Tacis

TRACECA Programme:
Regional traffic database and
forecasting model

Progress Report III:

Phase 2

June 1997

European Union

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Regional Traffic Database and

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(Project No. WW.93.05/05.01/B008)

Progress Report III : Phase 2

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1. INTRODUCTION AND PROJECT SYNOPSIS

1.1 This Progress Report deals with the Tacis project TRACECA Traffic Forecasting Model, Project No. WW93.05/05.01/B008. This report covers the period from February 1997 to May 1997. This Progress Report summarises the traffic model development and database construction for which separate technical reports are being produced. The Progress Report includes a description of the economic and traffic scenarios and the transport investment case studies to be tested using the model.

1.2 This Progress Report consists of two main parts:

- the main body of the report, which is an administrative report in a format defined by Tacis for the use of Tacis, Brussels, and the local Co-ordination units;

- Appendices containing technical material relating to current progress, including:

  - future year scenarios;

  - investment case studies for investigation in subsequent work.

1.3 In addition, three separate technical reports have been issued;

- Database Manual (May 1997);

- Draft Model Development Report produced for seminars and workshops (June 1997);

- Russian version of the SATURN traffic modelling software manual.

1.4 An extension of the project duration has been approved. The project duration is now 21 months with the draft Final Report due for submission in month 21 (September 1997).

1.5 Table 1.1 - show the 'Project Synopsis'.

Table 1.1 - Project Synopsis

Project Title :	TRACECA Regional Traffic Database and Forecasting Model
Project Number :	WW 93.05/05.01/B008
Country :	All 8 TRACECA States

Wider Objectives: to assist in the prioritising of transport investment options in the region through the introduction of a quantitative planning tool which can simulate the impacts of investment.

Specific Project Objectives:

- introduction and establishment of computer-based planning tools in the eight TRACECA states including:
  - a common regional database of transport and trade flows and transport infrastructure and transport costs;
  - a multi-modal model for analysing scenarios and developing forecasts;
- application of the tools to:
  - create comprehensive multi-modal synoptics of existing and forecast future flows;
  - highlight bottlenecks of all types;
  - identify preferred locations for multi-modal transfer centres;
  - identify and catalogue specific road/rail/maritime and multimodal projects for detailed feasibility studies;
- transfer of know-how in transport database design and modelling.

Outputs/Activities:

- an Inception Mission and Inception Report (month 3);
- Phase 1A involving data acquisition and storage followed by Progress Report 1 (month 9);
- Phase 1B consisting of the development of scenarios and database, followed by Progress Report II (month 13);
- Phase 2 including synoptic forecasts and development of investment options, followed by Progress Report III (month 15);
- Phase 3 which is the handover of the computer equipment and software and support missions, followed by a draft Final Report (month 18) and Final Report (month 21).

Inputs:

- technical assistance;
- computers and other office equipment;
- database, forecasting and office-oriented computer software.

Project Starting Date :	Mid-January 1996
Project Duration :	21 Months

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2. SUMMARY OF PROJECT PROGRESS

2.1   This section contains a summary of progress since the start of the project.

2.2   Four stages of work have been accomplished so far:

- mobilisation/inception (January to March 1996);

- Phase 1A (April to August 1996);

- Phase 1B (September 1996 to February 1997);

- Phase 2 (March to May 1997).

2.3   The delays encountered on the project so far, particularly in obtaining satisfactory and consistent data on freight movements, have resulted in the project progress being about 2 months behind the original schedule. The revised project duration enables this slippage to be accommodated in the project programme.

2.4   The major achievements of the work to date are:

- agreements have been made with local operators and technical partners in the 8 TRACECA states and all have participated in data collection;

- data has been processed and a database constructed for the storage and retrieval of this data;

- a base year model has been calibrated and tariff data used to develop route costs functions by mode and commodity;

- discussions have taken place with the TRACECA co-ordinating consultants on scenarios and investment case studies;

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- forecasts of economic growth prospects in the TRACECA countries have been developed based on extensive research of existing sources;

- a programme of seminars and workshops has been prepared for the early part of the Phase 3 work.

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3. SUMMARY OF PROJECT PLANNING

3.1   This section contains a summary of the planning for the remainder of the project.

3.2   Major progress has been achieved in completing the construction of the TRACECA database and in completing the base year model of calibration (subject to a number of minor refinements).

3.3   The overall programme for the project is shown in Figure 3.1. The remaining stage of the work is Phase 3. This will entail the handover of the computer equipment and software and seminars, workshops and support missions to assist the local partners in the application of the database and model.

3.4   These support missions will take place in parallel with the testing of the investment case studies and will be followed by a draft Final Report (month 21) and Final Report (month 24).

3.5   The project planning tables are included in Appendix D.

TRACECA REGIONAL TRAFFIC FORECASTING MODEL
FIGURE 3.1: PROJECT PROGRAMME

TASK	1996												1997											
Month:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MOBILISATION/INCEPTION	━	━																						
INCEPTION REPORT		X																						
PHASE 1a: DATA AQUISITION AND STORAGE			━	━	━	━	━	━	━	━	━	━												
Equipment procurement			━	━							━	━	━	━										
Detailed database/model specification			━	━																				
Methodology of data collection			━	━																				
Collection of existing data						━	━	━	━	━	━		━	━	━									
Data review missions								━	━				━											
Surveys						━	━																	
Data entry (spreadsheet)							━	━	━	━	━													
PROGRESS REPORT I											X													
PHASE 1b: SCENARIOS AND DATABASE/MODEL DEVELOPMENT											━	━	━	━	━	━								
Database construction/testing												━	━	━	━	━								
Forecasting Model development (including calibration)													━	━	━	━								
Data transfer to database													━	━	━	━								
Scenario proposals											━	━	━											
PROGRESS REPORT II														X										
PHASE 2: SYNOPTIC FORECASTS													━	━	━	━	━	━						
Scenario definition													━	━										
Zonal economic forecasts													━	━	━									
Model runs (present/future)																	━	━						
Synoptic traffic forecasts																	━	━						
PROGRESS REPORT III																			X					
PHASE 3: IMPLEMENTATION/HANDOVER																	━	━	━	━				
Database/model manual preparation																━	━	━	━					
Handover missions																		━	━					
Case studies																	━	━						
Support missions																		━	━					
DRAFT FINAL REPORT																					X			
TACIS Comments																							━	
FINAL REPORT																								X

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4. PROJECT PROGRESS IN THE REPORTING PERIOD

DATABASE

4.1 The TRACECA database has been constructed and a Database Manual prepared. This manual explains the scope of the data sets held in the database and provides a guide to the use of the database for retrieving data. The scope of the data held is summarised in Figure 4.1.

4.2 The structure of the database is founded on three types of spatial unit consistent with the transport model definition:

- zones : representing the spatial units for representing freight movements between different parts of the TRACECA region.

- nodes: representing road junctions, rail termini, rail junctions and ports and points at which significant changes in the standard of the transport supply varies.

- links: representing the road, rail and sea strategic transport route network as a series of discrete section of transport infrastructure or service lines connecting nodes.

4.3 The Manual provides a zone plan, network definitions and commodity types. The manual also includes an Annex describing the calculation of transport tariffs for use in the transport modelling.

TRANSPORT MODEL - BASE YEAR CALIBRATION

4.4 During this reporting period work has continued on calibrating the base year (1995) model.
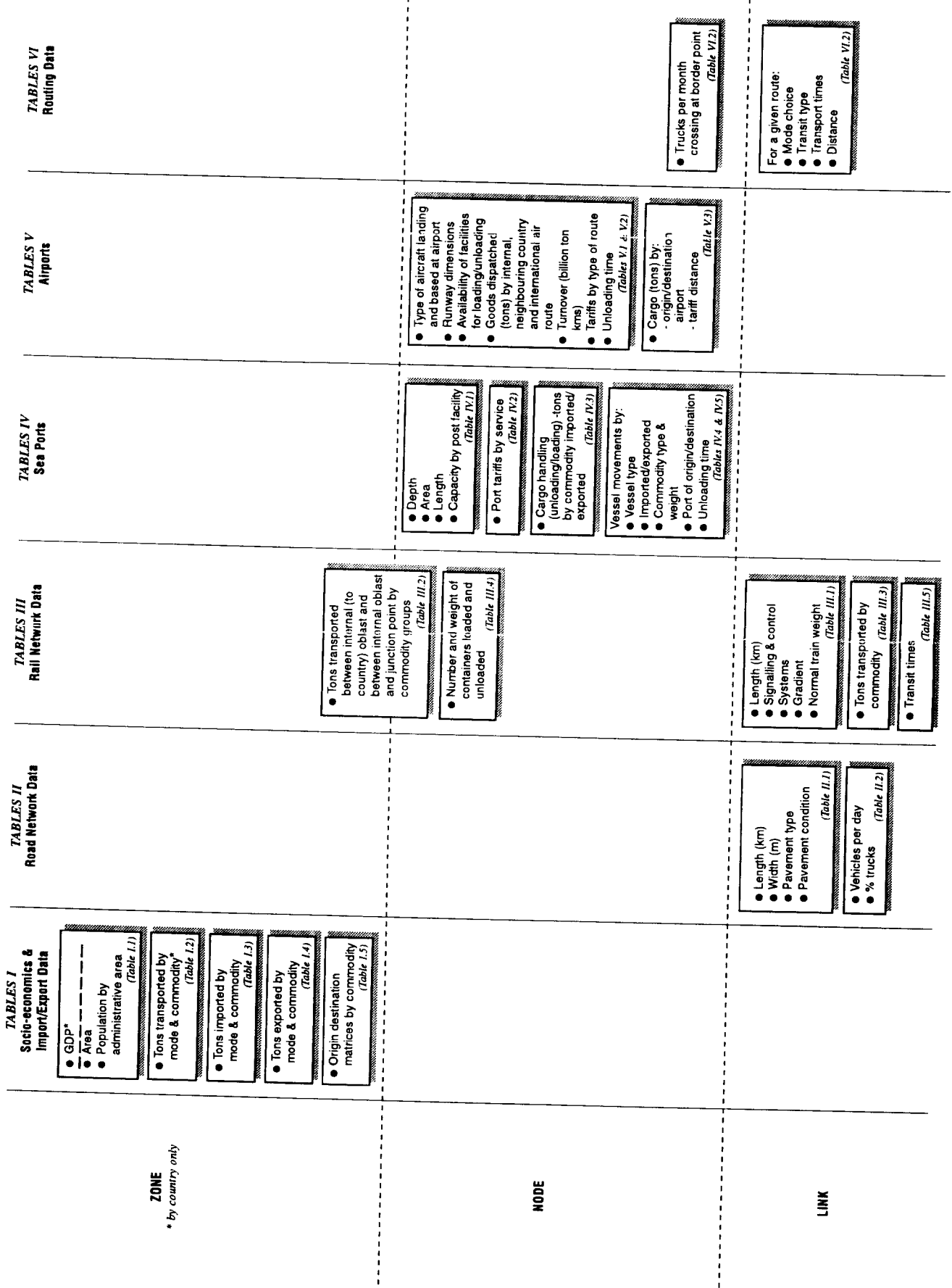
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FIGURE 4.1

	TABLES I Socio-economics & Import/Export Data	TABLES II Road Network Data	TABLES III Rail Network Data	TABLES IV Sea Ports	TABLES V Airports	TABLES VI Routing Data

ZONE *(* by country only)*

TABLES I:
- GDP*
- Area
- Population by administrative area *(Table I.1)*

- Tons transported by mode & commodity* *(Table I.2)*

- Tons imported by mode & commodity *(Table I.3)*

- Tons exported by mode & commodity *(Table I.4)*

- Origin destination matrices by commodity *(Table I.5)*

TABLES III:
- Tons transported between internal (to country) oblast and between internal oblast and junction point by commodity groups *(Table III.2)*

- Number and weight of containers loaded and unloaded *(Table III.4)*

NODE

TABLES IV:
- Depth
- Area
- Length
- Capacity by post facility *(Table IV.1)*

- Port tariffs by service *(Table IV.2)*

- Cargo handling (unloading/loading) -tons by commodity imported/exported *(Table IV.3)*

- Vessel movements by:
- Vessel type
- Imported/exported
- Commodity type & weight
- Port of origin/destination
- Unloading time *(Tables IV.4 & IV.5)*

TABLES V:
- Type of aircraft landing and based at airport
- Runway dimensions
- Availability of facilities for loading/unloading
- Goods dispatched (tons) by internal, neighbouring country and international air route
- Turnover (billion ton kms)
- Tariffs by type of route
- Unloading time *(Tables V.1 & V.2)*

- Cargo (tons) by:
- origin/destination airport
- tariff distance *(Table V.3)*

TABLES VI:
- Trucks per month crossing at border point *(Table VI.2)*

- For a given route:
- Mode choice
- Transit type
- Transport times
- Distance *(Table VI.2)*

LINK

TABLES II:
- Length (km)
- Width (m)
- Pavement type
- Pavement condition *(Table II.1)*

- Vehicles per day
- % trucks *(Table II.2)*

TABLES III:
- Length (km)
- Signalling & control
- Systems
- Gradient
- Normal train weight *(Table III.1)*

- Tons transported by commodity *(Table III.3)*

- Transit times *(Table III.5)*

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4.5   This work has now been largely completed and a paper describing the model development has been prepared for issue to the local partners and recipients at the seminars and workshops planned for June.   A Russian version of the SATURN software manual has also been prepared ready for use at the workshops.   The main calibration work had focused on establishing appropriate values of time of commodities.   These have been determined to provide an acceptable fit between the modelled trade and observed movements across the Caspian sea, at the Black Sea Ports and the allocation between road and rail.

