

EVALUATION REPORT ON THE OCEANS SUBPROGRAMME  
"TECHNICAL SUPPORT TO GLOBAL AND REGIONAL PROGRAMMES FOR  
THE ASSESSMENT, PREVENTION, CONTROL AND ABATEMENT  
OF MARINE POLLUTION"

Evaluation of Project FP/ME/5101-93-03 (3033)

Report by Mr. Peter Hayward (Consultant)

UNITED NATIONS ENVIRONMENT PROGRAMME  
PROGRAMME DEVELOPMENT AND EVALUATION UNIT (PDEU)

December 1994

**CONTENTS**

	<u>Page</u>
1. EXECUTIVE SUMMARY .....	1
2. INTRODUCTION .....	6
2.1 BACKGROUND .....	
2.2 PURPOSE AND METHODOLOGY OF THE EVALUATION .....	
Purpose 7	
Methodology 8	
3. PROJECT DESIGN AND ACCOMPLISHMENTS 9	
3.1 APPROPRIATENESS OF PROJECT 9	
Legislative basis 9	
Priorities of the three Agencies11	
Objectives of the project13	
3.2 EFFICIENCY AND EFFECTIVENESS OF DELIVERY OF PROJECT	
OBJECTIVES, ACTIVITIES AND OUTPUTS15	
3.3 QUALITY AND UTILITY OF THE PROJECT21	
3.4 ORGANIZATIONAL STRUCTURE AND MANAGEMENT SYSTEMS26	
Organizational structure26	
Management systems27	
Relationship between UNEP, IAEA and IOC28	
4. PROBLEMS AND CONSTRAINTS ENCOUNTERED29	
Financial29	
Project development and implementation31	
Governments' co-operation32	
Inter-Agency co-operation32	
Staffing and resource allocation33	
5. LESSONS LEARNT33	
6. CONCLUSIONS AND RECOMMENDATIONS34	
Conclusions34	
Recommendations35	
APPENDIX PROJECT OUTPUTS AND ACTIVITIES38	
Comparison of project objectives and achievements by reference to each Annex	

LIST OF ACRONYMS

CEP	Caribbean Environment Programme
CONPACSE	Convention for the Protection of the South-East Pacific against Pollution
EAF	Eastern African Action Plan
FAO	Food and Agriculture Organization of the United Nations
GC	UNEP Governing Council
GEEP	The IOC/UNEP/IMO Group of Experts on the Effects of Pollutants
GEF	Global Environment Facility
GEMS	Global Environment Monitoring System of UNEP
GEMSI	The IOC/UNEP Group of Experts on Methods, Standards and Intercalibration
GESREM	The IOC/IAEA/UNEP Group of Experts on Standards and Reference Materials
GIPME	Global Investigation of Pollution in the Marine Environment of
IAAC	Inter-Agency Advisory Committee for MED POL
IAEA	International Atomic Energy Agency
IAEA-MEL	Marine Environment Laboratory of the IAEA, Monaco
IMO	International Maritime Organization
IMW	International Mussel Watch Experiment
IOC	Intergovernmental Oceanographic Commission of UNESCO
KAP	Kuwait Action Plan
MAP	Mediterranean Action Plan
MARPOLMON	Marine Pollution Monitoring System of IOC
MED POL	Long-terms Programme for Pollution Monitoring and Research in the Mediterranean Sea
MEDU	See UNEP/MEDU
MESL	Marine Environmental Studies Laboratory: a section of IAEA-MEL
MoU	Memorandum of Understanding
MTF	Mediterranean Trust Fund
OCA/PAC	Oceans and Coastal Areas Programme Activity Centre of UNEP
PAHs	Polycyclic aromatic hydrocarbons
PDEU	Project Design and Evaluation Unit of UNEP
PREC	UNEP's Project Review and Evaluation Committee of UNEP
PSC	Project Screening Committee of UNEP
QA	Quality Assurance
RCU	Regional Coordinating Unit of OCA/PAC's Regional Seas Programme
RM	Reference Method
SPREP	South Pacific Regional Environment Programme
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEP	United Nations Environment Programme
UNEP/MEDU	Coordinating Unit for the Mediterranean Action Plan, Athens
WACAF	West and Central African Action Plan
WHO	World Health Organization

**TECHNICAL SUPPORT TO GLOBAL AND REGIONAL PROGRAMMES FOR  
THE ASSESSMENT, PREVENTION, CONTROL AND ABATEMENT  
OF MARINE POLLUTION**

**1. EXECUTIVE SUMMARY**

1. The need to develop comprehensive and scientifically reliable marine pollution monitoring programmes goes back to the earliest days of the Regional Seas Programme. It was always envisaged that one of the objectives of the monitoring programmes would be to provide the scientific basis on which decision makers could make effective and rational decisions for managing local, national and regional pollution problems. It was also foreseen that the data generated within the framework of regional monitoring programmes would provide a valuable contribution to the establishment of global assessments of marine pollution.

2. Collaboration between UNEP and the Marine Environment Laboratory of the International Atomic Energy Agency (IAEA-MEL) in Monaco dates from 1975. Prior to the introduction of the umbrella project which is the subject of the present evaluation, contractual relations between UNEP and IAEA-MEL were governed by no fewer than eight separate projects/subcontracts. The umbrella project was conceived primarily to resolve problems of excessive administration arising from this multitude of projects. It was also expected to improve the problems of cash flow and to provide a more stable contractual relationship for the staff employed at IAEA-MEL's Marine Environmental Studies Laboratory (MESL), which is the effective organ for the workplan.

***Appropriateness of Project***

3. The project can be seen as furthering the implementation of the United Nations strategy for maintaining and enhancing the quality of regional marine environments and for improving the understanding of the global marine environment as set out in the System-Wide Medium-Term Environment Programme for the period 1990-1995. The origins of the present umbrella project can be traced back to early decisions of the UNEP Governing Council, but of particular relevance are more recent decisions concerning, *inter alia*, the needs to strengthen interregional cooperation (decision 13/25) and technical cooperation with developing countries in order to enable them to develop and enhance their capacity for identifying, analysing, monitoring, preventing and managing environmental problems (decision 15/14). The decisions of the United Nations Conference on Environment and Development (UNCED), as recorded in chapter 17 of Agenda 21, are also relevant to the appropriateness of the umbrella project. In particular, Agenda 21 advocates strengthening inter-agency cooperation and stresses the need to build the capacities of national and regional institutions, particularly in developing countries.

4. The project should also be seen in terms of implementing the framework for cooperation as embodied in the Memorandum of Understanding (MOV) dated 15 October 1992, between UNEP, IAEA and IOC. The MoU notes that the objectives of UNEP, IOC and IAEA converge in a number of areas relating to the assessment, prevention, control and abatement of marine pollution from different sources. The MoU identifies a number of areas suitable for joint programming and cooperation to serve the mutual interests and objectives of the three bodies.

***Efficiency and effectiveness of delivery of project objectives, activities and outputs***

5. In brief, the evaluation indicates a generally high degree of fulfilment of the project activities and outputs when actual delivery is compared with the intentions as stated in the project document. However, despite a good correlation between project intentions and project implementation, progress towards achievement of both the long- and short-term objectives is patchy. This does not necessarily indicate failure of the project; simply that the long-term objectives set a high standard, even are idealistic, and will necessarily take some years to achieve. The conclusion can be drawn that within the scope of the project as defined, it is an effective vehicle to achieve the project objectives in the longer-term. Having said that, future amendments of the project should focus more on the opportunities for assistance to other areas of the Regional Seas

Programme.

### ***Quality and utility of the project***

6. It is clear that MESL has demonstrated its credentials as a centre of excellence capable of delivering high-quality outputs in terms of scientific reports, the development of standard reference methods and the production of reference materials, the conduct of intercomparison exercises, and training and quality assurance programmes. There is a need to widen this expertise and incorporate it more effectively within the framework of the Regional Seas Programme. The utility of this project in addressing the issues of monitoring programmes in the marine environment is important as an essential tool to determine the priorities for control and abatement measures and, in the longer term, to measure the effectiveness of measures taken. However, consideration will have to be given to the appropriate allocation of resources to this aspect of the Regional Seas Programme *vis à vis* other activities of OCA/PAC. Despite the high quality of the outputs and the undoubted utility of the project, decisions will have to be taken on the financial resources to be allocated to these tasks by comparison with other priorities. In this case, joint efforts may need to be made to find alternative funding to finance the expansion of the project to other regional seas.

### ***Organizational structure and management systems***

7. An Advisory Group composed of the Director of IAEA-MEL, the Director of UNEP OCA/PAC and the Secretary of IOC, is intended to meet at least once a year and to be the agent for "joint planning". There appear to have been some limitations to this arrangement. The Advisory Group met on only one occasion and no minutes of the meeting are available. Apart from the project document itself, there is no evidence of how "joint programming" has been implemented. The absence of an overall programme officer for the project has also weakened the management system, in particular as regards the review of overall project implementation. Within the framework of the Mediterranean Action Plan, however, an Inter-Agency Advisory Committee (IAAC) for MED POL has long been established. This provides a forum where joint programming decisions are taken, at least within the framework of MED POL.

8. Concerning working relationships between the agencies, it is evident that there are very close ties between MESL and UNEP OCA/PAC. There is also a very close and effective working relationship between MESL and UNEP/MEDU. The relations with IOC are more tenuous. Effectively, IOC fulfils its part of the tripartite MoU by servicing the three GIPME (Global Investigation of Pollution in the Marine Environment) Groups of Experts and there is no active involvement of IOC on a regular basis in the activities of the project. However, the activities of the Regional Seas Programme and the technical support provided by IAEA-MEL through this project are a direct benefit to the aims and activities of IOC.

### ***Problems and constraints encountered***

9. The chief problem facing the umbrella project is that which it was set up to solve, namely financial management. The objectives of avoiding problems of cash flow and creating greater stability have not, in practice, been achieved for a variety of reasons. The working relationship between UNEP and IAEA-MEL is effectively a continuum with much of the work being of an ongoing nature. The relationship is constantly under threat from the lack of ongoing financial commitment implied by the biennial, or even annual, decisions as to the disbursement of the Environment Fund. Support from the Mediterranean Trust Fund is also uncertain, being dependent on the decisions of the Contracting Parties to the Barcelona Convention. Problems with financial management also arise from past deficiencies in the financial accounting and reporting of MESL and, in some instances, lack of communication between UNEP OCA/PAC and UNEP MEDU.

10. As regards project implementation, there is some evidence that UNEP has not exercised such close control since the initiation of the umbrella project. However, this is not the case with regard to MEDU and the Mediterranean Action Plan where, because of the structures which have been established, notably the Inter-Agency Advisory Committee, there is close involvement. The major problem with project implementation is that the respective activities and workplan of the 12 Annexes were not modified when the umbrella project was extended from a one year to a two-year project. Responsibility for this failure to equate activities with financial commitments must be shared between all the agencies involved. To some extent, the very nature of the umbrella project itself, and the lack of a single individual as overall programme officer, resulted in a lack of overall responsibility for the project.

11. There is evidence that Governments have cooperated well with the umbrella project and there is unanimous agreement on the part of officials most involved that the project has had a catalytic effect in encouraging Governments to address the issues of marine pollution. Nevertheless, as regards the project's long-term objective of providing scientific support for the implementation of policies of integrated coastal area management there is, as yet, little evidence to show that, even in the Mediterranean region, Governments have made the jump from making assessments of contamination in the marine environment to drawing up plans for action.

12. The umbrella project also represents a good example of inter-agency cooperation between UNEP and IAEA and demonstrates how the expertise of one organization has been used to good effect to fulfil the policy objectives of another. A major problem has been the position of staff of the MESL laboratory, most of whom are funded by UNEP through this project. The lack of long-term financial commitment has resulted in virtually non-existent employment security and has also caused problems for the recruitment of staff for the implementation of the project.

### *Lessons learnt*

13. Although activities can be verified and outputs examined for their utility and quality, the long-term objectives in a project of this nature can only be achieved by a gradual process of improvement. Progress may be slower than anticipated and the yardstick for measurement should be whether progress is being made, rather than whether absolute levels of attainment have been achieved.

14. It is clear that the umbrella project has not solved all the problems governing the relationship between UNEP and MESL; nor has it resolved the problems of cash flow; nor has it created the financial stability which MESL sought. There have been weaknesses in the overall management of the project, stemming in the main from the lack of a single programme officer. Notable is the failure to maintain and update the activities and workplan of the various Annexes.

15. All OCA/PAC projects should contain a reference to external evaluation and should include budgetary provision for this. The half-yearly progress reports should be submitted within 30 days of the end of the reporting period, as envisaged in the project document, and should also identify to which Annex of the project document the activities relate.

## ***Conclusions***

16. The following conclusions can be drawn which are expanded in section 6:

(a) Judged from the progress which is being made, the umbrella project is a success from the scientific and technical viewpoint, as is evident from the improved data quality;

(b) Achievement of the long-term project objectives has not yet been reached in entirety and the short-term objectives of "joint programming" between the agencies involved have not, in general, been achieved;

(c) More attention should be paid to extending the geographical coverage of the project to other regional seas programmes;

(d) There is effective cooperation between UNEP and MESL in the provision of scientific advice, but there is scope for closer involvement with IOC;

(e) The project management has not been sufficiently tightly exercised, stemming, in the main, from the lack of an overall programme officer in OCA/PAC and inadequate control exercised by the supervisory Advisory Group;

(f) The umbrella project has not solved all the problems of financial management and there remain problems with cash flow and long-term financial commitment;

(g) Overall, the project has been an effective mechanism for making progress at the scientific level and is a good example of inter-agency cooperation.

## ***Recommendations***

17. The following recommendations are proposed for consideration, should there be a follow-up to the umbrella project:

(a) There should be a review of the status of laboratories in the Mediterranean region to assess whether/when the capacity-building stage has been reached;

(b) It should be ascertained whether certain functions which are now performed by MESL (e.g. quality assurance training; intercomparison exercises) could be carried out by other laboratories in the Mediterranean region;

(c) There is scope for MESL to play a more active role in other areas of the Regional Seas Programme, as foreseen in the umbrella project;

(d) Attention should be given to the future role of UNEP support to laboratories within the Regional Seas Programme (including project delivery) in the light of its experience in the Mediterranean region. An assessment should be made of the needs for creating regional centres of excellence to perform similar functions to those currently being undertaken by MESL in other Regional Seas Programme areas, with a view to obtaining GEF support;

(e) To avoid a serious set-back for the long-term policy of OCA/PAC, UNEP funds should be made available to finance the continuation of the project in 1995 on the basis of an updated workplan to be prepared by MESL in close cooperation with OCA/PAC and MEDU;

(f) The long-term value of the umbrella project for OCA/PAC needs to be assessed in the light of competing demands for the available resources;

(g) Alternative sources of funding for the activities of the present umbrella project need to be actively explored both by UNEP and in close consultation with IAEA-MEL. Alternative sources of funding which should be examined include UNDP, regional trust funds, IOC and the Principality of Monaco;

(h) UNEP should persevere with the umbrella project for the management of its relations with MESL but with tighter management control at OCA/PAC by means of:

(i) An overall project supervisor;

(ii) Closer involvement of regional programme officers.

(i) There should be closer co-operation between the Fund Management Officers at OCA/PAC and MEDU to monitor the allocation of financial resources from the Mediterranean Trust Fund;

(j) The Advisory Group should continue to meet to give the necessary policy guidance and to ensure project delivery.

