# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION AND OPENING OF THE SESSION</td>
<td>3</td>
</tr>
<tr>
<td>2. ELECTION OF OFFICERS</td>
<td>4</td>
</tr>
<tr>
<td>3. ADOPTION OF THE AGENDA</td>
<td>4</td>
</tr>
<tr>
<td>4. PROGRESS REPORT OF THE WORLD HEALTH ORGANIZATION FOR 1982</td>
<td>4</td>
</tr>
<tr>
<td>5. REPORT OF THE EXPERT ADVISORY COMMITTEE</td>
<td>11</td>
</tr>
<tr>
<td>6. ACCELERATED RESEARCH PROGRAMME ON BLACKFLY LARVICIDES</td>
<td>14</td>
</tr>
<tr>
<td>7. EXTENSIONS:</td>
<td></td>
</tr>
<tr>
<td>ADDITIONAL STUDIES IN THE SOUTHERN EXTENSION ZONE</td>
<td>17</td>
</tr>
<tr>
<td>PROPOSALS FOR A WESTERN EXTENSION</td>
<td>18</td>
</tr>
<tr>
<td>8. ONCHOCERCIASIS CHEMOTHERAPY PROJECT</td>
<td>20</td>
</tr>
<tr>
<td>9. REPORTS OF BENIN, GHANA AND MALI ON SOCIOECONOMIC DEVELOPMENT</td>
<td>24</td>
</tr>
<tr>
<td>10. PLAN OF ACTION AND BUDGET OF THE PROGRAMME FOR 1983</td>
<td>26</td>
</tr>
<tr>
<td>11. FINANCING OF THE ONCHOCERCIASIS CONTROL PROGRAMME</td>
<td>28</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>12. CONCLUSIONS AND DECISIONS</td>
<td>30</td>
</tr>
<tr>
<td>13. DATE AND PLACE OF THE COMMITTEE'S FOURTH SESSION</td>
<td>31</td>
</tr>
<tr>
<td>14. CLOSURE OF THE SESSION</td>
<td>31</td>
</tr>
<tr>
<td>15. FIELD TRIP TO SELINGUE DAM</td>
<td>31</td>
</tr>
<tr>
<td>ANNEX I - AGENDA</td>
<td>32</td>
</tr>
<tr>
<td>ANNEX II - LIST OF PARTICIPANTS</td>
<td>33</td>
</tr>
<tr>
<td>ANNEX III - ONCHOCERCIASIS FUND, INCEPTION 30 SEPTEMBER 1982</td>
<td>43</td>
</tr>
</tbody>
</table>
1. INTRODUCTION AND OPENING OF THE SESSION: Agenda item 1

1.1 The third session of the Joint Programme Committee (JPC) of the Onchocerciasis Control Programme (OCP) in the Volta River Basin area was held at the Hôtel de l'Amitié, Bamako, Mali, from 7 to 10 December 1982. The session was attended by representatives of Belgium, Benin, Canada, France, Federal Republic of Germany, Ghana, Italy, Ivory Coast, Kuwait, Mali, Netherlands, Niger, Saudi Arabia, Switzerland, Togo, United Kingdom of Great Britain and Northern Ireland, United States of America, Upper Volta, the African Development Bank (ADB), the United Nations Development Programme (UNDP), the Food and Agriculture Organization of the United Nations (FAO), the World Bank (IBRD) and the World Health Organization (WHO). Observers from Guinea, Senegal, the Organization for Coordination and Cooperation in the Control of Major Endemic Diseases (OCCGE), the Office for Scientific and Technical Research Overseas (ORSTOM) and the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), were present. The session was also attended by representatives of Guinea-Bissau and Sierra Leone, as well as by a member of the Expert Advisory Committee (EAC), the Chairman and a member of the Ecological Group, and a representative of the External Auditor. A list of participants is attached as Annex II.

1.2 His Excellency General Amadou Baba Diarra, Deputy Secretary-General of the Mali People's Democratic Union and Minister of State for Works and Amenities welcomed the participants and declared the session open.

1.3 His Excellency Dr. N'Golo Traoré, Minister for Public Health and Social Affairs, said that the international community had reason to be proud of the Programme's achievements since 1974. Such had been the success of vector control operations that in 80% of the OCP area the children born each year were secure from onchocerciasis, the prevalence of the disease among adults had fallen sharply, and annual Simulium bites per person in hyperendemic areas had been reduced from 200 000 to 0-10. Thus optimum conditions had been created for the development of the valleys of the Volta region. The close cooperation between the Participating Governments and the Donors was a fine example of a fruitful North-South dialogue.

1.4 There remained the problems of reinvasion, sometimes from more than 400 km from the OCP area, the resistance of certain forest species of Simulium to temephos, and the lack of safe and effective drugs for use in mass campaigns. He agreed with the Independent Commission on the Long-Term Prospects of the Programme that its long-term success depended on an extension to the West, the main source of reinvasion. The 10-year drought in the Sahel countries had made it essential to make full use of the river valleys, and hence to extend onchocerciasis control to the Senegal river basin. As to residual flies, they should be reduced to a level which no longer represented a threat to public health and which could be maintained by the Participating Countries when responsibilities have been transferred. The Programme had placed considerable emphasis on training the necessary national technical staff.

1.5 He was convinced that OCP would form another milestone in the cooperation between countries of the world. Mali's material, human and intellectual resources were committed to victory in the battle to control onchocerciasis.

1.6 Dr. Comlan A.A. Quenum, WHO Regional Director for Africa, expressed his thanks for the warm welcome extended to the Committee. On behalf of the Director-General of WHO and on his own behalf, he thanked the Donor Countries and Institutions, the Sponsoring Agencies and all the members of the Committee for their contributions to the Programme's spectacular success.
The results so far were encouraging. The vector was under control in 80% of the Programme area. Operational performance in 1982 had been satisfactory as were the epidemiological results. From 1975 to 1981, an analysis of the evolution of onchocerciasis in a sample of 128 villages, within an area of 654,000 km² with a population of over 10 million inhabitants, had confirmed that transmission had been interrupted in all basins. Some 500,000 children below the age of 5 years, born since vector control operations had begun, were free from onchocerciasis. However, the Programme faced the phenomenon of reinvasion and the appearance of resistance to two insecticides in two vector species. The decisions taken by the Committee in 1981 regarding the extensions to the South and West, the accelerated research into larvicides, the chemotherapy project, and the intensification of research in all fields were appropriate responses. The positive reaction of the pharmaceutical industry and the mastery of the situation by the technicians in the field gave grounds for optimism.

The question of the long-term devolution of the Programme's responsibilities to Participating Countries merited attention during Phase II. It had been agreed at the meeting of National Onchocerciasis Committees in Accra, in June 1982, that the Programme could not be taken over in its present structure; thus the best means of ensuring the progressive take-over of activities by national staff required study. Appropriate solutions must be found so that the benefits of a decade of sustained work were not lost.

At the conclusion of the inaugural meeting, the Committee was entertained by a group of young musicians and singers from the National Institute for the Blind.

2. ELECTION OF OFFICERS: Agenda item 2

Prior to the election of officers the outgoing Chairman welcomed the representatives of Italy among the Donors and of Guinea-Bissau and Sierra Leone among the observers.

His Excellency Dr. N'Golo Traoré, Minister of Public Health and Social Affairs of Mali, was elected Chairman of the session by acclamation. Mr. R.J. Courty (France) was elected Vice-Chairman.

3. ADOPTION OF THE AGENDA: Agenda item 3

The provisional agenda was adopted with a change in the order of items (see Annex I).

4. PROGRESS REPORT OF THE WORLD HEALTH ORGANIZATION FOR 1982: Agenda item 4

The progress report of the World Health Organization for 1982 (document JPC3.2) was presented by the Programme Director.

1982 had been a difficult year for the Programme on account of insecticide resistance, adverse weather and hydrological conditions, reinvasion, and logistic problems. Nevertheless, the situation had remained well controlled in all the savanna foci of onchocerciasis in the initial area of the Programme.
4.3 Because of the appearance of resistance to chlorphoxim in the south-west of the OCP area late in 1981, only one year after introduction of the product and following resistance to temephos (Abate \(\text{R}^\text{®}\)), larviciding had had to be carried out with a new and unfamiliar product, Bacillus thuringiensis serotype H-14 (B.t. H-14), which was not available in a satisfactory formulation.

4.4 In the dry season application of Teknar, the B.t. H-14 formulation used by the Programme, had created serious logistic problems. Accordingly, for the wet season a new strategy had been developed in resistant foci in southern areas of Ivory Coast and Teknar was replaced by Abate, which had a selective effect against the savanna species likely to reinvade protected savanna areas. Although the wet season began very early, the application of Abate was successful in providing continued protection from reinvasion for the upper parts of the river basins in the north of Ivory Coast and the south-west of Upper Volta. Even so, the lack of appropriate insecticides, aircraft and release equipment led to two upsurges of transmission: one resulted from partial reinvasion of the upper basin of the Sassandra, which had been inadequately treated with Teknar at the start of the wet season, the other from local production in north-eastern Ivory Coast following a gap in larviciding when no suitable release equipment was available.

4.5 Meanwhile, monitoring of chlorphoxim resistance showed a return to normal susceptibility of the larvae in several areas by June. Since the Ecological Group had confirmed in March that this larvicide had less effect on non-target fauna than originally believed, chlorphoxim was reintroduced on an experimental basis in September on a stretch of the Marahoué. The result was an abrupt fall in the density of biting females from over 1000 to 10 by November. Chlorphoxim application was still continuing without any sign of resistance, and it was hoped to use it for at least two months during the high-water period in 1983, in areas where the use of Teknar had proved too difficult or too costly.

4.6 One favourable development in the resistance zone was that the choice of three insecticides, applied by means of five different types of equipment mounted on two types of aircraft, gave the Programme much more room for manoeuvre than could have been hoped for a year earlier. It should be borne in mind that larvicide rotation and the new release systems were still at an experimental stage.

