of Bikini Atoll was the site of two main structures that are still there today: the Communications Station Bunker and the Monitoring Bunker. The less substantial Bomb Assembly Building was demolished in the 1980s because of its very poor condition. There are more observation and monitoring bunkers on seven other islands in the atoll, including Bikini itself. All the bunkers are made of reinforced concrete. There are other tangible remains, in particular technical equipment that was abandoned on the site.

Radiation:

According to a report by the International Atomic Energy Agency in 1998, the scientific community recognizes that access to the islands of the Bikini Atoll and its lagoon is today considered not to represent a health hazard, provided that certain conditions relating to food are complied with (see below).

Most of the radionuclides produced in nuclear weapons testing are short-lived. They are therefore no longer present today in the form of radionuclides, but in transmuted forms that are stable and hence non-radioactive. However, there are still radioactive nuclides, such as those with half-lives of a few decades (cesium-137 and strontium-90 in particular) on the atoll in substantial quantities. To a lesser extent there are also radionuclides with a long half-life (plutonium-239, plutonium-240, americium-241).

Cesium-137 is the most dangerous of these radionuclides because of its current concentrations, which are on average 160 times greater than its natural occurrence, and this can rise to 1,000 times in certain locations, combined with its biochemical assimilation by plants. Coral atoll soils are potassium-poor. Potassium is an essential nutrient for plants, and it tends to be replaced by cesium. The regular consumption of vegetables grown on the atoll may be hazardous for human health.

Environmental and human impact:

The natural environment, the landscape, and the seascape form an important part of the value of Bikini. They have been powerfully impacted by the nuclear testing. However, the wealth and biodiversity of the marine flora and fauna, which derive naturally from the ocean, have recovered in a remarkable and original way. This is particularly visible in the Bravo crater, where coral activity and the geological reconstitution of the reef have been taking place for a number of years. The waters and the site of Bikini in fact provide a unique living laboratory for the study of ecosystem regeneration after a major destructive event and following extreme exposure to radioactivity. Similar observations have been made of the regeneration of vegetation and fauna on the atoll, birds in particular.

In the moments following nuclear explosions, enormous clouds of radioactive dust were formed, rapidly reaching up to the highest layers of the atmosphere. The dust was then swept up by the prevailing winds, and a large proportion of the radioactive material fell into the ocean and into the territories over which the winds blew. Twenty-three Japanese fishermen aboard the *Daigo Fukuryu Maru* were irradiated in March 1954 as a result of the Castle Bravo test, even though they were outside the prohibited zone. All the fishermen developed serious radiation sickness, which had a considerable impact on public opinion in Japan and worldwide.

During the Castle Bravo blast, which was exceptionally powerful and badly managed in technical and scientific terms, the population of the neighbouring atoll of Rongelap (130km east of Bikini), where some of Bikini's inhabitants had been relocated, was irradiated. The consequences for the health of an abnormally high proportion of these people were considerable: thyroid disorders and growth anomalies in children, high cancer rates, abnormal second- and third-generation embryos, etc.

The experimental relocation of people on Bikini Atoll in the 1970s also led to unacceptable results in terms of public health. The atoll was again evacuated.

More generally, the life of the inhabitants of Bikini and nearby atolls was totally disrupted by the introduction of American military and nuclear facilities and by the test firings and their consequences. In this respect, the State Party has used the term 'nuclear colonialism.'

History and development

The emergence of the atolls forming the Marshall archipelago is relatively recent. The arrival and settlement of the Micronesian populations in the islands goes back to the 4th and 3rd millennia BCE. Their lifestyle, which remained largely traditional over a long period, was based on fishing, and the gathering of fruit, coconut in particular.

The traditional Micronesian way of life was little affected by the visits in the 16th-18th centuries of the first European explorers such as Captain Marshall, after whom the islands were named. The same was true of the first colonial episode, as a German protectorate at the end of the 19th century. Coconut plantations were developed. After World War I the islands were made a Japanese mandate by the League of Nations.

In the inter-war period the Japanese considered the Marshall Islands to have strategic importance and turned them into a strong military site. During the Pacific War a substantial American naval force of 40,000 men captured the outpost at Kwajalein and the archipelago in February 1944, following a hard-fought battle which resulted in the deaths of the entire 8,000-strong Japanese garrison. The Americans then counted the Marshall Islands as territory conquered in battle against the enemy.

The use of atomic bombs by the US Army on the Japanese cities of Hiroshima (6 August 1945) and Nagasaki (9 August 1945) led to the unconditional surrender of Japan and the end of World War II. However, these military actions took place just after a number of major agreements between the Allies: the territorial divisions made at Yalta (February 1945), the end of the war in Europe (May 1945) and the Potsdam Conference, and finally the San Francisco Conference that created the United Nations (June 1945). The use of nuclear weapons had suddenly changed the balance of power between the Allies. Nuclear disarmament and/or nuclear non-proliferation under the control of the United Nations immediately became an issue and a major source of disagreement: the USSR pressed for disarmament as a priority whilst the USA, the only nation to possess atomic weapons, wanted non-proliferation at any cost. The issue was increasingly keenly debated at several international meetings during the winter of 1945-46, particularly at the 1st General Assembly of the United Nations (January 1946). The principle of the United Nations having a controlling power over nuclear weapons was recognized, but the Americans and the Soviets were unable to reach an agreement on how to implement the decision.

Suspicion became the keynote of relations between the former allies over a long period. The Cold War had just begun between the West and the Soviet Union. The Soviets, excluded from the occupation of Japan (February 1946), shortly afterwards announced the formation of a Communist government in North Korea. In the spring, military tensions between the two blocs that were beginning to emerge developed in various regions of the world.