## 2. INTRODUCTION

### 2.1 Background

The need to develop comprehensive and scientifically reliable marine pollution monitoring programmes goes back to the earliest days of UNEP's Regional Seas Programme. It should be remembered that in those days national monitoring programmes for the most part did not exist and the concept of regional assessments was a distant goal at which to aim. It was always envisaged that one of the objectives of the monitoring programmes would be to provide the scientific basis on which decision makers could make effective and rational decisions for managing local, national and regional pollution problems. In addition, it was foreseen that the data generated within the framework of regional monitoring programmes, provided that they were conducted on a comparable basis using standard reference methods of sampling and analysis, would provide a valuable contribution to the establishment of global assessments of marine pollution conducted within the framework of the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

The collaboration between UNEP and the Marine Environment Laboratory (IAEA-MEL) of the International Atomic Energy Agency (IAEA) in Monaco dates from 1975 with the creation of the Mediterranean Action Plan (MAP). The involvement of IAEA in UNEP projects gradually grew through its coordination of UNEP's Reference Methods for Marine Pollution Studies (from 1984), active participation in the IOC/UNEP/GIPME (Global Investigation of Pollution in the Marine Environment) Programme and expert groups, and technical support for capacity-building within the framework of the Regional Seas Programme in regions beyond the Mediterranean. The laboratory has provided assistance in the regions of the Kuwait Action Plan (KAP), West and Central Africa (WACAF), East Africa (EAF), South-East Pacific (CONPACSE), the Caribbean (CEP), the South Pacific (SPREP) and the Black Sea.

In 1986, IAEA-MEL created a new section, the Marine Environmental Studies Laboratory (MESL), to act as the focal point for inter-agency cooperation and the provision of comprehensive technical support for regional and global marine pollution assessments of a non-nuclear nature. IAEA's interest in non-nuclear pollution assessments stems, first, from the utility of applying nuclear and isotope techniques to the study of marine processes, time scales, and the behaviour of non-nuclear contaminants and, second, from the position of IAEA-MEL as a centre for analytical quality control and as the only marine laboratory in the United Nations system. MESL currently serves as the regional activity centre for MED POL (the pollution monitoring programme of MAP). Within the MED POL framework, MESL is responsible for the development of analytical techniques for chemical contaminants: it is responsible for the development of methodology, for training and quality assurance, and data generated by the MEDPOL laboratories.

Prior to the introduction of the umbrella project which is the subject of this evaluation, the contractual relations between UNEP OCA/PAC and IAEA, on the one hand, and between UNEP/MEDU (the Coordinating Unit for the Mediterranean Action Plan) and IAEA, on the other hand, were governed by no less than eight separate projects/subcontracts or Memoranda of Understanding. The administration of these separate projects, which were all working towards the same overall goal, was creating a substantial administrative burden for IAEA (both at Monaco and at IAEA headquarters in Vienna), not least because of the frequent need to transfer resources between different budget lines as MESL staff were used to implement different

projects. It was primarily to resolve these problems of excessive administration that the umbrella project was conceived. It was also expected that an umbrella project would improve the problems of cash flow and would also provide more stable contractual and working conditions for the staff employed at MESL.

The project should also be seen as the means of giving practical effect to the new trilateral Memorandum of Understanding between IAEA, UNEP and IOC which was signed on 15 October 1992. Previously, inter-agency cooperation had been achieved through the mechanism of bilateral agreements between IAEA and UNEP (7 August 1981) and between IAEA and IOC (18 May 1982). The new MoU defines areas where IAEA, UNEP and IOC have common interests and objectives in marine environmental problems, it sets out a strategy for coordinated planning and implementation of relevant activities and it provides a practical framework for continuing and enhancing inter-agency cooperation. In particular, it identifies the following areas as subjects of mutual interest and cooperation:

- (a) Generating essential information for carrying out marine pollution assessments and follow-up activities in relation to the implementation of international conventions and cooperative programmes;
- (b) Assistance in building the technical capacity of regional laboratories for assessing non-nuclear marine pollution;
- (c) Provision of emergency assistance;
- (d) Establishment of regional technical support centres.

The MoU recognizes that the formulation of joint IAEA/UNEP/IOC programmes will be a continuous process and may provide a means by which agreed activities can be financed from sources at their disposal, recognizing the financial budgetary constraints of each organization.

## **2.2 Purpose and methodology of the evaluation**

### ***Purpose***

The evaluation of project FP/ME/5101-93-03 (3033), "Technical Support to Global and Regional Programmes for the Assessment, Prevention, Control and Abatement of Marine Pollution", has been carried out as part of the annual programme of UNEP's Programme Design and Evaluation Unit (PDEU). UNEP Governing Council at its seventeenth session in 1993 decided that a project from the Oceans Programme should be selected for evaluation during 1994. This project was screened by the Project Screening Committee (PSC) for evaluation at its meeting on 26 November 1992 and was actually approved by the Project Review and Evaluation Committee (PREC) on 3 May 1993.

It should be noted that the project has its own internal evaluation mechanism. In describing the institutional framework, the project document in its section 5.1 notes that for the purposes of joint planning the tripartite MoU establishes a high-level Advisory Group constituting the Director of IAEA-MEL, the Director of UNEP OCA/PAC and the Secretary of IOC to meet at least on an annual basis. In addition, each of the 12 Annexes to the

project document contains its own appropriate evaluation mechanism. In addition to these mechanisms, it would have been helpful if the project document had contained a clear indication that the project might be subject to external evaluation, as suggested by the PSC in the minutes of its 127th meeting on 26 November 1992.

The following (paraphrased) terms of reference have been taken as the guiding principles for the present external evaluation:

- (a) To determine how the project has assisted Governments to conduct and implement strategies for marine pollution monitoring, control and abatement;
- (b) To determine whether and how joint programming was undertaken by IAEA, UNEP and IOC;
- (c) To verify whether a regionally sustained programme has been developed, whether regular reports on the status and trends of marine contamination are generated as well as scientific reports to assist the resolution of current management uncertainties;
- (d) To verify the attainment of short-term objectives and outputs;
- (e) To determine the catalytic role played by this project in encouraging Governments to address the issues of marine pollution;
- (f) To examine how the institutional arrangements have facilitated or hindered the implementation of the project;
- (g) To determine the adequacy of the project monitoring and reporting arrangements;
- (h) To draw lessons from this project and provide concrete conclusions and realistic recommendations for future project cooperation.

### ***Methodology***

The evaluation has focused on the management of the project by UNEP OCA/PAC as the agency responsible for the overall coordination of the project. The evaluation has also examined the "delivery" of the project within a recipient region of the Regional Seas Programme, namely the Mediterranean Action Plan, and how the institutional arrangements for project management have worked in practice between OCA/PAC, MEDU and MESL. Ideally, the present evaluation should also have included a visit to the Monaco laboratory of IAEA-MEL, to see at first hand the resources being put into the project by the laboratory and to discuss in depth with IAEA officials their views on how the project has been managed and has fulfilled, or otherwise, its objectives. It would also have been valuable to ascertain the views of the Secretary of IOC on the intrinsic value of the project and how IOC might play a more active role in joint programming and possibly contribute to the financial support of the activities.

The evaluation has been carried out by means of examination of relevant files held within UNEP OCA/PAC and UNEP/MEDU. This was substantiated by a number of in-depth discussions with various programme officers and others concerned in the Regional Seas Programme, both in Nairobi and in Athens. The opportunity afforded by a meeting of

representatives of the Regional Seas Programme, held in Nairobi during the time of the evaluation, was used to discuss the project with a larger number of representatives from different geographical areas than had originally been anticipated in the evaluation programme.

It should be placed on record that full cooperation was afforded to the external evaluator, both in the availability of documentation and in the allocation of time for interviews.

It should be noted that the present evaluation is, of necessity, incomplete owing to the lack of opportunity to discuss the project with officials at IAEA-MEL and IOC on this occasion. Nevertheless, informal discussions have been held with the Head of MESL who has responded with the utmost cooperation to questions raised by the consultant.

### 3. PROJECT DESIGN AND ACCOMPLISHMENTS

#### 3.1 Appropriateness of project

##### *Legislative basis*

The project can be seen as furthering the implementation of the United Nations' strategy for maintaining and enhancing the quality of regional marine environments and for improving the understanding of the global marine environment as set out in the System-Wide Medium-Term Environment Programme for the period 1990-1995. This notes that "although the problems of the oceans are global in nature, the strategy has been to contribute to their solution through globally coordinated regional programmes, all based upon the same general policy, strategy and methodology while being adapted to the specific needs of each region" [196]. "UNEP will continue to coordinate the promotion and the early stages of the implementation of the regional action plans" [197]. The Programme notes that the strategy will be implemented, *inter alia*, through "(a) Technical assistance and support to national and regional institutions in the establishment of monitoring systems and in marine pollution protection and control..." and "(b) Support to intercalibration, intercomparison and quality assurance related to measurement of marine pollution ..." [198].

As regards the global marine environment, the Programme notes that the basis of the system-wide strategy "will be the improvement and expansion of international programmes of open ocean research and monitoring. Attention will be given to the harmonization of methods, the improvement of procedures for handling scientific data, and the preparation of global assessments ..." [201].

The origins of the present umbrella project can be traced back to early decisions of the UNEP Governing Council, but of particular relevance are the following more recent decisions:

(a) Decision 13/25 of 23 May 1985 concerning "Marine Pollution" in which the Governing Council *inter alia*, "Urges the Executive Director, in cooperation with other relevant United Nations bodies, to make every effort to strengthen interregional co-operation so as to promote the exchange of information and experience and to contribute to the protection of the global marine environment."

(b) Decision 15/14 concerning the "clearing house" function of UNEP in which the

Governing Council notes that the United Nations General Assembly in paragraph 15 of its resolution 42/187 of 11 December 1987 "reaffirmed the need for developed countries and appropriate organs and organizations of the United Nations system to strengthen technical co-operation with developing countries in order to enable them to develop and enhance their capacity for identifying, analysing, monitoring, preventing and managing environmental problems in accordance with their national development plans, priorities and objectives". The decision goes on to stress "that the United Nations Environment Programme can and should play an active role in helping to provide and mobilize the assistance needed by developing countries ..."

(c) Decision 16/2 of 31 May 1991 on "Integration of environment and development", in which the Governing Council "Requests the Executive Director and the secretariat of the Programme to contribute actively to the solution of the problems of technology transfer to the developing countries, particularly in the pursuit of the concept of sustainable development".

(d) Decision 16/15 B on "The 1991 state-of-the-environment report 'The State of the World Environment, 1991'", in which the Governing Council inter alia "Requests the Executive Director within the Environment Programme... (c) To continue to develop and strengthen measures to facilitate improved protection and sustainable development of oceans and coastal resources..."

(e) Decision 16/26 B on "Strategies for the protection and development of the oceans and coastal areas", in which the Governing Council "Welcomes the continuing cooperation between the United Nations Environment Programme and the Intergovernmental Oceanographic Commission on the preparation of strategies for the protection and development of the oceans and coastal areas".

The decisions of the so-called Earth Summit on "Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources" as adopted on 14 June 1992 and contained in Chapter 17 of Agenda 21 are also of direct relevance to the appropriateness of the umbrella project. Chapter 17 of Agenda 21 calls for a movement towards the establishment of "new approaches to marine and coastal area management and development at the national, sub-regional, regional and global levels" and that these approaches should be "precautionary and anticipatory in ambit" [17.1]. In order to achieve this policy, Agenda 21 advocates strengthening inter-agency cooperation [17.116] including where necessary the co-location of staff [17.120b] and enhancing or creating subregional or regional technical centres and networks [17.120d]. Furthermore, the need is stressed to build the capacities of national and regional institutions, particularly in developing countries [17.43, 17.35f] and to conduct regular environmental assessments as part of integrated coastal area management programmes [17.8c, 17.9] for marine environmental protection and for useful and comparable pollution assessments for managing the marine environment; to develop standard comparable measurement techniques; to validate, intercompare and review data [17.100c]; and to conduct regional and global research studies [17.35c, 17.37e, 17.100c].

### ***Priorities of the three agencies***

Apart from the legislative basis for the project, as provided for in decisions of the UNEP Governing Council and in the mandate for action as set out in Chapter 17 of Agenda 21, the project also has to be seen in terms of implementing the framework for cooperation as

embodied in the Memorandum of Understanding dated 15 October 1992. This is the most recent and current document to define the areas where IAEA, UNEP and IOC have common interests and objectives in tackling the problems of the marine environment.

In the case of UNEP, the MoU notes that, through OCA/PAC and the Global Environmental Monitoring System (GEMS/PAC), UNEP contributes to the coordination of "inter alia, formulation and implementation of global and regional programmes for assessment of the state of pollution in the marine environment and for protection of the marine environment and coastal areas from pollution."

The purpose of the IOC is, *inter alia*, "to promote, plan and coordinate observing the monitoring systems on the properties and quality of the marine environment, to promote the preparation and dissemination of processed oceanographic data, information, and assessment studies, as well as the development of standards, reference materials and nomenclature for use in marine science and related ocean services." Through its GIPME Programme, IOC has the overall objective "to prove [sic] a scientifically sound basis for the assessment and control of marine contamination and pollution, and to supply the necessary marine scientific input for prevention of unacceptable degradation of the marine environment. The implementation of GIPME is gradually being developed through regional and open ocean components."

Through the activities of its Marine Environment Laboratory, the IAEA "has as its objectives, to carry out studies of radioactive and non-radioactive contaminants in the sea, to provide technical assistance and training, and to provide intercalibration and data quality services to laboratories on a world-wide scale". On the basis of its long-standing cooperation with UNEP, IOC and other agencies, a special section was set up at IAEA-MEL in 1986 to deal with inter-agency collaborative projects on the provision of comprehensive technical support for regional and global marine pollution assessments.

The MoU notes that the objectives of UNEP, IOC and IAEA thus converge in a number of areas relating to the assessment, prevention, control and abatement of marine pollution from different sources and related research. In order to serve the mutual interests and objectives of the three agencies and to effect joint programming and cooperation, the MoU identifies the outlined in A-D below:

*A. Generating essential information for carrying out marine pollution assessments and follow-up activities in relation to the implementation of international conventions and cooperative programmes*

The MoU identifies the following specific cooperative activities:

- (a) Provision of expert advice for marine pollution assessments through the three GIPME Groups of Experts;
- (b) Development of reference methods and guidelines for marine pollution studies;
- (c) Implementation of new, regional monitoring research and assessment programmes;
- (d) Coordination of research activities, such as the Global Mussel Watch programme;

- (e) Data review and modelling.

*B. Assistance in building the technical capacity of regional laboratories for assessing non-nuclear marine pollution*

Technical assistance, education and training will be provided through IAEA-MEL in analytical techniques and field and laboratory procedures. The MoU envisages that work will focus on:

- (a) Intercalibration and data quality control programmes, to be organized through IAEA-MEL, with an emphasis on quality assurance missions;
- (b) Common instrument service facilities to be maintained at IAEA-MEL, including operator training;
- (c) Joint planning of scientific seminars, workshops and congresses to avoid duplication and to optimize efficiency.

*C. Provision of emergency assistance*

There should be consideration of establishing a service which would enable rapid pollution impact assessments to be carried out in emergency situations.

*D. Establishment of regional technical support centres*

The development of such centres should be considered in order to guarantee the validity of data generated in regional marine pollution monitoring and research programmes and to serve as regional focal points for assessment, training, equipment maintenance and data review.

It will be noted that all of the elements identified in the MoU are to be found in one form or another within the framework of the project document under evaluation. It may be concluded, therefore, that the project document is a mechanism for giving practical effect to the aspirations of the three agencies as recorded in their tripartite Memorandum of Understanding.