4.7 Abate was still the only larvicide in use in 75\% of the original Programme area and continued to give extremely satisfactory results. In the west reinvasion had occurred early and on a substantial scale in 1982, but had been of short duration. In the east it had been moderate and localized in the extreme south of the treated areas. All the area covered by the Programme in Upper Volta and Niger, most of the Programme area in Mali, and the whole of north-eastern Ivory Coast, Ghana, northern Togo and north-western Benin had remained fully protected throughout the year. In 430 man days of fly catching at the height of the wet season only 56 blackflies were caught in Upper Volta, compared with 753 in the same area in 1981 and an estimated 100 000 flies before vector control began.

4.8 During the dry season it had been possible to suspend all aerial larviciding for seven successive weeks throughout the eastern zone, a big advance on the two-week suspension in 1981. Larviciding had also been suspended at times in other areas. OCP was currently compiling data on aerial operations for computer storage, and would in future be able to give the JPC a precise indication of the savings made.
4.9 There had been a corresponding improvement in the epidemiological situation. In some 80% of the Programme area, where transmission is interrupted, children under five years were free from onchocerciasis, and the disease seemed to be disappearing in the 5-9 year age group in many villages. In other age groups prevalence was unmistakably declining. For example, in the village of Niarba on the White Volta, where prior to vector control all inhabitants had contracted onchocerciasis by the age of 10, not a single child under 10 was found to have the disease in 1982. In the 10-15 year age group the prevalence rate had fallen from 100% to 43%, and the overall prevalence rate had fallen from 82.5% to 56%. Evaluation of eight villages in eastern Upper Volta in October had revealed only one child under 15 years with onchocerciasis.

4.10 An increasing number of people who had had onchocerciasis before vector control started had now become negative, even though they had not received chemotherapy or changed their place of residence. Why regression occurred was unknown and studies were being initiated to investigate it.

4.11 The improvement in the epidemiological situation was evident from analysis of the ophthalmological data, for the prevalence of ocular onchocerciasis was falling at an average rate of about 5% annually. The risk of ocular lesions in the 10-15 year age group had become extremely low. The number of elderly people with irreversible eye lesions or blindness was gradually falling because of natural deaths and the reduction in new cases.

4.12 In 1982 measurement of visual field was carried out during the detailed evaluations as a trial measure. The procedure improved the detection of blindness cases, and over a period of time would provide better monitoring of the evolution of lesions of the posterior segment of the eye. It had been decided to make such measurement a routine part of the detailed evaluations.

4.13 Similar improvements in the epidemiological situation were not to be expected in the extension zone in Ivory Coast, where resistance and reinvasion had prevented a general halt to transmission. Accordingly, it had been decided not to carry out the evaluation planned for 18 villages in that area as no new information would be obtained.

4.14 Five strains of Onchocerca volvulus had been isolated from biological specimens obtained in the Programme area. Of various enzymes tested, only one had so far shown any indication of a difference between forest and savanna strains. Studies were also in progress on the use of histochemical staining to differentiate parasite strains in infected blackfly larvae.

4.15 The search for an immunological method of diagnosis was continuing, and a large number of biological specimens had been sent to research laboratories in Europe and Australia.

4.16 The studies on the longevity and fertility of adult worms had so far produced data for 299 nodules taken from people in eight villages. Altogether 1138 worms, 711 of them female, had been isolated. The percentage of dead females was 21.9% three years after the interruption of transmission against 12.8% in unprotected areas. For areas with longer periods of protection the size of the sample would need to be increased.

4.17 An important development in field research in 1982 had been the introduction of further training for the technicians working in the sectors and subsectors, who were now expected to carry out new types of evaluation.
4.18 Mobile teams had performed over 150 insecticide susceptibility tests, and the team responsible for new insecticide trials had investigated the behaviour and efficacy of all compounds and formulations submitted to the Programme. Systematic tests had been conducted on the spectrum of resistance to all current or potential insecticides.

4.19 Other research projects in the fields of entomology, parasitology, immunology, release equipment, aquatic monitoring and cartography had been contracted out to collaborating institutions. Expenditure on such contracts so far in 1982 amounted to some US $ 365 000, and over 80% of it had gone to institutions in the Participating Countries.

4.20 There had been close collaboration between scientific staff in the field and the statistics team. Data analysis had already confirmed the correctness of some of the Programme's methods, or shown where improvements were possible and hence where savings could be made in the long-term without loss of efficiency. A microcomputer was to be installed at Ouagadougou to process data relating to aquatic monitoring and the aerial release of insecticides.

4.21 For the past year the Programme had been employing a hydrobiologist, assisted by a technician. They coordinated the work of the national teams, and were involved in determining the impact of new insecticides on non-target aquatic fauna.

4.22 Two meetings for hydrobiologists associated with the Programme had been held during the year. One had considered the ichthyological data collected over the past five years and drawn up a plan of action suitable for any new vector control campaign. The other had finalized the surveillance plan for the present Programme area for 1982-1983.

4.23 In accordance with the biennial reporting system for socioeconomic development agreed upon by the JPC at its second session, three countries had prepared reports in 1982. The reports were in a form better suited to their purpose than in the past. Countries submitting reports would in future receive more support from the Programme, which since August had again had a Chief of the Economic Development Unit.

4.24 Cooperation with subregional agencies for development in West Africa had been strengthened. Moreover two studies had been carried out in Upper Volta, one on dam projects and the other on spontaneous migration.

4.25 The Programme had made a start on preparatory studies for the eventual transfer of responsibility for certain activities to the Participating Countries. The matter had been broached with the ministers of those countries at the meeting of National Onchocerciasis Committees in June, and would henceforth appear on the agenda of the meeting each year. Both the Director-General and the Regional Director for Africa had promised support in preparations for devolution, and a working group set up in Brazzaville had laid the preliminary foundations. Late in November another working group of senior officials from four Participating Countries had met in Ouagadougou to identify activities for which these countries could begin taking responsibility, the national structures required, the minimum resources required, and a timetable.
4.26 One way in which the Programme was already contributing to the devolution of responsibilities was through its training activities. Since 1974 a total of 134 people had received training organized by the Programme, and 60 of them were nationals of the Participating Countries who received training as a preliminary to work within OCP. The courses were mainly for technical training in medical entomology and parasitology, microscopy and ophthalmology, held at specialized centres of the OCCGE. The Programme had also arranged for the training of 77 persons employed, or about to be employed in their national services, one third of such training being at University level. Countries were being invited to submit candidates for training, and it was anticipated that the demand would be even higher than previously. For 1983 the budget allocation for training had been increased by 15% to US $230,000, but following the recent meeting on devolution, expenditure was now likely to exceed that figure.

4.27 Whereas a year ago 20% of professional posts had been unfilled, the situation had since greatly improved. Wide use was being made of the authority granted to engage consultants to fill senior posts for periods of 11 months on a renewable basis. The only remaining problem was to find a Chief for the Epidemiological Evaluation Unit.

4.28 A consultant on transport management had recently spent a month in the Programme area reviewing the transport unit, its staff, and the use and maintenance of its vehicles, in order to recommend ways of making further reductions in expenditure.

4.29 Aerial operations had been carried out with six helicopters and one fixed-wing aircraft in the dry season and with eight helicopters and two fixed-wing aircraft in the wet season. The Programme had secured the assistance of specialists in the United Kingdom to help develop release equipment for B.t. H-14 and various insecticide combinations.

4.30 During the last wet season the staff of Viking Helicopters Limited had performed outstandingly, at times handling very large amounts of B.t. H-14 on their own at caches in the bush in order to ensure that rivers were correctly treated.

4.31 A Contract Review Committee was set up to consider tenders for the fourth aerial operations contract covering 1983-1985. Twenty-nine replies to the advertisements in the papers were received. On the basis of previously determined criteria 10 companies were invited to submit tenders and four had actually done so. The Review Committee found that the company which made the lowest tender was not in a position to meet the contract requirements. The tender from the holders of the present contract, CCC/Viking, was US $1,900,000 lower than either of the remaining tenders, and the Committee had recommended its acceptance by the Director-General. The new 3-year contract (1983-1985), signed on 16 July 1982 for a sum of $7,637,400 Canadian dollars, provided for the replacement of the current fleet by Hughes 500C helicopters with larger-capacity engines and by Turbo Thrush fixed-wing aircraft.

4.32 The Committee of Sponsoring Agencies had met several times to review progress in implementing the recommendations made by the JPC at its second session. The Ecological Group had met in March and the Expert Advisory Committee in September. All those committees had shown a very constructive attitude, and their assistance and advice were highly appreciated.
4.33 The Participating Countries and the Donors had been kept informed of the Programme's activities, and several meetings had been held with the national authorities of the countries concerned by the Western extension.

4.34 Relationships with the scientific community had been kept up through the Programme contracting research workers from the Participating Countries, Europe and the United States of America.

4.35 Progress reports had been sent regularly to everyone concerned with the Programme's activities. National information services had been given support in the organization of public awareness campaigns. Wide use had been made of the films on the Programme, and assistance had been provided with the making of further films.

4.36 Because of the complex and often unforeseeable nature of the tasks involved, it was very difficult to make long-range financial forecasts for the proposals concerning the Southern and Western extensions, accelerated research on new larvicides, and chemotherapy research. Nevertheless, the Programme was well aware of the need of the Donors to have such forecasts, and intended, with the assistance of the World Bank and other agencies, to carry out a long-term financial analysis. It was hoped that the results would be available by mid-1984.

4.37 In conclusion, the Programme Director paid tribute to the commitment and dedication of his staff, and to the tremendous support he had received from Donors and Participating Countries, from the Expert Advisory Committee and the Ecological Group, from the Sponsoring Agencies in general and the WHO Regional Office for Africa in particular.

4.38 Representatives of contributing parties welcomed the continuing success of vector control operations, and the continued improvement in the situation in the onchocerciasis-controlled areas. The virtual disappearance of onchocerciasis in children was a source of great satisfaction. They also commented favourably on the marked improvement in the Programme's staffing situation.

