



Rail Maintenance
Central Asia: Infrastructure
**Project Completion
Report**
March 1998

PROJECT COMPLETION REPORT

Project Title:	TRACECA Rail Maintenance Central Asia: Infrastructure 2		
Project Number:	TNREG 9310		
Country:	Kazakstan, Turkmenistan, Kyrgyzstan, Tadjikistan, Uzbekistan		
Local operator:	Ministry of Transport and Communication of the Republic of Kazakstan, State Railway Companies of Turkmenistan, Kyrgyzstan, Tadjikistan, Uzbekistan		
	Main local partner	EC Consultant	
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Signatures:			

Date of report : March 1998

Reporting period : January 1997 - July 1997
and Completion Period until March 1998

Author of report : B. Draper, Dept. Team Leader
F. Prescha, Project Manager

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This project is financed by the European Union's Tacis Programme, which provides grant finance for know-how to foster the development of market economies and democratic societies in the New Independent States and Mongolia.

1. PROJECT SYNOPSIS

Project Title:	TRACECA Rail Maintenance Central Asia: Infrastructure 2
Project Number:	TNREG 9310
Country:	Kazakstan, Turkmenistan, Kyrgyzstan, Tadjikistan, Uzbekistan

- PROJECT OBJECTIVE[S]:
- A: Conduct a feasibility study for the upgrading of the Aktau - Bejneu line in Kazakstan.
 - B: Conduct a survey of existing conditions for freight and passenger traffic, make recommendations to improve overall service quality on TRACECA rail corridor. Train selected senior staff in Western Europe.
 - C: Conduct a feasibility study for the development of the Amudarya road and rail crossing at Chardzhev in Turkmenistan.

- PLANNED OUTPUTS:
- A: Feasibility study for rehabilitation of Aktau-Bejneu railway line in Kazakstan produced
 - B: Proposals for improvements in rail passenger and freight traffic in five countries produced; representatives from seven railway administrations trained in Western Europe
 - C: Feasibility study for rehabilitation, rebuilding or new construction of rail or combined road/rail bridge at Chardzhev in Turkmenistan produced
- Equipment to a total value of 240,000 ECU purchased and distributed to project beneficiaries



PROJECT ACTIVITIES:

- A: Preparation of feasibility study for rehabilitation of Aktau - Bejneu railway line in Kazakstan including following activities:
- production of traffic forecast
 - evaluation of technical feasibility
 - evaluation of economic and financial feasibility
 - further selection criteria and ranking of alternatives
 - initial engineering design
- B: Production of proposals for improvements in rail passenger and freight traffic services in five countries including following activities:
- examination of existing conditions in freight and passenger traffic
 - study visit to Western Europe
 - recommendations to improve freight and passenger transport
 - overview about railway infrastructure state and recommendations for improvement (with emphasis on permanent way and signalling and telecommunication)
- C: Production of feasibility study for rehabilitation, rebuilding or new construction of a rail or combined road/rail bridge at Chardzhev in Turkmenistan including following activities:
- traffic and revenue forecast
 - inspection of existing bridge and potential for refurbishment
 - review of existing feasibility study
 - economic analysis and recommendations
 - preparation of preliminary design documents

PROJECT STARTING DATE: 22nd March, 1996

PLANNED PROJECT DURATION: *12 months, to March 1997
Extension for 4 months, to July 1997
Completion of Module C (financial evaluation only) and activities on procurement of equipment until submission of this Report*



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PROJECT COMPLETION REPORT

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2 Summary of Project Progress since the Start of the Project

The study is divided into three modules:

Module A	Aktau-Mangyshlak-Bejneu Line
Module B	Improvement of Freight and Passenger Traffic
Module C	Feasibility Study for Chardzhev Bridge

The initial research was carried out by local partners from May 1996 onwards. The expert team then visited the countries involved during the period from late August 1996 to the end of November 1996, and a follow-up visit was made by some members of the team in May 1997. During these periods of stay in Central Asia the experts worked alongside the local partners and counterparts on-site in Aktau, Mangyshlak and Bejneu for Module A and in Chardzhev for Module C. As part of Module B visits were made to all five countries involved.

An Inception Report was produced in June 1996 followed by a Progress Report in November 1996 and the Draft Final Reports were then sent out in July 1997.

At the request of the Co-ordinating Unit additional material connected with the economic and financial appraisal for Module C was delivered in November 1997.

As part of Module B of the project a study visit was arranged to Germany and Austria in March 1997 to allow selected staff of the Railways concerned to gain an insight into the workings of Western European Railways. The selection procedure was made by the Railways covered under Module B.

A further activity under Module B was the procurement of equipment. The Consultant, in collaboration with Tacis and the individual Railways, has been involved in the delivery of equipment consisting mainly of computer hardware and specialised railway gear. Due to logistical difficulties this part of Module B is still on-going.

Sections 3 and 4 of this report go into more detail on the activities described above.



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3 Project Progress in the Final Project Period

The project was divided into three modules, to run concurrently. The reporting period consists of the Phases 4 - 6 of the project performance defined in the Interim Report:

Phase 4 of the Project

Examination of problems found and development of proposals and solutions (already started until submission of the Progress Report)

Phase 5 of the Project comprised the Study Tour to Western Europe for selected railway managers from the Project countries.

Phase 6 of the Project was the completion of Module B including a last field visit of the experts to the Study region. Phase 6 also involved the completion of all recommendations concerning the Aktau - Bejneu line for Module A and the Chardzhev Bridge in Module C and the production of the Draft Final Reports.

The date of expiry of the project has been postponed by Side Letter N° 3 of 17 March 1997. The reasons were as reported in the previous reports:

- problems in local support and the need to find local partners for the investigation of Chardzhev bridge in Turkmenistan during the Project implementation stage leading to overall postponement of work under Module C,
- problems in nomination of study tour participants leading to the necessity of shifting the Study visit from November 1996 to March 1997.

The progress made in the final project stage within the context of each of the three modules as well as the overall project performance is described as follows:

3.1 Module A: Upgrading of Aktau-Bejneu Rail Line

During the period covered by this report, one field visit was made to Kazakstan by the Investment Planner of the Project Team in April-May 1997.