One caveat should be noted, however: IAEA has neither the regular budget funds nor the mandate to subsidize entirely non-nuclear activities such as those carried out by MESL. This position is defined in the Agency's programme and budget for 1993-1994, approved by the Board of Governors, which states that IAEA-MEL will serve as a focal point for practical inter-Agency cooperation, provided that resources necessary for the expansion of the programme to non-radioactive pollutants are made available by the collaborating organizations".

***Objectives of the project***

It is necessary to review the objectives of the project under evaluation in the light of the legislative mandate of the UNEP Governing Council and the priorities identified in Agenda 21, as well as with regard to the priorities of the three cooperating organizations, as outlined in the tripartite Memorandum of Understanding. The long-term objective of the project overall is:

"To assist Governments to conduct comparable assessments of marine pollution in coastal and ocean environments and to develop and implement strategies for marine

pollution monitoring, control and abatement. The information generated will provide scientific support for the implementation of policies of integrated coastal area management and should contribute to global and regional networks for regularly evaluating the status and trends in marine pollution."

The short-term objectives are taken directly from the tripartite MoU:

"The objectives of IAEA, UNEP and IOC thus *converge* in a number of areas relating to the assessment, prevention, control and abatement of marine pollution from different sources and related research. In working together to achieve these shared objectives, they hereby undertake joint programming with the purpose of attaining results of a practical and tangible nature."

The achievement indicator for the long-term objective is:

"The creation of a regionally sustained interlinking programme for regular and comparable marine pollution assessments appropriate to the specific management needs of each region but contributing to a common understanding of global trends in contamination of the marine environment. The network will generate regular reports on the status and trends of contamination of the marine environment at the national, regional and global levels as well as scientific reports which assist in the resolution of current management uncertainties."

In addition, achievement indicators for the short-term objectives are specified in the individual Annexes of the project document.

In principle, the objectives of the project match well the priorities of the three cooperating organizations and correspond to current needs of the international community as reflected in the principles set out in Agenda 21. The establishment of regional programmes of marine pollution monitoring is an essential foundation of the Regional Seas Programme. Such monitoring programmes are intended to provide the scientific basis for management decisions concerning the marine environment at both national and regional level, and to assist the decision makers to identify priorities for action.

In order that such monitoring programmes can contribute to a better understanding of marine pollution on a global basis, which is the primary interest of IOC, the data deriving from the regional programmes must be of a comparable nature. This means that participating laboratories must all be employing standard reference methods of sampling and analysis; it means that participating laboratories should be following Good Laboratory Practice and be subject to quality assurance checks; it means that laboratories must take part in intercalibration exercises to ensure that their performance is kept up to scratch; it means that data must be evaluated by independent assessors before inclusion in a regional data bank so

as to maintain the integrity of the data collected for subsequent assessment purposes. These principles apply not only to data collected within a region, but also to data submitted on an interregional basis for global evaluation purposes. The principles therefore apply to both the UNEP Regional Seas Programme and to the GIPME Programme of IOC.

Given its long and unique experience in the field of method development, quality assurance and training activities, and experience in organizing intercalibration exercises, *inter alia*, the MESL of the Monaco laboratory is uniquely well placed to carry out the manifold tasks and activities identified in the workplan contained in the various annexes to the project document.

It can be concluded that the project document provides a good basis for resolving some of the marine pollution monitoring problems within the spirit of inter-agency cooperation as identified in Agenda 21.

Nevertheless, it could be said that the project title is somewhat overambitious and even misleading in relation to the project objectives as defined above. It is clear that the project is intended to provide technical support to global and regional programmes for the assessment of marine pollution, but the inclusion of the words "prevention, control and abatement" of marine pollution suggests a more far-reaching scope for the project than is actually the case.

Furthermore, whilst it is true that the outputs of the project in terms of the status and trend reports that will ultimately be produced, as well as the reports on training, etc., provide a management tool for Governments which should help decision makers to decide on priorities for action, it should be recognized that in practice decisions are not always reached on such a logical basis. In reality, it is often political constraints which determine how and whether money should be spent on which measures to control and reduce pollution of the marine environment. Nevertheless, the long-term value of the monitoring and assessment programmes, which are established in accordance with the rigorous scientific criteria towards which the Regional Seas Programme aims, should enable future generations of scientists to assess the effectiveness or otherwise of the measures actually taken. The project should therefore have long-term value, even if it does not lead to the precise sequence of events that its authors intend (methodology development > institution building > measurement campaigns on a comparable basis > scientific reports and assessments of marine pollution > decisions for action).

### **3.2 Efficiency and effectiveness of delivery of project objectives, activities and outputs**

The objective of this section is to determine the extent of achievement of the project objectives by reviewing the project activities and outputs. A detailed comparison of project outputs and activities by close reference to each annex is contained in the Appendix.

Annex I deals with the general coordination of the project, including the budget, and does not provide for specific outputs and activities; these are covered in the remaining 11 annexes which are assessed below.

#### *Annex II: Development of new methodologies and common quality assurance/quality control standards*

Annex II could be regarded as the core of the project. The outputs have global, as well as regional, application and the objectives are defined as follows:

"To assist Governments to obtain high quality validated data for marine pollution assessments at a global and regional level by the provision of standard methodologies and reference materials (as part of an integrated package of support for data quality assurance)."

The short-term indicators of achievement of the project objectives are well defined, e.g., assessing the proportion of monitoring laboratories producing acceptable data before and after the project; actual use of the standard reference methods and reference materials in all Regional Seas Programmes; etc. It has not been possible within the time-frame of the evaluation to carry out a definitive assessment of the extent to which the short-term indicators have been achieved, but such an exercise could provide valuable insights. As indicated in the following paragraphs, there is clear evidence of substantial progress, but there are also indications that more attention has been focused on the production of the project outputs (e.g. the development of reference methods) rather than on the delivery to the project clients (i.e. the laboratories participating in the Regional Seas Programmes). The extent of achievement of the different components of annex II are analysed below.

*Reference methods:* This is an area where there has been much activity but it is difficult to relate progress against the indicators in the project document, primarily because of the ongoing nature of the work. It is apparent (see Appendix 1) that many reference methods currently have the status of being "ready for printing", rather than delivered. In part, this delay in achieving the final product output is due to the peer review process (described in section 3.3). In summary, eight new reference methods have been developed, four have been updated and two have been translated into French. In addition, eight topics have been subject to method development in 1993/1994.

However, there is little direct relationship with the workplan described in annex II. Only two of the new or updated methods which were printed in 1993 or are now ready for printing are listed in the work plan. Indeed, of the 13 methods listed in the annex II workplan, five are now scheduled to commence in 1995 and a further two are still under discussion to identify suitable experts.

The envisaged training video on Reference Methods and their application and the promotional material to draw attention to this activity have not been completed. The scenario has been developed, some filming has been done, but the work needs the attention of a professional for completion and this has not been effected owing to lack of specific funding for implementation.

The stock of Reference Methods is kept in OCA/PAC in Nairobi for distribution within the Regional Seas framework. The total number of copies distributed per issue is 500 on average. They are sent to the Regional Coordinating Units (50 - 100 copies per unit), for distribution directly to the contact laboratories in their region, to other United Nations agencies and international organizations, and to laboratories cooperating with the Regional Seas Programme. In the case of the Mediterranean, 128 laboratory contacts participating in the monitoring programme are on the mailing list of MEDU and will automatically receive these Reference Methods. However, it has not been possible to verify the efficiency of the distribution network in other regions and, particularly, to ascertain whether the Reference Methods are reaching their intended targets, i.e. the participating laboratories. This will depend on the efficiency of each RCU.

In addition, MESL receives 100 copies of each Reference Method. These are distributed through training courses organized in Monaco or through regional training courses and, upon request, are distributed to laboratories.

*Technical Bulletins and manuals:* two Technical Bulletins for Marine Pollution Studies were envisaged. One has been published and one is ready for printing. Other manuals of techniques relevant to the quantification of biological effects (a GEEP activity) and a manual on data quality control and good laboratory practice (a GESREM initiative) do not appear to have been produced during the project lifespan.

*Reference materials:* The production and certification of reference materials are subject to international approval in the framework of IOC's GESREM group. Only one item of reference material was produced in 1993, deriving from work carried out in 1992. This was, in fact, based on a tuna fish homogenate rather than on the mussel tissue indicated in the project document. The latter is the subject of an inter-comparison exercise (see below) and the deadline for results is 31 December 1994. Depending on the results, certified reference material may be available by the end of 1995.

The certification of further reference material deriving from the inter-comparison of trace metals in a polluted marine sediment (IAEA-356) has been completed and should be available in 1994.

There is no evidence of the production of regional reference materials (both for sediments and organisms); such materials were anticipated in the project document.

It is a fundamental feature of the project that reference materials should be available free of charge to laboratories that request them. It is unclear which organization is primarily responsible for the distribution of reference materials, although logically that would be MESL. The laboratory does not have precise records of where reference materials have been distributed, although participants at training courses organized in Monaco and the regions automatically receive samples. In addition, laboratories which have participated in the intercalibration exercises are advised to keep the remaining inter-comparison sample as a reference method for quality control purposes.

*Intercalibration exercises:* MESL has in fact organized three world-wide and regional inter-comparison exercises for trace elements and trace organics in sediment, mussel homogenate and sea plant homogenate (instead of the two envisaged in the project document). One exercise has been completed and a report published; the second exercise will close at the end of 1994; and the third began in 1994. These global inter-comparison exercises include laboratories in the Regional Seas Programme, especially Mediterranean laboratories (see Appendix).

An inter-comparison exercise involving expert laboratories has been carried out in order to produce certified reference material for total mercury and methyl-mercury in a mussel homogenate.

In addition, MESL has organized regional intercalibration exercises, notably for the Kuwait Action Plan, and has conducted several small-scale inter-comparison exercises to

evaluate the suitability of new determinands (e.g. faecal sterols in sediments, methyl-mercury compounds and fungicides and herbicides) in connection with the development of the MED POL programme.

*Specialist reports:* The project document indicated that specialist reports would be prepared on relevant elements of analytical methodology and of biological effects studies; on regional and interregional data quality reviews; and on available stocks/future plans for the production of reference materials. The time scale for the production of those reports was not specifically indicated in the project workplan.

Five scientific literature papers on developments in analytical methodology have been published and are used by MESL in training activities. A review of data quality in the framework of the Mediterranean Action Plan was published as MAP Technical Report No. 81 in 1994 and, as such, automatically circulated to 402 recipients on the regular mailing list of UNEP/MEDU. Also, the current status of Reference Methods and Technical Bulletins for Marine Pollution Studies series was published by IAEA-MEL/MESL in April 1994.

### *Annex III: Technical support for the implementation of MED POL-Phase II*

*Maintenance of analytical instruments:* Nine missions were carried out between April 1993 and May 1994 as part of the installation and maintenance service programme (eight were envisaged in the project document). Two of these missions were paid for by IAEA and not from the project.

Mission reports are produced for MEDU following each visit and an overall report "Instrument Maintenance in the MED POL Programme" has been prepared assessing the value of this activity.

*Training:* Three consultation meetings and one training workshop were envisaged in the project document and all four meetings have been held (three in 1993 and one in 1994).

*Inter-comparison exercises:* Two inter-comparison exercises for all MED POL laboratories and two specialist inter-comparison exercises related to pilot monitoring programmes were envisaged in the project document. These have been carried out and are summarized in relation to the activities of annex II.

*Review of data quality in the Mediterranean:* MAP Technical Report No. 81, constituting such a data quality review, has been published (see also the reference to specialist reports above).

*Research:* MESL supervises research contracts in the framework of MED POL. Ten such contracts were supervised in 1993-1994 and others are under consideration.

### *Annex IV: Support for the "Joint monitoring exercises and training courses" component of MED POL*

*Training:* Whereas the training objectives provided in the framework of Annex III are to provide support for the principles of the MED POL programme, the training objectives under Annex IV are more specifically focused on the needs of specific laboratories and are intended to

enhance all aspects of quality assurance. Five training courses were held in Monaco and included 24 trainees from six countries participating in the MED POL programme.

In addition, two regional training courses were conducted (in Lebanon and Syrian Arab Republic) to provide "on the job" training for 11 personnel.

It is evident from the comments that the trainees made in their post-course evaluations that the usefulness of the training carried out is extremely great and is well appreciated.

*Joint monitoring exercises and quality assurance programme:* Seven quality assurance missions were carried out in the period May 1993 to June 1994. Reports on each mission are prepared for the Coordinating Unit (MEDU). On occasions, MEDU staff have accompanied the MESL staff and have confirmed the success of these missions.

*Annex V: Assistance in the implementation of the UNEP/World Bank technical assistance programme*

The objective of the World Bank Programme was to finance the purchase of appropriate laboratory instruments in order to enhance the national capabilities of laboratories participating in the MED POL programme and to strengthen the network of research institutes contributing to the regional monitoring activities. Instruments were bought and delivered by MESL under the supervision of UNEP/MEDU; MESL was its subcontractor.

The objectives of the World Bank coincided with those of UNEP and MAP in that the Bank saw this capital expenditure programme as a tool for use by decision makers, leading ultimately to concrete pollution control measures (as stated in the long-term objective).

The potential outputs of this part of the project were seen as national status and trend reports. Five "country reports" were prepared in 1993-1994, but none have been officially published. They have been compiled and sent to the countries concerned for comments, but there have been neither positive nor negative reactions. The reports on Slovenia and Egypt were compiled in their entirety by MESL.

Further comments on the potential usefulness of such status reports are contained in section 3.3. For the purposes of this section, it must be noted that the relevant outputs, although prepared, are not in the public domain and therefore this results in a certain lack of effectiveness of project delivery.

*Annexes VI-X: Technical assistance to other Regional Seas Action Plans*

It must be noted that the outputs and activities for the five annexes ostensibly dealing with the project's support to other areas of the Regional Seas Programme are much less well defined. The impression is created that these annexes were included in the umbrella project partly to justify its transformation into an umbrella project.

*South-East Pacific (Annex VI):* One training course on pesticide analyses was envisaged and carried out for nine trainees coming from five countries in the region. In addition, an MESL expert organized an expert meeting to design a new marine pollution monitoring programme for the region and arrange an analytical chemistry training course (paid for by IAEA and not the project).

*West Africa and East Africa (Annexes VII and VIII):* The only project activities for these two regions specified in the project document include participation in the intercalibration exercises. Laboratories from the West and Central African Action Plan did indeed participate in the two global intercalibration exercises (see Appendix) but there was no participation from East Africa, nor were any regional inter-comparison exercises undertaken.

*Caribbean (Annex IX):* The project document indicates a comprehensive list of activities due to be carried out to assist the implementation of the Caribbean Environment Programme. A quality assurance and sampling mission was carried out in Mexico and on-the-job training was provided in Cuba. In addition, MESL staff contributed to the development of the work through their active participation in regional meetings.

*Black Sea (Annex X):* The programme for the environmental management of the Black Sea is not a UNEP OCA/PAC project but a GEF project. Nevertheless, UNEP undertook to provide technical support and this has resulted in three training courses in Monaco (two of them in conjunction with trainees from the MEDPOL programme), training 10 trainees from four countries in the Black Sea region. MESL staff have contributed actively in various meetings related to the development of this programme.

*Annex XI: Provision of technical support for the development/enhancement of new marine pollution assessment programmes in the regional seas, including emergency assessments*

The project outputs and activities for this annex are not well defined, the principal activity being envisaged as the development of a workplan for the biennium 1994-1995. There is no evidence that such a workplan has been developed, nor is it clear whether contacts have been made with other relevant international organizations concerning the provision of emergency assistance. Such assistance has been provided in one case concerning the analysis of sediment samples in the Philippines following leaks from containers containing toxic wastes. Some progress has been made on the development of an analytical system for the rapid screening of contaminants.