4.39 The importance of the gradual transfer of responsibilities to the Participating Countries was stressed by several Donor representatives. It was essential to the long-term success of the Programme, and a necessary complement to any extension of operations. Such devolution should be linked to the primary health care system. OCP commented that, although the Independent Commission had recommended a start to devolution about 1990-1995, the Participating Countries now wanted to start much earlier. Indeed, a provisional start had already been made in the Bandiagara area of Mali, where for the past two years larviciding had been carried out exclusively from the ground. The Programme technician in the area had introduced health workers of 14 villages to monitoring and larviciding activities, and it was planned to extend the scheme to other villages. However, it was necessary to proceed very gradually and cautiously, preferably in areas where the rivers were easy to reach and treat.

4.40 The Programme Director had already invited senior officials in the Participating Countries to let him know what activities they could take over and what should be left to OCP. The aim of the devolution process was to build up the countries' capability to a certain level and gradually reduce OCP activities. He foresaw that, when the Programme had reached its objectives, an inter-country organization would need to be set up to coordinate control activities, research and training in the Participating Countries.
4.41 One representative raised the question of the discrepancy between salaries for Programme staff and staff of the national services. OCP stressed that the salaries of staff of the national services were a matter for the Participating Countries alone.

4.42 A representative of a Participating Country, referring to the tables on pages 10 and 11 of the Progress Report, asked the reason for the increased fly catches at certain points at certain seasons from 1979 onwards. OCP explained that the five points selected were all in zones subject to both reinvasion and larvicide resistance. The short-lived increases in May on the Bandama, Léraba and Bou rivers were largely due to the inadequacy of the present Teknar formulation to cope with the sudden rise in water levels at the start of the wet season, and to a simultaneous reinvasion movement. The August and September increases on the Marahoué resulted from logistic shortcomings at the high-water period, when the technical capacity of the helicopters was exceeded and no fixed-wing aircraft with suitable release equipment was available. At the 295 other catching sites, the figures had been at least as good as in previous years and often better.

4.43 In reply to a question on the savings resulting from the suspension of larvicide application during the dry season, OCP said that data were currently being processed by computer and some figures should be available within a matter of months.

4.44 Asked for further information on B.t. H-14, OCP said it was highly effective against Simulium but had virtually no effect on non-target fauna. Unfortunately the present formulation, Teknar, was unsatisfactory, and a formulation allowing treatment at lower dosages was needed.

4.45 Concern was expressed about the reappearance of blackflies on the Sota river in northern Benin. OCP believed that reinvasion from rivers in Nigeria may be a cause. When reinestation occurred, great care was taken in the weekly evaluation of insect catches to establish whether it was due to local production or to reinvasion.

4.46 A representative asked whether some apparent reinvasion might really be due to early maturation of the blackfly larvae. The Programme Director indicated that the techniques used allowed a very clear differentiation between local production and reinvasion flies, leaving no room for error.

4.47 In reply to another question, OCP explained that the data for the ophthalmological examinations were presented only for the Programme area as a whole because the number of villages evaluated was too small to provide statistically valid results for an individual country.

4.48 A Donor representative asked where people trained by the Programme in the past were currently employed. The Programme Director replied that OCP provided further training for people who were already working either for the Programme itself or for their governments, and so far as he knew all past trainees were usefully employed. The "brain drain" had not so far proved a problem.
4.49 Another representative, commenting on the large volume of documentation produced by OCP, suggested that the documents prepared for the JPC should normally be sufficient, and additional reports should be issued only when unforeseen occurrences so required. The Programme Director said he had in the past tried reducing the number of progress reports, but had immediately been deluged with requests for information from all parties. He felt that quarterly or six-monthly progress reports ought to suffice.

5. REPORT OF THE EXPERT ADVISORY COMMITTEE: Agenda item 5

5.1 The report of the EAC, document JPC3.3, was introduced by Dr. P. Haskell in the absence of the EAC Chairman.

5.2 The EAC had been given a wider mandate than in the past, and now considered such aspects as management and devolution as well as technical and medical matters. There was a feeling within the EAC that the Programme had been asked to do too much too quickly. The staff had responded magnificently, but a period of consolidation was needed before embarking on new large-scale control operations. Strengthening of the staff component was strongly recommended.

5.3 Although the appearance of resistance to temephos presented a serious problem, this larvicide remained fully effective in 80% of the OCP area. Nevertheless, should resistance appear in the savanna form of the vector before adequate alternative larvicides were available the situation could be extremely serious; OCP had therefore been asked to prepare a contingency plan to deal with that situation if and when it arose.

5.4 The EAC agreed with the Ecological Group that no new control operations should be started unless two operationally usable larvicides were available in addition to Abate. Such larvicides must be obtainable in large quantities, must have the necessary storage properties, must be suitable for application by the release equipment available, and must have been cleared by the Ecological Group.

5.5 Reinvasion was of course a great nuisance and made the work of the Programme more difficult and costly, but it was a familiar problem common to almost all vector control campaigns and there was no need to fear that the Programme would be jeopardized even if no immediate solution were found to bring it under control immediately. The EAC recommended pressing forward with a research programme on adulticiding, as that offered one possibility of dealing with reinvading flies. Trials in Upper Volta had already shown the application of chemicals for tsetse control to have a very definite effect on the local adult *Simulium* population.

5.6 The EAC had endorsed a proposal by the Vector Control Unit to reduce the time and money spent on the entomological evaluation network. As for epidemiological evaluation, it seemed that the acceptable levels set some years ago for the annual biting rate and annual transmission potential should now be revised. Review of those levels could produce economies by reducing the amount of control required.

5.7 The EAC attached great importance to the development of an immunodiagnostic technique for onchocerciasis, and work on that was being carried out through the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR).
5.8 Since the Programme was set up, estimates of the longevity of the adult worm had fallen from approximately 15 years to 11-12 years or even less, a new factor which could make a difference to the duration and cost of the Programme.

5.9 The EAC was not entirely in agreement with the Independent Commission's view that the devolution of vector control activities to Participating Countries would not be cost-effective. The Bandiagara experiment should provide much useful information, but it was most important to proceed with caution.

5.10 The statement on priorities for future OCP activities, contained in Annex I of the report, had been agreed on unanimously by the EAC. Unquestionably, the first priority in the short-term was to maintain present operations in order to safeguard what had already been achieved. That implied urgent work to develop alternative larvicides, and continued research into resistance and reinvasion. The second priority at present was the development of a drug for the treatment of onchocerciasis, although in the longer term chemotherapy must take pride of place: when vector control ended after the interruption of transmission, chemotherapy would be the only means whereby the Participating Countries could continue to contain the disease. A drug must be found if the Programme was ever to be brought to an end. The proposed southward and westward extensions to the Programme could not be placed higher than third on the list of priorities, although the EAC strongly supported them because the areas concerned were sources of reinvasion and affected the ultimate security of the Programme area.

5.11 The report of the Ecological Group (document JPC3.3, Annex 4) was presented by the Chairman of the Group, Professor J. Koeman.

5.12 In carrying out its task of advising the Programme on the environmental impact of pesticides, the Group had been kept well informed of activities by the Programme Director and his staff. It was a great advantage to the Group to meet regularly with the hydrobiologists involved with the Programme.

5.13 Additional studies on the impact of temephos on fish populations had confirmed earlier results. Temephos still met the criteria set by the Group and was acceptable from an environmental viewpoint.

5.14 The overall impact of chlorphoxim on invertebrate fauna in the wet season had been found to be less significant than some hydrobiologists used to believe. Nevertheless, since there was still some uncertainty surrounding the impact of chlorphoxim in the dry season, the Group recommended its replacement by B.E. H-14 wherever possible.

5.15 In the Programme area there were many untreated tributaries which could act as reservoirs for fish and insect species which might be affected by spraying. In this respect and at the suggestion of the Group, the OCP hydrobiologist had begun a study of the biological potential of the N'Zi river system, in collaboration with ORSTOM.

5.16 Stressing the different ecology of the rivers the Chairman of the Ecological Group underlined the need for hydrobiological studies to be undertaken for at least two years before the treatment of rivers in any area. He also emphasized the Group's recommendation that at least two operationally usable larvicides should be made available in addition to temephos before the launching of control operations in the Western extension area. Reservations were expressed on the meaning of paragraph 45 of the EAC report (document JPC3.3).
5.17 Discussion of the EAC report focussed mainly on the question of priorities. Some representatives expressed agreement with the priorities suggested while others insisted that the order should not be rigidly maintained, and pointed out an apparent contradiction in the EAC's statement on priorities: first priority was "maintaining the present operations and securing success in the currently defined Programme area", yet the "ultimate security of the present Programme area" was dependent on the protection against reinvasion afforded by the proposed extensions. In other words, the third priority was essential to achieving the first priority.

5.18 It was also argued that if the boundaries of the Programme were extended to control the foci of reinvasion it would be possible to discontinue larviciding in the centre of the Programme area.

5.19 The EAC entirely agreed that the Western and Southern extensions were extremely important in the long term for the protection of the present Programme area. It had assigned those extensions a lower priority for purely practical reasons: there was a serious shortage of information, especially on the Western extension area, and the resources for carrying out such extensions were simply not available.

5.20 The EAC pointed out that it had arrived at its priorities on scientific grounds and in the light of the resources available to the Programme in terms of money, manpower, expertise, experience and information. Research to develop alternative larvicides had to remain the top priority for another two years at least. Representatives were reminded that the objective of the Programme was not to eradicate onchocerciasis, or to eliminate the blackfly from Africa - a completely impossible undertaking - but to reduce transmission to such a level that the disease no longer presented a socioeconomic problem.

5.21 The World Bank commented that knowledge of onchocerciasis and its control had increased enormously since the objectives and strategy of OCP were laid down in 1973. Those objectives and strategies now needed to be redefined in the light of the recently acquired knowledge, the problems of insecticide resistance and reinvasion, and the apparent need for wider geographical boundaries.

5.22 A number of representatives voiced their anxiety that the use of temephos for onchocerciasis control in Nigeria might increase the danger of resistance in the Programme area. OCP stated that the Nigerian authorities were cooperating closely with the Programme, and were keeping it well informed. It had been arranged that as soon as the manager of the Nigerian programme was appointed, he would visit Ouagadougou to study OCP's methods. Up to now the only insecticide routinely used for onchocerciasis control in Nigeria had been DDT. Small quantities of temephos had been used only in a small area 800 km from the nearest OCP river. The launching of a control programme in Nigeria could only be beneficial to OCP, since it would prevent reinvasion from the east.

