

**UNITED  
NATIONS**

**S**



**Security Council**

Distr.  
GENERAL

S/AC.26/2004/16  
9 December 2004

Original: ENGLISH

---

UNITED NATIONS  
COMPENSATION COMMISSION  
GOVERNING COUNCIL

REPORT AND RECOMMENDATIONS MADE BY THE PANEL OF COMMISSIONERS  
CONCERNING PART ONE OF THE FOURTH INSTALMENT OF "F4" CLAIMS

## CONTENTS

	<u>Paragraphs</u>	<u>Page</u>
Introduction .....	1 - 8	6
I. OVERVIEW OF PART ONE OF THE FOURTH “F4” INSTALMENT .....	9	7
II. PROCEDURAL HISTORY .....	10 - 21	8
A. Article 16 reports.....	10	8
B. Article 34 notifications .....	11	8
C. Classification of claims and transmittal of claim files .....	12 - 15	8
D. Monitoring and assessment data .....	16 - 18	9
E. Oral proceedings.....	19 - 21	9
III. LEGAL FRAMEWORK.....	22 - 52	9
A. Mandate of the Panel.....	22 - 23	9
B. Applicable law.....	24 - 25	10
C. Compensable losses or expenses .....	26 - 29	10
D. Evidentiary requirements .....	30 - 32	11
E. Legal issues.....	33 - 52	12
1. Amendment of claims.....	34 - 36	12
2. Damage outside Kuwait or Iraq.....	37	12
3. Parallel or concurrent causes of environmental damage.....	38 - 40	12
4. Duty of the claimant to prevent and mitigate environmental damage	41 - 44	13
5. Environmental damage resulting from the presence of refugees .....	45 - 48	14
6. Remediation objectives.....	49 - 50	15
7. Compensation for loss or depletion of natural resources .....	51	16
8. Applicability of Governing Council decision 19 .....	52	16
IV. REVIEW OF PART ONE OF THE FOURTH “F4” INSTALMENT CLAIMS..	53 - 62	16
V. CLAIM OF THE ISLAMIC REPUBLIC OF IRAN.....	63 - 102	18
A. Overview .....	63 - 66	18
B. Claim No. 5000456 – Remediation of damage to terrestrial, groundwater and marine resources.....	67 - 102	19
1. Remediation of damage to terrestrial resources resulting from the presence of refugees.....	67 - 81	19

2. Remediation of damage to terrestrial resources resulting from contamination from the oil well fires.....	82 - 88	21
3. Remediation of damage to groundwater resources.....	89 - 94	22
4. Remediation of damage to marine resources.....	95 - 100	22
5. Recommended award.....	101 - 102	24
VI. CLAIM OF THE HASHEMITE KINGDOM OF JORDAN.....	103 - 155	24
A. Overview.....	103 - 109	24
B. Claim No. 5000458 – Remediation of damage to water, agricultural, wetland and marine resources.....	110 - 155	26
1. Remediation of damage to water resources.....	110 - 128	26
2. Remediation of damage to agricultural resources.....	129 - 138	28
3. Remediation of damage to wetland resources.....	139 - 147	30
4. Remediation of damage to marine resources.....	148 - 154	31
5. Recommended award.....	155	32
VII. CLAIMS OF THE STATE OF KUWAIT.....	156 - 241	32
A. Overview.....	156 - 157	32
B. Claim No. 5000259 – Remediation of damage to marine and coastal resources.....	158 - 191	33
Recommended award.....	190 - 191	37
C. Claim No. 5000466 – Remediation of damage to terrestrial resources.....	192 - 240	37
1. Introduction.....	192 - 196	37
2. Remediation of damage at the Umm Al Gawati ordnance repository site.....	197 - 208	38
3. Remediation of damage at the Umm Ar Russ ordnance repository site.....	209 - 218	39
4. Remediation of damage at open burning/open detonation sites.....	219 - 234	40
5. Revegetation of contaminated and affected areas within the Umm Al Gawati ordnance repository site and the OB/OD sites.....	235 - 238	42
6. Recommended award.....	239 - 240	43
D. Recommended awards for the claims of Kuwait in part one of the fourth “F4” instalment.....	241	43
VIII. CLAIMS OF THE KINGDOM OF SAUDI ARABIA.....	242 - 321	44
A. Overview.....	242	44

B. Claim No. 5000455 – Remediation of damage to terrestrial resources .....	243 - 300	44
1. Remediation of damage resulting from military encampments, fortifications and roads .....	247 - 291	44
2. Remediation of damage resulting from soot deposition .....	292 - 298	53
3. Recommended award.....	299 - 300	54
C. Claim No. 5000465 – Remediation of damage to marine resources .....	301 - 320	55
Recommended award.....	319 - 320	57
D. Recommended awards for the claims of Saudi Arabia .....	321	58
IX. CLAIM OF THE SYRIAN ARAB REPUBLIC.....	322 - 349	58
A. Overview .....	322 - 326	58
B. Claim No. 5000457 – Remediation of damage to groundwater, surface water and forest resources.....	327 - 349	59
1. Remediation of damage to groundwater resources.....	327 - 336	59
2. Remediation of damage to surface water resources.....	337 - 341	60
3. Remediation of damage to forest resources .....	342 - 348	61
4. Recommended award.....	349	62
X. CLAIM OF THE REPUBLIC OF TURKEY .....	350 - 356	62
Claim No. 5000153 – Remediation of damage to forest resources.....	351 - 355	62
Recommended award.....	356	63
XI. RELATED ISSUES .....	357 - 359	63
A. Currency exchange rate.....	357	63
B. Interest .....	358 - 359	63
XII. SUMMARY OF RECOMMENDATIONS .....	360	65
Notes.....		66

TECHNICAL ANNEXES TO THE REPORT ON PART ONE OF THE FOURTH “F4”  
INSTALMENT

Introduction .....	69
I. Modifications to remediation programme – claim No. 5000456 – Iran – Damage to rangeland areas (paragraphs 71 to 78) .....	71

II. Modifications to remediation programme – claim No. 5000259 – Kuwait – Damage to marine and coastal resources (Paragraphs 158 to 191) .....	73
III. Modifications to remediation programme – claim No. 5000466 – Kuwait – Damage to terrestrial resources (open burning/open detonation sites) (paragraphs 192 to 238).....	74
IV. Modifications to remediation programme – claim No. 5000455 – Saudi Arabia – Damage to terrestrial resources (paragraphs 243 to 291) .....	76
V. Modifications to remediation programme – claim No. 5000465 – Saudi Arabia – Damage to marine resources (paragraphs 301 to 318) .....	78
Glossary.....	79

List of tables

1. Summary of the claims in part one of the fourth “F4” instalment .....	7
2. Recommended award for claim No. 5000456.....	24
3. Recommended award for claim No. 5000458.....	32
4. Recommended award for claim No. 5000259.....	37
5. Recommended award for claim No. 5000466.....	43
6. Summary of recommended awards for the claims of Kuwait .....	43
7. Recommended award for claim No. 5000455.....	54
8. Recommended award for claim No. 5000465.....	57
9. Summary of recommended awards for the claims of Saudi Arabia .....	58
10. Recommended award for claim No. 5000457.....	62
11. Recommended award for claim No. 5000153.....	63
12. Summary of recommended awards in part one of the fourth “F4” instalment .....	65

### Introduction

1. The Governing Council of the United Nations Compensation Commission (the “Commission”), at its thirtieth session held from 14 to 16 December 1998, appointed the “F4” Panel of Commissioners (the “Panel”), composed of Messrs. Thomas A. Mensah (Chairman), José R. Allen and Peter H. Sand to review claims for direct environmental damage and depletion of natural resources resulting from Iraq’s invasion and occupation of Kuwait.
2. The fourth instalment of “F4” claims (the “fourth ‘F4’ instalment”) consists of nine claims: three by the Government of the State of Kuwait (“Kuwait”); two by the Government of the Kingdom of Saudi Arabia (“Saudi Arabia”); one by the Government of the Islamic Republic of Iran (“Iran”); one by the Government of the Hashemite Kingdom of Jordan (“Jordan”); one by the Government of the Syrian Arab Republic (“Syria”); and one by the Government of the Republic of Turkey (“Turkey”) (collectively the “Claimants”).
3. This is part one of the report of the Panel concerning the fourth “F4” instalment. It contains the recommendations of the Panel on eight of the nine claims in the fourth “F4” instalment, and is submitted to the Governing Council pursuant to article 38(e) of the Provisional Rules for Claims Procedure (the “Rules”) (S/AC.26/1992/10).
4. The remaining claim in the fourth “F4” instalment is claim No. 5000454 of Kuwait for which the award recommended by the Panel exceeds 1 billion United States dollars (USD). The Panel has prepared a separate report on claim No. 5000454 so as to comply with the provisions of Governing Council decision 114 (S/AC.26/Dec.114 (2000)). The Panel’s recommendations on that claim are presented in the “Report and recommendations made by the Panel of Commissioners concerning part two of the fourth instalment of ‘F4’ claims” (S/AC.26/2004/R.40).
5. The fourth “F4” instalment claims were submitted to the Panel in accordance with article 32 of the Rules on 28 March 2003.
6. Some portions of the claims in the third instalment of “F4” claims (the “third ‘F4’ instalment”) were transferred to the fourth “F4” instalment. By Procedural Order No. 5 of the third “F4” instalment, dated 28 March 2003, the Panel deferred to the fourth “F4” instalment the portion of claim No. 5000451 of Saudi Arabia relating to remediation of damage caused by sunken oil. This portion of claim No. 5000451 is reviewed in this report as claim No. 5000465. By Procedural Order No. 6 of the third “F4” instalment, dated 9 July 2003, the Panel deferred to the fourth “F4” instalment the portion of claim No. 5000450 of Kuwait relating to the remediation and revegetation of areas affected by disposal of mines and other remnants of war. This portion of claim No. 5000450 is reviewed in this report as part of claim No. 5000466.
7. Some portions of claims in the fourth “F4” instalment have been transferred to the fifth instalment of “F4” claims (the “fifth ‘F4’ instalment”). By Procedural Order No. 6 of the fourth “F4” instalment, dated 30 April 2004, the Panel deferred the portion of claim No. 5000259 of Kuwait relating to remediation of coastal mudflats to the fifth “F4” instalment. By Procedural Order No. 7, dated

30 April 2004, the Panel deferred a portion of claim No. 5000458 of Jordan relating to the remediation of rangelands to the fifth “F4” instalment. By Procedural Order No. 8, dated 30 April 2004, the Panel deferred a portion of claim No. 5000457 of Syria relating to loss of agricultural resources to the fifth “F4” instalment.

8. The claims reviewed in this report are summarized in table 1. The “amount claimed” column shows the compensation sought by the Claimants (with amendments, where applicable) expressed in USD and corrected, where necessary, for computational errors. The total compensation sought in the claims reviewed in this report is USD 16,305,459,098.<sup>1</sup>

Table 1. Summary of the claims in part one of the fourth “F4” instalment

<u>Country</u>	<u>Claim No.</u>	<u>Amount claimed (USD)</u>
Iran	5000456	2,484,623,669
Jordan	5000458	136,761,897
Kuwait	5000259	33,901,560
	5000466	695,119,160
Saudi Arabia	5000455	9,470,667,058
	5000465	1,844,497,435
Syria	5000457	1,634,619,154
Turkey	5000153	5,269,165
<u>Total</u>		16,305,459,098

#### I. OVERVIEW OF PART ONE OF THE FOURTH “F4” INSTALMENT

9. The claims in the fourth “F4” instalment are for expenses resulting from measures already taken or to be undertaken to clean and restore environment alleged to have been damaged as a direct result of Iraq’s invasion and occupation of Kuwait. The Claimants seek compensation for expenses resulting from measures already taken or to be undertaken by them to remediate damage caused inter alia by:

- (a) Oil released from damaged oil wells in Kuwait;
- (b) Pollutants released from the oil well fires and fire-fighting activities in Kuwait;
- (c) Oil released from pipelines onto the land;
- (d) Oil-filled trenches;
- (e) Oil spills into the Persian Gulf from pipelines, offshore terminals and tankers;
- (f) Movement and presence of refugees who departed from Iraq and Kuwait;
- (g) Mines and other remnants of war;

- (h) Movement of military vehicles and personnel; and
- (i) Construction of military fortifications, encampments and roads.

## II. PROCEDURAL HISTORY

### A. Article 16 reports

10. Significant factual and legal issues raised by the claims in the fourth “F4” instalment were included in the Executive Secretary’s thirty-sixth report, dated 10 July 2001, thirty-seventh report, dated 18 October 2001, and fortieth report, dated 25 July 2002, issued pursuant to article 16 of the Rules. These reports were circulated to the members of the Governing Council, to Governments that have filed claims with the Commission and to the Government of the Republic of Iraq (“Iraq”). In accordance with article 16(3) of the Rules, a number of Governments, including Iraq, submitted information and views in response to these reports.

### B. Article 34 notifications

11. Pursuant to article 34 of the Rules, notifications were sent to Iran, Jordan, Kuwait, Saudi Arabia, Syria and Turkey requesting additional information and documentation to assist the Panel in its review of the claims in the fourth “F4” instalment.

### C. Classification of claims and transmittal of claim files

12. On 12 September 2002, the Panel issued Procedural Order No. 1 of the fourth “F4” instalment classifying the claims in the fourth “F4” instalment as “unusually large or complex”, within the meaning of article 38(d) of the Rules. Procedural Order No. 1 directed the secretariat to send to Iraq copies of the claim files, comprising the claim form, the statement of claim and related exhibits, for each of the claims in the fourth “F4” instalment. The secretariat transmitted copies of the claim files to Iraq. The secretariat also transmitted copies of Procedural Order No. 1 to Iraq and the Claimants.

13. The claim files for the claims referred to in paragraph 6 were sent to Iraq pursuant to Procedural Order No. 1 of the third “F4” instalment, dated 30 July 2001.

14. The Commission received written comments from Iraq on the claims on 9 February, 29 March and 17 May 2004.

15. The Panel determined that it would not be able to complete its review of the fourth “F4” instalment claims within the 12-month period specified in article 38(d) of the Rules, and pursuant to Governing Council decision 35(c) (S/AC.26/Dec.35 (1995)) advised the Executive Secretary of the Commission accordingly. The Executive Secretary advised the Governing Council of the Panel’s determination.

#### D. Monitoring and assessment data

16. On 13 September 2002, the Panel decided that monitoring and assessment data received from the Claimants should be made available to Iraq. This decision was intended to further one of the objectives of Governing Council decision 124 (S/AC.26/Dec. 124 (2001)), namely “assisting the ‘F4’ Panel of Commissioners in the conduct of its tasks, through ensuring the full development of the facts and relevant technical issues, and in obtaining the full range of views including those of Iraq” (annex I, paragraph 2).

17. On 27 January 2003, the Panel issued Procedural Order No. 2 of the fourth “F4” instalment by which it requested the Claimants to identify previously submitted monitoring and assessment data and to provide any other monitoring and assessment data that they considered to be relevant to their claims in the fourth “F4” instalment.

18. In accordance with the decision to transmit monitoring and assessment data to Iraq, the data referred to in paragraph 17 were transmitted to Iraq.<sup>2</sup>

#### E. Oral proceedings

19. On 27 February 2004, the Panel issued Procedural Order No. 3 of the fourth “F4” instalment by which it informed the Claimants and Iraq that oral proceedings on the fourth “F4” instalment would be held on 27 and 28 April 2004. The procedural order stated, *inter alia*, that within the time allotted to them during the oral proceedings, the Claimants and Iraq could raise any legal, factual and scientific issues related to the claims in the fourth “F4” instalment on which they wished to elaborate further. Procedural Order No. 3 requested the Claimants and Iraq to submit to the Commission the issues which they intended to address during the oral proceedings. The Panel reviewed the issues submitted and a list of the issues approved by the Panel was communicated to Iraq and the Claimants.

20. By Procedural Order No. 4 of the fourth “F4” instalment dated 27 February 2004, the Panel requested Iraq and Saudi Arabia to address the following additional issue during the oral proceedings: “Does Governing Council decision 19 [(S/AC.26/Dec.19 (1994))] bar recovery for all or part of Saudi Arabia’s claim No. 5000455?”

21. Oral proceedings were held at the Palais des Nations in Geneva on 27 and 28 April 2004. Representatives and experts of Iraq and the Claimants attended the oral proceedings and presented their views.

### III. LEGAL FRAMEWORK

#### A. Mandate of the Panel

22. The mandate of the Panel is to review the “F4” claims and, where appropriate, recommend compensation.

23. In discharging its mandate, the Panel has borne in mind the observations of the Secretary-General of the United Nations, in his report to the Security Council of 2 May 1991, that:

“The Commission is not a court or an arbitral tribunal before which the parties appear; it is a political organ that performs an essentially fact-finding function of examining claims, verifying their validity, evaluating losses, assessing payments and resolving disputed claims. It is only in this last respect that a quasi-judicial function may be involved. Given the nature of the Commission, it is all the more important that some element of due process be built into the procedure. It will be the function of the commissioners to provide this element.”<sup>3</sup>

#### B. Applicable law

24. Article 31 of the Rules sets out the applicable law for the review of claims, as follows:

“In considering the claims, Commissioners will apply Security Council resolution 687 (1991) and other relevant Security Council resolutions, the criteria established by the Governing Council for particular categories of claims, and any pertinent decisions of the Governing Council. In addition, where necessary, Commissioners shall apply other relevant rules of international law.”

25. Paragraph 16 of Security Council resolution 687 (1991) reaffirms that Iraq is “liable under international law for any direct loss, damage, including environmental damage and the depletion of natural resources, or injury to foreign Governments, nationals and corporations, as a result of Iraq’s unlawful invasion and occupation of Kuwait”.

#### C. Compensable losses or expenses

26. Governing Council decision 7 (S/AC.26/1991/Rev. 1) provides guidance regarding the losses or expenses that may be considered as “direct loss, damage, or injury” resulting from Iraq’s invasion and occupation of Kuwait in accordance with paragraph 16 of Security Council resolution 687 (1991).

27. Paragraph 34 of Governing Council decision 7 provides that “direct loss, damage, or injury” includes any loss suffered as a result of:

- (a) “Military operations or threat of military action by either side during the period 2 August 1990 to 2 March 1991;
- (b) Departure of persons from or their inability to leave Iraq or Kuwait (or a decision not to return) during that period;
- (c) Actions by officials, employees or agents of the Government of Iraq or its controlled entities during that period in connection with the invasion or occupation;
- (d) The breakdown of civil order in Kuwait or Iraq during that period; or

(e) Hostage-taking or other illegal detention.”

28. Paragraph 35 of Governing Council decision 7 provides that “direct environmental damage and the depletion of natural resources” includes losses or expenses resulting from:

- (a) “Abatement and prevention of environmental damage, including expenses directly relating to fighting oil fires and stemming the flow of oil in coastal and international waters;
- (b) Reasonable measures already taken to clean and restore the environment or future measures which can be documented as reasonably necessary to clean and restore the environment;
- (c) Reasonable monitoring and assessment of the environmental damage for the purposes of evaluating and abating the harm and restoring the environment;
- (d) Reasonable monitoring of public health and performing medical screenings for the purposes of investigation and combating increased health risks as a result of the environmental damage; and
- (e) Depletion of or damage to natural resources.”

29. As the Panel has observed in previous reports,<sup>4</sup> paragraph 35 of Governing Council decision 7 does not purport to give an exhaustive list of the activities and events that can give rise to compensable losses or expenses; rather it should be considered as providing guidance regarding the types of activities and events that can result in compensable losses or expenses.

#### D. Evidentiary requirements

30. Article 35(1) of the Rules provides that “[e]ach claimant is responsible for submitting documents and other evidence which demonstrate satisfactorily that a particular claim or group of claims is eligible for compensation pursuant to Security Council resolution 687 (1991)”. Article 35(1) also provides that it is for each panel to determine “the admissibility, relevance, materiality and weight of any documents and other evidence submitted.”

31. Article 35(3) of the Rules provides that category “F” claims “must be supported by documentary and other appropriate evidence sufficient to demonstrate the circumstances and amount of the claimed loss”. In addition, Governing Council decision 46 (S/AC.26/Dec.46 (1998)) states that, for category “F” claims, “no loss shall be compensated by the Commission solely on the basis of an explanatory statement provided by the claimant.”

32. When recommending compensation for environmental damage or loss that has been found to be a direct result of Iraq’s invasion and occupation of Kuwait, the Panel has in every case assured itself that the applicable evidentiary requirements regarding the circumstances and amount of the damage or loss claimed have been satisfied.

#### E. Legal issues

33. In reviewing the claims in the fourth “F4” instalment, the Panel considered a number of legal issues relating to the claims. Some of these issues were raised by Iraq in its written responses or in submissions during the oral proceedings and were commented upon by the Claimants during the oral proceedings.

##### 1. Amendment of claims

34. Some Claimants proposed amendments to some of their claims in the fourth “F4” instalment which they stated were based on the results of monitoring and assessment activities. In some cases, the amendments increase the compensation claimed and in others, the amendments decrease the compensation claimed. The Panel reviewed each proposed amendment to ensure that it was not a new claim filed after the appropriate deadlines.