In home office work the Work Packages (WP) as follows were completed:

WP 1130	Calculation of traffic volume
WP 1230	Identification of bottlenecks, definition of upgrading strategies
WP 1240	Definition of volume and repair of reconstruction works
WP 1250	Description of proposed works
WP 1340	Economic profitability
WP 1350	Financial profitability
WP 1420	Ranking of alternatives and recommendations
WP 1530	Financing strategy and programme
WP 1540	Proposal and recommendations for the upgrading programme



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The results of the technical and economic investigations were presented to the Ministry of Transport and Communication of the Republic of Kazakstan in Almaty in the end of May:

Therefore the conference TRANSEURASIA 1997 on 22/23 May 1997 in Almaty was used to present the results of Module A as well as general suggestions of the consultant on rail infrastructure financing to Vice-Minister Mr Muhamedzhanov, who agreed with the principal results.

A further presentation took place with the Head of the Railway Department of the Ministry for Transport and Communication, Mr Segal. He principally agreed with the results of the work on Module A. In his opinion the given optimistic scenario for freight traffic development will be realistic. He is looking for a strong increase of petrol transport on the line by rail. Other future sources of traffic will be the Aktau port development, especially in case of re-installation of a ferry line Aktau - Baku which will be very interesting for Kazak exports to Southern Europe and Northern Africa (via Poti), as well as the creation of the North-South-corridor.

It was stated that the railways will not be able to finance the necessary works for upgrading the line without state or private aid. But for the state the main directions of investment will not be in the West of Kazakstan: The main focus will be the electrification of the Tchu - Almaty - Sary-Ozek section as well as the upgrading of the rail connection between Almaty and the future capital Akmola. The Kazak MOT and the Railways place their hopes in the participation of private investment in the upgrading of the Aktau - Bejneu line, especially in the oil companies.

The Draft Final Report - English version - was submitted by July 11, 1997. The Russian version was submitted by August 20, 1997. Both reports were sent to TACIS in Almaty, to the TRACECA co-ordinating office in Tashkent, to the local sub-contractor Kazgiprozheldortrans and direct to the Ministry of Transport /Russian version/).

3.2 Module B: Proposals and Training to Improve Freight and Passenger Traffic on TRACECA route (Kazakstan, Kyrgyzstan, Uzbekistan, Turkmenistan and Tadjikistan)

In this Module main emphasis was given on the organisation and performance of the Study Visit of railway managers to Europe as well as to the second round-region trip of the expatriate experts.

Thus, work on the following Work Packages (WP) was undertaken and completed:

- WP 2210 Development of study visit programme
- WP 2220 Preparation and performance of study visit
- WP 2310-30 Recommendations to improve freight and passenger transport

3.2.1 Study Visit

As proposed by the Consultant in the Inception and Progress Reports from political and professional points of view the number of participants was extended from eight to eleven people



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within the total framework of the project budget. This allowed the inclusion of two experts from Kyrgyzstan, Tadjikistan, Turkmenistan and Uzbekistan plus three experts from Kazakstan, having the largest railway network in the area. This approach was supported by the local railway administrations as well as by the TACIS co-ordinating units and finally approved by the Task Manager.

List of railway managers participating in the study visit

1	Mrs Amantchina, S. Ye.	Kazakstan, former Almaty Railway	Tariff and International Traffic Expert in Financial and Economic Department
2	Mr Badambayev, T. T.	Kazakstan, former Almaty Railway	Head of Technical Division in the Operational Department
3	Mr Galper, S. M.	Kyrgyzstan	Head of Wagon Depot
4	Mr Gubatchev, V. A.	Uzbekistan	Deputy Head of International Relations Department
5	Mr Khoudaiberdyev, E.	Tadjikistan	Head of International Traffic Department
6	Mr Mamadjanov, I.	Tadjikistan	Deputy Chief of Container Transport Department
7	Mr Mamedov, M. M.	Turkmenistan	Deputy Head of Operational Department
8	Mr Mirmakhmudov, T. Kh.	Uzbekistan	Deputy Head of Freight Traffic and Commercial Department
9	Mr Sakhatov, A. Tch.	Turkmenistan	Head of Passenger Station Ashgabat
10	Mr Salikov, M. A.	Kazakstan, former Tselinaya Railway	Deputy Head of Freight Traffic and Commercial Department
11	Mr Zubov, N. I.	Kyrgyzstan	Deputy Head of Operational Department

In general the nomination of the study visit participants by the recipients proved to be an extremely difficult procedure. The very late nomination as well as different problems concerning the permission to leave the country and the obtaining of the visas caused a delay of the study visit to March 1997. These were the reasons for the absence of the Kazak Tselinaya Railway (replaced by a second trainee from the Almaty Railway).

The study visit took place in the period between March 9 and March 22, 1997.

The first week the trainees were familiarised with the experience of German Railways (March 9 till March 15). Lectures and visits were organised at the Railways Headquarters in Frankfurt-am-Main and Mainz, at DE-Consult's Headquarters in Frankfurt-on-Main as well as at different railway facilities in Frankfurt-am-Main and Munich.

The second week the trainees were acquainted with the experience of Austrian Railways (March 17 till March 21). Lectures were organised mainly in the ÖBB railway training centre in Bad Voeslau near Vienna. A wide number of excursions to different railway facilities in Vienna, the Vienna outskirts as well as in Wels and Salzburg took place.

The team of lecturers included high-staff managers and experts from the Joint Stock Company German Railway (DB AG) and from the Austrian Federal Railways (ÖBB), as well as managers and experts of the consultants' companies. For the detailed programme of the study visit see Draft Final Report on Module B.



3.2.2 Railway Infrastructure Survey

In accordance with the Terms of Reference and the Work Plan contained in the Inception and Progress Reports, it was planned to conduct a final mission of the experts formerly involved in Module B to the investigation area. The target of this mission would be the completion and discussion of the prepared recommendations for improvement of both freight and passenger traffic on the TRACECA route. It was scheduled to organise this trip after the Study tour of the local experts in Europe.

As a result of a discussion with the EC Task Manager and the TRACECA Co-ordination Team at the end of February 1997 the consultant was asked to change the approach of the final mission within the framework of Module B.

In accordance with these requirements the mission was carried out with a strong technical and infrastructure orientation instead of the earlier planned commercial and operational orientation. This was done to avoid overlapping between several other TRACECA projects and to give a general overview of the state of the railway infrastructure in the whole Central Asian area.