*Annex XII: Assistance in the IOC/UNEP International Mussel Watch Experiment*

The analyses of mussel homogenate samples were completed by MESL in the beginning of 1993. It is not clear why this annex was included in the umbrella project, which was signed in June 1993.

#### *Overall assessment*

In addition to the analysis of how individual components of the umbrella project have been carried out, it is also necessary to review the overall effectiveness and delivery of the project objectives, outputs and activities.

It is evident from the above analytical summary and the details in Appendix 1 that much

has been accomplished. A comparison of the activities proposed in the project document with what has actually taken place reveals that much of the workplan has been achieved, but over the time span June 1993 to October 1994, rather than in the original January-December 1993 time frame.

The outputs of the project, whether they are technical methods published by UNEP or reports on consultation meetings and training activities, are well presented. In particular, the mission reports following on the job training and quality assurance visits are succinct, informative and presented swiftly to MEDU, which is the primary unit responsible for monitoring the progress within the framework of the MAP. There is some evidence that the delivery of the outputs could be improved, or at least better monitored. It is important to ensure that aids such as the Reference Materials are indeed delivered to all the laboratories which could make good use of them. It would also be valuable to ensure that the reports and publications of Reference Methods reach the concerned laboratories in the Regional Seas Programme which are intended to be the ultimate beneficiaries.

In assessing whether the objectives have been achieved, the declared long-term objective of the umbrella project can be broken down into four components. The first is to assist Governments to conduct comparable assessments of marine pollution in coastal and ocean environments. It would seem that progress is definitely being made towards this objective by the means of training courses, quality assurance programmes, joint monitoring exercises, instrument maintenance activities. These have provided the necessary elements but the objective of "comparable assessments" has not yet been achieved.

The second objective concerns the development and implementation of strategies for marine pollution monitoring, control and abatement. Within the Mediterranean region, the consultation meetings within the framework of MEDPOL Phase II have provided the basis for the development of the MEDPOL monitoring programme. But it should be noted that these are confined to the Mediterranean region and there is no evidence to demonstrate the application of the strategies to other regional seas, although much could be learned from the Mediterranean experience.

The third objective is the provision of scientific support for the implementation of policies of integrated coastal area management. Apart from begging the question as to what is meant by "integrated coastal area management" in this context, there is little apparent evidence of a link between scientific data collection, on the one hand, and the preparation - let alone implementation - of coastal area management policies on the other hand.

The fourth objective is that the project should contribute to global and regional networks for regularly evaluating the status and trends in marine pollution. It is evident that progress is being made but, as with other aspects, most activity is confined to the Mediterranean. Even here, the national monitoring data is not published and is presumably not input to the global programme. Trends reports can only be published at periodic intervals (normally not less than five years); the last assessment of the state of the marine environment in the Mediterranean was published in 1989.

The short-term objective of the project essentially concerns "joint programming" by IAEA, UNEP and IOC. There is little evidence to show that joint programming as such is effectively addressed by this project, although the aim is clearly important. The issue is more complex than the project itself and, indeed, is linked with the financial and management questions which are

addressed in sections III.4 and IV.

In brief, the evaluation indicates a generally high degree of fulfilment of the project activities and outputs when actual delivery is compared with the intentions as stated in the project document. The chief exception is the mismatch of Reference Methods actually worked on during the project time frame compared with the work plan in the project document. However, despite a good correlation between project intentions and project implementation, progress towards achievement of both the long and short term objectives is patchy. This does not necessarily indicate failure of the project; simply that the long-term objectives set a high standard - even are idealistic - and will necessarily take some years to achieve. The conclusion can be drawn that within the scope of the project, as defined, it is an effective vehicle to achieve the project objectives in the longer term. Having said that, future amendments of the project should focus more on the opportunities for assistance to other areas of the Regional Seas Programme.

### **III.3 Quality and Utility of the Project**

The purpose of this section of the evaluation is to attempt to analyze the project outputs and results in terms of their application and influence to the problems of marine pollution, especially within the context of the OCA/PAC policy for the Regional Seas Programme.

*Annex II: Development of new methodologies and common quality assurance/quality control standards*

As stated above, Annex II is essentially the core of the project. The new methodologies and standards to be developed have impact not only at the regional level, but also are essential for fulfilment of the aim of global assessments of the state of marine pollution. There are essentially four activities contained in Annex II.

*Reference Methods.* The series of Reference Methods prepared within the framework of UNEP's Regional Seas Programme sets out to describe standard methods of sampling, analysis, procedures, etc which should be followed by all participating laboratories in order to ensure not only high standards of laboratory practice but also comparable data sets produced within the framework of regional action plans which can also contribute to global assessments of marine pollution because the standards are common. There is no doubt of the high quality of the Reference Methods produced in this series. The system of peer review within the scientific groups of GIPME, as well as oversight by the OCA/PAC technical staff, is guaranteed to ensure high quality and state of the art methods.

The relevance of some of the Reference Methods could be debated. There is perhaps a tendency to focus on some more esoteric guidelines which may well extend the frontiers of marine science but do not necessarily address the more basic analytical problems confronting laboratories working in less developed countries within the Regional Seas Programme whose needs may be more associated with assessing the level of sewage pollution and nutrient inputs rather than, for example, selected neurotoxins. There is, however, evidence of an acknowledgement of these more basic needs and of a consequential shift in the workplan designed to meet them.

*Reference materials.* Reference materials are natural environmental samples (normally of

biological tissue or sediments) with known quantities of contaminants which laboratories can use as a standard by which to measure their own analytical performance. Reference materials are therefore an important ingredient in the quality assurance procedures of laboratories participating in the Regional Seas Programmes in order to ensure that they produce good quality data. The usefulness of certified reference materials is not in doubt. An issue which could usefully be addressed is whether the procedure for distributing reference materials free of charge to participating laboratories is working as efficiently as it could and whether, once received, the laboratories concerned are making full use of the reference materials in their internal quality control procedures.

*Intercalibration exercises.* Intercalibration (or intercomparison) exercises are blind tests in which laboratories are requested to identify the levels of specified contaminants in certified environmental samples of unknown value to the laboratories. The aim is to provide an external check on the performance of the participating laboratories, which knowledge can then be used to assess the reliability of data submitted by these laboratories under regional monitoring programmes. Such exercises, carried out at regular intervals, are therefore important to ensure that the quality of data being contributed to regional and global marine pollution programmes is maintained.

MESL produces comprehensive reports on the results of the intercalibration exercises which it organises. These reports are important tools to focus attention on further training and quality assurance needs; they are also important for ensuring the reliability of the assessment of status and trends reports, both on a national and regional basis.

Of the three global intercalibration exercises carried out within the time frame of this project, one has been completed and a report published. This exercise was for the determination of trace elements in polluted marine sediments. Given the number of parameters measured and the fact that the material originated from a polluted coastal lagoon, the sample was particularly relevant for laboratories which will be charged with the task of assessing coastal pollution. The exercise will also lead to a future reference material.

The results confirmed a good degree of agreement between analysts for most elements analyzed. The exercise also confirmed that methyl mercury compound samples (an important contaminant for human health reasons) in different biological and environmental samples should not be an analytical problem in the future.

The smaller scale intercomparison exercises for indicators of sewage pollution are also important for obvious human health purposes. Such indicators are also important in coastal zone management issues, eg for monitoring tourism potential.

*Specialist reports.* The potential value and usefulness of such reports is important. In particular, the data quality reports, such as the "Data Quality Review for MED POL" already referred to, leading eventually to reports on the status and trends of marine contamination, are fundamental achievement indicators of the long-term project objective.

### *Annex III: Technical support for the implementation of MEDPOL-Phase II*

*Maintenance missions.* The maintenance missions are essential in order to maintain the quality and effectiveness of the high cost laboratory instrumentation. The principle of a peripatetic engineer servicing a number of laboratories within a geographical region seems to be a clever

solution to an important problem which could be repeated to good effect in other regions, provided the governments concerned guaranteed their support by voting trust fund allocations in the longer term.

*Training.* The three "consultation meetings" and one workshop carried out in the framework of Annex III resulted in very clear reports prepared by MESL. The outcome of the consultation meetings was recognised as MESL's contribution to MEDPOL in 1994, subject to the financial limitations of Contracting Parties to the Barcelona Convention, but these were never translated in a revised workplan to the umbrella project document. The following paragraphs briefly summarise the relevance of the four training activities to the MEDPOL programme and the overall project.

The guidelines on analytical quality assurance recommend a holistic approach to achieve good quality data leading ultimately to full self-sufficiency. The guidelines recommend that quality assurance programmes should be mandatory and should form an integral part of each MEDPOL laboratory's monitoring agreement.

The consultation meeting on the application of chemical tracers of domestic contaminants for marine pollution surveys assessed the innovative techniques to complement traditional microbiological assays. Although a definitive method was not produced, the value of such techniques was recognised. This initiative could have widespread potential for application in other areas of the Regional Seas Programme.

The consultation on guidelines and reference methods for sample work-up in organic contaminant analyses confirmed that current protocols in the UNEP Reference Methods series are out of date, particularly for the important organochlorine compounds. A procedure was initiated for updating the methodology including review by IOC expert panels.

The workshop on the determination of contaminants in sediments (added to the workplan by Rev 3 of the project document) recognised the value of sediment monitoring as a constituent part of an integrated marine pollution monitoring programme, both as a "sink" for contaminants and as a potential bioavailable source of contaminants. The workshop carried out a thorough and detailed examination of two new reference methods to determine both trace elements and organic compounds in sediments.

*Intercomparison exercises.* The value of specialised intercomparison exercises is important for the development of the MEDPOL programme. The procedure is to use 5-6 laboratories for pilot monitoring to provide an overview of the level of pollution of the contaminant concerned and to review methodologies. On the basis of the intercomparison exercise, the Contracting Parties can decide whether to include the parameter concerned within the MEDPOL programme as a regular feature.

*Research.* The value and usefulness of the research projects supervised within the framework of the umbrella project has not been evaluated.

#### *Annex IV: Support for the "Joint Monitoring Exercises and Training Courses" component of MEDPOL*

As described in section III.2, the activities under this Annex comprise training courses conducted in Monaco, on the job training in regional laboratories and joint monitoring and

quality assurance missions to laboratories in the MEDPOL region.

It would seem that the various elements of the training package constitute one of the most successful aspects of the umbrella project. The comments of trainees attending the training courses in Monaco confirm, without exception, the high degree of relevance to the trainees' needs and their satisfaction with the overall level and presentation of the training. The observations of MEDU officers attending the quality assurance missions confirm that these are fully dovetailed to the needs of the laboratories which are assisted. The system of carrying out split samples for subsequent analysis by MESL and the laboratory concerned has proved to be a very efficient training method. The evidence of the success of these measures is seen in an improvement in the quality of the data generated under the MEDPOL programme.

*Annex V: Assistance in the implementation of the UNEP/World Bank technical assistance programme*

The project aims of providing laboratory instrumentation needed in order to conduct chemical analyses of potential pollutants are, of course, entirely laudable and an important element in capacity building within the Mediterranean region. However, the project outputs, namely national status and trends reports, have not yet been achieved. These are not only an important indicator of the success of Annex V, but are an essential element of the long-term objective of the project overall.

None of the 5 national reports prepared has been published because government approval has not been given. The respect for national sensitivities on these matters is understandable but it is essential to address these issues honestly and openly, otherwise there is a real danger of all concerned working within a vacuum.

*Annexes VI - X: Technical assistance to other Regional Seas Action Plans*

As indicated in section III.2, the umbrella project does little to address specific problems within the framework of the Regional Seas Programme other than the Mediterranean although, of course, the outputs of Annex II concerning reference methods and common quality standards should have universal application.

The project makes no apparent contribution to the development of the East and West Africa Action Plans and only small contributions to the others specified (the South East Pacific and the Caribbean) apart from the Black Sea where considerable MESL activity has taken place partly outside the framework of the project. The inputs to these Actions Plans are essentially of a training nature and, it can be assumed, will have been of value to the participants affected.

*Annex XI: Provision of technical support for the development/enhancement of new marine pollution assessment programmes in the regional seas, including emergency assessments*

It cannot be said that this Annex has contributed much to the overall utility of the umbrella project. The provision of emergency assessments is an activity where the project could have a role to play in the wider context of the UN response to environmental emergencies. The limited achievements of the project so far in relation to an analytical system for rapid screening of contaminants seems to be on the right lines, but it is probably an activity which would benefit from wider discussion within the UN system and with potential beneficiaries in the Regional

Seas Programme as regards their perceived needs.

#### *Annex XII: Assistance in the IOC/UNEP International Mussel Watch Experiment*

Although the final analyses were completed in the first three months of 1993, the samples were collected during late 1991 and throughout 1992. The objectives of the International Mussel Watch project are to quantify the sources and rates of inputs of human wastes into the world's oceans so that the current status of marine environmental health can be evaluated and future trends may be determined. To this extent, the IMW component of the umbrella project is, of course, of relevance to the overall project objectives.

#### *Overall assessment*

It is evident that the quality of the project outputs is of a very high standard. This is the case whether it is the published reference methods, or the production of reference materials, but is especially evident in the quality of the training activities including the joint monitoring and quality assurance programme to laboratories in the MEDPOL region.

As regards the usefulness of the project activities and outputs, it would seem that these are still relevant and valid for the future development of the Regional Seas Programme. However, as noted elsewhere in this evaluation report, there is too much concentration on activities within the Mediterranean region and not sufficient consideration to the needs of the other Regional Seas Programme areas. Apart from the activities specified for the Caribbean region (which, for the most part, were not achieved) the detailed application of project methods and the possible involvement of MESL are ignored. This is true even in the case of those regional seas where the OCA/PAC management should be strong because the activities are still co-ordinated from Nairobi.

In conclusion, it is clear that MESL has demonstrated its credentials as a centre of excellence capable of delivering high quality outputs in terms of scientific reports, the conduct of intercomparison exercises, and training and quality assurance programmes. There is a need to widen this expertise and incorporate it more effectively within the framework of the Regional Seas Programme. The utility of this project in addressing the issues of monitoring programmes in the marine environment is important as an essential tool to determine the priorities for control and abatement measures and, in the longer term, to measure the effectiveness of measures taken. However, consideration will have to be given to the appropriate allocation of resources to this aspect of the Regional Seas Programme vis à vis other activities of OCA/PAC. Despite the high quality of the outputs and the undoubted utility of the project, decisions will have to be taken on the financial resources to be allocated to these tasks by comparison with other priorities. In this case, joint efforts may need to be made to find alternative funding to finance the expansion of the project to other regional seas which is envisaged above. These issues are addressed elsewhere in this evaluation, in particular in the Recommendations.

### **III.4 Organizational Structure and Management Systems**

#### *Organizational structure*

The project document appears to place overall responsibility for the management of the project in the hands of the Advisory Group established by the tripartite MoU (this is composed of the Director of IAEA-MEL, the Director of UNEP OCA/PAC and the Secretary of IOC). The

Advisory Group is intended to meet at least once per year and to be the agent for "joint planning".

In practice, it appears that there have been some limitations to this arrangement. Owing to the busy schedule of the three executive officials concerned, it has been difficult apparently to find mutually convenient dates for meeting. On the one occasion when an Advisory Group meeting took place (March 1994), no minutes were kept or records taken of any decisions made. Apart from the project document itself, there is no evidence of how "joint programming" has been implemented.

Despite this overall lack of supervision and control, the project has nevertheless functioned effectively. Within the framework of the Mediterranean Action Plan, an Inter-Agency Advisory Committee (IAAC) for MEDPOL has long been established. The IAAC meets at least annually and produces reports of its meetings which record the discussions and decisions taken. The proposals of the IAAC are then considered by the Contracting Parties to the Barcelona Convention. In fact, the IAAC provides a forum where joint programming decisions are taken at least in the framework of MED POL.