This was the context in which President Truman gave his approval to a plan proposed by the US Army to resume nuclear tests on an isolated Pacific island. The Bikini Atoll at the north-eastern tip of the Marshall archipelago, which shortly before had been the core of the Battle of the Pacific and was still occupied by American troops, was chosen. The inhabitants of Bikini Atoll, who numbered just over one thousand, were evacuated in March 1946 to the neighbouring atoll of Rongelap. Extensive preparations then took place on the main islands of the atoll to create the necessary military base, including command and firing control bunkers and logistical installations. Tens of thousands of military personnel were involved in the operations.

The first two tests at Bikini took place on 1 and 25 July 1946, under the codename Crossroads. They consisted of an air strike (Able) followed by a underwater strike (Baker), on the same position in the east of the lagoon. There were two objectives: on the one hand to stage an impressive display of American nuclear power, and on the other to carry out a military study of the direct impact of a nuclear explosion on a naval fleet.

The Russians' development of a nuclear weapon capability (1949), followed by the Korean War (1950), led to the intensification of the Cold War. The Americans then developed thermonuclear weapons, in the form of the massively powerful hydrogen bomb. In October 1952 the H-bomb was tested for the first time at Bikini, in a 10,400kt explosion (Ivy Mike), 800 times more powerful than the bomb dropped on Hiroshima. This was the first man-made nuclear fusion, and was carried out using cores of deuterium, a heavy isotope of hydrogen (resulting in the name 'hydrogen bomb'). An operational version, the most powerful ever made by the Americans, was tested in March 1954 (Castle Bravo, 15,000kt), and this was followed by three other firings of similar power in 1954, all of them at Bikini.

Twenty-three tests were carried out at Bikini between July 1946 and August 1958, including the most powerful explosions ever conducted by the US Army. The neighbouring site of Enewetak Atoll, a little over 300km to the west, was also used from 1948 to 1958 (44 explosions). The Bikini inhabitants were relocated several times from one atoll to another. Those on Rongelap were authorized to return to their island in 1957, but the return proved a failure as the high degree of cesium-137 pollution made food grown on the islet hazardous.

Following the dropping of the two bombs on Japan and the spectacular Operation Crossroads tests at Bikini, a series of symbols and images began to impinge upon international public opinion, and this awareness was bolstered by the many nuclear tests carried out in the 1950s by the Americans, the Russians, and the British (from 1952). They acquired a considerable value and have played a major role in post-World War II history right up to the present day. The huge nuclear mushroom cloud emerging in a few seconds above the ocean is an image universally associated with such explosions. Initially created in Japan, the monster Godzilla emerging from the sea has become a popular icon of nuclear terror and its infinite power of devastation. Reflecting the international diffusion of American culture in the post-war period, the fashion of the two-piece bathing suit was launched in Paris under the name 'bikini.' The theme of nuclear explosions in the Pacific was taken up by various artists, including the painter Salvador Dalí and the film director John Huston.

From a political viewpoint, the balance of terror born out of the Cold War was perfectly illustrated by the parallel development of nuclear weapon testing by the two blocs. Soviet efforts to catch up with and overtake the Americans culminated in the 50 megaton Big Ivan thermonuclear bomb (tested in 1961).

These events marked the course of a new nuclear age which was suddenly opening up for mankind. After beginning at Hiroshima in 1945, it was followed up less than one year later at Bikini, at a time when the warring nations of World War II were officially at peace. It was thus inevitable that a powerful anti-nuclear feeling should develop. The Japanese fishing boat irradiated in 1954 by the Castle Bravo test was to become a symbol; the irradiation of the populations of the Marshall Islands also raised concerns in international opinion. Several conferences then took place. Bertrand Russell and Albert Einstein published a celebrated manifesto protesting against the Bikini tests. The years 1954-55 marked a turning point as the fears inspired by military nuclear capabilities, which until then had been shared only by limited circles of specialists, spread to international public opinion. A powerful popular movement calling for an end to tests and for nuclear disarmament was launched, a movement which had failed to take hold at the time of the creation of the United Nations Organization at the end of World War II.

Pressure of public opinion, together with the advances made in the digital simulation of nuclear tests, a new field of technological and military progress, led the US Government to take a unilateral decision to end nuclear tests (1958). This gave the USA the opportunity to revive its diplomatic efforts to ratify a non-proliferation treaty, at a time when new players were preparing to join the nuclear club, including France (whose first test was conducted in 1960).

From 1967 onwards the US authorities considered the possibility of the Bikini people returning to their atoll, and this led to work to clean up radioisotope contamination This was carried out from 1970 onwards, backed up by an agricultural production programme. Medical follow-up of inhabitants showed, however, high levels of human contamination as a result of consuming food produced on the atoll and water from its wells. The atoll had therefore to be evacuated once again in 1978.

Long after the ending of nuclear tests, the Marshall Islands remained subject to an exceptional legal status from the viewpoint of international law. They were still the site of a large-scale American conventional military presence in the Western Pacific. The legal situation was only gradually normalized during the 1980s, leading ultimately to the independence of the archipelago in 1990.