35. In the third “F4” report, the Panel stated that, “it is appropriate to receive and consider amendments to the amounts claimed, provided that such amendments are based on information and data obtained from monitoring and assessment activities.”<sup>5</sup> Accordingly, the Panel accepted proposed amendments where it was satisfied that they were based on the results of monitoring and assessment activities.

36. In some cases Claimants proposed amendments which were not based on information obtained from monitoring and assessment activities. Where such amendments were received after the expiry of the deadline for the receipt of unsolicited information the Panel accepted them only where they decreased the claimed amounts.

##### 2. Damage outside Kuwait or Iraq

37. Some claims in the fourth “F4” instalment relate to environmental damage that is alleged to have occurred outside Kuwait or Iraq. As noted in the first “F4” report,<sup>6</sup> neither Security Council resolution 687 (1991) nor any decision of the Governing Council restricts eligibility for compensation to damage that occurred only in Kuwait or Iraq.<sup>7</sup> Accordingly, the Panel finds that losses or expenses that meet the criteria set forth in paragraph 35 of Governing Council decision 7 are compensable in principle, even if they occurred outside Kuwait or Iraq.<sup>8</sup>

##### 3. Parallel or concurrent causes of environmental damage

38. Iraq contends that some of the damage for which compensation is sought by the Claimants cannot be attributed solely to Iraq’s invasion and occupation of Kuwait. It alleges that some of the damage resulted from other factors that existed before and after the invasion and occupation of Kuwait. According to Iraq, the environment in the Claimants’ countries was not in pristine condition prior to the invasion and occupation. In particular, Iraq refers to exploration for oil, the operation of refineries and petrochemical industries and the large number of oil tankers operating in the Persian Gulf as sources of environmental damage both before and after the invasion and occupation. With respect to Saudi Arabia’s claim for damage to its terrestrial resources from military activities, Iraq

asserts that any damage still remaining is the result of mismanagement and destructive land use, especially the failure to control livestock grazing and the use of off-road vehicles in sensitive areas of the desert.

39. With regard to Iraq's liability for environmental damage where there are parallel or concurrent causes, the Panel recalls that in its second "F4" report it noted that,

"Iraq is, of course, not liable for damage that was unrelated to its invasion and occupation of Kuwait nor for losses or expenses that are not a direct result of the invasion and occupation. However, Iraq is not exonerated from liability for loss or damage that resulted directly from the invasion and occupation simply because other factors might have contributed to the loss or damage. Whether or not any environmental damage or loss for which compensation is claimed was a direct result of Iraq's invasion and occupation of Kuwait will depend on the evidence presented in relation to each particular loss or damage."<sup>9</sup>

40. In reviewing each of the claims, the Panel has considered whether, and if so to what extent, the evidence available indicates that the damage for which compensation is sought was wholly or partly the result of factors unrelated to Iraq's invasion and occupation of Kuwait. Where, on the basis of the evidence, the Panel finds that damage resulted from causes wholly unconnected with Iraq's invasion and occupation of Kuwait, no compensation is recommended. Where the evidence shows that damage resulted directly from Iraq's invasion and occupation of Kuwait but that other factors have contributed to the damage for which compensation is claimed, due account has been taken of the contribution from such other factors in order to determine the level of compensation that is appropriate for the portion of the damage which is directly attributable to Iraq's invasion and occupation of Kuwait. Where the information available does not provide a basis for determining what proportion of the damage, if any, can reasonably be attributable directly to Iraq's invasion and occupation of Kuwait, no compensation is recommended for the alleged damage.<sup>10</sup>

#### 4. Duty of the claimant to prevent and mitigate environmental damage

41. Iraq contends that some of the damage for which the Claimants seek compensation in the fourth "F4" instalment has been caused or contributed to by the Claimants themselves, either because they failed to take steps to mitigate damage resulting from the invasion and occupation of Kuwait or because the damage had been aggravated by the acts or omissions of the Claimants after the invasion and occupation. For example, Iraq claims that Kuwait's mismanagement of the Umm Al Gawati ordnance repository site constitutes a breach of Kuwait's obligation to mitigate the damage.

42. Iraq reiterates its view that failure by a claimant to take reasonable and timely measures to mitigate damage from the invasion and occupation of Kuwait amounts to contributory negligence and justifies rejection of the claim for compensation or a corresponding reduction in the compensation to be awarded to the claimant.

43. The Panel recalls that in the third “F4” report, it stressed that:

“each claimant has a duty to mitigate environmental damage to the extent possible and reasonable in the circumstances. Indeed, in the view of the Panel, that duty is a necessary consequence of the common concern for the protection and conservation of the environment, and entails obligations towards the international community and future generations. The duty to mitigate damage encompasses both a positive obligation to take appropriate measures to respond to a situation that poses a clear threat of environmental damage as well as the duty to ensure that any measures taken do not aggravate the damage already caused or increase the risk of future damage. Thus, if a claimant fails to take reasonable action to respond to a situation that poses a clear threat of environmental damage, the failure to act may constitute a breach of the duty to mitigate and could provide justification for denying compensation in whole or in part. By the same token, where a claimant takes measures that are unreasonable, inappropriate or negligent in the circumstances and thereby aggravates the damage or increases the risk of damage, the claimant may be required to bear some responsibility for the portion of the loss or damage that is attributable to its own acts or omissions.”<sup>11</sup>

44. However, as the Panel noted in the third “F4” report,

“whether an act or omission of a claimant constitutes failure to mitigate damage depends on the circumstances of each claim and the evidence available. The test is whether the claimant acted reasonably, having regard to all the circumstances with which it was confronted.”<sup>12</sup>

##### 5. Environmental damage resulting from the presence of refugees

45. Three of the Claimants allege that the presence in their territories of refugees from Iraq or Kuwait following Iraq’s invasion and occupation of Kuwait resulted in adverse impacts on their environment and natural resources, including water, agricultural, terrestrial and marine resources.

46. In reviewing these claims, the Panel was mindful of the need for sufficient evidence to demonstrate that the damage for which compensation was sought was a direct consequence of Iraq’s invasion and occupation of Kuwait, as required by Governing Council decision 7 and article 35 of the Rules. In particular, it was necessary to consider whether the presence of the refugees occurred during the period specified in paragraph 34(b) of Governing Council decision 7, and also whether the stay of any of the refugees beyond that period was due to factors unrelated to Iraq’s invasion and occupation of Kuwait, such as intervening acts, including decisions of the Claimants or other Governments.

47. In this regard, the Panel recalls that the “F2” Panel of Commissioners, in its report on the first instalment of “F2” claims, considered the issue whether an act or decision of a Government or a third party could have the effect of breaking “the chain of causation between the asserted loss and Iraq’s invasion and occupation of Kuwait, so as to relieve Iraq of liability”.<sup>13</sup> The “F2” Panel of

Commissioners found that “intervening acts or decisions, as a general rule, break the chain of causation and losses resulting therefrom are not compensable”.<sup>14</sup>

48. The Panel appreciates the humanitarian actions of a number of claimant Governments in opening their borders to large numbers of refugees from Iraq or Kuwait following Iraq’s invasion and occupation of Kuwait, and in assisting the United Nations and its bodies and institutions to provide assistance to these refugees. The Panel also recognizes that the influx of so many additional persons may have caused some damage to the environment and natural resources of the receiving countries. However, the Panel considers that, in reviewing claims for compensation submitted in accordance with Governing Council decision 7, it is obliged to satisfy itself that each claim fully meets the applicable evidentiary requirements established in the Rules. Specifically, the evidence presented must be sufficient to demonstrate that the alleged losses or expenses resulted directly from Iraq’s invasion and occupation of Kuwait and that there were no intervening or supervening acts or decisions that broke the chain of causation.

#### 6. Remediation objectives

49. In the third “F4” report, the Panel stated that “the appropriate objective of remediation is to restore the damaged environment or resource to the condition in which it would have been if Iraq’s invasion and occupation of Kuwait had not occurred.”<sup>15</sup> However, the Panel stressed that,

“In applying this objective to a particular claim, regard must be had to a number of considerations. These include, inter alia, the location of the damaged environment or resource and its actual or potential uses; the nature and extent of the damage; the possibility of future harm; the feasibility of the proposed remediation measures; and the need to avoid collateral damage during and after the implementation of the proposed measures.”<sup>16</sup>

50. With respect to the claims in the fourth instalment, the Panel reiterates its view that, in determining what remediation measures are necessary, “primary emphasis must be placed on restoring the environment to pre-invasion conditions, in terms of its overall ecological functioning rather than on the removal of specific contaminants or restoration of the environment to a particular physical condition.”<sup>17</sup> As the Panel noted in the third “F4” instalment report, “even if sufficient baseline information were available to determine the exact historical state of the environment prior to Iraq’s invasion and occupation of Kuwait, it might not be feasible or reasonable to fully recreate pre-existing physical conditions.”<sup>18</sup> In particular, it is worth noting that, in some circumstances, measures to recreate pre-existing physical conditions might not produce environmental benefits and could indeed pose unacceptable risks of ecological harm. In the view of the Panel, where proposed measures for the complete removal of contaminants are likely to result in more negative than positive environmental effects, such measures should not qualify as reasonable measures to clean and restore the environment, within the meaning of article 35(b) of Governing Council decision 7.

7. Compensation for loss or depletion of natural resources

51. The fourth “F4” instalment only concerns claims for compensation for expenses of measures to remediate alleged environmental damage. The Panel did not consider the issue of possible compensation that may be due to claimants for loss or depletion of natural resources. This issue will be considered, as necessary, in the fifth “F4” instalment.

8. Applicability of Governing Council decision 19

52. As noted in paragraph 20, the Panel requested Iraq and Saudi Arabia to address at the oral proceedings the following issue: “Does Governing Council decision 19 [(S/AC.26/Dec. 19 (1994))] bar recovery for all or part of Saudi Arabia’s claim No. 5000455?” A detailed discussion on this issue is contained in paragraphs 255 to 256, 259 to 263 and 267 to 271 of this report.

IV. REVIEW OF PART ONE OF THE FOURTH “F4” INSTALMENT CLAIMS

53. Article 36 of the Rules provides that a panel of Commissioners may “(a) in unusually large or complex cases, request further written submissions and invite individuals, corporations or other entities, Governments or international organizations to present their views in oral proceedings” and “(b) request additional information from any other source, including expert advice, as necessary”. Article 38(b) of the Rules provides that a panel of Commissioners “may adopt special procedures appropriate to the character, amount and subject-matter of the particular types of claims under consideration.”

54. In view of the complexity of the issues raised by the claims and the need to consider scientific, engineering and cost issues, the Panel sought the assistance of a multi-disciplinary team of independent experts retained by the Commission (“the Panel’s expert consultants”). The Panel’s expert consultants were retained, *inter alia*, in the fields of desert ecology and botany, agriculture, forestry, plant pathology, terrestrial and marine remediation techniques, marine biology, coastal ecology and geomorphology, geology, hydrogeology, water quality, chemistry, water treatment engineering, coastal and civil engineering, ordnance disposal, health risk assessment, economics, statistics, remote sensing and modelling of the transport of airborne pollutants.

55. At the direction of the Panel, the secretariat and the Panel’s expert consultants undertook site visits in Iran, Jordan, Kuwait, Saudi Arabia and Syria, and also met with representatives and experts of Iran, Kuwait and Saudi Arabia in Geneva. The purpose of these visits and meetings was to enable the secretariat and the Panel’s expert consultants to obtain information that would assist the Panel to:

- (a) Assess the nature and extent of environmental damage resulting from Iraq’s invasion and occupation of Kuwait;
- (b) Evaluate the technical feasibility, reasonableness and cost-effectiveness of the remediation measures proposed by the Claimants; and
- (c) Identify possible remediation alternatives.

56. Where necessary, the Panel requested additional information from the Claimants to clarify their claims.

57. The Panel also directed the secretariat to conduct two meetings between the Panel's expert consultants and legal, scientific and technical consultants of Iraq. During these meetings, the Panel's expert consultants provided explanations and clarifications of issues raised by Iraq on the fourth "F4" instalment claims.

58. In reaching its findings and formulating its recommendations on the claims, the Panel has taken due account of all the information and evidence made available to it, including the evidence and information provided by the Claimants in the claim documents; results of monitoring and assessment activities; responses to requests for additional information; information and views submitted by Governments in response to article 16 reports; written responses submitted by Iraq; information obtained during the site visits; views presented by Iraq and the Claimants during the oral proceedings; and reports of the Panel's expert consultants.

59. The Panel has been assisted in its review of the claims in this instalment by data submitted by claimants as a result of monitoring and assessment activities. In some cases the information from monitoring and assessment projects provided the basis for the Panel to ascertain the nature and extent of damage for which compensation is being claimed and to evaluate the appropriateness of the measures proposed to remediate the damage. However, in some other cases the information provided was not sufficient to show that damage has been caused as a result of Iraq's invasion and occupation of Kuwait, or to indicate the nature and extent of damage, or to confirm the need for and appropriateness of proposed remediation measures. In this regard, the Panel stresses that the fact that the results of monitoring and assessment activities may not provide support for a related substantive claim does not necessarily invalidate the appropriateness of the project or the methods used by the claimant. As stated by the Panel in the first "F4" report, the purpose of monitoring and assessment is to enable a claimant to develop evidence to establish whether environmental damage has occurred and to quantify the extent of the resulting loss.<sup>19</sup> The Panel also clarified that "a monitoring and assessment activity could be of benefit even if the results generated by the activity establish that no damage has been caused. The same may be the case where the results indicate that damage has occurred but that it is not feasible or advisable to undertake measures of remediation or restoration. Confirmation that no damage has been caused or that measures of remediation or restoration are not possible or advisable in the circumstances could assist the Panel in reviewing related substantive claims".<sup>20</sup>

60. In order to avoid multiple recovery of compensation, the Panel instructed the secretariat to carry out cross-claim and cross-category checks of the claims. On the basis of these checks, the Panel is satisfied that there is no risk of duplication of awards of compensation.

61. In considering future measures proposed by the Claimants to clean and restore damaged environment, the Panel has evaluated the reasonableness of the measures by reference to, inter alia, the potential of the measures to achieve the remediation objectives set out in paragraphs 49 and 50; potential adverse environmental impacts of the proposed measures; and the cost of the measures as

compared with other remediation alternatives that confer the same environmental benefits. In some cases, the Panel has found that certain modifications to the measures proposed are necessary or desirable to take account of these considerations. Details of such modifications are set out in technical annexes I to V to this report. The amounts recommended for the claims are based on the proposed measures as modified. This is consistent with the approach adopted by the Panel in its previous reports.

62. The Panel's analysis of claims in part one of the fourth "F4" instalment is set forth in chapters V through X of this report. A glossary of scientific and technical terms is appended to this report.

## V. CLAIM OF THE ISLAMIC REPUBLIC OF IRAN

### A. Overview

63. In the fourth "F4" instalment, the Panel reviewed one claim (claim No. 5000456) with an asserted value of USD 2,484,623,669<sup>21</sup> submitted by Iran for expenses of future measures to remediate environmental damage alleged to have resulted from Iraq's invasion and occupation of Kuwait. The claim comprises three claim units relating, respectively, to damage to terrestrial resources, damage to groundwater resources and damage to marine resources.

64. The first claim unit relates to expenses of future measures to remediate terrestrial resources in Iran alleged to have been damaged by:

- (a) The presence of refugees who departed from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait; and
- (b) Contamination from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

65. The second claim unit relates to expenses of future measures to remediate groundwater resources in Iran alleged to have been damaged by contamination from the oil well fires in Kuwait.

66. The third claim unit relates to expense of future measures to remediate marine resources in Iran alleged to have been damaged by:

- (a) The oil spills in the Persian Gulf resulting from Iraq's invasion and occupation of Kuwait; and
- (b) Contamination from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

B. Claim No. 5000456 – Remediation of damage to terrestrial, groundwater and marine resources

1. Remediation of damage to terrestrial resources resulting from the presence of refugees

67. Iran seeks compensation in the amount of USD 1,063,040 for expenses to restore rangelands and USD 1,308,840 for expenses to restore forests alleged to have been damaged by refugees who departed from Iraq or Kuwait between 2 August 1990 and 2 March 1991.

68. Iran states that 89,256 refugees who departed from Iraq and Kuwait as a result of Iraq's invasion and occupation of Kuwait entered Iran after 2 August 1990. Iran asserts that the presence of these refugees and their livestock caused massive damage to terrestrial resources of Iran, including loss of vegetation and soil erosion.<sup>22</sup>

69. Iraq states that Iran has failed to demonstrate that the presence of refugees or their livestock adversely affected Iran's rangelands or had any significant impact on Iran's forest resources. Further, Iraq argues that Iran has not provided any evidence to show that there is currently any damage that requires remediation.

70. The Panel notes that there is evidence in published literature that a considerable number of refugees entered Iran after departing from Iraq or Kuwait during the period 2 August 1990 to 2 March 1991 specified in paragraph 34 of Governing Council decision 7.

71. The Panel finds that there is evidence that the presence of the refugees resulted in environmental damage to rangeland areas proposed for remediation in this claim and that this damage is a direct result of Iraq's invasion and occupation of Kuwait in accordance with paragraph 16 of Security Council resolution 687 (1991) and Governing Council decision 7.

(a) Remediation of damage to rangelands

72. Iran proposes to reseed rangelands alleged to have been damaged by the refugees, amounting to 6,644 hectares, in order to restore the areas to "pre-war status" conditions or to "biomass production" levels similar to undamaged areas. Iran indicates that additional measures may be needed to remove gravel and loosen compacted soils in the damaged areas.

73. In the view of the Panel, it is appropriate for Iran to take measures to restore the damaged areas. Subject to some modifications, the Panel considers that the remediation measures proposed by Iran are reasonable. The Panel considers that the total area of rangelands that requires remediation is 220 hectares. The Panel also considers that applying organic amendments to encourage the growth of native plant species would be more appropriate than applying fertilizers. Details of these modifications are set out in annex I.

74. The Panel finds that, with the modifications in annex I, the remediation measures proposed by Iran constitute measures that are reasonably necessary to clean and restore the environment, within the meaning of paragraph 35(b) of Governing Council decision 7.

75. The expenses of the proposed remediation measures have been adjusted to take account of the modifications in annex I, including:

- (a) Reduction of the total area to be remediated to 220 hectares;
- (b) Application of organic amendments instead of fertilizer; and
- (c) Higher seeding rates and maintenance of reseeded for three years.

76. Adjustments have also been made to take account of:

- (a) Uncertainty regarding the nature and extent of the damage caused to the camp areas by the presence of refugees who arrived in Iran after departing from Iraq or Kuwait between 2 August 1990 and 2 March 1991, due to limited baseline information available on the conditions of the areas prior to Iraq's invasion and occupation of Kuwait and the absence of reliable data on the numbers of refugees and livestock that came into the areas after departing from Iraq or Kuwait between 2 August 1990 and 2 March 1991;
- (b) The fact that the evidence presented regarding the measures proposed for some of the areas does not enable the Panel to substantiate the full amount of the expenses claimed; and
- (c) The possibility that some of the damage to the areas was due to other factors unrelated to Iraq's invasion and occupation of Kuwait including, in particular, uncontrolled livestock grazing.

77. These adjustments reduce the compensable expenses to USD 188,760.

78. Accordingly, the Panel recommends compensation in the amount of USD 188,760 for the remediation of damage to Iran's rangelands caused by the presence of refugees from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

(b) Remediation of damage to forests

79. Iran proposes to replant forests alleged to have been damaged by the presence of refugees in order to restore the forests to "pre-war status" conditions or to "biomass production" levels similar to undamaged areas.

80. In the view of the Panel, the evidence provided by Iran for this claim is not sufficient to demonstrate that the refugees who allegedly caused damage to forests departed from Iraq or Kuwait during the period 2 August 1990 to 2 March 1991 stipulated in paragraph 34 of Governing Council decision 7. Consequently, the Panel finds that Iran has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

81. Accordingly, the Panel recommends no compensation for remediation of damage to Iran's forests alleged to have been caused by the presence of refugees who departed from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

2. Remediation of damage to terrestrial resources resulting from contamination from the oil well fires

82. Iran seeks compensation in the amount of USD 209,808,831 for expenses to revegetate rangelands alleged to have been damaged by contamination from the oil well fires in Kuwait. Iran also seeks compensation in the amount of USD 728,447,850 for expenses to restore forest areas alleged to have been damaged by contamination from the oil well fires in Kuwait. In addition, Iran seeks compensation in the amount of USD 642,500,000 for expenses to neutralize the alleged effects on soils of soot contaminants from the oil well fires in Kuwait.

83. Iran states that pollutants from the oil well fires in Kuwait were deposited in Iran. Iran notes that many international and national reports, supported by extensive visual, satellite and remote sensing data collections, show that significant quantities of pollutants were dispersed in the southern and south-western provinces of Iran via wet and dry deposition.

84. Iran states that its assessments of satellite images and meteorological data “clearly reveal the extent of the greatest amount of soot over southern and south-western provinces of Iran”. Iran further states that analysis of black rain samples show “increased concentrations of anions, cations, and heavy metals” in rain following Iraq’s invasion and occupation of Kuwait. Iran also states, based on another study, that Iranian territory was exposed to wet deposition from approximately 350,000 tons of soot, as well as nitrogen and sulphur oxides, organic carbons, heavy metals and polycyclic aromatic hydrocarbons (“PAH”) from the oil well fires in Kuwait.