The team of experts executing the infrastructure assessment and analysis mission under Module B consisted of:

Mr Frank Prescha	Leader of the group of experts and general railway operation and infrastructure expert,
Mr Michael Wogowitsch	Permanent Way Expert,
Mr Jean-Michel Bertruc	Signalling/Telecom Expert.

Thus, this team carried out the final part of Module B instead of the commercial, management and operation experts (Messrs Draper, Hassmann and Rabouel). Since Mr Bertruc was not member of the Team of Experts initially approved by the contract he was accepted by the EU Contracting Unit with Side Letter N° 4 of 22 May 1997 as replacement to Mr Rabouel.

Taking into consideration the limited time available, the team concentrated its efforts on the main equipment and facilities available for maintenance and repair of equipment in their respective specialities, with recommendations for improvements in organisation and/or purchase of tools and equipment. To obtain a full overall picture about the state of the infrastructure in the Central Asian TRACECA countries, the team of experts has included in its assessments and estimations further fields of railway infrastructure such as electrification, incl. power supply, bridges and superstructures.

The investigations were based on site visits and technical discussions with local executives for telecommunications, signalling and electrification maintenance as well as for permanent way, bridges and civil engineering in the four countries visited:

- Kyrgyzstan from 13th to 17th of May 1997 - Bishkek,
- Kazakstan on 12th and from 18th to 24th of May - Almaty,
- Uzbekistan from 25th to 31st of May - Tashkent,
- Turkmenistan from 1st to 7th of June - Ashgabat.



Unfortunately, it was not possible to organise a visit to Tadjikistan for the whole of the experts' team during the limited time of the field mission. A meeting between the leader of the group of experts and the railway executives responsible for signalling and telecommunication, as well as for the infrastructure maintenance department took place at Khodzhen (main station on the Fergana valley North corridor) which gave necessary information about their network, especially about the Fergana valley corridor.

The experts' work on site was prepared and supported by local institutes involved in Module B:

- for Kazakstan the Kazgiprozheldortrans Institute of Almaty,
- for Kyrgyzstan the scientific and research company NPO Kyrgyzdortranstechnika of Bishkek,
- for Uzbekistan the company Techvneshtans, Tashkent branch,
- for Turkmenistan the Turkmenistan Railway's Project and Design Institute "Turkmenzhel dorproject" of Ashgabat.

The above-mentioned local partners were responsible for the provision of basic information (on the basis of earlier prepared questionnaires) for the expatriate experts and were also involved in the logistical organisation of the meetings with the railway executives. They further undertook the organisation of on-site inspections of railway facilities (stations, tracks, signal boxes, CTC centres, permanent way workshops, workshops for maintenance of signalling and telecommunication equipment as well as track machines, local departments for track maintenance and signalling/telecommunication).

The findings of the experts as well as the first conclusions and recommendations were discussed with the higher railway management:

- in Kyrgyzstan with the Head of the Railway, the Chief engineer as well as the heads of the technical departments,
- in Uzbekistan with the International department responsible for the TRACECA projects as well as heads of technical departments,
- in Turkmenistan with the Head of the Railway, the Deputy Chief engineer as well as all the heads of the technical and operational departments,
- in Kazakstan the heads of the Kazgiprozheldortrans Institute as well as representatives of technical departments.

The Draft Final Report - English version - was submitted by July 10, 1997. The Russian version was submitted by September 23, 1997. Both reports were sent to the TACIS Co-ordinating Units of all five countries involved as well as to the TRACECA co-ordinating office in Tashkent.

3.2.3 Purchase of Equipment

Already in the Inception Report, the Consultant made proposals for the disbursement of the 240,000 ECU equipment budget. These proposals took into consideration the political situation in



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the region and the particularly 'delicate' relations between the countries by splitting the amount between the countries involved in the project proportional to their involvement in the project.

The proposed proportions were as follows:

Kazakstan	40 %	=	96,000 ECU
Turkmenistan	40 %	=	96,000 ECU
Uzbekistan, Kyrgyzstan, Tadjikistan	6.7 % each	=	16,000 ECU each

The Consultant had received no official comments or suggestions on these proposals from the EU in the period until the submission of the Progress Report. On the contrary, the Consultant was confronted with proposals to concentrate the budget on a small number of measures of benefit to one or two countries only.

Taking into consideration the limited amount of the budget, procurement of heavy technical equipment such as locomotives, coaches, track maintenance machines, etc. was impossible.

Only in February 1997 the Consultant was able to start the preparation of the equipment purchase. An agreed strategy with the local beneficiaries of the project could be found only in the time during and after the last field mission of the Project Manager in May/June 1997. Thus, the (partly not specified) procurement ideas could be presented for approval to the EC Task Manager only in the end of June 1997.

In summary the results of the discussions with the recipients were as follows:

Country	Total amount (ECU)	to be spent on
Kazakstan	96,000	<ul style="list-style-type: none"> • computer equipment for improvement of railway infrastructure planning, • engineering copy equipment, • rail maintenance equipment
Turkmenistan	96,000	<ul style="list-style-type: none"> • devices and equipment for instrumental observance and measurements on railway bridges
Kyrgyzstan	16,000	<ul style="list-style-type: none"> • computer equipment for improvement of freight traffic operation
Tadjikistan	16,000	<ul style="list-style-type: none"> • computer equipment for improvement of freight traffic operation and infrastructure maintenance
Uzbekistan	16,000	<ul style="list-style-type: none"> • computer equipment for improvement of freight traffic operation

The approval for the defined equipment was received from the European Commission beginning of July 1997.



After the discussions with the Railways Representatives the Consultant collected offers from different potential suppliers for already clear defined equipment. Furthermore the evaluation of offers for Kazakstan, Uzbekistan, Kyrgystan and Tadjikistan were sent to the European Commission for approval. Until end of October 1997 approvals were received from the European Commission for Kazakstan, Uzbekistan and Kyrgystan. The receipt of this approvals was precondition for the Consultant for contract negotiations with the selected supplier.

At the end of June 1997 the Consultant asked the European Commission to approve the prolongation of the project period in order to complete the procurement process.

Between the end of October 1997 and February 1998 further correspondence was made between the Railways Representatives, Suppliers and the Consultant in order to solve still open items. Due to slow decision making in the Railways and telecommunications problems not all open items could be solved.