3. OUTSTANDING UNIVERSAL VALUE, INTEGRITY AND AUTHENTICITY

Comparative analysis

The State Party compares the nuclear test site of Bikini with a selection of other locations in the world where such weapons have been detonated, in order to highlight its originality and significance:

- The site of the first use of the atom bomb in Japan, in August 1945, inscribed on the World Heritage List as the Hiroshima Peace Memorial (Genbaku Dome) (1996, criterion (vi)).
- The first nuclear explosion at Trinity, in July 1945, in the State of New Mexico in the USA.
- The site of Enewetak Atoll in the Marshall

Islands, used alongside Bikini from 1948 onwards.
- The underground nuclear test site in Nevada in the USA.
- The Soviet Union's first test site at Semipalatinsk in Kazakhstan, used from 1949 onwards.
- The British test sites of Maralinga and Emu in the Australian desert, from 1952 onwards, and the island of Kiritimati in the Indian Ocean (H-bomb, 1957).
- The sites of Mururoa and Fangataufa in French Polynesia, used from 1966 onwards.

Five main criteria are indicated by the State Party for a comparison of the sites: a monument and memorial to the dawn of the nuclear age, the events that occurred and their general impact, testimony to a type of colonialism which is specific to nuclear weapons, the associated symbolic values, and the impact on nuclear disarmament policies.

Although it is not easy to document a comparative analysis of this sort, since many nuclear test sites are today still covered by military secrecy restrictions (Russia, France), a panorama emerges which points to the specific characteristics of Bikini. The atoll forms part of a direct historic sequence beginning with the first nuclear test at Trinity and the military use made of the resulting weapon at Hiroshima and Nagasaki. It marked the symbolic start of the Cold War and the development of the arms race which characterizes this period. It is in particular the location of the testing of the first H-bomb. It is also a place in which a specific form of violence was exercised on local populations, initially by their relocation and then by the irradiation to which they were subjected, resulting in serious public-health consequences. Finally, particularly in the wake of the extremely powerful but inadequately controlled Castle Bravo test, the Bikini tests were the cause of the international nuclear disarmament movement of the 1950s and 1960s.

ICOMOS wishes to pay tribute to the comparative study effort made by the State Party to situate its property in relation to its historic, symbolic, and geopolitical significance. These are clearly major events which were seminal in world history in the second part of the 20th century. The remarks to be made are therefore of only minor importance:

- Reference should have been made to the important Soviet site of Novaya Zemlya, where the most powerful H-bomb test ever was carried out (1961) and which is thus closely involved in Cold War events.
- The American nuclear bomb was the result of a remarkable military-industrial effort from 1942 onwards, known as the Manhattan Project, which also involved locations that form an integral part of this story.
- The French tests in the Pacific were carried out on sites that are geographically very similar to Bikini Atoll, but they are chronologically separate, relate to weapons of substantially lesser power, and may be considered to form part of a second phase of the nuclear era, that of dissemination.

ICOMOS notes that the comparative analysis provided by the State Party is based on properties of similar value, some inscribed and some not inscribed on the World Heritage List and on national, regional, and international lists. ICOMOS considers that the comparative analysis is appropriate.

ICOMOS considers that the comparative analysis justifies consideration of this property for the World Heritage List.

Justification of Outstanding Universal Value

The nominated property is considered by the State Party to be of Outstanding Universal Value as a cultural property for the following reasons:

- The nuclear bomb tests at Bikini completely changed the history not only of Bikini and the Marshall Islands, but also of the world, with the dawning of the nuclear age and of the Cold War. The atoll constitutes a form of monument in the context of a paradoxical image of peace and of earthly paradise.
- Bikini Atoll has conserved direct tangible evidence that is highly significant in conveying the power of the nuclear tests, *i.e.* the sunken ships sent to the bottom of the lagoon by the tests in 1946 and the gigantic Bravo crater. These attributes are complementary to the testimony provided by the Hiroshima memorial.
- Bikini was considered to be a territory captured by warfare and isolated from the rest of the world, where it was possible to release nuclear firepower at will. The displacement of the Bikini inhabitants, followed by their exposure to radiation, has given rise to a sense of 'nuclear colonialism.'
- The Bikini tests gave rise to a series of images and symbols of the nuclear era, characterized by deterrence through terror, which human civilization had just entered. From the Bravo test onwards, these images and symbols formed the basis for the development of international disarmament movements.

ICOMOS considers that this justification of the value of the nominated property is appropriate.

ICOMOS considers it necessary to consider changing the name of the property to bring it into line with the theme of the nomination, for example, by adopting the name 'Bikini nuclear tests site.' This request was made to the State Party in the letter of 17 December 2009. In its reply of 2 February 2010, the State Party proposed as the new name: 'Bikini Atoll, nuclear tests site.'

Integrity and Authenticity

Integrity

In material terms, the property represents the interweaving of a clearly identified natural setting, an atoll in the heart of the Pacific, with a series of violent aggressions against this natural environment by the process of nuclear blasts. The violence of the blasts was immense in its scale, representing 7,000 times the power of the Hiroshima bomb, over a period of twelve years, which is relatively limited in terms of human history. The property as a whole thus forms a landscape that bears witness to the extreme material violence that man is capable of inflicting upon nature and, indeed, upon mankind itself.

Integrity therefore needs to be seen in terms of this testimony in two parts that are closely intertwined.

The first consists of the remains of human artefacts associated with the tests, in the condition in which they were left after the nuclear blasts: sunken ships, craters, bunkers, and remains of technical facilities. These items are substantial and easily identifiable. They are, however, slowly deteriorating as a result of natural processes.

How does nature react then in the long term to these human aggressions and what are the dynamic patterns in the long run? This is expressed in terms of geology (regeneration of the coral reef), geophysics (changes in the radionuclide rates), and ecosystems (alteration and restoration of marine and terrestrial biodiversity, both in animals and plants, analysis of variations in species and their health, state of heath of human populations). In this sense the landscapes at Bikini can be interpreted as cultural landscapes because part of their geophysical structure and ecological composition is the result of human intervention.

