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WASTE DISPOSAL AND WASTE MANAGEMENT IN ANTARCTICA AND THE SOUTHERN OCEAN

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Summary: 1. Introduction. – 2. Waste generated in the Antarctic Treaty Area. A) The fragmentary approach. i) The Antarctic Treaty and the disposal of radioactive waste. ii) Waste generated by scientific activities. iii) Waste generated by tourist activities and non-governmental expeditions. iv) Waste generated by possible future mining activities. B) The comprehensive approach. i) The comprehensive legal framework. ii) General obligations. iii) Waste management planning and management practices. iv) Prohibited products, waste removal and waste disposal in the Antarctic Treaty Area. – 3. Transboundary movements of hazardous waste and Antarctica. – 4. Some conclusive remarks.

1 INTRODUCTION

Beginning with the consideration that every human activity provokes the existence of waste[1], it is easy to understand that in modern industrial times the gross accumulation of waste has become a major environmental concern. In order to face this problem at an international level, contemporary international law has evolved in two main directions. On the one hand, legal norms have been created for regulating the disposal and management of hazardous waste with the aim of eliminating or, at least, minimising

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1 This assertion is also true for Antarctica, the least populated continent in the world. As has been held, "(...) wherever man goes he leaves evidence of having been there" (*Handbook of the Antarctic Treaty System*, 7th ed., 1990, p. 2203).

F. Francioni and T. Scovazzi (eds.), International Law for Antarctica, 319-374.

significant adverse impact on a given environment. On the other hand, but only in recent years, norms have appeared in order to control the illicit traffic of transboundary movements of hazardous waste or the emission of substances that pose a global environmental risk to the whole planet.

With regard to Antarctica, scientists[2], environmental organisations[3] and politicians[4] have recognised that the levels of environmental pollution due to waste generated in this polar region are, to a large extent, inferior to those existing in other more populated or industrialised regions of the world. Though it is true, it must also be noted that the growth rates of Antarctic waste have constantly increased over the last years.[5] The need to protect Antarctica from this kind of pollution arises from the very fact of the ex-

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2 "Wastes generated by Antarctic operations are generally narrower in range and have lower toxicity levels than those of industrialised and heavily populated areas of the world". *Report of the SCAR Panel of Experts on Waste Disposal in Response to Antarctic Treaty Consultative Meeting XIII Recommendation 4*, 3 August 1988, p. 15.

3 Cfr. IUCN, *A Strategy for Antarctic Conservation*, 1991, p. 7, where it is stated that: "Antarctica is still much less affected by human activities than most other parts of the world (...)".

4 For instance, regarding the presence of chlorinated hydrocarbons in the Southern Ocean, the United Nations Document A/46/590 of 25 October 1991, *Question of Antarctica. State of the environment in Antarctica and its impact on the global system. Report of the Secretary-General*, p. 9-10, para. 30, states that: "The concentration of pesticides and other chlorinated hydrocarbons in the Southern Ocean area is several orders of magnitude lower than that in the Northern Hemisphere. It is believed that research stations are likely to be responsible for some of the local contamination. The low level of these compounds, which have been observed in Antarctica, may derive from aerial transport and ocean currents".

5 The Antarctic Treaty Consultative Parties (hereinafter quoted as ATCPs) noted that "the increasing level and complexity of Antarctic operations have increased the quantity and variety of wastes produced (...)": para. 5 of the Preamble of Recommendation XV-3 of 1989.

treme fragility of its ecosystem[6] and from the global and regional influences that it exerts on and receives from other ecosystems all over the world.[7]

The vulnerability of the Antarctic environment to human interference (coming mainly from scientific and tourist activities and their logistic and support facilities) is greatly increased by the extreme conditions of this continent, that create special difficulties for waste disposal and waste management in this polar region:

> "... The level of biological decomposition of terrestrial wastes is markedly lower than that of temperate and tropical regions. In the terrestrial environment, microbial activity is often non-existent and decomposition is slow or virtually absent. In addition to low rates of organic decomposition, the entrapment in ice of waste matter significantly increases the persistence, over time, of discarded material. Thus, the most active mechanisms by which matter is transformed and transported in tropical and temperate moist environments are weak or lacking in terrestrial Antarctica".[8]

Another inconvenience that also has to be taken into account is the difficulty of elaborating uniform measures on waste disposal and waste management,

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6 Some criticism have been verted on the fragile nature of the Antarctic environment. For instance, LAWS, *Presentation by the President of the Scientific Committee on Antarctic Research, SCAR Report No. 6*, January 1991, p. 9, considers that the application of the term "fragile" to Antarctic ecosystems "is in effect questionable". See also the *Report presented by SCAR to the United Nations on the State of the Antarctic Environment*, p. 11, in relation with UNGA Resolution 45/78 A, of 12 December 1990. Notwithstanding it, it must be underlined that the ATCPs had previously recognised "the vulnerability to human interference of the Antarctic environment and its dependent and associated ecosystems". See, for instance, the preamble paragraphs of Rec.s VI-4 of 1970, VIII-13 of 1975, IX-5 of 1977, XII-3 of 1985 and XV-1 of 1989. More recently, para. 1 of the Preamble of Rec. XVIII-1 of 1994 reaffirmed "the exceptional character of the Antarctic environment given in particular the fragility of its fauna and flora (...)".

7 On these questions, see WELLER (ed.), *The Role of Antarctica in Global Change*, 1989, p. 28. See also the United Nations Document A/48/449 of 18 October 1993: *Question of Antarctica. State of the Environment in Antarctica. Report of the Secretary-General*, p. 4, para. 9, and p. 12, para. 52. For the action already taken by ATCPs on these questions, see Rec. XVII-4 of 1992: "Global Change Research and International Co-operation in Antarctica".

8 *Report of the SCAR Panel of Experts* cit., p. 8.

given the high number of factors that may have a bearing on producing environmental impact on Antarctica.[9] Among them, the different kinds of environments, human operations, logistic structures, location of stations, etc., must be considered.[10]

The nomogenetic procedures on waste disposal and waste management become even more complex, due to the fact that Antarctic waste is present in all the sources of pollution existing in this polar area. In fact, there are sources of pollution relevant in Antarctica that are considered insignificant by international environmental law in other regions of the world. This is the case, for instance, of the so-called inland pollution, that is, the abandonment of waste in the Antarctic terrestrial environment, their incineration inland or their burial in the ice. This source of pollution has been described as follows:

> "Several thousand tons of freight and about 30 million litters of fuel are imported into Antarctica every summer; very little is brought back. Large amount of solid wastes lie about the stations and the camp sites, polluting their surroundings, since it would be both costly and disruptive to dig for burial in the permanently frozen ground. When disposed of in the ice, solid wastes begin a long and slow migration, carried by the ice-flow towards the distant glacier fronts (...).

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9 Cfr. PINESCHI, *La protezione dell'ambiente in Antartide*, 1993, p. 298.

10 "(...) The rates of waste production vary seasonally, with the highest rates occurring during summer when major resupply and summer operations take place. (...) Most waste is generated at coastal stations, specially those which operate as transit stations for the resupply of inland sites and summer operations. Lower waste production occurs at inland stations, while summer coastal and inland operations have the lowest waste production" (*Report of the SCAR Panel of Experts* cit., p. 16). "A key logistical advantage of coastal operations is the ability to resupply directly from ships and to simply remove rubbish, with the major costs being those associated with ship time. Unitised and containerised cargo reduces the packaging requirements for individual cargo items and, ultimately, the amount of waste products. Inland operations and others not directly accessible by ship produce and accumulate wastes which are often expensive to remove because of logistic constraints" (*ibidem*, p. 17-18). Incidentally, it must be noted that this difficult situation has been recognised by the ATCPs, when stating that: "different environments, scales of operation, and logistic infrastructures will require different approaches to waste management" (Preamble of Rec. XV-3 of 1989).

> Liquid wastes cause severe and permanent contamination when they are discharged inland, into the grounds and lakes of the ice-free areas, whose extremely slow physical and geochemical processes are unable to disperse pollutants (...). Many artificially induced changes affect the grounds, the inland waters and the snows in the surroundings of the stations, where the natural geochemical conditions are irrecoverably altered by pollution, contamination and by chemical aggression brought about by liquid spills, by fumes and by other agents".[11]

Other sources of Antarctic pollution, like land based pollution, are present in Antarctica both in traditional ways, common to any other area in the world[12], and in new ways in which wastes originally abandoned on land end their polluting cycle by being naturally disposed of at sea. It is obvious that this combination of inland and land based pollution has greater environmental impact, as it affects both terrestrial and marine ecosystems. This practice seems to have been very frequent in the past, at least at the United States McMurdo Station:

> "In the early expeditionary days of the Antarctic Program (1956 through 1977), solid and other waste was staged on the sea ice on the eastern side of Winter Quarters Bay. The annual sea ice breakout in the late summer months would carry the waste materials out to open sea. Large items (vehicle bodies, obsolete heavy equipment, etc.) occasionally dropped into the water at the edge of McMurdo Sound before being carried out to sea. When the ice breakout did not occur for a period of three years in the 1970's, the waste previously staged remained. Over the years additional scrap and other waste accumulated on land extending from the water's edge. This area became known as the Old Dump or Winter Quarters Bay Dump. Accidentally oil spills also occurred in the area. Unfortunately, chemicals and other harmful wastes of unknown quantities were at times disposed of directly into the Bay. From December 1980, all waste

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11 See MANZONI, *Environmental Hazards in Antarctica and Man's Impact on the Antarctic Environment*, in FRANCIONI (ed.), *International Environmental Law for Antarctica*, 1992, p. 60-61.

12 "Sewage and domestic waste are not returned from the Antarctic. At Faraday and Signy, sewage is discharged directly into the sea, whilst at Halley V it is discharged directly into an ice pit. At Rothera both sewage and kitchen waste are macerated before being piped to the sea. The methods of disposal of sewage and domestic waste used by B.A.S. are currently under review" (British Antarctic Survey, *Environmental Policy and Practice in the British Antarctic Survey*, Doc. XVI ATCM/INFO 23, 7 October 1991, p. 8.

disposal operations were moved to an alternate site located on the north side of Fortress Rock".[13]

Waste generated in Antarctica is also present in other sources of pollution of this frozen continent. With regard to atmospheric pollution, it must be emphasised that, if compared with other regions of the world, emissions generated in Antarctica represent very low rates[14] out of the whole amount of particulate emissions detected in the Antarctic atmosphere.[15] Waste coming from other sources of pollution, such as dumping or pollution coming from ships, is practically insignificant in the Southern Ocean[16], though it may be important in local areas.[17] As far as there has been no mining activity in the Antarctic continental shelf, no waste coming from off-shore exploitation exists in this polar region.

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13 National Science Foundation, *A National Science Foundation Strategy for Compliance with Environmental Law in Antarctica*, 1989, p. 31. The importance of the environmental impact of waste so disposed of at sea, has also been remarked: "The discharge of wastes directly into the sea, often without treatment, has led to the accumulation of chemical residues in the tissues of marine animals, and on the ocean floor. Concentrations of PCBs and heavy metals in the bottom sediments of portions of McMurdo Sound exceed the levels found in the most polluted bays in the US": BARNES, *Protection of the environment in Antarctica: Are Present Regimes Enough?*, in JØRGENSEN-DAHL and ØSTRENG (eds.), *The Antarctic Treaty System in World Politics*, 1991, p. 207.

14 "With powerhouses, transport and the combustion of waste, the total particulate emissions on or adjacent to land, from all operators is estimated to be less than 200 tones per year, much of which is blown to sea" (*Report of the SCAR Panel of Experts* cit., p. 28).

15 "(...) Atmospheric pollution in the Antarctic region is relatively limited by a remoteness from the main sources of industrial pollutants, as well as by some air-circulation patterns. Most scientists tend to agree that air pollution resulting from human activities in the Antarctic is, as of now, rather limited and localised in its effects. Observations over recent years reflect, however, that the Antarctic atmosphere has been disturbed by the effects of pollutants originating at lower latitudes, and particularly by industrial pollutants from the Northern Hemisphere" (UN Doc. A/46/590, *Report of the Secretary-Genera* cit., p. 5, para. 10).

16 UN Doc. A/46/590, *Report of the Secretary-Genera* cit., p. 10, para. 33.

17 On accidental pollution from ships, specially on the 1989 Bahía Paraíso accident, see *ACOPS Yearbook*, 1990, p. 9. On this accident, see *Argentine Ship Sinks near Palmer Station*, *AJUS*, 1989, p. 3.

What has been said so far relates to waste generated in Antarctica. However, in dealing with waste disposal and waste management in this polar region, a fact that creates additional legal difficulties is the higher quantitative and qualitative importance of waste generated outside this region, but present in Antarctica through global atmospheric circulation or through oceanic waters. As it has been stated:

> "In fact, the major known impacts on the Antarctic are from outside the region. Some examples are: first, CFCs introduced to the atmosphere to the north of the Antarctic led to ozone thinning and the overall influence of increased ultraviolet radiation on biota. Secondly, in Antarctic snow and ice, heavy metals originating elsewhere are widespread, and there are identifiable radio-active layers from atomic bomb tests. Thirdly, effects of global warming due to human impacts outside the Antarctic are predicted to be greater in the Polar regions, with extensive effects on Antarctic ice shelf break up, pack ice extent and fast ice persistence (...)".[18]

2 WASTE GENERATED IN THE ANTARCTIC TREATY AREA

Over the years, the ATCPs' attitude towards waste management and waste disposal has gone through a process of evolution which, though still not finished, has produced a rather complex set of different legal norms.

A) The Fragmentary Approach

Till recent years, the ATCPs have followed a fragmentary approach when dealing with waste. The first problem they addressed was the need to forbid the disposal of what is considered to be the most hazardous waste, radioactive waste. Then, they moved on to regulate the disposal and management of waste generated by different human activities. They were aware that the constant increase of a given activity meant that waste produced by it was also permanently increased, with the following environmental risks and damages, or as they understood, before the activity

18 LAWS, *Presentation by the President of the Scientific Committee on Antarctic Research* cit., p. 10.

actually took place, that waste was going to be generated in such an amount that some regulations were needed. In this way, ATCPs focused their attention first on waste produced by scientific activities, then on that produced by tourist activities and non-governmental expeditions and finally by future mining activities. This piece-by-piece approach ignored that the problems that waste disposal and waste management posed were nearly always the same, regardless of the human activities which produced them and that, in any case, the environment in which they were going to be disposed of or managed was the same one: Antarctica.

i) The Antarctic Treaty and the Disposal of Radioactive Waste

In the various negotiations prior to the Antarctic Treaty, no real concern was expressed about radioactive uses or waste in Antarctica until the very last minute. At the Antarctic Conference (Washington, 15 October – 1 December 1959) some non-nuclearisation provisions emerged due to the pressure of the southern States.[19] The first of these Treaty provisions was the prohibition on any measures of a military nature, such as the carrying out of military manoeuvres and the testing of any type of weapon (Art. I), including of course nuclear weapons. Therefore, the possibility of radioactive waste materials coming from the testing of nuclear weapons vanishes in Antarctica, if such testing takes place inside the AT Area.

