

Traceca: Central Asian Railways
Restructuring Project.
Module A: Kazakhstan Railway
Final Report and Annexes
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Central Asian Railways Restructuring - Kazakhstan

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EXECUTIVE SUMMARY

1. Executive summary

This report is divided into a number of chapters as follows:

1. Executive summary.
2. Introduction.
3. Legal situation.
4. Institutional and management organisation.
5. Financial situation.
6. Costing and financial analyses.
7. Economic analysis and traffic forecasts.
8. Management information systems.
9. Railway operations
10. Railway infrastructure.
11. Rolling stock.
12. Environment considerations
13. Human resources.
14. Business plan-Kazakhstan railways 2000.
15. Regional co-operation



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EXECUTIVE SUMMARY

The introduction gives a brief summary of Kazakhstan and of Kazakhstan railways. The background to the report is outlined.

1.1 Legal

The legal situation of the railways and the laws governing transport are outlined. The evolution of the railways from being part of the Ministry of Railways of the old Soviet Union to the present day is discussed.

In the former USSR railways were divided into 27 separate administrations, which reported to Moscow. Three of these administrations were located in Kazakhstan, covering respectively the regions of Western Kazakhstan (West Kazakhstan Railway), Northern Kazakhstan (Tselinnaya Railway) and Southern Kazakhstan (Almaty Railway). Within these three administrations there were a total of 14 "subsidiaries".

After Kazakhstan became an independent republic, an Order of the Government placed the enterprises of the USSR administration (including these three administrations) under the jurisdiction of the State. On the 31st. January 1997 the Government established KAZAKHSTAN TEMIR ZHOLY ("KTZ") as a Republican State Enterprise as a legal person with its own charter.

1.1.1 Legal main recommendations and action.

- Legislate for the separation of the management and operation of the railway from the Ministry of Transport and Communication.
- Prepare contract between the railway KTZ and the Ministry of Transport and Communications including a performance agreement.
- New legislation should not inhibit future privatisation.
- M O T C to set policy and act as the regulatory authority for the railway.

1.2 Institutional and management organisation

The institutional arrangements, which exist between the state and the railway, are dealt with. Recommendations for a new relationship are outlined which would create a new autonomous railway company, which would have the responsibility of managing their own affairs without state interference. The Ministry of Transport and Communications would become the Regulatory authority, a Licensing authority and would be the Railway Safety Inspecting Authority.

Recommendations are made for management re-organisation from one that is functional based to one, which is business orientated. This involves the introduction of new skills in business and marketing. Proposals are made for the introduction of a change management system, which will drive the changes, necessary for KTZ success. This change management must be driven from the top and include all levels of staff.



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1.2.1 Role of Railway in National Transport Strategy

As Kazakhstan is a large land-locked nation, the railways play an extremely important role in national transport strategy.

Declining traffics eroded the revenue base, as did controlled prices which did not grow in pace with inflation. As a result little money was put into maintaining or repairing the infrastructure, leaving a significant related backlog.

1.2.2 Change to market economy

Before the break-up of the Soviet Union, the railway operated in a very protected environment, with a virtual monopoly in certain types of transport, particularly long-distance freight transport.

With the coming of a market economy, the railway must compete on price and service with other modes of transport.

Due to the strategic importance of the railways to the economy of Kazakhstan it is important that the state retains the ownership of the infrastructure for the foreseeable future.

1.2.3 Policy Issues

1.2.3.1 Market Orientation/Railway

KTZ will increasingly face competition from other modes of transport in a free market economy. Already there is significant competition from buses and private cars for passenger traffic. This can be expected to grow with improvements in roads infrastructure, and increase in income.

Greater competition can also be expected for freight traffic.

The railway itself is divesting to meet the challenges and opportunities of new market situation.

The State/Railway relationship must also be restructured to meet the new situation.

1.2.3.2 Harmonisation of Competition

It is in the interests of the State to have competition in the transport sector in such a way that hidden subsidies are eliminated, and that there is a "level playing field" for the different transport modes.

This is particularly relevant as between road and rail. The costs of the road infrastructure is often hidden in central and local Government accounts, and is not recovered from the cars, buses and trucks that provide transport service. On the other hand, the costs of the railway infrastructure can be clearly identified and are charged in full to the railways.



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1.2.3.3 Third Party Access

National Governments throughout the European Union are now opening up their railway infrastructures to third party access. This has the advantage of introducing elements of competition and thus eliminating monopoly railway operations.

1.2.3.4 Privatisation/Corporatisation

Our recommendations on internal reorganization involve splitting KTZ into separate, autonomous entities to improve their management. Some of these entities may further be "corporatised", creating separate legal entities. These changes would greatly facilitate subsequent privatization.