The significance of the site is the testimony it bears to the advent of a climactic relationship between man and nature, from the use of intra-atomic nuclear forces to the design of weapons of hitherto inconceivable power, followed by their actual use. The integrity of this testimony is clearly present at Bikini today.

The physical condition of the terrestrial and underwater military remains is gradually being eroded and damaged by natural elements (see Conservation). In the perspective of an active relationship between human artefacts and nature, it would seem to be in the order of things that nature should now intervene in a way that corresponds with its own time frame.

Furthermore, a considerable mass of documents exists to provide information and testimony about the history of Bikini Atoll as a nuclear test site: films, photographs, articles, interviews, scientific studies, etc. The same is true with regard to past changes in the natural environment and changes that are now under way. In the present case the value of these documentary and scientific records is essential for an understanding of the site, its values, and its historic and human significance in a long-term perspective. This documentation forms a third component of the property, and has not yet really been associated with it.

ICOMOS considers that the integrity of the property today is of an acceptable level, in view of the simultaneous presence of the remains of human artefacts and the process of natural recomposition which follows their use.

ICOMOS considers that the degradation of the human artefacts by natural elements forms part of the cultural process in a very exceptional way, as illustrated by the property. The integrity of the testimony of the property must be strengthened by the appropriate use of the considerable mass of documentary material associated with the site and its history.

Authenticity

The site has not undergone any substantial reconstruction; human presence there has remained very limited because of the presence of radionuclides.

The authenticity of the material elements constituting the property is unquestionable.

ICOMOS considers that the conditions of integrity and authenticity have been met.

Criteria under which inscription is proposed

The property is nominated on the basis of cultural criteria (iv) and (vi).

Criterion (iv): be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

This criterion is justified by the State Party on the grounds that Bikini Atoll is an outstanding example of a nuclear test site. It has many technical remains and characteristic terrestrial and underwater landscape elements. It is tangible testimony of the birth of the Cold War and it bears witness to its development into a race for increasingly powerful weapons. It marks the dawn of the nuclear age in the 20th century. It bears witness to the consequences of the nuclear tests on the civil populations of Bikini and the Marshall Islands, in terms of population displacement and public-health issues.

ICOMOS considers that this criterion has been appropriately analysed. However, whereas the historical testimony to the tangible beginnings of the Cold War and the nuclear arms race is relevant, the theme of the dawn of the nuclear era needs to be related to the explosions at Hiroshima and Nagasaki, from the historical, human, and symbolic points of view.

ICOMOS considers that this criterion has been justified.

Criterion (vi): be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance;

This criterion is justified by the State Party on the grounds that ideas and beliefs directly and tangibly associated with nuclear testing on Bikini Atoll are of outstanding universal significance. The nuclear tests that took place there gave rise to many symbols and images associated with the nuclear era in the second part of the 20th century. They also gave rise to international movements advocating nuclear disarmament.

ICOMOS considers that this criterion has been appropriately analysed. The arguments must, however, be set against the perspective of the arms race between the two military-industrial blocs facing each other. The American tests at Bikini were followed by those of the Soviets, and together the tests generated icons and symbols of the risk of total mutual nuclear destruction and a geopolitical balance based on terror.

ICOMOS considers that this criterion has been justified.

The State Party is looking into the possibility of an extension of the values of the site as a mixed property, on the grounds of the natural dimensions that are directly linked to the consequences of the nuclear tests, particularly with regard to criterion (ix).

ICOMOS considers that the nominated property meets criteria (iv) and (vi) and conditions of authenticity and integrity and that Outstanding Universal Value has been demonstrated.

Description of the attributes

- Following the nuclear bombs dropped on Hiroshima and Nagasaki, the tests at Bikini confirmed that humanity was entering a 'nuclear era' in a long-term perspective. Its many military remains bear witness to the start of the Cold War, the race to develop weapons of mass destruction, and the balance of terror.
- The violence inflicted on natural, geophysical, and living elements by nuclear weapons illustrates the climactic relationship that man can have with his environment. The ecosystems, landscapes, seascapes, and underwater seascapes of Bikini bear witness to this relationship.
- The nuclear tests have changed the history of Bikini and the Marshall Islands through the displacement of populations, human irradiation, and contamination by radionuclides. These elements are historic and social.
- The Bikini tests, and more generally the Cold War, have given rise to a series of images and symbols of the nuclear era. They also led to the development of international movements advocating nuclear disarmament. These are intangible testimonies that are directly associated with the property.

4. FACTORS AFFECTING THE PROPERTY

Development pressures

After the evacuation of the inhabitants of Bikini, the construction of the military nuclear facilities, and the tests themselves, there was for a long period only a limited presence of observers from the US Department of Energy.

The attempt to resettle a community in the 1970s, to be supported by the exploitation of farming resources, turned out to be a failure because of the radioisotope contamination of the crops and drinking water.

Illegal shark fishing in the lagoon could constitute a threat, since this type of fish has proliferated as part of the creation of a new ecological balance. The many sharks, which include several protected species, form a major aspect of biodiversity and are a significant attraction for tourists.

Metal objects have been removed from the wrecks of the sunken naval vessels at various points in time. Any such removal is now illegal.

The possibility of using Bikini Atoll as a nuclear-waste site was considered at one point, but today this idea has been abandoned by the State Party, as it conflicts with the decision to promote tourism.

ICOMOS would encourage the State Party to regulate development projects in Bikini Atoll so as to ensure that they are compatible with the expression of the property's values.