5.23 A Donor representative commented on OCP's increasing activities in forest areas and sought an assurance that the intention was not to undertake large-scale onchocerciasis control in the forest but merely to study the significance of vector activity in the forest for onchocerciasis control in savanna areas. Expenditure on such studies should be kept to the minimum.

5.24 OCP felt a thorough study of forest onchocerciasis was needed to determine its severity and its public health and socioeconomic significance. Some of the forest foci were potential sources of reinvasion of *S. damnosum*; one of the forest species, *S. soubrense*, was able to reproduce in the savanna and had developed resistance to the organophosphorus larvicides. Nevertheless, studies during the past year suggested that *S. soubrense* did not present as serious a problem as had at first been feared: although it certainly acted as a vector in the forest, it appeared to play a minor role in transmission in the true savanna areas.
5.25 Replying to a question about the likelihood of resistance to temephos developing in savanna species of the vector, the EAC representative said it was surprising that resistance had not developed already. In any vector control programme in which a population was placed under sufficient selection pressure, for example by the use of insecticides, resistance was sure to appear sooner or later.

5.26 Some representatives endorsed the EAC proposal for more research on adulticides, and asked about their potential. OCP said there was no intention to replace larvicides by adulticides throughout the Programme, but adulticides could be used as a back-up technique in some isolated foci or to deal with reinvasion.

5.27 Anxiety was expressed concerning the use of chemicals for fishing. Some of the chemicals were related to the Programme's larvicides, and their use in rivers might accelerate resistance. The Chairman of the Ecological Group said the use of plant poisons for fishing was traditional, and people tended to replace naturally occurring poisons by chemicals that were more readily available, such as lindane. OCP's hydrobiologist was endeavouring to collect information on the extent of the abuse, and the Participating Countries were urged to keep a close watch on the situation. There seemed to be little danger that the use of organophosphorus pesticides in agriculture would lead to resistance to temephos; such chemicals rarely found their way into the rivers, except perhaps during the cleaning of containers.

5.28 The Programme Director outlined the EAC's proposals for at least six additional professional staff to strengthen the operational, technical and management structures of the Programme. A Participating Country representative asked what efforts were being made to recruit Africans for the new posts. The Programme Director replied that the posts had not yet been created, but if they were the vacancies would be advertised in the normal way. It was his policy to give emphasis to recruiting from the Participating Countries, but the overriding criterion in selection was the candidate's knowledge, efficiency and capability. At present 65% of OCP's professional staff came from African countries, 51% from the Participating Countries.

6. ACCELERATED RESEARCH PROGRAMME ON BLACKFLY LARVICIDES: Agenda item 6

6.1 The accelerated research programme on blackfly larvicides was instituted at the second session of the JPC in order to find alternative larvicides in case resistance to temephos should become widespread. The report (document JPC3.8) was introduced by WHO, which also provided additional information that had become available since the document was prepared.

6.2 There were two groups engaged in the screening of new larvicide formulations in the field: the OCCGE/ORSTOM group at Bouaké, Ivory Coast, which concentrated on biological insecticides, and the newly formed OCP group at Kara, Togo, which dealt with chemical insecticides. It was intended to transfer the latter group in 1983 to Lomé, where much better facilities were available.

6.3 The table on pages 6 and 7 of the document needed some updating. Chlorphoxim 206 C had proved superior to the other two chlorphoxim formulations tested. More was now known about cytothrin, azamethifos and methiocarb, and the manufacturer of the last-named product had been asked to improve the formulation. OMS 3002 was now known to be a pyrethroid. The Sumitomo company had recently supplied three new insecticides: a carbamate and two insect development inhibitors (IDIs).
6.4 Among the chemical insecticides, the research programme was currently giving priority
to two organophosphorus compounds (chlorphoxim and azamethifos), a carbamate (methiocarb) and
three pyrethroids (deltamethrin, permethrin and OMS 3002), so as to determine the best
formulation, the effective dose, carry and effects on non-target fauna.

6.5 Research on IDIs was delayed because they needed a different evaluation method. An
appropriate method was currently being developed, and in due course the IDIs, particularly
diflubenzuron, would be paid the same attention as the other larvicides.

6.6 As regards biological larvicides, strenuous efforts were being made to improve the
formulation of B.t. H-14. The Abbott company would shortly supply five new formulations of
Vectobac, and Sandoz, the present supplier, was to provide a new formulation of Teknar twice
as concentrated as the present formulation; all were designed for direct application in
water. Solvay had already provided 49 samples of B.t. H-14, two of which had proved more
effective than the Teknar currently used by OCP. Another 87 intermediate formulations had
been tested in order to determine what ingredients were desirable, particularly solvents and
emulsifying agents, and had led to the development of 50 more refined formulations,
two-thirds of which could be industrially produced by the second quarter of 1983.

6.7 A meeting held in Ouagadougou in November 1982 had recommended careful and continuous
quality control of all insecticides sent to OCP.

6.8 In 1983 the Programme would have a Bell 205 helicopter capable of transporting 800
litres of insecticide, compared with 200 litres for the Hughes 500 C machines presently in
use. The spraying equipment - tanks, piping, etc. - would need to be modified to suit any
new insecticide formulations adopted.

6.9 Coordination between OCP, the WHO Division of Vector Biology and Control (VBC) and the
manufacturers was excellent. The manufacturers were very satisfied with the quality of the field
trials carried out by OCP and its collaborating laboratories and the speed with which they were sent the results.

6.10 A representative of a Donor country asked if it was intended to continue the larvicide
development programme after the two alternative larvicides insisted on by the EAC became
available. This programme represented a heavy drain on resources, and OCP was fundamentally
concerned with operational activities, not research. The EAC replied that, once the
necessary alternative larvicides became available, OCP's involvement in active larvicide
research could cease, but VBC in Geneva would continue its liaison with manufacturers to
develop larvicides for other insect vectors and would acquire much information of potential
relevance to blackfly control. If resistance to any of the three operational larvicides
should develop, VBC would then be in a good position to get another formulation developed
quickly. The EAC considered that an ideal arrangement. The JPC was reminded that the
Programme was not engaging in fundamental research on new insecticides: development of a
single compound could cost US $ 10-20 millions. It was simply helping manufacturers to
reformulate existing compounds for use in blackfly control.

6.11 A number of representatives asked when the two alternative larvicides were expected to
become available. EAC and WHO were in agreement that, although a suitable biological
larvicide formulation (B.t. H-14) might well become available in 1983, it would take at least
two or three years to perfect another chemical larvicide and obtain the approval of the
Ecological Group for its operational use. The second chemical insecticide should be of a
different class from temephos, i.e. not an organophosphorus compound, so as to reduce the
risk of cross-resistance.
6.12 There was some discussion of the advisability of alternating insecticides. WHO felt that, when three operational larvicides became available, it would help to cut down the risk of resistance if they were alternated according to season. However, apart from chlorphoxim which has its environmental restrictions and belongs to the same class, none of the alternative larvicides currently under consideration was nearly as effective as temephos, which would remain the mainstay of the Programme for the foreseeable future.

6.13 Replying to questions of a financial nature, OCP pointed out that a provision of US $ 534,900 for accelerated larvicide screening was included in the proposed budget for 1983. It was not expected that the screening programme would require any additional funds beyond those already budgeted up to the end of 1985. The amount budgeted for 1983 covered consultancies or contracts with external institutions for larvicide evaluation and susceptibility trials, research on the physicochemical properties required by the larvicide formulations, development of new release techniques, and research on the mechanisms for the development of resistance. The development of new formulations was paid for by the manufacturers themselves.

6.14 WHO informed a representative who asked about the prospects for permethrin that, while it was most effective against blackfly larvae and had little toxicity for mammals, it became extremely toxic when released in water, especially for shellfish. The compound would need to be made much more selective, and the Penwalt company had been asked to develop a microencapsulated formulation.

6.15 At the request of another representative, WHO provided more details of the work being done on biological larvicides. B.t. H-14 had the desired larvicidal properties, but the formulation needed to be improved for wet-season use: it must be presented in an ultraconcentrated form, not sink to the bottom of the river, and carry for 30 km at a river discharge of 200 m³ per second. So far almost 200 formulations had been tested.

6.16 Some interest was taken in the future prospects of IDIs. Little was known as yet because no satisfactory method for evaluating their effects on blackflies had been devised. Such products would need to be specific in their effects, which seemed difficult to achieve, and would need to be effective at all stages of larval development.

6.17 More information was sought on the suitability of the Programme's aircraft and the larvicide release equipment. Besides obtaining an additional large-capacity helicopter (paragraph 6.8), OCP would in 1983 replace the Pilatus Porter fixed-wing aircraft with Turbo-Thrush aircraft. The latter was specially built for releasing insecticides and could carry 1200 litres as against only 600 for the Pilatus Porter. It also provided greater protection and better visibility for the pilot.

6.18 From the aerial operations viewpoint it was fortunate that both temephos and chlorphoxim were non-corrosive and could be released quite simply by either a gravity system or a pressure system. B.t. H-14 needed to be released in droplet form, so a boom and nozzle system had been developed for use on helicopters. With fixed-wing aircraft it was difficult to release a large quantity over a small area by that system, and OCP was experimenting with a venturi system. The contractor had been asked to develop a system that would release B.t. H-14 in 60-micron droplets at a rate of 50 litres per second.
6.19 One representative enquired whether OCP was still able to conduct river trials of new larvicides under meaningful conditions, in view of the success of the Programme in reducing the blackfly population. WHO replied that the transfer of the Insecticide Research Unit to Lomé would resolve that problem. At Kara it was surrounded by rivers subjected to weekly spraying, but there were many untreated breeding sites readily accessible from Lomé. Paradoxically, the appearance of resistance close to Bouaké had greatly facilitated the screening activities of the OCGGE Research Institute.