### *Management systems*

Project document FP/ME/5101-93-03 (3033) contains 12 separate Annexes, each identifying its own short-term objectives, outputs, activities and work plan. However, at the time of the evaluation there was no single officer designated to oversee the development and management of the project other than Director of OCA/PAC himself. The absence of an overall programme officer is probably one reason for the failure to maintain the work plan and activities of the project when it was decided to extend its duration from a one year to a two year period (see section III.5).

The impression is gained that despite the 12 Annexes which constitute the project, most effort is concentrated on Annexes II to V. Annex II deals with the development of new methodologies and common quality assurance/quality control standards; Annex III deals with technical support for the implementation of MED POL Phase II; Annex IV deals with support for the "joint monitoring exercises and training courses" component of MED POL; and Annex V deals with assistance in the implementation of the UNEP/World Bank programme under which the purchase and installation of a number of analytical instruments for seven Mediterranean countries was financed by the World Bank. These Annexes are the continuation of ongoing projects, in some cases for many years. The outputs, activities and work plan in these Annexes are most clearly defined, reflecting not only the long established nature of the work but also evidence of the close co-operation between MESL and OCA/PAC on the one hand and between MESL and MEDU on the other. By contrast, the outputs and activities for the remaining Annexes are less well defined in substantive terms. Indeed, it would appear that the Annexes were drawn up without close consultation with programme officers from the regional seas involved.

The project document provides (section 6.1) that within 30 days of the end of the reporting period, IAEA-MEL will submit to the office of the Environment Fund and Administration and the Office of the Environment Programme, through OCA/PAC, half-yearly progress reports as at 30 June and 31 December according to a format specified in Appendix III. In fact, IAEA-MEL failed to provide these half-yearly progress reports on its own initiative and it was not until the OCA/PAC Fund Management Officer (FMO) requested these reports on 7 October 1994

that the Head of MESL provided two reports for the periods July-December 1993 and January-June 1994. The submitted progress reports conform exactly to the format prescribed in Appendix III. However, it is suggested that in future it would be helpful if the information submitted could be broken down to enable verification of the work carried out with the individual Annexes of the umbrella project. It seems that no action is taken within OCA/PAC on the progress reports, but they could form the basis of useful discussion between the overall programme officer (when designated) and MESL, as well as with programme officers or units concerned with individual Annexes, on any shortcomings in implementation of the project. The progress reports could also form the basis of evaluation by the Advisory Group.

It should also be noted that, in addition to the lack of liaison with certain programme officers and representatives of the Regional Seas Programme, the creation of the umbrella project has also had the effect of lessening direct contact between UNEP, OCA/PAC and MESL. It does not seem inevitable that this should be a consequence of creating an umbrella project, but it is clearly a danger that the establishment of the new contractual relations between UNEP and IAEA-MEL have lessened, perhaps psychologically, individual responsibility for elements of the programme. If the danger is recognised, action can be taken to ensure that it does not lead to problems in the management of individual Annexes.

Finally, the absence of an overall programme officer for the project means that there is no effective management system to review overall project implementation.

#### ***Relationship between UNEP, IAEA and IOC***

The over-riding impression of the relations between UNEP, OCA/PAC and IAEA-MEL is that financial problems continue to beset the management of this project. The result is that inordinate amounts of time are still spent on financial management problems rather than addressing substantive issues of the project. For example, it is evident that MESL has the expertise to carry out more technical assistance within the framework of the Regional Seas Programme, particularly if the technical capacity building elements within MED POL become less time consuming in future. The umbrella project would be the ideal framework in which to develop future activities and work plans, but it is not very effective in that respect at present.

It is also evident that there are very close ties between MESL and UNEP OCA/PAC. Not to put too fine a point on it, MESL depends upon OCA/PAC for its very existence. (This point is addressed further in section III.5.)

There is also a very close and effective working relationship between MESL and MEDU. It is evident from the activities carried out in implementation of Annexes III-V (see section III.2 above) that there are a number of fronts where there is active and close co-operation between the two organizations. The programme of consultation meetings and training workshops etc, provides regular opportunities for meetings between the respective staff, as well as in the framework of the IAAC.

The relations with IOC are more tenuous. Effectively, IOC fulfils its part of the tripartite MoU by servicing the three GIPME Groups of Experts which provide expert guidance on the following matters:

- GEMSI (the IOC/UNEP Group of Experts on Methods, Standards and Inter-calibration)

- GESREM (the IOC/IAEA/UNEP Group of Experts on Standards and Reference Materials)
- GEEP (the IOC/UNEP/IMO Group of Experts on the Effects of Pollutants).

It is true that these groups serve a useful function in providing high level, independent scientific advice on matters such as methodologies which are the subject of Annex II of the project. However, there is no active involvement of IOC on a regular basis in the activities of the project.

There is one area where the project (or perhaps the tripartite MoU) should lead to closer co-operation and less duplication of effort. This concerns the coverage of the respective monitoring programmes of UNEP's Regional Seas Programmes and IOC's MARPOLMON Programme. The consequence of past independent developments has resulted in parallel monitoring and research programmes. There are moves within the framework of GIPME to merge the respective monitoring programmes. This has been achieved in the case of the Caribbean and Mediterranean regions and may result in a common programme in the East Asian Seas. The two programmes derive from different origins; OCA/PAC's Regional Seas Programme stems from political needs and legal instruments whereas IOC's regional programme reflects oceanographic realities. The consequence is that in many cases the geographical entities are not the same and this will certainly lead to some problems when attempting to rationalise the two programmes.

It is acknowledged in the long-term and short-term objectives of the project that the outputs of the Regional Seas Programme should feed into the IOC programmes for global assessment. The activities of the Regional Seas Programme, and consequently the technical support provided by IAEA-MEL through this project, are of direct benefit to the aims and activities of IOC. It would therefore seem to be pertinent to consider whether IOC should provide a financial contribution to the umbrella project commensurate with its interests and in recognition of its partnership in the tripartite MoU.

#### **IV. PROBLEMS AND CONSTRAINTS ENCOUNTERED**

##### ***Financial***

The chief problem facing the umbrella project is that which it was set up to solve, namely financial management. The primary aim of the umbrella project was to simplify its financial administration from the IAEA and MESL viewpoints. UNEP management recognised from the start that the umbrella project would not necessarily be an advantage for either UNEP OCA/PAC or UNEP/MEDU. Apart from simplifying the financial administration, it was also expected that the umbrella project would avoid problems of cash flow and would create greater stability both for the project and, ultimately, for MESL staff.

However, in reality these objectives have not been achieved. The reasons probably stem from a variety of causes. The first is the project lifespan itself. It is evident, both from the thrust of the tripartite MoU and from the detailed activities specified in the work plans of the various Annexes, that much of the work undertaken by MESL is essentially of an ongoing nature. Although individual activities may be allotted a specific time frame, the general orientation of the work is ongoing and continuous.

This long-term nature of the relationship between MESL and UNEP (it must be remembered that the working relationship between UNEP and IAEA-MEL extends back nearly 20 years) is somewhat at variance with the one or at most two year biennial budgetary system pursued by UNEP. Thus, although there is a continuum in the working relationship between UNEP and MESL, the relationship is constantly under threat from the lack of ongoing commitment implied by the biennial - even annual - decisions as to the disbursement of the Environment Fund.

The lack of financial commitment from UNEP is mirrored also by the uncertain nature of support from the Mediterranean Trust Fund (MTF), which is always dependent on the Contracting Parties to the Barcelona Convention, which contribute about 10% of the funding of the project. One of the major components of MTF support is the bulk of the staff costs for the laboratory instrument maintenance service engineer (Grade P3). The budget proposals of the MTF are scrutinised increasingly carefully by the Contracting Parties, not only to verify that expenditure has in reality been incurred for the activities voted, but also to determine relative priorities within the financial resources available. A further complication arises from the fact that, although funds may be approved in the budget of the Contracting Parties, they cannot be disbursed until the financial contributions have actually been received by the Fund Management Office in Nairobi. This has on occasions led to delays in carrying out the agreed work programme in accordance with the originally envisaged timetable because funding was not available. This has sometimes resulted in funds being lent from the Environment Fund in order to maintain activities.

Despite the inherent difficulties in the financial management of the project for the reasons described above, the umbrella project has presumably resulted in some advantages for MESL and its counterpart, IAEA Headquarters in Vienna. Not least, the appointment of a Fund Management Officer (Grade P2) should presumably have eased the administrative burden of the Project Co-ordinator. It must be reported, however, that within the life cycle of the umbrella project there have been deficiencies in the financial accounting and reporting of MESL. In addition, because the umbrella project is handled from OCA/PAC in Nairobi, there have on occasions been problems with regard to the administration of the MTF, which is the responsibility of MEDU in Athens, which ultimately has to report to the Contracting Parties of the Barcelona Convention.

Given the nature of the difficulties in financial management of the project which have been encountered in the biennium 1993-94, it would be tempting to revert back to the former system of separate projects. Such a move could, indeed, lead to greater financial control, especially for the MTF administered by MEDU, but this would be at the expense of increased involvement and administrative work both in MESL in Monaco, IAEA Headquarters in Vienna and in MEDU in Athens. It would therefore seem to be worthwhile from the viewpoint of the financial management of the project to retain the structure of the umbrella project but, in the light of the occasional lapses which have occurred in 1993-94, it is essential that better communications are established between MESL and MEDU on the one hand, and between MEDU and Nairobi on the other, in order to enhance financial control of the project.

It must also be acknowledged that the existence of the umbrella project does not *ipso facto* guarantee the long-term stability of the project. Nevertheless, closer co-operation between UNEP and MESL on future work plans (see below) and decisions on future financial commitments from the Environment Fund at an earlier date could avoid some of the uncertainties of financial management which currently beset the project and have, indeed, done so over a period of years. Whilst it may not be reasonable for MESL, on its part, to assume any

long-term guarantee from UNEP, it is not unreasonable to expect that financial decisions are taken earlier in order to facilitate medium-term planning and avoid unnecessary stress on MESL staff members affected by these external decisions.

### ***Project development and implementation***

The umbrella project is an external project. The activities and work plan were initially drawn up by MESL. It is evident that there was close consultation between MESL and UNEP staff on the activities of those Annexes which were ongoing projects of some considerable duration (viz Annex II on methodologies and quality assurance/quality control standards; and Annexes III-V on measures under the MAP). In the case of other Annexes to the umbrella project, the specified activities and work plan are often less precise and it would seem that there was less consultation between MESL in drafting the project document and the relevant programme officers in the regional seas framework of OCA/PAC. It is understandable that greater concentration should have focused on those geographical and functional activities where MESL had most experience. However, there would be mutual advantage for both MESL and OCA/PAC to explore how the expertise of the laboratory could assist the development of appropriate monitoring procedures in the framework of other regional seas' action plans.

As regards project implementation, there is some evidence that UNEP has not exerted such close control since the initiation of the umbrella project. However, this is not the case with regard to MEDU and the MAP where, because of the structures which have been established, notably the Inter-Agency Advisory Committee (see Section III.4), there is close involvement.

The major problem with project implementation is that the respective activities and work plan of the 12 Annexes were not modified when the umbrella project was extended from a one year to a two year project (except for very minor details extending joint monitoring and quality assurance missions to 1994 in the context of Annex IV which were included in Rev 1, signed on 15 November 1993, and the addition of a workshop on the determination of PAHs in sediments and organisms which was included in Rev 3, which was signed on 22 August 1994). The explanation for this omission is probably due to the following factors:

- the umbrella project was only signed in June 1993 and the activities and work plan which it contained were essentially of 12 months' duration, even though the original time plan specified dates only in 1993;
- as stated previously, many of the activities (eg the equipment maintenance visits) are of an ongoing nature;
- for administrative reasons there was a need to approve the financial extension of the umbrella project from 1993 to 1994 rapidly leading to the new financial commitments for 1994 being approved in Rev 1 on 15 November 1993.

Although these may be the reasons for the failure to update the activities and the work plan, it does not fully absolve either MESL or OCA/PAC or MEDU from failing to equate activities with financial commitments. To some extent, the very nature of the umbrella project itself, and the lack of a single individual as overall programme officer, resulted in a lack of overall responsibility for the project.

### ***Governments' co-operation***

There is evidence that governments have co-operated well with the umbrella project. The project needs the collaboration of governments in order to succeed (eg it is up to governments to send CVs to MESL to determine the beneficiaries for training) and, indeed, the number of countries benefiting from the training given by MESL (20 countries sending trainees to Monaco and 6 countries benefiting from regional training activities) is further evidence of government co-operation with the project.

It is also necessary to consider whether the project has had a catalytic effect in encouraging governments to address the issues of marine pollution. Judged by this yardstick, there is unanimous agreement on the part of officials most involved that the project has had such an effect. In the Mediterranean region, UNEP has given strong support over many years. Indeed, some might argue that UNEP commitment has been too great, thus avoiding the need for the countries concerned to fend for themselves.

Although there is agreement that the project has indeed succeeded (at least in the Mediterranean region) in forcing governments to address the issues of marine pollution, it is also clear that the level of competence of laboratories in the region has not in fact reached the levels anticipated when the precursors of the present project were initiated. It seems that in some measure this is due to the fact that governments have not given sufficient priority to supporting marine pollution monitoring from their own national resources; in other words, they have relied heavily on UNEP-backed support. There is also a certain lack of consistency and long-term commitment to the monitoring activities on the part of individual laboratories. To this extent, the project has not had as far reaching an impact on government policies concerning the marine environment as might have been expected.

Nevertheless, as a result of the umbrella project and its predecessors, there are now a number of national reports on the status of contamination of the marine environment. Unfortunately national sensitivities have resulted in these reports not being available in the public domain. There have also been assessments of the overall level of contamination of the Mediterranean approved for publication by the Contracting Parties to the Barcelona Convention.

It should be recalled that the long-term objective of the umbrella project is *inter alia* to provide scientific support for the implementation of policies of integrated coastal area management. There is, as yet, little evidence to show that, even in the Mediterranean region, governments have made the jump from making assessments of contamination in the marine environment to drawing up action plans. There is, however, some evidence that government priorities will change when MEDPOL III is approved in the future.

### ***Inter-Agency co-operation***

On balance the umbrella project represents a good example of inter-agency co-operation between UNEP and IAEA. Notwithstanding the financial difficulties which have beset the project (leading in some cases to delays in implementation) and certain weaknesses in project management, on the basis of the activities carried out and the outputs produced the project has achieved positive results. It is in some ways a model example of how the expertise of one agency has been used to good effect to fulfil the policy objectives of another organisation.

It is not so evident that IOC involvement has been as effective or constructive as it could have

been. The tripartite MoU envisages a strong interest on the part of IOC in participating in joint programming and activities such as the present umbrella project. It is evident that IOC plays an important role in the development of reference methods, the development of technical manuals including the quantification of biological effects, and advice on data quality control and good laboratory practice (Annex II of the project).

The second area where IOC involvement is envisaged is in the implementation of the International Mussel Watch experiment. Although the background to this component of the project states that "the participation of MESL ensures close links between this global programme and the monitoring and assessment components of the Regional Seas Action Plans", it is not evident how these links are achieved.

### ***Staffing and resource allocation***

The chief problem in this area is the position of MESL staff. Although some laboratory staff have been working on the programme for many years, their employment security is virtually non-existent, being limited to monthly contracts when financial resources are constrained. It may be unrealistic to expect long-term contracts given the evident lack of long-term financial commitment to the non-nuclear marine monitoring activities, but it could be expected that better planning of the umbrella project could result in both agreed work plans (between MESL and UNEP) and earlier financial commitment from the Environment Fund and regional trust funds.