Tourism pressures

Small-scale tourism was introduced experimentally in the late 1990s since nuclear contamination had diminished to a low level and was well under control. However, the remote location of the atoll and the difficulties of establishing a permanent air link restricted tourism of this kind. The State Party considers that the development of tourism is an objective, but tourism must remain low-scale in view of the isolated location of atoll.

ICOMOS considers that there is potential for tourism in the atoll, with regard to both natural and cultural resources. It is, however, essential to consider regulating tourism and the involvement of local communities from the outset. Priority must be given to setting up tourism facilities which respect the natural setting and the cultural values of the site.

Environmental pressures

Environmental pressures are linked with the permanent relationship between the coral atoll structure of the property, its oceanic environment, and climatic events. Problems could arise if this fragile balance is lost (see Natural disasters, and Impact of climate change).

Natural disasters

Up to now the climate of Bikini Atoll has been exceptionally stable; the atoll is not located in a typhoon area. The earthquake risk appears to be low: there has not been an earthquake there up to the present.

Impact of climate change

As Bikini is a coral atoll, it is potentially exposed to many aspects of climate change:

- increased occurrence of violent storms, gales, and exceptionally high tides;
- rising sea level and average temperature: ultimately, the covering of all or part of the atoll by the ocean cannot unfortunately be ruled out;
- modification of the coral reef by change in water acidity (colour, production of coral).

It is hard to predict the long-term effects on biodiversity precisely, but it will most likely change. It is possible there could be an increase in the salinity of the soil, for example, followed by a rapid impoverishment of the plant biodiversity on the land and a trend towards desertification.

ICOMOS considers that climate change constitutes a major threat to the integrity of the atoll.

Threats specific to the nature of the property

The removal of metal (lead, copper, etc.) from the remains of the sunken vessels is not only intrinsically dangerous but also constitutes a direct attack on the property.

The presence of stocks of bombs and fuel in the sunken vessels gives rise to risks of explosion and oil pollution of the area.

ICOMOS considers that the main threats to the property are the combined effects of climate change and the presence of stocks of bombs and fuel in the submerged vessels. Illegal metal removal and shark fishing should also be borne in mind.

5. PROTECTION, CONSERVATION AND MANAGEMENT

Boundaries of the nominated property and buffer zone

The property consists of the coral reef, the islets, and the interior lagoon. The boundary is a line connecting the seaward ocean shorelines of all islands at a depth of mean low water. The total surface area is 73,000ha, of which land above sea level represents 1%.

The buffer zone is the area within a line at a distance of 5 nautical miles (9.26km) from the shore. Its surface area is 130,425ha.

There are apparently no inhabitants on the atoll at the present time. The Conservation and Management Plan indicates that a small permanent team of around ten persons could be introduced.

ICOMOS considers that the boundaries of the nominated property and of its buffer zone are adequate.

Ownership

As in the rest of the Marshall Islands, land on Bikini Atoll is held under customary tenure through traditional clan relationships. Traditionally, land is divided into parcels (*weto*) allocated to their users by the chief of the community (*Iroij*). Inhabitants of Bikini have been displaced, but the community exists, with an officially recognized customary chief. The Kili-Bikini-Ejit (KBE) Local Government and a governor representing the central government are also involved.

Marine ownership of the lagoon is collectively that of the people of the Marshall Islands. It is exercised by the government, with recognition of customary rights, particularly for fishing.

The rights, title, and interests in respect of the sunken naval vessels in the lagoon have been transferred from the US Government to the Marshall Islands (*Compact of Free Association*, 1985, sec. 177).

The proposed marine buffer zone (within the 5 nautical mile line) is under the direct responsibility of the governor.

Protection

Legal Protection

The property is protected by the Historic and Cultural Preservation Act (1991). This Act provides for controlled access to elements of the property, particularly those under water; it prohibits the export of elements of the property (punishable by fines and imprisonment) and regulates the development and use of land inside the

property.

The local government produced ordinances in 1988, updated in 1996, to complete these provisions, severely regulating entry to Bikini Atoll and diving on ships. All yachts visiting Bikini Atoll must obtain permission from the KBE Local Government for entry and diving. These arrangements were further tightened in 2008 in order to regulate navigation and diving in the lagoon. In its additional documentation sent on 2 February 2010, the State Party indicates that a new order, no. 2-2010, has revised all the texts relating to the marine and underwater protection of the property, making them more precise.

The natural biodiversity of Bikini is protected by a local government decree (1997). It prohibits fishing for sharks or turtles in the lagoon and restricts the fishing of other species.

The Conservation and Management Plan briefly indicates that it is important to carry out an evaluation of the potential impact of any plan for demolition, construction, deforestation, or civil-engineering works on the attributes of the value of the property (6.a.(i)).

ICOMOS wishes to stress the importance that should be attached to evaluating the impact of any building project or for the transformation of the existing elements on the attributes of the value of the property.

Traditional Protection

Traditional protection is provided by the exercise of customary law in the ownership, distribution of use of the land, and organization of fishing (see Ownership). Furthermore, the State Party indicates that the Bikini community agrees to and fully supports efforts to preserve the nuclear test heritage.

ICOMOS considers that, in practice, the traditional ownership system of the Marshall Islands takes full precedence over public law, and that it can thus be assimilated to fully exercised private law ownership.