At the beginning of May 1998 the Consultant sent the evaluation result for parts to be purchased for the Turkmen Railway to the European Commission for approval. Furthermore an enquiry for a still outstanding approval for Tadjikistan was sent to the European Commission. These approvals are presently still outstanding and under review.

At present the procurement procedure has the following status:

Kazakstan:	Main parts of the required equipment were ordered in January 1998.
Uzbekistan:	The Consultant is in contract negotiations with the selected supplier.
Kyrgystan:	Required equipment were ordered in May 1998; Prepayment is outstanding to the supplier.
Tadjikistan:	Approval of the selected supplier from the European Commission is outstanding.
Turkmenistan:	Approval for a parts of the equipment from the European Commission is outstanding; Further information from the Turkmen Railway are outstanding.

The further procurement procedure is pending, awaiting further information from the European Commission. We will report further on this activity when it is completed.

3.3 Module C: Feasibility Study for Chardzhev Bridge

During the period covered by this report, two field visits were made to Turkmenistan:

- by the Transport Economist to Ashgabat and Chardzhev in March 1997
- by the Investment Planner to Ashgabat in April-May 1997

Thus, work on the following Work Packages (WP) was undertaken and completed:

WP 3120	Forecast of demand
WP 3130	Forecast of revenue
WP 3310-20	Review of existing feasibility study



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WP 3420	Definition of operating costs
WP 3430	Cost-benefit analysis
WP 3440	Financing strategies, financial development plan
WP 3450	Recommendations for implementation
WP 3500	Preparation of preliminary design documents

During the visit of the Transport Economist approach and results of the demand and revenue forecast were discussed with the Turkmen Railway (TDDY), the local planning institutes and authorities in Chardzhev as well as with the Transport Department at the Cabinet of Ministers and principally approved.

During the Final visit of the Project Manager under Module B (as described above) the railway authorities were informed about the conclusions on Module C, especially concerning the state of the existing railway bridge. The technical results of the common bridge inspection of the Consultant's Bridge Expert, Mr Brandstetter with the local experts were fully supported by the responsible bridge maintenance and construction unit of Turkmenistan (Turkmentransmost). In the centre of the discussion were questions concerning the short and medium term measures for the life extension of the bridge (inspections, corrosion protection, train length and weight restrictions). Additional questions of the Head of the Railway concerning dismantling of existing high voltage line and necessary operational restrictions on the bridge were answered and included as Annex J to the Draft Final Report.

The Draft Final Report - English version - was submitted by July 18, 1997. The Russian version was submitted by October 6, 1997. In the time between the submission of these reports the Consultant was asked by the TRACECA Co-ordinating Unit to solve several issues in order to allow further implementation actions. In the beginning of September 1997 these questions were partly answered by the Consultant changing inter alia chapters 5.3.4 of the Draft Final Report concerning estimation of IRR and cash flow effects for road and rail bridges. These changes were already included in the Russian version of the Draft Final Report.

In order to solve additional requirements of the TRACECA Co-ordinating Unit and to eliminate some minor mistakes in the Annexes of the Draft Final Report a Supplement to the Draft Final Report was issued on November 18, 1997 (Russian version on December 18, 1997) containing new version of the Chapters 5.2 (Operating Costs) and 5.3 (Cost-Benefit-Analysis) including actualised financial calculation tables as Annexes.

All mentioned reports and Supplements were sent to the TACIS Co-ordinating Unit in Ashgabat, to the Turkmen Railways and/or Turkmentransmost as well as to the TRACECA co-ordinating office in Tashkent.

The main analysis of the above-mentioned supplement was the separation of costs for road and rail traffic and an estimation of revenues based on the traffic prognoses.



4 Overall Report on the Total Project

The three modules which made up the project were each distinct from one another and therefore are treated separately below.

4.1 Module A: Aktau-Mangyshlak-Bejneu Line

The study comprised both technical and economic evaluations of the Aktau-Bejneu route and the following were the principal findings:

4.1.1 Future Regional Economic Activity and Future Traffic Levels

The prognoses foresee an approximate increase from a present level of 2 million tonnes of freight to between 8.1 million tonnes and 14.2 million tonnes by the year 2005, depending on the actual level of economic activity. At the same time, the demand for passenger traffic will grow from the present two train pairs per day to a future three pairs.

The expected level of future economic activity in the region clearly has a major impact on the expected level of traffic on the route. However, the majority of plans for investment to secure such future activity are projected by the Government rather than private industrial investors and this aspect must therefore be considered to have a high degree of risk associated with it. This is particularly the case for those projected investments which date from the time prior to the break-up of the USSR.

There is therefore some uncertainty in attempting to project future economic activity in an environment such as that in Kazakstan, because of the above factors and also because of the limited experience of market economic processes.

4.1.2 Physical Condition of the Rail Route

The surveys undertaken by the Consultant show that there is a serious backlog of infrastructure maintenance which results in the imposition of many temporary speed restrictions; investment is required to restore the line to good condition thereby eliminating these restrictions. This elimination in itself will lead to an increase in line capacity.

The signalling system is generally in good condition and functions satisfactorily. However, the poor availability of suitable spare parts is a cause for concern and dictates that replacement by a new system using standard components will be required in the medium term.

As with the signalling system, the telecommunications network is generally in good condition, but suffers from obsolescence, and will need to be replaced by a modernised system in the medium term. This will also affect installations outside the strict confines of the rail route, since there is extensive communication with headquarters in Atyrau and Aktyubinsk.



The locomotive fleet is obsolescent and, though generally in good condition, a programme to re-engine the units is proposed. Passenger rolling stock is generally in good condition but suffers from inadequate maintenance facilities. In the case of both locomotives and carriages, there is a shortage of suitable spare parts and tools which needs to be addressed.

4.1.3 Route Capacity in Relation to Traffic Forecasts

The route is technically capable of accommodating all traffic levels up to and including the most optimistic scenario without any further investment. However, there is a steady deterioration in the technical condition of the route, particularly its infrastructure, and this deterioration can be expected to accelerate over the next few years. Assuming that the remedial measures for infrastructure are implemented, the other measures required are in anticipation of future problems rather than in response to existing difficulties.

No requirement is considered necessary for investments in such measures as electrification, track doubling or new construction in order to meet future traffic demand up to 2005.