7. EXTENSIONS: Agenda item 7

(For a discussion of the level of priority to be accorded to the extensions, see sections 5.10 and 5.16–5.21).

Additional studies in the Southern extension zone

7.1 OCP introduced document JPC3.5 and outlined the new information obtained during the past year. Enough knowledge was now available for systematic larviciding to begin; unfortunately, routine application of temephos would almost certainly give rise to resistance within a matter of months, and there was as yet no alternative larvicide suitable for use at all seasons. In 1983, therefore, it was proposed to conduct an interim programme. This would include entomological surveillance, aquatic monitoring, susceptibility testing as well as studies on the vector capacity of S. soubrense, on the correlation between hydrology and the dynamics of the vector population and on the teletransmission of hydrology data. Teknar would be used experimentally on certain rivers for four months.

7.2 The EAC confirmed its support for the Southern extension, which should go ahead as soon as the alternative larvicides became available.

7.3 A Donor representative pointed out that more hydrobiological data still had to be collected before the extension operations could be implemented.

7.4 In reply to questions, OCP stated that the area of the proposed Southern extension was about 115,000 km², compared with 764,000 km² for the present OCP area. There was no reliable information on the population of the extension area.

7.5 WHO told the meeting that when the Programme was launched two insecticides had been available: DDT, rejected for its impact on the environment, and temephos. Chlorphoxin had reached the stage of river trials. There had been some other promising insecticides, but work on them had been discontinued because of their effects on non-target fauna.

7.6 OCP confirmed that the only obstacle to immediate implementation of the Southern extension was the lack of alternative larvicides. Such additional larvicides were essential, for the extension area contained vector species which were known to become resistant within a few months when put under constant pressure from organophosphorus insecticides.

7.7 EAC reiterated its view that no major new control operations should be undertaken until two more larvicides were available for year-round operational use. However, it did support the trial use of Teknar at the end of the dry season in certain rivers of the extension area as a means of reducing reinvansion of the central OCP area.
7.8 One representative queried the annual expenditure of US $704,000 on maintaining the existing infrastructure and pre-control activities in the extension area, since earlier discussions had shown that the required alternative larvicides would not become available for at least two or three years. Another suggested that the buildings could be maintained by the Participating Countries themselves, while some of the OCP staff in the area might usefully be employed on studies in the Western extension area.

7.9 The Programme Director replied that the problem had been created by the unexpected appearance of resistance in the Ivory Coast extension area. Rather than dismiss the trained personnel and let the infrastructure deteriorate, he had endeavoured to use the existing facilities for other purposes. The very presence of potentially resistant species and of untreated rivers made the area ideally suited for research on resistant species and new larvicides, and much of OCP's research was now being conducted there. The OCP staff responsible for maintenance were now doing valuable work by assisting with research and trials. He felt that was a satisfactory solution under the circumstances, but would welcome guidance from the JPC.

7.10 The representative of Benin drew attention to the problems facing the Samiondji farm project in an area where 49% of the inhabitants were infected with onchocerciasis. He asked what transitional measures could be taken pending the implementation of the Southern extension.

7.11 OCP said it regularly received enquiries of a similar nature, especially because some bilateral Donors asked for reassurance about the onchocerciasis situation before committing funds to development projects. There was no effective alternative at present to the larviciding methods used currently by the Programme. Perhaps an interim solution for the Samiondji farm project could be to attempt to treat people at risk by the local health services.

Proposals for a Western Extension

7.12 OCP introduced the working document JPC3.6, "Proposals for a Western Extension of the Programme in Mali, Guinea, Guinea-Bissau, Senegal and Sierra Leone" and outlined the steps taken since the previous session of the JPC. Additional investigations had been carried out and had confirmed very serious gaps in present knowledge of vector distribution, river flows, communications facilities, meteorology, geography and several other factors in the Western extension area.

7.13 There were a number of obstacles to early implementation of the extension, besides the lack of suitable alternative larvicides. Also for parts of the year large sections of the extension zone were very difficult to reach. Much of the terrain was mountainous, and cloud cover made it difficult or even dangerous for aircraft to operate. To the south there was much lush vegetation, and many watercourses were not visible from the air.

7.14 In view of the difficulties, OCP had prepared a second document (OCP82.7, "Proposals for preparatory activities in the Western Extension Area for the period 1983-1985"), which suggested a procedure for obtaining the additional knowledge required before the two-year phase of preparatory activities could be embarked upon.
7.15 Representatives of Participating Countries and observers from Guinea, Guinea-Bissau, Senegal and Sierra Leone appealed for implementation of the Western extension project at the earliest possible date. Onchocerciasis was accelerating the migration of young people from rural areas, leading to a drop in agricultural activity and hence to a loss of foreign exchange for socioeconomic development. A control programme would boost development, would protect future generations from the risk of blindness, and would protect the present Programme area against reinvasion. The countries concerned were fully committed to participate effectively in implementing the project; some of them had already set up national onchocerciasis committees and begun to create the infrastructure for logistic support. After more than five years of discussion all parties were agreed on the need for the Western extension, for humanitarian, socioeconomic and scientific reasons: the time had come to take a positive decision. Pending the availability of additional larvicides, a start could be made in the savanna areas in the north of the extension area, where the vector S. damnosum had not yet developed resistance.

7.16 Several representatives pointed out that, even if the technical problems could be overcome, the financing of the extension would present a major obstacle. The Donors had set an outstanding example of international solidarity by committing themselves to a 20-year Programme. They had already contributed over US $ 100 million, and could hardly be expected to provide substantially more at a time of worldwide economic recession. There was no question as to the desirability of the Western extension, but when funds were limited it was necessary to establish priorities. Unless the priorities recommended by the EAC were followed, the achievements in the present OCP area would be jeopardized.

7.17 Notwithstanding the funding problem, the Donors were in broad agreement with the proposals contained in the working documents, and in favour of gradual introduction of vector control in the Senegal and Gambia basins, in the north of the extension area. It was stressed that the present staff were already overloaded and should not be asked to shoulder additional responsibilities.

7.18 Some representatives questioned the claim that the extension of vector control would increase the risk of insecticide resistance. In Ivory Coast resistance had appeared, but only in S. soubrense and S. sanctipauli, species which were not known to be vector of severe onchocerciasis. That did not seem a logical reason for refusing to extend vector control in areas where S. damnosum and S. sirbanum were the only dangerous vectors.

7.19 OCP confirmed that when S. soubrense left its original habitat, it either ceased to bite man or had great difficulty in becoming established; where it did succeed in establishing itself it bit man but had a low transmission potential. However, it displayed extremely varied behaviour in different river basins at different latitudes, and it would be premature to generalize from the observations so far available. It was essential to intensify research in order to find out more about S. soubrense.

7.20 A number of representatives asked why the Ecological Group insisted on the availability of at least two operational alternative larvicides to temephos before any extension could be undertaken. The Chairman of the Ecological Group replied that it was not a rigid requirement but a recommendation; it was a very reasonable recommendation made on purely scientific grounds. OCP had been very fortunate in operating for a long period with only one larvicide, for almost all insects treated with insecticides developed resistance within a few years. Experience with vector control in other regions indicated that expanding the area under control tended to increase the likelihood of resistance. Reinvasion might well have retarded the appearance of resistance in the bulk of the present OCP area; extension, by eliminating
the reinvading flies, was likely to result in the rapid development of resistance to temephos and chlorphoxim. The Programme would then be left with only one effective larvicide, B.t. H-14; that was why the Ecological Group had recommended that at least one other larvicide should be available, essentially from a different chemical group. Otherwise the Programme could be at serious risk.

7.21 A specialist in vector genetics noted that the gene for temephos resistance was present in the S. soubrense/sanctipauli group; it would be selected very quickly in those species when temephos was used, so alternative larvicides were essential. In S. damnosum/sirbanum, however, the resistance gene was either absent or was difficult to select for as yet unknown reasons. Resistance could develop in those species, but was not dependent on extension. Each reinvasion from the extension area constituted an attempt to select resistant genotypes; if that continued for a number of years, there was a very grave danger that a gene system extremely resistant to temephos would develop in S. damnosum/sirbanum; extension of vector control could only lessen that danger.

7.22 An observer asked why the proposed expenditure on aquatic monitoring (US $ 500 320) was so much greater than that on entomological studies (US $ 104 500). OCP replied that the larvicide susceptibility test surveys and the vector control activities could also be regarded as entomological studies and brought the total up to US $ 2 137 449.

7.23 The Regional Director appealed to the JPC to do nothing that might jeopardize the benefits already achieved through genuine international cooperation. He felt that at the present stage the Programme needed to show great patience and far-sightedness. Accordingly, he urged the JPC to reach an agreement in principle on the Western extension.

8. ONCHOCERCIASIS CHEMOTHERAPY PROJECT: Agenda item 8

8.1 The report of the Onchocerciasis Chemotherapy Project Working Group (document JPC3.7, Rev.1) was introduced by WHO. At its second session the JPC had accepted the recommendation of the Independent Commission on the Long-Term Prospects of the Programme that priority be given to finding and developing a new drug against onchocerciasis. Such a drug would remove the residual reservoirs of infection in the human population, reduce the need for long-term larviciding, and provide a finite end-point for large-scale OCP activities. A drug development programme could therefore prove highly cost-effective, and the JPC had provided US $ 1 150 000 to start up such a programme.

8.2 The OCP Committee of Sponsoring Agencies and the Standing Committee of TDR had appointed a working group of five members to make recommendations on expenditure and monitor use of the funds available in 1982 and to recommend a permanent mechanism for managing and operating the project.