Furthermore, ICOMOS considers that the resolute and active support of the Bikini community for the protection of the property is of crucial importance. The community must in particular be fully informed about the consequences of possible inscription on the World Heritage List, which would mean that the remains of the nuclear tests would have to be left in place, since they form an integral part of the value of the property. ICOMOS, in its letter dated 17 December 2009, asked the State Party if it would confirm this point. The new Management Plan, included in the additional documentation of 2 February 2010, points out that families from Bikini are actively involved in the local government, and are present in the Management Office of the property.

Effectiveness of protection measures

Access to Bikini Atoll is strictly controlled, under the authority of the Kili-Bikini-Ejit (KBE) Local Government, and it is reserved to tourists and scientific teams. Divers in the sunken vessel area must be accompanied. The taking of any artefacts from the sunken vessels is strictly prohibited and is considered to constitute theft.

The marine surveillance zone extends for 12 nautical miles around all the atolls of the archipelago, particularly Bikini.

ICOMOS considers it necessary to extend the protection measures to include the remains of the military facilities on land. It would be necessary to draw up an inventory of them and have the most significant ones inscribed on the national list of historic sites.

ICOMOS would like to have more details of the Bikini marine surveillance system, which does not seem to be fully operational at the present time.

ICOMOS considers that the legal protection and traditional protection in place are appropriate, but that they must include the protection of the land-based military remains, through the drawing up of an inventory, and the inscription of the most significant remains of this type on the list of national historic sites.

Conservation

Inventories, recording, research

A substantial set of archive material and written and audiovisual documents forms a complementary dimension of the property. It is essential for understanding, interpreting, and presenting the value of the property.

Research efforts up to now have focused on the sunken vessels, but relatively little attention has been paid to the remains on land. In addition to the inventory already mentioned, ICOMOS considers that it is necessary to study them from a heritage and historical viewpoint.

Present state of conservation

The state of conservation of the main sunken vessels and the most important bunkers is generally quite good. They are, however, slowly deteriorating. For example, the deck of the aircraft carrier *Saratoga* is threatening to collapse; some of the land buildings have been demolished because they were considered to be dangerous; the coral reef is gradually reconstituting itself inside the Bravo crater by natural process. The intentional destruction of the vessels is primarily a human action, and is now being completed by the action of the natural elements.

Active conservation measures and maintenance

The state of conservation is monitored by observing the hulls of the sunken vessels and the structures on land. There are, however, no specific conservation measures or systematic monitoring.

ICOMOS considers that a general inventory of the terrestrial and underwater properties is necessary.

ICOMOS considers that, even if a large part of the property is destined to slowly return to a natural state, the planned monitoring programme must be set up and applied not only to the underwater parts but also to the land-based parts.

Effectiveness of conservation measures

ICOMOS considers that efforts are necessary in the inventorization, knowledge, and monitoring of the constituent elements of the property. In view of the particular significance of the property, exceptionally in this specific case the lack of a conservation programme does not represent a threat to the property's value.

In its reply dated 2 February 2010, the State Party confirmed the involvement of the Historic Preservation Office in the inventorization, protection and conservation of the property. It is in particular an active member of the Bikini Atoll Conservation Management Board.

In view of the changeable nature of the property, which is slowly returning to a natural state, ICOMOS considers that the meaning of conservation in this case is specific, and that it may be considered to be satisfactory. However, in order to ensure the expression of the value of the property, the following actions should be carried out, under the supervision of the official national organization for heritage preservation and conservation:
- Creation of a full and detailed inventory of all the elements of the property,
- Monitoring of the state of conservation of the property,
- Presentation of documentary material and scientific records associated with the history of the property.

Management

Management structures and processes, including traditional management processes

The management process is the responsibility of the Kili-Bikini-Ejit (KBE) Local Government, which is based on an electoral procedure in the Bikini community; this community currently lives on other atolls (see History).

The Conservation and Management Plan provides for the setting up of a Bikini Atoll conservation and management office. It will include the various partners involved in Bikini - elected representatives of the local government, traditional chiefs, the head of tourism, the Bikini Atoll Divers unit (currently being developed), the conservation director (the appointment process is under way), and representatives of the young people and women. The office will be responsible for implementing and monitoring the management, conservation, and monitoring of the property. This office, the Bikini Atoll Conservation Management Board, was set up by Resolution 012 of the local government of Kili-Bikini-Ejit on 21 January 2010.

The office will be assisted by a scientific council of international experts.

Bikini Atoll Divers is an official operational organization under the auspices of the local government. It is currently being constituted in order to accompany people diving on the site of the sunken vessels. The group will live on the atoll and will set up a diving base there.

The management system also includes the Marshall Islands Vessel Monitoring System.

The State Party confirmed, in its reply dated 2 February 2010, the official involvement of the Historic Preservation Office in the management process.

ICOMOS, in its letter dated 17 December 2009, asked the State Party to specify the dates of: the actual setting up of the Conservation and Management Office, the appointment of the director, and the constitution of the Divers Group. ICOMOS considers that additional information is still required about these points, particularly as regards the Divers Group.

Policy framework: management plans and arrangements, including visitor management and presentation

The legislative texts have up to now formed the backbone of the management and monitoring of the property. They are implemented by the local government.

The Conservation and Management Plan has been drawn up (January 2009). It sets out the general strategic guidelines for the future of the property. In its reply dated 2 February 2010, the State Party refers to the definitive Management Plan (2010) and its enactment by resolution 012 of the local government of Kili-Bikini-Ejit, on 21 January 2010.

Tourist facilities have remained very limited up to now, but some accommodation capacity does exist, particularly on the islet of Eneu, with a set of buildings erected for the US base, a jetty, and a landing strip, with two more recent buildings for tourists.

A Peace Museum is planned at Majuro, capital of the Marshall Islands.