85. Iran also presented the results of monitoring and assessment studies that it undertook to assess the impact of airborne contaminants on vegetation and soils. These included enzymatic and dendrochronological studies that were conducted to assess the impacts of contamination from the oil well fires in Kuwait on vegetation in Iran.

86. Iraq states that Iran has failed to demonstrate “that airborne pollutants from the oil well fires ... had any significant impact on Iran’s forestry resources” or that there has been “any significant damage to its rangelands caused by aerial deposition of contaminants”, or that “the soot from the smoke plume that may have been deposited on Iranian territory had any adverse impact on Iranian soils.”

87. As previously noted by the Panel, there is evidence that contamination from the oil well fires in Kuwait reached some parts of Iran.<sup>23</sup> However, none of the evidence demonstrates either that damage was in fact caused to forests, rangelands or soils in south-western Iran or that any such damage still remains that would warrant remediation. For example, the carbon to nitrogen (C:N) ratios upon which Iran relies to support its claim of damage to soils are overstated and inconsistent with the level of soot deposition that most likely occurred in Iran. Further, the magnitude of the alleged increase in soil salinity does not appear high enough to have resulted in lasting damage to affected soils. Consequently, the Panel finds that Iran has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

88. Accordingly, the Panel recommends no compensation for remediation of damage to Iran's terrestrial resources alleged to have resulted from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

### 3. Remediation of damage to groundwater resources

89. Iran seeks compensation in the amount of USD 527,904,400 for expenses of future remediation measures to minimize groundwater contamination alleged to have resulted from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

90. Iran presented evidence intended to show that some contamination from the oil well fires in Kuwait reached Iran. Iran also presented results of studies it conducted, including near-infrared satellite imagery and data on "black rain", to show that contamination from the oil well fires in Kuwait impacted its groundwater resources.

91. Iraq states that Iran has failed to demonstrate a direct causal link between the alleged damage to its groundwater resources and airborne pollutants emitted by the oil well fires, or any damage to its groundwater resources caused by contaminated rain. Further, Iraq asserts that Iran has not demonstrated that any adverse effects persist that would require remediation.

92. As previously noted by the Panel, there is evidence that pollutants from the oil well fires in Kuwait reached some parts of Iran.<sup>24</sup> Data provided by Iran, including near-infrared satellite imagery and data on black rain, suggest that some of the pollutants were deposited in south-western Iran.

93. However, the evidence submitted by Iran in support of this claim is not sufficient to enable the Panel to determine whether any damage was in fact caused to Iran's groundwater resources by contaminants from the oil well fires in Kuwait and, if so, the nature and extent of any such damage. The data provided indicate only a tenuous link between the oil well fires in Kuwait and any contamination of groundwater in Iran. In particular, the data provided on, *inter alia*, metal concentrations and ratios, PAH concentrations, soil ratios and surface water contamination indicate only a minimal correspondence between water quality measurements, on one hand, and black rain contaminant levels, on the other. Consequently, the Panel finds that Iran has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

94. Accordingly, the Panel recommends no compensation for remediation of damage to Iran's groundwater resources alleged to have been caused by the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

### 4. Remediation of damage to marine resources

95. Iran seeks compensation in the amount of USD 373,590,708 for expenses of future remediation of coastal areas and coral reefs alleged to have been damaged by oil spills and contaminants from the oil well fires in Kuwait, and for expenses of a coral reef research programme.

96. According to Iran, its marine environment has been polluted by oil released into the Persian Gulf during Iraq's invasion and occupation of Kuwait, as well as by dry deposition of soot from the oil well fires in Kuwait. Iran presented evidence to show that the oil spills created oil slicks in an extended area of the Persian Gulf and that the oil well fires in Kuwait resulted in the deposition of particulates over extended areas of land and sea. Iran also presented an analysis of satellite images used to track the oil spills and contaminants from the oil well fires moving from Kuwait to Iran. In addition, Iran presented analytical data, including chemical and fingerprinting information. Iran states that its analyses and field observations provide a strong indication that oil originating from the oil spills resulting from Iraq's invasion and occupation of Kuwait reached the coast of Iran.

97. Iraq states that Iran has failed to demonstrate that any of the oil present on its shoreline originated from the oil spills resulting from Iraq's invasion and occupation of Kuwait, or that the presence of the oil on its shoreline presents any environmental risks that would necessitate remediation. Further, Iraq states that Iran has failed to provide any evidence in support of its claim for remediation of coral reefs. Iraq also states that Iran has not taken account of several possible parallel causes of contamination of its marine resources.

98. As noted by the Panel in its first "F4" report, there is evidence that Iran's marine resources were exposed to oil spills in the Persian Gulf resulting from Iraq's invasion and occupation of Kuwait.<sup>25</sup> The Panel finds that damage caused by those oil spills would constitute environmental damage that is compensable in accordance with paragraph 16 of Security Council resolution 687 (1991).

99. In the view of the Panel, although it is likely that some of the contamination currently observable in the central Bushehr coast is attributable to the oil spills or the oil well fires resulting from Iraq's invasion and occupation of Kuwait, there are other possible major causes of the contamination. These include the 1983 Nowruz oil spill and other events during the Iran-Iraq war; the operation of oil platforms; terminals and oil processing facilities; as well as natural seeps in the Persian Gulf. The evidence submitted by Iran, including chemical and fingerprinting data, are not sufficient to enable the Panel to determine the proportion of damage attributable to Iraq's invasion and occupation of Kuwait, as distinct from other potential causes. As stated in paragraph 40 of this report, where there are parallel or concurrent causes of damage and the information available does not provide a basis for determining what proportion of the damage can reasonably be attributed to Iraq's invasion and occupation of Kuwait, no compensation is recommended. Consequently, the Panel finds that Iran has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

100. Accordingly, the Panel recommends no compensation for remediation of damage to Iran's coastal and coral reef resources alleged to have been caused by the oil spills and the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait, or for expenses of the related coral reef research programme.

## 5. Recommended award

101. The Panel's recommendation for compensation for claim No. 5000456 is summarized in table 2.

Table 2. Recommended award for claim No. 5000456

<u>Claim Unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage to terrestrial resources	1,583,128,561	188,760
Damage to groundwater resources	527,904,400	nil
Damage to marine resources	373,590,708	nil
<u>Total</u>	2,484,623,669	188,760

102. For the reasons stated in paragraph 359, no date of loss for the purposes of any potential award of interest is indicated for this recommended award.

## VI. CLAIM OF THE HASHEMITE KINGDOM OF JORDAN

### A. Overview

103. In the fourth "F4" instalment, the Panel reviewed one claim (claim No. 5000458), with an asserted value of USD 136,761,897, submitted by Jordan for expenses of future measures to remediate environmental damage that it alleges resulted from Iraq's invasion and occupation of Kuwait. Claim No. 5000458 is for future measures to restore and remediate damage to groundwater, agricultural, wetland and marine resources. The amount of USD 136,761,897 represents an increase in the compensation claimed, resulting from amendments made by Jordan on the basis of new information obtained from its monitoring and assessment activities.<sup>26</sup>

104. The terrestrial unit of claim No. 5000458, with an asserted value of USD 25,082,273 (relating to remediation of rangelands alleged to have been damaged by the presence in Jordan of refugees and their livestock arriving from Iraq or Kuwait), was deferred to the fifth "F4" instalment and will be reviewed as part of claim No. 5000304.

105. Jordan states that "from the beginning of Iraq's invasion and occupation of Kuwait in August 1990 and until September 1991, its territory was flooded with over 1.88 million refugees of different nationalities." Jordan defines "refugees" as "all those people, of whatever nationality, who entered Jordan from Iraq and Kuwait as a direct result of Iraq's invasion and occupation of Kuwait, between 2 August 1990 and 1 September 1991, having left Iraq or Kuwait on or before 2 March 1991."<sup>27</sup>

106. Jordan groups refugees into three categories, namely, “involuntary immigrants”, “returnees” and “evacuees”. Involuntary immigrants are those refugees of non-Jordanian nationality who stayed in Jordan after 1 September 1991. Jordan defines “involuntary immigrants” as people who were “refugees” initially, but who were still resident in Jordan after 1 September 1991.<sup>28</sup> Jordan states that most of the involuntary immigrants and returnees settled in Amman, Zarqa and Irbid. Returnees are those refugees with Jordanian nationality who were “living/working outside the country and who were forced to return to Jordan” as a result of Iraq’s invasion and occupation of Kuwait or were outside Kuwait and Iraq at the time of Iraq’s invasion and occupation of Kuwait.<sup>29</sup> Evacuees are those refugees who sought “short-term shelter in Jordan (usually measured in days or weeks)” as a result of Iraq’s invasion and occupation of Kuwait prior to repatriation to other countries.

107. Jordan estimates that, of the total number of refugees who entered Jordan from 2 August 1990 to 1 September 1991, 242,000 were involuntary immigrants, 216,000 were returnees and 1.42 million were evacuees. Jordan states that the initial days following Iraq’s invasion and occupation of Kuwait were a time of chaos. Record keeping was, at best, a secondary concern of Jordanian officials whose focus was on humanitarian relief. In support of its claim, Jordan provides data obtained from files kept by the Ministry of Interior containing information exchanged between the Expatriate Relief Committee and national and international agencies, in addition to 1994 census data and monthly estimates of the number of returnees that arrived in Jordan by air and through the Ruwashed Checkpoint. Information for the refugee camps is incomplete, in particular for the month of August 1990.

108. As has been found by other Panels, the vast majority of refugees were present in the camps in Jordan because of Iraq’s invasion and occupation of Kuwait.<sup>30</sup> In this regard, the Panel observes that it is not surprising that camp records are incomplete, given the unexpected large influx of refugees into Jordan in the months following Iraq’s invasion and occupation of Kuwait.

109. In the first “F4” report, the Panel noted that any loss which was incurred as a result of departures of persons from Iraq or Kuwait during the period from 2 August 1990 to 2 March 1991 would constitute direct loss, damage or injury resulting from Iraq’s invasion.<sup>31</sup> The Panel noted, however, that, “[t]he decision whether any particular loss resulted from departures within the meaning of the Governing Council decision will depend on the evidence produced in each case.”<sup>32</sup> In this regard, the “F4” Panel recalled that:

“other panels of Commissioners have found that some expenses incurred subsequent to 2 March 1991 in connection with the departure of persons from Iraq or Kuwait during the period 2 August 1990 to 2 March 1991 may be compensable as direct losses resulting from Iraq’s invasion and occupation of Kuwait.”<sup>33</sup>

B. Claim No. 5000458 – Remediation of damage to water, agricultural, wetland and marine resources

1. Remediation of damage to water resources

110. Jordan alleges that the 10.8 per cent increase in its population, resulting from the presence of refugees following Iraq's invasion and occupation of Kuwait, led to an increased demand for fresh water, which in turn resulted in over-pumping of water from its groundwater aquifers. According to Jordan, the over-pumping resulted in the salinization of Jordan's main aquifers, in particular the aquifer of Northern Mujib.

111. Jordan also alleges that the additional human waste produced by the refugees caused microbiological contamination of springs in the water extraction areas of As-Salt, Jarash and Wadi-As-Sir. The springs in these water extraction areas which are alleged to have been contaminated are Qairawan, Baqouriyeh, Shoreya'a, Hazzir and Wadi As-Sir. Jordan explains that there was increased production of wastewater as a result of the population increase. This resulted in seepage of effluent from the ponds of the As-Samra Wastewater Treatment Plant; reduction in the quality of treated wastewater since the As-Samra Wastewater Treatment Plant was working above its design capacity; increase in the wastewater effluent being produced at refugee camps; and increased generation of wastewater by returnees and involuntary immigrants who settled around springs. Additionally, Jordan states that the Amman-Zarqa groundwater basin was contaminated by a plume of effluent occurring directly beneath the treatment lagoons and settling ponds of the As-Samra Wastewater Treatment Plant.

(a) Northern Mujib Aquifer

112. Jordan seeks compensation in the amount of USD 42,714,792 for expenses of future measures to clean and restore the Northern Mujib freshwater aquifer that was allegedly contaminated as a result of Iraq's invasion and occupation of Kuwait.

113. Jordan submitted results of monitoring and assessment studies which show trends of increasing salinity in the Northern Mujib freshwater aquifer.

114. Iraq states that there is recorded evidence of mismanagement of water resources in Jordan before 1991, especially of the depletion of the Northern Mujib aquifer, and it argues that the increase of salinity may be due to over-pumping before 1991.

115. Iraq also states that the decrease in the level of the Northern Mujib aquifer may be due to pumping more than the sustainable yield. Iraq contends that the alleged increase in salinity may be due either to reduction of the proportion of fresh annual rainfall in the extracted water, or to the increased application of saline irrigation water to agricultural areas, causing salt to leach into the groundwater. Iraq further contends that increased nitrate content in the groundwater is probably a consequence of an increase in the quantity of fertilizer used in agricultural areas or of the impact of human waste disposal.

116. The Panel finds that, although Jordan has submitted the results of monitoring and assessment studies that show trends of increasing salinity in the waters of the Northern Mujib aquifer, the data submitted do not demonstrate a causal link between the increase in salinity and the presence of refugees from Iraq and Kuwait. The Panel, therefore, finds that Jordan has failed to establish that the presence of the refugees resulted in the increased salinity of the Northern Mujib aquifer. Consequently, Jordan has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

117. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to the Northern Mujib aquifer in Jordan as a result of Iraq's invasion and occupation of Kuwait.

(b) Qairawan, Baqouriyeh, Shoreya'a, Hazzir and Wadi As-Sir springs

118. Jordan seeks compensation in the amount of USD 797,487 for expenses of future measures to clean and restore the Qairawan, Baqouriyeh, Shoreya'a, Hazzir and Wadi As-Sir springs that it alleges have been contaminated as a result of Iraq's invasion and occupation of Kuwait.

119. Jordan submitted results of monitoring and assessment studies which are intended to show microbiological contamination of the springs caused by septic tanks and latrine pits at refugee settlements or from wastewater treatment plants.

120. Iraq argues that there is recorded evidence of mismanagement of water resources in Jordan prior to 1991, especially of contamination of water from urban settlements with incomplete connections to sewerage networks within the catchments of highly vulnerable springs.

121. In the view of the Panel, Jordan did not present sufficient information showing that refugees actually settled in the catchment areas of the springs. In addition, the data presented do not demonstrate any specific trends showing that damage at any of the five springs is attributable to the presence of refugees. The Panel, therefore, finds that Jordan has failed to establish that the presence of the refugees resulted in the contamination of the Qairawan, Baqouriyeh, Shoreya'a, Hazzir and Wadi As-Sir springs. Consequently, Jordan has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

122. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to the Qairawan, Baqouriyeh, Shoreya'a, Hazzir and Wadi As-Sir springs in Jordan as a result of Iraq's invasion and occupation of Kuwait.

(c) As-Samra Wastewater Treatment Plant

123. Jordan seeks compensation in the amount of USD 43,487,516 for expenses of future measures to remediate contamination of groundwater and irrigation water from the As-Samra Wastewater Treatment Plant that it alleges resulted from Iraq's invasion and occupation of Kuwait.

124. Jordan submitted results of monitoring and assessment studies intended to demonstrate that:

- (a) The presence of refugees resulted in increased production of wastewater;
- (b) The increased volume of wastewater caused seepage of effluent from the ponds of the As-Samra Wastewater Treatment Plant;
- (c) The increased volume of wastewater also caused the As-Samra Wastewater Treatment Plant to work above its design capacity, and this reduced the quality of treated wastewater; and
- (d) The Amman-Zarqa groundwater basin was contaminated by a plume of effluent occurring directly beneath the treatment lagoons and settling ponds of the As-Samra Wastewater Treatment Plant.

125. Iraq argues that there is recorded evidence of mismanagement of water resources in Jordan before 1991, especially concerning the overload of As-Samra Wastewater Treatment Plant and leakage from the ponds to groundwater since the plant commenced operations in the mid-1980s.

126. In the view of the Panel, the data provided by Jordan show that salinity reaching groundwater originated primarily from soluble minerals underneath the ponds rather than from the wastewater in the ponds. The Panel notes that the data show that salinity downgradient from As-Samra began to increase shortly after the construction of the plant in 1985 and continued to increase until at least 2000, and that the available data do not provide a basis for determining what impacts, if any, the activities of the refugees might have had on the level of the salinity of the plume.

127. The Panel, therefore, finds that Jordan has failed to establish that the presence of the refugees resulted in the contamination of its water resources from the As-Samra Wastewater Treatment Plant. Consequently, Jordan has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

128. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Jordan's water resources from the As-Samra Wastewater Treatment Plant by the presence of refugees from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

## 2. Remediation of damage to agricultural resources

129. Jordan seeks compensation in the amount of USD 31,947,837 for expenses of future measures to remediate damage to agricultural resources that it alleges resulted from Iraq's invasion and occupation of Kuwait.

130. Jordan alleges that the 10.8 per cent increase in its population, resulting from Iraq's invasion and occupation of Kuwait, led to a reduction in crop yields due to increased consumption of fresh water and increased pressure on the wastewater treatment plants.

131. Jordan states that it uses effluent from the As-Samra Wastewater Treatment Plant for irrigation. Jordan claims that increased effluent to the As-Samra Wastewater Treatment Plant as a result of the presence of returnees and involuntary immigrants resulted in an increase in salinity of effluent from

the As-Samra Wastewater Treatment Plant and that this caused damage to agricultural resources. According to Jordan, the increase in saline effluent resulted in an increase in the salinity of water drawn from the King Talal Reservoir and the King Abdullah Canal and the use of this water for irrigation caused an increase in soil salinity at four locations in the Middle Jordan Valley, which in turn resulted in reduced crop yields. Jordan calculates a pro rata share of the resulting soil salinity attributable to the returnees and refugees that might persist until the year 2015, and bases the amount of its claim on this allocation.

132. Jordan has submitted results of monitoring and assessment studies which it claims show a reduction in crop yields due to decreased quality and quantity of irrigation water as a result of increased consumption of freshwater. Jordan also claims that these studies show that damage to agricultural resources resulted from increased salinity of effluent from the As-Samra Wastewater Treatment Plant.

133. Iraq argues that Jordan's evaluation of damage is only theoretical since (a) the data provided concerning soil salinity are not relevant for assessing the damage because the level of salinity "before crisis" ranges from 1 to 100 deciSiemens per metre, the latter level being too high for crop cultivation; and (b) the level "after crisis" is calculated with a model, which makes it impossible to prove the increased levels using soil samples.

134. Iraq agrees that it is logical to assume that the increase of influent to As-Samra Wastewater Treatment Plant was due to the increase in the number of households connected to the sanitary sewage system, including refugees, and that this may have caused poorer quality effluent from the plant as a result of the reduction in the wastewater retention time within the ponds. However, Iraq observes that, given the standard efficiency of waste stabilization ponds, this would have resulted in increasing organic matter, suspended solids and microbiological contents of the effluent, but not an increase in salinity. Hence, according to Iraq, any increase in salinity, which is a key parameter in the claim unit, resulted only from mismanagement of water used for irrigation.

135. Iraq also observes that possible increases in levels of nitrate, phosphorus and organic matter in the treated wastewater used for irrigation may have had beneficial effects on crop yields by providing more nutrients, and states that there are other causes for the variations in crop yields such as climate, sanitary conditions, market conditions and effects of agreements with other countries on the sharing of water resources.

136. Iraq further observes that, although Jordan argues that the tomato crop is seriously affected by the salinity, tomatoes have been replaced by other crops which are equally difficult to grow in saline soils. Also, the total agricultural area decreased from 1994 to 1997, but increased after 1998. Iraq suggests that this leads to the conclusion that salinity is no longer a problem.

137. In the view of the Panel, the data provided by Jordan are not sufficient to show that the presence of refugees had an impact on its agricultural resources. The Panel finds that the data submitted by Jordan are inconclusive. In particular, the measurements of salinity in As-Samra effluent, irrigation waters and agricultural soils do not show a clear pattern of impact that coincides with the presence of

refugees in Jordan. The Panel, therefore, finds that Jordan has failed to establish that the presence of the refugees resulted in damage to its agricultural resources. Consequently, Jordan has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

138. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Jordan's agricultural resources by the presence of refugees from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

### 3. Remediation of damage to wetland resources

139. Jordan seeks compensation in the amount of USD 17,776,404 for expenses of future measures to remediate damage to the Azraq wetlands. Jordan states that there was a reduction in the total area of wetlands resulting from diminished water supply as a result of the influx of refugees following Iraq's invasion and occupation of Kuwait.

140. The Azraq wetlands in the Jordan River Valley lie on an important migration route for birds and provide habitat for resident wildlife species, including birds, mammals, reptiles, fish and invertebrates. These wetlands are listed under the 1971 Ramsar Convention on Wetlands of International Importance.<sup>34</sup>

141. Jordan alleges that the 10.8 per cent increase in its population following Iraq's invasion and occupation of Kuwait resulted in higher demand for fresh water and increased wastewater output. According to Jordan, this led to a diminished water supply to the Azraq wetlands and a consequent reduction in the total area of wetlands. Jordan also states that the diminished water supply resulted in a change in wetland and riparian habitats, and that this caused alterations in the diversity and numbers of plant species present in the wetlands, and also affected the physical structure of the habitats, such as height and dispersion of shrubs. Jordan states that this had a detrimental effect on the plants and wildlife in the wetlands.