4.6   The assignment calibration has been confined to looking at the strategic freight movements between the TRACECA countries. The freight matrices have been built from customs data, and therefore, represent international movements only. Direct comparison between assigned flows and observed flows has therefore, been confined to key ports and border crossings. In all countries it is clear that there are high levels of domestic traffic, which are included in the observed data, and hence, the observed flows should, and are, significantly higher than the assigned international movements on links within countries. In calculating total flows relative to link capacities it may be necessary to take account of this domestic traffic and this can be included in the model network as a fixed flow on links. In addition to this there are several other factors which prevent a direct comparison between observed flows of freight on links and assigned flows from the modelling process:

- annual observed flows for rail have been factored to average daily flows;

- road flow data in number of trucks per day has been converted to represent daily tonne flows using a weighted average tonnage per truck;

- history shows that there has been a significant volatility in trade movements over recent years resulting from economic conditions, trade barriers and the closure of border crossing points;

- traffic information collected to date has mainly comprised of 1993 flow data, whereas the import/export data received represents trade in 1995.

4.7   The seminar paper on model development provides the basis for discussing and refining the base year model.   Areas where refinements are anticipated are:

- more detailed representation of networks on the fringe of the TRACECA area in order to better represent internal to external movements;

- representation of total trade flows on the network by using estimates of total freight volumes (derived from rail flow data and road goods vehicle counts) as preloads. This enables the assigned international freight movements by mode and commodity to be expressed as a percentage of total movement on the network;

- refinement to the routeing and loading of freight on the TRACECA and competing corridors in Central Asia by adjusting the zone connections to the network to achieve a more even assignment of flow on adjacent links.

4.8   Any refinements to the base year model will be undertaken during and immediately after the seminars and workshops in June. A consolidated revision of the base year model and model development report will be issued in early July.

FORECASTING

4.9   Preliminary macro-economic forecasts were presented in Progress Report II together with preliminary proposals for regional trade development scenarios.

4.10   Subsequent discussions with the TRACECA Co-ordination Team held on 25 April 1997 have resulted in the scenarios being condensed to two, presenting a low and high level of economic growth across the region as a whole.

4.11   Similarly, a clear distinction has been established between:

- scenarios - representing future year trade patterns (matrices) reflecting two different levels of economic growth; and

- case studies - representing changes to the transport network including infrastructure investments and tariff changes.

4.12   The forecasts of economic growth underpinning the future year trade patterns have been based on a review of international sources and sector specific analyses. Appendix A describes these trade forecasts scenarios.

4.13 The meeting with the Co-ordination Team held on 25 April 1997 also provided a basis for reviewing the range of case study tests to be undertaken with the TRACECA model. Appendix B summarises the list of case studies for investigation.

LOCAL TECHNICAL PARTNERS

4.14 As previously reported, Project work in the countries continues to rest on a dual structure:

- a "local operator" which is the official counterpart organisation responsible for the project in the country;

- a "local technical partner organisation" which will receive, operate and maintain the database and forecasting model.

4.15 In preparing for the seminars and workshops in June it is evident that the local operators are likely to want to participate in the technical aspects of the database and model applications directly. Also, as previously reported, the contribution that different partners are able to make varies from country to country and is dependent on their capabilities and their approach to participation in the project. Indeed, the nominated local partners are able to contribute to certain aspects of the work better than other aspects and are unlikely to have the full range of skills necessary for on-going data collection, analysis, forecasting and modelling. Based on discussions with the technical partners and local operators we advise that flexibility is maintained in the precise allocation of responsibilities. We envisage that the technical partners may ultimately comprise a mix of staff from existing institutes and Ministries with different organisations/individuals taking the lead role on data collections, economic forecasting and modelling.

4.16 The ultimate objective of involving technical partners in the project is to facilitate the transfer of technology and know-how in forecasting and data management through the application of modelling and data analysis techniques. Progress towards this goal continues to be made through the involvement of technical partners in data collection, data processing, economic forecasting and model development.

4.17 The June seminars and workshops provide the mechanism for initiating technology transfer in parallel with clarifying the allocation of responsibilities and practical ways of

working beyond this project in each of the eight countries. The Draft Final Report will provide clear recommendations agreed with the local operators.

PROJECT OFFICES

4.18   Progress on the technical work has proceeded in parallel with establishing regional bases for the on-going application of the model and data analysis. As described in previous progress reports, the emphasis at the start of the project was placed on establishing a project office (equipped with communications and computer equipment) in Kazakhstan. The local technical partner operating from this office has now acquired a basic proficiency in the fundamentals of modelling and continues to contribute to the technical work.

4.19   We continue to operate a project office in Tashkent, Uzbekistan. Project offices are also being established in Ashgabad (Turkmenistan) and Tblisi (Georgia) in time for the June seminars and workshops being held in these two locations.

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5. PROJECT PLANNING FOR THE NEXT REPORTING PERIOD

5.1   The next reporting period is Phase 3 "Implementation/Handover" and consists of:

- issue of the database and model manuals to local technical partners and local operators;

- seminars and workshops to introduce the database and modelling tools to the local partners and operators followed by a further workshop to further facilitate training and the local partners participation in case study investigations. Appendix C presents the proposed structure and content of the initial seminars and workshops planned for Ashgabad and Tblisi in June 1997;

- consolidation of the traffic forecasting model taking account of any refinements agreed with the local partners;

- implementation of the database and model in regional project offices;

- case study tests using the model;

- collation of 1996 trade and freight movement data, where available. We intend that local partners collate data and enter this directly to the database in order to encourage the use of the database.

5.2   We also propose that this final, Phase 3, stage of the work provides clear recommendations on how the database and model can be best maintained and operated in practice beyond the end of the study. This issue will be debated at the June seminars.

5.3   The Phase 3 Progress Report is to be submitted in the form of a draft Final Report in September 1997. Figure 5.1 shows a detailed work plan.

TRACECA REGIONAL TRAFFIC FORECASTING MODEL
FIGURE 5.1 DETAILED WORK PLAN FOR PHASE III

TASK	June					July				Aug				Sept				
Month	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30
Equipment procurement (continuing task)	▪	▪	▪	▪	▪	▪	▪	▪	▪									
Data collection (continuing task)	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪					
Database and Model Manuals		▬																
Seminars and Workshops		▬	▬															
- Ashgabat		▬																
- Tblisi			▬															
Handover/Support Missions & Workshop	▬	▪	▪	▪	▪	▬	▬	▬	▪	▪	▪	▪						
Forecasting Model Consolidation					▬	▬												
- base year refinement					▬													
- forecast scenarios matrices						▬												
Case Studies							▬	▬	▬	▬	▬							
Draft Final Report													▬	▬				

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APPENDIX A

Traceca Trade Forecasts

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A. TRACECA TRADE FORECASTS

A.1   This Appendix sets out the preparation of the international trade scenarios and forecasts for the Traceca Countries based on forecasts of economic growth and developments.

A.2   In forecasting freight traffic flows and appraising infrastructure investments it is appropriate to consider a range of economic growth expectations with reasonable probability of occurrence. This means that it is not appropriate to forecast the highest possibilities for growth which may not have more than a 1% probability of occurrence. Infrastructure designed to accommodate such a high level of demand would generally be an excessive use of scarce capital resources that could be more beneficially be invested in other projects with greater benefit. In many cases designing in the first place for the highest foreseeable level of demand could result in a completely unaffordable project.

A.3   The appropriate basis of such forecasts is that there is about a 70% probability of the eventual outturn being somewhere between the selected high growth and the selected low growth. There will be a chance (+/-15%) of the outturn being higher or lower than the forecast range. This is unavoidable in the method and periods of peak traffic demand can be accepted as they are anyway short. In the case of freight if the growth rate proves to be consistently faster than forecast then infrastructure strengthening or additional facilities can be planned before the demands seriously swamp the capacity. This one of the main reasons for continuously monitoring the demand year on year.

ECONOMIC GROWTH PROSPECTS IN THE TRACECA COUNTRIES

A.4   Forecasting economic growth as is the case for traffic growth is subject to many economic and fiscal uncertainties normal in the market economics of the world. However in Traceca there are additional uncertainties as follows, compounding the 'normal' range:

- disturbances to the demographic development patterns due to the cross migration of different ethnic and national groups from the FSU, decline in the birth rate etc.

- political instability restricting investor confidence and therefore the rate of development of the market economy.

- economic transition uncertainties affected by government policy.

- world market uncertainties due to external factors; most obviously the future of oil and gas prices and the economics of such investments as pipelines etc.

A.5 In the Phase II Progress Report in March 1997 we included preliminary national economic forecasts in Appendix D. This analysis of the current factors influencing economic growth and the likely future prospects in each country was built upon our previous SWOT analysis and lead to the tentative conclusion on ranges of economic growth of GDP as shown in Table A.1 which gives forecast rates for high economic growth, "Central" or most likely and low economic growth.

A.6 The growth rates shown in Table A.1 take account of current reported economic growth, local government data, EBRD and IMF data and the likely timing and magnitude of developments in the oil and gas exports from Azerbaijan, Kazakstan, Turkmenistan and Uzbekistan.

A.7 Forecasting freight demand on a complex network of routes also combining rail, road and maritime modes has to take account of the inherent suitability of some modes for certain types of freight (commodities) and also transit time, security and tariff issues which are of different relative importance for different commodities. The model has therefore differentiated 8 groups of commodities for forecasting as follows:

- Grains and cereals;
- Cotton and textiles
- Ores, metals and stone
- Oil, petroleum and minerals
- Wood, construction plant equipment etc.
- Dry bulk
- Vehicles
- Other Consumer Goods

**Table A.1 - Economic Growth Forecast Ranges for the
Traceca Countries % Per Annum**

Country	Years Forecast	1996	1997	1998	1999	2000	2001	2002-2006	2007-2011
Armenia	High	6.5	7.5	7.5	7.5	7.5	7.5	6.0	5.0
	Central	6.5	7.0	7.0	6.0	6.0	6.0	5.0	4.0
	Low	6.5	6.5	6.0	5.0	5.0	5.0	5.0	4.0
Azerbaijan	High	-4.4	4.5	5.5	6.0	7.0	9.0	10.0	9.0
	Central	-4.4	4.4	5.0	5.5	7.0	9.0	9.0	8.0
	Low	-4.4	3.5	4.0	5.0	6.0	6.0	7.0	7.0
Georgia	High	8.0	10.0	10.0	9.0	9.0	9.0	8.0	6.0
	Central	8.0	10.0	10.0	7.0	7.0	7.0	5.5	5.0
	Low	8.0	8.0	8.0	6.0	6.0	6.0	5.0	4.0
Kazakstan	High	0.4	1.5	3.5	5.0	5.0	6.0	8.0	8.0
	Central	0.4	1.1	3.0	5.0	5.0	5.5	7.5	7.0
	Low	0.4	1.0	2.5	4.0	4.0	4.0	6.0	5.0
Kyrgyzstan	High	2.4	6.0	6.0	6.0	6.0	6.0	6.0	5.0
	Central	2.4	5.3	5.4	5.5	5.6	5.6	6.0	4.0
	Low	2.4	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Tadjikistan	High	-7.0	1.0	3.6	5.0	5.0	5.0	4.0	4.0
	Central	-7.0	0.3	3.6	4.1	4.1	4.1	3.0	3.0
	Low	-7.0	0.0	2.5	3.0	3.0	3.0	3.0	3.0
Turkmenistan	High	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
	Central	3.7	2.0	2.0	2.0	2.0	2.0	3.5	3.5
	Low	3.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Uzbekistan	High	-1.0	1.0	3.0	5.0	5.0	5.0	5.0	5.0
	Central	-1.0	0.5	2.5	4.0	5.0	5.0	3.5	3.0
	Low	-1.0	0.5	1.5	3.0	3.5	3.5	3.5	3.0

FREIGHT TRAFFIC DEVELOPMENT RELATIVE TO GDP

A.8 Growth in freight is a function of GDP growth for many commodities. On a World average each 1% of GDP growth produces between 1.2% - 1.5% increases in trade flows by volume.