Reaching an agreement on non-military nuclear tests was much more difficult, but finally a solution was obtained and the main treaty provision on Antarctic non-nuclearisation was drafted in Art. V. According to it, "any nuclear explosions in Antarctica and the disposal there of radioactive waste material" are expressly forbidden. Therefore, both military and non-military nuclear explosions are not possible in the AT Area. It is true that other uses of nuclear energy are allowed in the white continent, as was explicitly recognised by the United States, France and Australia at the 1959 Antarctic Conference[20], but these other nuclear uses are also covered by the prohibition on the disposal of radioactive waste materials in Antarctica.

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19 VAN DER ESSEN, *Origine et développement du système antarctique*, in FRANCIONI and SCOVAZZI (eds.), *International Law for Antarctica*, 1987, p. 11-12.

20 The text of these declarations is published in BUSH, *Antarctica and International Law. A Collection of Inter-State and National Documents*, 1982, I, p. 34. See also CORTESE, *La denuclearizzazione dell'Antartide, dello spazio extra-atmosferico e del fondo marino*, *RDISDP*, 1971, p. 105-109.

In fact, between 1962 and 1972 the USA ran a nuclear power plant at McMurdo station. The reactor did produce radioactive waste. The nuclear plant suffered several breakdowns, by fire and by radioactive leaks. Its costly dismantlement began in 1972 and, following Art. V, the plant components and large amounts of contaminated soil had to be removed from Antarctica.

The possibility of other licit uses of nuclear energy in Antarctica has been considered by the ATCPs since the very first Antarctic Treaty Consultative Meeting. In 1961, the ATCPs, taking into consideration the provisions established in Art. V of the AT, recommended "to their Governments that they exchange by all means deemed advisable information on the application of nuclear equipment and techniques in the Treaty Area".[21] When the use of radio-isotopes in Antarctic scientific investigations began to be developed, the ATCPs faced this problem, considering both "the need to minimise harmful disturbance to the Antarctic environment" and "that the uncontrolled use of radio-isotopes in the course of scientific investigations may jeopardise the conduct of subsequent investigations".[22] From this perspective, both the duty of giving prior and appropriate information on such experiments[23] and, more important, the desire (not the obligation) that waste containing radio-isotopes should (and not shall) be removed from the AT Area[24], arose.

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21 Rec. I-XIII of 1961. Highlighting that this Recommendation was referring only to licit uses of nuclear energy and without altering the prohibition on radioactive waste disposal, "the Chilean delegation stated that it understood that the declaration in no way implied a change in Article V of the Antarctic Treaty". Report of the First ATCM.

22 Rec. VI-5 of 1970. On the possible environmental impacts of radio-isotopes uses, MANZONI, *Environmental Hazards in Antarctica and Man's Impact on the Antarctic Environment* cit., p. 65, has written that: "In current scientific activities minor nuclear hazards are brought into the Antarctic area by a variety of scientific tests based on radioactive isotopes; unfortunately, the artificial isotopes modify the natural geochemistry of the environment and annihilate some natural parameters of scientific interest. Small nuclear generators powering automatic equipment, such as automatic weather stations, also introduce locally a potential risk of radioactive contamination".

23 Rec. VI-6 of 1970 and point XIII of the Standard format for the annual exchanges of information, annexed to Rec. VIII-6 of 1975.

24 Point 1 (d) of the Code of Conduct for Antarctic expeditions and station activities, annexed to Rec. VIII-11 of 1975.

Another point regarding radioactive wastes is the geographical scope of the prohibition contained in Art. V of the AT. The AT applies to the area south of 60° South Latitude, including all ice shelves. However, according to Art. VI, nothing in the AT "shall prejudice or in any way affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within the area". A provision that has been interpreted in two different ways. On the one hand, some scholars have estimated that the AT does not extend as far as the high seas existing south of 60° South Latitude[25] and so the ban on the disposal of radioactive waste materials only applies to the Antarctic continent and islands, including all ice shelves, but not the adjacent seas.[26]

On the other hand, other scholars have insisted on that the AT does not say that it does not apply to the sea, but that Art. VI simply says that the AT is not applicable insofar as it is in conflict with the freedoms of the high seas.[27] So the main question is if such conflict really exists. Leaving the existence of special conventional norms on dumping wastes at sea aside for now[28], it is doubtful whether the disposal of radioactive waste materials

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25 FREELAND, *The Antarctic Treaty*, in *Report of International Law Conference Held at Niblett Hall, July 1960*, 1960, p. 27; HAYTON, *The Antarctic Settlement of 1959*, *AJIL*, 1960, p. 359-360; HANESSIAN, *The Antarctic Treaty 1959*, *ICLQ*, 1960, p. 471-472; TAUBENFELD, *A Treaty for Antarctica*, in *International Conciliation*, 1961, p. 246; THEUTENBERG, *The Evolution of the Law of the Sea with Special Regard to the Polar Areas: A Study Concerning Resources and Strategy*, 1984, p. 67.

26 For instance, BUSH, *Antarctica and International Law* cit., I, p. 327, considers that "the saving of high seas rights in that area probably means that the prohibition on disposal on nuclear wastes does not apply to the high seas". See also KISH, *The Law of International Spaces*, 1963, p. 180; PALLONE, *Resource Exploitation: The Threat to the Legal Regime of Antarctica*, *IL*, 1978, p. 551.

27 WILSON, *Antarctica, the Southern Ocean and the Law of the Sea*, *JAGJ*, 1978, p. 52; INFANTE CAFFI, *La plataforma continental antártica. Implicaciones jurídicas para un régimen de recursos minerales*, in ORREGO VICUÑA (ed.), *La Antártica y sus recursos. Problemas científicos, jurídicos y políticos*, 1983, p. 346; AUBURN, *Antarctic Law and Politics*, 1982, p. 130; VAN DER ESSEN, *Les régions arctiques et antarctiques*, in DUPUY and VIGNES (eds.), *Traité du Nouveau Droit de la Mer*, 1985, p. 487.

28 On the applicability to the Southern Ocean of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (London, Mexico City, Moscow, Washington, 29 December 1972) see *infra*.

could be regarded as falling under the freedoms of the high seas, as neither Art. 2 of the Convention on the High Seas (Geneva, 28 April 1958) nor Art. 87, para. 1, of the United Nations Convention on the Law of the Sea (Montego Bay, 10 December 1982) expressly mention it. Nevertheless, it is rather difficult to conceive that such a hazardous activity is compatible with the reasonable use and due diligence clause in regard to other legitimate uses of the high seas by third States.[29] In any case, it has been pointed out that "activities which pollute or are likely to pollute the high seas are contrary to the obligation – arising from customary international law – to protect and preserve the marine environment".[30]

Actually, it seems that the ATCPs have followed this second thesis. Occasionally, some of them have declared that the provisions of Art. V of the AT apply both to Antarctica and the Southern Ocean.[31] In fact, Art. III of CCAMLR states that the Contracting Parties in this Convention, whether or not they are Parties to the AT, are bound by the obligations contained in Arts. I and V of the AT in all the seas south of the Antarctic convergence. It must be also remembered that the radioactive wastes produced at McMurdo Station were neither disposed of at Antarctica nor dumped into the Southern Ocean.[32]

ii) Waste Generated by Scientific Activities

Once there were some regulations on the most hazardous wastes, ATCPs focused their attention on what is, without doubt, the main human activity in Antarctica: science, as it is obvious that scientific activities also generate waste in Antarctica, as anywhere else in the world.

At the same time that the ATCPs began to face the possible environmental impact of the use of radio-isotopes in Antarctica, the ATCPs, while assuming

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29 See McDOUGAL and BURKE, *Public Order of the Oceans*, 1962, p. 758; BOU, *La utilización pacífica de la Antártida y del Océano Austral en el Derecho Internacional contemporáneo*, in *Justicia, paz, solidaridad. Estudios en recuerdo del Profesor J. M. Rojo*, 1994.

30 SCOVAZZI, *The Application of the Antarctic Treaty System to the Protection of the Antarctic Marine Environment*, in FRANCIONI (ed.), *International Environmental Law for Antarctica*, 1992, p. 116.

31 For instance, see the declaration of the German Democratic Republic in UN. Doc. A/C.1/40/PV.52, p. 37.

32 See AUBURN, *The Ross Dependency*, 1972, p. 40.

the will to take interim measures to reduce known causes of harmful environmental interference, they invited the SCAR:

> "(a) to identify the types and assess the extent of human interference which has occurred in the Treaty Area as a result of man's activities;
> (b) to propose measures which might be taken to minimise harmful interference;
> (c) to consider and recommend scientific programmes which will detect and measure changes occurring in the Antarctic environment".[33]

Though this invitation referred to all types of human interference, SCAR responses concentrated on the practical matter of how Antarctic scientific stations and activities affected the environment and suggested some guidelines to assist in minimising such effects. At the Seventh ATCM, the ATCPs merely took note of those responses and postponed their detailed discussion to the Eighth ATCM.[34] Finally, in 1975 Rec. VIII-11 was passed, containing a Code of Conduct for Antarctic expeditions and station activities.[35]

The Code of Conduct is structured in four parts and only the first of which deals with waste disposal in Antarctica. On this subject, the Code of Conduct includes some precautionary measures, initiates a list of substances that should be removed from the AT Area and establishes several procedures for waste disposal, depending on different criteria.

Firstly, the precautionary measures contemplated in the Code of Conduct relate either to the discouraging of the importing of certain substances into Antarctica, in order to reduce the pollution in its origin, or to the suggestion of some safer practices when dealing with the disposal of waste. In the first group of recommended measures, paragraphs 1 (e) and (f) state the following:

> "Every effort should be made to reduce the plastic packaging of products imported into the Antarctic Treaty Area.

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33 Rec. VI-4 of 1970.

34 Rec. VII-1 of 1972. Nonetheless, by this Recommendation the ATCPs considered "these responses of SCAR as voluntary guidelines for the conduct of their expeditions and stations".

35 *Handbook*, p. 2201.

If possible the use of leaded fuel or fuels containing ethylene bromide and ethylene chloride should be avoided".

Given the broad conditional terms in which these paragraphs are written, it proves difficult to understand why this list of discouraged substances is so short, specially if compared with the list of waste that should be removed from this area. Certainly, the lack of uniformity between both lists is a serious environmental gap of Rec. VIII-11.

The second group of precautionary measures is represented by the desire to monitor the effluents when incinerators are used (para. 1, g). This provision has to be understood taking into account the time when this Recommendation was adopted. Otherwise, we find that other more dangerous procedures for waste disposal are tacitly (for instance, incineration in open air) or expressly (i. e. disposal of some solid waste at sea) allowed by this Code of Conduct.

Secondly, the Code of Conduct for Antarctic expeditions and station activities contains a list of waste that should be removed from the AT Area. A clear distinction is made between waste that should always be removed from the AT Area (according to para. 1, d, only waste containing radio-isotopes) and that waste that should be removed only if produced at coastal (not inland) stations. In this last group, the following kind of waste is included: batteries, lubricant oils containing harmful additives and all plastic and rubber products.[36]

Thirdly, the Code of Conduct recommends different procedures for waste disposal, depending on the location of the scientific station in which it is generated and on the nature of the waste. If waste is produced at field sites supported by coastal stations, it is recommended "where feasible" to use the facilities of their supporting station. If they come from inland stations, then all wastes should be concentrated in deep pits. Finally, a wide range of different procedures (disposal of waste at sea[37], incineration[38] or differ-

36 Rec. VIII-11, para. 1 (a) (ii) and (iii).

37 Non-combustible waste, including chemicals, but not batteries "may be disposed of at sea either in deep water or, if it is not possible, at specified sites in shallow water": para. 1 (a) (i).

38 Incineration is recommended for lubricant oils containing no harmful additives, and for carcasses and materials associated with imported experimental animals: para. 1 (a) (iii).

ent procedures combined with the disposal of residues at sea[39]) are recommended for coastal stations.

The timid and inadequate character of the Code of Conduct can be seen both in the fact that the burial of waste generated at coastal stations is the only procedure for waste disposal not expressly recommended[40] and in the lack of reference to safer procedures for waste disposal designed for special sensitive areas of the Antarctic environment. Indeed, until the adoption of the Protocol on Environmental Protection to the Antarctic Treaty, there was no provision in the AT system expressly prohibiting the abandonment or the disposal of waste neither in Specially Protected Areas (SPAs)[41] nor in Sites of Special Scientific Interest (SSSIs).[42] Nevertheless, though it was not specifically required[43], in the management plans of many SSSIs

39 "Wood, wood products and paper should be incinerated, the ash being disposed of at sea": para 1 (a) (iii); "human waste, garbage and laundry effluents should, where possible, be macerated and be flushed into the sea": para 1. (b) (1); and "large quantities of photographic liquids should be treated for the recovery of silver and the residue should be flushed into the sea": para. 1 (b) (ii).

40 "Except as stated for inland stations, waste should not be buried": Para 1 (c), *in fine*.

41 SPAs are defined in Art. VIII of the Agreed Measures for the Conservation of Antarctic Fauna and Flora as "areas of outstanding scientific interest listed in Annex B". Nevertheless, inspections carried out by ATCPs have revealed the existence of waste in SPA No. 1 (*Handbook*, p. 3202), in SPA No. 3 (*Handbook*, p. 3205), in SPA No. 7 (*Handbook*, p. 3220) and in SPA No. 15 (*Handbook*, p. 3215).

42 In Rec. VII-3 of 1972, the ATCPs recognised that "sites of non-biological interest cannot be designated as Specially Protected Areas". So they decided to create a new kind of protected areas, called SSSIs, each of them accompanied by an individual management plan regulating access and use for a specified period to such sites. According to Rec. VIII-3 of 1975, SSSIs should only be proposed when: "(i) scientific investigations are being carried out or are planned to begin before the following meeting of SCAR, and there is a demonstrable risk of interference which would jeopardise those scientific investigations; or (ii) they are of exceptional scientific interest and therefore require long-term protection from harmful interference".

43 In the description of the contents of each management plan, Rec. VIII-3 of 1975 does not include any specific provision on waste disposal, but only a generic reference to "any other restraints that may be needed".

approved before the adoption of PEPAT, provisions on waste disposal or waste removal from concrete SSSIs have appeared.[44]

Perhaps one of the major weaknesses of the Code of Conduct is that Rec. VIII-11 is the main set of provisions on waste disposal in Antarctica that has become effective till now. Though Recommendations adopted under Art. IX of the AT become effective when approved by all the ATCPs[45], it must be pointed out that the provisions of Rec. VIII-11 have no binding effect at all, but a rather strong "soft law" character. This is affirmed not only by the conditional language of most of its provisions, but also because it expressly states that the ATCPs have to comply with this Code of Conduct "to the greatest extent feasible".

In spite of the weaknesses and loopholes in the Code of Conduct, some ATCPs were aware from the very first moment of the need to strengthen the measures drawn up by the Code of Conduct.[46] During the XIIth ATCM, Australia presented a draft recommendation in order to amend the Code of Conduct. Though no amendment was approved, Rec. XII-4 of 1983 took note that things had changed since the adoption of the Code of Conduct[47] and the ATCPs agreed to refer to their national Antarctic programmes the questions of problems implementing the Code of Conduct and of the

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44 See, for instance, the management plans of SSSIs No. 1 and 3 (annexed to Rec. VIII-4 of 1975; for SSSI No. 1, see also Rec. XIII-9 of 1985), 9, 11, 12, 14, 15, 16, 19 and 20 (annexed to Rec. XIII-8 of 1985), and 29 (annexed to Rec. XV-6 of 1989). See also Rec.s XV-5 and XV-6 of 1989. The extent of these provisions varies depending on the special circumstances of each SSSI, and they go from the mere desire to avoid "the depositing of any pieces of equipment or material that would in any way hinder re-occupation of nests by penguins" (management plan of SSSI No. 1) to other more broad scope provisions, such as "Human wastes must not be deposited within the Site" (i. e. management plan of SSSI No. 11) or "All materials, including combustibles, introduced into the Site should be removed after each visit. Solid human waste should be disposed of into the sea through tide cracks" (management plan of SSSI No. 29).