8.3 The objective of the project was to find a drug that would kill or permanently sterilize the adult female worm of Onchocerca volvulus; any additional action on microfilariae must be achieved without causing severe reactions in the patients treated. A single drug should suffice, for resistance would be most unlikely to develop quickly. Whereas the generation turnover-time was about two days for the malaria parasite, and only 20 minutes for some bacteria, it was about 12-15 months for O. volvulus and it would, therefore, probably be many years before selection could produce resistance. The drug must also be genuinely safe and have a high therapeutic index; it would need to be administered to likely infected individuals with onchocerciasis who as yet manifest no symptom of the disease, and a toxic drug would be unacceptable in such circumstances.
8.4 The funds expended in 1982 with the Working Group's approval (section 6.2 of the document) had differed in some respects from the tentative budget presented to the JPC in December 1981 (section 6.1). The allocation for toxicology testing had been substantially reduced because diethylcarbamazine N-oxide (DEC N-oxide) had failed the cattle screen and thus been eliminated from consideration. WHO had entered into an agreement with Ciba-Geigy for the testing of three of that company's compounds, and the toxicological tests were currently in progress. If any of the three compounds passed the tests, it could be ready for first-stage clinical trials in man by the end of 1983.

8.5 Expenditure on cooperation with the Wellcome Foundation had been increased in order to set up a unit for chemical synthesis and screening of drugs and the biochemical examination of filarial parasites. It was a basic operation aimed at finding new compounds which might have a filaricidal action. Funds had also been earmarked for small-scale clinical studies on the new formulation of mebendazole, for the resynthesis of a number of new arsenical compounds, and for a revision of the protocols for clinical trials.

8.6 If any of the drugs now at a fairly advanced stage of development were to prove suitable for large-scale use in onchocerciasis, it could become available to the Programme within three to five years. Mebendazole was the drug on which most work had been done. It did not kill the adult worm, but prevented it from producing microfilariae for a period of some months. Unfortunately, as well as requiring a 2-3 week course of treatment, it also had some teratogenic and toxic properties, and was unlikely to prove the answer to OCP's problems.

8.7 Flubendazole (Janssen Pharmaceuticals) had proved ineffective in an oral preparation but had displayed an extremely promising action on a small group of patients in an injectable preparation. It certainly sterilized the adult worms for a considerable period, and may have killed them. Unfortunately, the injection was so painful as to preclude further trials. Work to improve the formulation was necessary.

8.8 Ivermectin (Merck, Sharpe and Dohme) was a new single-dose microfilaricide. As the killing of microfilariae by any drug usually produces serious reactions in the human host, the manufacturer has agreed to conduct double-blind trials to find out whether Ivermectin represents any advance over the standard microfilaricide, DEC.

8.9 The only other drugs currently being tested were the three Ciba-Geigy preparations, now undergoing toxicological testing. If none of the drugs mentioned proved suitable, the project would have to start again from the very beginning with synthesis and screening of further new compounds. Drug development was an extremely lengthy, complex and expensive process, and on average it was necessary to screen 10 000 compounds before a suitable one was found.

8.10 The Working Group had outlined the basic long-term strategies for the development of an onchocerciasis drug. The most important strategy was cooperation with the drug industry. That could be done by providing financial incentives, screening facilities, and assistance with clinical trials. The chemotherapy project should also collaborate closely with TDR, which was currently spending almost US $1 million annually on filaricide research. For example, primary and secondary screening should be common to both the onchocerciasis project and the TDR project on lymphatic filariasis.
8.11 Toxicity assessment in man and regulatory clearance presented a difficult problem. Great care would have to be taken to ensure that the population treated would not be subjected to undue risks. Any drug, before release for general use, would have to be tested for safety and effectiveness according to the best available scientific standards. It must not only meet the standards of the manufacturing company, which were quite rigorous, and of the country of origin, but must also be approved by the WHO Secretariat Committee on Research involving Human Subjects (SCRIHS) and by the health authority of the recipient country. In its report the Working Group had recommended a meeting of experts to identify the requirements, but it now felt it would be better to convene a small group of experts to consider each particular drug as and when sufficient data became available.

8.12 The Group had proposed a long-term management structure for the chemotherapy project in section 7.2 of its report. It had endeavoured to keep bureaucracy to a minimum, and suggested that the project should act on scientific and technical advice of the Director of TDR. There would be a Steering Committee established by the Director of TDR in consultation with the Director of OCP. The post of Secretary of the Steering Committee would be highly demanding, and great care would need to be taken in filling it.

8.13 Besides the group set up within the Wellcome Foundation, another interdisciplinary group to undertake chemical synthesis, biochemistry and screening activities would need to be formed, and that might prove difficult.

8.14 The Group recommended an annual budget for the chemotherapy project of US $ 3 450 000 amounting to US $ 17.25 million for the period 1983-1987, as shown in sections 8.6 and 8.7 of its report.

8.15 In the ensuing discussion, the Committee stressed the importance of finding a safe drug and commended the proposed chemotherapy project. It considered that the existence of several promising drugs justified pressing ahead, even though there was no guarantee of success within a reasonable time. To discover one drug would be a major advance; the possibility of drug resistance could be discounted, since each generation of O. volvulus took over a year.

8.16 Because of the speculative aspect of the project, however well conceived, a representative believed that the use of suramin, whose disadvantages were known, should not be ruled out. With suitable precautions it could be applied on a limited scale, perhaps using the protocol already worked out by OCP. WHO replied that there were tremendous logistic problems in administering suramin as it required a course of seven weekly intravenous injections; however, it could be used for extended individual treatment.

8.17 In answer to questions, WHO said that it was not yet known if any drug could be given in a single dose; mebendazole, for example, required two or three weeks of treatment, and in the only trial of flubendazole five injections had been given at weekly intervals, though a single treatment might be possible if an acceptable formulation could be found. Ivermectin could probably be given in a single dose, but its usefulness had not yet been demonstrated. The Ciba-Geigy compounds were effective in a series of five daily doses in animals. A single-dose treatment would be ideal, but a regime not longer than five daily doses would still be a practical proposition.
8.18 On the question of informed consent, before drugs were used in clinical trials, clearance had to be obtained from WHO's ethical committee (SCRIHS) and the government of the country concerned. The clinical investigator then assumed responsibility for giving the drug to a particular individual or not. It was customary either to treat a patient presenting signs or symptoms of onchocerciasis or to go to a village and offer treatment to persons with the disease. The conditions of treatment and the expected effect of the drug were explained to the people concerned in the presence of the village chief. Only otherwise healthy adult males who wished to join the trial were accepted.

8.19 A sum of US $ 5000 had been given to strengthen clinical activities in Togo (Dr. Schulz-Key, Tübingen), and specifically for the examination of nodules from patients treated with a new formulation of mebendazole at Lomé and in Tamale, Ghana. US $ 20 000 had been given for a study in Ghana of the effect of mebendazole's microfilaricidal action on the posterior segment of the eye (Dr. Taylor, Baltimore).

8.20 The representative of the Federal Republic of Germany said that his Government had initiated a bilateral programme at the National Institute of Hygiene, Lomé, to carry out drug trials, parasitological investigations and mass nodulectomies, and also to encourage the development of a research institute in a Participating Country. Regrettably, the programme was a year behind schedule because of difficulties over the appointment of a national counterpart. The representative of Togo said that the problem had now been overcome and a national counterpart appointed. TDR was carrying out a study of the relationship between bovine and human onchocerciasis at the same institute. The Programme Director emphasized the value to OCP of the spin-off from such bilateral activities.

8.21 The Committee approved the management structure proposed for the chemotherapy project, though one representative felt that its complexity might make rapid decisions impossible. The Director of TDR said that the Working Group's report had been thoroughly discussed in the Special Programme. TDR considered the proposals workable and would gladly accept the responsibilities assigned to it if the JPC so decided. Part of the apparent complexity of the management structure resulted from the spelling out of normal consultation procedures. Decisions and actions could be taken fast, but review by other bodies was necessary for the sake of accountability and evaluation. If experience with B.t. H-14 was a reliable guide, the structure did not prevent a discovery from reaching the stage of operational application in four years. The possibility of conflict referred to by the EAC was highly unlikely and WHO was able to mobilize its staff resources as needed, regardless of the organizational label of a particular expert.

8.22 A representative recalled that the Independent Commission had suggested a special account so that donors outside OCP could contribute specifically for drug development. Another representative considered that such an account might attract badly needed funds; for example, some of the large private foundations might feel free to contribute.

8.23 The World Bank representative advised against setting up a special fund for chemotherapy, though all research activities might be shown in one section of the budget. On the other hand, he endorsed the suggestion of a special account, which could well attract outside funds from entities that did not wish to join OCP. It would certainly not be desirable for members of the JPC to designate their contributions for specific activities, because that would make the selection of priorities meaningless.
9. REPORTS OF BENIN, GHANA AND MALI ON SOCIOECONOMIC DEVELOPMENT: Agenda item 9

9.1 Introducing his country's report (document JPC3.4A), the representative of Benin said that it contained two parts: a list of projects under way in the onchocerciasis-controlled areas in Benin as part of the national development plan; and a description of measures taken for the development of those areas by the unit responsible in the Ministry of Planning. With a view to self-sufficiency in food, agricultural projects were emphasized; other projects concerned village water supply. A number of district and commune health centres were being built with the help of donor countries, and primary health workers had been trained. Two large projects were in progress in the extension zone: the Savé sugar complex and the Onigbolo cement works. The unit responsible in the Ministry of Planning had nearly completed its socioeconomic study of the onchocerciasis-controlled areas, and the results would be available in April 1983. Three pilot zones had been established in which solutions to the problems of remoteness, water supply, health and education were being studied with the participation of the local populations. A draft integrated development plan for these areas had been drawn up, and a meeting of staff of the various departments concerned, with the participation of UNDP and FAO, was being arranged to work out a strategy. He welcomed the appointment of a Chief of the OCP Economic Development Unit. The unit should be given adequate resources to play a part in coordination, training and technical cooperation, and provide a link between Participating Countries and Donors for the financing of development projects.

9.2 The representative of Ghana, introducing his country's report (document JPC3.4B), recalled that a National Onchocerciasis Secretariat was established in 1975 to study the development potential of the onchocerciasis-controlled areas, promote development activities, and serve as a national coordinating body. The main national bodies engaged in socioeconomic development were the Northern Regional Rural Integrated Programme (NORRIP), the Upper Regional Agricultural Development Programme (URADEP), and the Farmers Service Company (FASCOM). If properly developed, the two regions concerned could provide enough food to feed Ghana. The report discussed such necessities as good water, adequate food, health amenities, and education. In connexion with project GHA/80/021 (p. 7 of the report), which had been suspended, he noted that an FAO team had resumed work on the revision of the project document. The report also briefly dealt with Ghana's part of the Southern extension area. Much remained to be done in the onchocerciasis-controlled areas, and Ghana would continue to seek more technical, financial and moral support. In that respect, the OCP Economic Development Unit should foster close cooperation and the exchange of information among countries, and arrange study visits and meetings to discuss common problems.