4.1.4 Organisation

A major obstacle to the smooth operation of freight and passenger trains between the Port of Aktau and the junction station of Bejneu is the fact that the first 18 km of route, from Aktau to Mangyshlak, are not owned by the state railways of Kazakhstan but by an industrial organisation known as KASKOR. This effectively precludes through operation of freight trains from origin to destination by one haulier, and prevents WKR passenger trains reaching their natural traffic objective at Aktau. It is therefore strongly recommended that the trunk route of the Aktau-Mangyshlak railway be transferred — by purchase if necessary — to the WKR. Failing this, running powers for WKR trains should be granted by KASKOR for the Mangyshlak-Aktau section.

4.1.5 Financial Analysis

From figures provided by the West Kazakhstan Railway for 1995 and part of 1996, it is estimated that the Aktau - Bejneu line presently is running at an operating loss of USD 3.6 millions per year. Figures from the same source however show that the Atyrau District during the same period was operating at a profit of approximately the same figure, which indicates that the line is being cross-subsidised by the Railway's other operations in the district.

There is a problem, however, in analysing financial information due to the lack of detailed cost information inherent in the accounting systems used in the former Soviet Union, and which are still in force in the independent states formed following the dissolution. A future priority must be the establishment of modern management accounting techniques, with computer applications, to enable the Railway to better control its financial operations.

Based on the assessments of the technical experts, the required investment costs for the technical measures recommended have been estimated at a total of approximately USD 257 million up to



the year 2007 to modernise the line. This figure includes USD 155 million up to 2003 for the permanent way, USD 8 million up to the end of 1999 for telecommunications and USD 94 million for signalling up to the end of 2007.

A general problem with railways in the former Soviet Union is the overall lack of maintenance of the equipment. In this respect the line under consideration is no exception. Nonetheless, if the recommended investments are implemented the required maintenance programmes must be followed to maintain the equipment at the required standard. Accordingly the maintenance costs were also calculated based on the recommended investments. These showed that for the permanent way the recommended measures would in fact reduce maintenance costs from USD 3.6 million in 1998 to USD 2.15 million by 2003. For telecommunications the annual costs when installed would amount to USD 593.7 thousand and for signalling eventually reach a level of USD 750 thousand.

From the forecast for future traffic on the line and taking into account the above-mentioned maintenance costs as well as depreciation, the results of operations under a number of scenarios have been calculated. The overall result of this exercise shows however that, given the recommended investment measures are carried out as suggested, the line could in the best case be covering its costs by the year 2000. The most pessimistic scenario indicates that this level will not be reached until beyond 2006.

4.1.6 Economic Evaluation

Calculations obtained have been extrapolated over a period of 25 years for the various scenarios. The result shows that under the most pessimistic scenario, in which industrial production is increased without new construction taking place, oil is exported by rail and there is a growth in seaport activities, a negative IRR is obtained, whereas for the most optimistic; (a new refinery, new factory for fertilisers, opening of the North-South Corridor), an IRR of 9.6% can be achieved over the lifetime of the investments. Therefore, only the most optimistic forecast traffic levels are likely to approach justifying the investment from an economic point of view.

4.2 Module B: Improvement of Freight and Passenger Traffic

This module comprised of a review of all five TRACECA Central Asia countries following which the ensuing were the principal findings.

4.2.1 Railway Operations

The current operations are still based on the standards set prior to independence. Few new initiatives are in evidence and day to day matters are handled as before.

In the former Soviet Union railway operations were conceived on a state-wide basis. Communications were based on logistical considerations and only secondary notice was given to the borders between the individual republics making up the union. With the coming of independence however, the newly created states established their sovereignty within their



boundaries and as a result new frontiers have to be crossed with the ensuing procedures and restrictions. This has had a marked effect on the Railways in the region in that the operations have been complicated by the fact that services which previously ran on state territory now have to cross frontiers. The situation is further complicated in certain countries in the region by the fact that in order to access different parts of the national territory by rail it is necessary to pass through one or more of the neighbouring countries. To overcome these problems a few new lines have been planned which are now coming into operation. In many cases however the problem is likely to continue to exist for some time.

There are problems with rolling stock in that when the FSU was disbanded the rolling stock was distributed, in certain cases somewhat arbitrarily, between the newly created railways. The individual railways are generally dissatisfied with the situation in that they feel „the others“ got a better deal. As wagons are now sent to foreign destinations which were previously national territory, hire charges have to be paid by the countries receiving them. As a result empty wagons are generally returned as quickly as possible to save foreign currency, with the resulting inefficiencies.

A further problem being faced by the railways in the countries of the region is that of repairs and maintenance. The repair shops set up during the Soviet era were planned to service large regions. The newly created railways therefore find themselves either with insufficient capacity or none at all, or conversely with overcapacity in those countries where the repair shops were placed. The necessary agreements and organisation to overcome these problems are still in the early stages.

The train operations themselves are co-ordinated in central dispatching centres or district offices depending on the size of the Railway. Generally passenger trains operate long distance routes connecting national capitals with each other and with Moscow. Some cities have attained popularity and attract many passengers because of the market facilities available, where individuals can exchange goods being transported from China or the Central Asian Republics. The passenger timetables generally provide overnight services so that customers can sleep on the train, thereby avoiding overnight lodging costs, and arrive at their destinations in the early morning. Here again the timetables are determined in a centralised fashion from Moscow in the same manner as previous to independence, and the national timetables adjusted accordingly.

In the case of freight trains operations are conducted from marshalling yard to marshalling yard rather than by the use of direct trains on a regularly scheduled timetable. The result is long journey times which put the railways at a disadvantage to other forms of transport, instead of being able to profit from the advantage of being able to haul large quantities of goods over long distances within competitive time limits.

4.2.2 Commercial and Marketing

The concepts of market-oriented commercial competition is still in its infancy in the Railways of the region. The philosophy is still generally that which existed in Soviet times when the railways had an essentially strategic role, with centralised decision-making and no competition from other modes of transport. The consultant was continually confronted with the attitude that the railways had nothing to fear in the way of competition, although a cursory observation of the trucks on the main roads and a visit to a bus terminal indicates the contrary.



The Railways are in many ways restricted in their ability to operate commercially. This is especially the case with regard to passenger transport, where government decisions determine the level of fares rather than market considerations. It is clear that the earnings levels of the population in general are not sufficient to be able to afford higher fares. Nonetheless, the Railways should be compensated for the shortfall, through subsidies based on contracts with the Governments involved.