45 Art. IX-4 of the AT. Rec. VIII-11 became effective on 16 December 1978.

46 In the Final Report of the VIIIth ATCM it can be read that: "Some delegations felt, nevertheless, that Rec. VIII-11 could have been even stronger and expressed a reservation accordingly. Environmental matters will be subject to continuing review at future Consultative Meetings".

47 Rec. XII-4 of 1983 took note of the "general increase in awareness among Consultative Parties of the potential environmental impacts of the disposal of waste in the Antarctic region": preamble, para. 2 (*Handbook*, p. 2203).

desirability and feasibility of revising the Code of Conduct. In this same line of action, by Rec. XIII-4 of 1985, the ATCPs:

> "invite(d) SCAR, using all resources available to it, to undertake a comprehensive review of the waste disposal aspects of the Annex to Recommendation VIII-11 and, giving due consideration to the need to avoid detrimental effects on neighboring or associated ecosystems outside the Antarctic Treaty Area and to considerations of cost-effectiveness (...)".

In this way, Rec.s XII-4 and XIII-4 moved smoothly from being a fragmentary approach on waste to a comprehensive one.

iii) Waste Generated by Tourist Activities and Non-Governmental Expeditions

The actual and potential risks that tourism implies for the Antarctic environment are less pronounced than other environmental risks coming from any other human Antarctic activity. As it has been highlighted:

> "The total number of tourists recorded up to now has been relatively contained and the time that tourists spend in Antarctica is generally rather short. It is known, however, that tourism in the Antarctic tends to concentrate on a few easily accessible areas, which are the most interesting from the naturalistic point of view, and the number of visitors has been increasing constantly over recent years".[48]

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48 PINESCHI, *Tourist Activities and the Protection of the Antarctic Environment: Current Obligations and Possible Future Developments*, in FRANCIONI (ed.), *International Environmental Law for Antarctica*, 1992, p. 177-178. On the number of tourists that have visited the AT area, "(...) the record compiled from the 1965/66 season to the present indicates that Antarctic tourism is experiencing a period of substantial growth. For example, of the approximate 39.000 tourists who have visited Antarctica since 1957, more than 40% have travelled during the past five summer seasons (1986/87 to 1990/91). Tourists numbers visiting Antarctica increased by more than 600% between the 1985/86 (782 tourists) and 1990/91 (4.842 tourists) seasons" (doc. XVI ATCM/INFO 38, 4 October 1991, p. 1, paper submitted by the United Kingdom). One year later, the United Kingdom reported that the number of tourists had been increased by 34% (doc. XVII ATCM/INFO 4, 11 November 1992, p. 1).

In 1966, both the first commercial ship-borne tourist expedition and the first non-governmental expedition appeared in Antarctica.[49] Since then, the ATCPs have tried to regulate this activity, but until now they have failed in adopting a comprehensive regime for Antarctic tourism and non-governmental expeditions.[50] The Recommendations adopted so far only deal with the likely lasting and harmful effects of tourism whether on the conduct of scientific research or on the Antarctic environment (in Rec. IV-27 of 1966 the potential effects of tourism were related to the conservation of Antarctic fauna and flora; since Rec. VI-7 of 1970, these effects are referred to the Antarctic environment).[51]

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49 However, since 1957 both Argentina and Chile had organised ship-borne and airborne tourist trips to and from Antarctica. See THOMSON, *Transport and Tourism in the Antarctic Development*, in ORREGO VICUÑA and SALINAS ARAYA (eds.), *El desarrollo de la Antártica*, 1977, p. 290-294; REICH, *The Development of Antarctic Tourism*, in *Polar Record*, 1980, p. 203-214.

50 The XVth ATCM (Paris, 9-20 October 1989) agreed that a comprehensive review of tourism and non-governmental activities was required. The Final Report of the XIth ATSCM, para. 11, postponed to the XVIth ATCM the question of tourism. Rec. XVI-13 of 1991 convened an Informal Working Group of the Parties on the question of a comprehensive regulation of tourist and non-governmental activities in Antarctica. Neither this Informal Working Group on Tourism (Venice, 9-10 November 1992) nor the XVIIth ATCM (Venice, 11-20 November 1992) succeeded in this item. See Doc. XVII ATCM/WP 34, 20 November 1992, Final Report of the XVIIth ATCM, para. 108-114. The XVIIIth ATCM (Kyoto, 11-22 April 1994), though recognising that "there was a wide convergence of views that it was timely for action to be taken on this matter at this Meeting", could only add that: "there was agreement that the objective at this Meeting was not to create new rules and regulations but to provide guidance to those visiting Antarctica and those organising and conducting tourism and non-governmental activities there" (Final Report of the XVIIIth ATCM, para. 59). Nevertheless, some ATCPs considered that the most appropriate form of regulating tourism activities would be through a new Annex to PEPAT (see, for instance, the opening address by Mr. Miguel Arias Estevez, Head of the Delegation of Spain, *ibidem*, p. 96). See NICHOLSON, *Antarctic Tourism – The Need for a Legal Regime*, in WOLFRUM (ed.), *Antarctic Challenge II*, 1986, p. 191-203.

51 On the regime of Antarctic tourism and non-governmental expeditions, see BOCZEK, *The Legal Status of Visitors, Including Tourists and Non-Governmental Expeditions in Antarctica*, in WOLFRUM (ed.), *Antarctic Challenge III*, 1988, p. 455; BERMEJO and BOU, *El marco jurídico de la cooperación económica en la Antártida: realidades y perspectivas de futuro*, *AADI*, 1993, p. 94-99.

Regarding the potential environmental impact generated by tourist activities and non-governmental expeditions[52], the Recommendations adopted until now by the ATCPs[53] contain two classes of rules. On the one hand, there are rules requiring tourists to refrain from certain activities which are dangerous to the environment. On the other hand, some rules have been drawn up in order to prevent the harmful impact of tourism in the most sensitive Antarctic areas. In both groups of rules, there are provisions that direct or indirectly deal with the problem of waste.

In the first group of rules, attention must be drawn to the fact that Annex II 9 of the Statement of Accepted Principles and the Relevant Provisions of the Antarctic Treaty[54] reproduces the corresponding paragraph of the Code of Conduct for Antarctic expeditions and station activities on waste disposal. Though many of these provisions are difficult to apply to tourists and other Antarctic visitors[55], it must also be noted that this Statement has no binding force at all, as Rec.s VII-4 of 1972 and VIII-9 of 1975 only require that all those who enter the AT area be aware of it. In this sense, the following provision contained in the Guidance for Visitors to the Antarctic is much more important:

> "2. Litter of all types must be kept to a minimum. Retain all litter (film wrappers, tissue, food scraps, tins, lotion bottles, etc.) in a bag or pocket to be

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52 "In reality, these impacts are essentially not different than those resulting from scientific and logistical activities (...). Any human activity in Antarctica can be expected to involve the same types of environmental impacts, because whatever the purpose, all activities require transportation and/or logistics infrastructure, and contain a risk-factor for accidents. One activity that is likely to have an environmental impact peculiar to "non-governmental" operators, is the placement of large numbers of people in environmentally sensitive locations for short periods of time, and often repetitively. Thus, while the resulting disturbance to local fauna and flora may not be different in kind to that caused by state sponsored activities, it may differ in its intensity or pattern of incidence. It is the level and intensity of commercial tourism visits, rather than their fundamental nature, that makes them of particular concern": ASOC, *The Regulation of Tourism in Antarctica*, Doc. XVI ATCM/INFO 77, 11 October 1991, p. 5.

53 Rec.s IV-27 of 1966; VI-7 of 1970; VII-4 of 1972; VIII-9 of 1975; and X-8 of 1979.

54 Rec. VIII-9 of 1975, Annex A.

55 For instance, the provision on the recovery of silver from large quantities of photographic liquids.

disposed of on board your ship. Avoid throwing tin cans and other trash off the ship near land".[56]

The problem of getting tourist and other Antarctic visitors from third States involved with such a provision, though faced by the ATCPs[57], has been partially solved with the codes of conduct adopted by several tourist organisations on a voluntary basis.[58] However, both the provisions contained in the Guidance for Visitors to the Antarctic and in the different codes of conduct, only deal with human wastes generated by tourist activities. Leaving aside for now, the provisions settled by the PEPAT, there is no provision in the ATS regulating the problem of waste generated by other activities related to tourism, such as those directed at facilitating the access of tourists to Antarctica and their presence there (for instance, the building of airstrips and wharves or the creation of hosting facilities). Though this problem has

56 Rec. VIII-9 of 1975, Annex A.

57 Rec.s VII-4 of 1972, para. 2; VIII-9 of 1975, para. 1; and X-8 of 1979, Part I.

58 For instance, para. 10 of the *Antarctica Visitor Guidelines*, adopted by IAATO, states that: "Return all litter to the ship for proper disposal. This includes litter of all types, such as film containers, wrappers and tissues. Garbage takes decades to break down in this harsh environment". Para. 15 of the *Antarctica Tour Operator Guidelines* prescribes that: "It is the responsibility of the tour operator to ensure that no evidence of our visits remains behind. This includes garbage (of any kind), marine pollution, vandalism, etc. Litter must never be left ashore". Both texts are published in Doc. XVI ATCM/INFO 58, *Guidelines for Tour Operators and Tourists*, paper presented by the United States on 9 October 1991. The *Guidelines of Conduct for Antarctica Visitors*, adopted by all IAATO's members, in its para. 3 states the following: "Leave nothing behind (...) leave no litter ashore and remove any litter you may find while ashore" (published in Doc. XVII ATCM/INFO 65, 6 November 1992). Nevertheless, it must be remembered that, as MANHEIM, *Gaps in Management of Antarctic Seaborne Tourism under the Protocol*, paper delivered at the XVIIth ATCM, p. 3, says: "The IAATO Guidelines do not constitute legally enforceable requirements and they do not govern all companies currently sponsoring trips to Antarctica".

already been identified by the ATCPs[59] and in spite of having presented various proposals[60], no solution has been reached until now.

The existence of a second group of rules that try to prevent the harmful impact of tourism in the most sensitive Antarctic areas is a different question. This approach has been looked at in three different ways. Firstly, the ATCPs have forbidden the access of tourists to some sensitive Antarctic areas, avoiding in this way the production and accumulation of waste there. This is the case for SPAs[61], SSSIs[62], Specially Reserved Areas (SRAs)[63], new

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59 In the Doc. ATCM XV/WP 10, presented by the Federal Republic of Germany during the XVth ATCM (October 1989), p. 1-2, it is stated that: "Growing activities of such character by land will necessarily lead to an expansion of infrastructure, e. g. additional fuel reserves, extra means of transport. Also, more waste will be produced. The disposal of existing wastes already needs improvement. (...) The differences between possible mineral activities and tourist expeditions may be eminent, particularly with regard to the dimension of possible damages. (...) However, (...) also tourist activities may lead to substantial damages, e. g. air craft crashes, ship accidents, pollution caused by fuel reserves (that were additionally deposited for tourist transport purposes), damages to Antarctic flora and fauna (...)".

60 There has been two different kinds of proposals on this item. First, proposals prohibiting the construction of tourist facilities. For instance, the French proposal embodied in Doc. XVI ATCM/WP 2, 25 September 1991, p. 4, stressed that "Operators should use maritime vessels exclusively, without setting up any permanent or temporarily land infrastructure, or any floating hotel or removable base". This proposal was reiterated also by ASOC: "ASOC is opposed to the establishment of land-based tourist facilities and proposes that such a prohibition be directly expressed within a Management Plan" (doc. XVI ATCM/INFO 77, 11 October 1991). Second, some ATCPs have insisted on the convenience of submitting the creation of such facilities to the previous authorisation given in an ATCM. For instance, Art. 8, para. 5 of the Draft Annex VI to the PEPAT, proposed by Chile, France, Germany, Italy and Spain, established that: "La décision d'entreprendre la construction dans la zone du Traité sur l'Antarctique d'infrastructure flottante ou à terre pour l'hébergement des visiteurs ou pour leurs loisirs n'est prise qu'après l'avis positif préalable de la Réunion consultative du Traité sur l'Antarctique donné à l'issue de l'examen de ce project conformément aux dispositions de l'Annex I du Protocol" (doc. XVII ATCM/WP 1, 9 November 1992).

61 Rec. VI-7 of 1970, para. 2 (c). This Recommendation became effective on 1 November 1982.

62 Guidance for Visitors to the Antarctic, annexed to Rec. VIII-9 of 1975. This Recommendation became effective on 1 November 1982.

islands formed by geological processes[64] and probably for new kinds of protected areas that might be created in the near future.[65] Secondly, from time to time the ATCPs have considered the idea of minimising the possible impact of tourism upon the Antarctic environment by concentrating them in special areas. The outcome of this idea has been the creation of Areas of Special Tourist Interest (ASTIs)[66], though until now no ASTI has been designated. Lastly, an additional category of protected area has been established: the Multiple-use Planning Areas (MPAs)[67], which could serve to whatever of the above mentioned purposes.[68]

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63 Rec. XV-10 of 1989, para. 4. According to this Recommendation, SRAs are defined as "areas of outstanding geologic, glaciological, geomorphological, aesthetic, scenic or wilderness value". This Recommendation has not become effective yet.

64 Rec. VI-11 of 1970, para. 2. This Recommendation became effective on 10 October 1973.

65 At the informal working group on tourism (Venice, 9-10 November, 1992), SCAR proposed to designate as soon as possible several glaciological protected areas, where the management plans prohibit the access of airborne tourism.

66 Rec.s VII-4 of 1972, para. 3 and VIII-9 of 1975, para. 2 (b). According to Rec. VIII-9, ASTIs respond to "the necessity to restrict the number of places where large numbers of tourists may land so that the ecological effects may be monitored". However, there is no special provision for ASTIs on waste management or waste disposal. More recently, the XIXth ATCM (Kyoto, 11-22 April 1994) agreed that: "there would be benefit in using Antarctic Specially Managed Areas (ASMAs) in some cases to ensure that tourism and non-governmental activities do not interfere with scientific research or have adverse effects on the Antarctic environment" (Final Report of the XIXth ATCM, p. 14, para. 57).

67 Rec. XV-11 of 1989, para. 1, defines MPAs as those areas in which ATCPs "ensure that ongoing and planned human activities in Antarctica, through their combined or cumulative effects, do not result in mutual interference or in adverse impacts upon the Antarctic environment". This Recommendation has not become effective yet.