9.3 The representative of Mali, introducing his country's report (document JPC3.4C), said that work on the constitution of a data bank on the onchocerciasis zone had gone ahead with the completion and analysis of aerial photographs at three different scales. The information generated would focus on four main themes: water courses, cultivable land, forest resources, and soil potential and use. That information was supplemented by surveys carried out by the national unit for development of the onchocerciasis-controlled areas. However, the methodology used was time-consuming, and activities linked to Mali's integrated development strategy had gone ahead. The national unit had initiated a number of small projects at the village level with a view to the rational occupation and use of onchocerciasis-controlled land, particularly in selected pilot zones. For example, each village was being allocated an area of cultivable land, wells fitted with pumps were being installed, and cereal mills were being provided. An interdisciplinary group on the economic development of the controlled areas had been set up. It was proposed to extend the activities undertaken in the pilot villages to the whole onchocerciasis zone. The data bank, once it had been completed, would be helpful in securing sorely needed funds for Mali's programme; the Committee's assistance would be welcome. The Participating Countries would also have difficulty in taking over responsibility for onchocerciasis control unless the international community assisted with the substantial resources necessary, perhaps through national onchocerciasis funds. The OCP Economic Development Unit should be given adequate resources to assist countries with surveys, training, project funding, and so on.
9.4 The JPC congratulated the countries concerned on the progress made in the quality and presentation of the reports. The inclusion of maps was welcomed. In general, the requests made by the Committee in the past were now being met. The item was of increasing importance; since the economic development of the controlled areas was a basic objective of OCP, and attention must be drawn to the progress made in order to ensure support from Donors.

9.5 It was suggested that further guidance should be given on the format of the reports, and that the inclusion of some cost-benefit analysis would be helpful in reviewing the Programme's economic effects. Other speakers believed that any attempt to produce banking documents for the JPC would unduly strain countries' resources; the reports should set out the main lines of countries' activities without going into detail. Cost-benefit studies would in many cases be premature, but it might be possible to attach analyses of particular projects from time to time.

9.6 A representative asked why OCP did not confine itself to control and treatment of the disease, leaving socioeconomic development to other agencies, whether multilateral or bilateral. The Programme Director agreed that, while health and development were inextricably linked, OCP's role lay in control of the disease in order to release the fertile river areas for development by the countries themselves. The purpose of the reports was not to solicit funds, but to report on progress, and countries seeking funds should contact the Donors directly. A meeting would be held to discuss further the format of the reports.

9.7 The representative of the African Development Bank said that the Bank Group had participated in OCP because it saw no other way of achieving the objective of developing the affected areas. The African Development Bank and the African Development Fund were ready to help in pre-investment studies and the financing and implementation of projects. He invited requests for assistance in mature projects in the freed areas.

9.8 The appointment of a Chief for the Economic Development Unit was welcomed. Several speakers commented on the Unit's role and urged that it should be given adequate resources to carry out its work programme. WHO said that the Committee of Sponsoring Agencies was to meet in early 1983 to redefine the Unit's activities and programme. The implementation of EAC's recommendations (document JPC3.3, paragraphs 111-113) would be considered when the Unit's programme was worked out, in consultation with the Participating Countries. While it would do what it could to help countries to exploit the full potential of the controlled areas, development activities as such were beyond the anticipated role of the Unit.

10. PLAN OF ACTION AND BUDGET OF THE PROGRAMME FOR 1983: Agenda item 10

10.1 For the discussion of this item, the Committee had before it the Plan of Action and Budget for 1983 (document JPC3.9) and a summary of 1981 expenditure together with the External Auditor's report (document JPC3.10).

10.2 The budget implementation rate for 1981 came very close to 100% with a total expenditure of US $ 16 646 363 out of an approved budget of US $ 16 653 600.
10.3 Reviewing 1982 expenditure, WHO said that the overall budget of US $ 18.8 million would be implemented to the extent of some 92%; implementation of the core budget would be virtually complete, but there had not been full expenditure on the four additional activities approved at the Committee's previous session (further studies in the Senegal river basin area, chemotherapy research, accelerated larvicide screening, and further work in the Southern extension areas). The internal economy drive had continued. Although the Programme had to buy more insecticide than originally planned but it had benefitted from favourable exchange rates. The funds unspent in 1982 would be carried forward in the Onchocerciasis Fund.

10.4 The budget estimates for 1983 of US $ 17 550 800 provided for the continuation of activities in the present OCP area and for accelerated larvicide screening. The budgets for the proposed Western extension and for chemotherapy research had been submitted separately, while the estimates for the maintenance of the infrastructure and for research studies in the Southern extension area appeared in an addendum to the main budget document and in document JPC3.5 respectively.

10.5 The budget did not include provision for the additional professional staff proposed by the EAC, but the estimates for short-term consultants were considerably increased, particularly for research. Professional administrative posts had been reduced from 10 to 8. There was a small increase in general services posts. The transport fleet had been reduced by 5%, and further reductions were anticipated. The increase of US $ 1.2 million in estimated expenditure on vector control was explained by normal cost increases, additional professional posts, an increase from 7500 to 7700 flying hours to cope with the larger amount of insecticide to be sprayed, higher per diem rates for the general service staff, and a capital expenditure of US $ 200 000 for the construction of a new aerial base at Sara-Kawa (Togo).

10.6 Thus the estimates for a total amount of US $ 22 542 000 were for a core budget, including accelerated larvicide screening, of US $ 17 550 800 (document JPC3.9); US $ 704 100 for maintenance of the infrastructure, ongoing activities and services (document JPC3.9, Addendum) and US $ 200 000 for research (document JPC3.5) in the Southern extension area; US $ 3 450 000 for chemotherapy research (document JPC3.7, Rev.1) and US $ 637 100 for preparatory work on the Western extension (document OCP82.7).

10.7 Projections for the next three years (1983-1985) indicated that expenditure on the core budget together with estimates for maintenance of activities in the Southern extension area would remain within the guiding figure of US $ 115 million for Phase II. However, if the requested amounts for chemotherapy research and for the Western extension were projected over the same period, an additional total of US $ 13 215 600 up to the end of Phase II would be required.

10.8 The Committee noted that operational activities accounted for an increasing proportion of the budget estimates, reflecting an action-oriented approach, and that appropriate action had been taken in response to the External Auditor's comments.

10.9 A representative suggested that the budget tables should include a column for actual as well as approved expenditure for the previous year, with an explanation of divergences. WHO explained that the increase in actual as opposed to approved expenditure on operations and maintenance in 1981 was the result of an underestimate when the figures were prepared.
10.10 In answer to questions, WHO said that the proposed increase in building costs for vector control (Table IV) was accounted for by a one-time provision of US $ 200 000 for the construction of a new aerial hanger at Sara-Kawa (Togo) as part of the transfer of the operational base from Tamale. The figure included architect's fees, the provision of water and electricity, and the construction of the hanger itself.

10.11 There were historical reasons for the differences from year to year in the figures for insecticides. Adequate stocks of temephos and chlorphoxim for 1982 and 1983 remained from previous orders, partly as a result of changes in the insecticides used following the appearance of resistance, and only Teknar would have to be bought in 1983. Expenditure would go up considerably in 1984 and 1985 when all stocks had to be replenished. The figures related only to insecticides to be used in the present OCP area. Regular monitoring showed that the stored temephos and chlorphoxim was retaining its full effectiveness.

10.12 With regard to the External Auditor's comment on procedures for accounting for stocks of insecticide (document JPC3.10), WHO explained that fuel and insecticide were kept in 140 caches throughout the OCP area, as both helicopters and fixed-wing aircraft when on treatment mission had to land to reload every two hours. On each mission a pilot flew he recorded both the duration of flight and the amount of insecticide released. Each time he landed he recorded the amount of fuel and insecticide taken and the amount left. Records were kept at Ouagadougou and at each aerial operation base and the inventory was updated each month. However, the task was complex; some 300 000 litres of insecticide, delivered in drums of 55 litres (temephos and chlorphoxim) or 20 litres (Teknar), were used by OCP each year.

10.13 A representative asked how the Epidemiological Evaluation Unit would study the other diseases associated with onchocerciasis or other public health problems (Plan of Action, p. 8) and how much time and money would be devoted to them. WHO replied that provision had been made for such studies to be undertaken in the course of the epidemiological surveillance and research activities.

10.14 In answer to a question, WHO said that a pilot scheme for the teletransmission of hydrometric data would be undertaken so that spraying could be based on up-to-date readings of the water level; this would mean that the quantity of larvicide needed could be calculated more precisely, the dangers of under- or over-treating could be avoided, and unnecessary flights and treatments could be eliminated, with consequent savings. The computer storage and analysis of aerial operations data was proving necessary because of the mass of information accumulated and the frequent requests for management information.

11. FINANCING OF THE ONCHOCERCIASIS CONTROL PROGRAMME: Agenda item 11

11.1 For the discussion of this item, a table summarizing Phase II past expenditure and future budget requirements up to the end of that Phase (1985) was circulated.

11.2 The representative of the World Bank, commenting on the shortfall in pledges to cover operations until the end of Phase II, indicated that in order to finance the regular OCP budget for the next three years an additional US $ 7.5 million in pledges would be required. The proposed chemotherapy activities would require a further US $ 10.5 million. An additional total in excess of US $ 18 million would therefore be needed before the start of activities in the Southern and Western extension areas could be contemplated. The Bank would none the less be ready to agree in principle to the extensions. The Bank itself would increase its contributions from US $ 2 million to US $ 2.5 million in each of the three remaining years in Phase II.
11.3 The representative of Kuwait said that Kuwait would contribute US $ 6 million for the second phase. It would also consider contributing a share of the additional cost of drug and larvicide development and the proposed extensions proportionate to its share in the total cost of Phase II.