A.9 Additional relevant factors are the relative cost of labour and capital in the country of forecast. Where labour costs are low trade based on import and export develops more rapidly. Such trade flows are already developing in several of the Traceca countries

(Armenia and Uzbekistan). Therefore this factor has been taken into account as 1.5% for 5 years declining to 1.29% in later years. This gives the forecast ranges of growth rates applicable to general trade commodities as shown in Table A2 and total prospective growth in Table A.3.

**Table A.2 - Trade Growth Forecast Ranges for the
Traceca Countries % Per Annum**

Country	Years Forecast	1996	1997	1998	1999	2000	2001	2002-2006	2007-2011
Armenia	High	9.69	11.18	11.18	11.18	11.18	11.18	7.74	6.45
	Central	9.69	10.43	10.43	8.94	8.94	8.94	6.45	5.16
	Low	9.69	9.69	8.94	7.45	7.45	7.45	6.45	5.16
Azerbaijan	High	6.56	6.71	8.20	8.94	10.43	13.41	12.90	11.61
	Central	6.56	6.56	7.45	8.20	10.43	13.41	11.61	10.32
	Low	6.56	5.22	5.96	7.45	8.94	8.94	9.03	9.03
Georgia	High	11.92	14.90	14.90	13.41	13.41	13.41	10.32	7.74
	Central	11.92	14.90	14.90	10.43	10.43	10.43	7.10	6.45
	Low	11.92	11.92	11.92	8.94	8.94	8.94	6.45	5.16
Kazakstan	High	0.60	2.24	5.22	7.45	7.45	8.94	10.32	10.32
	Central	0.60	1.64	4.47	7.45	7.45	8.20	9.68	9.03
	Low	0.60	1.49	3.73	5.96	5.96	5.96	7.74	6.45
Kyrgyzstan	High	3.58	8.94	8.94	8.94	8.94	8.94	7.74	6.45
	Central	3.58	7.90	8.05	8.20	8.34	8.34	7.74	5.16
	Low	3.58	7.45	7.45	7.45	7.45	7.45	6.45	5.16
Tadjikistan	High	10.43	1.49	5.36	7.45	7.45	7.45	5.16	5.16
	Central	10.43	0.45	5.36	6.11	6.11	6.11	3.87	3.87
	Low	10.43	-	3.73	4.47	4.47	4.47	3.87	3.87
Turkmenistan	High	5.51	5.22	5.22	5.22	5.22	5.22	4.52	4.52
	Central	5.51	2.98	2.98	2.98	2.98	2.98	4.52	4.52
	Low	5.51	2.98	2.98	2.98	2.98	2.98	2.58	2.58
Uzbekistan	High	1.49	1.49	4.47	7.45	7.45	7.45	6.45	6.45
	Central	1.49	0.75	3.73	5.96	7.45	7.45	4.52	3.87
	Low	1.49	0.75	2.24	4.47	5.22	5.22	4.52	3.87

Table A.3 - Trade Growth Forecast Ranges for the Traceca Countries
% Growth Over 1995 (based on GDP growth forecasts)

Country	Years Forecast	1995	1996	2001	2006	2011
Armenia	High	100.00	109.69	186.29	270.44	369.65
	Low	100.00	109.69	162.59	222.24	285.81
Azerbaijan	High	100.00	93.44	147.19	269.98	467.58
	Low	100.00	93.44	132.85	204.68	315.36
Georgia	High	100.00	111.92	215.53	352.19	511.28
	Low	100.00	111.92	181.25	247.75	318.62
Kazakstan	High	100.00	100.60	136.10	222.40	363.41
	Low	100.00	100.60	125.98	182.89	249.99
Kyrgyzstan	High	100.00	103.58	158.93	230.72	315.36
	Low	100.00	103.58	148.35	202.78	260.78
Tadjikistan	High	100.00	98.57	118.82	152.81	196.52
	Low	100.00	98.57	105.93	128.08	154.85
Turkmenistan	High	100.00	105.51	136.05	169.66	211.58
	Low	100.00	105.51	122.20	138.80	157.65
Uzbekistan	High	100.00	98.51	129.57	177.11	242.09
	Low	100.00	98.51	117.34	146.33	176.93

COTTONS AND TEXTILES

A.10 The growth of cotton and textiles freight will depend on several factors amongst which the following are important:

- area devoted to the cotton crop which may continue to reduce as a result of increasing pressure for food production and reduced reliance/availability of food aid.

- agricultural factors, insecticide technology and weather; all affecting the effective cotton yield.

- world demand (estimated to grow at about 1.9% pa over the next 10 years).

• major demand growth in cheaper manufacturing centres in S Asia, SE Asia and in high quality manufacturing centres in Europe mainly S Europe and E Europe.

• development of indigenous textile industries affected by political, trade and economic factors.

A.11 At present only Uzbekistan and Turkmenistan export significant quantities of cotton lint. Cotton production in both Azerbaijan and Tadjikistan has been severely affected by the local political situation and given the influence of the various factors listed above, cotton production in those countries appears unlikely to return to 1991 levels in the foreseeable future.

A.12 Production of cotton in Uzbekistan may increase by up to 7% above the 1991 level due mainly to improved yields whilst the same factor may enable Turkmenistan to maintain production at about the 1991 level. The projected development of cotton production is shown in Table A.4. About 95% - 99% of the production is exported from Uzbekistan and Turkmenistan.

A.13 The main growth in demand for cotton is forecast to occur in the following countries as shown in Table A.5:

• Asia/Pacific region, manufacturing centres such as in Taiwan and Indonesia; (up to 55% growth by 2010);

• China; (up to 35% growth by 2010);

• India/Pakistan; (up to 25% growth by 2010);

• Europe for high quality long staple cotton (mainly in South and East Europe) up to 25% growth by 2010.

Table A.4 - Projected Cotton Production in Traceca Countries

Thousands of Metric Tonnes

Years	Azerbaijan	Kazakstan	Kyrgyzstan	Tadjikistan	Turkmenistan	Uzbekistan	Total
1991/92 (Actual)	174	100	25	249	423	1520	2491
1995/96	92	92	23	162	393	1537	2299
2000/01	101	98	24	190	414	1587	2415
2005/06	123	100	25	205	416	1610	2479
2009/10	144	102	26	217	417	1628	2534

Table A.5 - Projected Growth in Cotton Imports by Major World Regions

Regions	Years			
	1995	2000	2005	2010
Europe	100.0%	109%	116%	124%
Americas	100.0%	107%	114%	120%
Africa	100.0%	105%	110%	115%
South Asia	100.0%	111%	123%	135%
China	100.0%	112%	125%	139%
Other Asia/Pacific	100.0%	125%	146%	166%

GRAINS AND CEREALS

A.14   On account of population growth and rising per capita income the demand for grain, cereals (and other foodstuffs) can be expected to increase. Table A.6 shows the projections adopted for this study. Domestic grain production is also expected to increase with land use being switched from cotton to grain and other crops, cultivation being re-established on the resolution of local disputes and hostilities; and agricultural yields generally improving on account of adoption of more up-to-date farming practices. Nevertheless the demand for importation of grain may be expected to increase in all countries except Kazakstan as shown in Table A.6.

Table A.6 - Projected Growth in Demand and Import of Grains and Cereals

Year	Growth in GDP per Head		Domestic grain demand		Grain import growth	
Country	2001	2011	2001	2011	2001	2011
Armenia	129%	183%	111%	126%	105%	113%
Azerbaijan	118%	243%	109%	133%	104%	116%
Georgia	138%	211%	112%	129%	106%	114%
Kzazakstan	112%	207%	108%	128%	100%	100%
Kyrgyzstan	122%	183%	110%	126%	105%	113%
Tadjikistan	102%	125%	106%	119%	103%	109%
Turkmenistan	105%	135%	107%	120%	103%	110%
Uzbekistan	106%	125%	107%	119%	104%	109%

GROWTH IN DEMAND FROM EXTERNAL COUNTRIES

A.15 Growth in trade with external countries has been projected on the basis of forecast GDP growth rates in the major trading partner countries of the Traceca states and elsewhere on consideration of average GDP growth rates in World Regions. The relationship between GDP growth and growth in trade volume as discussed in A.9 above has been taken into account. The following sections discuss the forecasts for selected major trade partners. The use of GDP growth as the indicator results in relatively low forecasts of trade growth with regions with low growth rates even though the absolute increase in GDP and market size, is in some cases far higher than in countries with high percentage GDP growth rates. The possible implications of alternative forecasts are discussed in A.24 below.

Russia

A.16 GDP growth in 1996 was negative in Russia (-6%) with industrial sector output falling in every branch. Given present fiscal policies the economy is broadly expected to be flat in 1997 with a recovery starting in 1998. Growth of 2% to 3% is forecast for 1998 and this may accelerate to the 4% - 6% pa by 2000. Table A.6 shows the cumulative high and low economic growth forecasts and Table A.7 shows the corresponding trade flow forecasts taking account of the GDP/trade volume relationship discussed in A.9 Thus GDP is forecast to grow in the range 160% - 205% and trade by 185% - 255% by 2010/11.

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China

A.17   China is already an important trading partner for the Central Asian countries and is likely to grow in importance in relation to economic growth. An example is China's demand for copper ores (about 20% of World demand) and production in Kazakstan and Kyrgyzstan.

A.18   Chinese mainland economic growth is projected to be 9.3% in 1997 (source EIU). The economic aggregates will be boosted in 1997 by the return of Hong Kong and its US $ 160 bn GDP. The Chinese economy is expected to quadruple in size by 2010 even on a fairly pessimistic assumption of an inability to maintain the very high annual growth rates (+15% pa) of the 1986-1994 period, and a declining growth rate in future. The growth projections for GDP and trade volume are shown in Tables A.7 and A.8 respectively. GDP is forecast to grow by between 300% and 400% and trade volume in the range 450% - 650%.

Japan and Other SE Asia

A.19   The forecast growth is low on account of the weightage of the Japanese economy and its relatively low growth rate. The factor discussed in A.15 above is relevant and an alternative forecast is presented in A.24 below.

South and West Asia and Middle East

A.20   GDP growth rates in the range 5%-7% pa have been considered on the basis of the relative importance of the Turkish economy with its present vigorous growth and the prospective importance of Southern Asia more generally (India, Pakistan etc.). This results in GDP growth in the range 230% - 260% and trade volume growth in the range 310% - 370%.

Southern and Eastern Europe

A.21   GDP growth rates in the range 3.5% - 5% pa have been considered resulting in economic growth in the range 175% - 215%. This may be regarded as reasonably optimisation compared to the 1996/97 weighted average growth in this region of 3.3%. Trade volume growth is projected on the above basis in the range 205% - 265%.