The fact that tariffs are still determined centrally in Moscow, at annual tariff conferences, also impedes the capacity of marketing and commercial departments in their activities, since this arrangement allows them little room for initiative. However for freight transport it is possible to give contracts to expeditors who can then arrange shipments and give discounts. The extent of the activities of these expeditors and their freedom of operation varies from Railway to Railway.

4.2.3 Finance and Tariff Policy

The consultant experienced considerable difficulties in obtaining financial information. The reasons for this appear to be twofold: 1) The present systems generally in use are leftovers from Soviet times and serve essentially to record financial transactions rather than to provide meaningful management information, and 2) Such information is regarded as highly confidential, if not secret, and can only be disclosed on authorisation from the highest levels.

The information generated by the financial systems, which are to a very large extent manual, is very general. There is need for the introduction of management accounting methods in order to be able to determine where problem areas exist as well as which services are most profitable. In this respect the Railways need to be reorganised into Business Centres with budgeting along profit centre and cost centre lines, and the Infrastructure separated from Operations. As part of this reorganisation the systems should be computerised to the greatest extent to which this is feasible.

With regard to the reluctance to provide information on the grounds of confidentiality; this is a problem of philosophy and mentality which must change. The figures which the consultant was able to obtain can not be regarded as reliable for presentation to banks in connection with the obtaining of credits. Before a financial institution can make a decision with regard to the provision of loans it will be necessary to perform detailed audits of the financial statements.

The tariff system is a continuation of that in place during the Soviet era. The 1989 tariffs are updated at annual conferences based on inflation rates and movements in the exchange rates of the currencies of the different countries.

There is need for new systems for tariff determination to be introduced in line with methods used in Western Europe. The new agreements should provide for flexibility to negotiate on an individual contract basis and allow for reaction to market forces in the countries of the region.



4.2.4 Infrastructure Signalling and Telecommunications

Based on the experts' visits, discussions with local executives and technical evaluations of the TRACECA route, the following points summarise the Consultant's principal findings:

4.2.4.1 Infrastructure

The condition of the permanent way and bridges, as well as the track machines, shows a general deterioration over recent years. The Railways have been unable to generate the necessary funds to keep the track in a good state of repair. Moreover there is also a lack of appropriate machinery and tooling to perform the required tasks.

Therefore the governments involved will need to support the Railways in this respect, by making available sufficient funds. To accomplish this the Railways should undergo a reorganisation which will separate infrastructure from operations. In this way the government can uphold its obligation to maintain the infrastructure in good working order and the Railways will be responsible themselves for the efficiency of their operations.

It is also recommended that the Railways of the region co-operate in exchanging information and joint training of staff to offset some of these problems.

4.2.4.2 Signalling

The signalling system is generally in good condition and works satisfactorily. However, the poor availability of suitable spare parts to replace older ones is a cause for concern and implies that replacement by a new system using new technology will be required in the short term.

4.2.4.3 Telecommunications

In general most of the telecommunication systems are old and suffer from obsolescence. Due to the age of the systems, failures will be more frequent and the situation will become critical within a few years. Most of the former manufacturing capacity in the FSU has been discontinued, so that availability of spare parts is bound to be a problem. It is not considered viable to continue to operate main lines equipped with open wire. For the open wire sections, it is vital to plan the replacement by cables (optical for long distance and copper for permanent way distribution) in the short term.

4.2.4.4 Overhead Catenary System (O.C.S.)

The line sections which are electrified work correctly and it does not seem that new installations are required in the short term. The present maintenance problem is a lack of money to buy vital replacement parts. In the forthcoming years, if nothing is done, train operation will be heavily disturbed.



In a few words, these networks face serious problems, which are:

- a large part of the equipment has already reached the end of its economic life,
- procurement of spare parts is not possible for older systems,
- if spare parts are still available, money is not,
- obsolete technology is used which needs heavy day-to-day maintenance,
- the logistic requirements for maintenance (cars, trolley, tools, instrumentation) are not sufficient,
- no possibility to enlarge most of the system, not even by system components of western companies,
- increasing number of faults; it is foreseeable that the system will no longer be operable at a specific future point.

Based on the information provided by the different networks, it is clear that two main actions should be undertaken:

The first action is to provide sufficient budget means to the maintenance departments in order to maintain the existing equipment, which has been less than 20 years in operation, and which can be used for at least another 15 years. In the last five years, all these departments have suffered a total lack of budgetary funds to buy the necessary materials, tools and spare parts.

The required budget for the maintenance departments is approximately 32.45 million USD.

The second action is to invest urgently in the replacement of all equipment over 30 years of age which has reached the end of its economic life. If this replacement is applied only in the main corridors, the removed equipment could be used as spare parts for the secondary lines. There is an urgent requirement to invest in such measures as replacement of older signalling systems, telecommunication backbone renewal and refurbishing of electrified lines in response to existing difficulties, in anticipation of future problems and in order to meet the traffic demand for the next fifteen years.

The required investment costs to modernise and rehabilitate the main lines have been estimated to a total of approximately 142.8 million USD.

4.2.5 Study Visit

As part of the assignment for Module B a two week study visit was arranged to the national railways of Germany and Austria in order to provide an insight into the methods and organisation of Western European railways. Participants were from each of the Railways in the region.

The general impression from those who participated was that the visit was well worthwhile. Unfortunately, however, there was not sufficient time to go into detail on many aspects for which the participants had questions. Also the participants were not all from the same disciplines and



This project is financed by the European Union's Tacis Programme, which provides grant finance for know-how to foster the development of market economies and democratic societies in the New Independent States and Mongolia

professional background, which meant that the subjects dealt with had to be somewhat generalised.

4.2.6 Technical Support

The Consultant made proposals for the disbursement of the 240,000 ECU equipment budget in the Inception Report (June 1996). After submission of this proposal, the Consultant has received no official comments from the European Commission. The received suggestion of leasing locomotives expressed by the European Commission found no interest in the Turkmen and Uzbekistan Railways.

At the time of submitting the Progress Report (November 1996) the Consultant voiced his opinion, that the budget should be distributed as proposed in the Inception Report. Furthermore the Consultant made suggestions for the use of the equipment budget for Kazakstan and Turkmenistan.