68 Their management plans have to include "specific measures to avoid or minimise mutual interference and cumulative impacts, including where necessary measures applicable to: (vii) visitors, including designation of areas within which access by tourists or other visitors should be limited or prohibited, and/or as areas to which such access might be directed to obtain maximum benefit from exposure to the characteristics of the area": *ibidem*, para. 4 (f) (vii).

iv) Waste Generated by Possible Future Mining Activities

The issue of mining activities in Antarctica has been discussed by ATCPs since 1972 and from 1977 to 1988 they have conducted negotiations aimed at establishing an international regime for the management of Antarctic mineral resources.[69] These negotiations concluded in June 2, 1988, with the adoption of CRAMRA, a convention whose future is quite uncertain after the adoption of PEPAT.

Nevertheless, it must be highlighted that the protection of the Antarctic environment has been an important aim in the negotiations for the establishment of a minerals convention.[70] Though no exploitation of such resources has taken place to date, or is expected to in the near future, ATCPs have recognised that if mineral activities do take place, great environmental concern will be raised. In fact, all mineral activities (prospecting, exploration and exploitation) will generate waste materials, as will associated logistic facilities and operations.[71]

Facing these considerations, CRAMRA begins with the assertion that no Antarctic mineral resource activity shall take place until it is judged, based upon an assessment of its possible impact, whether the activity in question would or would not cause significant adverse effects on the Antarctic environment or on global or regional climate or weather patterns.[72] Implementing this objective, CRAMRA specifies that upon cessation of mineral resource activities the operator has the duty to ensure the removal of all installations and equipment as well as the site rehabilitation.[73] It must be noted that CRAMRA neither establishes nor suggests any waste disposal pro-

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69 On these negotiations, see ORREGO VICUÑA, *Antarctic Minerals Exploitation*, 1988. On CRAMRA, see BERMEJO, *L'Antarctique et ses ressources minérales: le nouveau cadre juridique*, 1990.

70 BARNES, LIPPERMAN and RIGG, *Waste Management in Antarctica*, in WOLFRUM (ed.), *Antarctic Challenge III*, 1988, p. 498. This idea has been repeated in Rec.s VII-6 of 1972, VIII-14 of 1975, IX-1 of 1977, X-1 of 1979 and XI-1 of 1981.

71 See the Report of the Group of Experts on Mineral Exploration and Exploitation, London, September 1977, paras. 26 and 71, and the Report of the Group of Ecological, Technological and other related Experts on Mineral Exploration and Exploitation in Antarctica, Washington, June 1979, para. 7.

72 Art. 4, paras. 2 and 3 of CRAMRA. See also its Art. 51, para 1.

73 See Art. 37, paras. 6 and 8 (c), of CRAMRA for prospecting and Art. 47 (v) for exploration. It is curious to note that there is no similar provision for exploitation activities.

cedure for reaching this site rehabilitation objective. Probably, because "there are no effective methods for the full restoration of sites on land, on ice, or at sea in the Antarctic disturbed by mineral exploration or exploitation (...). The most that can be done is to grade land surfaces and remove all possible extraneous material".[74] So what CRAMRA does is leaving for the future the adoption of detailed measures for the protection of the Antarctic environment and dependent and associated ecosystems and for the promotion of safe and effective exploration and development techniques.[75] Anyway, it is expressly ruled that an operator undertaking any Antarctic mineral resource activity shall take the necessary and timely response action, including prevention, containment, clean up and removal measures, if the activity damages or threatens to damage the Antarctic environment or dependent or associated ecosystems.[76]

B) The Comprehensive Approach

The celebration of the XVth ATCM (Paris, 9-20 October 1989) marked a major turning point for ATCPs preoccupation on environmental protection in Antarctica and the Southern Ocean. The attitude, involving the regulation of each possible environmental impact upon Antarctica and the Southern Ocean coming from any actual or future human activity, i. e. the so-called fragmentary approach, was finally abandoned. Instead, the desire to regulate the preservation and protection of the environment on a comprehensive basis appeared.

i) The Comprehensive Legal Framework

Regarding waste management and waste disposal, the origins of a comprehensive approach have to be traced back to the XIIth ATCM, when Rec. XII-4 of 1983 recognised that:

74 Report of the Group of Experts on Mineral Exploration and Exploitation cit., para. 30.

75 See Arts. 21, para. 1 (c), 47 (b) and 54, para 4, of CRAMRA.

76 See Arts. 8, paras. 1 and 2 (d); 44, para. 2 (b) (iv); and 47 (c).

> "(...) improvements in logistics and technology increase the feasibility of on-site treatment of human and other waste, and of the removal of solid waste, residues and noxious substances from the Treaty Area".[77]

Two years later, the ATCPs asked SCAR to "undertake a comprehensive review of the waste disposal aspects of the Annex to Recommendation VIII-11"[78], but without waiting for the results of this review, the ATCPs began to take action on this matter.[79] After a thorough study carried out by a SCAR Panel of Experts on Waste Disposal since 1986, its Report was finally concluded on 3 August 1988.[80] In fact, this Panel of Experts exceeded the scope of Rec. XIII-4 of 1985. The review of the waste disposal procedures they made and their final recommendations were not only confined to scientific expeditions and station activities, but also applied to any human activity in Antarctica.

Closely following the Report of the SCAR Panel of Experts, though establishing stricter criteria, Rec. XV-3 of 1989 on Waste Disposal was passed.[81] This Recommendation contained the most detailed set of norms

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77 Rec. XII-4 of 1983. Last preamble paragraph (*Handbook*, p. 2203). See also PUCEIRO RIPOLL, *Waste Disposal: Need for Further Regulation?* in WOLFRUM (ed.), *Antarctic Challenge III*, 1988, p. 530.

78 Rec. XIII-4 of 1985, para. 1 (*Handbook*, p. 2203).

79 The Final Report of the XIVth ATCM, para. 74, states the following: "Acknowledging information provided by several delegations on new and improved methods of waste disposal, Parties were urged to take into account the following goals in conducting their activities in the Antarctic: a) the cleanup of existing waste disposal sites; b) the minimisation of the amount of waste generated through careful consideration of the nature and the volume of materials taken into the Antarctic which are likely to become or generate waste; c) the re-use or re-cycling of waste materials; d) the removal of all waste from the Treaty Area that cannot otherwise be disposed of in an environmentally sound manner" (*Handbook*, p. 2204). See also para. 77 of the Final Report of the XVth ATCM (*ibidem*, p. 2206).

80 The Report of the SCAR Panel of Experts, quoted *supra*, note 2, was made by the following specialists: Bleasel (Australia), Bolin (Sweeden), Bonner (United Kingdom) and Knox (New Zealand).

81 After studying the differences between Rec. XV-3 and the SCAR Report, *Rex Moncur* concluded that: "All of the measures proposed by SCAR have been adopted in Recommendation XV-3 and, while there are differences between the two, no parts of the code have reduced the obligations on operators. There are two principal differences between SCAR's draft code and the ATCM recommen-

on waste disposal and waste management adopted until then, but it was not the only Recommendation adopted at the XVth ATCM that dealt with the problem of waste. However, at least two other Recommendations have to be mentioned. Firstly, Rec. XV-4 of 1989 on the Prevention, Control and Response to Marine Pollution established both measures prohibiting different practices of waste disposal in the Southern Ocean and an appeal to the ATCPs to become parties, if they were not already, of six international marine conventions, two of which concern waste. Secondly, Rec. XV-5 of 1989 on Environmental Monitoring in Antarctica also regulated environmental monitoring programmes of waste disposal and accurate records of materials imported into, removed from or disposed of in Antarctica.[82]

At the same time that these three Recommendations revolutionized the whole previous set of norms on waste disposal and waste management, it is well known that Rec. XV-1 of 1989 convoked a Special ATCM in order to "explore and discuss all proposals relating to the comprehensive protection of the Antarctic environment and its dependent and associated ecosystems".[83] One of the objectives of such Special ATCM was to "review the existing body of measures for the protection of the Antarctic environment and its dependent and associated ecosystems".[84] But curiously enough, in a legal sustainable development way, this review was going to affect both Recommendations on waste disposal and waste management adopted prior to the XVth ATCM[85], and the three Recommendations dealing with waste that were passed at the same ATCM.[86]

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dation: the language used, which is simpler, stronger and more precise; and the structure and presentation of the code" (*Waste disposal in Antarctica: adoption of the SCAR Report by the fifteenth Antarctic Treaty Consultative Meeting*, 18 May 1990, Paper delivered by Rex Moncur to the Council of Managers of National Antarctic Programs Meeting, Sao Paulo, Brazil, 1990, p. 2-3).

82 None of these three Recommendations have become effective yet.

83 Rec. XV-1 of 1989, para. 2.

84 *Ibidem*, para. 3 (b).

85 The ninth preamble paragraph quoted "Recommendations relating to: (i) the Antarctic Protected Area system (...); (ii) the Code of Conduct for Antarctic expeditions and station activities; (iii) the effects of Antarctic tourism and non-governmental expeditions; (iv) the use of radio-isotopes; (v) oil contamination; (vi) the prohibition on the disposal of nuclear waste (...)".

86 Rec.s XV-3, XV-4 and XV-5 are expressly mentioned in the eleventh preamble paragraph of Rec. XV-1 of 1989.

During the First Session of the XIth Special ATCM (Viña del Mar, 19 November to 6 December 1990), the Working Group II was given the task of reviewing the existing environmental measures, included those regarding the disposal of waste. On this item, Working Group II based its work on Rec. XV-3 of 1989 and on two additional proposals, of a highly codifying character.[87] The *Rolf Trolle Andersen Draft* emerged from these deliberations, with an Annex II on Waste Disposal and Waste Management.[88] Though this document was subsequently amended at the first Madrid Session (23 to 30 April 1991)[89], the final result, embodied in current Annex III to PEPAT on Waste Disposal and Waste Management, closely follows Rec. XV-3 of 1989, but with the corresponding improvements. It is precisely this close link existing between the three Recommendations dealing with waste adopted at the XVth ATCM and Annex III to PEPAT that justifies a joint analysis of these texts.

ii) General Obligations

Annex III to PEPAT begins defining its scope in the broadest sense. In this way, this Annex shall apply practically to every human activity that takes place in the AT area.[90] With this definition, the comprehensive scope of

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87 Doc. XI ATSCM/4. Add. 2, *Protocol Supplementing the Antarctic Treaty. Annex on Waste Disposal*, submitted by the United States of America; and Doc. XI ATSCM/2, *Draft Protocol to the Antarctic Treaty on Environmental Protection. Part IV – Monitoring (Arts. 34 to 45)*, submitted by New Zealand. On the XIth ATSCM, see BERMEJO and BOU, *La celebración del Protocolo al Tratado Antártico sobre protección del medio ambiente: orígenes y negociaciones*, *ADI*, 1993, p. 155-211.

88 Doc XI ATSCM/8/Add. 2, Appendix 2 (December 5, 1990), *Waste Disposal and Waste Management*. This document is included in Doc. XI ATSCM/9/Rev. 1 (December 5, 1990), *Provisional Report of the XIth ATSCM*, Annex F, Appendix II.

89 See Doc. XI ATSCM/2/WP.8 of April 22, 1991, *Annex on Waste Disposal and Waste Management*, proposed by the United States; Doc. XI ATSCM/2/WP.19 of April 23, 1991, *Amendments to Annex on Waste Disposal and Waste Management*, proposed by Chile; and the Informal proposal submitted by the United Kingdom and Australia to amend the same Annex.

90 According to Art. 1, "this Annex shall apply to (...) all (...) governmental and non-governmental activities in the Antarctic Treaty area for which advanced notice is required under Article VII (5) of the Antarctic Treaty, including associated logistic support activities". It is interesting to note that this article makes

the XVth ATCM Recommendations is improved in two different ways. Firstly, Annex III shall apply to every human activity, whether governmental or not. The inclusion of non-governmental activities is important, because it was not clear at all, under Rec.s XV-3, XV-4 and XV-5 of 1989, whether these activities were covered by their provisions.[91] Secondly, with the reference to activities undertaken in the AT area, the provisions of Annex III are to apply both to terrestrial and marine environments existing in this area, while at the XVth ATCM a clear distinction was made between them.[92]

The main objective of Annex III is contemplated in Art. 1, para. 2. According to it:

> "The amount of wastes produced or disposed of in the Antarctic Treaty area shall be reduced as far as practicable so as to minimise impact on the Antarctic environment and to minimise interference with the natural values of Antarctica, with scientific research and with other uses of Antarctica which are consistent with the Antarctic Treaty".[93]

Developing this objective, several procedures on waste disposal and a list of prohibited products are regulated in detail in Arts. 2 to 7 of Annex III.[94]

At the same level as the need to reduce the amount of waste produced or disposed of in the AT area, a second objective is introduced by Annex III. This one means that in the planning and carrying out of activities in the AT area "waste storage, disposal and removal from the Antarctic Treaty area, as well as recycling and source reduction" are essential considerations (Art. 1, para 3). In implementing this provision, and in spite of the environmental impact assessment procedures contemplated in Annex I to PEPAT, Arts. 8

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express reference to scientific activities and tourism undertaken in the AT area, which are, without doubt, the most polluting human activities in this polar area.

91 For instance, in Rec. XV-3 of 1989 the phrase "each Government carrying out Antarctic activities shall, in respect of those activities (...)" is commonly used.

92 While para. 1 of Rec. XV-3 of 1989 was referred to "wastes produced or disposed of in Antarctica", para. 1 of Rec. XV-4 of 1989 mentioned discharges or disposals from vessels into the marine environment of the AT area.

93 This provision is inspired in para. 1 of Rec. XV-3 of 1989. The main differences are that the expression "to the maximum extent possible" has been substituted by the wording "as far as practicable" and that the reference "to minimise interference with the natural values of Antarctica" has been added.

94 Vide *infra*.

to 10 of Annex III contain different provisions on waste management planning and management practices.[95]

Complementing both objectives, the duty to remove waste from Antarctica is contemplated as a general obligation developed by Annex III, which specifies who has the duty to remove and what things ought to be removed. In this sense, Art. 1, para. 5, states that past and present waste disposal sites on land and abandoned work sites of Antarctic activities shall be cleaned up by the generator of such wastes and the user of such sites.[96] This general obligation has two exceptions that in principle seem reasonable. There is no obligation to remove either any structure designated as a historic site or monument[97] or any structure or waste material whose actual removal

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95 Vide *infra*. It must be pointed out that, without waiting for the entry into force of Rec. XV-3 or the Annex III to PEPAT, several ATCPs have incorporated in their national Antarctic programs different waste management planning and management practices. See, for instance, the following documents: *Safety in Antarctica. Report of the US Antarctic Program. Safety Review Panel*, Washington, 1988; Australian Antarctic Division, *Environmental Management of Australia's Antarctic Stations*, April 1989; Doc. XVI ATCM/INFO 23 of 7 October 1991, *Environmental Policy and Practice in the British Antarctic Survey*; Doc. XVI ATCM/INFO 60 of 10 October 1991, *Protocol on Antarctic Environmental Protection Concluded between Chile and Argentina* (Buenos Aires, 2 August 1991); Doc. XVI ATCM/INFO 75 of 10 October 1991, *Argentina: Removal of Waste from the Marambio Antarctic Base*.

96 While this provision strengthens the obligation to remove provided for in para. 22 of Rec. XV-3 of 1989, either by specifying the holders of the duty or by referring to past and present waste disposal sites, it must be pointed out that the reference to inland sites did not appear in that Recommendation. See the Document XVIII ATCM/INFO 33, submitted by the United Kingdom Delegation to the XVIIIth ATCM (Kyoto, 11-22 April 1994) on the *Clean-up and Conservation of Abandoned British Bases in the Antarctic Peninsular Region*.