142. Jordan also claims that, as a result of the increased water withdrawal, it was obliged to suspend plans that were in place to restore the wetlands. Jordan considers suspension of these plans to be a "lost opportunity" that was due to the influx of refugees and it claims that the suspension of the plans was also a direct cause of the subsequent increase in the withdrawal of water from the Azraq wetlands.

143. Jordan submitted results of monitoring and assessment studies which it claims show trends of increased water demand and consequential decreasing water supply to the wetlands. However, Jordan acknowledges that the major proportion of damage to the Azraq wetlands, through water loss and the failure of the springs supplying them, occurred before Iraq's invasion and occupation of Kuwait. It therefore explains that its claim relates to the relatively small area of wetlands that it alleges was lost through increased withdrawal of water to supply the returnees and involuntary immigrants.

144. Iraq states that the Jordanian authorities had allowed water withdrawals at twice the planned rate in 1990 and 1991, this rate being such that the Azraq wetlands would have dried up in any case.

145. In the view of the Panel, the evidence available shows that the Azraq wetlands have been almost entirely eliminated over the past 30 years due to withdrawal of groundwater from the Azraq basin as well as reduction in surface flows into the wetlands caused by upstream dams in Jordan and Syria. The Panel recognizes that refugees may have used water withdrawn from the Azraq wetlands, but Jordan does not provide any information on the basis of which any increase in the groundwater withdrawn to serve the refugees can be estimated.

146. The Panel, therefore, finds that Jordan has not established that the presence of the refugees resulted in damage to the Azraq wetlands. Consequently, Jordan has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

147. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Jordan's wetland resources by the presence of refugees from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

#### 4. Remediation of damage to marine resources

148. Jordan seeks compensation in the amount of USD 37,861 for expenses of future measures to restore coral reefs along parts of the Gulf of Aqaba coast that it alleges were damaged as a result of the influx of refugees following Iraq's invasion and occupation of Kuwait.

149. Jordan alleges that damage occurred to coral reefs along 1,300 metres of its Gulf of Aqaba coastline as a result of the influx of refugees following Iraq's invasion and occupation of Kuwait. Jordan claims that damage was likely to have been caused to the King Abdullah Reef opposite the National Touristic Camp where refugees were present in large numbers. Jordan estimates that approximately 16,500 people per day were passing through the camp, in particular during a three-week crisis period in the late summer of 1990. Jordan proposes to compensate for the ecological damage by creating an artificial reef and seeks compensation for the cost of constructing such a reef.

150. Jordan states that damage to the coral reefs is likely to have resulted from the discharge of sanitary waste into the water near the National Touristic Camp either directly by refugees or via groundwater transport from overflowing temporary toilet facilities. Jordan states that additional damage is likely to have been caused by the disposal of plastic bags directly into the lagoon or by wind transport from the beach into the water. Finally, Jordan states that damage resulted from refugees trampling the reefs during the late summer period. Jordan uses several models to quantify the damage attributable to Iraq's invasion and occupation of Kuwait. The models are based on the estimated number of refugees present in the National Touristic Camp during a three week period in August 1990, the physical characteristics of the study area, and assumptions derived from published literature and other sources of data.

151. Iraq asserts that this claim is based on theoretical models. It points out that the presence of damage has not been verified with field data and that sufficient account has not been taken of potential causes of damage that may not be related to its invasion and occupation of Kuwait.

152. Iraq further states that, although coral reefs have an intrinsic value, Jordan has not demonstrated that the coral reefs in the Gulf of Aqaba provide any specific ecological services. Iraq notes that although the coral reefs are situated in a tourist location, few tourists actually use them. Iraq also states that no evidence has been given to clarify the support that the coral reefs provide to fisheries.

153. The Panel considers that, although it is reasonable to assume that some damage could have been caused to the coral reefs by the presence of refugees, Jordan has provided no evidence to establish that any damage attributable to Iraq's invasion and occupation of Kuwait was caused to the coral reefs or that any such damage still persists that would require remediation. In particular, no information was provided about the condition of the coral reefs before or after Iraq's invasion and occupation of Kuwait, or the nature and extent of the damage to the coral reefs, or the link between such damage and the presence of the refugees. Consequently, the Panel finds that Jordan has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

154. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Jordan's marine resources by the presence of refugees from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

#### 5. Recommended award

155. The Panel's recommendation for compensation for claim No. 5000458 is summarized in table 3.

Table 3. Recommended award for claim No. 5000458

<u>Claim unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage to water resources	86,999,795	nil
Damage to agricultural resources	31,947,837	nil
Damage to wetland resources	17,776,404	nil
Damage to marine resources	37,861	nil
<u>Total</u>	136,761,897	nil

## VII. CLAIMS OF THE STATE OF KUWAIT

### A. Overview

156. In the fourth "F4" instalment, the Panel reviewed three claims submitted by Kuwait for expenses for measures to remediate environmental damage that it alleges resulted from Iraq's invasion and occupation of Kuwait. Claim No. 5000259 is for future measures to remediate damage to sand beaches caused by oil pollution in the Persian Gulf. Claim No. 5000466 is for future measures to

remediate damage to terrestrial resources from stockpiled ordnance and unexploded ordnance, and from open burning/open detonation pits. As stated in paragraph 4, the Panel's recommendations concerning claim No. 5000454 are presented in part two of the fourth "F4" instalment report, (S/AC.26/2004/R.40).

157. One unit of claim No. 5000259, with an asserted value of USD 1,958,947,049 (relating to measures to remediate coastal mudflats damaged by oil spills), has been deferred to be reviewed as claim No. 5000468 in the fifth "F4" instalment.

B. Claim No. 5000259 – Remediation of damage to marine and coastal resources

158. Kuwait seeks compensation in the amount of USD 33,901,560 for expenses of future measures to remediate damage to its coastal environment resulting from Iraq's invasion and occupation of Kuwait. This amount represents a decrease in the compensation claimed, resulting from amendments made by Kuwait on the basis of new information obtained from monitoring and assessment activities.<sup>35</sup>

159. In March 2004, Kuwait submitted a proposal to amend claim No. 5000259 by, *inter alia*, introducing a claim unit for the removal of sunken vessels. By Procedural Order No. 5 dated 10 March 2004, the Panel decided not to accept the proposed amendment. The Panel concluded that the evidence available indicated that Kuwait had been aware of the potential threat to the environment posed by sunken vessels prior to the expiry of both the deadline for filing environmental claims on 1 February 1998 and the deadline for the filing of unsolicited information for the fourth "F4" instalment on 15 May 2001. The Panel noted that Kuwait could have included the claim unit in the submissions that it filed within these deadlines.

160. Kuwait states that its coastal environment was damaged by more than 12 million barrels of oil deliberately released into the Persian Gulf by Iraqi forces.

161. Kuwait asserts that the oil released as a result of Iraq's invasion and occupation of Kuwait dwarfed all previous inputs of oil into the Persian Gulf from spills, refinery operations, natural seeps, exploration and production activities, operational discharges from vessels, urban run-off and similar sources.

162. Kuwait alleges that the 1991 oil spills resulted in oil contamination along its coastline. Based on monitoring and assessment, Kuwait has identified the following specific areas of contamination:

- (a) A coastal oil deposit area;
- (b) Coastal oil trenches comprising the mainland coastal oil trench and the Bubiyan Island coastal oil trench;
- (c) Areas of coastal weathered oil layers; and
- (d) Residual oil contamination in certain areas in the Khiran Inlets.

163. Kuwait states that the coastal oil deposit area, which is an area with visible oil contamination, is located in the supratidal zone north of Kuwait Bay, and that it contains an estimated 23,025 cubic metres of contaminated material.

164. Kuwait states that the mainland coastal oil trench, located in the supratidal zone near Subiyah in North Kuwait Bay, together with related coastal oil deposits, contains an estimated 8,319 cubic metres of contaminated material, while the Bubiyan Island coastal oil trench contains an estimated 30 cubic metres of contaminated material.

165. Kuwait describes the weathered oil layers along the coastline as “discrete patches of oil contamination consisting of asphalt-like mixtures of visible oil and sand along various shoreline locations” that contain an estimate of 4,202 cubic metres of contaminated material.

166. Kuwait states that biomarker analysis of samples taken from the coastal oil deposit area, the mainland coastal oil trench and two areas of weathered oil layers, compared to biomarker data of samples taken from some inland oil fields remaining from Iraqi destruction of oil wells, shows that the contamination in these areas resulted directly from Iraq’s invasion and occupation of Kuwait.<sup>36</sup> Kuwait also states that satellite images and other evidence show that the contamination in the coastal oil deposit area and mainland coastal oil trench area resulted directly from Iraq’s invasion and occupation of Kuwait.

167. Kuwait alleges that approximately 0.7 square kilometres in three sub-areas of the Khiran Inlets are still contaminated by oil. Kuwait presented satellite images from 1991, identifying some coastal accumulations in the Khiran Inlets and the results of chemical analyses of samples collected from these inlets.

168. Iraq’s general position is that, “despite the large volume of the oil spill and its origin in Kuwait waters, it was essentially not Kuwait that saw its shores polluted but Saudi Arabia.”

169. Iraq argues that Kuwait has not demonstrated that the weathered oil layers are a direct result of the 1991 oil spills or that there has been any loss of biological function or that there is any environmental risk.

170. Iraq also states that, although there is evidence that residual oil contamination in certain areas in the Khiran Inlets is linked to the 1991 oil spills, Kuwait has not demonstrated any impairment of ecological function.

171. With regard to the areas of the coastal oil deposit and the mainland coastal oil trench, the Panel observes that the evidence available shows that the areas are almost devoid of plant and animal life. The Panel notes that satellite images and other evidence submitted by Kuwait show that the contamination in the coastal oil deposit and the mainland coastal oil trench areas are a direct result of Iraq’s invasion and occupation of Kuwait. The Panel finds that this damage constitutes environmental damage directly resulting from Iraq’s invasion and occupation of Kuwait, and a programme to remediate it would constitute reasonable measures to clean and restore the environment.

172. However, the Panel finds that Kuwait has not provided sufficient evidence of the existence of the Bubiyan Island coastal oil trench. Consequently, the Panel finds that Kuwait has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules in relation to this portion of the claim.

173. With regard to the weathered oil layers, the Panel notes that some of them are unusually large, indicating that they resulted from an exceptionally large oil spill. Pre-invasion and post-invasion oil spill data for the region show that oil spills that occurred during Iraq's invasion and occupation of Kuwait far exceed in size any other single oil spill. The Panel also notes that there is a high risk of localized adverse ecological impact from these large weathered oil layers.

174. On the other hand, there are also relatively small weathered oil layers whose source is uncertain and which may not be directly related to Iraq's invasion and occupation of Kuwait.

175. The Panel finds that the larger weathered oil layers constitute environmental damage that resulted directly from Iraq's invasion and occupation of Kuwait, and a programme to remediate the damage constitutes measures that are reasonably necessary to clean and restore the environment, in accordance with paragraph 35(b) of Governing Council decision 7.

176. With regard to the residual oil contamination in the Khiran Inlets, the Panel finds that it resulted largely from Iraq's invasion and occupation of Kuwait. The Panel notes from the data submitted by Kuwait that the mean total petroleum hydrocarbon ("TPH") levels in two of the areas targeted for remediation range from 3,000 to 4,000 milligrams per kilogram. In the view of the Panel, contamination in these two areas is a legitimate cause for concern, and it is reasonable for Kuwait to take measures to address the problem in these areas. The Panel, therefore, considers that a programme to remediate the residual oil contamination in these two areas constitutes measures that are reasonably necessary to clean and restore the environment in accordance with paragraph 35(b) of Governing Council decision 7.

177. Kuwait proposes to excavate visibly contaminated areas of the coastal oil deposit and coastal oil trenches and to treat the excavated material with high temperature thermal desorption ("HTTD"). Kuwait proposes to utilize the HTTD plants that it intends to construct for the remediation of damage covered by another of its claims.<sup>37</sup> Kuwait also proposes to apply in situ bioremediation to enhance natural degradation processes for the remaining non-visible contamination. Kuwait then proposes to backfill the excavated area with the cleaned sediment materials generated from the HTTD treatment. Measures to clear the area of ordnance and post-remediation monitoring are also proposed.

178. Kuwait proposes to undertake remediation measures for the weathered oil layers similar to those proposed for the coastal oil deposit and coastal oil trench described in paragraph 177. However, the measures in those areas would not include bioremediation of residual contamination, backfilling, ordnance clearance or separate post-remediation monitoring activities.

179. Kuwait also proposes in situ bioremediation for the residual oil contamination in the Khiran Inlets; post-remediation monitoring; and ordnance management measures.

180. Iraq argues that no compensation should be awarded for ordnance clearance, first, because no claim had previously been submitted for the alleged damage and, secondly, because an award for mine clearance throughout Kuwait has already been made to Kuwait in the second “F4” instalment.

181. Iraq also contends that the HTTD method is too expensive and is inappropriate for the remediation of the damage claimed.

182. The Panel considers that proposed excavation of visibly contaminated material in the areas of the coastal oil deposit and mainland coastal oil trench is reasonable. The Panel also considers that landfilling of the excavated material is a reasonable disposal option.

183. The Panel does not consider that in situ bioremediation of residual contamination and consequential long-term monitoring will be necessary since the proposed remediation programme involves the excavation of all visibly contaminated material. However, the Panel finds that it will be necessary to backfill the excavated area with clean material and also to clear the area of ordnance. In the view of the Panel, removal of ordnance is a reasonable safety measure.

184. The Panel finds that, although in situ bioremediation of residual contamination in the shoreline of the Khiran Inlets appears to be feasible, the available information indicates that the potential benefits of such bioremediation, in terms of reduction of contamination and improvement in ecological function, are uncertain. In the view of the Panel, wet tilling of these areas would be adequate to clean and restore the environment.

185. Details of the modifications and adjustments to the proposed remediation methods are set out in annex II to this report.

186. The Panel finds that, with the modifications outlined in annex II, the remediation measures proposed by Kuwait constitute measures that are reasonably necessary to clean and restore the environment, within the meaning of paragraph 35(b) of Governing Council decision 7.

187. The expenses of the proposed remediation measures have been adjusted to take account of the modifications in annex II and other adjustments including:

- (a) Elimination of in situ bioremediation and long-term monitoring;
- (b) Elimination of HTTD treatment of excavated material;
- (c) Costs of landfilling of excavated material;
- (d) Costs of wet tilling in the Khiran Inlets; and
- (e) Reduction to take account of the portion of the damage in the weathered oil layer areas that may not be attributable to Iraq’s invasion and occupation of Kuwait.

188. These adjustments reduce the compensable expenses to USD 3,990,152.

189. Accordingly, the Panel recommends compensation in the amount of USD 3,990,152 for remediation of damage to Kuwait's coastal resources caused by oil contamination resulting from Iraq's invasion and occupation of Kuwait.

Recommended award

190. The Panel's recommendation for compensation for claim No. 5000259 is summarized in table 4.

Table 4. Recommended award for claim No. 5000259

<u>Claim Unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage to marine resources	33,901,560	3,990,152
<u>Total</u>	33,901,560	3,990,152

191. For the reasons stated in paragraph 359, no date of loss for the purposes of any potential award of interest is indicated for this recommended award.

C. Claim No. 5000466 – Remediation of damage to terrestrial resources

1. Introduction

192. Claim No. 5000466 comprises four claim units, with an asserted value of USD 695,119,160, for expenses of future measures to remediate environmental damage to terrestrial resources alleged to have resulted from Iraq's invasion and occupation of Kuwait. This amount represents an increase in the compensation claimed, resulting from amendments made by Kuwait on the basis of new information obtained from its monitoring and assessment activities.<sup>38</sup>

193. The first claim unit relates to future measures to remediate damage to terrestrial ecosystems alleged to have been caused by stockpiled ordnance and unexploded ordnance at the Umm Al Gawati ordnance repository site.

194. The second claim unit relates to future measures to remediate damage to terrestrial ecosystems alleged to have been caused by stockpiled ordnance and unexploded ordnance at the Umm Ar Russ ordnance repository site.

195. The third claim unit relates to future measures to remediate damage to terrestrial ecosystems at seven open burning/open detonation ("OB/OD") sites.

196. The fourth claim unit relates to future measures to revegetate contaminated and affected areas within the Umm Al Gawati ordnance repository site and the OB/OD sites. This claim unit was transferred from claim No. 5000450 in the third "F4" instalment.

2. Remediation of damage at the Umm Al Gawati ordnance repository site

197. Kuwait seeks compensation in the amount of USD 535,720,804 for expenses of future measures to remediate alleged damage to terrestrial resources at the Umm Al Gawati ordnance repository site from ordnance left in the territory of Kuwait as a result of Iraq's invasion and occupation.

198. According to Kuwait, Iraq's invasion and occupation resulted in over 1.6 million mines and more than 109,000 tons of other unexploded ordnance being scattered throughout its cities, towns, oil facilities, beaches, coastal waters and desert.

199. Kuwait states that the recovered ordnance was moved to a safe location (the Umm Al Gawati site) for final disposal. Kuwait further states that environmental damage in the form of soil contamination has occurred at the Umm Al Gawati site as a result of the leaking of contaminants from the stockpiled ordnance and several spontaneous detonations that occurred at the site from 1992 to June 2003.

200. Kuwait claims that the affected area is 20.26 square kilometres and that the contamination extends to a depth of 1 metre, and estimates that 1,844,093 cubic metres of soil is contaminated.

201. Kuwait states that there are no written reports or analyses of the causes of specific spontaneous detonations. However, Kuwait states that these detonations may be due to a combination of the following factors:

- (a) Many of the pieces of ordnance were not designed for extended life spans or extended storage in the field.
- (b) High temperatures and low humidity can make some munitions unstable, causing spontaneous detonations.
- (c) Explosions in multiple revetments may have occurred when pieces of live ordnance from one revetment have been thrown into others by the force of explosion, thereby detonating the ordnance in other revetments.

202. Kuwait confirms that there were no standard operating instructions or standard operating procedures developed for the ordnance storage facility at the Umm Al Gawati site. Kuwait also states that ordnance was stored in bermed areas, variously described as bunkers, revetments or magazines, with sand walls. These were constructed in varying sizes, but were typically about 60 metres by 70 metres, and Kuwait states that there were no further engineering or design specifications for the facility.

203. Kuwait proposes to remediate the Umm Al Gawati site by instituting a cleaning and restoration programme that includes:

- (a) Clearing and disposing of unexploded ordnance, stored munitions and debris at these sites;

- (b) Excavating and treating contaminated soil using HTTD, followed by backfilling the cleaned soil;
- (c) Covering the treated area with a geomembrane liner and cap; and
- (d) Implementing a revegetation programme in the treated area.

204. Iraq argues that the damage alleged at the Umm Al Gawati site is a direct result of Kuwait's own mismanagement of the site. Specifically, Iraq states that Kuwait has been negligent in not adopting reasonable safety measures in storing ordnance.

205. Iraq further contends that using HTTD to treat excavated soil could have serious adverse environmental impacts.

206. The evidence available to the Panel shows that the alleged damage at the Umm Al Gawati site was caused by several spontaneous detonations that occurred since 1992, and by leakage from stored ordnance. The evidence also shows that Kuwait had failed either to take appropriate and reasonable precautions against the possibility of such spontaneous detonations or to adequately manage a site containing such potentially dangerous substances. In the view of the Panel, the failure of Kuwait to take the necessary measures in the face of a clear risk of damage was the direct cause of the resulting damage, and this broke the chain of causation so as to relieve Iraq of liability for the damage.

207. The Panel, therefore, finds that the alleged environmental damage at the Umm Al Gawati site was not a direct result of Iraq's invasion and occupation of Kuwait. Consequently, expenses for the remediation of the alleged damage at the Umm Al Gawati ordnance repository site are not compensable in accordance with Governing Council decision 7.

208. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused at the Umm Al Gawati site as a result of Iraq's invasion and occupation of Kuwait.

### 3. Remediation of damage at the Umm Ar Russ ordnance repository site

209. Kuwait seeks compensation in the amount of USD 118,055,538 for expenses of future measures to remediate alleged damage to terrestrial resources at the Umm Ar Russ ordnance repository site from ordnance left in the territory of Kuwait as a result of Iraq's invasion and occupation.

210. Kuwait alleges that the ammunition depot at the Umm Ar Russ site was used by ordnance clearance contractors retained by Kuwait during the initial stages of the effort to clear Iraqi mines and ordnance from Kuwait after the liberation of Kuwait.

211. Kuwait states that during 1991 and January 1992, Iraqi ordnance was collected and stored at the Umm Ar Russ site. After a spontaneous detonation of ordnance at the site in January 1992, Kuwait decided that the ordnance should be stored in a more remote location, and accordingly undamaged ordnance was moved to the Umm Al Gawati site.

212. Kuwait alleges that, at the Umm Ar Russ site, 3.55 square kilometres of land is affected by spontaneous detonation of ordnance and by ongoing activities to clear unexploded ordnance and debris. Kuwait states that 0.54 square kilometres of this area can visibly be identified as heavily impacted by soil discoloration and the presence of ordnance on the surface.