After submission of the Progress Report the further procedure for procurement of equipment was pending due to the outstanding decision for the distribution of the equipment budget from the European Commission.

End of February 1997 during a meeting in Brüssel the Consultant received a verbal agreement from the European Commission for the already in the Inception Report proposed distribution of the equipment budget. This was the basis for the further procedure.

During the mission in May/June 1997 discussions were made between the Consultant and the Railways Representatives in order to define the equipment to be procured. End of June 1997, the output of this discussions were sent to the European Commission for approval. In summary the results of the discussions with the recipients were as follows:



Country	Total amount (ECU)	to be spent on
Kazakstan	96,000	<ul style="list-style-type: none"> • computer equipment for improvement of railway infrastructure planning, • engineering copy equipment, • rail maintenance equipment
Turkmenistan	96,000	<ul style="list-style-type: none"> • devices and equipment for instrumental observance and measurements on railway bridges
Kyrgystan	16,000	<ul style="list-style-type: none"> • computer equipment for improvement of freight traffic operation
Tadjikistan	16,000	<ul style="list-style-type: none"> • computer equipment for improvement of freight traffic operation and infrastructure maintenance
Uzbekistan	16,000	<ul style="list-style-type: none"> • computer equipment for improvement of freight traffic operation

The approval for the defined equipment was received from the European Commission beginning of July 1997.

After the discussions with the Railways Representatives the Consultant collected offers from different potential suppliers for already clear defined equipment. Furthermore the evaluation of offers for Kazakstan, Uzbekistan, Kyrgystan and Tadjikistan were sent to the European Commission for approval. Until end of October 1997 approvals were received from the European Commission for Kazakstan, Uzbekistan and Kyrgystan. The receipt of this approvals was precondition for the Consultant for contract negotiations with the selected supplier.

End of June 1997 the Consultant asked the European Commission to approve the prolongation of the project period in order to complete the procurement process.

Between end of October 1997 and February 1998 further correspondence were made between the Railways Representatives, Suppliers and the Consultant in order to solve still open items. Due to slow decision making in the Railways and telecommunications problems not all open items could be solved.

Beginning of May 1998 the Consultant sent the evaluation result for parts to be purchased for the Turkmen Railway to the European Commission for approval. Furthermore an enquiry for a still outstanding approval for Tadjikistan was sent to the European Commission. As reply the Consultant verbally received from the European Commission the information that it is not possible to receive any further approval form the European Commission due to the expiry date (begin of July 1997) of the contract. Furthermore the European Commission informed verbally the Consultant that probably orders for equipment made from the Consultant behind the expiry date of the contract will not be accepted / reimbursed from the European Commission. As reply to this information the Consultant informed the European Commission about the pervious approach and asked for the decision if the Consultant should stop the activities or proceed.



At present the procurement procedure has the following status:

Kazakstan:	Main parts of the required equipment were ordered in January 1998.
Uzbekistan:	The Consultant is in contract negotiations with the selected supplier.
Kyrgystan:	Required equipment were ordered in May 1998; Prepayment is outstanding to the supplier.
Tadjikistan:	Approval of the selected supplier from the European Commission is outstanding.
Turkmenistan:	Approval for a parts of the equipment from the European Commission is outstanding; Further information from the Turkmen Railway are outstanding.

We will report further on this activity when it is completed.

4.3 Module C: Feasibility Study for Chardzhev Bridge

This part of the assignment involved technical and economic evaluations of the Chardzhev Bridge and the transport corridor of which it forms part, It is strongly recommended that the engineering option 'combined road and rail bridge on the site of the existing pontoon crossing' be adopted and implemented as soon as possible.

The points outlined below summarise the principal findings.

4.3.1 Future Regional Economic Activity and Future Traffic Levels

Various scenario forecasts have been developed to project the levels of traffic which can be expected to pass over the Amu Darya River at Chardzhev within the next ten years or so.

The most optimistic traffic forecast scenarios predict that Rail traffic will double and Road traffic will increase by 2005 to double and to 2010 to triple present levels.

The uncertainty of attempting to project future economic activity in an environment such as that in Turkmenistan, where there is little experience of market economic processes, must, however, always be kept in mind. In addition attempting to forecast traffic levels over the Amu Darya at Chardzhev involves risk factors, besides those influenced solely by economic activity in Turkmenistan, particularly:

- changes in economic activity in neighbouring countries (influencing transit traffic)
- future changes in modal split (rail:road)
- construction of additional river crossings at other locations such as Kerki
- construction of alternative rail routes in neighbouring countries (e.g. Uzbekistan)
- construction of additional rail routes within Turkmenistan (e.g. North-South Corridor)
- development of international trade by Iran
- resolution of civil war and conflicts in Afghanistan and Tadjikistan



4.3.2 Physical Condition of the Rail Bridge

Surveys were undertaken by the Consultant which show that there are short-term measures which should be taken urgently to ensure continued operation, but that realistically the bridge should be replaced within the next ten years.

The necessary short-term measures have been communicated to the appropriate Railway authorities who have noted the urgency of the situation.

4.3.3 Route Capacity in Relation to Traffic Forecasts

Both of the existing river crossings, road and rail, will need to be replaced to cope with the projected level of traffic beyond 2005.

- the existing rail bridge has insufficient capacity given the need to restrict train sizes, speeds and axleloads in view of its present condition
- the existing pontoon road bridge is a serious bottleneck and is already operating at virtually full capacity

Therefore, to cope with projected traffic levels, replacement of both existing rail and road river crossings is required as soon as possible.

4.3.4 Financial and Economic Analysis

The estimated capital outlay for the recommendations amount to approximately USD100million over the next ten to fifteen years. This figure includes the recommended refurbishment of the existing bridge and the construction of its replacement. In addition more funds must be budgeted than at present for the upkeep of the bridge so that future problems can be avoided.

It must be decided whether the Railway is to be the owner of the crossing or the Government through the appropriate ministry. In connection with this decision it must be further decided whether a toll is to be charged to road traffic users to offset the costs of operating and maintaining the new structure. The present pontoon bridge is privately owned and tolls are levied for its use.

Using the current tariff structure for tolls on the pontoon bridge as a guideline, it is estimated that at this level the revenues so generated will be sufficient to cover operating costs should such a decision be taken.