97 Complementing this exception, para. 103 of the Final Report of the XVIIth ATCM states the following: "Attention was also drawn to the fact that a number of abandoned work sites may have scientific and historic values and that program operators should consider such possibilities before initiating clean-up operations to give effect to Article 1 (5) of Annex III of the Protocol". For the practical problems caused by Wilkes Station, see *Waste Disposal in Antarctica: Adoption of the SCAR Report by the Fifteenth Antarctic Treaty Consultative Meeting*, 18 May 1990 cit., p. 3-4. See also the Document XVIII ATCM/WP 26, submitted by the Argentinean Delegation to the XVIIIth ATCM (Kyoto, 11-22 April 1994) on *The Maintenance Work on Sites and Historical Monuments*.

would involve greater adverse environmental impact than would leaving it in its existing location.[98] Additionally, it is expressly mentioned that when removing waste from the AT area, and "to the maximum extent practicable", such waste shall be returned to the country from which the activities generating the waste were organised or to any other country in which arrangements have been made for their disposal[99] in accordance with relevant international agreements[100] (Art. 1, para. 4). But no provision establishes a solution when there is no understanding between the State that has generated the waste and the State from which the expedition has departed or between the generator of the waste and the owner of the waste disposal site.

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98 As Pineschi has underlined, the wording of the second exception takes into account the difficulties of removing wrecked vessels and crashed aircraft from Antarctica, whose removal could cause more significant environmental impact than actually leaving them there. See also para. 81 of the Final Report of the XVth ATCM, in *Handbook*, p. 2207. A concrete application of this provision can be found in Doc. XVII ATCM/INFO 71, in which Germany, after conducting an IEE, concluded that "Georg von Neumayer" station ought to be removed from Antarctica, but it also was decided that the steel tubes of the station, which are buried under 10 meters of compact drift snow and ice, should remain in the ice, as it was the safer environmental solution. It is also worth noting that, on 18 February 1992, the Governments of the Netherlands and of the Argentinean Republic signed a Joint Memorandum of Understanding in order to recover the fuel stored inside the "Bahia Paraiso", an Argentinean vessel that sunk near Palmer Station on 28 January 1989 (see *OSIR*, 12 March 1992, p. 3). At the XVIIIth ATCM, the Head of the Delegation of Argentina announced that this operation was successfully concluded (Final Report of the XVIIIth ATCM, p. 56). However, the vessel still remains where it sunk. For a critical comment on both exceptions, see PINESCHI, *La protezione dell'ambiente in Antartide*, 1993, p. 304-309.

99 A brief description of the practices currently being followed can be found both in the *Report of an Inspection under Article VII of the Antarctic Treaty by Observers from Sweden*, January 1994, and in Greenpeace International, *1992/93 Antarctic Expedition Report*, April 1994.

100 According to the Informal Amendments proposed by the United Kingdom Delegation at the first Madrid Session of the XIth ATSCM, "the reference to relevant international agreements (...) needs clarification. Does this wording relate to the London Dumping Convention, Basle Agreement (...)?". Unfortunately, no clarification has been provided by the final wording of this article.

iii) Waste Management Planning and Management Practices

The Report of the SCAR Panel Group of Experts stressed that one of the main loopholes of the regime embodied in the Code of Conduct for Antarctic expeditions and station activities (Rec. VIII-11 of 1975) was the lack of provisions on waste management planning. This loophole made the assessment of long-term environmental impact caused by accumulation of waste more difficult.[101] The report also insisted that one of the most important factors in good waste disposal systems is the education of expedition staff in what is required from them and why it is so important, as it is obvious that without a strong educational programme on this matter a country is not likely to achieve a satisfactory result.[102] From these considerations, provisions on waste management planning and management practices emerged both in Rec. XV-3 of 1989 and in Annex III to PEPAT.

The obligation to plan waste management is based on three different provisions. Firstly, the obligation to establish a waste disposal classification system is ruled in order to record waste and to facilitate studies aimed at evaluating the environmental impact of scientific activity and associated logistic support.[103] The criteria to classify waste are also regulated, being categorised on the basis of the nature of the waste rather than on the disposal options.[104] Secondly, each Party carrying out Antarctic activities has the duty to prepare and annually review and update its waste management plans, specifying for each site, field camp or ship the following data:

> "(a) programmes for cleaning up existing waste disposal sites and abandoned work sites;

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101 *Report of the SCAR Panel Group of Experts* cit., p. 32.

102 *Ibidem*, p. 31.

103 The reasons why the scope of this obligation is limited only to scientific activities and their associated logistic support, are not clear at all. Regular tourists activities also could comply with it.

104 In this way, waste produced shall be classified as sewage and domestic liquid wastes (Group 1); other liquid wastes and chemicals, including fuels and lubricants (Group 2); solids to be combusted (Group 3); other solid wastes (Group 4); and radioactive material (Group 5). Although this criterium was already established by para. 2 of Rec. XV-3 of 1989, it has acquired legal character with Art. 8, para. 1 of Annex III to PEPAT.

(b) current and planned waste management arrangements, including final disposal;
(c) current and planned arrangements for analysing the environmental effects of waste and waste management; and
(d) other efforts to minimise any environmental effects of wastes and waste management".[105]

And lastly, for a better planning of future scientific programmes, each Party shall prepare an inventory of locations of past activities (such as traverses, fuel depots, field bases, crashed aircraft) before the information gets unfortunately lost. Provision that has to be complied with "as far as it is possible"[106] and which cannot be identified with Art. 8, para. 2 (a).

The management practices contemplated both in Rec. XV-3 of 1989 and in Annex III to PEPAT intend to make States and operators active in Antarctica responsible for their actions. So, each Party has the obligation to both designate a waste management official to develop and monitor waste management plans for each site and to ensure that members of its expeditions receive adequate training designed to limit the impact of its operations on the Antarctic environment and to inform them of the requirements for waste disposal and waste management.[107] An example of this duty is the obligation of each Party to discourage the use of polyvinyl chloride (PVC) products among the members of its Antarctic expeditions.[108]

Following well-settled Antarctic practices, the control of the compliance with these provisions is guaranteed either by the inspection procedures established by Art. VII of the AT and Art. 14 of the PEPAT[109], or by the

105 Para. 3 (a) of Rec. XV-3 of 1989 and Art. 8, para 2, of Annex III to PEPAT. The words "including final disposal" were added in Art. 8, para 2 (b), because "this would require that parties demonstrate that they have disposed of their wastes from Antarctica in an appropriate manner" (*Annex on Waste Disposal and Waste Management, Informal Amendments proposed by the United Kingdom Delegation*, p. 2).

106 Para. 3 (b) of Rec. XV-3 of 1989 and Art. 8, para. 3, of Annex III to PEPAT.

107 Paras. 5 and 6 of Rec. XV-3 and Art. 10 (a) and (b) of Annex III to PEPAT.

108 Paras. 7 *in fine* and 8 of Rec. XV-3 of 1989, and Art. 10 (c) of Annex III.

109 Strengthening this provision, para. 67 of the Final Report of the XVIIth ATCM lays stresses on that: "The Meeting noted that inspections, in addition to verifying adherence to the fundamental principles and objectives of the AT, now require emphasis on environmental matters". The reports previously quoted of the most recent Antarctic inspections, i. e. those carried out during 1993 by

annual exchanges of information. Regarding Antarctic inspections, the Final Reports of the XVIIIth and XIXth ATCM show that substantial progress is being made in implementing the provisions on Annex III to PEPAT.[110] For instance, the delegation of the United States presented to the XIXth ATCM (Seoul, 8-19 May 1995) a Draft Report on Antarctic Inspection under Art. VII of the AT during the period 9 February – 11 March 1995[111], where it is stated the following:

> "Proper management and disposal of wastes was a priority concern at all stations visited. The provisions governing waste management in Annex III of the Madrid Protocol, though not yet in force, have already had significant influence upon waste handling practices in Antarctica".[112]

Perhaps, much more important than controlling the actual compliance of the provisions of Annex III, is the development, during the last two ATCM, of several inspection checklists. COMNAP and SCALOP, through the work of their subordinate groups, submitted to the XVIIIth ATCM a proposed checklist format for use in the planning and conduct of inspections for permanent stations.[113] This ATCM also noted the checklists submitted by the United Kingdom for permanent stations, abandoned bases and vessels, that had already been used by the United Kingdom, Italy and the Republic of Korea

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Sweeden and Greenpeace International, are good samples of this purpose.

110 See the Final Report of the XVIIIth ATCM, para. 78. In this way, in the Message from the XVIIIth ATCM to Stations in the Antarctic, it is expressly recognised that "Great efforts have been made to introduce updated means of waste disposal (...)".

111 Doc. XIX ATCM/INF 96.

112 In the view of the US inspection team, "fuel storage and fuel transfer practices were the components of station activities with the greatest potential for causing significant adverse impacts". Accordingly, the XIXth ATCM "suggested that Parties ask the COMNAP, through their members, to identify steps that could be taken to improve fuel storage and handling and that this item be included on the Agenda for the next ATCM" (Final Report of the XIXth ATCM, p. 21-22). These agreements have been included in the corresponding Resolution adopted at this Meeting concerning fuel storage and handling (*ibidem*, p. 87).

113 Doc. XVIII ATCM/WP 22. See also the Final Report of the XVIIIth ATCM, para. 83, and p. 164, point 2.4.

during their joint Treaty Inspection in 1993.[114] As a result of these discussions, the XVIIIth ATCM acknowledged that standard checklists provide guidelines that could enhance the quality and consistency of inspections, without limiting a Party's individual action in conducting inspections. This ATCM agreed that, as a first step, it would be valuable to have a checklist for permanent stations and associated installations[115], recognising that it would be useful to develop further checklists. Accordingly, the XVIIIth ATCM asked SCAR to produce a checklist for protected areas to be submitted at the next ATCM. Moreover, the United Kingdom offered to co-ordinate the production of checklists for abandoned stations, vessels, aircraft, refuges and waste dumps for discussion at the XIXth ATCM.[116]

The XIXth ATCM, considered the draft checklists submitted by the United Kingdom for vessels and for abandoned stations[117] and a draft checklist submitted by Australia for inspection of waste disposal sites.[118] At the same time the XIXth ATCM underlined that the main benefit of the checklists was their use as guidelines for carrying out inspections under Art. VII of the AT and in assessing implementation of the provisions of PEPAT, pointing out that they should not be used as a mandatory questionnaire,[119] a Resolution was also adopted on these matters.[120] This Resolution includes Checklist A for Permanent Antarctic Stations and Associated Installations, which was approved at the previous ATCM, and three new checklists: Checklist B for Vessels within the AT Area; Checklist C for Abandoned Antarctic Stations and Associated Installations; and Checklist D for Waste Disposal

114 Doc. XVIII ATCM/INFO 8. The XVIIIth ATCM also discussed a Chilean working paper (Doc. XVIII ATCM/WP 12) on this matter.

115 The agreed *Checklist A for Permanent Antarctic Stations and Associated Installations* has been published in Annex E (ii) of the Final Report of the XVIIIth ATCM, p. 255-260. Though several points of this checklist deal with different aspects of waste disposal and waste management at the permanent stations (such as points 4.4, 8, 9.1, 10.4, 12.2 and so on), it is worth noting that its long point 19 is wholly devoted to waste management.

116 *Ibidem*, para. 84.

117 Doc. XIX ATCM/WP 2.

118 Doc. XIX ATCM/WP 23.

119 Final Report of the XIXth ATCM, para. 79.

120 *Ibidem*, p. 88.

Sites. All of them include different questions regarding waste disposal and waste management in Antarctica.[121]

Developing the second way of control, the annual exchanges of information among the ATCPs and the CEP shall include the different waste management plans, reports on their implementation, in which it is likely that the several waste management officials will have something to say, and the inventories on past activities.[122] It is important to note that the CEP is expressly entitled to review waste management plans and reports on their implementation and it "may offer comments, including suggestions for minimising impacts and modifications and improvement to the plans, for the consideration of the Parties". This rather ambiguous phrase could have at least two different meanings, as it is possible to understand that only the CEP can make these comments and suggestions to each ATCP's concrete waste management plan, which would avoid any further discussion at any posterior ATCM.[123] A different interpretation arises from the possibility of interpreting the expression "for the consideration of the Parties" as meaning by every ATCP. In this second case, the CEP's comments and suggestions might be discussed at any ATCM, and ATCPs might take the corresponding decisions. Nevertheless, it must be added that the CEP's comments and suggestions have no binding force at all.

It is interesting to note that, in order to implement these provisions, and without waiting for them to enter into force, COMNAP and SCALOP have already taken action on this matter. Implementing Rec. XV-3, the SCALOP Sub-Group on Waste Management prepared a format and procedures for the annual exchange of plans and information on waste management in Antarctica, that were adopted by SCALOP.[124] Accordingly, 17 Managers

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121 It is possible that in the next ATCM more checklists may be approved. At the XIXth ATCM, the United Kingdom noted that checklists dealing with inspection of aircraft and refuges have still to be developed. The Delegation of Italy offered to prepare a checklist covering field camps and refuges for discussion at the XXth ATCM (Final Report of the XIXth ATCM, para. 78).

122 Para. 4 of Rec. XV-3 of 1989 and Art. 9 of Annex III to PEPAT. It must be underlined that the reports on the implementation of waste management plans are not mentioned in Rec. XV-3 of 1989.

123 This meaning finds some legal grounds on the description of the activities that the Parties to PEPAT may do. See Art. 9, para. 4, of Annex III to PEPAT.

124 SCALOP Notice No. 20: *Waste Management Plans and Information Exchange* (26 September 1990), p. 1.

of National Antarctic Programs reported to the SCALOP secretary on different data for the period 1 October 1990 to 30 September 1991. These data were related to the training of expedition members, waste reduction programmes, fuel consumption estimates, inventory of past activities and individual waste management plans for each fixed site, field camp and ship.[125] Though this exchange of information was of an experimental nature[126], it progressively became the official format and procedures for the annual exchange of plans and information on waste management in Antarctica.[127]

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125 See the Waste Management Reports for period 1 October 1990 to 30 September 1991 by the Japanese National Institute of Polar Research (January 24, 1991); by the People's Republic of China's National Committee for Antarctic Research (January 15, 1991); by the Spanish Antarctic National Program; by the British Antarctic Survey (23 November 1990); by the Dirección Nacional del Antártico, Instituto Antártico Argentino (9 January 1991); by the Australian Antarctic Division (15 November 1991); by Italy (May 17, 1991); by the South African Department of Environment Affairs (21 December 1990); by the New Zealand's Department of Scientific and Industrial Research (20 December 1990); by the Korean Polar Research Center; by the German Alfred-Wegner-Institut for Polar and Marine Research (20 November 1990); by the US National Science Foundation (October 12, 1990); by the USSR Arctic and Antarctic Research Institute; by Poland; by India; by Brasil's Secretaria da Commissaõ Interministerial para os recursos do mar (23 November 1990); and by the Instituto Antártico Chileno.