Northern and Western Europe

A.22 GDP growth rates in the range 2% - 3.5% have been considered (compare 1996/97, 2.36%). This results in economic growth by 2010/11 in the range 140% - 172% and trade volume growth in the range 155% - 200%.

A.23 As agreed in the discussions with the Traceca co-ordination team held on 25th April the above ranges of growth has been input to the model.

Alternative Approach

A.24 As discussed in A.13 the effect of using GDP growth rates as an indicator of external trade growth for Traceca is to forecast only moderate rates of growth with the existing large economies in Western Europe and in Japan.

A.25 It is appropriate to note that the Western Europe economy in aggregate is expected to grow by between $2500 Bn - $4600 Bn in absolute 1996 values in the period 1996-2010 whereas in the same period the Russian economy may grow by between $250 Bn and $424 Bn and the Chinese economy may grow by between $1450 Bn - $2100 Bn as shown in Table A.7.

A.26 The increase in economic activity over present levels is also a measure of the prospective market size for Traceca countries' products and the ability to satisfy their import requirements. Both the above considerations have of course to be tempered with regard to the import/export costs and other related issues such as security. Table A.7 sets out the value of absolute GDP growth in each region, a crude growth rate adjustment factor relative to Russia and a relative transportation cost factor. These considerations can be used to derive an alternative estimate of the potential growth in trade volumes by 2010/11 as shown in Table A.7. On this alternative basis the potential for trade growth with Europe and Japan is assessed as much greater than the basis of GDP growth rates.

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Table A.7 - Traceca External Partner Potential Trade Growth Scenarios

Country/Region	Economic Growth Scenario	GDP based Growth Factors in %	Absolute GDP Growth in US $ Bn (1996 values)	Growth Rate adjustment	Transport Cost Adjustment	Adjusted Growth Factors
Russia	High	255	420	1	1	255
	Low	185	250	1	1	185
China	High	650	2090	1.94	1.50	636
	Low	450	1450	2.36	1.50	504
Japan & Other SE Asia	High	180	3070	10.25	2.0	506
	Low	150	1900	9.31	2.0	387
South & West Asia and Middle East	High	370	1030	1.68	1.25	397
	Low	310	830	1.96	1.25	367
Southern & Eastern Europe	High	265	2290	5.20	2.0	411
	Low	205	1480	5.29	2.0	343
Northern & Western Europe	High	200	4670	14.04	2.50	602
	Low	155	2510	11.90	2.50	400

A.27   This in summarised below:

Table A.8 - Potential Trade Increase 1995-2010

Country Region	GDP Growth Rate Basis %	Absolute Market Size Growth Basis %
Russia	255/185	255/185
China	650/450	636/504
Japan & Other SE Asia	180/150	506/387
South & West Asia	370/310	397/367
Southern & Eastern Europe	265/205	411/323
Northern & West Europe	200/155	600/400

A.28   It will be appropriate for the Traceca country technical partners to consider the impact of such an alternative assessment of trade potential on the demands for infrastructure in due course.

A.29 Using the trade growth figures estimated above the growth factors have been derived for imports and exports of the 8 grouped commodities as shown in tables A.10 - A.17. These growth factors will be used to forecast interzonal trade flows for 2001 and 2010/11. Forecasts for 2001 are appropriate as a possible typical opening year for new infrastructure projects whilst 2010/11 represents a "design year" forecast suitable for projects prepared in a transitional situation with attendant more than normal uncertainties regarding the forecasts. The intermediate year 2006 is available from the basic economic assumptions. However it will also be appropriate to interpolate between assignments for 2001 and 2010/11.

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TABLE A.10 GROWTH FACTORS FOR 2001 AND 2010/11
COMMODITY: GRAINS AND CEREALS

IMPORT				EXPORT			
COUNTRY	ZONE	Growth Factors		COUNTRY	ZONE	Growth Factors	
		2001	2010/11			2001	2010/11
Tadjikistan	1	1.03	1.09	Tadjikistan	1	1.00	1.00
	2	1.03	1.09		2	1.00	1.00
	3	1.03	1.09		3	1.00	1.00
Kyrgyzstan	4	1.05	1.13	Kyrgyzstan	4	1.00	1.00
Uzbekistan	7	1.04	1.09	Uzbekistan	7	1.00	1.00
	8	1.04	1.09		8	1.00	1.00
	9	1.04	1.09		9	1.00	1.00
	10	1.04	1.09		10	1.00	1.00
	11	1.04	1.09		11	1.00	1.00
Turkmenistan	12	1.03	1.10	Turkmenistan	12	1.00	1.00
	13	1.03	1.10		13	1.00	1.00
	14	1.03	1.10		14	1.00	1.00
Georgia	21	1.06	1.14	Georgia	21	1.00	1.00
Armenia	22	1.05	1.13	Armenia	22	1.00	1.00
Azerbaijan	23	1.04	1.16	Azerbaijan	23	1.00	1.00
Kazakstan	151	1.00	1.00	Kazakstan	151	1.05	1.15
	152	1.00	1.00		152	1.05	1.15
	153	1.00	1.00		153	1.05	1.15
	161	1.00	1.00		161	1.05	1.15
	162	1.00	1.00		162	1.05	1.15
	163	1.00	1.00		163	1.05	1.15
	171	1.00	1.00		171	1.05	1.15
	172	1.00	1.00		172	1.05	1.15
	173	1.00	1.00		173	1.05	1.15
	181	1.00	1.00		181	1.05	1.15
	182	1.00	1.00		182	1.05	1.15
	183	1.00	1.00		183	1.05	1.15
	184	1.00	1.00		184	1.05	1.15
	185	1.00	1.00		185	1.05	1.15
	191	1.00	1.00		191	1.05	1.15
	192	1.00	1.00		192	1.05	1.15
	201	1.00	1.00		201	1.05	1.15
	202	1.00	1.00		202	1.05	1.15
	203	1.00	1.00		203	1.05	1.15
South Russia	24	1.00	1.00	South Russia	24	1.05	1.15
North Russia	26	1.00	1.00	North Russia	26	1.00	1.00
North Russia	27	1.00	1.00	North Russia	27	1.00	1.00
North Russia	28	1.00	1.00	North Russia	28	1.00	1.00
Ukraine	29	1.00	1.00	Ukraine	29	1.05	1.15
China	30	1.00	1.00	China	30	1.00	1.00
South Asia SCont	31	1.00	1.00	South Asia Sc	31	1.00	1.00
West Asia & ME	32	1.05	1.15	West Asia & ME	32	1.00	1.00
Turkey	33	1.00	1.00	Turkey	33	1.00	1.00
N W Europe	34	1.00	1.00	N W Europe	34	1.00	1.00
Southern Europe	35	1.00	1.00	Southern Europe	35	1.00	1.00
Central Europe	36	1.00	1.00	Central Europe	36	1.00	1.00
Baltic	37	1.00	1.00	Baltic	37	1.00	1.00
N Central Europe	38	1.00	1.00	N Central Europe	38	1.00	1.00

North Europe	39	1.00	1.00		North Europe	39	1.00	1.00
Middle East	40	1.05	1.15		Middle East	40	1.00	1.00
East Africa	41	1.00	1.00		East Africa	41	1.00	1.00
West Africa	42	1.00	1.00		West Africa	42	1.00	1.00
East Asia	43	1.00	1.00		East Asia	43	1.00	1.00
East Asia	44	1.00	1.00		East Asia	44	1.00	1.00
America E Coast	45	1.00	1.00		America E Coast	45	1.00	1.00
America West Coast	46	1.00	1.00		America West Coast	46	1.00	1.00

TABLE A.11 GROWTH FACTORS FOR 2001 AND 2010/11							
COMMODITY: COTTON AND TEXTILES							
IMPORT				**EXPORT**			
COUNTRY	ZONE	Growth Factors		COUNTRY	ZONE	Growth Factors	
		2001	2010/11			2001	2010/11
Tadjikistan	1	1.03	1.09	Tadjikistan	1	0.70	1.00
	2	1.03	1.09		2	0.70	1.00
	3	1.03	1.09		3	0.70	1.00
Kyrgyzstan	4	1.05	1.13	Kyrgyzstan	4	1.00	1.00
Uzbekistan	7	0.98	0.94	Uzbekistan	7	1.03	1.07
	8	0.98	0.94		8	1.03	1.07
	9	0.98	0.94		9	1.03	1.07
	10	0.98	0.94		10	1.03	1.07
	11	0.98	0.94		11	1.03	1.07
Turkmenistan	12	0.98	0.94	Turkmenistan	12	1.04	1.05
	13	0.98	0.94		13	1.04	1.05
	14	0.98	0.94		14	1.04	1.05
Georgia	21	1.06	1.14	Georgia	21	1.00	1.00
Armenia	22	1.05	1.13	Armenia	22	1.00	1.00
Azerbaijan	23	1.04	1.16	Azerbaijan	23	1.00	1.00
Kazakstan	151	1.04	1.12	Kazakstan	151	1.00	1.00
	152	1.04	1.12		152	1.00	1.00
	153	1.04	1.12		153	1.00	1.00
	161	1.04	1.12		161	1.00	1.00
	162	1.04	1.12		162	1.00	1.00
	163	1.04	1.12		163	1.00	1.00
	171	1.04	1.12		171	1.00	1.00
	172	1.04	1.12		172	1.00	1.00
	173	1.04	1.12		173	1.00	1.00
	181	1.04	1.12		181	1.00	1.00
	182	1.04	1.12		182	1.00	1.00
	183	1.04	1.12		183	1.00	1.00
	184	1.04	1.12		184	1.00	1.00
	185	1.04	1.12		185	1.00	1.00
	191	1.04	1.12		191	1.00	1.00
	192	1.04	1.12		192	1.00	1.00
	201	1.04	1.12		201	1.00	1.00
	202	1.04	1.12		202	1.00	1.00
	203	1.04	1.12		203	1.00	1.00
South Russia	24	1.04	1.12	South Russia	24	1.00	1.00
North Russia	26	1.04	1.12	North Russia	26	1.00	1.00
North Russia	27	1.04	1.12	North Russia	27	1.00	1.00
North Russia	28	1.04	1.12	North Russia	28	1.00	1.00
Ukraine	29	1.04	1.12	Ukraine	29	1.00	1.00
China	30	1.12	1.39	China	30	1.04	1.12
South Asia Sc	31	1.11	1.35	South Asia Sc	31	1.04	1.12
West Asia & ME	32	1.05	1.15	West Asia & ME	32	1.00	1.00
Turkey	33	1.00	1.00	Turkey	33	1.04	1.12
N W Europe	34	1.09	1.24	N W Europe	34	1.00	1.00
Southern Europe	35	1.09	1.24	Southern Europe	35	1.00	1.00
Central Europe	36	1.09	1.24	Central Europe	36	1.00	1.00
Baltic	37	1.00	1.00	Baltic	37	1.00	1.00
N Central Europe	38	1.09	1.24	N Central Europe	38	1.00	1.00

North Europe	39	1.00	1.00	North Europe	39	1.00	1.00
Middle East	40	1.00	1.00	Middle East	40	1.00	1.00
East Africa	41	1.05	1.15	East Africa	41	1.00	1.00
West Africa	42	1.05	1.15	West Africa	42	1.00	1.00
East Asia	43	1.25	1.66	East Asia	43	1.00	1.00
East Asia	44	1.25	1.66	East Asia	44	1.00	1.00
America E Coast	45	1.07	1.20	America E Coast	45	1.00	1.00
America West Coast	46	1.07	1.20	America West Coast	46	1.00	1.00