In the case where it should be decided not to levy tolls, the annual costs for upkeep of the bridge, together with depreciation charges, will amount to approximately USD3.5 million once construction has been completed and these charges will need to be covered by the Railways operations or through Government assistance.



4.3.5 Investment Strategy

As mentioned above it must be decided whether ownership of the bridge is to be in the hands of the Railway or the Government.

It is presumed that, independent of the question of ownership, outside financing will be required for the measures recommended. Under existing conditions it is expected that the debt financing of these measures will amount to between USD6 million and USD7 million per annum, depending on the conditions negotiated. This level is expected to be progressively reached between the years 2006 and 2012.

The financing of this debt will not be totally covered by the net revenues from tolls raised for use of the bridge if the tariffs remain at their current levels. Should it be decided therefore, that the level of the tolls charged should not be increased or that the use of the bridge be free, a commitment must come from either the Government or the Railway to undertake the repayments, or a portion thereof.

Since the financial and accounting systems currently used are essentially those in force in the former Soviet Union, a detailed audit of the financial situation and the results of operations of the Railway will need to be undertaken in connection with the funding of the recommended measures.



5 Lessons Learnt and Recommendations

The Consultant was very impressed by the standard of technical knowledge of the local partners as well as the staff of the Railways visited.

The obtaining of data and documentation proved to be problematic in certain cases, both with regard to the time taken and the detail required. Problems were particularly encountered in obtaining financial data, which in most cases is still considered highly confidential and restricted. It is suggested that for future studies clarification must be obtained in advance that consultants should have access to this type of information. In the area of management accounting, data was particularly lacking, presumably because under the former centralised economic system it was not a vital element, as is the case in market oriented economies.

The procurement of equipment for the Railways involved proved to be a problem both logistically and from the point of view of time spent on this part of the study. The consultant therefore feels that this segment should rather have been a project in itself than an addendum to one of the modules.

The study visit organised by the Consultant was well received by the participants. However, the time available did not prove sufficient to enter into details of the topics presented. The participants were likewise from varying disciplines. It is recommended that future activities of this nature should therefore be concentrated on particular fields, so that the participants may get more intensively involved and obtain more detailed support concerning their particular problems.

The three modules forming the study were very different in content as well as context. Here again the Consultant experienced logistical problems, especially in Module B where five countries were visited in the space of one month, with all the accompanying problems connected with travel in Central Asia: Airline schedules, procurement of visas, purchase of airline tickets etc..



ANNEXES

Project Progress in Reporting Period

Project Completion Report

PROJECT COMPLETION REPORT

Project title : Rail Maintenance Central Asia: Infrastructure		Project number : TNREG 9310	Country : Kazakhstan, Kyrgyzstan, Tadjikistan, Turkmenistan, Uzbekistan	Page : 1
Reporting period : since 3/1996		Prepared on : March 1998	EC Consultant : DE-Consult in association with ARE and SYSTRA	
REPORTING PERIOD	MAIN ACTIVITIES UNDERTAKEN	EC CONSULTANT	MATERIALS AND EQUIPMENT	INPUTS UTILISED
03/1996-06/1996	1. Project Implementation	3 work months (1.5 MM) (only local capacity)		2 flights to Central Asia
07/1996-12/1996	2. Data collection by local experts 2. Data collection by local experts 3. Technical and economic survey by the expatriate experts in Module A (Kazakstan) and C (Turkmenistan, incl. bridge revision) as well as first round trip of the Module B Team 4. Examination of problems found and development of proposals and technical solutions for Module A and C as well as for the commercial and operational parts of Module B 5. Completion of technical documentation and outline and discussion of improvement measures under (primarily under Module A and commercial and operational parts of Module B)	4 work months (10 MM) 4 work months (12.5 MM) 2 work months (3 MM)		12 flights to Central Asia 4 flights to Central Asia 1 flight to Brussels
01/97-07/97	4. Examination of problems found and development of proposals and technical solutions for Module A and C as well as for the commercial and operational parts of Module B 6. Completion of technical documentation and outline and discussion of improvement measures under (primarily under Module C and Infrastructure assessment Mission under Module B 7. Study visit for railway management staff from the region to Germany and Austria (preparation and performance)	1 work month (1 MM) 5 work months (7 MM) 2 work months (1.5 MM) 2 work months (1 MM)		1 flight to Brussels 6 flights to Central Asia 11 trainees' flights to Europe Per diem for 14 days study visit additional study costs and local transport as planned
since 07/97	8. Preparation of Final Report 9. Procurement of equipment	permanent work (not separately scheduled by the contract) (ex 1.5 MM for backstopping)	Whole equipment budget of ECU 240,000	
	TOTAL			

PROJECT PROGRESS IN THE REPORTING PERIOD

Project title : Rail Maintenance Infrastructure	Central Asia: Project number : TNREG 9310	Country :Kazakhstan, Kyrgyzstan, Tadjikistan, Turkmenistan, Uzbekistan	Page : 1										
Planning period : since January 1997		Prepared on : March 1998											
Project objectives : Provide feasibility studies for upgrading of the Aktau - Beineu line and for the development of the Amudarya road and rail crossing at the Charazhev site; survey of existing conditions. recommendations for investigation and improvement of the overall service quality on TRACECA rail corridor; training for senior staff in this regard													
INPUTS													
No	TIME FRAME							EQUIPMENT AND MATERIAL	OTHERS				
	ACTIVITIES IMPLEMENTED	1997											
		1	2	3	4	5	6	7	after July 1997 since 7 /1997	PERSONNEL			
			EC Consultant								Counterpart (approximately)		
1	Final Examination of problems found and development of proposal and technical solutions in Modules A, B, C	X								1.0 MM	1.0 MM		
2	Staff training phase (Study Visit to Germany and Austria)		X	X						1.5 MM			
3	Completion of technical documentation and outline and discussion of improvement measures in all Modules (including Final Mission under Module B)		X	X	X					7.0 MM	4.0 MM		
4	Preparation of Final Report						X	X		1.0 MM			
5	Activities for Equipment Procurement		X				X	X	x	incl. in other activities		Whole equipment budget of ECU 240,000 (see text)	
TOTAL										10.5 MM	5 MM	Whole equipment budget of ECU 240,000	5 experts' flights 11 trainees' flights, special study tour costs