The staff of MESL are in an unusual position. All but two of the staff posts are funded by UNEP (IAEA funds a P3 and a G6 post), but the laboratory staff are legally employed by IAEA. The unusual situation has created some difficulties in the past owing to what might be termed "divided loyalties". However, it should be clear that it is ultimately the responsibility of the Director of IAEA-MEL to manage the activities of MESL within the context of the umbrella project and within the constraints of the budget allocation, although day to day responsibility lies with the Head of MESL who is the Project Co-ordinator.

It should be noted that the uncertain financial situation has also caused problems for the recruitment of staff to MESL.

## **V. LESSONS LEARNT**

1. The premise on which the umbrella project is based is that the MESL is a "centre of excellence". The project assumes that through the resources of MESL - through training, through the elaboration of reference methods etc, the conduct of intercomparison exercises and quality assurance programmes - the standards of national laboratories will be raised provided they have the necessary equipment. The experience of the umbrella project shows that, particularly in the Mediterranean region which has been most exposed to the influence of MESL, this is not a simple matter. Trained staff leave; governments do not necessarily accord sufficient priority and financial support to follow up the initial investment; etc. Hence progress is slow. It is evident that improvements are being made but the levels expected have not yet been achieved. The key word in assessing this project is patience. The yardstick by which it should be judged is whether progress is being made rather than whether absolute levels have been achieved.

2. It is clear that the umbrella project has not solved all the problems governing the relationship between UNEP and MESL. Arguably it has created some new problems in that, at

the regional level, because the umbrella project is managed from UNEP Headquarters, there is less intimate financial control. It is also clear that the umbrella project has not resolved the problems of cash flow; nor has it created the financial stability which MESL sought.

3. There have been weaknesses in the overall management of the project, stemming in the main from the lack of a single programme officer at OCA/PAC. Notable is the failure to maintain and update the activities and work plan of the various Annexes. In a project of this size and value, covering a range of activities in different regions, it is incumbent on all involved - including the Director of IAEA-MEL in close co-operation with UNEP (as envisaged in the tripartite MoU) - to keep progress under close scrutiny and identify new activities to justify continued financial support.

4. All OCA/PAC projects should contain a reference to external evaluation and include budgetary provision for this in keeping with the UNEP Project Design, Approval and Evaluation Manual.

5. The half-yearly progress reports should be submitted within 30 days of the end of the reporting period as envisaged in the project document. It is the responsibility of MESL to ensure that these reports are submitted in due time; it is the responsibility of OCA/PAC to examine the reports by reference to the activities, outputs and work plan envisaged in the project document. In future, the half-yearly progress reports should not only follow the outline indicated in Appendix III, but should also identify to which Annex of the project document the activities relate, thus facilitating the verification of the project.

## **VI. CONCLUSIONS AND RECOMMENDATIONS**

### **Conclusions**

1. From the scientific and technical viewpoint, the umbrella project can be rated a success. Progress is being made in the development of Reference Methods to ensure that environmental samples are collected and analyzed in a comparable manner; reference materials are being developed to assist laboratories' internal quality assurance checks; intercomparison exercises are demonstrating the improved performance of laboratories participating in the Regional Seas Programme; training is being provided to improve methodologies in monitoring programmes such as MEDPOL and, at individual laboratory level, to enhance their capability. Proof of the success of these measures is seen in improved data quality.
2. Despite the overall success of the project activities and outputs, the long-term project objectives have not yet been achieved in their entirety. Indeed, it would be unrealistic to expect their complete fulfilment within the timescale of a one or two year project.
3. The short-term objective of "joint programming" among the three agencies concerned (UNEP, IAEA-MEL and IOC) has also not been successfully demonstrated other than in the project document itself and, in the Mediterranean region, in the context of the activities of the Inter-Agency Advisory Committee.
4. The geographical coverage is not wide enough. More attention needs to be paid to extending the project activities to other areas of the Regional Seas Programme.

5. MESL is a good partner for UNEP in the provision of scientific advice, particularly in the field of the development of analytical techniques, training and quality assurance programmes, and data review. There is scope for closer future involvement with IOC.
6. The project management function has not been exercised sufficiently rigorously. This lack of control is evident from the fact that the workplan for 1994 was not extended when the project life span was extended to a second year. The Advisory Group has not functioned as envisaged; it has not been a medium for "joint programming" and any decisions on the management of the umbrella project have not percolated down. There has been no overall programme officer in charge of the project within OCA/PAC which has contributed to the lack of overall control over project implementation.
7. The umbrella project has not solved all the problems of financial management which it was set up to tackle. There are still problems with cash flow and the release of funds, both from the Environment Fund and from the Mediterranean Trust Fund. Nevertheless, on balance the umbrella project is a good mechanism for governing relations between UNEP and IAEA-MEL.
8. Overall, the project has been effective in making progress in marine pollution monitoring programmes and is a good example of effective inter-agency co-operation. The weaknesses in project management can easily be corrected and, if effected, should ensure a more effective project in future. Specific recommendations for further consideration are contained in the following paragraphs.

## **Recommendations**

### ***Project development***

1. There should be a review of the status of laboratories in the Mediterranean region to assess whether/when the capacity building stage has been reached. The objective would be to ascertain when MESL resources could reasonably be expected to be released for other regions.
2. To ensure the comparability of regional data, as envisaged in the objectives of the umbrella project, there will always be a need for quality assurance and inter-comparison exercises. However, it does not necessarily follow that MESL is the only laboratory capable of conducting such activities. The aim should be to ascertain whether certain functions which are now performed by MESL could be done by other laboratories in the Mediterranean region.
3. There is scope for MESL to play an active role in other areas of the Regional Seas Programme. This is foreseen in the umbrella project but it is an opportunity that needs to be developed and given clearer focus, not least in the light of the answers to recommendations 1 and 2.
4. How UNEP provides support to laboratories within the Regional Seas Programme needs to be given attention; also the role which UNEP should play in the light of its experience in the Mediterranean region. In the short term there would seem to be evidence to continue to support training in local laboratories. This capacity building function should be eligible for UNDP financial support.

5. In the longer term, regional centres of excellence to perform similar functions to those currently undertaken by MESL could be envisaged. The coming years should be used to identify more precisely the needs to achieve this goal with a view to obtaining GEF support.

### *Financial resources*

6. In the short term UNEP Environment Funds should be made available to finance the project in 1995 on the basis of an updated work plan to be prepared by MESL in close co-operation with OCA/PAC and MEDU. It would be a serious set-back for the long-term policy of OCA/PAC if the project were unilaterally cut back. This is not to say, however, that UNEP Environment Fund resources should necessarily be maintained at current levels for the indefinite future.
7. The long-term value of the umbrella project for OCA/PAC needs to be assessed in the light of competing demands for the available resources. There will remain a need for marine pollution monitoring - not least to measure the effectiveness of management decisions - but there is a need to move to more "action oriented" projects to reduce pollution and enhance coastal resources.
8. Alternative sources of funding need to be actively explored both by UNEP and in close consultation with IAEA-MEL. The submission to GEF may provide a breathing space. The GEF proposal may fail, in which case the need for alternative financing will become more acute.
  - UNDP should be approached to support the training element in the umbrella project. This should be done on the basis of an overall training strategy for the Regional Seas Programme rather than on an ad hoc basis.
  - Regional Trust Funds. It can be envisaged that the type of support presently given in the Mediterranean region could be extended to other Regional Action Plans, eg equipment maintenance, quality assurance, etc. If such is the case, it would be reasonable to assume that the regional trust funds should bear part of the financial burden in the way that the MTF does now. Even relatively small financial contributions, if replicated throughout the Regional Seas Programme, would add up to significant financial support for MESL activities.
  - IOC. It is evident that the international scientific community benefits at the global level from inputs to the GIPME Programme deriving from activities within the Regional Seas Programme. If expansion of the regional monitoring programme is envisaged along the lines indicated above, then such inputs to the global programme will be more valuable for global assessment purposes. Although IOC supports the meetings of experts within the framework of GIPME and its sub-groups, concerted efforts should be made to ensure that IOC makes an appropriate financial contribution to the long-term development of the monitoring programme commensurate with the benefits to the international scientific community.
  - The Principality of Monaco. The Principality has declared its commitment to

involvement in the marine environment and this of course is evident through its support of the IAEA-MEL. Is it possible that the Principality could fund, for example, a single post within MESL?

***Project management***

9. UNEP should persevere with the umbrella project for the management of its relations with MESL. However, the project needs tighter management control at OCA/PAC. In particular, there should be:
  - (a) an overall project supervisor to be, *inter alia*, the principal channel of communication with the Project Co-ordinator at MESL;
  - (b) closer involvement of regional programme officers who are at present notionally responsible for individual annexes.

Such measures are necessary for the preparation of precise work plans and the supervision of the implementation of the project.

10. There should be closer co-operation between the Fund Management Officers at OCA/PAC and MEDU to monitor the allocation of financial resources from the Mediterranean Trust Fund.
11. The Advisory Group should continue to meet to give the necessary policy guidance and ensure project delivery. Minutes should be kept which should be disseminated to all concerned parties.

**APPENDIX 1**

**PROJECT OUTPUTS AND ACTIVITIES**

**Comparison of project objectives and achievements  
by reference to each Annex**

## **ANNEX II: DEVELOPMENT OF NEW METHODOLOGIES AND COMMON QUALITY ASSURANCE/QUALITY CONTROL STANDARDS**

### **Outputs**

#### **1. Reference methods and technical manuals**

##### ***Project objectives***

"At least 5 additional reference methods, 5 additional revised methods and a total of 4-5 additional translations of Reference Methods (into Spanish or French). The production of translations is pending regional support for the activity."

"Two manuals of techniques relevant to quantification of biological effects (GEEP activities)."

"One additional manual on data quality control and good laboratory practice (GESREM initiative)."

"One training video tape on Reference Methods and their application."

##### ***Project achievements***

#### **NEW REFERENCE METHODS**

Reference Method for Marine Pollution Studies No. 61, LCR/ASEAN/AIDAB/IOC/IAEA, Monitoring coral reefs for global change *UNEP, 1993*

Reference Methods for Marine Pollution Studies No. 59, UNEP/IAEA/IOC/FAO, Determination of organotins in environmental samples *During 93/94 subject to GEMSI review, now ready for printing*

\*Reference Methods for Marine Pollution Studies RM "JA"  
UNEP/IOC/FAO/IMO/IAEA: Statistical analysis and interpretation of marine community data *Completed and being finalised ready for printing*

*RMs 27-39, Z - "Determination of trace elements in sediments and particulate suspended matter  
These single element determination reference methods will be replaced by a single Reference Method". A draft version of the revised manuscript has been produced during the reporting period and discussed at UNEP/IOC/IAEA meeting "Determination of contaminants in sediments" in Mytilini.  
Will be ready for printing by the end of 1994*

Reference Methods for Marine Pollution Studies "QC"  
UNEP/WHO/IAEA. Quality Assurance and Good Laboratory Practice for marine micro biological measurements *Ready for printing*

\*Reference Methods for Marine Pollution Studies "AO"

UNEP/WHO/IAEA. Determination of *Staphylococcus aureus* in sea water and sewage by the multiple test-tube (MPN) method.

*Produced by WHO: to be printed by UNEP in 1994*

Reference Methods for Marine Pollution Studies "AQ"

UNEP/WHO/IAEA. Determination of *Camphylobacter* in sea water and sewage by the multiple test-tube (MPN) method.

*Ready for printing*

Reference Methods for Marine Pollution Studies "AR"

UNEP/WHO/IAEA. Determination of Mesophylic aeromonads in sea water and sewage by the multiple test-tube (MPN) method.

*Ready for printing*

#### UPDATED REFERENCE METHODS

Reference Methods for Marine Pollution Studies No. 3

UNEP/WHO: Determination of faecal coliforms in sea water by the membrane filtration culture method.

*Ready for printing*

Reference Methods for Marine Pollution Studies No. 4

UNEP/WHO: Determination of faecal streptococci in sea water by the membrane filtration culture method.

*Ready for printing*

Reference Methods for Marine Pollution Studies No. 5

UNEP/WHO: Determination of faecal coliforms in bivalves by multiple test tube method.

*Ready for printing*

Reference Methods for Marine Pollution Studies No. 6

FAO/IOC/IAEA, Guidelines for monitoring chemical contaminants in the sea using marine organisms

*UNEP, 1993*

#### TRANSLATED REFERENCE METHODS

Reference Methods for Marine Pollution Studies No. 6

FAO/IOC/IAEA, Guidelines for monitoring chemical contaminants in the sea using marine organisms

*TRANSLATED IN FRENCH 1994*

(Lignes directrices concernant l'utilisation d'organismes marins pour la surveillance des contaminants chimique en mer)

Reference Methods for Marine Pollution Studies No. 57

UNEP/IOC/IAEA: Contaminant monitoring programmes using marine organisms: Quality Assurance and Good Laboratory Practice

*TRANSLATED IN FRENCH 1994*

(Programmes de surveillance continue des contaminants utilisant des organismes marin: Assurance de la Qualité et Bonne Pratiques de Laboratoire)

#### METHOD DEVELOPMENT

**Organometals and organometaloids:** Work started in March 1992 on Methyl-Mercury compounds in the marine environment. A very sensitive and reproducible analytical method

has been developed for all samples of marine origin. Five papers have been published.

For **organotin** compounds an expert from the United States was hired from October 1994 onwards. The work has just started. For the same purpose the IAEA has allocated approx. US\$40.000 to purchase a new GC-FPD at the beginning of 1995.

Development of the Analytical Technique to determine organophosphorus and organochlorine pesticides in water samples. The emphasis in this development was on the pre-separation steps. A draft manuscript has been prepared. *Ongoing*

Development and optimization of the analytical method for the determination of organophosphorus compounds in marine sediments. *2nd half of 1993*

Gel permeation chromatography has been applied as a clean-up technique for petroleum hydrocarbons in coral samples. *Since April 1994*

Optimization of methods for the determination of faecal sterols in sediment. *Jan-March 1993*

Cross-checking and additional calibration of organochlorine compounds determination (use of new internal standard). *March 1994*

A study of the effect of gamma irradiation on the stability of organic contaminants in Marine Reference Material IAEA-357 was done. This is an important contribution to the protocol for the organization of intercomparison exercises. *October 1994*

STATUS ON REFERENCE METHODS IDENTIFIED IN ANNEX II (except where identified by \* in previous sections)

RM "AH" Guidelines for assessing eutrophication in the marine environment. *Not done: consultant to be hired in 1995*

RM "AI" Determination of petroleum hydrocarbons in selected marine organisms. *Under preparation: planned for 1995*

RM "AM" Determination of chlorinated hydrocarbons in marine organisms and sediments: sample extraction and clean-up  
*Under revision by GEMSI. Expected from the consultant any time for final editing by IAEA and approval by OCA/PAC for printing.*

RM 53 Determination of nitrogen and phosphorus in suspended matter and sediments  
*Consultant to be hired. Will be joined with RM52 to be produced in 1995.*

RM "AC" Determination of selected neurotoxins in marine organisms  
*Not done: to be initiated in 1995*

RM "AE" Determination of organophosphorus compounds in marine sediments.  
*Not done: planned for 1995*

RM "56" Determination of dissolved/dispersed hydrocarbons in marine waters.  
*In preparation by MESL*

RM "JC" Scope for growth determinations in marine bivalve molluscs.  
*In the hands of GEEP Chairman for review*

RM "QC" Quality Assurance and Good Laboratory Practice for marine microbiological measurements  
*Produced by WHO: to be reprinted by UNEP in 1994*

RM "AP" Guidelines for monitoring land-based sources of marine pollution.  
*Currently being edited by MEDU, Athens*

RM6 Guidelines for monitoring chemical contaminants in the sea using marine organisms.  
*GEMSI advice is being sought*

Measurement of selected herbicide compounds in the marine environment.  
*Under discussion to identify suitable expert*

Assessment of sewage pollution using faecal sterols.  
*Under discussion to identify suitable expert*

## **2. Technical Bulletins**

### ***Project objectives:***

"Two "Technical Bulletins for Marine Pollution Studies" (giving additional technical information to facilitate regional monitoring programmes)."