TABLE A.12 GROWTH FACTORS FOR 2001 AND 2010/11
COMMODITY: ORES, METALS AND STONE

IMPORT					EXPORT				
COUNTRY	ZONE	Growth Factors			COUNTRY	ZONE	Growth Factors		
		2001		2010/11				2001		2010/11
		High	Low	High	Low			High	Low	High	Low
Tadjikistan	1	1.00	1.00	1.00	1.00	Tadjikistan	1	1.20	1.06	2.00	1.60
	2	1.00	1.00	1.00	1.00		2	1.20	1.06	2.00	1.60
	3	1.00	1.00	1.00	1.00		3	1.20	1.06	2.00	1.60
Kyrgyzstan	4	1.00	1.00	1.00	1.00	Kyrgyzstan	4	1.59	1.48	3.15	2.61
Uzbekistan	7	1.30	1.17	2.42	1.77	Uzbekistan	7	1.30	1.17	2.42	1.77
	8	1.30	1.17	2.42	1.77		8	1.30	1.17	2.42	1.77
	9	1.30	1.17	2.42	1.77		9	1.30	1.17	2.42	1.77
	10	1.30	1.17	2.42	1.77		10	1.30	1.17	2.42	1.77
	11	1.30	1.17	2.42	1.77		11	1.30	1.17	2.42	1.77
Turkmenistan	12	1.00	1.00	1.00	1.00	Turkmenistan	12	1.36	1.22	2.12	1.58
	13	1.00	1.00	1.00	1.00		13	1.36	1.22	2.12	1.58
	14	1.00	1.00	1.00	1.00		14	1.36	1.22	2.12	1.58
Georgia	21	2.16	1.81	5.00	3.20	Georgia	21	2.16	1.81	5.00	3.20
Armenia	22	1.86	1.62	3.70	2.86	Armenia	22	1.86	1.62	3.70	2.86
Azerbaijan	23	1.47	1.33	4.70	3.15	Azerbaijan	23	1.47	1.33	4.70	3.15
Kazakstan	151	1.36	1.26	3.63	2.50	Kazakstan	151	1.36	1.26	3.63	2.50
	152	1.36	1.26	3.63	2.50		152	1.36	1.26	3.63	2.50
	153	1.36	1.26	3.63	2.50		153	1.36	1.26	3.63	2.50
	161	1.36	1.26	3.63	2.50		161	1.36	1.26	3.63	2.50
	162	1.36	1.26	3.63	2.50		162	1.36	1.26	3.63	2.50
	163	1.36	1.26	3.63	2.50		163	1.36	1.26	3.63	2.50
	171	1.36	1.26	3.63	2.50		171	1.36	1.26	3.63	2.50
	172	1.36	1.26	3.63	2.50		172	1.36	1.26	3.63	2.50
	173	1.36	1.26	3.63	2.50		173	1.36	1.26	3.63	2.50
	181	1.36	1.26	3.63	2.50		181	1.36	1.26	3.63	2.50
	182	1.36	1.26	3.63	2.50		182	1.36	1.26	3.63	2.50
	183	1.36	1.26	3.63	2.50		183	1.36	1.26	3.63	2.50
	184	1.36	1.26	3.63	2.50		184	1.36	1.26	3.63	2.50
	185	1.36	1.26	3.63	2.50		185	1.36	1.26	3.63	2.50
	191	1.36	1.26	3.63	2.50		191	1.36	1.26	3.63	2.50
	192	1.36	1.26	3.63	2.50		192	1.36	1.26	3.63	2.50
	201	1.36	1.26	3.63	2.50		201	1.36	1.26	3.63	2.50
	202	1.36	1.26	3.63	2.50		202	1.36	1.26	3.63	2.50
	203	1.36	1.26	3.63	2.50		203	1.36	1.26	3.63	2.50
South Russia	24	1.21	1.12	2.56	1.85	South Russia	24	1.21	1.12	2.56	1.85
North Russia	26	1.21	1.12	2.56	1.85	North Russia	26	1.21	1.12	2.56	1.85
North Russia	27	1.21	1.12	2.56	1.85	North Russia	27	1.21	1.12	2.56	1.85
North Russia	28	1.21	1.12	2.56	1.85	North Russia	28	1.21	1.12	2.56	1.85
Ukraine	29	1.21	1.12	2.56	1.85	Ukraine	29	1.21	1.12	2.56	1.85
China	30	2.30	2.08	6.50	4.50	China	30	1.65	1.55	3.75	2.75
South Asia Sc	31	1.75	1.67	3.70	3.10	South Asia Sc	31	1.00	1.00	1.00	1.00
West Asia & ME	32	1.75	1.67	3.70	3.10	West Asia & ME	32	1.00	1.00	1.00	1.00
Turkey	33	1.75	1.67	3.70	3.10	Turkey	33	1.00	1.00	1.00	1.00
N W Europe	34	1.30	1.20	2.00	1.55	N W Europe	34	1.00	1.00	1.00	1.00
Southern Europe	35	1.00	1.00	1.00	1.00	Southern Europe	35	1.00	1.00	1.00	1.00
Central Europe	36	1.00	1.00	1.00	1.00	Central Europe	36	1.00	1.00	1.00	1.00
Baltic	37	1.00	1.00	1.00	1.00	Baltic	37	1.00	1.00	1.00	1.00

N Central Europe	38	1.00	1.00	1.00	1.00	N Central Europe	38	1.00	1.00	1.00	1.00
North Europe	39	1.00	1.00	1.00	1.00	North Europe	39	1.00	1.00	1.00	1.00
Middle East	40	1.00	1.00	1.00	1.00	Middle East	40	1.00	1.00	1.00	1.00
East Africa	41	1.00	1.00	1.00	1.00	East Africa	41	1.00	1.00	1.00	1.00
West Africa	42	1.00	1.00	1.00	1.00	West Africa	42	1.00	1.00	1.00	1.00
East Asia	43	1.25	1.15	1.80	1.50	East Asia	43	1.25	1.15	1.80	1.50
East Asia	44	1.25	1.15	1.80	1.50	East Asia	44	1.25	1.15	1.80	1.50
America E Coast	45	1.25	1.15	1.80	1.50	America E Coast	45	1.25	1.15	1.80	1.50
America West Coast	46	1.25	1.15	1.80	1.50	America West Coast	46	1.25	1.15	1.80	1.50

TABLE A.13 GROWTH FACTORS FOR 2001 AND 2010/11											
COMMODITY: OIL, PETROLEUM AND MINERALS											

		IMPORT						EXPORT			
COUNTRY	ZONE	Growth Factors				COUNTRY	ZONE	Growth Factors			
		2001		2010/11				2001		2010/11	
		High	Low	High	Low			High	Low	High	Low
Tadjikistan	1	1.19	1.06	1.97	1.55	Tadjikistan	1	1.00	1.00	1.00	1.00
	2	1.19	1.06	1.97	1.55		2	1.00	1.00	1.00	1.00
	3	1.19	1.06	1.97	1.55		3	1.00	1.00	1.00	1.00
Kyrgyzstan	4	1.59	1.48	3.15	2.61	Kyrgyzstan	4	1.00	1.00	1.00	1.00
Uzbekistan	7	1.30	1.17	2.42	1.77	Uzbekistan	7	1.00	1.00	1.00	1.00
	8	1.30	1.17	2.42	1.77		8	1.00	1.00	1.00	1.00
	9	1.30	1.17	2.42	1.77		9	1.00	1.00	1.00	1.00
	10	1.30	1.17	2.42	1.77		10	1.00	1.00	1.00	1.00
	11	1.30	1.17	2.42	1.77		11	1.00	1.00	1.00	1.00
Turkmenistan	12	1.36	1.22	3.63	2.50	Turkmenistan	12	1.00	1.00	1.00	1.00
	13	1.36	1.22	3.63	2.50		13	1.00	1.00	1.00	1.00
	14	1.36	1.22	3.63	2.50		14	1.00	1.00	1.00	1.00
Georgia	21	2.16	1.81	5.11	3.19	Georgia	21	1.00	1.00	1.00	1.00
Armenia	22	1.86	1.63	3.70	2.86	Armenia	22	1.00	1.00	1.00	1.00
Azerbaijan	23	1.00	1.00	1.00	1.00	Azerbaijan	23	3.00	2.00	5.00	4.00
Kazakstan	151	1.36	1.26	3.63	2.50	Kazakstan	151	1.00	1.00	1.00	1.00
	152	1.00	1.00	1.00	1.00		152	4.00	3.00	4.00	3.00
	153	1.00	1.00	1.00	1.00		153	4.00	3.00	4.00	3.00
	161	1.36	1.26	3.63	2.50		161	1.00	1.00	1.00	1.00
	162	1.36	1.26	3.63	2.50		162	1.00	1.00	1.00	1.00
	163	1.00	1.00	1.00	1.00		163	4.00	3.00	4.00	3.00
	171	1.36	1.26	3.63	2.50		171	1.00	1.00	1.00	1.00
	172	1.36	1.26	3.63	2.50		172	1.00	1.00	1.00	1.00
	173	1.36	1.26	3.63	2.50		173	1.36	1.26	3.63	2.50
	181	1.36	1.26	3.63	2.50		181	1.00	1.00	1.00	1.00
	182	1.36	1.26	3.63	2.50		182	1.00	1.00	1.00	1.00
	183	1.36	1.26	3.63	2.50		183	1.00	1.00	1.00	1.00
	184	1.36	1.26	3.63	2.50		184	1.36	1.26	3.63	2.50
	185	1.36	1.26	3.63	2.50		185	1.00	1.00	1.00	1.00
	191	1.36	1.26	3.63	2.50		191	1.36	1.26	3.63	2.50
	192	1.36	1.26	3.63	2.50		192	1.00	1.00	1.00	1.00
	201	1.36	1.26	3.63	2.50		201	1.00	1.00	1.00	1.00
	202	1.36	1.26	3.63	2.50		202	1.00	1.00	1.00	1.00
	203	1.36	1.26	3.63	2.50		203	1.00	1.00	1.00	1.00
South Russia	24	1.21	1.12	2.56	1.85	South Russia	24	1.21	1.12	2.56	1.85
North Russia	26	1.21	1.12	2.56	1.85	North Russia	26	1.21	1.12	2.56	1.85
North Russia	27	1.21	1.12	2.56	1.85	North Russia	27	1.21	1.12	2.56	1.85
North Russia	28	1.21	1.12	2.56	1.85	North Russia	28	1.21	1.12	2.56	1.85
Ukraine	29	1.21	1.12	2.56	1.85	Ukraine	29	1.21	1.12	2.56	1.85
China	30	2.30	2.08	6.49	4.52	China	30	1.00	1.00	1.00	1.00
South Asia Sc	31	1.75	1.67	3.70	3.12	South Asia Sc	31	1.00	1.00	1.00	1.00
West Asia & ME	32	1.00	1.00	1.00	1.00	West Asia & ME	32	1.00	1.00	1.00	1.00
Turkey	33	1.75	1.67	3.70	3.12	Turkey	33	1.00	1.00	1.00	1.00
N W Europe	34	1.29	1.19	2.00	1.54	N W Europe	34	1.00	1.00	1.00	1.00
Southern Europe	35	1.42	1.32	2.65	2.05	Southern Europe	35	1.00	1.00	1.00	1.00
Central Europe	36	1.42	1.32	2.65	2.05	Central Europe	36	1.00	1.00	1.00	1.00
Baltic	37	1.42	1.32	2.65	2.05	Baltic	37	1.00	1.00	1.00	1.00

N Central Europe	38	1.42	1.32	2.65	2.05	N Central Europe	38	1.00	1.00	1.00	1.00
North Europe	39	1.29	1.19	2.00	1.54	North Europe	39	1.00	1.00	1.00	1.00
Middle East	40	1.00	1.00	1.00	1.00	Middle East	40	1.00	1.00	1.00	1.00
East Africa	41	1.00	1.00	1.00	1.00	East Africa	41	1.00	1.00	1.00	1.00
West Africa	42	1.00	1.00	1.00	1.00	West Africa	42	1.00	1.00	1.00	1.00
East Asia	43	1.23	1.15	1.80	1.49	East Asia	43	1.00	1.00	1.00	1.00
East Asia	44	1.23	1.15	1.80	1.49	East Asia	44	1.00	1.00	1.00	1.00
America E Coast	45	1.23	1.15	1.80	1.49	America E Coast	45	1.00	1.00	1.00	1.00
America West Coast	46	1.23	1.15	1.80	1.49	America West Coast	46	1.00	1.00	1.00	1.00