ICOMOS considers that a property inventory process, particularly for the land-based elements, must form an integral part of the management plan.

ICOMOS wishes to be kept informed about the Peace Museum project, its progress, its briefs and powers, and the close links it may have both with the management of site documentation and with the interpretation of the site.

Risk preparedness

There is no specific plan with regard to natural risks or the risks arising from human artefacts.

ICOMOS considers that an evaluation of the risks of unexploded bombs and of the fuel in the underwater remains, together with risk-prevention measures, must form an integral part of the management plan. In its letter of 17 December 2009 ICOMOS asked the State Party to provide a study evaluating these risks.

The State Party's reply refers to the Delgado report of 1991, drawn up as a result of cooperation between the National Park Service of the United States and the local government of Kili-Bikini-Ejit.

ICOMOS notes that the report contains a number of points of information which are a cause for concern. The report, which dates back almost twenty years, was the first to suggest that the site's nuclear heritage value could be recognised, and could be presented for cultural and tourism purposes.

ICOMOS considers it essential to carry out an evaluation of the current situation as regards the fuel oil pollution risk and the potential danger of bombs still present in the sunken fleet. The setting up of an international mission for this purpose should be considered as soon as possible.

Involvement of the local communities

The local communities are the owners of the land by customary law; they will be fully involved in the management process.

ICOMOS considers that the local populations must be fully informed about the consequences of possible inscription on the List with regard to the conservation and management of the nuclear remains.

Resources, including staffing levels, expertise and training

A permanent team of two people is planned at Majuro for the management of tourism at Bikini, together with about fifteen people at Bikini itself, including four professional divers.

The appointment of a conservation and management office director is planned.

ICOMOS recommends the building up of visitor facilities and of the presentation of the property's cultural values. This could be carried out in conjunction with the Peace Museum project.

Effectiveness of current management

The management system depends primarily on the application of the laws and orders that govern the property. The conservation and management plan is currently being drafted and the operational structures are currently being set up.

ICOMOS considers that the proposed management system does include the elements needed to be effective; however, details are required about how the Conservation and Management Office will function in practice, its director must be appointed, and the Divers Group must be set up and made operational.

ICOMOS considers that the management system for the property is adequate. Furthermore, ICOMOS recommends the setting up of the Bikini Divers Group, the reinforcement of visitor reception and of the presentation of the property's cultural values, and the constitution of a peace museum and of a documentation centre focusing on the value of the property.

6. MONITORING

A programme for the monitoring of underwater artefacts is being developed in partnership with professionals (a university and the Western Australian Maritime Museum). This will lead to the establishment of a database of artefacts and an assessment of their state of conservation. A monitoring process, incorporating photographic records, is planned.

ICOMOS considers that monitoring of the property is essential, as it is inherently subject to change. The monitoring must be extended to the land-based elements. The periodicity of monitoring needs to be decided, as do the bodies in charge of the monitoring process.

ICOMOS considers that, in view of the nominated property and the nature of its values, it is not necessary to carry out quantitative monitoring with numerical indexes. The monitoring proposed for underwater artefacts is therefore satisfactory, but it must be extended to include the land-based elements of the property.

7. CONCLUSIONS

ICOMOS recognizes the Outstanding Universal Value of Bikini Atoll, in the Marshall Islands.

Recommendations with respect to inscription

ICOMOS recommends that the nomination of Bikini Atoll, nuclear tests site, Republic of the Marshall Islands, be ***referred back*** to the State Party to allow it to:

- Draw up an inventory of the land-based properties that contribute to the value of the property; inscribe the most important of these on the national historic sites list; monitor their conservation, specifying the frequency for monitoring to be carried out and the organization that will take charge of monitoring.

ICOMOS also recommends that the State Party give consideration to the following points:

- Set up the Bikini Divers Group;