126 According to SCALOP Notice No. 20, *Waste Management Plans and Information Exchange* (26 September 1990), p. 1: "With reference to paragraph 4 of ATCM Rec. XV-3, it is recognised that the use of this format will not be part of the formal Treaty exchange for the period October 1990 through September 1991. The current use of these procedure will, however, result in: an early international exchange; a test of the usefulness of the format; initiation of standard waste classification; a basis for further discussion at the June 1991 COMNAP/SCALOP meetings; and a significant step toward implementation of ATCM Rec. XV-3".

127 In a meeting of the SCALOP Sub-Group on Waste Management (Bologna, Italy, 20 June 1991), the annual waste management report format was revised, including information on the quantities of waste, although with an optional character. See SCALOP Notice No. 43, *Waste Management Report* (September 25, 1991), p. 1-3. At the meeting in Bariloche, Argentina, in June 1992 the SCALOP Sub-Group further revised the format of the Waste Management Report to incorporate the provisions of the Protocol and its Annex III. It was also decided that the revised format was going to be presented in the COMNAP report to the XVIIth ATCM with the proposal that it be included in the annual AT exchange of information commencing in 1993. See SCALOP Notice No. 61, *Waste Management Report for 1991/92* (August 14, 1992), p. 1; COMNAP Notice No.

Another field in which some recent developments have taken place relates to waste management planning and management practices concerning waste generated by tourism and non-governmental activities in the Antarctic. On 8 July 1993, a bilateral set of meetings were initiated between COMNAP and IAATO. Since these meetings, some fruitful results have been obtained.[128] But more important was the fact that the XVIIIth ATCM, with the participation of an invited expert from IAATO, adopted Rec. XVIII-1 of 1994, containing both a Guidance for Visitors to the Antarctic and a Guidance for those Organising and Conducting Tourism and Non-governmental Activities in the Antarctic. Although none of these two texts are mandatory for those intending to visit or organise and conduct tourism and non-governmental activities in the Antarctic, there is an appeal "to act in accordance with the attached guidance consistent with the relevant provisions of their applicable national law".[129] Nevertheless, both texts contain some provisions dealing with Antarctic waste. While the Guidance for Visitors to the Antarctic annexed to Rec. XVIII-1 of 1994 simply strengthens the language used in the Guidance for Visitors to the Antarctic attached to Rec. VIII-9 of 1975[130], the Guidance for those Organising and Conducting Tourism and Non-governmental Activities in the Antarctic, also annexed to Rec. XVIII-1 of 1994, contains more updated and complex provisions concerning waste. Thus, the sixth "key obligation on organisers and operators consist in preventing the disposal and discharge of prohibited waste". In order to reach this aim, among the procedures to be followed by organisers and operators when

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59, *Draft COMNAP Report to XVIIth ATCM* (August 14, 1992), p. 17 and 54. Once this goal was achieved, as the SCALOP Sub-Group had no further tasks to undertake, it ceased operation (see SCALOP, *Progress Report for 1992/93*, Christchurch, New Zealand, 21-25 June 1993, p. 2).

128 For instance, the Final Report of the XVIIIth ATCM, p. 168, states the following: "IAATO responded favourably and agreed to provide specific information on (tourism) activities in the 1993/94 season".

129 Rec. XVIII-1, para. 2.

130 In the Guidance for Visitors to the Antarctic annexed to Rec. XVIII-1 of 1994, section E, entitled "Keep Antarctica Pristine", states the following: "Antarctica remains relatively pristine, and has not yet been subjected to large scale human perturbations. It is the largest wilderness area on earth. Please keep it that way. 1) Do not dispose of litter or garbage on land. Open burning is prohibited. 2) Do not disturb or pollute lakes or streams. Any materials discarded at sea must be disposed of properly".

planning to go to the Antarctic, it is underlined that "organisers and operators should (and not shall) provide information to assist in the preparation of (...) waste management plans in accordance with Annex III of the Protocol". Moreover, once they are in the AT area, organisers and operators should (and not shall):

> "Dispose of waste materials in accordance with Annex III and IV of the Protocol. These annexes prohibit, among other things, the discharge of plastics, oil and noxious substances into the AT area; regulate the discharge of sewage and food waste; and require the removal of most wastes from the area".

These provisions must be considered as a timid effort in order to make organisers and operators of tourism and non-governmental activities comply with the relevant provisions of PEPAT dealing with waste, before its entering into force. It is, however, desirable that, once PEPAT enters into force, the contents of both the format on the information to be provided in advance notice and of the report on completion of activities to be presented within three months of the end of the activity will be modified, in order to include information on waste management planning and management practices.[131]

iv) Prohibited Products, Waste Removal and Waste Disposal in the Antarctic Treaty Area

With respect to the nature of waste produced in Antarctica, and specially to the environmental risks they create, Rec. XV-3 and Annex III to PEPAT have ruled a complex set of substantive provisions on waste treatment.

131 It must be underlined that the XIXth ATCM (Seoul, 8-19 May 1995) began to discuss these questions. While it was noted that Attachment A to Rec. XVIII-1 of 1994 outlines the requirements for advance notice of tourism and non-governmental activities, the requirements for post-activity reports were settled down by Resolution 2 (1995). Although none of these texts require to inform on waste management planning and management practices, during the XIXth ATCM the Delegation of Canada, when discussing the item on tourism and non-governmental activities in the AT area, pointed out that there may be value in having some information about on board waste production and disposal at gateway ports. At the same ATCM, the Delegation of The Netherlands drew the attention of the Meeting to the issue of compliance enforcement from gateway ports. It suggested that the next ATCM considers this question as a separate Agenda item and offered to prepare a document on the matter (see Final Report of the XIXth ATCM, p. 14-16).

Beginning with the most dangerous substances, the ATCPs have followed a preventive approach with them. Not only their utilisation has been prohibited, but also the introduction of certain kinds of substances and materials into this environment, in order to prevent unacceptable environmental risks when they become waste. In fact, the ATS is the only legal system in the world that until now contains this foresight.[132] In this way, Art. 7 of Annex III to PEPAT states the following:

> "No polychlorinated biphenyls (PCBs), non-sterile soil, polystyrene beads, chips or similar forms of packaging, or pesticides (other than those required for scientific, medical or hygiene purposes) shall be introduced onto land or ice shelves or into water in the Antarctic Treaty area".

Though this wording has improved that of Rec. XV-3[133], it can be criticised that PEPAT has added no new substances or materials to the list of prohibited products established by para. 7 of Rec. XV-3. In fact, both Australia and Chile proposed during the XIth ATSCM to lengthen this list[134], getting no positive response.

A more flexible approach is followed for certain substances, such as polyvinyl chloride (PVC) products, as there is no formal prohibition on their introduction in the AT area, but each Party assumes the duty to discourage their use and to ensure that its Antarctic expeditions are advised of any PVC

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132 PINESCHI, *La protezione dell'ambiente in Antartide* cit., p. 301.

133 The phrase "onto land or ice shelves or into water in the Antarctic Treaty area" is more specific than the phrase "shall not be send to the Antarctic", used in para. 7 of Rec. XV-3.

134 Australia proposed to include leaded fuels among the prohibited products (Doc. ATSCM/W.G.II/4, 29 November 1990, p. 3). The Chilean draft proposal was more complete, as it stated that: "The introduction of the following substances on to land, or ice shelves, or into the sea in the Antarctic Treaty area shall be prohibited: a) radioactive and toxic wastes; b) pesticides other than those strictly necessary for medical purposes or for maintaining hygiene on board of vessels, in aircraft, and at stations; c) polychlorinated biphenyls (PCBs); d) non-sterile soil; e) pathogenic micro-organismus; f) substances having carcinogenic, teratogenic or mutogenic properties in or through contact with the Antarctic environment; g) polystyrene beads, chips or similar forms of packaging" (see Doc. XI ATSCM/2/WP 19, Amendments to Annex on Waste Disposal and Waste Management Proposed by Chile, 23 April 1991, p. 2-3).

products they may introduce into this area for their subsequent removal.[135] However, neither Annex III to PEPAT nor Rec. XV-3 have included among the discouraged substances the use of leaded fuels or fuels containing ethylene bromide and ethylene chloride, as was stated by the Code of Conduct for Antarctic expeditions and station activities.[136]

In order to implement the general obligation to remove waste from Antarctica, Art. 2 of Annex III to PEPAT has established a complex classification of waste to be removed. Though the duty to remove is not valid for all kind of Antarctic waste, a clear distinction is made among waste that always[137] or nearly always[138] has to be removed from this polar area; waste that has to be removed as far as possible[139]; and waste that ought to be removed unless treated by another procedure to be made sterile.[140]

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135 Art. 10 (c) of Annex III to PEPAT and paras. 7 and 8 of Rec. XV-3.

136 Para. 1 (f) of Rec. VIII-11 of 1975.

137 According to Art. 2, para. 1, of Annex III: "The following wastes, if generated after entry into force of this Annex, shall be removed from the Antarctic Treaty area by the generator of such wastes: (a) radio-active materials; (b) electrical batteries; (c) fuel, both liquid and solid; (d) wastes containing harmful levels of heavy metals or acutely toxic or harmful persistent compounds; (e) polyvinyl chloride (PVC), polyurethane foam, polystyrene foam, rubber and lubricant oils, treated timbers and other products which contain additives that could produce harmful emissions if incinerated". See also Rec. XV-3, paras. 11 and 12 (a).

138 Among the waste included in this list, Art. 2, para. 1, of Annex III mentions the following: "(f) all other plastic wastes, except low density polyethylene containers (such as bags for storing wastes), provided that such containers shall be incinerated in accordance with Article 3 (1); (g) fuel drums; and (h) other solid, non-combustible wastes; provided that the obligation to remove drums and solid non-combustible wastes contained in subparagraphs (g) and (h) above shall not apply in circumstances where the removal of such wastes by any practical option would result in greater adverse environmental impact than leaving them in their existing locations". Compare this provision with Rec. XV-3, paras. 12 (b) and 13 (b) and (c).

139 "Liquid wastes which are not covered by paragraph 1 above and sewage and domestic liquid wastes, shall, to the maximum extent practicable, be removed from the Antarctic Treaty area by the generator of such wastes" (Art. 2, para. 2, of Annex III to PEPAT). It must be pointed out that sewage and domestic liquid wastes were not quoted in para. 13 of Rec. XV-3.

140 "The following wastes shall be removed from the Antarctic Treaty area by the generator of such wastes, unless incinerated, autoclaved or otherwise treated to be made sterile: (a) residues of carcasses of imported animals; (b) laboratory culture of micro-organisms and plant pathogens; and (c) introduced avian

For all this waste, some practical problems arise, due mainly to the remoteness of Antarctica from the rest of the world, as it is not possible to ensure regular voyages in order to remove waste from there. As it becomes necessary to wait for the arrival of resupply ships, Annex III to PEPAT does not establish any deadlines for carrying out this duty.[141] However, as a caution, it establishes that all waste to be removed from the AT area shall be stored in such a way as to prevent its dispersal into the environment.[142]

As for the disposal of waste that is not going to be removed from the AT area, Annex III to PEPAT only allows three procedures: waste disposal by incineration, on land and into the sea. In the three cases, the disposal of waste is not free at all, but it is subject to strict conditions and limits.

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products" (Art. 2, para. 3, of Annex III to PEPAT). Para. 14 of Rec. XV-3 does not mention plant pathogens.

141 For instance, in the Argentine Almirante Brown station, removal of garbage takes place at the end of the summer season on the icebreaker *Almirante Irizar*; in the Spanish Gabriel de Castilla station, waste is taken out on the resupply ship *Hesperides* twice a year, at the mid-summer resupply and at the end of the summer (it is taken to Punta Arenas, Chile): see Greenpeace International, *1992/93 Antarctic Expedition Report* cit., p. 8 and 83. There might be other causes to postpone the compliance of this duty to remove waste. For instance, "No radioactive waste was removed from McMurdo during the 1992/93 season. This was because USAP has developed a new policy, under which radioactive materials are returned to the institution or university in the United States that sponsored the research for which it was used. However, because this policy was not formulated until mid-season, the Navy was unable to change its contracts in time to return the waste that season (...). As a result, the material stayed in Antarctica and was scheduled to have been returned during the 1993/94 season" (*ibidem*, p. 130).

142 Art. 6 of Annex III to PEPAT and paras. 16 (b) and 17 of Rec. XV-3. It must be pointed out that waste removal from the AT area is progressively becoming a reality. Some ATCP have made explicit the objective of their national Antarctic programs that all waste from their research stations and ships, other than sewage or domestic waste, shall be removed from Antarctica. See, for instance, Doc. XVI ATCM/INFO 23 (7 October 1991), *Environmental Policy and Practice in the British Antarctic Survey* cit., p. 7. Moreover, as we have already seen, the most recent Antarctic inspections have reported a high degree of compliance with this duty (i.e., about 13,500 kg of waste is removed annually from the German Neumayer station; approximately 350 tons of waste were removed at the end of the 1992/93 season from the US McMurdo station).

Regarding waste disposal by incineration, Rec. XV-3 established that all open burning of waste shall be phased out. Annex III to PEPAT has complemented this duty, adding that open burning shall be phased out "as soon as practicable, but by no later than the end of the 1998/1999 season".[143] Meanwhile, some preventive measures have to be adopted before proceeding to the disposal of waste by open burning, as "allowance shall be made for the wind direction and speed and the type of wastes to be burnt to limit particulate deposition" on land and to avoid such deposition over sensitive areas including, in particular, areas given protection under the ATS.

Other ways to deal with waste disposal by incineration are allowed, as it is stipulated that combustible waste, not removed from the AT area, shall be burnt in incinerators which reduce harmful emissions to the maximum extent practicable.[144] Though incineration has been considered as not being an environmentally-safe form of waste disposal[145], some safeguard measures have also been introduced by Annex III to PEPAT. According to it, "any emission standards and equipment guidelines which may be recommended by, inter alia, the Committee (CEP) and the Scientific Committee on Antarctic Research (SCAR) shall be taken into account".

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143 Rec. XV-3, para. 16; Art. 3, para. 2, of Annex III to PEPAT. This deadline has been criticised by environmental organisations, which have asked for the immediate cessation of all open burning in Antarctica (see ASOC, *A Critique of the Protocol to the Antarctic Treaty on Environmental Protection*, Doc. XVI ATCM/INFO 21, 8 October 1991, p. 8). However, the practice of open burning has not disappeared from Antarctica. When talking about the Russian Novolazarevskaja station, the *Report of an Inspection under Art. VII of the Antarctic Treaty by Observers from Sweden*, cit., p. 47 states that: "There is no incinerator at the station, and burning in drums in the open is a frequent occurrence. The ashes are said to be removed from the Antarctic area". In other cases, i.e. the Indian Maitri station, steps have been already adopted in order to end the open burning practices before the arrival of the deadline (*ibidem*, p. 37).

144 Rec. XV-3, para. 15; Art. 3, para. 1, of Annex III to PEPAT.

145 "ASOC is opposed to the use of incinerators in Antarctica and recommends that no new incinerators be built, and existing ones be phased out" (ASOC, *A Critique of the Protocol* cit., p. 8). An incinerator that became operational at US McMurdo station at the beginning of the 1992/93 summer, has been recently closed down due to unexpectedly high levels of dioxin detected in emissions. According to Greenpeace International, *1992/93 Antarctic Expedition Report* cit., p. 130, the United States Antarctic Program does not plan to reopen it.