TABLE A.14 GROWTH FACTORS FOR 2001 AND 2010/11										
COMMODITY: WOOD, CONSTRUCTION PLANT, EQUIPMENT, MACHINERY										

IMPORT						EXPORT					
COUNTRY	ZONE	Growth Factors				COUNTRY	ZONE	Growth Factors			
		2001		2010/11				2001		2010/11	
		High	Low	High	Low			High	Low	High	Low
Tadjikistan	1	1.18	1.06	1.97	1.55	Tadjikistan	1	1.18	1.06	1.97	1.55
	2	1.18	1.06	1.97	1.55		2	1.18	1.06	1.97	1.55
	3	1.18	1.06	1.97	1.55		3	1.18	1.06	1.97	1.55
Kyrgyzstan	4	1.59	1.48	3.63	2.61	Kyrgyzstan	4	1.59	1.48	3.63	2.61
Uzbekistan	7	1.30	1.17	2.42	1.77	Uzbekistan	7	1.30	1.17	2.42	1.77
	8	1.30	1.17	2.42	1.77		8	1.30	1.17	2.42	1.77
	9	1.30	1.17	2.42	1.77		9	1.30	1.17	2.42	1.77
	10	1.30	1.17	2.42	1.77		10	1.30	1.17	2.42	1.77
	11	1.30	1.17	2.42	1.77		11	1.30	1.17	2.42	1.77
Turkmenistan	12	1.36	1.22	2.42	1.58	Turkmenistan	12	1.36	1.22	2.42	1.58
	13	1.36	1.22	2.42	1.58		13	1.36	1.22	2.42	1.58
	14	1.36	1.22	2.42	1.58		14	1.36	1.22	2.42	1.58
Georgia	21	2.16	1.81	5.11	3.18	Georgia	21	2.16	1.81	5.11	3.18
Armenia	22	1.86	1.63	3.70	2.86	Armenia	22	1.86	1.63	3.70	2.86
Azerbaijan	23	1.47	1.33	4.68	3.15	Azerbaijan	23	1.47	1.33	4.68	3.15
Kazakstan	151	1.36	1.26	3.63	2.50	Kazakstan	151	1.36	1.26	3.63	2.50
	152	1.36	1.26	3.63	2.50		152	1.36	1.26	3.63	2.50
	153	1.36	1.26	3.63	2.50		153	1.36	1.26	3.63	2.50
	161	1.36	1.26	3.63	2.50		161	1.36	1.26	3.63	2.50
	162	1.36	1.26	3.63	2.50		162	1.36	1.26	3.63	2.50
	163	1.36	1.26	3.63	2.50		163	1.36	1.26	3.63	2.50
	171	1.36	1.26	3.63	2.50		171	1.36	1.26	3.63	2.50
	172	1.36	1.26	3.63	2.50		172	1.36	1.26	3.63	2.50
	173	1.36	1.26	3.63	2.50		173	1.36	1.26	3.63	2.50
	181	1.36	1.26	3.63	2.50		181	1.36	1.26	3.63	2.50
	182	1.36	1.26	3.63	2.50		182	1.36	1.26	3.63	2.50
	183	1.36	1.26	3.63	2.50		183	1.36	1.26	3.63	2.50
	184	1.36	1.26	3.63	2.50		184	1.36	1.26	3.63	2.50
	185	1.36	1.26	3.63	2.50		185	1.36	1.26	3.63	2.50
	191	1.36	1.26	3.63	2.50		191	1.36	1.26	3.63	2.50
	192	1.36	1.26	3.63	2.50		192	1.36	1.26	3.63	2.50
	201	1.36	1.26	3.63	2.50		201	1.36	1.26	3.63	2.50
	202	1.36	1.26	3.63	2.50		202	1.36	1.26	3.63	2.50
	203	1.36	1.26	3.63	2.50		203	1.36	1.26	3.63	2.50
South Russia	24	1.21	1.12	2.56	1.85	South Russia	24	1.21	1.12	2.56	1.85
North Russia	26	1.21	1.12	2.56	1.85	North Russia	26	1.21	1.12	2.56	1.85
North Russia	27	1.21	1.12	2.56	1.85	North Russia	27	1.21	1.12	2.56	1.85
North Russia	28	1.21	1.12	2.56	1.85	North Russia	28	1.21	1.12	2.56	1.85
Ukraine	29	1.21	1.12	2.56	1.85	Ukraine	29	1.21	1.12	2.56	1.85
China	30	2.29	2.08	6.49	4.52	China	30	2.29	2.08	6.49	4.52
South Asia Sc	31	1.75	1.67	3.70	3.12	South Asia Sc	31	1.75	1.67	3.70	3.12
West Asia & ME	32	1.75	1.67	3.70	3.12	West Asia & ME	32	1.75	1.67	3.70	3.12
Turkey	33	1.75	1.67	3.70	3.12	Turkey	33	1.75	1.67	3.70	3.12
N W Europe	34	1.29	1.19	2.00	1.54	N W Europe	34	1.29	1.19	2.00	1.54
Southern Europe	35	1.42	1.32	2.65	2.05	Southern Europe	35	1.42	1.32	2.65	2.05
Central Europe	36	1.42	1.32	2.65	2.05	Central Europe	36	1.42	1.32	2.65	2.05
Baltic	37	1.42	1.32	2.65	2.05	Baltic	37	1.42	1.32	2.65	2.05

N Central Europe	38	1.42	1.32	2.65	2.05	N Central Europe	38	1.42	1.32	2.65	2.05
North Europe	39	1.29	1.19	2.00	1.54	North Europe	39	1.29	1.19	2.00	1.54
Middle East	40	1.75	1.67	3.70	3.12	Middle East	40	1.75	1.67	3.70	3.12
East Africa	41	1.75	1.67	3.70	3.12	East Africa	41	1.75	1.67	3.70	3.12
West Africa	42	1.00	1.00	1.00	1.00	West Africa	42	1.00	1.00	1.00	1.00
East Asia	43	1.23	1.15	1.80	1.49	East Asia	43	1.23	1.15	1.80	1.49
East Asia	44	1.23	1.15	1.80	1.49	East Asia	44	1.23	1.15	1.80	1.49
America E Coast	45	1.23	1.15	1.80	1.49	America E Coast	45	1.23	1.15	1.80	1.49
America West Coast	46	1.23	1.15	1.80	1.49	America West Coast	46	1.23	1.15	1.80	1.49

TABLE A.15 GROWTH FACTORS FOR 2001 AND 2010/11										
COMMODITY:	DRY BULK									

IMPORT					EXPORT					
COUNTRY	ZONE	Growth Factors				COUNTRY	ZONE	Growth Factors			
		2001		2010/11				2001		2010/11	
		High	Low	High	Low			High	Low	High	Low
Tadjikistan	1	1.18	1.06	1.97	1.55	Tadjikistan	1	1.18	1.06	1.97	1.55
	2	1.18	1.06	1.97	1.55		2	1.18	1.06	1.97	1.55
	3	1.18	1.06	1.97	1.55		3	1.18	1.06	1.97	1.55
Kyrgyzstan	4	1.59	1.48	3.63	2.61	Kyrgyzstan	4	1.59	1.48	3.63	2.61
Uzbekistan	7	1.30	1.17	2.42	1.77	Uzbekistan	7	1.30	1.17	2.42	1.77
	8	1.30	1.17	2.42	1.77		8	1.30	1.17	2.42	1.77
	9	1.30	1.17	2.42	1.77		9	1.30	1.17	2.42	1.77
	10	1.30	1.17	2.42	1.77		10	1.30	1.17	2.42	1.77
	11	1.30	1.17	2.42	1.77		11	1.30	1.17	2.42	1.77
Turkmenistan	12	1.36	1.22	2.42	1.58	Turkmenistan	12	1.36	1.22	2.42	1.58
	13	1.36	1.22	2.42	1.58		13	1.36	1.22	2.42	1.58
	14	1.36	1.22	2.42	1.58		14	1.36	1.22	2.42	1.58
Georgia	21	2.16	1.81	5.11	3.18	Georgia	21	2.16	1.81	5.11	3.18
Armenia	22	1.86	1.63	3.70	2.86	Armenia	22	1.86	1.63	3.70	2.86
Azerbaijan	23	1.47	1.33	4.68	3.15	Azerbaijan	23	1.47	1.33	4.68	3.15
Kazakstan	151	1.36	1.26	3.63	2.50	Kazakstan	151	1.36	1.26	3.63	2.50
	152	1.36	1.26	3.63	2.50		152	1.36	1.26	3.63	2.50
	153	1.36	1.26	3.63	2.50		153	1.36	1.26	3.63	2.50
	161	1.36	1.26	3.63	2.50		161	1.36	1.26	3.63	2.50
	162	1.36	1.26	3.63	2.50		162	1.36	1.26	3.63	2.50
	163	1.36	1.26	3.63	2.50		163	1.36	1.26	3.63	2.50
	171	1.36	1.26	3.63	2.50		171	1.36	1.26	3.63	2.50
	172	1.36	1.26	3.63	2.50		172	1.36	1.26	3.63	2.50
	173	1.36	1.26	3.63	2.50		173	1.36	1.26	3.63	2.50
	181	1.36	1.26	3.63	2.50		181	1.36	1.26	3.63	2.50
	182	1.36	1.26	3.63	2.50		182	1.36	1.26	3.63	2.50
	183	1.36	1.26	3.63	2.50		183	1.36	1.26	3.63	2.50
	184	1.36	1.26	3.63	2.50		184	1.36	1.26	3.63	2.50
	185	1.36	1.26	3.63	2.50		185	1.36	1.26	3.63	2.50
	191	1.36	1.26	3.63	2.50		191	1.36	1.26	3.63	2.50
	192	1.36	1.26	3.63	2.50		192	1.36	1.26	3.63	2.50
	201	1.36	1.26	3.63	2.50		201	1.36	1.26	3.63	2.50
	202	1.36	1.26	3.63	2.50		202	1.36	1.26	3.63	2.50
	203	1.36	1.26	3.63	2.50		203	1.36	1.26	3.63	2.50
South Russia	24	1.21	1.12	2.56	1.85	South Russia	24	1.21	1.12	2.56	1.85
North Russia	26	1.21	1.12	2.56	1.85	North Russia	26	1.21	1.12	2.56	1.85
North Russia	27	1.21	1.12	2.56	1.85	North Russia	27	1.21	1.12	2.56	1.85
North Russia	28	1.21	1.12	2.56	1.85	North Russia	28	1.21	1.12	2.56	1.85
Ukraine	29	1.21	1.12	2.56	1.85	Ukraine	29	1.21	1.12	2.56	1.85
China	30	2.29	2.08	6.49	4.52	China	30	2.29	2.08	6.49	4.52
South Asia Sc	31	1.75	1.67	3.70	3.12	South Asia Sc	31	1.75	1.67	3.70	3.12
West Asia & ME	32	1.75	1.67	3.70	3.12	West Asia & ME	32	1.75	1.67	3.70	3.12
Turkey	33	1.75	1.67	3.70	3.12	Turkey	33	1.75	1.67	3.70	3.12
N W Europe	34	1.29	1.19	2.00	1.54	N W Europe	34	1.29	1.19	2.00	1.54
Southern Europe	35	1.42	1.32	2.65	2.05	Southern Europe	35	1.42	1.32	2.65	2.05
Central Europe	36	1.42	1.32	2.65	2.05	Central Europe	36	1.42	1.32	2.65	2.05
Baltic	37	1.42	1.32	2.65	2.05	Baltic	37	1.42	1.32	2.65	2.05

N Central Europe	38	1.42	1.32	2.65	2.05	N Central Europe	38	1.42	1.32	2.65	2.05
North Europe	39	1.29	1.19	2.00	1.54	North Europe	39	1.29	1.19	2.00	1.54
Middle East	40	1.75	1.67	3.70	3.12	Middle East	40	1.75	1.67	3.70	3.12
East Africa	41	1.75	1.67	3.70	3.12	East Africa	41	1.75	1.67	3.70	3.12
West Africa	42	1.00	1.00	1.00	1.00	West Africa	42	1.00	1.00	1.00	1.00
East Asia	43	1.23	1.15	1.80	1.49	East Asia	43	1.23	1.15	1.80	1.49
East Asia	44	1.23	1.15	1.80	1.49	East Asia	44	1.23	1.15	1.80	1.49
America E Coast	45	1.23	1.15	1.80	1.49	America E Coast	45	1.23	1.15	1.80	1.49
America West Coast	46	1.23	1.15	1.80	1.49	America West Coast	46	1.23	1.15	1.80	1.49