### ***Project achievements:***

Technical Bulletins for Marine Pollution Studies No. 3,  
IAEA/UNEP/IOC: Trace elements and trace organic contaminants in polluted coastal sediment - Result of the world-wide intercomparison exercise.

*Final editing by MESL*

## **3. Reference materials**

### ***Project objectives:***

"Completion of the production of two new international reference materials for trace metals and organic contaminants in mussel tissue, denominated GESREM I and GESREM III respectively."

"Projection of regional reference materials (sediments and organisms) and their analytical reference value reports."

***Project achievements:***

**IAEA-350: Trace Elements in Tuna Fish Homogenate.**

Report completed in December 1992 but issued as Reference Material in 1993.

The certification of a further reference material deriving from the intercomparison of trace metals in a polluted marine sediment (IAEA-356) has been completed and should be available in 1994.

**4. Global intercalibration exercises**

***Project objectives:***

"Organization of global intercalibration exercises on marine organisms and sediments for monitored contaminants (trace metals, chlorinated and petroleum hydrocarbons) and communication of the results, both on a collective and individual basis (MESL).

Organization of global specialist intercalibration exercises on priority contaminants (as defined by regional action plans) which are not presently generally monitored (organomercury, sewage sterols, etc)."

***Project achievements:***

**1) World-wide and regional intercomparison for the determination of trace elements (Ag, As, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Sn, Se, V and Zn) in polluted marine sediment, IAEA-356 (Venice Lagoon sediment)**

A total of 68 laboratories reported results of which 18 laboratories are within the MED POL participating countries.

<b>UNEP Regional Seas Programme</b>	<b>Laboratories</b>	<b>No. Countries</b>
Mediterranean Action Plan	23	13
Kuwait Action Plan	3	2
Black Sea Action Plan	4	2
West and Central African Action Plan	2	2
Caribbean Action Plan	4	2
South Pacific Action Plan	9	4
East Asian Seas Action Plan	4	4
North West Pacific Action Plan	2	2

South Asian Seas Action Plan	4	2
------------------------------	---	---

Date of exercise: 1992-1994

Date of report: September 1994

**2) The intercomparison sample IAEA-142 for trace organics in mussel homogenate was prepared and distributed to 235 laboratories world-wide for intercomparison.**

<b>UNEP Regional Seas Programme</b>	<b>Laboratories</b>	<b>No. Countries</b>
Mediterranean Action Plan	78	17
Kuwait Action Plan	9	7
Black Sea Action Plan	11	5
West and Central African Action Plan	8	8
East African Action Plan	4	4
Caribbean Action Plan	17	9
South Pacific Action Plan	3	3
East Asian Seas Action Plan	3	2
North West Pacific Action Plan	11	3
South Asian Seas Action Plan	1	1

Several laboratories in Europe, USA and Canada were also invited to participate in this exercise.

The deadline for reporting the results is 31 December 1994.

3) The same sample "**Mussel Homogenate, IAEA-142**" was prepared for the distribution of intercomparison for determination of total and methyl-mercury. The homogeneity testing has been performed and samples are currently being distributed. Only (15) expert laboratories will be involved in this exercise in order to obtain well grouped results which will permit certification of both parameters. The samples will fulfil the increased demand for such reference materials from the laboratories in the Member States.

**4) Sea plant homogenate IAEA-140 for the determination of trace elements, pesticides, chlorinated and petroleum hydrocarbons and PCBs.**

Period: Started at the beginning of 1994.

The same number of laboratories as in exercise (1) above will be involved. In addition, in collaboration with UNEP's Regional Seas Programme an updated list is being produced. More laboratories from developing countries will be represented.

**5) A package of 20 samples for the determination of trace elements was sent to the ROPME Secretariat (Kuwait Action Plan) for distribution to regional laboratories.**

So far 7 laboratories have sent their results.

### PARTICIPATION IN EXTERNAL INTERCOMPARISON EXERCISES

TOTAL AND METHYL-MERCURY DETERMINATIONS IN THE FOLLOWING EXTERNAL INTERCOMPARISON EXERCISES:

- 1) IAEA-085: Human hair (high levels), through the AQCS programme of the IAEA.  
*April/May 1994*
- 2) IAEA-086: Human hair (low levels), through the AQCS programme of the IAEA.  
*April/May 1994*
- 3) Natural water samples, organised by Electric Power Research Institute, Palo Alto, California. MEL served as a second laboratory.  
*May 1994*
- 4) NIES No. 13 Human hair: National Institute of Environmental Standards, Japan.  
*March 1994*

### TRACE ELEMENTS IN EXTERNAL INTERCOMPARISON EXERCISES

- 1) Air particulates, organised by the World Meteorological Organisation as part of the MEDPOL programme.  
*Sept/Oct 1994*
- 2) GESREM I Mussel homogenate

This sample is in the process of certification. It has been prepared by joint efforts of IAEA, National Institute for Standards and Technology - NIST, USA and National Research Council of Canada - NRCC.

This sample will become available free of charge to all laboratories from the UNEP Regional Seas Programme.  
*Beginning 1994*

- 3) Trace elements in Lichen IAEA-335 and IAEA-336 as a part of the IAEA AQCS programme.

### TRACE ORGANIC CONTAMINANTS IN EXTERNAL INTERCOMPARISON EXERCISES

- 1) GESREM II
- 2) IAEA-336 - Chlorinated hydrocarbons in Lichen, as part of the IAEA's AQCS programme.
- 3) IAEA-359 - Agrochemicals in Cabbage, as part of the IAEA's AQCS programme.

Note for 2) and 3): Final report has not been obtained as yet, so it is not possible to evaluate the performance.

### SPECIALIZED INTERCOMPARISON EXERCISES

Fungicide intercalibration  
Greece-1, Spain-1, France-1, Egypt-1

sent out December 1993

Additionally, several small scale intercomparison exercises were organized for the new determinands (including methyl mercury, fungicides and faecal sterols).

Faecol sterols: At the workshop on the Application of Chemical Tracers of Domestic Contaminants for Marine Pollution Surveys, the strategy was adopted for a small scale Intercomparison Exercise for faecal sterols. Samples of the polluted marine sediment IAEA-357 were distributed to the participants. So far no results have been received.

## 5. Specialist reports

### *Project objectives:*

"Specialist reports on:

Relevant developments in analytical methodology.

Relevant developments in biological effects studies.

Regional and inter-regional data quality reviews.

Available stocks/future plans for the production of reference materials."

### *Project achievements:*

Five reports have been prepared under the heading of "relevant developments in analytical methodology":

"Comparison of distillation with other current isolation methods for the determination of methyl mercury compounds in low level environmental samples: Part I: Sediments" in *Analytica Chimica Acta*, 281, pp 135-152 (1993).

"Comparison of distillation with other current isolation methods for the determination of methyl mercury compounds in low level environmental samples: Part II: Water" in *Analytica Chimica Acta*, 282, pp 153-168 (1993).

"An improved speciation method for mercury by GC/CVAFS after aqueous phase ethylation and room temperature precollection" in *Talanta*, Vol 41, No 3, pp 371-379 (1994).

"Simultaneous determination of mercury speciation in biological materials by GC/CVAFS after ethylation and room-temperature precollection" in *Clin Chem*, 40/4, pp 602-607 (1994).

"Coastal water contamination from a triazine herbicide used in antifouling paints" in *Environmental Science & Technology*, Vol 27, No 9 (1993).

Some of these specialist reports were produced in collaboration with scientists from other institutions. They are used by MESL for training courses and/or specialised assistance to member states.

"Data Quality Review for MED POL: Nineteen Years of Progress"

Prepared by MESL and published by UNEP/MEDU as MAP Technical Reports Series No. 81, 1994.

"Current Status of Reference Methods and Technical Bulletins for Marine Pollution Studies Series" published by IAEA-MEL/MESL in April 1994.

## **6. Information documents**

### ***Project objectives:***

"Information documents to attract the widest possible interest in this component of the Regional Seas and GIPME/MARPOLMON activities."

### ***Project achievements:***

Not ascertained.

## **ANNEX III: TECHNICAL SUPPORT FOR THE IMPLEMENTATION OF MEDPOL PHASE II**

### **Outputs and Activities**

#### **1. Maintenance of analytical instruments**

##### ***Project objectives***

"Maintenance of analytical instruments in laboratories participating in MEDPOL in the following countries: Albania, Algeria, Croatia, Cyprus, Egypt, Greece, Israel, Lebanon, Libya, Malta, Morocco, Slovenia, Syria, Tunisia, Turkey. At least 8 of these countries will be visited during 1993."

"Reports of instrument installation and service missions."

##### ***Project achievements:***

**The following missions were organized as part of the installation and maintenance service programme:**

24-30 April '93	Marine Research and Training Center, PIRAN Slovenia Installation of a new Hewlett-Packard Gas Chromatograph Mod 5890 Ser. II and regular service of GFAAS SpectrAA-10 BQ.	T. Barisic
26 June to 3 July '93	University of TIRANA, Albania Installation of a new VARIAN Atomic Absorption Spectrophotometer, SpectrAA - 10 BQ. Due to low water pressure graphite furnace could not be used. A water pump needs to be purchased and a second service visit will be necessary.	T. Barisic
4-6 October '93	Marine Biological Station, PIRAN, Slovenia Service of the Hewlett-Packard Gas Chromatograph and the Atomic Absorption Spectrophotometer Mod. SpsectrAA-10 BQ, Varian. Both instruments were in very good condition.	T. Barisic
6-8 October '93	Centre for Marine Research, ROVINJ, Croatia Service of the Aanderaa Current Meters	T. Barisic
11-14 October '93	Institute R. Boskovic, ZAGREB, Croatia Service of the Hewlett-Packard Gas Chromatograph	T. Barisic
19-23 February '94	University of Tirana, TIRANA, Albania Service of the Hewlett-Packard Gas	T. Barisic

	Chromatograph Mod. 5890 Ser. II and the Atomic Absorption Spectrophotometer Mod. SpectrAA-10 BQ, Varian. Installation of a new water pump into a GTA-96 workhead cooling system.	
21-25 April '94	Institute R. Boskovic, ZAGREB, Croatia Installation of a new ECD into the Hewlett-Packard Gas Chromatograph Mod. 5890 Ser. II	T. Barisic
8-12 May '94	Université Mohammed Premier, OUJDA, Morocco: Installation of a AAS, Mod. SpectrAA 10, Varian and training thereon.	T. Barisic (paid by IAEA)
12-14 May '94	Laboratoire National, Ministère de l'Interieur, RABAT, Morocco: Installation of a Hewlett-Packard Gas Chromatograph Mod. 5890 Ser. II	T. Barisic (paid by IAEA)

Report on "Instrument Maintenance in the MED POL Programme" published by IAEA-MEL/MESL in October 1993.

## 2. Training

### *Project objectives:*

"Organization of three consultation meetings and one training workshop related to the efficient operation of the MEDPOL monitoring programme."

"Provision of standards and reference materials for all laboratories participating in the MEDPOL programme."

"A catalogue of the bank of standards and reference materials maintained at IAEA-MEL for use by laboratories participating in MEDPOL."

### *Project achievements:*

*In Monaco:*

#### **Consultation Meeting on Guidelines on Analytical Data Quality Assurance.**

UNEP/IAEA

21-23 Oct '93

L. D. Mee

Report issued: UNEP(OCA)MED WG. 72/1

M. Horvat

11 participants from 11 countries represented.

**Consultation Meeting on the Application of Chemical Tracers of Domestic Contaminants for Marine Pollution Surveys**

IAEA/WHO/UNEP 25-27 Oct '93 J. Readman  
6 participants from 6 countries represented.

**Consultation Meeting on Guidelines and Reference Methods for Sample Work-up in Organic Contaminant Analyses**

IAEA/UNEP 28-30 Oct '93 J. Readman  
6 participants from 6 countries represented.

*In Mytilini/Lesbos, Greece:*

**Workshop for the Determination of Contaminants in Sediments**

MAP-UNEP/UNDP/IOC 20-25 Sept '94 J. Readman  
13 participants from 10 countries represented.

**3. Intercomparison exercises**

***Project objectives:***

"Organization of two intercomparison exercises for all MEDPOL laboratories and two specialist intercomparison exercises related to pilot monitoring programmes conducted within the framework of MEDPOL."

"Reports of those pilot monitoring exercises in which IAEA-MEL is participating together with partner Agencies (FAO, WHO, WMO etc)."

***Project achievements:***

Methyl Mercury: Samples of fish homogenate trace metals in ROPME fish ME-ROPME-1/TM was distributed to six laboratories in the Mediterranean. This was organised to follow up the performance within MEDPOL laboratories that participated in Group Training courses organised in 1992.

See also Annex II.

**4. Data quality**

***Project objectives:***

"A review of data quality in the Mediterranean."

***Project achievements:***

"Data Quality Review for MED POL: Nineteen Years of Progress"  
Prepared by MESL and published by UNEP/MEDU as MAP Technical Reports Series No.

81, 1994 (recorded also under Annex II).

## 5. Research

### *Project objectives:*

"Supervision of about 9 MEDPOL research contracts."

### *Project achievements:*

The following MEDPOL research contracts are currently being supervised from MESL.

<u>Reference</u>	<u>P.I.</u>	<u>Action/Status</u> <b><u>during 1993</u></b>
GRE-37-K	Grimanis	completed
ITA-70-A	Magnoni	completed
GRE-20-L	Varnavas	completed
FRA-18-L	Martin	completed
ISR-30-L	Herut	completed
CRO-1-K	Cosovic	\$5.000
FRA-59-K	Garrigues	completed
GRE-71-A	Stephanou	completed
SLO-1	Byrne	completed
ISR-45-I	Gitelson	pending \$
SPA-?	Barcelo	\$5.000
GRE-92-IV	Vasilikiotis	declined
GRE-102-11	Dionyssopoulos	declined
GRE-104-11	Albanis	declined
ISR-48-N	Krumgalz	\$5.000
CRO-14-I	Tomaic	\$2.000
ITA-(?)	Baldi	declined
ISR-62-I	Zoller	pending
CRO-(?)	Kurelec	\$5.000
GRE-109-11	Albanis	declined
ALB-2-IV	Khedi	declined
GRE-114-1	Siskos	declined
ALG-(?)	Boulahid	declined
		<b><u>during 1994</u></b>
CRO-1-K	Cosovic	\$5.000
ISR-45-I	Gitelson	\$5.000
SPA-?	Barcelo	\$5.000
ISR-48-N	Krumgalz	declined
CRO-14-I	Tomaic	\$2,000
ISR-62-I	Zoller	pending
CRO-(19)	Kurelec	\$5.000
GRE-122	Angelidis	undecided
GRE-124	Eleftheriou	undecided

ISR-30	Herut	undecided
GRE-130	Scoullos	undecided
GRE-109	Albanis	undecided
GRE-123	Chaniotakis	undecided

## **ANNEX IV: SUPPORT FOR THE JOINT MONITORING EXERCISES AND TRAINING COURSES COMPONENT OF MEDPOL**

### **Outputs and Activities**

#### ***Project objectives:***

"The programme will concentrate on implementing quality control and good laboratory practice in MEDPOL monitoring laboratories. Countries specifically involved within the 1993 programme will include Albania, Croatia, Cyprus, Egypt, Slovenia, Tunisia, Morocco, Lebanon, Malta, Syria and Turkey. Extended QA visits will be made to certain of these countries by MESL personnel. Programme elements to be implemented will be....."