Without waiting for the entry into force of PEPAT, Rec. XVII-1 of 1992 established that ATCPs "through their SCAR National Committees request SCAR to consider and provide advice on: emission standards that should be established to ensure that the combustion of fossil fuels and incineration of waste do not contaminate the Antarctic atmosphere, terrestrial, ice aquatic or marine environments in a way that would compromise their scientific values".[146] Implementing this Recommendation, and at the request of the SCAR Group of Specialists on Environmental Affairs (GOSEAC), SCALOP completed a survey of all current incinerators in the AT area. The results of this survey were discussed by GOSEAC which, in addition, investigated current emission standards and best operating practices used in Europe and North America for incinerators. Moreover, GOSEAC also considered a set of papers with special reference to *in situ* burning of hydrocarbon spills in the polar regions.[147] Although the XVIIIth ATCM welcomed the SCAR-COMNAP report describing their activities and recommending next steps[148], no measure was adopted on this matter. At the XIXth ATCM, SCAR presented a further report on incineration.[149] On this occasion, the XIXth ATCM agreed that it was important "to seek means of reducing pollution caused by the use of incineration at Antarctic stations. The SCAR proposals for minimising the use of incineration and the reduction of its impact in cases where incineration cannot be avoided highlighted the need for two-stage incineration with close temperature control, adequate filtering for particulate material and monitoring of fuel gases to ensure optimal incinerator performance. The present lack of appropriate ecotoxicological information made it difficult to determine internationally agreed emission limits for specific components". Accordingly, the XIXth ATCM agreed that:

> "(a) wherever practicable waste which is presently incinerated should be removed from Antarctica;
> (b) where it is necessary to continue incineration, Parties should investigate means of minimising the impact of emissions;
> (c) incinerators should only be operated by trained personnel[150]".

146 Para 1 (ii) of Rec. XVII-1 of 1992.
147 Final Report of the XVIIIth ATCM, p. 20, para. 87.1, and p. 131.
148 Doc. XVIII ATCM/WP 21.
149 Doc. XIX ATCM/WP 25.
150 Final Report of the XIXth ATCM, p. 25-26, para. 85-86.

The second procedure that is allowed is waste disposal on land. In fact, the possibilities of using this method are very low. There is an absolute prohibition, with no exception, on the disposal of all kind of waste in ice-free areas or in fresh water systems[151] and it must be remembered that most scientific stations are located in these areas. For the rest of Antarctica, special protection is provided against waste disposal on land, as it is stated that:

> "Sewage, domestic liquid wastes and other liquid wastes not removed from the Antarctic Treaty area in accordance with Article 2, shall, to the maximum extent practicable, not be disposed of onto sea ice, ice shelves or the grounded ice-sheet (...)".[152]

Nevertheless, an exception to this provision is ruled when waste is generated by stations located inland on ice shelves or on the grounded ice-sheet. In these cases, waste may be disposed of in deep ice pits where such disposal is the only practicable option. The location of such pits on known ice-flow lines which terminate at ice-free areas or in areas of high ablation is forbidden.[153] In noting the exceptional character of the provision allowing for the disposal of waste in deep ice pits, a different solution has been established for waste generated at field camps. In this case, waste shall, to the maximum extent practicable, be removed by the generator of such waste to supporting stations or ships for disposal in accordance with Annex III.[154]

The third and last allowed procedure is for the disposal of waste into the sea. Although this waste disposal procedure is not forbidden in Antarctic seas, it must be noted that both Rec. XV-3 and Annex III to PEPAT have reduced the number of substances that the Code of conduct for Antarctic expeditions and station activities recommended for disposal of at sea and that some environmental criteria have also been established. In particular, Art. 5 of Annex III to PEPAT states the following:

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151 Art. 4, para 1, of Annex III to PEPAT. Para. 20 of Rec. XV-3 did not mention fresh water systems; moreover, according to it, domestic liquid wastes shall not be disposed of onto ice free land "to the maximum extent practicable".

152 Art. 4, para. 2, of Annex III to PEPAT. No similar provision was included in Rec. XV-3.

153 Para. 23 of Rec. XV-3 and Art. 4, para. 2, *in fine* of Annex III to PEPAT.

154 Para. 24 of Rec. XV-3 and Art. 4, para. 3, of Annex III to PEPAT.

> "1. Sewage and domestic liquid wastes may be discharged directly into the sea, taking into account the assimilative capacity of the receiving marine environment and provided that:
> (a) such discharge is located, wherever practicable, where conditions exist for initial dilution and rapid dispersal; and
> (b) large quantities of such wastes (generated in a station where the average weekly occupancy over the austral summer is approximately 30 individuals or more) shall be treated at least by maceration.
> 2. The by-product of sewage treatment by the Rotary Biological Contacter process or similar processes may be disposed of into the sea provided that such disposal does not adversely affect the local environment, and provided also that any such disposal at sea shall be in accordance with Annex IV to the Protocol".

Leaving aside the question of the interpretation of this provision[155], waste disposal into the sea creates at least two main problems. The first of it relates to the fact that this waste disposal procedure has been considered to be inadequate for the Antarctic environment.[156] Nevertheless, the cross reference to Annex IV to PEPAT reduces the possibility of using this procedure. Art. 14 of Annex IV establishes that with respect to those Parties which are also Parties to MARPOL 73/78, nothing in this Annex shall derogate from the specific rights and obligations thereunder. On 16 November 1990, an amendment to MARPOL 73/78 was passed in which the AT area was designated as a special area under Annexes I and V of MARPOL 73/78 and severe

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155 As PINESCHI, *La protezione dell'ambiente in Antartide* cit., p. 313-314, has written, this provision must be interpreted taking into account that (i) according to Art. 2, para. 2, of this Annex sewage and domestic liquid wastes shall, "to the maximum extent practicable", be removed from the AT area; and that (ii) ash disposal at sea is implicitly prohibited by Art. 3, para. 1, *in fine*.

156 "Sewage and domestic liquid wastes are yet to be adequately addressed. The Annex continues to promote maceration as a sufficient means to handle sewage and domestic liquids. Maceration, however, does not address the actual content of the effluent, such as heavy metals, bacteria and viruses, chemicals and other contaminants. Heavy metal contamination also suggests that the effluent is not composed of only sewage and domestic wastes. ASOC strongly recommends at least biological treatment for sewage which is compatible to the Antarctic environment, coupled with measures to safeguard the effluent from contamination. We also urge that the sludge from sewage treatment (e. g. the Rotary Biological Contacter process) be retrograded from Antarctica, and not dumped at sea" (cfr. ASOC, *A Critique of the Protocol* cit., p. 8).

environmental measures were adopted.[157] Among them, this amendment establishes that "all wastes are to be removed from the Antarctic area due to the ecological importance of the fragile ecosystems of the area" and that "in respect of the Antarctic area, any discharge into the soil of oil or oily mixture from any ship shall be prohibited".

The second problem relates to other waste disposal procedures into the sea, such as dumping into the Southern Ocean. It must be remembered that Rec. XV-4 of 1989 included "a prohibition within the AT area on all intentional discharges from vessels into the marine environment (...)" and that the London Dumping Convention (LDC) was the first of the six international conventions mentioned in this Recommendation, whose accession was suggested to all ATCPs in order to prevent marine pollution in the Antarctic seas. Moreover, the LDC was expressly mentioned by Rec. XV-3 both when ruling the dumping of waste at sea[158] and when dealing with incineration at sea.[159] Although there was a clear intention by the ATCPs to apply the LDC

157 Res. MEPC.42(30), 16 November 1990. See also Rec. XV-4 of 1989, para. 5.

158 "Solid non-combustible wastes, which cannot be removed to land disposal sites outside of the Antarctic Treaty area and which are to be disposed of at sea, shall only be disposed of at selected dump sites in deep waters, within or outside the Antarctic Treaty area and only in accordance with the International Convention for the Prevention of Marine Pollution by the Dumping of Wastes and other Matter (London Dumping Convention), as well as any other relevant international agreements"; "Dumping of any other wastes at sea shall be carried out in accordance with the London Dumping Convention" (paras. 18 and 19 of Rec. XV-3).

159 "Vessels engaged in supporting Antarctic activities that are not fitted with incinerator facilities shall, to the maximum extent practicable, stockpile waste, excluding untreated sewage and domestic effluents, for appropriate disposal at stations, bases, deep waters sites or outside of the Antarctic Treaty area, provided that such wastes may be disposed of at stations or bases in Antarctica only in accordance with this practices, and at sea only in accordance with relevant Antarctic Treaty recommendations, the London Dumping Convention and any other relevant international agreements. Any incineration of ship-board wastes in the Antarctic Treaty area shall be conducted in incinerators of the type which are designed to reduce harmful emissions to the maximum extent practicable" (para. 21 of Rec. XV-3). It must be noted that the Parties to the LDC prohibited the incineration at sea of noxious liquid waste in February 1991 and, more recently, Resolution LC.50(16), 12 November 1993, has prohibited the incineration at sea of industrial waste.

in Antarctica[160], there is neither provision for dumping in PEPAT, nor mention of the LDC in it. This loophole was discussed at the XVIth ATCM without reaching any final decision.[161] Therefore, nowadays dumping at Antarctic seas is ruled by the Code of Conduct for Antarctic expeditions and station activities which, in fact, allows the dumping of different substances at sea, and by international conventions which are binding only for their Parties.

Another important feature of PEPAT is that, for the first time and with a global perspective, it has incorporated provisions for waste disposal for special sensitive areas of the Antarctic environment. Annex V to PEPAT on Area Protection and Management has changed all the previous system of Antarctic protected areas, by creating two new categories of protected areas: Antarctic Specially Protected Areas (ASPAs)[162] and Antarctic Specially Managed Areas (ASMAs).[163] Provisions for waste disposal shall be included in the management plans of both ASPAs[164] and ASMAs.[165] It is also inte-

160 According to para. 95 of the Final Report of the XVth ATCM, "In looking at future work, there was (...) consideration of the relevance of additional international conventions to questions of marine pollution in Antarctica. In this context, specific mention was made of further restrictions on dumping and incineration at sea in the Antarctic area, pursuant to the London Dumping Convention (...)" (*Handbook*, p. 2.209).

161 See *EPL*, 1991, p. 211.

162 According to Art. 3, para 1, of Annex V to PEPAT: "Any area, including any marine area, may be designated as an Antarctic Specially Protected Area to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research". In fact, future ASPAs shall include current SPAs, SSSIs, SRAs, ASTIs and Historic Sites and Monuments.

163 Art. 4, para 1, of Annex V to PEPAT states the following: "Any area, including any marine area, where activities are being conducted or may in the future be conducted, may be designated as an Antarctic Specially Managed Area to assist in the planning and co-ordination of activities, avoid possible conflicts, improve co-operation between Parties or minimise environmental impacts". Future ASMAs shall embrace all MPAs that may be designated.

164 The proposed management plan for designating an area as an ASPA, shall include provisions regarding: "(iii) the installation, modification or removal of structures; (...) (v) restrictions on materials and organisms which may be brought into the area; (...) (vii) the collection or removal of anything not brought into the area by the permit-holder; (viii) the disposal of waste" (Art. 5, para. 3, (i) of Annex V to PEPAT).

resting to note that, pending the entry into force of PEPAT but after its adoption, ATCPs have continued the trend, though not legally required, of incorporating provisions for waste disposal in the management plans of every new SPAs and SSSIs[166] or in all the revised management plans of previous SPAs and SSSIs. In doing so, ATCPs are aware that they are implementing Annex V to PEPAT.[167]

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165 The proposed management plan for designating an area as an ASMA, shall include provisions regarding: "(iii) the installation, modification or removal of structures; (...) (vi) the collection or removal of anything not brought into the area by the visitor; (vii) the disposal of waste". Art. 5, para. 3, (j) of Annex V to PEPAT.

166 See Rec.s XVI-2, XVI-5, XVI-6, XVI-8 and XVI-9 of 1991, and Rec. XVII-2 of 1992. Among the prohibitions contained in the respective management plans, it is mentioned to "incinerate, bury or otherwise dispose of any non-human waste within the Area; all such waste must be removed from the Area". In the management plans of SPAs No. 1, 2, 3, 18 and 22 this prohibition is reinforced, as it is stated that: "No wastes, including human wastes, are to be left in the Area". At the XIXth ATCM, Measure 1 (1995) was adopted, revising Descriptions and Managements Plans for SPAs No. 13 and 15. In both cases, point 7 (v) of the two management plans contains different restrictions on materials and organisms which may be brought into the areas; and, in both cases, point 7 (viii), entitled "Disposal of waste", states that: "All non-human wastes shall be removed from the Area. Human waste may be deposited in the sea" (Final Report of the XIXth ATCM, p. 47-55). Measure 5 (1995) approved the Management Plan for SPA No. 24 and its point 7 (viii) simply says that: "All non-human wastes shall be removed from the area" (*ibidem*, p. 80). Measure 2 (1995) revised the Description and Management Plan for SSSI No. 11. It follows the same format that the other two Measures, but point 7 (viii) states that: "All wastes, including all human wastes, must be removed from the Area. Excretion of human wastes is prohibited within the Area" (*ibidem*, p. 64-65).

167 For instance, the 3rd preamble paragraph of Rec. XVII-2 of 1992, states the following: "The Representatives, Noting also that the format of these revised Area Descriptions and proposed Management Plans accord with Article 5 of Annex V of the Protocol on Environmental Protection to the Antarctic Treaty". The XIXth ATCM adopted Resolution 6 (1995), entitled "Uniform Model for Managements Plans". In this Resolution, ATCP recommended that: "The structure of the Management Plan for SPA No. 13, adopted under Measure 1 (1995), be regarded as a model for the preparation of all new and revised Management Plans for protected areas for the purposes of Annex V (to PEPAT)" (Final Report of the XIXth ATCM, p. 90).

3 TRANSBOUNDARY MOVEMENTS OF HAZARDOUS WASTE AND ANTARCTICA

Without entering in a detailed analysis of the problems posed in international law by transboundary movements of hazardous waste[168] and taking into account the broad definition of transboundary movement given by the Basel Convention[169], it is possible to identify, at least theoretically, three different hypotheses of transboundary movements of hazardous waste involving the Antarctic continent.

The first one implies the possibility of exporting hazardous waste or other waste from one Antarctic sector to another. Although at least for States who claim sovereignty over parts of Antarctica this would be a transboundary movement case, it rather seems that the non-solution agreement of Art. IV of the AT and Art. 4 of PEPAT, and the global approach established by PEPAT in its Art. 2, make the Basel Convention not applicable to this hypothesis. Its very premise, that is to say the existence of a transboundary movement, disappears in this case as a consequence of the more specific regulations embodied in the AT system.

The second hypothesis involves the possibility of exporting wastes generated outside the AT area for their disposal in Antarctica. But this hypothetical transboundary movement of waste seems to have no legal chance in international law, as neither Art. 4, para 6, of the Basel Convention

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168 On this problem, see, among others, BACCAR, *Conventions mondiales sur le contrôle des mouvements transfrontières des déchets toxiques et relations Nord-Sud*, in *La protection juridique de l'environnement*, 1989, p. 253-259; VALLETTE and SPALDING, *The International Trade in Wastes: A Greenpeace Inventory*, 1990, 5th ed.; SEBEK, *International Legal Regulation of Trade in Toxic Waste, its Transport and Disposal*, in POSTIGLIONE (ed.), *Per un Tribunale internazionale dell'ambiente*, 1990; KWIATKOWSKA and SOONS, *Transboundary Movements of Hazardous Wastes and their Disposal: Emerging Global and Regional Regulation*, *HYIL*, 1992; MURPHY, *Prospective Liability Regimes for the Transboundary Movement of Hazardous Wastes*, *AJIL*, 1994; RUMMEL-BULSKA, *The Basel Convention: A Global Approach for the Management of Hazardous Wastes*, *EPL*, 1994.