213. Kuwait claims that 50 per cent of the heavily impacted area is contaminated and will require excavation and treatment to a depth of 50 centimetres, with a total excavated volume of 135,000 cubic metres. Kuwait's proposed remediation programme for the Umm Ar Russ site is generally similar to the remediation programme that it has proposed for the Umm Al Gawati site, except that natural recovery of vegetation is proposed as against revegetation.

214. Iraq argues that Kuwait has not provided sufficient evidence to demonstrate the nature and extent of the damage at the Umm Ar Russ site, and that the alleged damage is a direct result of Kuwait's own mismanagement of the site. Specifically, Iraq states that Kuwait has been negligent in not following reasonable safety measures in storing ordnance at the site.

215. Iraq also contends that using HTTD to treat excavated soil could have serious adverse environmental impacts.

216. The evidence available to the Panel shows that the alleged contamination at the Umm Ar Russ site was caused by the spontaneous detonations that occurred in 1992. No evidence has been provided by Kuwait that appropriate management procedures were adopted at the Umm Ar Russ site. In the circumstances, the Panel considers that the detonations that caused the alleged damage were the result of mismanagement by Kuwait, including the failure to take adequate precautions to prevent foreseeable damage from the ordnance stored at the site. In the view of the Panel, the mismanagement of the site by Kuwait was the direct cause of the resulting damage, and this broke the chain of causation so as to relieve Iraq of liability for the damage.

217. The Panel, therefore, finds that the alleged environmental damage at the Umm Ar Russ site was not a direct result of Iraq's invasion and occupation of Kuwait. Consequently, expenses of measures to remediate the alleged damage are not compensable in accordance with Governing Council decision 7.

218. Accordingly, the Panel recommends no compensation for the remediation of damage alleged to have been caused at the Umm Ar Russ site as a result of Iraq's invasion and occupation of Kuwait.

#### 4. Remediation of damage at open burning/open detonation sites

219. Kuwait seeks compensation in the amount of USD 2,211,398 for expenses of future measures to remediate damage to terrestrial ecosystems at the seven OB/OD sites alleged to have been caused by disposal of ordnance left in the territory of Kuwait as a result of Iraq's invasion and occupation.

220. Kuwait claims that disposal of mines and unexploded ordnance in OB/OD sites resulted in the presence of residual explosives and explosive-related chemicals at levels that are a potential threat to human health and the environment.

221. Kuwait proposes to remediate the OB/OD sites by instituting a cleaning and restoration programme consisting of:

- a) The identification, removal and destruction of unexploded ordnance and munitions;
- b) Excavation and thermal treatment of contaminated soil using HTTD;
- c) Collection, inspection, separation and treatment of scrap metal using HTTD;
- d) Backfilling excavated areas with treated soil; and
- e) Covering the treated area with a geomembrane liner and a cap of clean soil.

222. Kuwait also proposes a revegetation programme for the treated areas. This programme is discussed in paragraphs 235 to 238 of this report.

223. Kuwait states that disposal of the mines and unexploded ordnance was necessary to mitigate a “lethal threat” to the population of Kuwait and that the use of OB/OD sites was the safest, most efficient and most cost-effective approach for achieving this objective.

224. Kuwait claims that 15 per cent of the total land area of 70,000 square metres at the seven OB/OD sites has been affected by the contamination. Kuwait also claims that the contamination extends to a depth of 1 metre, resulting in a total volume of 4,500 cubic metres of soil that needs to be remediated.

225. Iraq argues that Kuwait has failed to present any evidence to justify the proposed use of HTTD for remediation of alleged contamination. Iraq also argues that the use of OB/OD sites is a standard and widely used method for disposing of live ordnance, and that it does not cause any soil contamination that would require remediation.

226. Further, Iraq contends that Kuwait’s claim that there is soil pollution at the OB/OD sites is based on research into contamination at military sites in the United States, where decades of poor material storage and waste management have resulted in soil and groundwater contamination. Iraq maintains that this research is not relevant to the contamination at the OB/OD sites in Kuwait.

227. Based on the evidence and reports presented in support of this claim, the Panel finds that the presence of ordnance in Kuwait was a direct result of Iraq’s invasion and occupation of Kuwait. As the Panel stated in the second “F4” report, the original destruction and disposal of the ordnance were undertaken in accordance with standard procedures for disposal of ordnance, especially having regard to the circumstances at the time.<sup>39</sup> Consequently, environmental damage resulting from destruction and disposal of ordnance is a direct result of Iraq’s invasion and occupation of Kuwait.

228. The Panel, therefore, finds that a programme to remediate the damage caused to Kuwait’s terrestrial ecosystems from the disposal of ordnance at the OB/OD sites would constitute reasonable measures to clean and restore the environment, in accordance with paragraph 35(b) of Governing

Council decision 7. However, the Panel notes that Kuwait has submitted evidence of damage in respect of only three OB/OD sites, covering approximately 30,000 square metres.

229. In the view of the Panel, Kuwait has not provided convincing evidence that the risks posed by ordnance contamination at the OB/OD sites are such as to require removal and treatment of contaminated soils, followed by the application of an intensive revegetation programme. Furthermore, the Panel considers that the use of HTTD to treat excavated soil which might contain unexploded ordnance would pose significant environmental risks because of the danger of explosion.

230. For these reasons, the Panel considers that the remediation programme proposed by Kuwait needs to be modified. In the view of the Panel, measures aimed at clearing and disposing of ordnance and stabilizing the disturbed surface areas with a layer of gravel would constitute adequate measures in the circumstances. Details of the modifications are set out in annex III to this report.

231. The Panel finds that, with the modifications outlined in annex III, the remediation measures proposed by Kuwait constitute measures that are reasonably necessary to clean and restore the environment, within the meaning of paragraph 35(b) of Governing Council decision 7.

232. The expenses of the proposed remediation measures have been adjusted to take account of the following modifications in annex III and other adjustments including:

- (a) Reduction in the area to be remediated;
- (b) Elimination of the excavation and HTTD treatment of excavated material;
- (c) The cost of regrading of bermed areas; and
- (d) Adjustments of the costs of geophysical surveys, ordnance clearance and site works.

233. These adjustments reduce the compensable expenses of the remediation measures to USD 162,259.

234. Accordingly, the Panel recommends compensation in the amount of USD 162,259 for remediation of Kuwait's OB/OD sites.

5. Revegetation of contaminated and affected areas within the Umm Al Gawati ordnance repository site and the OB/OD sites

235. Kuwait seeks compensation in the amount of USD 39,131,420 for expenses of future measures to revegetate contaminated and affected areas within the Umm Al Gawati ordnance repository site and the seven OB/OD sites.

236. As stated in paragraph 207, the Panel finds that the alleged environmental damage at the Umm Al Gawati site is not a direct result of Iraq's invasion and occupation of Kuwait. Consequently, the Panel recommends no compensation for future measures to revegetate contaminated and affected areas within the Umm Al Gawati site.

237. As stated in paragraph 227, the Panel finds that the damage resulting from the destruction and disposal of ordnance at the OB/OD sites is a direct result of Iraq's invasion and occupation of Kuwait. However, in its review of the future remediation programme proposed for the areas affected within the OB/OD sites, the Panel has recommended an award that includes remediation measures that rely on natural revegetation (annex III, paragraph 7). Consequently, the Panel finds no need for a revegetation programme for these areas.

238. Accordingly, the Panel recommends no compensation for future measures to revegetate contaminated and affected areas within the OB/OD sites.

#### 6. Recommended award

239. The Panel's recommendation for compensation for claim No. 5000466 is summarized in table 5.

Table 5. Recommended award for claim No. 5000466

<u>Claim unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage at the Umm Al Gawati ordnance repository site	535,720,804	nil
Damage at the Umm Ar Russ site	118,055,538	nil
Damage at OB/OD sites	2,211,398	162,259
Revegetation of the Umm Al Gawati site and OB/OD sites	39,131,420	nil
<u>Total</u>	695,119,160	162,259

240. For the reasons stated in paragraph 359, no date of loss for the purposes of any potential award of interest is indicated for this recommended award.

#### D. Recommended awards for the claims of Kuwait in part one of the fourth "F4" instalment

241. The Panel's recommendations for compensation for the claims of Kuwait in part one of the fourth "F4" instalment are summarized in table 6.

Table 6. Summary of recommended awards for the claims of Kuwait

<u>Claim No.</u>	<u>Subject matter</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
5000259	Damage to marine resources	33,901,560	3,990,152
5000466	Damage to terrestrial resources	695,119,160	162,259
<u>Total</u>		729,020,720	4,152,411

## VIII. CLAIMS OF THE KINGDOM OF SAUDI ARABIA

### A. Overview

242. In the fourth “F4” instalment, the Panel reviewed two claims submitted by Saudi Arabia for expenses of measures to remediate environmental damage that it alleges resulted from Iraq’s invasion and occupation of Kuwait. Claim No. 5000455 is for future measures to remediate damage to terrestrial resources. Claim No. 5000465 is for future measures to remediate damage to subtidal resources.

### B. Claim No. 5000455 – Remediation of damage to terrestrial resources

243. Claim No. 5000455 comprises two claim units with an asserted value of USD 9,470,667,058 for the expenses of future measures to be undertaken by Saudi Arabia to remediate environmental damage alleged to have resulted from Iraq’s invasion and occupation of Kuwait. This amount represents an increase in the compensation claimed, resulting from amendments made by Saudi Arabia on the basis of new information obtained from its monitoring and assessment activities.<sup>40</sup>

244. The first claim unit relates to future measures to remediate areas in Saudi Arabia damaged by military encampments, fortifications and roads built by the Allied Coalition Forces.

245. The second claim unit relates to future measures to remediate areas damaged by airborne pollutants from the oil well fires that accumulated in desert areas in the form of soot.

246. In March 2004, Saudi Arabia submitted a proposal to amend this claim by, *inter alia*, adding a claim unit for measures already taken to clean radioactive sites; and for future measures to remediate waste dumps, radioactive firing ranges and related contingency and engineering costs. Saudi Arabia asserted that the amendment was based on the results of monitoring and assessment studies. By Procedural Order No. 9 dated 30 April 2004, the Panel decided not to accept the proposed amendment. The Panel concluded that the evidence available indicated that Saudi Arabia had been aware of the existence of the waste dumps and radioactive firing ranges prior to the expiry of the deadline for both the filing of environmental claims on 1 February 1998 and filing of unsolicited information for the fourth “F4” instalment on 15 May 2001. The Panel noted that Saudi Arabia could have included the claim unit in the submissions that it filed within these deadlines.

#### 1. Remediation of damage resulting from military encampments, fortifications and roads

247. Saudi Arabia seeks compensation in the amount of USD 8,429,835,265 for expenses of future measures to remediate areas allegedly damaged by military encampments, fortifications and roads resulting from Iraq’s invasion and occupation of Kuwait.

248. According to Saudi Arabia, military activity, comprising excavations, grading and general soil movement activities, were carried out by Allied Coalition Forces in Saudi Arabia for structures such as trenches, perimeter walls, housing compounds, concrete structures, paved roads and helipads. Saudi Arabia estimates that approximately 1,312 sites (829 camps and 483 road areas) were constructed in

Saudi Arabia by Allied Coalition Forces during Iraq's invasion and occupation of Kuwait. Saudi Arabia also alleges that, out of 233 sites at which analysis of remote sensing information was evaluated with ground-truthing tests, a total of 192 locations were found to have trenches, 99 sites were found to have perimeter walls, 26 sites were found to have housing walls and nine sites were found to have graded areas, backfilled trenches and paved roads.

249. Saudi Arabia estimates the extent of disturbance by trenches, perimeter walls, housing walls and graded land as 21,948,205 cubic metres in volume. Saudi Arabia estimates that 143 square kilometres of "core" areas and 629 square kilometres of "peripheral" areas were damaged as a result of military activity. Saudi Arabia explains that "[c]ore impacts reflect direct impact associated with the primary uses of the military facilities, while the peripheral disturbance areas reflect indirect impact resulting from persistent usage of the military facilities." According to Saudi Arabia, further environmental damage resulted from 449 square kilometres of roads that were constructed by the Allied Coalition Forces.

250. Saudi Arabia states that the construction of these encampments, fortifications and roads, scattered over a large area of its northern, north-eastern and eastern desert, exposed soil and other materials to wind erosion which adversely affected the desert ecosystem, including soil, desert vegetation, air and biodiversity.

251. Saudi Arabia presented evidence seeking to link alleged environmental damage from encampments and fortifications to military activities during Iraq's invasion and occupation of Kuwait. These include remote sensing studies to identify encampments and fortifications constructed by the Allied Coalition Forces, and analyses of changes in vegetation using the Normalized Difference Vegetation Index (NDVI). Additionally, Saudi Arabia cites published literature describing the activities of the Allied Coalition Forces. Finally, the claim includes photographic documentation, including photographs of military trenches, camps and roads taken from June to August 2003.

252. Iraq contends that the portion of this claim relating to "costs to be incurred in remediating damage to Saudi Arabia's terrestrial environment, allegedly caused by the Allied Coalition Forces when preparing for the ground war" is not eligible for compensation.

253. As a preliminary point, Iraq states that paragraph 34(a) of Governing Council decision 7, which holds Iraq liable for any loss suffered as a result of "military operations or threat of military action by either side during the period 2 August 1990 to 2 March 1991" is "inconsistent with the rules and principles of international law governing state responsibility". Iraq also states that it considers paragraph 34(a) of Governing Council decision 7 to be "inconsistent with Security Council resolution 687 (1991), which establishes that Iraq is only responsible for 'direct' loss, damage or injury". According to Iraq,

"[D]amage caused by the Allied Coalition Forces to the environment in Saudi Arabia cannot be considered, under any known standard of international law, a direct result of Iraq's invasion and occupation of Kuwait, as there were several intervening, superseding events between Iraq's initial action and the subsequent damage. The Allied Coalition

took the decision to react; it decided to use Saudi Arabia for the staging of operations and then carried out the preparations for the ground war in a manner that, according to the Claimant, created lasting damage to the environment.”

254. Iraq further argues that, even on the basis of paragraph 34(a) of Governing Council decision 7, Iraq cannot be held liable for the loss claimed by Saudi Arabia because the alleged damage to Saudi Arabia’s territorial resources “did not result from military operations of the Allied Coalition Forces.” According to Iraq, “the activities of the Allied Coalition Forces in Saudi Arabia can be considered as preparatory activities, but not military operations per se.” Iraq contends that the activities that have allegedly affected Saudi Arabia’s territory “are not military operations by their nature” and they are thus not covered by paragraph 34(a) of Governing Council decision 7. According to Iraq, “building a road, for instance, is not a ‘military operation’ even if that road is then used for transporting troops or armament.” The same applies to the “construction of accommodation for military personnel and storage of space for equipment; digging trenches, constructing fortifications and the manoeuvres of troops before the commencement of hostilities.” Iraq states that “the preparatory character of the activities is demonstrated by the fact that the alleged damage is a result of activities in the area before the conflict”. In particular, Iraq alleges that “the effect of these activities occurred without any combat activity”. Thus, according to Iraq, the damage resulting from the activities “can in no way be considered as a direct result of the conflict.”

255. Finally, Iraq asserts that the costs for which Saudi Arabia claims compensation are excluded by Governing Council decision 19, which “confirms that the costs of the Allied Coalition Forces, including those of military operations against Iraq, are not eligible for compensation”. According to Iraq, these costs must be characterized as “costs of the Allied Coalition Forces, including those of military operations against Iraq”, within the meaning of Governing Council decision 19. Iraq points out that by decision 19 the Governing Council “has distinguished between loss suffered as a result of (a) military operations, including those of the Allied Coalition Forces, on the one hand, and (b) the costs of the Allied Coalition Forces, including those of military operations against Iraq, on the other hand”. Iraq asserts that, “in applying the distinction between loss resulting from military operations and the costs of the Allied Coalition Forces, it must be borne in mind that liability for the former category of loss, irrespective of its author, is a particularity of the UNCC system and an exception to the general principle of liability”. As such, “it must be construed restrictively”, and “in case of doubt about how a particular loss is to be characterized, preference should be given to cost of the Allied Forces, excluding Iraq’s liability”.

256. In this regard, Iraq observes that the costs of activities of the Allied Coalition Forces, such as transporting the Allied Coalition Forces to Saudi Arabia and installing these forces in Saudi Arabia; setting up their camps; staging their equipment and supplies; constructing fortifications, roads and the infrastructure for their operations; and positioning the troops for military operations, are “undoubtedly costs of the Allied Coalition Forces” and “cannot be considered as loss suffered as a result of military operations”. Iraq further argues that “the costs of closing up the camps, filling in the fortifications and removing the installations are of the same nature as those for establishing the camps and other installations and facilities” because “they are merely the reverse side of the original costs”. Hence

these costs do not qualify as “a loss suffered as a result of military operations”, and Iraq “is not liable for them under paragraph 34(a) of Governing Council decision 7”. According to Iraq, these costs are barred by Governing Council decision 19 and thus not eligible for compensation.

257. In response to Iraq’s contention that the damage to Saudi Arabia’s terrestrial environment in this claim did not result from “military operations or the threat of military operations”, Saudi Arabia points out that the damage for which it claims compensation “arises from the establishment of defensive positions to repel the Iraqi forces that invaded and occupied Kuwait and threatened to invade Saudi Arabia and from the operations to expel those Iraqi forces from Kuwait”. Saudi Arabia notes that its territory was the subject of military operations as well as threats of military action from Iraq during the period August 1990 to February 1991. In this regard, Saudi Arabia refers to the finding of the “F2” Panel of Commissioners in the report on its second instalment, which stated:

“Not only was Saudi Arabia subject to actual military operations ... but it was also the subject of threats of military action, including verbal threats, the threat posed by the massing of Iraqi troops into the Saudi Arabian border on 3 August 1990 and the aiming of Scud missiles at the territory of Saudi Arabia during the period of Iraq’s invasion and occupation of Kuwait. The incursion of Iraqi troops in the Saudi Arabian territory in January 1991 confirmed the reality of the threat of military action posed by Iraq to Saudi Arabia during the period of Iraq’s invasion and occupation of Kuwait.”<sup>41</sup>

258. Saudi Arabia asserts that the invasion and occupation of Kuwait by Iraq and the threat - and indeed the reality - of further military action against Saudi Arabia by Iraq created the imperative for military operations by Saudi Arabia. Saudi Arabia argues, therefore, that these actions constituted a reasonably foreseeable response to the stark threat of military action posed by Iraq and, thus, the consequential environmental damage is a direct result of Iraq’s invasion and occupation of Kuwait.

259. With regard to Iraq’s contention that Governing Council decision 19 bars recovery of part of this claim, Saudi Arabia points out that, pursuant to Governing Council decision 7, Iraq is liable for, among other things, “any loss suffered as a result of military operations or threat of military action by either side during the period 2 August 1990 to 2 March 1991.” Saudi Arabia argues that Governing Council decision 19 has no relevance to the environmental damage caused to the territory of Saudi Arabia as a result of military operations in Saudi Arabia, whether by Iraq or by the Allied Coalition Forces.

260. Saudi Arabia notes that decision 19 is “a one sentence ruling which does not purport to define or clarify the principles of compensation set out in Security Council resolution 687(1991) and Governing Council decision 7”. Specifically, Saudi Arabia points out that “nothing in decision 19 addresses environmental damage or suggests that decision 19 was ever intended to preclude recovery of compensation for any such damages”. According to Saudi Arabia, Governing Council decision 19 “implemented a narrowly focused policy against requiring Iraq to pay for the military costs of the Allied Coalition Forces”, and must be read together and interpreted in harmony with Security Council resolution 687 (1991) and Governing Council decision 7.

261. Saudi Arabia further notes that the “unequivocal language of [Governing Council] decision 7 regarding recovery of compensation for environmental damage and depletion of natural resources was issued by the Governing Council before it issued decision 19”. According to Saudi Arabia, “had the Governing Council meant to repeal this aspect of decision 7 and bar compensation for costs of critically important environmental measures, the Council should have and would have used specific language to that effect. It did not do so.”

262. Saudi Arabia maintains that its analysis of the intent and scope of Governing Council decision 19 is consistent with, and supported by, the decisions of other panels of Commissioners, including the “F2” and “F3” Panels of Commissioners. In this regard, Saudi Arabia notes that “in every case where the “F2” Panel found a claim to be excluded by decision 19, the claim was for monetary expenses or the economic value of services provided contemporaneously with the presence of the 1990-1991 Coalition Forces”. In contrast, Saudi Arabia observes that both the “F2” and “F3” Panels of Commissioners had found that decision 19 “did not apply to damages caused by a consequence of military action, such as the damage to roads caused by military activity, the inability to care for vegetation or the inability to properly maintain ships”. In this connection, Saudi Arabia points out that “[t]here are no costs in its claim that were paid or incurred during the period when the Allied Coalition Force existed or which related to the costs of the Allied Coalition Forces. Rather, virtually all of the costs in the claim are for environmental remediation actions that are still, even today, in the future.”