11.4 The United Kingdom representative said that, subject to parliamentary approval, his Government would raise its contribution to £500 000 in 1983, and as much or a little more in 1984 and 1985; that represented a total additional contribution of about US $ 1 million for Phase II, to assist the Programme in securing its present position and in advancing according to the agreed priorities.

11.5 The representative of the Netherlands recalled that his country had already disbursed 75% of its pledge of 27 million of Dutch guilders for Phase II, the remaining 25% to be paid in 1983. Agreeing to the priorities as established by the EAC he stressed the major funding effort that would be required to protect present achievements and requested further efforts on the part of the World Bank to broaden the donor community supporting the Programme. The Netherlands would wish to discuss the long-term financing before the fifth session of the JPC in 1984 and would welcome a detailed plan for devolution.

11.6 The representative of the United States of America said his country would pay its pledged contribution of US $ 2 million for 1983 and would increase it by an additional US $ 500 000 bringing its total 1983 contribution to US $ 2.5 million. Subject to the availability of funds his country proposes to sustain its support at this new level.

11.7 The representative of France informed the Committee that his country would continue to contribute FF 5 million a year during Phase II. While supporting the Western extension in principle his country felt it essential that every effort be made to secure the present success.

11.8 The representative of the Federal Republic of Germany said that his country would provide a further DM 2.5 million in 1983 to support activities according to the priorities recommended by EAC. He was in favour of extension of the OCP area once the necessary conditions had been met and the required funds were available.

11.9 The representative of Canada was prepared to accept the principle of a Western extension, within the priorities determined; however, she stressed the need for a study of the long-term financing of the Programme. Canada would, in addition to its Can.$ 6 million commitment to Phase II, endeavour to include annually the special additional contribution of Can.$ 200 000 it had made in 1982, subject to parliamentary approval.

11.10 The representative of Saudi Arabia said that since JPC's second session his country had pledged a new donation of US $ 10 million, to be paid in instalments of US $ 2 million over the five years beginning in 1982; thus US $ 8 million would be paid during Phase II and the balance in the third phase, if approved. The donation was for present operations and the additional priorities identified by EAC.

11.11 The Belgian representative said that her country's contribution in 1982 would be 25 million Belgian francs, a 10% increase over 1981; it hoped to make further slight increases in the remainder of Phase II.
11.12 The representative of the African Development Bank said that ADB would continue to contribute US $300,000 a year during the remainder of the second phase. It would also act as a funding source (of last resort) for economic development projects in onchocerciasis-controlled areas.

11.13 The UNDP representative, expressing support for further research on larvicides and chemotherapy and for the Southern and Western extensions, confirmed UNDP's contribution of US $3 million for Phase II, which it proposed to increase by some 20%.

11.14 The representative of Switzerland supported the priority activities identified by EAC, including the principle of a Western extension with limited activities in the proposed area in the coming three years. Subject to parliamentary approval, Switzerland would continue to contribute within its pledge of Sw.Fr. 12 million for Phase II; it would also contribute a further Sw.Fr. 3 million for the additional activities.

11.15 WHO, reporting on the status of contributions from Participating Countries, said that all outstanding contributions for 1980 had been paid, for 1981 one country had still to pay 35% of its contribution, and four countries had yet to pay for 1982. However, one country's contribution had been transferred elsewhere and attempts were made to redirect it to the Programme.

11.16 The World Bank representative thanked contributors for their generous response; he estimated the additional funding pledged at some US $9.5 million for Phase II. That was sufficient to start work on chemotherapy research but not on the extensions. Assuming that the JPC approved the proposed budget, the Bank would seek further funds to close the gap in the funding for chemotherapy research and to begin preliminary work on the extensions.

11.17 In answer to questions, the World Bank representative agreed that a comprehensive picture of OCP's estimated medium- and long-term costs was needed. It might prove possible to separate certain programme components for bilateral assistance or external contributions. He invited suggestions as to possible donor countries or institutions.

12. CONCLUSIONS AND DECISIONS

12.1 At the conclusion of its discussions, the JPC reached the following consensus:

(1) The JPC shares the view expressed in the budget of the Programme concerning the importance of accelerated research on larvicides.

(2) The JPC also recognizes the key importance of developing drugs to supplement larviciding. It accordingly approves the implementation of the proposed chemotherapy programme during Phase II, even though its funding is not yet fully assured, since the limited reserves at present available are adequate to justify such risk-taking.
The JPC recognizes the importance of both the Western and the Southern extensions and acknowledges them to be highly justified. However, shortage of funds, the need to strengthen the Programme and certain constraints preclude simultaneous launching of all the required activities in the present phase. The JPC agrees that top priority should be given to the funding needed for the completion of Phase II before devoting funds to chemotherapy and to the extensions. The JPC reaffirms its agreement with the principle of the Southern extension but recognizes that its implementation can hardly be embarked upon before the end of Phase II. It gives its endorsement to the principle of the Western extension. However, the putting into effect of this extension is closely dependent on a number of factors, in particular:

(i) its technical feasibility;
(ii) the availability of financial and human resources with which to strengthen the Programme;
(iii) the working out of a long-term strategy for the Programme.

It would therefore seem difficult to contemplate undertaking these extensions before the completion of Phase II.

The Bank is requested to intensify its fund-raising efforts so as to enable it to finance, should the occasion arise, the preparatory work for these extensions and allow them to be put into effect immediately when the time is ripe.

So as to assist the Bank in raising the necessary funds for the execution of Phase III, the JPC also requests that the Programme draw up a long-term financial forecast for the Programme as a whole, taking into account devolution in protected areas and extensions into new areas.

Finally, the JPC approves the financial provisions set forth in the budget documents.

13. DATE AND PLACE OF THE COMMITTEE'S FOURTH SESSION

The Committee accepted with gratitude the invitation of the Government of France to hold its fourth session in Paris in early December 1983.

14. CLOSURE OF THE SESSION: Agenda item 13

Participants expressed their appreciation to the Chairman for the outstanding manner in which he had conducted the meeting, and to the Government and people of Mali for their hospitality.
14.2 In his closing remarks, the Chairman said that the session had been marked by a determination, in the face of limited resources, to protect and consolidate the Programme's achievements so far. The Committee's decisions as to priorities reflected, at the same time, its concern for complete success in the future. He congratulated the various partners in OCP and the Programme Director on their effective collaboration in a remarkable cooperative endeavour.

14.3 The Chairman declared closed the third session of the Joint Programme Committee.

15. FIELD TRIP TO SELINGUE DAM

15.1 On Monday, 6 December, participants had an opportunity to visit Sélingué, where they were shown round the health centre and dam, and saw a demonstration of insecticiding by fixed-wing aircraft and helicopter.
AGENDA

1. Opening of the session
2. Election of officers
3. Adoption of the agenda
5. Report of the Expert Advisory Committee
6. Accelerated research programme on blackfly larvicides
7. Extensions:
   - Additional studies in the Southern extension zone
   - Proposals for a Western extension
8. Onchocerciasis Chemotherapy Project
9. Reports of Benin, Ghana and Mali on socioeconomic development
10. Plan of Action and Budget of the Programme for 1983
11. Financing of the Onchocerciasis Control Programme
12. Other matters
13. Closure of the third session
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Inter-state Permanent Committee for Drought Control in the Sahel (CILSS)

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Conseiller OMS, Programme Eau-Santé-Nutrition, Institut du Sahel, Bamako
### ONCHOCERCIASIS FUND

**JANUARY 1, 1974 TO SEPTEMBER 30, 1982**

(expressed in millions of US dollars)

<table>
<thead>
<tr>
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<tr>
<td><strong>Contributions:</strong></td>
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<tr>
<td>African Development Bank</td>
<td>1.1</td>
<td>1.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Belgium</td>
<td>2.4/L</td>
<td>1.1/2/L</td>
<td>3.5</td>
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<tr>
<td>Canada</td>
<td>3.3</td>
<td>2.4</td>
<td>5.7</td>
</tr>
<tr>
<td>France</td>
<td>5.8</td>
<td>2.6/L</td>
<td>7.8</td>
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<td>Germany, Federal Republic of</td>
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<td>2.8/L</td>
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<tr>
<td>Iraq</td>
<td>0.05</td>
<td>-</td>
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<tr>
<td>Italy</td>
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<td>-4/L</td>
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<tr>
<td>Ivory Coast</td>
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<tr>
<td>Japan</td>
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<td>Netherlands</td>
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<td>6.3/L</td>
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<td>Norway</td>
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<tr>
<td>OPEC Fund for International Development</td>
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<td>Al Sabah Foundation</td>
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<td>Saudi Arabia</td>
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<td>1.7/L</td>
<td>5.0</td>
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<tr>
<td>Switzerland</td>
<td>-</td>
<td>4.5</td>
<td>4.5</td>
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<tr>
<td>United Kingdom of Great Britain and Northern Ireland</td>
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<td>1.6</td>
<td>7.2</td>
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<tr>
<td>UNDP</td>
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<td>United States of America</td>
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<td>13.7</td>
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<td>World Bank</td>
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<tr>
<td><strong>Sub-Total</strong></td>
<td>62.0</td>
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<td>109.7</td>
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<td><strong>Income from investment</strong></td>
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<td>4.8</td>
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<td><strong>Total</strong></td>
<td>63.5</td>
<td>52.5</td>
<td>116.0</td>
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**DISBURSEMENTS**

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<td>Advances to WHO</td>
<td>56.2/L</td>
<td>46.0</td>
<td>102.2</td>
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<td>Balance carried forward</td>
<td>7.3</td>
<td>6.5</td>
<td>13.8</td>
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</table>

/1 A portion of this amount was received in 1980
/2 1980 contribution received in 1981; 1981 received in 1982
/3 Includes US$ 4 million for first quarter of 1980
/4 Further contribution for 1982 received or to be received after 30 September 1982
/5 UNDP previous contribution through projects directly executed by WHO
US$ 2.0 million (1973-78)