169 "Transboundary movement means any movement of hazardous wastes or other wastes from an area under the national jurisdiction of one State to or through an area under the national jurisdiction of another State or to or through an area not under the national jurisdiction of any State, provided at least two States are involved in the movement" (Art. 2, para. 2, of the Basel Convention).

nor Art. 4, para. 2 (1), of the Bamako Convention allow it. In fact, with a very similar language, both texts read as follows:

> "The Parties agree not to allow the export of hazardous wastes or other wastes for disposal within the area south of 60° South latitude, whether or not such wastes are subject to transboundary movement".

The last assertion of these provisions means that the prohibition on exporting waste towards the AT area is of an absolute nature and so, it is also applicable to claimant States which try to export waste towards their claimed Antarctic sectors. In fact, this interpretation has already been followed by some claimant States, who have forbidden this possibility.[170]

However, these provisions leave at least two problems unsolved. Firstly, neither the Basel Convention nor the Bamako Convention apply to all kind of waste. In particular, radioactive waste and waste which is derived from the normal operations of a ship, are not included in the scope of these conventions.[171] Regarding radioactive waste, it must be highlighted that the obligations contained in Art. V of the AT and in Art. III of CCAMLR are of an absolute nature, that is to say, the disposal of radioactive waste material in Antarctica and the Southern Ocean is expressly forbidden and this prohibition is valid both for radioactive waste originated inside the AT area and for those ones coming from outside. Moreover, the intention to extend this prohibition to third States has been already expressed by ATCPs in Rec. VIII-12 of 1975[172], by unilateral declarations[173] and by bilateral agree-

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170 For instance, Art. VIII of the Protocol on Antarctic environmental protection concluded between Chile and Argentina (Buenos Aires, 2 August 1991) cit., establishes that: "In order to ensure that no waste be introduced and no disposal be made in the Antarctic Treaty area, the Parties shall co-ordinate their actions to control the movements of radioactive, toxic and hazardous waste originating outside the said area".

171 Art. 1, paras. 3 and 4, of the Basel Convention. While according to Art. 2, para 2, of the Bamako Convention radioactive waste is included in the scope of this Convention, Art. 2, para. 3, excludes from it the waste which is derived from the normal operations of a ship.

172 "The Representatives (...) Bearing in mind the undertaking of Contracting Parties in Article X of the AT to exert appropriate efforts, consistent with the Charter of the United Nations, to the end that no one engages in any activity in Antarctica contrary to the principles or purposes of the Treaty (...) Recommend to their Governments that they continue to exert appropriate efforts to the end

ments.[174] At least for the dumping of nuclear waste into the Southern Ocean, the evolution of the LDC reinforces this prohibition.

During 1995, this last trend seems to have been strengthened. At the XIXth ATCM (Seoul, 8-19 May 1995) the Netherlands tabled a working paper concerning waste disposal.[175] This Paper raised the issue of the relationship of Art. V of the AT to current negotiations on a nuclear waste convention by the International Atomic Energy Agency (IAEA). This raised concerns that the prohibition on disposal of nuclear waste in Antarctica contained in Art. V, para. 1, of the AT might be affected if negotiations on a nuclear waste convention were to lead to a convention to which all ATCP become parties. Following Art. V, para. 2, of the AT, the rules established under such a convention would apply in Antarctica.[176] Accordingly, in Resolution 1 (1995), the Representatives of the ATCPs:

> "*Noting* that in September 1994 the International Atomic Energy Agency's General Conference adopted a resolution inviting the Board of Governors and the Director General to commence preparations for a convention on the safety of radioactive waste management;
> *Urge* their Governments to:
> co-ordinate their positions in any negotiations relating to the disposal of nuclear waste in which they participate, with the objective of the inclusion of provisions

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that no one disposes of nuclear waste in the AT area" (*Handbook*, p. 2.212).

173 At the VIIIth ATCM, the Representative of Australia, *Mr. K.G. Brennan,* made a statement reiterating his Government's opposition to the disposal of nuclear waste in the AT area. His exact words were: "Australia is concerned that the Antarctic environment and the surrounding oceans and atmosphere should not become contaminated by radioactive waste. We are firmly of the view that safe disposal of radioactive waste in the ice sheet cannot be guarantied on the basis of existing knowledge (...). In the light of its concern expressed above, and the conclusions reached by the group of scientific experts already referred to, Australia would firmly oppose any move to permit the disposal or storage of radioactive waste in the Antarctic ice sheet". Other Representatives associated themselves with this statement (*Handbook*, p. 2.212).

174 See the text of Art. VIII of the Protocol on Antarctic environmental protection concluded between Chile and Argentina (Buenos Aires, 2 August 1991), quoted above.

175 Doc. XIX ATCM/WP 11, rev. 1.

176 Final Report of the XIXth ATCM, p. 14, para. 53 and p. 32, para. 114.

prohibiting the transfer of nuclear waste to and the disposal of nuclear waste in the Antarctic Treaty Area".[177]

Consequently, it is very possible that, in a near future, there might be a multilateral treaty prohibiting any transboundary movement of nuclear waste towards the AT Area.

Regarding waste which is derived from the normal operations of a ship, the prohibitions on discharges of oily residues and mixtures, plastics, garbage and sewage from vessels into the Antarctic marine environment introduced by Rec. XV-4 of 1989 and Annex IV to PEPAT have been complemented by the 1990 amendment of MARPOL 73/78. According to this amendment, the designation of Antarctica as a special area implies both that in the AT area there will be no discharge into the soil of oil or oily mixture from any ship and that there will be no establishment of waste reception facilities for vessels, as it is wished "to avoid transferring the problem of waste disposal from vessels to Antarctic stations and facilities". Moreover, it is also worth noting that the XIXth ATCM discussed a letter sent by the International Maritime Organisation (IMO)[178], concerning a proposal to broaden the MARPOL Antarctic Special Area from the area south of 60° South latitude to the area south of the Antarctic Convergence. Although the XIXth ATCM agreed that the matter should be decided by the IMO itself, it also agreed that a response should be sent to the IMO suggesting that IMO may wish to take up the matter with the CCAMLR Commission.[179]

The second problem relates to the complex relationships between the LDC and the Basel Convention, as both Conventions apply to waste disposal by dumping at sea. In particular, the possibility of considering the LDC as an agreement falling under Art. 11, para. 2, of the Basel Convention, which makes the Basel Convention inapplicable, has been a troublesome problem at least in the discussions of the LDC meetings since 1986.[180] If this were the case, States parties in both Conventions could use the LDC for not

177 *Ibidem*, p. 85.

178 Doc. XIX ATCM/INFO 83.

179 Final Report of the XIXth ATCM, p. 14, para. 54.

180 On these questions, see JUSTE, *La regulación internacional de los movimientos transfronterizos de desechos y otras materias peligrosas*, AHLADI, 1995, p. 57.

complying with the Basel Convention.[181] At the same time, it must be remembered that in 1990 the representative from the United Nations Environmental Program posed the following question to the XIIIth Consultative Meeting of the Contracting Parties to the LDC:

> "As UNEP understands resolution XV-3 of the report of the fifteenth consultative meeting of the Antarctic Treaty, the parties to the Antarctic Treaty are implementing the provisions of the London Dumping Convention concerning dumping at sea whether they are parties to it or not. That leads UNEP to understand that the application of the London Dumping Convention among the Antarctic Treaty parties is within the exclusive competence of the Antarctic Treaty and does not fall within the competence of the London Dumping Convention. The question addressed to this Meeting is whether or not this understanding is correct".[182]

After discussion of this question by the ad hoc Group of Legal Experts on Dumping, the XIVth Consultative Meeting of the Contracting Parties to the LDC endorsed its conclusions as follows:

> "1. The application of the requirements of the London Dumping Convention among the Antarctic Treaty Parties is not within the exclusive competence of the Antarctic Treaty;
> 2. Increased efforts should be made to promote membership in the London Dumping Convention among Antarctic Treaty Parties that are not yet Contracting Parties to the Convention;
> 3. The fact that no mention of the London Dumping Convention is made in the recently established Protocol on Environmental Protection to the Antarctic Treaty and the Annexes thereto (XI ATSCM/2 of 21 June 1991) was not viewed as a problem in light of the obligations of Antarctic Treaty Parties that are also Contracting Parties to the London Dumping Convention and the intention of Antarctic Treaty Parties to develop rules for the prevention of pollution from dumping at sea which would have to be based on international law;

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181 In particular, as regards the duties to inform or to ask for the previous consent of the State of transit and the State of export and the prohibition to export wastes to third States for their dumping at sea.

182 Report of the Thirteenth Consultative Meeting of Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 29 October – 2 November 1990, p. 42, point 8.3.

4. The development of rules for the protection of the Antarctic Treaty area from dumping of wastes at sea should be welcomed and supported by the Contracting Parties to the London Dumping Convention;
5. In light of the requirements of Article VIII of the London Dumping Convention, Contracting Parties should endeavour to act consistently with the objectives and provisions of such regional rules to be developed within the Antarctic Treaty framework; and
6. Questions concerning dumping at sea in the area south of 60° South latitude should be brought to the attention of the Consultative Meeting of Contracting Parties to the London Dumping Convention; it is beyond the competence or scope of the ad hoc Legal Group or the Contracting Parties to the London Dumping Convention to decide whether questions concerning dumping at sea in the area south of 60° South latitude should be addressed to the Antarctic Treaty Consultative Meeting".[183]

However, on the other hand, there is the ATCP's attitude concerning the application of other environmental treaties inside the AT Area. At the XVIIIth ATCM, Chile submitted a Working Paper on the relationship between PEPAT and other international agreements of a global scope.[184] This Working Paper identified several international agreements that applied or were relevant to the AT Area and to PEPAT, and among them both the LDC and the Basel Convention were included.[185] But the XVIIIth ATCM did not adopt any concrete measure on this matter. In fact, the only thing that the XVIIIth ATCM did was to underline that:

183 Report of the Fourteenth Consultative Meeting of Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 25-29 November 1991, p. 14-15, point 5.5.

184 Doc. XVIII ATCM/WP 31.

185 These international agreements were the following: the 1989 Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (the Basel Convention), the 1992 Convention on Biodiversity, the 1992 United Nations Framework Convention on Climate Change, the 1985 Vienna Convention for the Protection of the Ozone Layer and its 1987 Protocol on Substances that Deplete the Ozone Layer (the Montreal Protocol), the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters, and the International Convention for the Prevention of Pollution from Ships and its Protocol of 1978 (MARPOL 73/78). Attention was also drawn to the 1982 United Nations Law of the Sea Convention. See Final Report of the XVIIIth ATCM, p. 13, para. 52.

> "The Meeting agreed it was important to ensure proper co-ordination between global environmental agreements and the operation of the AT system and, in particular, of the PEPAT. The Meeting agreed that the requirements for co-ordination were specific to each of the agreements and that the primary responsibility for ensuring such co-ordination lay with the Parties to the AT that were Parties to the other agreements".[186]

The third and final theoretical hypothesis of transboundary movements involves the removal from the AT area of waste generated in Antarctica. It is difficult to consider that this hypothesis falls under the scope of the Basel Convention, as its Art. 2, para. 2, requires that this transboundary movement must be originated in "an area under the national jurisdiction of one State", which inevitably opens a "Pandora's box" of territorial claims in the Antarctic continent and its adjacent seas. Anyway, we have already seen that waste removal from Antarctica is one of the main purposes of Annex III to PEPAT, as settled down by its Art. 1, paras. 4 and 5, and that its Art. 2 establishes a catalogue of waste to be removed from Antarctica. Indeed, this objective seems to have already obtained the general consensus of the international community and so, during the last years, both inter-

186 *Ibidem*, p. 14, para. 55. But these agreements entailed no substantive solution on this matter. In fact, Chile submitted to the XIXth ATCM an expanded version of a Working Paper (Doc. XIX ATCM/WP/20) on the relationship between PEPAT and other international agreements. This paper identified an additional number of relevant agreements and examined their scope in the AT context. The XIXth ATCM limited itself "to note the importance of examining the potential overlap between PEPAT and other international treaties and thanked Chile for submitting such a detailed report". The XIXth ATCM also asked Chile to present a revised version of the paper at the following ATCM, taking into consideration the discussion of the paper (Final Report of the XIXth ATCM, p. 14, paras. 51-52).

national conventions[187] and regional regulations[188] have tried to facilitate the removal of waste from the AT area.

4 SOME CONCLUSIVE REMARKS

As we have already seen, since 1959 ATCPs have constantly developed a complex set of norms dealing with waste disposal and waste management in Antarctica and the Southern Ocean. In this sustainable development effort, it is possible to distinguish at least two different approaches to the problem of Antarctic waste. Till the late 1980's, ATCPs have followed a fragmentary approach when dealing with waste. This means that they ruled different norms for waste disposal in Antarctica and the Southern Ocean depending on the nature of waste (i.e. radioactive waste materials) or on the human activity that generated such waste (scientific activities, tourist and other non-governmental expeditions and also for future mining activities).

Nevertheless, between 1988 and 1989 the shortcomings of this approach were evident, as those norms did not rule the most important factors to take into account for waste disposal in Antarctica. Indeed, there was no provision at all for waste management in this polar area. After the XVth ATCM and the adoption of PEPAT, ATCPs changed their attitude and they have moved

187 For instance, the 1990 amendment to MARPOL 73/78 after establishing that "all wastes are to be removed from the Antarctic area", states the following: "(a) The Government of each Party to the Convention whose ports are used by ships departing en route to or arriving from the Antarctic area undertakes to ensure that as soon as practicable adequate facilities are provided for the reception of all sludge, dirty ballast, tank washing water, and other oily residues and mixtures from all ships, without causing undue delay, and according to the needs of the ships using them; (b) The Government of each Party to the Convention shall ensure that all ships entitled to fly its flag, before entering the Antarctic area are fitted with a tank or tanks of sufficient capacity on board for the retention of all sludge, dirty ballast, tank washing water, and other oily residues and mixtures while operating in the area and have concluded arrangements to discharge such oily residues at a reception facility after leaving the area".

188 For example, Art. 1, para. 2 (e) of the Regulation of the European Economic Community Council No. 259/93, 1 February 1993 (*OJEC*, No. L 30, 6 February 1993) expressly allows the entering into the European Community of waste removed from Antarctica according to PEPAT.

towards a global approach on the different problems posed by waste disposal and waste management in the AT area.

Although some of the substantive provisions of Annex III to PEPAT might be criticised from an environmental point of view, such as those regarding the deadline for burning in open air or incineration at sea, it must be highlighted that the Antarctic system contains the most rigid international norms in the world on waste disposal and waste management. This foresight of the ATCPs seems to have reached the approbation of the international community, as other international conventions are reinforcing the duty to remove all kind of wastes from the AT area. In fact, the provisions contained in Annex III to PEPAT are of a highly technical character and it is easy that they generate the international consensus on them.