263. Saudi Arabia also argues that, “as a matter of fundamental law”, Governing Council decision 19 could not restrict Saudi Arabia’s right to engage in self-defence, a right that it considers to be a matter of jus cogens and is enshrined in Article 51 of the Charter of the United Nations. Saudi Arabia states that “in this instance, there was an overlap of inherent self-defence and Security Council action”. It maintains that the activities of Saudi Arabia’s forces in establishing and using defensive positions in northern Saudi Arabia represented “the continued lawful exercise of the Kingdom’s inherent and fundamental right of self-defence”. Saudi Arabia, therefore, submits that Governing Council decision 19 must be carefully applied against this background. In its view, “[h]ad the Governing Council intended to deprive the Kingdom of compensation for costs as a result of the exercise of its fundamental right of self-defence, the Governing Council would have done so directly”.

264. With regard to Iraq’s contention that it should not be held liable for damage that resulted from military operations or threat of military action by the Allied Coalition Forces, the Panel considers it sufficient to refer to its previous finding that losses or expenses which are a direct result of Iraq’s invasion and occupation of Kuwait are compensable “regardless of whether [they] resulted from military operations of Iraq or the Allied Coalition Forces”.<sup>42</sup>

265. The Panel does not consider that it is within the scope of its mandate to address Iraq’s contention that paragraph 34(a) of Governing Council decision 7 is inconsistent with “the rules and principles of international law governing state responsibility” and Security Council resolution 687 (1991).

266. With regard to Iraq’s assertion that the damage in Saudi Arabia was not the result of “military operations”, the Panel notes that there is ample evidence that considerable military operations took

place on the territory of Saudi Arabia to mobilize forces not only to repel actual attacks and counter real threats of military attacks by Iraq on Saudi Arabia but also to expel Iraqi forces from Kuwait and Saudi Arabia. As the “F2” Panel of Commissioners found in the report on its first instalment, “the military operations of both Iraq and the Allied Coalition Forces included for some time substantial portions of Saudi Arabia”.<sup>43</sup> The Panel notes, in this regard, that the damage to terrestrial resources for which Saudi Arabia claims compensation is alleged to have occurred between 2 August 1990 and 2 March 1991, while Saudi Arabia was subject to threats of military action from Iraq and its territory was the scene of actual military operations by Iraq and the Allied Coalition Forces.

267. With regard to the applicability of Governing Council decision 19 to part or all of this claim, the Panel observes that both Iraq and Saudi Arabia recognize the need to distinguish between two categories of losses, namely, (a) losses suffered as a result of military operations or threat of military action by either side during the period 2 August 1990 to 2 March 1991, on the one hand, and (b) losses that should be considered as “the costs of Allied Coalition Forces, including those of military operations against Iraq” as provided for in Governing Council decision 19, on the other hand. Hence, in the view of the Panel, the only issue for decision is whether expenses of reasonable measures to remediate environmental damage in Saudi Arabia that resulted directly from the operations of the Allied Coalition Forces fall within the category of “costs of Allied Coalition Forces, including those of military operations against Iraq”, within the meaning of Governing Council decision 19.

268. The Panel notes that Security Council resolution 687 (1991) as well as Governing Council decision 7 establish a general principle that Iraq is liable for all losses directly resulting from its invasion and occupation of Kuwait. Governing Council decision 7 elaborates and provides guidance on the types of losses that are encompassed in Iraq’s overall liability. “Environmental damage and the depletion of natural resources” are expressly included in these types of losses. Further, paragraphs 34 and 35 of Governing Council decision 7, read together, make it clear that losses or expenses resulting from reasonable measures incurred or to be incurred to clean and restore the environment are eligible for compensation, if damage to the environment is a direct result of, *inter alia*, “military operations or threat of military action by either side during the period 2 August 1990 to 2 March 1991”.

269. In the view of the Panel, the specific exemption from liability that was affirmed by Governing Council decision 19 relates to the economic costs incurred by the Allied Coalition in undertaking or supporting military operations against Iraq. There is no evidence that Governing Council decision 19 was meant to alter the basic principle of compensation set out in Security Council resolution 687 (1991) and Governing Council decision 7. In particular, there is no basis for asserting that Governing Council decision 19 requires the term “costs of military operations” to be interpreted so widely as to include “environmental damage and the depletion of natural resources” that resulted directly from Iraq’s invasion and occupation of Kuwait.

270. The Panel, therefore, finds that expenses incurred or to be incurred by Saudi Arabia for reasonable measures to remediate environmental damage resulting directly from military operations by Iraq or by the Allied Coalition Forces during the period 2 August 1990 to 2 March 1991 are, in

principle, eligible for compensation, in accordance with paragraph 34(a) of Governing Council decision 7.

271. The Panel notes that this finding is consistent with its previous findings. In the first “F4” report, the Panel considered claims for monitoring and assessment programmes proposed by Saudi Arabia in relation to environmental damage alleged to have resulted from “the deployment and movement of troops and associated support and combat vehicles” of the Allied Coalition Forces.<sup>44</sup> Referring to paragraph 34(a) of Governing Council decision 7, the Panel noted that “it is possible that the desert surface, groundwater, and ecology of the Saudi Arabian desert were damaged as a result of [among other things] the extensive movements of military personnel and equipment.”<sup>45</sup> The Panel then concluded that it was “appropriate for Saudi Arabia to undertake monitoring and assessment to evaluate the damage and determine the need for, and means of, remediation.”<sup>46</sup> On that basis the Panel found that a number of monitoring and assessment programmes proposed by Saudi Arabia in relation to the alleged environmental damage constituted “reasonable monitoring and assessment” and, consequently, that expenses of the programmes “qualify for compensation in accordance with paragraph 35 (c) of Governing Council decision 7.”<sup>47</sup> The Panel also notes that its finding is consistent with the findings of other panels of Commissioners.<sup>48</sup>

272. With regard to the nature and extent of damage and the need for remediation, Iraq contends that the satellite imagery submitted by Saudi Arabia demonstrates that the vegetation in the allegedly affected area has considerably recovered since 1992, and that the vegetation cover is now better than before Iraq’s invasion and occupation of Kuwait. Additionally, Iraq asserts that parallel causes such as overgrazing and off-road vehicle use contributed to the alleged environmental damage. While Iraq agrees that there has been some damage to the desert surface in areas of encampment, manoeuvres and roads, it nevertheless questions the extent of this damage, particularly in peripheral areas. In addition, Iraq refers to Saudi Arabia’s acknowledgement that a “significant number of the roads built during the Allied Coalition war effort continue to be used by Bedouin herders, the Saudi Arabian Coast Guard and recreational users”. Iraq asserts that “if these roads are to be considered environmental damage, then the principal cause of the damage is the subsequent continued use of these roads rather than the operations of the Allied Coalition Forces in 1990 and 1991”.

273. In the view of the Panel, there is evidence that the Allied Coalition Forces constructed military encampments, fortifications and roads in north-eastern Saudi Arabia during 1990 and 1991. The published literature contains descriptions of the movement of the Allied Coalition Forces in Saudi Arabia, and of the construction of military structures and roads during Iraq’s invasion and occupation of Kuwait. Saudi Arabia has also provided remote sensing data and the result of field investigations undertaken by it before and after Iraq’s invasion and occupation of Kuwait, that demonstrate widespread changes in the desert surface over the relatively short period of two or three years. The evidence also shows that the scouring and excavation activities to construct the encampments, fortifications and roads clearly damaged vegetation and soil.

274. The Panel, therefore, finds that construction of military encampments, fortifications and roads caused environmental damage to Saudi Arabia's desert areas which is a direct result of Iraq's invasion and occupation of Kuwait.

275. However, while the Panel considers that Saudi Arabia's estimate of the core areas damaged by military activity is accurate, the extent of the damaged peripheral areas appears to have been overestimated.

276. The Panel notes that the evidence available does not support Saudi Arabia's claim that the entire area damaged by military activities is compacted. Much of the damaged area experienced soil crusting or pulverization, which is more amenable to natural recovery processes. In the view of the Panel, the only areas that can be considered to be generally compacted are the core disturbance areas. In the peripheral areas only an estimated 20 per cent of the damaged area is compacted.

277. Similarly, the Panel considers that only an estimated 10 per cent of roadways suffered from soil compaction and that, although there was soil compaction in low-lying areas where moist soil would have been more prevalent, many areas contained pulverized soil, instead of compacted soil. The Panel notes that, from the perspective of potential ecological recovery, this is an important difference.

278. The Panel also considers that Saudi Arabia's estimate of the total area of roadways resulting from the Iraq's invasion and occupation of Kuwait is overstated. The Panel concludes that Saudi Arabia's remote sensing estimate of the average width of the roads as 25 metres is excessive and considers that a 10-metre width is a more accurate estimate.

279. While the Panel is satisfied that construction of military encampments, fortifications and roads was the major cause of environmental damage at these sites, it finds that uncontrolled livestock grazing and associated vehicle movements, both before and after Iraq's invasion and occupation of Kuwait, have also caused damage to the desert areas where military activities occurred. Accordingly, the Panel finds that the damage to these areas is not attributable solely to Iraq's invasion and occupation of Kuwait.

280. To minimize long-term negative impacts, Saudi Arabia proposes to restore the most damaged areas of its desert environment to a viable condition. Saudi Arabia states that vegetative cover is critical for the sustainability of the desert ecosystem as a whole, and proposes to undertake a programme of revegetation targeted at specific damaged areas.

281. Saudi Arabia's goal for restoring core, peripheral and roadway areas damaged by military activity is to restore them to levels comparable to undisturbed locations near the areas. Remediation is planned for all the core and peripheral areas. Saudi Arabia proposes to remediate only 90 per cent of the disturbed roadway areas. According to Saudi Arabia, this is to allow continued use of some of the roadways as access roads for local residents and herders, and for personnel and equipment engaged in remediation activities.

282. Based on pilot studies, Saudi Arabia proposes to eliminate compaction and restore the natural contour. All core, peripheral and roadway areas are proposed to be regraded and deep-ripped to a depth of 0.4 metres which would open up the soils to water infiltration and facilitate movement of soil macro-organisms. These areas would then be seeded and planted with shrubs, using material from nurseries established for this purpose, with the application of amendments. Pivot irrigation systems would be used to establish a stable water regime of between 200 and 250 millimetres per year. Saudi Arabia states that these restored sites would act as resource islands which would also promote revegetation of the adjacent areas. Restored areas would be fenced to manage or exclude grazing and recreational activities. Saudi Arabia plans to institute short-term and long-term monitoring programmes to assess the success of restoration. In addition, Saudi Arabia plans to build asphalt roads to facilitate movement of heavy equipment, personnel and materials to remediation sites. These roads will also help to channel desert traffic through established corridors.

283. Iraq contends that the proposed regrading of berms would set back restoration that has occurred naturally since 1992, and that deep ripping should only take place where it is clearly demonstrated that compaction will continue to impede vegetation growth. Iraq states that Saudi Arabia has presented little information on this aspect. Iraq also questions the necessity of large-scale seeding, nursery facilities and trial plots as proposed by Saudi Arabia, and asserts that the principal limiting factors for establishment of desert vegetation are water and grazing. Iraq states that irrigation is unlikely to be necessary and suggests that other measures, such as contour seeding and provision of dikes to capture rainwater for water spreading, would be more practical. According to Iraq, fencing and monitoring would be a better way to return to prior conditions and to provide rangeland productivity.

284. Iraq also states that continued use of the roads since 1991 and misuse of the rangelands have been the primary causes of the lack of recovery of vegetation in the areas of the roads. Accordingly, the prevention of further use of the roads to facilitate natural recovery, in combination with a proper rangeland management programme, would be the most appropriate method to promote revegetation.

285. The Panel finds that Saudi Arabia's objectives for remediation of the damage from the activities of the Allied Coalition Forces in Saudi Arabia are appropriate. In the view of the Panel, compacted core, peripheral and roadway areas will not recover without some form of remediation to loosen the soils. The Panel notes that vegetation has clearly been damaged in these areas and revegetation is necessary to restore ecological functions. However, the Panel considers that Saudi Arabia's proposals need to be modified because not all the sites are compacted. In the view of the Panel, it is not necessary to revegetate hundreds of small, isolated areas of damage, as suggested by Saudi Arabia.

286. The Panel has indicated a modified remediation programme, details of which are set out in annex IV to this report.

287. The Panel finds that, with the modifications outlined in annex IV, the remediation measures proposed by Saudi Arabia constitute measures that are reasonably necessary to clean and restore the environment, within the meaning of paragraph 35(b) of Governing Council decision 7.

288. The Panel emphasizes that in order to ensure the success of the remediation measures, it will be necessary for Saudi Arabia to adopt appropriate measures to protect vulnerable areas, such as fencing to control grazing and the use of off-road vehicles.

289. The expenses of the proposed remediation measures have been adjusted to take account of the modifications in annex IV and other adjustments including:

- a) Reduced amount of peripheral and road areas which require remediation;
- b) An adjustment to take account of the fact that uncontrolled livestock grazing contributed to the damage;
- c) Reduction in the area to be decompacted;
- d) Construction of revegetation islands;
- e) Elimination of construction of asphalt roads; and
- f) Reductions of labour and material costs by applying appropriate rates.

290. These adjustments reduce the compensable expenses to USD 618,974,433.

291. Accordingly, the Panel recommends compensation in the amount of USD 618,974,433 for remediation of damage in Saudi Arabia resulting from military encampments, fortifications and roads.

## 2. Remediation of damage resulting from soot deposition

292. Saudi Arabia seeks compensation in the amount of USD 1,040,831,793 for expenses of future measures to remediate areas allegedly damaged by soot deposition from the oil well fires in Kuwait.

293. According to Saudi Arabia, heavy soot from the oil well fires was deposited over an area of approximately 7,227 square kilometres of its desert areas. Saudi Arabia states that 31 square kilometres of khabari areas and 101 square kilometres of sabkha areas were contaminated by soot from the smoke plume resulting from the oil well fires. Saudi Arabia alleges that the soot degraded the desert ecosystems and poses potential risks to livestock, flora and fauna that rely on the water in these basins.

294. Saudi Arabia further states that information collected during the course of the damage survey indicated elevated levels of total petroleum hydrocarbons ("TPH"), accumulated in depressions, and that there are indications that low levels of polycyclic aromatic hydrocarbons ("PAH") contaminants were present in the regional vegetation. Saudi Arabia also asserts that there has been a noticeable reduction in the occurrence of Rimth (Haloxylon salicornicum), an important rangeland shrub, and that, to date, this species has not successfully recovered in many areas of the desert.

295. Iraq states that there is no evidence of residual damage from the effects of the smoke plume either on the soils or on vegetation. Iraq agrees with Saudi Arabia's estimate of the soot deposition

area but states that its own smoke plume modelling shows that soot concentrations were five times less than those alleged by Saudi Arabia. Iraq also asserts that the small number of locations studied cannot be representative of the vast area (132 square kilometres) claimed to have been affected and that, on the basis of internationally accepted criteria, the TPH concentrations reported by Saudi Arabia would not trigger remediation measures. Iraq also states that Saudi Arabia has assumed that all TPH must be derived from soot deposition caused by oil well fires in Kuwait. Iraq points out that the depressions where run-off allegedly concentrated are not far from the oil-producing wells of Fawaris and other oil facilities in Saudi Arabia, and the small amount of TPH found could easily have originated from these or other sources. Iraq also disputes Saudi Arabia's assertion that there was vegetation damage, especially to Rimth, as a result of soot deposition.

296. The Panel considers that, although soot deposition may have caused damage to plants at the time of the oil well fires, Saudi Arabia has not demonstrated the presence of any residual, ongoing damage to soils that would require remediation. The Panel notes that Saudi Arabia's soil sampling data suggest that very low levels of contamination do not pose any significant environmental threats. Further, the Panel does not consider that there is any evidence to attribute the alleged reduction in the occurrence of Rimth to contamination resulting from the oil well fires, rather than to other possible causes.

297. The Panel, therefore, finds that Saudi Arabia has not provided sufficient evidence to establish environmental damage from soot deposition from the oil well fires in Kuwait. Consequently, Saudi Arabia has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

298. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Saudi Arabia's desert ecosystems by soot deposition from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

### 3. Recommended award

299. The Panel's recommendations for compensation for claim No. 5000455 are summarized in table 7.

Table 7. Recommended award for claim No. 5000455

<u>Claim unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage resulting from military fortifications, encampments and roads	8,429,835,265	618,974,433
Damage resulting from soot deposition	1,040,831,793	nil
<u>Total</u>	9,470,667,058	618,974,433

300. For the reasons stated in paragraph 359, no date of loss for the purpose of any potential award of interest is indicated for this recommended award.

C. Claim No. 5000465 – Remediation of damage to marine resources

301. Saudi Arabia seeks compensation in the amount of USD 1,844,497,435 for expenses of future remediation of damage alleged to have been caused by sunken oil in the marine environment of Saudi Arabia as a result of Iraq's invasion and occupation of Kuwait. This amount represents a decrease in the compensation claimed, resulting from amendments made by Saudi Arabia on the basis of new information obtained from monitoring and assessment activities.<sup>49</sup> This claim is a deferred portion of claim No. 5000451 that was reviewed by the Panel in the third "F4" instalment.

302. Saudi Arabia states that, although there is no indication of severe oil contamination related to Iraq's invasion and occupation of Kuwait in subtidal sediments in its offshore territorial waters in the Persian Gulf, such contamination is present in the nearshore subtidal environment. Saudi Arabia asserts that the subtidal oil contamination is the combined result of the sinking of oil spilled during the invasion and the movement of invasion-related contaminated sediment from the coastline into the nearshore subtidal areas.

303. Saudi Arabia states that its previous submissions had shown that the shoreline contamination from the Kuwait border to Abu Ali resulted from the 1991 oil spills during Iraq's invasion and occupation of Kuwait.<sup>50</sup> Saudi Arabia also asserts that the location, nature and levels of subtidal contamination found at a number of sites are consistent with the redistribution of shoreline oil as a result of erosion and is, therefore, also attributable to the 1991 releases. Saudi Arabia adds that its fingerprinting analyses of subtidal sediment samples, collected from a few nearshore areas with total petroleum hydrocarbons ("TPH") levels exceeding 1,000 milligrams per kilogram, indicate invasion-related sources.

304. Saudi Arabia states that the specific areas identified for remediation show "significantly elevated levels of TPH sediment concentrations; i.e. greater than 200 mg/kg," and that such levels have adverse impacts on ecological communities in the subtidal sediments. Saudi Arabia seeks to support its assertion by making statistical comparisons of benthic samples from five impacted and five control locations. Saudi Arabia also states that it conducted an ecological risk assessment that found contaminated sediments with toxicity levels above acceptable risk thresholds. Saudi Arabia further claims that there is a risk that contaminated sediments may be released back into the water column, resulting in further adverse ecological impacts.

305. Iraq states that the evidence presented by Saudi Arabia does not support the claim that the subtidal contamination is a result of sedimentation from the contaminated coastline. According to Iraq, "these areas are subject to ongoing chronic pollution from routine sources" unrelated to the events arising from Iraq's invasion and occupation of Kuwait and it bears no responsibility for this.

306. Iraq further argues that natural recovery has already occurred with respect to any damage originating from the 1991 oil spills, since the area involved is located in a "sink". Iraq states that the

waters in the bays have a very poor turnover rate and, accordingly, any contamination is effectively locked up in the sediment and would not be released into the water column.

307. Iraq also states that there are serious flaws in the design of Saudi Arabia's study of the affected and control sites; and that this makes it impossible to draw any conclusions concerning the existence or extent of environmental impact from the alleged subtidal contamination.

308. On the basis of the information available, the Panel finds that oil contamination present in most of the areas that Saudi Arabia proposes to remediate is not sufficient to cause damage.

309. The Panel, however, notes from the data submitted by Saudi Arabia that very high TPH levels of up to 61,000 milligrams per kilogram have been recorded in a part of the Balbol area which is located in the area that Saudi Arabia proposes to remediate. The Panel also notes that the evidence available indicates that most of the contamination in this area resulted from Iraq's invasion and occupation of Kuwait. In the view of the Panel, contamination in the area with these elevated TPH levels (tens of thousands of milligrams per kilogram) is a legitimate cause for concern, and it is reasonable for Saudi Arabia to take measures to address the problem in that area.

310. The Panel, therefore, finds that contamination in the part of the Balbol area with elevated TPH levels constitutes environmental damage directly resulting from Iraq's invasion and occupation of Kuwait. Consequently, a programme to remediate the contamination would qualify as reasonable measures to clean and restore the environment in accordance with paragraph 35(b) of Governing Council decision 7. However, the evidence suggests that some of the contamination may be due to other factors unrelated to Iraq's invasion and occupation of Kuwait.

311. Saudi Arabia proposes to remediate 54 subtidal areas that are in the nearshore areas within the Dafi-Mussallamiyah Bays and the Tanajib-Manifa Bays, with a total area of 39,176,470 square metres and total volume of 9,066,065 cubic metres.

312. Saudi Arabia states that it would extend the remediation activities proposed for the contaminated coastline to adjoining contaminated near-shore subtidal areas, up to a depth of 2 metres and a distance of 250 metres from the coastline. These areas are to be bermed, dried and excavated; and the excavated sediments are to be treated using high temperature thermal desorption ("HTTD"). Any residual contamination at the excavated sites would be treated using bioremediation techniques. Contaminated subtidal areas outside these locations would be dredged. Dredged and excavated sediments would be treated using HTTD; and the remediated sites would be monitored.