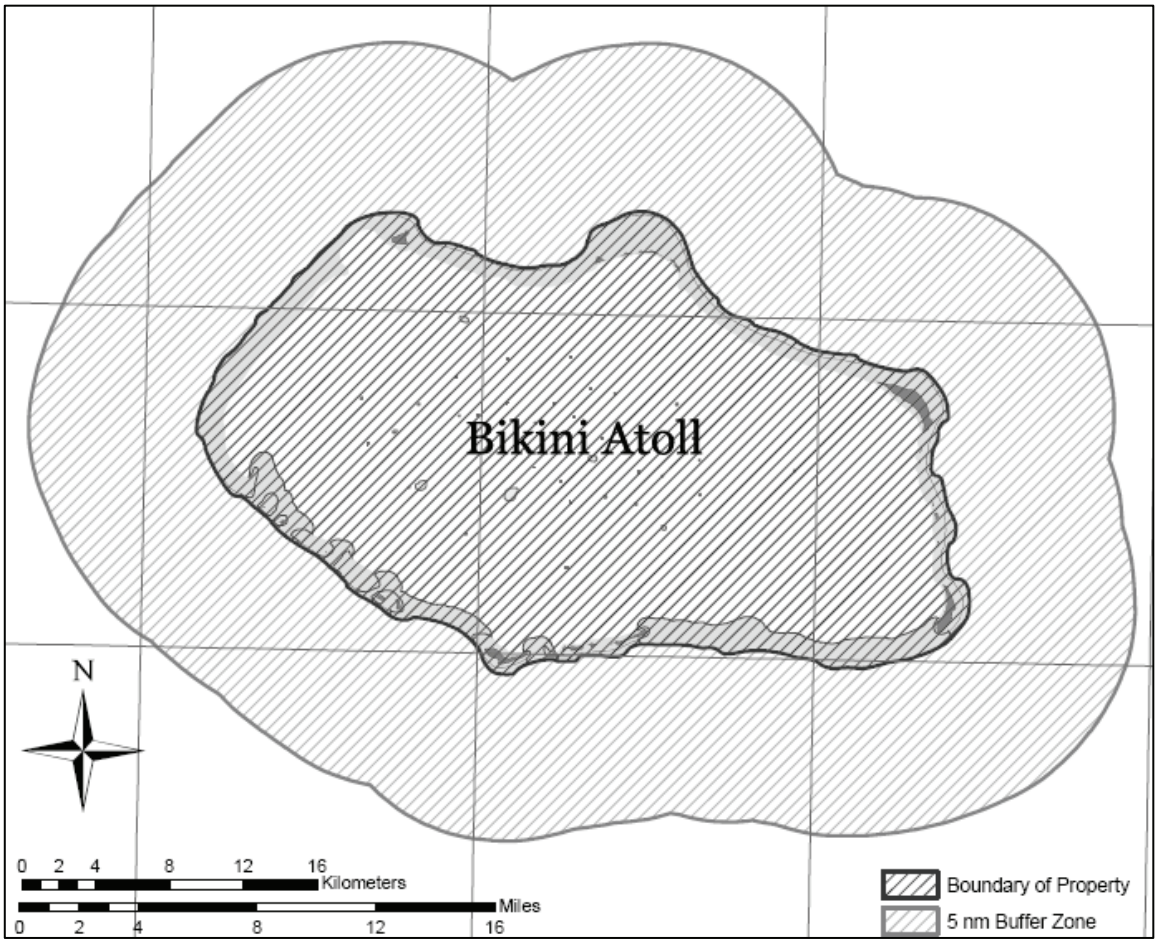
- Give consideration to the importance and value of the documentation relating to the history of the Bikini nuclear tests, and consider its management and its use, for example, in connection with the project for a Peace Museum and with regard to the interpretation of the property;

- Details should be provided about the number of inhabitants of the atoll, and the prospects for future development;

- Details should be given about Bikini's marine surveillance system;

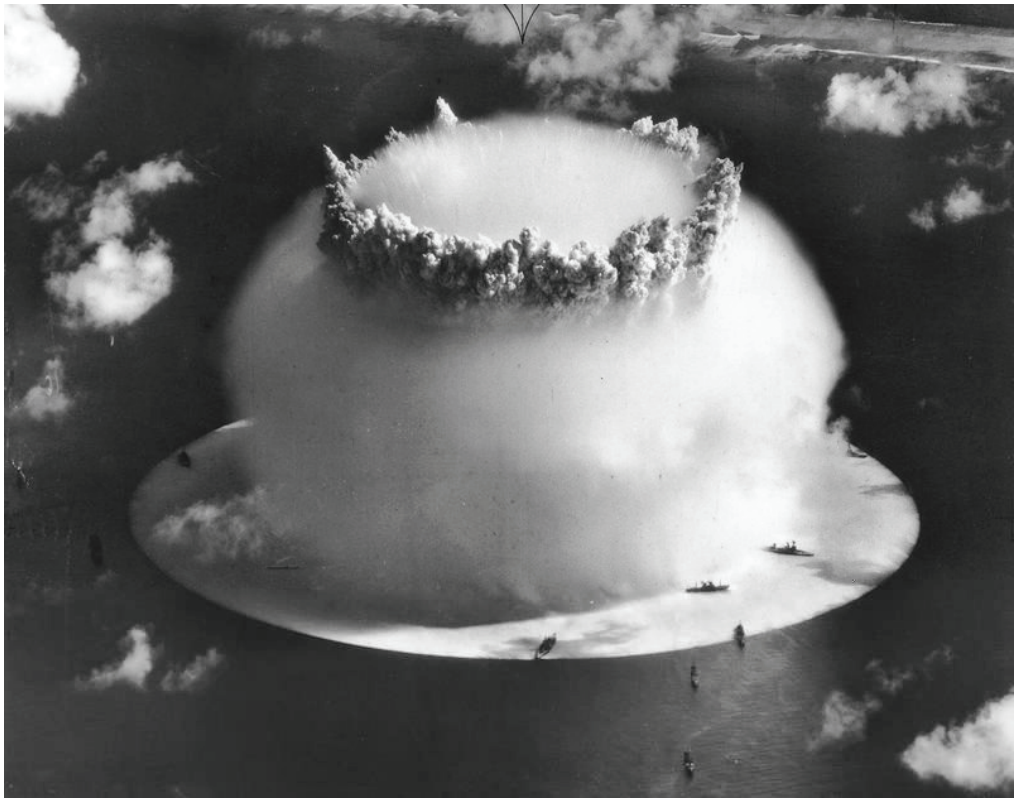
- Visitor reception and the presentation of the property's cultural values should be strengthened. This could be done in connection with the Peace Museum project.

ICOMOS is concerned about the presence of bombs and fuel oil in the wrecks of the sunken vessels. This is a threat to the property which could make visiting the wrecks dangerous; pollution of the lagoon could also result. As the only technical evaluation of this risk dates back to 1991, a new expert appraisal of these dangers and a review of possible solutions must be considered without delay. For this purpose, ICOMOS recommends the constitution of a coordinated international mission by the State Party.



Map showing the boundaries of the nominated property

Evacuation of the inhabitants of Bikini in 1946



Operation Crossroads, 1946

Aerial view of the Bravo crater

Sunken remains of the aircraft carrier Saratoga