TABLE A.16 GROWTH FACTORS FOR 2001 AND 2010/11										
COMMODITY:	VEHICLES										

IMPORT					EXPORT					
COUNTRY	ZONE	Growth Factors				COUNTRY	ZONE	Growth Factors			
		2001		2010/11				2001		2010/11	
		High	Low	High	Low			High	Low	High	Low
Tadjikistan	1	1.18	1.06	1.97	1.55	Tadjikistan	1	1.00	1.00	1.00	1.00
	2	1.18	1.06	1.97	1.55		2	1.00	1.00	1.00	1.00
	3	1.18	1.06	1.97	1.55		3	1.00	1.00	1.00	1.00
Kyrgyzstan	4	1.59	1.48	3.63	2.61	Kyrgyzstan	4	1.00	1.00	1.00	1.00
Uzbekistan	7	1.20	1.10	1.95	1.52	Uzbekistan	7	1.30	1.17	2.42	1.77
	8	1.20	1.10	1.95	1.52		8	1.30	1.17	2.42	1.77
	9	1.20	1.10	1.95	1.52		9	1.30	1.17	2.42	1.77
	10	1.20	1.10	1.95	1.52		10	1.30	1.17	2.42	1.77
	11	1.20	1.10	1.95	1.52		11	1.30	1.17	2.42	1.77
Turkmenistan	12	1.36	1.22	2.42	1.58	Turkmenistan	12	1.00	1.00	1.00	1.00
	13	1.36	1.22	2.42	1.58		13	1.00	1.00	1.00	1.00
	14	1.36	1.22	2.42	1.58		14	1.00	1.00	1.00	1.00
Georgia	21	2.16	1.81	5.11	3.18	Georgia	21	1.00	1.00	1.00	1.00
Armenia	22	1.86	1.63	3.70	2.86	Armenia	22	1.00	1.00	1.00	1.00
Azerbaijan	23	1.47	1.33	4.68	3.15	Azerbaijan	23	1.00	1.00	1.00	1.00
Kazakstan	151	1.36	1.26	3.63	2.50	Kazakstan	151	1.00	1.00	1.00	1.00
	152	1.36	1.26	3.63	2.50		152	1.00	1.00	1.00	1.00
	153	1.36	1.26	3.63	2.50		153	1.00	1.00	1.00	1.00
	161	1.36	1.26	3.63	2.50		161	1.00	1.00	1.00	1.00
	162	1.36	1.26	3.63	2.50		162	1.00	1.00	1.00	1.00
	163	1.36	1.26	3.63	2.50		163	1.00	1.00	1.00	1.00
	171	1.36	1.26	3.63	2.50		171	1.00	1.00	1.00	1.00
	172	1.36	1.26	3.63	2.50		172	1.00	1.00	1.00	1.00
	173	1.36	1.26	3.63	2.50		173	1.00	1.00	1.00	1.00
	181	1.36	1.26	3.63	2.50		181	1.00	1.00	1.00	1.00
	182	1.36	1.26	3.63	2.50		182	1.00	1.00	1.00	1.00
	183	1.36	1.26	3.63	2.50		183	1.00	1.00	1.00	1.00
	184	1.36	1.26	3.63	2.50		184	1.00	1.00	1.00	1.00
	185	1.36	1.26	3.63	2.50		185	1.00	1.00	1.00	1.00
	191	1.36	1.26	3.63	2.50		191	1.00	1.00	1.00	1.00
	192	1.36	1.26	3.63	2.50		192	1.00	1.00	1.00	1.00
	201	1.36	1.26	3.63	2.50		201	1.00	1.00	1.00	1.00
	202	1.36	1.26	3.63	2.50		202	1.00	1.00	1.00	1.00
	203	1.36	1.26	3.63	2.50		203	1.00	1.00	1.00	1.00
South Russia	24	1.21	1.12	2.56	1.85	South Russia	24	1.21	1.12	2.56	1.85
North Russia	26	1.21	1.12	2.56	1.85	North Russia	26	1.21	1.12	2.56	1.85
North Russia	27	1.21	1.12	2.56	1.85	North Russia	27	1.21	1.12	2.56	1.85
North Russia	28	1.21	1.12	2.56	1.85	North Russia	28	1.21	1.12	2.56	1.85
Ukraine	29	1.21	1.12	2.56	1.85	Ukraine	29	1.21	1.12	2.56	1.85
China	30	2.29	2.08	6.49	4.52	China	30	2.29	2.08	6.49	4.52
South Asia Sc	31	1.00	1.00	1.00	1.00	South Asia Sc	31	1.75	1.67	3.70	3.12
West Asia & ME	32	1.00	1.00	1.00	1.00	West Asia & ME	32	1.75	1.67	3.70	3.12
Turkey	33	1.00	1.00	1.00	1.00	Turkey	33	1.75	1.67	3.70	3.12
N W Europe	34	1.00	1.00	1.00	1.00	N W Europe	34	1.29	1.19	2.00	1.54
Southern Europe	35	1.00	1.00	1.00	1.00	Southern Europe	35	1.42	1.32	2.65	2.05
Central Europe	36	1.00	1.00	1.00	1.00	Central Europe	36	1.42	1.32	2.65	2.05
Baltic	37	1.00	1.00	1.00	1.00	Baltic	37	1.00	1.00	1.00	1.00

N Central Europe	38	1.00	1.00	1.00	1.00	N Central Europe	38	1.42	1.32	2.65	2.05
North Europe	39	1.00	1.00	1.00	1.00	North Europe	39	1.29	1.19	2.00	1.54
Middle East	40	1.00	1.00	1.00	1.00	Middle East	40	1.00	1.00	1.00	1.00
East Africa	41	1.00	1.00	1.00	1.00	East Africa	41	1.00	1.00	1.00	1.00
West Africa	42	1.00	1.00	1.00	1.00	West Africa	42	1.00	1.00	1.00	1.00
East Asia	43	1.00	1.00	1.00	1.00	East Asia	43	1.23	1.15	1.80	1.49
East Asia	44	1.00	1.00	1.00	1.00	East Asia	44	1.23	1.15	1.80	1.49
America E Coast	45	1.00	1.00	1.00	1.00	America E Coast	45	1.23	1.15	1.80	1.49
America West Coast	46	1.00	1.00	1.00	1.00	America West Coast	46	1.23	1.15	1.80	1.49

TABLE A.17 GROWTH FACTORS FOR 2001 AND 2010/11
COMMODITY: OTHER CONSUMER GOODS

		IMPORT						EXPORT			
COUNTRY	ZONE	Growth Factors				COUNTRY	ZONE	Growth Factors			
		2001		2010/11				2001		2010/11	
		High	Low	High	Low			High	Low	High	Low
Tadjikistan	1	1.18	1.06	1.97	1.55	Tadjikistan	1	1.18	1.06	1.97	1.55
	2	1.18	1.06	1.97	1.55		2	1.18	1.06	1.97	1.55
	3	1.18	1.06	1.97	1.55		3	1.18	1.06	1.97	1.55
Kyrgyzstan	4	1.59	1.48	3.63	2.61	Kyrgyzstan	4	1.59	1.48	3.63	2.61
Uzbekistan	7	1.30	1.17	2.42	1.77	Uzbekistan	7	1.30	1.17	2.42	1.77
	8	1.30	1.17	2.42	1.77		8	1.30	1.17	2.42	1.77
	9	1.30	1.17	2.42	1.77		9	1.30	1.17	2.42	1.77
	10	1.30	1.17	2.42	1.77		10	1.30	1.17	2.42	1.77
	11	1.30	1.17	2.42	1.77		11	1.30	1.17	2.42	1.77
Turkmenistan	12	1.36	1.22	2.42	1.58	Turkmenistan	12	1.36	1.22	2.42	1.58
	13	1.36	1.22	2.42	1.58		13	1.36	1.22	2.42	1.58
	14	1.36	1.22	2.42	1.58		14	1.36	1.22	2.42	1.58
Georgia	21	2.16	1.81	5.11	3.18	Georgia	21	2.16	1.81	5.11	3.18
Armenia	22	1.86	1.63	3.70	2.86	Armenia	22	1.86	1.63	3.70	2.86
Azerbaijan	23	1.47	1.33	4.68	3.15	Azerbaijan	23	1.47	1.33	4.68	3.15
Kazakstan	151	1.36	1.26	3.63	2.50	Kazakstan	151	1.36	1.26	3.63	2.50
	152	1.36	1.26	3.63	2.50		152	1.36	1.26	3.63	2.50
	153	1.36	1.26	3.63	2.50		153	1.36	1.26	3.63	2.50
	161	1.36	1.26	3.63	2.50		161	1.36	1.26	3.63	2.50
	162	1.36	1.26	3.63	2.50		162	1.36	1.26	3.63	2.50
	163	1.36	1.26	3.63	2.50		163	1.36	1.26	3.63	2.50
	171	1.36	1.26	3.63	2.50		171	1.36	1.26	3.63	2.50
	172	1.36	1.26	3.63	2.50		172	1.36	1.26	3.63	2.50
	173	1.36	1.26	3.63	2.50		173	1.36	1.26	3.63	2.50
	181	1.36	1.26	3.63	2.50		181	1.36	1.26	3.63	2.50
	182	1.36	1.26	3.63	2.50		182	1.36	1.26	3.63	2.50
	183	1.36	1.26	3.63	2.50		183	1.36	1.26	3.63	2.50
	184	1.36	1.26	3.63	2.50		184	1.36	1.26	3.63	2.50
	185	1.36	1.26	3.63	2.50		185	1.36	1.26	3.63	2.50
	191	1.36	1.26	3.63	2.50		191	1.36	1.26	3.63	2.50
	192	1.36	1.26	3.63	2.50		192	1.36	1.26	3.63	2.50
	201	1.36	1.26	3.63	2.50		201	1.36	1.26	3.63	2.50
	202	1.36	1.26	3.63	2.50		202	1.36	1.26	3.63	2.50
	203	1.36	1.26	3.63	2.50		203	1.36	1.26	3.63	2.50
South Russia	24	1.21	1.12	2.56	1.85	South Russia	24	1.21	1.12	2.56	1.85
North Russia	26	1.21	1.12	2.56	1.85	North Russia	26	1.21	1.12	2.56	1.85
North Russia	27	1.21	1.12	2.56	1.85	North Russia	27	1.21	1.12	2.56	1.85
North Russia	28	1.21	1.12	2.56	1.85	North Russia	28	1.21	1.12	2.56	1.85
Ukraine	29	1.21	1.12	2.56	1.85	Ukraine	29	1.21	1.12	2.56	1.85
China	30	2.29	2.08	6.49	4.52	China	30	2.29	2.08	6.49	4.52
South Asia Sc	31	1.75	1.67	3.70	3.12	South Asia Sc	31	1.75	1.67	3.70	3.12
West Asia & ME	32	1.75	1.67	3.70	3.12	West Asia & ME	32	1.75	1.67	3.70	3.12
Turkey	33	1.75	1.67	3.70	3.12	Turkey	33	1.75	1.67	3.70	3.12
N W Europe	34	1.29	1.19	2.00	1.54	N W Europe	34	1.29	1.19	2.00	1.54
Southern Europe	35	1.42	1.32	2.65	2.05	Southern Europe	35	1.42	1.32	2.65	2.05
Central Europe	36	1.42	1.32	2.65	2.05	Central Europe	36	1.42	1.32	2.65	2.05
Baltic	37	1.42	1.32	2.65	2.05	Baltic	37	1.42	1.32	2.65	2.05

N Central Europe	38	1.42	1.32	2.65	2.05	N Central Europe	38	1.42	1.32	2.65	2.05
North Europe	39	1.29	1.19	2.00	1.54	North Europe	39	1.29	1.19	2.00	1.54
Middle East	40	1.75	1.67	3.70	3.12	Middle East	40	1.75	1.67	3.70	3.12
East Africa	41	1.75	1.67	3.70	3.12	East Africa	41	1.75	1.67	3.70	3.12
West Africa	42	1.00	1.00	1.00	1.00	West Africa	42	1.00	1.00	1.00	1.00
East Asia	43	1.23	1.15	1.80	1.49	East Asia	43	1.23	1.15	1.80	1.49
East Asia	44	1.23	1.15	1.80	1.49	East Asia	44	1.23	1.15	1.80	1.49
America E Coast	45	1.23	1.15	1.80	1.49	America E Coast	45	1.23	1.15	1.80	1.49
America West Coast	46	1.23	1.15	1.80	1.49	America West Coast	46	1.23	1.15	1.80	1.49

APPENDIX B

Case Study Definitions

WS/Atkins

B. CASE STUDY DEFINITIONS

B.1   The objective of the case study tests is two fold:

- identify the traffic impacts of different transport investments on strategic freight flows on the TRACECA corridor; and

- involve the local partners in applying the model to provide inputs into the analysis and feasibility assessment of transport investments.