313. The Panel has indicated a modified remediation programme that it considers to be appropriate in the circumstances. The modified remediation programme involves targeted dredging of one highly contaminated sub-site within Balbol, landfilling of the dredged sediments and pre-remediation and post-remediation activities to evaluate ecological risks and remediation effectiveness. Details of the modifications are set out in annex V to this report.

314. The Panel finds that, with the modifications outlined in annex V, the remediation measures proposed by Saudi Arabia constitute measures that are reasonably necessary to clean and restore the environment, within the meaning of paragraph 35(b) of Governing Council decision 7.

315. The expenses of the proposed remediation measures have been adjusted to take account of the modifications indicated in annex V, including:

- (a) Reduction in the area to be remediated;
- (b) Elimination of HTTD treatment of excavated material;
- (c) Landfilling of excavated material; and
- (d) Elimination of in situ bioremediation of bermed areas.

316. An adjustment has also been made to take account of part of the damage at the sub-site within Balbol that may not be attributable entirely to Iraq's invasion and occupation of Kuwait.

317. The modifications and adjustments reduce the compensable expenses to USD 6,172,274.

318. Accordingly, the Panel recommends compensation in the amount of USD 6,172,274 for remediation of damage to Saudi Arabia's marine resources resulting from Iraq's invasion and occupation of Kuwait.

#### Recommended award

319. The Panel's recommendation for compensation for claim number 5000465 is summarized in table 8.

Table 8. Recommended award for claim No. 5000465

<u>Claim unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage to marine resources	1,844,497,435	6,172,274
<u>Total</u>	1,844,497,435	6,172,274

320. For the reasons stated in paragraph 359, no date of loss for the purposes of any potential award of interest is indicated for this recommended award.

D. Recommended awards for the claims of Saudi Arabia

321. The Panel's recommendations for compensation for the claims of Saudi Arabia are summarized in table 9.

Table 9. Summary of recommended awards for the claims of Saudi Arabia

<u>Claim No.</u>	<u>Subject matter</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
5000455	Damage to terrestrial resources	9,470,667,058	618,974,433
5000465	Damage to marine resources	1,844,497,435	6,172,274
<u>Total</u>		11,315,164,493	625,146,707

## IX. CLAIM OF THE SYRIAN ARAB REPUBLIC

A. Overview

322. Claim No. 5000457 comprises three claim units, with an asserted value of USD 1,634,619,154, submitted by Syria for expenses of measures to remediate environmental damage alleged to have resulted from Iraq's invasion and occupation of Kuwait. Syria proposes to take measures to remediate damaged water and forest resources.

323. One unit of claim No. 5000457 (relating to damage to agricultural resources from the oil well fires in Kuwait) has been deferred to be reviewed as claim No. 5000467 in the fifth "F4" instalment.

324. Syria alleges that its environment was damaged by airborne contaminants from the oil well fires in Kuwait. Syria seeks compensation for alleged damage to surface water and groundwater and damage to forests (including fruit trees).

325. The first and second claim units relate to alleged damage to Syria's groundwater and surface water caused by pollutants from the oil well fires in Kuwait. According to Syria, the contamination affected the quality of water used for agricultural, industrial and drinking purposes.

326. The third claim unit relates to alleged damage caused to forest resources by pollutants from the oil well fires. Syria alleges that almost all the seedlings of the 1991 growing season were destroyed. Syria also alleges that there was a high rate of loss of seedlings and of mature broadleaved trees, whereas the majority of mature coniferous trees were not affected.

B. Claim No. 5000457 – Remediation of damage to groundwater, surface water and forest resources

1. Remediation of damage to groundwater resources

327. Syria seeks compensation in the amount of USD 890,868,597 for expenses of measures to clean and restore contaminated drinking water wells that it alleges were polluted by contaminants from the oil well fires in Kuwait. Syria alleges that drinking water wells, particularly in the Yarmouk, Orontes, Euphrates and Tigris-Khabour Basins, were polluted by increased concentrations of sulphate, nitrate and ammonia which were deposited through rainfall. According to Syria, 10 per cent of the wells were affected.

328. Syria states that, as a result of the exposure to polluted air masses, wet and dry deposition processes occurred over its south-eastern territories. The dry deposition was in the form of gaseous pollutants (sulphur dioxide, carbon dioxide, carbon monoxide, nitrogen oxide and volatile organic compounds) and soot particles containing metals (vanadium, nickel, cobalt, chromium and iron) as well as polycyclic aromatic hydrocarbons (“PAH”), including benzo(a)pyrene, which is known to be a carcinogen. According to Syria, the wet deposition might have included acidic components, ionic components, soluble metals, elemental carbon and soluble organic fractions.

329. Iraq contends that there is no evidence that the “smoke plume” from the oil well fires in Kuwait reached Syria. In any case, Iraq asserts that there is no evidence to link the smoke plume to groundwater contamination anywhere in the region and that, given the depth of these groundwater wells, it is unlikely that they were contaminated by rainfall.

330. Iraq questions the alleged impact of the “smoke plume” from oil well fires in Kuwait on the air and rainwater quality in Syria. It states that no field evidence is provided by Syria to support the claim that surface or groundwater has been contaminated. Iraq argues that samples collected only once a year from the rivers or aquifers are insufficient to prove any damage to the surface or groundwater quality. Moreover, Iraq states that the sulphate and nitrate content of water in Syria before, during and after 1991 remained far below World Health Organization drinking water standards.

331. Iraq points out that, although Syria alleges that its groundwater was affected by sulphate, nitrate and ammonia and claims that 10 per cent of its 2,000 drinking wells across the country were affected, there is no evidence in the documentation submitted by Syria that shows damage to the wells or indicates the location of the wells alleged to have been damaged.

332. According to Iraq, the monitoring and assessment data submitted by Syria provide no evidence of surface or groundwater contamination. Iraq states that Syria has provided no details concerning the affected wells, such as type of aquifer, baseline data and trends for nitrate, sulphate and salinity, age of water, or other potential causes of these contaminants. Moreover, Iraq asserts that the analytical parameters are in most cases below drinking water standards.

333. The Panel considers that the data presented by Syria are inconclusive. In particular, the scarcity of pre-invasion data makes it difficult to assess the full significance of the post-invasion data.

334. In the view of the Panel, while some contamination of rainfall in Syria may have resulted from the oil well fires in Kuwait, it is unlikely that this would have resulted in contamination of groundwater resources in Syria. On the basis of the limited data available, the Panel considers that the amount of nitrate and sulphate that could have reached the groundwater (through a combination of wet deposition, dry deposition and infiltrating rainwater) would have been minimal.

335. The Panel, therefore, finds that Syria has not provided sufficient evidence to demonstrate damage to its groundwater resources from pollutants resulting from the oil well fires in Kuwait. Consequently, Syria has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

336. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Syria's groundwater resources by pollutants from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

## 2. Remediation of damage to surface water resources

337. Syria seeks compensation in the amount of USD 664,142,539 for expenses of measures to clean and restore surface water alleged to have been contaminated as a result of Iraq's invasion and occupation of Kuwait.

338. Syria states that its surface water resources were contaminated by pollutants from the oil well fires in Kuwait that were deposited on the ground in its territory. Syria alleges that the deposited contaminants caused a deterioration in the quality of surface water by increasing the levels of suspended solids and the demand for chemical oxygen and by decreasing the level of pH. According to Syria, this made it necessary to increase the quantities of chemicals used to treat the water. Syria alleges that 500 million cubic metres of surface water and 300 million cubic metres of industrial water were affected, and that the period of restoration was five years.

339. Iraq states that Syria has failed to prove any damage to its surface water resources. Iraq argues that, if surface waters were contaminated by suspended solids or chemicals from black or acid rain as is claimed, the damage would have been short-lived, lasting for some hours or at most days after the rains which occurred in 1991, which were very infrequent.

340. The Panel finds that Syria has failed to establish that contamination from the oil well fires in Kuwait caused damage to its surface water resources. In the view of the Panel, the data provided by Syria do not provide an adequate basis to identify the extent of any contamination. Furthermore, Syria has not shown a causal link between any increased water treatment costs and any such contamination. Consequently, Syria has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

341. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Syria's surface water resources by contamination from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

### 3. Remediation of damage to forest resources

342. Syria seeks compensation in the amount of USD 79,608,018 for expenses of measures to restore forest resources alleged to have been damaged as a result of Iraq's invasion and occupation of Kuwait.

343. Three specific areas have been identified by Syria as the areas affected, namely the Homs province (Jabal Abou Rijmain near Palmyra); the area from Al-Bo Kamal to the border with Iraq in Deir Al-Zoor province (including Al-Bishri mountain); the area along the roads between Deir Al-Zoor and Raqqa, and Damascus and Deir Al-Zoor.

344. Syria alleges that wet and dry deposition of pollutants from the oil well fires in Kuwait occurred over its south-eastern territories. Syria also alleges that plants were affected by black sand dust which settled on the leaves, and caused clogging of the pores and the drying and falling of the leaves. Syria claims that the deposition caused damage to forests in the south-eastern territories, and that this necessitated two replantings between 1991 and 1998.

345. Iraq states that the monitoring and assessment data submitted by Syria do not support the alleged contamination of soils or the alleged toxicity of wet deposition to plants. Iraq also claims that there is evidence, both in the published literature and also in the first Syrian national forest survey of 1990, that there are many parallel causes of forest degradation, mainly overgrazing and cutting of trees.

346. Iraq contends that the data indicate that the damage to forests was limited to seedlings that were produced mainly during the 1991 season. Iraq observes that the decay of seedlings, for which Syria provides documents, could have been due to other causes.

347. The Panel considers that the data provided by Syria do not demonstrate any damage to forests in Syria that could be linked to the oil well fires in Kuwait. Consequently, the Panel finds that Syria has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

348. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Syria's forest resources by contamination from the oil well fires in Kuwait resulting from Iraq's invasion and occupation of Kuwait.

4. Recommended award

349. The Panel's recommendation for compensation for claim No. 5000457 is summarized in table 10.

Table 10. Recommended award for claim No. 5000457

<u>Claim unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage to groundwater resources	890,868,597	nil
Damage to surface water resources	664,142,539	nil
Damage to forest resources	79,608,018	nil
<u>Total</u>	1,634,619,154	nil

## X. CLAIM OF THE REPUBLIC OF TURKEY

350. In the fourth "F4" instalment, the Panel reviewed one claim submitted by Turkey for expenses of measures to remediate environmental damage that it alleges resulted from Iraq's invasion and occupation of Kuwait. Claim No. 5000153 is for expenses of future remediation of forest resources.

Claim No. 5000153 – Remediation of damage to forest resources

351. Turkey seeks compensation in the amount of USD 5,269,165 for expenses of future remediation of forest resources alleged to have been damaged by refugees who entered Turkey after having departed from Iraq or Kuwait between 2 August 1990 and 2 March 1991.

352. Turkey states that 3,673 hectares of forests were damaged by the presence and activities of refugees who entered Turkey after leaving Iraq or Kuwait between 2 August 1990 and 2 March 1991. According to Turkey, a large number of refugees passed through Turkey during that period and cut down many trees in its oak forests for firewood. Turkey states that the refugees first cut standing trees and subsequently uprooted stumps, causing deterioration of forest root systems. Turkey has submitted forest statistics, photographs, videos and maps of the relevant areas. Turkey proposes to restore the forests by applying a variety of measures, including seeding, planting of seedlings and application of revitalization cutting to damaged root systems, depending on the nature and severity of the damage to the forests at particular locations.

353. Iraq states that Turkey has submitted no evidence of the exact arrival times of the refugees, but notes that Turkey refers to large numbers of refugees arriving in April 1991. Iraq asserts that there is uncertainty regarding the numbers of refugees and the timing of their movements, and claims that the maximum number of refugees that reached Turkey, having departed from Iraq or Kuwait between 2 August 1990 and 2 March 1991, was 60,000.

354. The Panel notes that there is evidence in the published literature that a large number of refugees passed through Turkey after having departed from Iraq or Kuwait between 2 August 1990 and September 1991. However, the evidence provided by Turkey is not sufficient to enable the Panel to determine whether the damage alleged to have resulted from the presence of refugees in Turkey is eligible for compensation. In particular, no information is provided by Turkey regarding the dates on which the refugees arrived in Turkey, the duration of their stay or the details of the damage that they are alleged to have caused. Consequently, the Panel finds that Turkey has failed to meet the evidentiary requirements for compensation specified in article 35(3) of the Rules.

355. Accordingly, the Panel recommends no compensation for remediation of damage alleged to have been caused to Turkey's forest resources by the presence of refugees from Iraq or Kuwait as a result of Iraq's invasion and occupation of Kuwait.

#### Recommended award

356. The Panel's recommendation for compensation for claim No. 5000153 is summarized in table 11.

Table 11. Recommended award for claim No. 5000153

<u>Claim unit</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Damage to forest resources	5,269,165	nil
<u>Total</u>	5,269,165	nil

## XI. RELATED ISSUES

### A. Currency exchange rate

357. The Commission issues awards in United States dollars. Some losses were claimed in United States dollars after conversion from other currencies. In keeping with the practice of other panels of Commissioners, the Panel has used currency exchange rates reported in the United Nations Monthly Bulletin of Statistics. In calculating the value of recommended awards, the Panel determined that the exchange rates used by the Claimants were reasonable approximations of the applicable rates in the United Nations Monthly Bulletin of Statistics.

### B. Interest

358. Governing Council decision 16 (S/AC.26/1992/16) provides that "[i]nterest will be awarded from the date the loss occurred until the date of payment, at a rate sufficient to compensate successful Claimants for the loss of use of the principal amount of the award". It also provides that the Governing Council will consider the methods of calculation and payment of interest at the appropriate

time, and that interest will be paid after the principal amount of awards. Accordingly, the Panel must determine the date from which interest will run, where relevant.

359. The majority of the fourth “F4” instalment claims are for financial expenditures that have not yet been incurred. In such cases, no interest is due and, accordingly, no date of loss has been indicated. With respect to completed remediation activities, the Panel has selected the approximate mid-point of the period during which expenses were incurred as the date of loss.

## XII. SUMMARY OF RECOMMENDATIONS

360. Based on the foregoing, the Panel recommends that the amounts set out in table 12 be awarded in respect of the claims included in part one of the fourth "F4" instalment.

Table 12. Summary of recommended awards in part one of the fourth "F4" instalment

<u>Country</u>	<u>Claim No.</u>	<u>Amount claimed (USD)</u>	<u>Amount recommended (USD)</u>
Iran	5000456	2,484,623,669	188,760
Jordan	5000458	136,761,897	nil
Kuwait	5000259	33,901,560	3,990,152
	5000466	695,119,160	162,259
Saudi Arabia	5000455	9,470,667,058	618,974,433
	5000465	1,844,497,435	6,172,274
Syria	5000457	1,634,619,154	nil
Turkey	5000153	5,269,165	nil
<u>Total</u>		16,305,459,098	629,487,878

Geneva, 3 August 2004

(Signed) Thomas A. Mensah  
Chairman

(Signed) José R. Allen  
Commissioner

(Signed) Peter H. Sand  
Commissioner

Notes

<sup>1</sup> None of the Claimants claimed interest or claim preparation costs.

<sup>2</sup> See paragraph 29 of the “Report and recommendations made by the Panel of Commissioners concerning the first instalment of ‘F4’ claims”, S/AC.26/2001/16 (“first ‘F4’ report”). In the first “F4” report, the Panel recommended awards for monitoring and assessment projects to identify and evaluate damage or loss suffered as a result of Iraq’s invasion and occupation of Kuwait. Some of these projects were intended to provide information to assist with the review of substantive claims by producing scientific and technical information about the nature and extent of environmental damage and potential remediation measures. Data produced by the following monitoring and assessment projects were transmitted to Iraq: for Iran’s claims, claim Nos. 5000329, 5000330, 5000343, 5000344, 5000347, 5000349, 5000350, 5000351, 5000352, 5000382, 5000383, 5000389, 5000420, 5000425, 5000427; for Jordan’s claims, claim Nos. 5000353, 5000354, 5000355, 500356, 500357, 5000358, 5000396, 5000429, 5000430, 5000431; for Kuwait’s claims, claim Nos. 5000378, 5000397, 5000398, 5000432, 5000435; for Saudi Arabia’s claims, claim Nos. 5000363, 5000408, 5000438, 5000439, 5000440, 5000441; and for Syria’s claims, claim No. 5000372.

<sup>3</sup> “Report of Secretary-General pursuant to paragraph 19 of Security Council resolution 687 (1991)”, S/22559, paragraph 20.

<sup>4</sup> “Report and recommendations made by the Panel of Commissioners concerning the second instalment of ‘F4’ claims”, S/AC.26/2002/26 (“second ‘F4’ report”), paragraph 22; “Report and recommendations made by the Panel of Commissioners concerning the third instalment of ‘F4’ claims”, S/AC.26/2003/31 (“third ‘F4’ report”), paragraph 25.

<sup>5</sup> Third “F4” report, paragraph 32.

<sup>6</sup> S/AC.26/2001/16.

<sup>7</sup> First “F4” report, paragraphs 53-54.

<sup>8</sup> See, for example, the “Report and recommendations made by the Panel of Commissioners concerning the fifth instalment of ‘F1’ claims”, S/AC.26/2001/15 (“fifth ‘F1’ report”), paragraph 18; and the “Report and recommendations made by the Panel of Commissioners concerning the first instalment of ‘F2’ claims”, S/AC.26/1999/23 (“first ‘F2’ report”), paragraph 22.

<sup>9</sup> Second “F4” report, paragraph 25.

<sup>10</sup> Third “F4” report, paragraph 39.

<sup>11</sup> Third “F4” report, paragraph 42.

<sup>12</sup> Third “F4” report, paragraph 43.

<sup>13</sup> First “F2” Report, paragraph 38.

<sup>14</sup> Ibid.

<sup>15</sup> Third “F4” report, paragraph 47.

<sup>16</sup> Ibid.

<sup>17</sup> Third "F4" report, paragraph 48.

<sup>18</sup> Ibid.

<sup>19</sup> First "F4" report, paragraph 30.

<sup>20</sup> First "F4" report, paragraph 32.

<sup>21</sup> Information produced by monitoring and assessment projects that were funded by awards in the first "F4" instalment was used by Iran to clarify or update the claimed costs for various claim units. The relevant projects are claim Nos. 5000420, 5000383, 5000347, 5000344, 5000389 and 5000350. Monitoring and assessment information was also submitted with respect to claim Nos. 5000343, 5000349, 5000351, 5000382, 5000425 and 5000427.

<sup>22</sup> Iran also claims that refugees who departed from Iraq and Kuwait as a result of Iraq's invasion and occupation of Kuwait entered Iran between 2 August 1990 and 2 March 1991 and required medical treatment and services. Iran's claim for these costs of medical treatment and services will be considered in the fifth "F4" instalment as part of claim No. 5000287.

<sup>23</sup> First "F4" report, paragraphs 61, 63.

<sup>24</sup> First "F4" report, paragraphs 61, 63.

<sup>25</sup> First "F4" report, paragraphs 61, 63, 127.

<sup>26</sup> The increase in claimed costs is based on information produced by monitoring and assessment activities that were funded by awards in the first "F4" instalment for claim Nos. 5000354, 5000355, 5000356, 5000357, 5000358, 5000429 and 5000430 (see table 5 of the first "F4" report).

<sup>27</sup> First "F4" report, paragraph 297.

<sup>28</sup> Ibid.

<sup>29</sup> Returnees and involuntary immigrants constituted a 10.8 per cent increase in Jordan's population.

<sup>30</sup> "Report and recommendations made by the Panel of Commissioners concerning the first instalment of 'A' claims", S/AC.26/1994/2, pages 24 to 26, 28 to 29; and "Report and recommendations made by the Panel of Commissioners concerning the first instalment of 'F2' claims", S/AC.26/1999, paragraphs 30 to 31.

<sup>31</sup> First "F4" report, paragraph 304.

<sup>32</sup> Ibid.

<sup>33</sup> First "F4" report, paragraph 306.

<sup>34</sup> UN Treaty Series 996/245.

<sup>35</sup> In light of the results of the monitoring and assessment studies that were funded by awards in the first instalment of "F4" claims for claims Nos. 5000378, 5000397 and 5000398 (see table 7 of the first "F4" report), Kuwait withdrew its claims for costs to remediate coastal structures and rocks and cost of recovering and treating sunken oil as evidence of ongoing contamination necessitating

remediation measures was not found. Additionally, the studies also resulted in a substantial reduction to the claimed cost for remediating sand beaches.

<sup>36</sup> The collection and analysis of samples were carried out as part of the monitoring and assessment programme which was funded by the awards for claim Nos. 5000378, 5000397 and 5000398 (see table 7 of first “F4” report).

<sup>37</sup> Claim No. 5000454, reviewed in part 2 of the fourth “F4” instalment. The facility is referred to in paragraph 84 of the “Report and recommendations made by the Panel of Commissioners concerning part two of the fourth instalment of ‘F4’ claims”, S/AC.26/2004/R.40, paragraph 84.