#### **1. Training courses**

##### ***Project achievements:***

During the period 1993/1994 five training courses were held in Monaco and two training courses in regional laboratories in connection with the MEDPOL programme.

##### **In Monaco**

- |    |  |                           |
|----|--|---------------------------|
| 1) | UNEP (MED POL/METAP) IAEA group training on determination of total and methylmercury in marine biological and sediment samples | 24/5-11/6/93<br>M. Horvat |
|----|--|---------------------------|

Participants from:  
Egypt-1, Morocco-2, Albania-2, Lebanon-1

- |    |  |                                 |
|----|--|---------------------------------|
| 2) | UNEP (MED POL/METAP) IAEA group training on determination of organochlorine compounds in marine biological and environmental samples | 12-30/07/93<br>J. P. Villeneuve |
|----|--|---------------------------------|

Participants from:  
Morocco-4, Romania-2 (see Annex X)

- |    |   |                                  |
|----|---|----------------------------------|
| 3) | UNEP (MED POL/METAP)/IAEA group training on determination of petroleum hydrocarbons in marine environmental samples | 13/9-1/10/93<br>J. P. Villeneuve |
|----|---|----------------------------------|

Participants from:  
Algeria-1, Egypt-3, Morocco-2, Malaysia (East Asian Seas Action Plan)

- |    |  |   |
|----|--|---|
| 4) | UNEP (MED POL/METAP) IAEA group training on determination of trace metals in marine biological and sediment samples and instrumental maintenance | 29/11-17/12/93<br>M. Horvat<br>T. Barisic |
|----|--|---|

Participants from:

Albania-3, Egypt-1, Tunisia-1

- 5) Training course on the determination of petroleum hydrocarbons 31/10-18/11/94  
J. P. Villeneuve

Participants from:

Bulgaria-2 (see Annex X), Lebanon-1, France-1,  
Albania-1

### **Regional**

QA mission to the Marine Research Centre of the CNRS in JOUNIEH, Lebanon in order to provide an **on-job training** on the changed GC. In fact, the packed column GC was changed into a Capillary Gas Chromatograph. 8-21/5/94  
J. P. Villeneuve

Participants: 1 staff member

QA mission to the Marine Research Institute, LATTAKIA, Syria in order to provide an **on-job training** for determination of petroleum hydrocarbons 28/5-15/6/94  
J. P. Villeneuve

Participants: 10 staff members

## **2. Joint monitoring exercises and quality assurance programme**

### ***Project achievements:***

- 7-16 May '93 Visit to the Laboratoire d'Etude de la Pollution (INSTOP) in La Goulette, Tunisia J. P. Villeneuve  
An IAEA-MEL expert on the analysis of trace organic contaminants checked the Q.A. programme, particularly concerning the analysis of organic pollutants and trained a new member of the staff at INSTOP for this work.
- 8-15 May '93 Visit to the Ministry of Agriculture and Natural Resources, Department of Fisheries, Nicosia, Cyprus. M. Horvat  
The METAP Project Officer discussed the chemical aspects of their new graphite furnace AAS (supplied through METAP) for the trace metals component of the Q.A. programme. She helped them to optimize conditions for low trace metal concentrations in marine biological sediment samples. In addition, she discussed other aspects of the Q.A. programme (sampling, sample preparation and storage, analysis of CRMs, participating in intercomparison exercises, etc)

17-25 May '93	Visit to the National Institute of Oceanography and Fisheries (NIOF) in Alexandria, Egypt In conjunction with the above mentioned Q.A. mission, an IAEA-MEL expert on the analysis of trace organic contaminants checked whether samples collected during the last sampling mission were prepared according to the agreed protocol. He also helped to solve some technical problems.	J. P. Villeneuve
22 June-2 July '93	Visit to the University of Tirana, Albania Mr J. P. Villeneuve visited the Organic Chemistry Chair in order to prepare a sediment Reference Material for their internal quality control on the analysis of trace organic contaminants and tried to set up some other technical items delivered from MESL.	J. P. Villeneuve
18-29 October '93	Q.A. mission to the Marine Biological Station in Piran, Slovenia in order to provide on-job training for determination of petroleum hydrocarbons.	C. Cattini
8-21 May '94	Q.A. mission to the Marine Research Centre of the CNRS in JOUNIEH, Lebanon in order to provide an on-job training on the changed GC. In fact, the packed column GC was changed in a capillary gas chromatograph.	J. P. Villeneuve
28 May-15 June '94	Q.A. mission to the Marine Research Institute, LATTAKIA, Syria in order to provide an on-job training for determination of petroleum hydrocarbons.	J. P. Villeneuve

**ANNEX V: ASSISTANCE IN THE IMPLEMENTATION OF THE UNEP/WORLD BANK PROGRAMME "ASSESSMENT OF ENVIRONMENTAL PROBLEMS IN THE MEDITERRANEAN: TECHNICAL ASSISTANCE PROGRAMME"**

**Outputs**

***Project objectives:***

"Some preliminary national Status and Trends reports are being produced in order to demonstrate the applicability of the data obtained to management issues."

***Project achievements:***

Preliminary Reports on the Status and Trends of Pollution of the Marine Environment have been prepared for:

Tunisia (April 1993)  
Egypt (May 1993)  
Slovenia (1993)  
Morocco (June 1993)  
Algeria (April 1994)

The reports on Slovenia and Egypt were compiled in their entirety by MESL.

None of the preliminary reports has been published.

**ANNEX VI: ASSISTANCE IN THE IMPLEMENTATION OF CONPACSE (S.E. PACIFIC ACTION PLAN MARINE POLLUTION MONITORING PROGRAMME)**

***Project objectives:***

"Consultation mission to support the Secretariat of CPPS (Santiago, Chile) in the design of the next phase of CONPACSE."

"Completion of the training course in pesticide analyses (in Costa Rica, Panama or Honduras)."

"Organization of a follow-up intercomparison exercise."

***Project achievements:***

01/11-19/11/93	Training course on pesticide analyses of marine sediments and biota Organized at the Centro para la Investigacion en Recursos Acuaticos (CIRA/UNAN) Managua, Nicaragua	J. P. Villeneuve
----------------	--	------------------

Participants from:  
Colombia-1, El Salvador-1, Honduras-1,  
Panama-1, Nicaragua-5

30/7-5/8/94	Organisation of an expert meeting to design a new marine pollution monitoring/control programme for the South (and Central) East Pacific and to arrange an analytical chemistry training course. Lima, Peru.	J. Readman
-------------	--	------------

(paid by IAEA)

## **ANNEX VII: QUALITY ASSURANCE AND TRAINING SUPPORT FOR THE IMPLEMENTATION OF WACAF/2 (WEST AND CENTRAL AFRICA ACTION PLAN)**

### **Activities**

#### ***Project objectives:***

"Continuation of intercomparison exercises as a follow-up to the 1992 training programme."

"Preliminary organization (through correspondence) of the training programme for 1994, including identification of suitable laboratories for hosting the workshop(s) and a study of the needs of participants."

"Travel of engineer to the WACAF countries to repair and upgrade existing equipment."

#### ***Project achievements:***

Laboratories from the region participated in the world-wide intercomparison exercises (IAEA-356 and IAEA-142) described under Annex II.

Advice was provided through correspondence to several laboratories regarding analytical protocols and on instrument maintenance. Spare parts for their gas chromatographs were supplied from MESL (through funds allocated in the umbrella project) and were sent to laboratories in Cotonou, Accra, Abidjan and Ibadan.

MESL participated in the Inter-Agency meeting on WACAF/2, EAF/5 and EAF/6 projects, FAO HQ, Rome, Italy (20-23 September 1993).

## **ANNEX VIII: QUALITY ASSURANCE AND TRAINING SUPPORT FOR THE IMPLEMENTATION OF EAF/6 (EAST AFRICA ACTION PLAN)**

### **Activities**

#### ***Project objectives:***

"Continuation of intercomparison exercises as a follow-up to the 1992 training programme."

"Preliminary organization (through correspondence) of the training and instrument maintenance programmes for 1994, including identification of suitable laboratories for hosting the workshop(s) and a study of the needs of participants."

#### ***Project achievements:***

Laboratories from the region were invited to participate in the world-wide intercomparison exercises (IAEA-356 and IAEA-142) described under Annex II, but results were not received.

Advice was provided through correspondence to several laboratories regarding analytical protocols and on instrument maintenance. Spare parts for their gas chromatographs were supplied from MESL (through funds allocated in the umbrella project) and were sent to laboratories in Mombasa, Maputo and the Seychelles.

MESL participated in the Inter-Agency meeting on WACAF/2, EAF/5 and EAF/6 projects, FAO HQ, Rome, Italy (20-23 September 1993).

## **ANNEX IX: ASSISTANCE IN THE IMPLEMENTATION OF THE ACTION PLAN OF THE CARIBBEAN ENVIRONMENT PROGRAMME**

### **Activities**

#### ***Project objectives:***

"Baseline studies on pesticide contamination and formulation of control measures: preparation of second training course on non-organochlorine pesticides."

"Monitoring and control of pollution by oil and marine debris: organization and implementation exercise in sediment and marine organisms."

"Site-specific studies of damaged ecosystems and development of proposals for remedial action: analytical services for the determination of trace metals and pesticides in coral reef skeleton samples."

"Guidance and expertise for the effective implementation and development of the CEPPOL activities."

"Identify ways of assisting governments with environmental emergencies."

#### ***Project achievements:***

7-16 March '93	Visit to the Instituto de Ciencias del mar y Limnologia, Estacion Mazatlan, Mexico. Comparative sampling mission in the Altata-El Pabellon lagoon system, Mexico.	J. P. Villeneuve
27 November-10 December '93	Training of counterpart staff in the analysis of trace metals contamination using AAS, Havana, Cuba (Travel paid by IAEA).	B. Oregioni

In addition, MESL have contributed to implementation of the Action Plan through their participation in:

26 April-11 May '93	Travel in conjunction with IAEA-MEL's commitments to UNEP and research activities on pesticides in the tropical marine environment.	L. D. Mee
21-25 March '94	Second meeting of Experts on Land-Based Sources of Pollution in the Wider Caribbean Region, San Juan, Puerto Rico.	J. Readman

15-16 April '94	Attendance at the International Symposium on the Joint IOC-UNEP Marine Pollution Assessment and Control Programme for the Wider Caribbean Region (CEPPOL), San Jose, Costa Rica.	A. Wagener
-----------------	--	------------

## **ANNEX X: PROVISION OF TECHNICAL SUPPORT TO THE GEF PROGRAMME FOR ENVIRONMENTAL MANAGEMENT OF THE BLACK SEA**

### **Activities**

#### ***Project objectives:***

"The initial activity will consist of technical support to UNEP in order to complete the project document and management structure for this programme."

#### ***Project achievements:***

1) Training courses in Monaco:

12-30/7/93	UNEP (MED POL/METAP) IAEA group training on determination of organochlorine compounds in marine biological and environmental samples	J. P. Villeneuve
------------	--	------------------

Participants from:  
Morocco-4, Romania-2 (see also Annex IV)

10-28/1/94	Training course on the determination of Organochlorine Contaminant Analyses	J. P. Villeneuve
------------	---	------------------

Participants from:  
Bulgaria-2, Ukraine-2, Russian Federation-2

31/10-18/11/94	Training course on the determination of Petroleum Hydrocarbons	J. P. Villeneuve
----------------	--	------------------

Participants from:  
Bulgaria-2, Lebanon-1, France-1, Albania-1 (see also Annex IV)

2) Preparation of document detailing the technical specifications of the scientific analytical equipment for the instrument procurement for the GEF Black Sea institutions (prepared in September 1994 by J. Readman and M. Horvat).

3) In addition, MESL have contributed to the implementation of the Black Sea Programme through their participation in the following meetings, many of which were attended without drawing on umbrella project funds.

21-23 Feb '93	Finalization of the project document for the GEF Programme for the rehabilitation and environmental management of the Black Sea ISTANBUL, Turkey (cost free).	L. D. Mee
---------------	---	-----------

5-7 April '93	Meeting of Black Sea environment ministers to sign a Ministerial Declaration on the Protection	L. D. Mee
---------------	--	-----------

	of the Black Sea in ODESSA, Ukraine (cost free).	
12-14 July '93	Travel to GENEVA and BUDAPEST in relationship with MESL's work in the Danube basin and Black Sea (paid by DANPOL).	L. D. Mee
6-7 January '94	Co-ordination Meeting of Research Activity Sponsors of the Programme for Environmental Management and Protection of the Black Sea, ISTANBUL, Turkey (paid by project).	J. Readman
3-6 May '94	First Joint Meeting of the Working Parties for Routine and Special Pollution Monitoring for the GEF Programme for Environmental Management and Protection of the Black Sea, ODESSA, Ukraine (paid by IAEA).	M. Horvat
6-7 September '94	Workshop on Monitoring, Laboratory Analyses and Information Management for the Black Sea Environmental Programme, SOPHIA, Bulgaria (cost free).	M. Horvat

## **ANNEX XI: PROVISION OF TECHNICAL SUPPORT FOR THE DEVELOPMENT/ ENHANCEMENT OF NEW MARINE POLLUTION ASSESSMENT PROGRAMMES IN THE REGIONAL SEAS (INCLUDING EMERGENCY ASSESSMENTS)**

### **Activities**

#### ***Project objectives:***

"Development of a workplan for the 1994/5 biennium."

"Establishment of contacts with relevant international organizations (and international coordination mechanisms) concerning the provision of emergency assistance."

"The provision of emergency assistance where requested and where appropriate financial/technical resources are available."

#### ***Project achievements:***

### **Philippines**

Two sediment samples were analysed for screening all organic contaminants. This was a consequence of a CNN report that toxic wastes are leaking from containers deposited by US companies. *October 1993*

#### **Status on analytical system for rapid screening**

The old GC-MS was replaced at the end of 1993. Beginning of 1994 work within the Organic Chemistry Unit was focused on the installation of and training in the use of a new Hewlett Packard GC-MS "Engine" system. The instrument has proven to be highly sensitive, especially in the negative ion chemical ionisation mode for the analysis of organochlorine agrochemicals. Work conducted during the reporting period on this instrument has included tests on:

- Analyses of pesticides in water (using C<sub>18</sub> cartridge and disk extraction)
- Low level analyses of petroleum hydrocarbons and polycyclic aromatic hydrocarbons
- Analyses of sterols associated with sewage contamination
- Fingerprinting of oil spills to investigate sources (using steranes and terpanes)

## **ANNEX XII: ASSISTANCE IN THE IMPLEMENTATION OF THE IOC/UNEP INTERNATIONAL MUSSEL WATCH (IMW) EXPERIMENT**

### **Activities**

#### ***Project objectives:***

"Completion of the sample analyses for IMW phase I; preparation of sampling and analytical reports; participation in the IMW regional meeting and follow-up IMW committee meetings; and preparation of proposals for follow-up activities."

#### ***Project achievements:***

Three samples of mussel homogenate were analyzed for the analyses of Petroleum and Organochlorine Hydrocarbons for the Mussel Watch project.

The Mussel Watch project was completed at the beginning of 1993.