B.2   During Phase 3 of the study the intention is to undertake a series of case study tests as an integral part of further working sessions with small groups of local technical partners.

B.3   Discussions held with the Tacis Co-ordinating Consultants on 25 April 1997 has, subject to verification during the June seminars, identified the range of tests to be carried out during the remainder of the project.

B.4   A structured approach to the testing is essential in order to maintain consistency and logic in the interpretation of the effects of both individual investments **and** of different combinations of investments.

B.5   The first stage in the testing is to produce future year freight flows with no investments in the network.

B.6   We propose that the second stage of testing is to produce future year freight flows with those existing links, currently closed for political reasons, reopened where considered appropriate. This should also include any network modifications implemented since 1995 including the Saraks to Bandar Abbas rail link opened in 1996. This will provide a more reasonable reference against which to assess the impacts of different investments in the network.

B.7 We propose that the third stage of testing should focus on investigating a range of projects designed to improve the TRACECA corridor, including comparisons with forecasts produced with other current TRACECA projects. This comprises:

- upgrading of the Caucasian railways (including projects identified in the TEWET TRACECA project);

- improvements to the Caucasian roads (including projects identified in the Kocks TRACECA project);

- tariff restructuring (based on findings of SISIE, TRACECA, tariffication simulation study);

- improvements in intermodal transport terminals (based on findings of the BCEOM TRACECA project);

- Poti and Batumi port improvements with enhanced links to Odessa, Varna, Constanza, Piraens, Rhine Main-Danube (based on the Terms of Reference for the Poti Port TRACECA Project);

- Caspian Sea shipping improvements (Baku-Turkmenisatn-Aktau);

- Chardzou bridge scheme (based on DE Consult's TRACECA project);

- Aktau-Beniu rail infrastructure project (based on DE Consult's existing TRACECA project);

- New rail links and improved road links to China (Kashgar) from Tashkent, Bishkek and Dushanbe the latter includes Gikorski Mountain Tunnel and Karakorum Highway;

- new rail links between Djezkazgan and Arkalyk (Kazakstan) and Djezkazgan and Kzyl-Orda (Uzbekistan);

- new links between Tadjikistan and China. (Murqab to Kul'ma, Kulyab to Zigar) to avoid section on M41 towards Charog which closes for several months during the winter.

B.8   We propose that the fourth stage of testing should focus on investigating the traffic effects of various projects designed to enhance north-south corridors. This comprises:

- north-south road and rail links in the Caucasus (including links through Sarpi, Vale, Megri, Dzulfa and Abkhazia;

- north-south links between Aktau and Iran through Turkmenistan.

B.9   The fifth and final stage of testing will need to examine the extent to which projects are interdependent, the extent to which projects in combination produce complementary traffic effects and the extent to which projects compete for the same traffic.

B.10   The precise specification of these tests will be developed during the seminars and workshops scheduled for the latter half of June and will be developed through further discussions with the TRACECA Co-ordination Team over this same period.

APPENDIX C

SEMINAR AND WORKSHOP STRUCTURE AND CONTENT

WS/Atkins

TRACECA REGIONAL DATABASE
TRAFFIC FOECASTING MODEL

INTRODUCTORY SEMINARS AND WORKSHOPS

ON THE

DATABASE, TRAFIC MODEL AND FORECASTING PROCEDURES

GENERAL SEMINAR PROGRAMME   **ASHGABAD 16-20 JUNE**

TBLISI 23-26 JUNE

Day One   2.00 pm Registration of participants, issue or workshop materials

Welcome,   Introduction of the Team and the Seminar Programme
             - Geoff Lawson/ Dr. Andy Southern

             Introductory remarks by a representative of the host
             country Government

Session 1   General introduction to modelling and application to
             TRACECA - Geoff Lawson/ Dr. Andy Southern

Session 2   Development and calibration of the Base Year (1995)
             TRACECA freight Traffic Model - Peter George

Session 3   Forecasting future economic growth and trade flows
             Geoff Lawson/Dr Andy Southern

Session 4   Preparing forecasts of future freight demands and routes
             with the Model - Dr Andy Southern

Day Two   9.00 am

Session 5   Introduction to databases - Jeremy Bunford

Session 6   Collection of data for the TRACECA Database
             Paul Pezant/Peter George

Session 7   Building up the TRACECA Database
             Jeremy Bunford

Lunch

Session 8   Maintaining and updating the TRACECA Database
                 Jeremy Bunford

Session 9   Maintaining and updating the Model (TRACECA Model
                 User Group) - Dr Andy Southern/Jeremy Bunford

Session 10   Discussion:

- data
- economic forecasting
- maintenance and operation of the database and model
- proposals from each of the Participating Countries for case studies and projects for evaluation with the model.

Day Three

Session 11 & 12   Workshops with examples of:

•	use of database	Jeremy Bunford
•	running the model	Peter George
•	modifying the networks	Peter George
•	coding	Sasha Bogdanchicova/ Jeremy Bunford
•	changing tariffs	Peter George
•	changing the matrix	Jeremy Bunford
•	analysing results from the model	Peter George

Day Four

Session 13   Further workshop sessions as required and discussion on
                 practical aspects of the database and the model applications

APPENDIX D

Project Planning Tables

TABLE 1

OVERALL PLAN OF OPERATIONS

Project title: Regional Traffic Database and Forecasting Model	Country: TRACECA States	Proj no:WW.93.05/05.01/B008
Planning period: January 1996 - September 1997	Prepared: June 1997	EU Lead Consultant: WS Atkins International Ltd.

Project objectives: development and implementation of a traffic database and forecasting model

NO.	MAIN ACTIVITIES	TIME FRAME 1996 Q1	Q2	Q3	Q4	1997 Q1	Q2	Q3	Q4	INPUTS PERSONNEL EU Experts (weeks)	Local Experts (weeks)	FLIGHTS Long haul (flights)	Local (flights)	PERDIEM (days)
1	Mobilisation/Inception	XXXX								25	10	3	5	50
2	Data Acquisition & Storage		XXX	XX						41	162	7	15	140
3	Scenarios & Database Development				XXX	XX				18	110	4	20	120
4	Synoptic Forecasts/ Investment Options						XXX	XX		20	82	4	20	120
5	Implementation/ Handover						X	XXX		18	50	4	20	120
6	Final Report							XX	X	6	30	3	10	50
	TOTAL									128	444	25	90	600

08/07/97

TABLE 2

OVERALL OUTPUT PERFORMANCE PLAN

Project title: Regional Traffic Database and Forecasting Model	Proj no:WW.93.05/05.01/B008	Country: TRACECA States
Planning period: January 1996 - September 1997	Prepared: June 1997	EU Lead Consultant: WS Atkins International Ltd.
Output /target dates	Agreed Objective Verifiable Indicators	Constraints and Assumptions
Inception mission and Report (month 3) Data acquisition and storage: Progress Report I (month 8) Development of database/model: Progress Report II (month 13) Synoptic reports, development of investment options: Progress Report III (month 17) Handover of software and support missions: Draft Final Report (month 21) Final Report (month 24)	For all reports: - agreement and support of local partners - completion of tasks For database/model: - ease of use by local partners - quality of output - sustainability	Main constraints: - availability of suitable data - availability of suitable local experts - level of co-operation of local authorities Main assumptions: - sufficient degree of local co-operation - traffic forecasting is feasible in the region

07/07/97

TABLE 3

PROJECT PROGRESS REPORT: LAST PERIOD

Project title: Regional Traffic Database and Forecasting Model	Country: TRACECA States
Planning period: January 1996 - September 1997	EU Lead Consultant: WS Atkins International Ltd.

Project objectives: development and implementation of a traffic database and forecasting model

NO.	MAIN ACTIVITIES	TIME FRAME 1997 APR	MAY	JUNE	INPUTS PERSONNEL EU Experts (weeks) Pln'd	Act'l	Local Experts (weeks) Pln'd	Act'l	FLIGHTS Long haul (flights) Pln'd	Act'l	Local (flights) Pln'd	Act'l	PERDIEM (days) Pln'd	Act'l
2	**DATA ACQUISITION & STORAGE**													
2.1	Equipment/software procurement	XX	X	XXX		2								
3	**SCENARIOS AND DATABASE/MODEL DEVELOPMENT**													
3.1	Database construction/testing	XXXX	XXXX	XXX	14	10	10	10	2	1	20	5	60	5
3.2	Forecasting model development	XXXX	XXXX	XXX	1	10	10	20				2		15
3.3	Further data collection				1	1	40	20						
3.4	Data transfer to database	XX			2	2	30	10						
3.5	Scenario proposals				2	2	20	5	2	2				5
4	**SYNOPTIC FORECASTS**													
4.1	Scenarious definition		XX		3	3	60	4	2	1	20	2	60	16
4.2	Zonal economic forecasts		XXX	XXXX	4	4								
4.3	Case study definition	XX	XX	XXXX	4	4	20	1	2	1			14	5
4.4	Progress Report III: Phases 2			X	3	3								
5	**IMPLEMENTATION/HANDOVER**													
5.1	Database/model manual preparation		XXXX		2			3						
5.2	Seminar/workshop preparation		XX	XX	2			2						
	TOTAL				38	41	190	75	8	5	40	9	134	46

10/07/97

TABLE 4   RESOURCE UTILISATION REPORT

Project title: Regional Traffic Database and Forecasting Model				Country: TRACECA States	
Planning period: January 1996 - September 1997			Prepared: June 1997	EU Lead Consultant: WS Atkins International Ltd.	
Project objectives: development and implementation of a traffic database and forecasting model					
RESOURCES/INPUTS	TOTAL PLANNED	PERIOD PLANNED	PERIOD REALISED	TOTAL REALISED	AVAILABLE
PERSONNEL (Weeks)					
EU Experts	128	38	41	102	26
Local Experts	444	190	75	331	113
FLIGHTS (Tickets)					
Long haul	25	8	5	13	12
Local	90	40	9	61	29
PER DIEM					
Days	600	134	46	475	125

TABLE 5

PLAN OF OPERATIONS FOR THE NEXT PERIOD

Project title: Regional Traffic Database and Forecasting Model

Planning period: January 1996 - September 1997   Prepared: June 1997

Project objectives: development and implementation of a traffic database and forecasting model

NO.	MAIN ACTIVITIES	TIME FRAME 1997					INPUTS PERSONNEL		FLIGHTS		PERDIEM
		JUN	JUL	AUG	SEPT	OCT	EU Experts (weeks)	Local Experts (weeks)	Long haul (flights)	Local (flights)	(days)
3	SCENARIOS/DATABASE DEVELOPMENT										
3.3	Further data collection/entry	XXXX	XXXX	XXXX			1	20			
4	SYNOPTIC FORECASTS										
4.1	Scenario definition	XXXX					1	4	1	1	10
4.2	Zonal economic forecasts						1	4			
4.3	Case study definitions		XX				1	4	1	1	10
5	IMPLEMENTATION/HANDOVER										
5.2	Handover/training missions	XX	XX				10	30	4	12	100
5.3	Case studies		XX XXXX	XX			8	30	4	12	48
5.4	Support mission		XX	XX			4	16	4	12	40
5.5	Draft Final Report				XX		2	5			
							28	113	14	38	208

10/07/97