<sup>38</sup> The increase in compensation claimed is primarily based on information produced by monitoring and assessment projects that were funded by awards in the first instalment of “F4” claims for claim Nos. 5000435 (see table 7 of first “F4” report).

<sup>39</sup> Second “F4” report, paragraphs 100-101.

<sup>40</sup> The increase in compensation claimed is primarily based on information produced by monitoring and assessment projects that were funded by awards in the first instalment of “F4” claims for claim Nos. 5000437, 5000438, 5000439, 5000440 and 5000441 (see table 9 of first “F4” report).

<sup>41</sup> Second “F2” report, paragraph 43.

<sup>42</sup> Second “F4” report, paragraph 126.

<sup>43</sup> First “F2” report, paragraph 65.

<sup>44</sup> First “F4” report, paragraph 622.

<sup>45</sup> First “F4” report, paragraph 629.

<sup>46</sup> Ibid.

<sup>47</sup> First “F4” report, paragraphs 634, 640, 646, 652, 658. The Panel recommended awards of compensation for monitoring and assessment projects in claim Nos. 5000437, 5000438, 5000439, 5000440 and 5000441 (see table 9 of first “F4” report).

<sup>48</sup> Fifth “F1” report, paragraph 24; Second “F2” report, paragraph 40; Third “F2” report, paragraph 18; and Second “F3” report, paragraph 15.

<sup>49</sup> First “F4” instalment claim no 5000363 for oceanographic survey and sampling project.

<sup>50</sup> Claim no. 5000451 reviewed by the Panel in the third “F4” instalment, paragraphs 169-189.

TECHNICAL ANNEXES TO THE REPORT ON PART ONE OF THE FOURTH "F4"  
INSTALMENT

Introduction

1. In reviewing the remediation measures proposed by the Claimants, the Panel found that modifications in the design, methodologies and the nature and extent of work to be undertaken would improve the net environmental benefit and reduce the cost of some of the measures. The general outlines and objectives of the modifications have been indicated in the parts of the report dealing with the relevant claims. In some cases, the Panel considers it useful to set out technical details of the modifications. As stated in paragraph 61 of the report, these details are indicated in the respective annexes.
2. The Panel recognizes that, in implementing the remediation activities, claimants may find it necessary to make further modifications to take account of new information or changing environmental conditions. In this regard, the Panel stresses that its findings regarding the proposed remediation measures, and its suggestions of possible modifications, have been based on information available to it on the environmental conditions in the Claimant countries prior to 31 July 2004.
3. As noted in paragraph 50 of the report, remediation programmes must be implemented with utmost caution, taking due account of the need to avoid potential adverse environmental impacts of remediation activities. This requires the use of flexible and site-specific approaches, incorporating a broad set of remediation techniques that are capable of addressing the wide range of habitats, the varying levels of contamination and the different ecological conditions present.
4. The Panel has been guided by the following principles in considering modifications to the remediation programmes proposed by the Claimants:
  - (a) Remediation approaches or techniques that pose unacceptable risks of ecological harm should be avoided.
  - (b) Remediation activities should be undertaken only if they are likely to result in more positive than negative effects.
  - (c) Remediation techniques that facilitate natural recovery processes should be preferred, and active remediation should build on and enhance natural recovery that has already occurred.
  - (d) Remediation should rely on proven and well-established technologies and techniques in preference to experimental or untested approaches.
  - (e) The effectiveness of remediation activities should be monitored to ensure that remediation targets are met. Remediation programmes should be designed to be sufficiently flexible and responsive to new information obtained from such monitoring.

- (f) Where more than one remediation approach or technique is appropriate to achieve the desired remediation goal, the most cost-effective option should be selected.
- (g) Remediation decisions should consider both the short-term and long-term effects of remediation activities on neighbouring ecosystems, including transboundary effects.

Annex I

## MODIFICATIONS TO REMEDIATION PROGRAMME – CLAIM NO. 5000456

## IRAN – DAMAGE TO RANGELAND AREAS (PARAGRAPHS 71 TO 78)

1. The area of damaged rangelands that requires remediation is 220 hectares.
2. A remediation approach that involves the loosening of the soil but leaves gravel in place will be most likely to restore ecological functions to the damaged sites. Gravel will help: (a) stabilize the loosened surface soil, by reducing the effects of wind and water erosion; (b) roughen the surface, thereby increasing the capture of wind-blown seeds and organic materials; and (c) retain moisture in the soils, which will improve germination of seeds and establishment of vegetation. Tilling to a depth of 15 to 20 centimetres should be adequate to loosen the soil. The surface should be prepared such that tilling patterns follow the land contours, in order to maximize the ability of the soil surfaces to capture water and promote infiltration, and to minimize run-off and associated erosion.
3. Seeds should be applied to the surface at a rate of 10 kilograms per hectare. An average of three years of additional maintenance reseeding will probably be required to enhance revegetation of the damaged sites. Typically, for each of the three years, reseeding at 30 per cent of the initial seeding level may be necessary, leading to a total reseeding quantity equivalent to 90 per cent of the quantity initially seeded.
4. Organic amendments should be applied in order to accelerate the growth of native plant species. Application of chemical fertilizer will not be appropriate because it can promote excessive growth of undesirable non-native species which are prey to fewer natural predators than native species.
5. Sources of organic amendments include wheat or barley straw, bark or wood chips, fully composted biosolids, olive cake residue or other readily available organic materials. Given the presence of grazing livestock in damaged areas, less palatable materials, such as wood chips or bark, would be more appropriate than materials such as straw, because the latter would encourage herders to bring livestock to graze in the revegetated areas.
6. Adding slowly decomposing materials, i.e. materials with high carbon to nitrogen (C:N) ratios, can accelerate development of more complete soil processes by improving soil physical conditions, stimulating microbial activity, and regulating levels of available nitrogen. Further field testing of different amendments may be necessary to identify the most effective form of organic matter to be used as soil amendments, the appropriate application rate, and the timing of the application. Organic soil amendments will also help to provide shelter and building material for soil invertebrates such as termites, which produce subsurface structures that assist the progressive burial of stones and gravel in these environments. The organic matter can also be used by other invertebrate decomposers and thus indirectly stimulate predators, especially ants, whose activities are also beneficial to the soil.

7. Full restoration of vegetation and ecological processes in damaged areas will also require protection of the sites against disruptive land uses, especially livestock grazing.
8. In addition, site-specific modifications may be needed to take account of differences in the size of the areas involved, the degree of damage in different areas, soil types and climatic factors (including rainfall levels).

Annex II

## MODIFICATIONS TO REMEDIATION PROGRAMME – CLAIM NO. 5000259

## KUWAIT – DAMAGE TO MARINE AND COASTAL RESOURCES (PARAGRAPHS 158 TO 191)

1. Excavation is the appropriate approach for the remediation of the coastal oil deposit, coastal oil trenches, and weathered oil layers, given the discrete layers of asphalt pavement or heavily oil-contaminated sediment present at or near the surface of these limited and well-defined areas. Suitable precautions should be taken against the possible risk from unexploded ordnance in these areas.
2. Treatment of excavated soil by HTTD will normally not be warranted for the remediation of these areas. Landfilling, which is routinely used for such material, would be the most appropriate alternative in this case.
3. Excavated areas in the coastal oil deposit and oil trench should be filled to restore the surface of the site to pre-excavation conditions. To achieve this it is advisable to use material with similar physical and chemical characteristics as the original soil in the area. Thermally treated soil would not be suitable for this purpose. Soil replenishment may not be needed for the weathered oil layers, given the shallow excavation depths and likelihood that natural replenishment will occur quickly at these locations.
4. In situ bioremediation of residual contamination at the sites of the coastal oil deposit and oil trenches is not warranted in the circumstances because residual contamination levels after excavation are likely to be low, and excavated areas can be backfilled with clean soil. For excavated weathered oil layers, raking or tilling of exposed soils would be adequate for any limited contamination that may be identified after excavation.
5. For the north-eastern and southernmost sub-areas of the Khiran Inlets, wet-tilling would be the most appropriate measure. To mitigate potential adverse effects of wet tilling, only areas of relatively high residual contamination (e.g., visually contaminated) should be tilled. All tilling should be conducted on a rising tide, with sorbent booms placed around the operation to contain or recover any released contamination.

Annex III

MODIFICATIONS TO REMEDIATION PROGRAMME – CLAIM NO. 5000466

KUWAIT – DAMAGE TO TERRESTRIAL RESOURCES (OPEN BURNING/OPEN  
DETONATION SITES) (PARAGRAPHS 192 TO 238)

1. Since Kuwait has identified only three open burning/open detonation (“OB/OD”) sites covering 30,000 square metres, the remediation programme should be limited to those three sites.
2. Given the low risk of human or ecological exposure to any residual toxic materials in the soil at the three identified sites, the remediation programme at these sites should be focused on removing gross hazards posed by residual unexploded ordnance (“UXO”) and the stabilization of soil in the disturbed areas in order to promote natural recovery of vegetation.
3. Although the three OB/OD sites do not show visible evidence of surface UXO or related debris, it is advisable to conduct geophysical investigation at the sites, using magnetometers to ensure that subsurface hazards are fully cleared. The investigations should cover the OB/OD sites as well as the berms surrounding the sites, as it is possible for UXO and remnants of UXO to be buried in these structures.
4. Areas of magnetic anomalies, indicating the possible presence of UXO, that are identified during the magnetometer survey should be subjected to clearance activities, which should follow well-established UXO investigation and clearance protocols such as those established by the United States Army Corps of Engineers (United States Army Corps of Engineers, “Engineering and Design: Ordnance and Explosives Response”, EM 1110-1-4009, Washington, DC, Department of the Army, 2000). Destroying UXO and remnants of UXO via blow-in-place procedures will be the safest and most expeditious approach.
5. If the geophysical survey uncovers anomalies requiring further investigation and possible clearance, explosive ordnance disposal experts should re-investigate each area of concern upon completion of the UXO clearance activities. This should consist of a second magnetometer survey to confirm that each anomaly has been successfully explained.
6. After clearance of UXO and related debris from the OB/OD sites and surrounding berms, any man-made berms around the OB/OD sites should be re-graded to their natural state consistent with the surrounding geography. Two of the OB/OD sites, namely, the Kuwait Oil Company site and the National Park site, have berms that appear to have been created from local surface materials. At these two sites, using bulldozers to re-spread the berm material at a depth of 0.3 metres across the surrounding area should return the sites to their natural topographical conditions.
7. Clearance and re-grading of the berms will cause disruption of soil and vegetation, so gravel should be applied to the disturbed areas to stabilize the soil surface and increase surface roughness. Application of gravel will improve the ability of the soil to capture and retain moisture, organic

materials and seeds. This should be adequate to promote natural recovery of vegetation and ecological functions across the small areas that will be disturbed at the OB/OD sites.

8. Any UXO clearance activities at the OB/OD sites should include the preparation by the clearance contractor of a certification documenting clearance activities at the sites. Certification of UXO clearance is a common international practice, that allows for informed and safe decision-making regarding future uses of cleared areas. Certification should include a report detailing the area cleared, the clearance depth, the types and quantities of UXO and debris found, and the survey and clearance techniques used.

Annex IV

MODIFICATIONS TO REMEDIATION PROGRAMME – CLAIM NO. 5000455

SAUDI ARABIA – DAMAGE TO TERRESTRIAL RESOURCES (PARAGRAPHS 243 TO 291)

1. The proposal to level the above-ground military structures is reasonable, and ripping is an appropriate method for loosening soils in compacted areas. However, only a portion of the damaged areas is compacted. Areas with other forms of soil damage (e.g., soil crusting, soil pulverization, or inversion of the soil profile) do not require ripping prior to revegetation.
2. An effective revegetation programme should concentrate efforts on revegetation islands dispersed throughout the damaged area. Revegetation islands of approximately six square kilometres, elongated to enhance down-wind seeding, would make it easier to enforce grazing restrictions and will be less expensive to construct and maintain than revegetating hundreds of small isolated areas of damage. To the extent possible, revegetation islands should be located in damaged areas. Where this is not possible, revegetation islands located in undamaged areas should be operated to serve as sources of seed and biological materials to support recolonization of any ripped areas outside the islands.
3. Nurseries for seed and shrub production are a key component of the revegetation programme. It will be necessary to develop these facilities to produce large numbers of indigenous seeds and plants required by the programme. The revegetation programme should focus on the production of a wide variety of native species. As support for the programme, a germination laboratory should be developed to provide ongoing seed testing and evaluation during the life of the project.
4. Planting an area equivalent to between 20 and 25 per cent of the revegetation islands will mimic the vegetative density of a natural desert environment. To the extent practical, planting should be undertaken in concentrated areas, particularly topographically low areas where runoff from heavy rain showers can concentrate. These areas will then serve as seed banks to facilitate the seeding and revegetation of adjacent areas within the protected area or in unprotected downwind areas.
5. The application of organic soil amendments will be beneficial across the entire 6-square kilometre protected area. The organic matter suitable for this purpose should be low in nutrients and slow to decompose. This type of organic matter is essential for improving the physical characteristics of the soils because organic matter with higher concentration of nutrient sources would encourage the growth of undesirable invasive weed species. Given the high livestock densities in Saudi Arabia, wood chips or bark would be an appropriate organic amendment to use, instead of straw which could encourage herders to bring livestock to graze in the revegetated areas. These organic amendments should accelerate the development of more complete soil processes and vegetation recovery.
6. It will not be necessary to apply chemical fertilizer or to inoculate plants with soil microbes. The organic amendments will provide adequate nutrients to support establishment of vegetation. Moreover, the application of fertilizer in the desert ecosystem can promote the excessive growth of undesirable non-native species, which are prey to fewer natural predators than native species. If the

soil used to grow seedlings is taken from local sources, it will already contain appropriate soil microbes needed to promote healthy vegetation.

7. Application of water is a critical component of a revegetation island programme. Drought can drastically affect vegetation, especially in stressed, degraded or recovering systems. It is, therefore, necessary to provide an irrigation system for the revegetated areas, in the event that rainfall is inadequate to support establishment of new vegetation. The most cost-effective approach will be to have a water supply well and drip irrigation system for each revegetation island. Such a system would consist of a well and, where necessary, a reverse osmosis system for purifying brackish water prior to use. Water can be applied directly to shrubs using the drip irrigation system. Grass types for these areas will most probably be established from seed, and a combination of precipitation and residual moisture from the drip system should provide adequate moisture for their establishment. A level of irrigation of approximately 50 millimetres per year for the first three years and 25 millimetres per year for the last two years of the programme, for a total of 200 millimetres of water, would adequately supplement the average rainfall in the area and minimize revegetation failure due to drought.

8. A number of maintenance and monitoring projects will be needed to ensure the success of the revegetation programme. Careful monitoring will need to be conducted to assess the effectiveness of the production and planting methods, species selection, amendments and irrigation programme. The results of the monitoring will make it possible for the programme to be modified as necessary to maximize its success. Two-person monitoring teams, consisting of a biologist and an ecologist, will need to spend approximately three days per month at each revegetation island. In addition, maintenance replanting will be required in order to achieve the desired species variety and density. This will involve three years of maintenance replanting at 30 per cent of the initial planting level each year, to produce a total replanting quantity equivalent to 90 per cent of the initial planting.

9. Construction of 640 kilometres of asphalt roads to facilitate movement of personnel and equipment to the remediation sites and reduce damage attributable to ongoing off-road driving is not necessary. Existing desert roads have been used successfully for the types of overland vehicular traffic that would be necessary for the proposed restoration programme.

Annex V

MODIFICATIONS TO REMEDIATION PROGRAMME – CLAIM NO. 5000465

SAUDI ARABIA – DAMAGE TO MARINE RESOURCES (PARAGRAPHS 301 TO 318)

1. As indicated by the Panel in the third “F4” report (S/AC.26/2003/31, paragraph 181), large-scale excavation in contaminated sub-tidal zones is not advisable, because of the likely adverse environmental impacts. In the one location where active remediation is warranted, it is preferable to rely on dredging of the contaminated sediments. Remediation based on berming intertidal and subtidal areas is not appropriate. Preventing the natural, regular inundation of tides would substantially increase the stress on local biota. Such an approach cannot easily be adapted to address targeted remediation of limited areas. Further, the substantial infrastructure needed is likely to have significant adverse environmental consequences. Finally, this approach is much less cost-effective than the alternative indicated in this annex.
2. Dredging is routinely used in such circumstances. Silt curtains and other protective measures commonly used for environmental dredging, such as providing temporary cover for dredged material and ensuring proper drainage of dredged sediments, should be utilized.
3. Additional sampling in the area targeted for active remediation should be undertaken to better delineate the depth, extent and severity of contamination. These samples should be evaluated for risks of ecological damage, to allow more precise comparison of the potential benefits and risks associated with active remediation. The results of these analyses should be used to refine the delineation of specific areas to be dredged. Post-dredging sampling should be undertaken to determine contamination levels in residual sediments from dredged areas.
4. Treatment of the material using HTTD is not warranted. Instead, landfilling should be utilized for the dredged material. Landfilling is routinely used for such material and involves significantly less expense in these circumstances.
5. Water in the dredged material should be treated before it is released back into the environment, unless testing confirms that the contaminant levels in the water are not high enough to require treatment.
6. Subtidal remediation activities should be undertaken in close coordination with shoreline remediation measures, in order to maximize the effectiveness of both programmes.

## GLOSSARY

acid rain:	Rainfall with a pH of less than approximately 5.7, typically caused by sulphur dioxide pollution.
anion:	Negatively charged particle.
benthic:	Relating to a region that includes the bottom of the sea and the littoral zones.
berm:	Mound or bank of earth, used especially as a barrier or to provide insulation.
bioremediation:	Application of nutrients (e.g., chemical fertilizer) to stimulate natural microbial communities that biodegrade petroleum hydrocarbon contamination.
black rain:	Rainfall containing residual contamination from smoke, especially in the form of soot. Source of contamination is either from rain droplets passing through a smoke layer or from particles in smoke acting as nucleation sites for rain droplets to form.
cation:	Positively charged particle.
deep-ripped:	Form of tilling that uses mechanical methods to loosen compacted soil.
dendrochronological study:	Study using a method of dating forest species and growth rates on the basis of the annual rings of the tree.
dry deposition:	Deposition of pollutants (such as dust, particulate matter, or gases) from the atmosphere through settling, as opposed to through rain, clouds, or fog.
enzymatic study:	Study using a method for assessing whether plants have been subjected to unusual environmental stresses through the measure of plant enzymes.
fingerprinting, biomarker fingerprinting:	Method for determining the source of oil contaminants based on analysis of petroleum components that remain detectable and relatively unchanged in oil residues even after natural environmental weathering and biodegradation.

geomembrane:	Impermeable layer of polymer, used, <u>inter alia</u> , in the construction of landfills or remediation projects.
ground-truthing:	Verification of remote sensing information by observation on the ground.
heavy metals:	Metals having a specific gravity (i.e., weight in comparison to weight of an equal volume of water) of 5.0 or over, and generally toxic in relatively low concentrations to plant and animal life. Such metals can persist in animal tissue and are capable of increasing in concentration as they pass upward through the food chain. Examples include lead, mercury, cadmium and arsenic.
high temperature thermal desorption (HTTD):	Process using heat to separate contaminants from contaminated material. In the process, water and organic contaminants are volatilized from the material. The volatilized contaminants usually require further treatment.
khabari:	Arabic term for topographical depressions forming water catchments. Also locally known as “faidhat”.
landfill:	Waste disposal facility on land. State-of-the-art landfills have liners and leachate collection and treatment systems to prevent contamination of surface and groundwater.
leachate:	Water that has percolated through waste material and leached out some of the constituents of the material.
open burning/open detonation (OB/OD):	Processes that rely on burning or detonation to destroy explosives or munitions in excavated pits.
ordnance:	Military materials such as weapons or ammunition.
organic amendment:	Soil additives such as wheat or barley straw, bark or wood chips, or fully composted biosolids, that hold water and nutrients and can accelerate the development of soil processes.

polycyclic aromatic hydrocarbons (PAH):	Hydrocarbon compounds containing two or more fused benzene rings that are high in molecular weight and slow to decompose. Also referred to as polyaromatic hydrocarbons or polynuclear aromatic hydrocarbons.
revetment:	Barrier or wall typically constructed of soil (e.g., one used to confine explosives).
Rimth – <u>Haloxylon salicornicum</u> :	Salt-tolerant plant that is palatable to livestock.
sabkha:	Arabic term for salt flat, usually located in areas of groundwater discharge. Sabkha soils may have strength in the surface hypersaline crust when dry, but once wetted or disturbed exhibit very low strength and bearing capacity.
sorbent boom:	Boom made of materials that preferentially absorb or adsorb petroleum hydrocarbons.
silt curtain:	Flexible, impenetrable barrier used to prevent migration of silt from a worksite in a water environment into the main water body.
total petroleum hydrocarbons (TPH):	Term used to describe a class of several hundred chemical compounds, comprising mainly hydrogen and carbon, originating from crude oil.
wadi:	Arabic term for streambed or other natural depression that is dry except during the rainy season.
wet deposition:	Deposition of pollutants (such as dust, particulate matter, or gases) by rain, snow, fog, or dew.
wet tilling:	Mechanical process of mixing sediments at or near the water line in shallow water depths, typically less than one metre.

-----