1.2.3.5 Divesting Agency

A very significant and challenging task involved in the re-structuring of KTZ relates to the wide range of activities, which are outside the core railway business of providing safe, competitive and efficient transport services. The standards achieved by the KTZ in education and health services are considered to be superior to the standards of the public health and education authorities.

However, in the new situation of a free- market economy, these non-core activities should be divested, to allow KTZ management to concentrate on serving railway customers, upgrading services, and improving performance and efficiency. Some of the non-core activities could be divested in the short term; others will take a much longer time. The process of divestment is a complex and a difficult task, calling for special skills.

1.2.4 Organisation Principles

Traditionally railways organised their management structures on functional principles. This involved grouping of activities according to their different functions. The functional approach has been widely applied in many types of enterprise, and has many advantages. However, a functional-type organisation structure has certain disadvantages. Functional departments can become too focused on their own speciality, losing sight of overall objectives of the enterprise. Only the Chief Executive can be held responsible for profit performance.

It is therefore recommended that the new organisation should have a cross-functional business focus as outlined later.

1.2.4.1 Overall structure

The proposed organisation structure is outlined in Annex 4

It is recommended that KTZ should be separated from the Ministry of Transport and Communications and set up as an autonomous entity.

A Board of Directors would be responsible for the implementation of Government policy to operate a profitable and sustainable railway.



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A management structure, which would focus on the main businesses of the railways i.e. Freight, Mainline Passenger, Suburban Passenger, Infrastructure and Rolling Stock, should be established.

These separate businesses should be run as separate profitable businesses with the overall direction coming from the Chairman/Chief Executive of KTZ.

1.2.5 Institutional and management organisation main recommendations

- KTZ to be set up as an independent company with responsibility for the profitable operation of the railway.
- A chairman (or chairman -chief executive) and a board of directors to be appointed by the government with responsibility for implementing government policy.
- The railway should be corporatised as follows
 - A. Infrastructure
 - B. Mainline (inter-city) passenger
 - C. Commuter services
 - D. Freight services
 - E. Rolling stock leasing division

1.3 Financial situation

A review of the finances of KTZ is undertaken and the change to adopting Generally Accepted Accounting Practice is recommended. The classification of, transport related activities, auxiliary activities, other sales and non-sale activities are commented upon. KTZ profitability statements are examined and the drop in revenue in the transportation of coal as anticipated by the railway for the first quarter of 1997 is noted. A drop of 10% in passenger traffic for the same period was not anticipated.

The financial position of KTZ is examined using western accountancy practice. When adjustments were made for increased depreciation provisions, KTZ showed a net loss of 21 billion Tenge (\$280mUS) for 1996. Obviously this matter has got to be addressed.

During the inception phase of the project the consultants worked closely with the EBRD mission and were provided with access to all of the financial data that has been collected by the bank during its visits to Kazakhstan. In addition the consultants had the opportunity to meet Mr. John Winner and his team of experts who were working on the development of a draft business plan for KTZ. These contacts proved to be extremely valuable in enabling the CIE Consult / Systra team to gain an understanding of the current financial position of KTZ, the difficulties that have been faced in recent years and the actions that are being taken by KTZ management to improve the situation.



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A review was conducted of the balance sheet data for 1995, 1996 and the first quarter of 1997. The half-year results for 1997 were being prepared by KTZ's finance department during August 1997 and were not available for review. The financial statements were presented in the format used by KTZ for statutory reporting purposes to the national fiscal authorities. These statements are not audited and are not prepared according to international accounting practice. The financial statements have not been subjected to a rigorous independent financial audit so it is not possible to determine if they represent a "true and fair view" of the performance of the company or of the value of its assets and outstanding liabilities. KTZ is taking very positive steps to improve that quality of its financial data and a number of staff in the finance department are undergoing training to familiarise them with Generally Accepted Accounting Practice (GAAP).

In the analyses carried out it would appear that KTZ will come into profit (using western accounting standards) in the year 1998 and show increasing profits to the year 2007 (see optimistic and pessimistic forecasts in chapter 14).

Even the pessimistic forecast suggests that operating profit (before depreciation) increases from 24% to 36% during the period while retained profits increase from 3,764 million tenge to 5,276 million tenge.

1.4 Cost and financial analysis

1.4.1 Traffic costing or business evaluation

The main aim of Traffic Costing or Business Evaluation is to assist management to understand the commercial viability of the various 'transport products' (Block train freight services, wagon load freight, express passenger or local passenger trains) that are provided by the railway company. The process of Traffic Costing is not the same as an annual 'profit and loss account', but is an assessment of the economic value to the business, and therefore uses a 'longer term' (or smoothed average) view of costs.

Traffic Costing may be used to provide an advisory service to the Marketing Departments as an *aid* to understand tariff setting and profitability; and also by the financial planning department for use in determining longer-term strategy and investment decision making.

1.4.2 An Outline Approach to Railway Business Evaluation.

Financial analysis and control concerns the overall financial evaluation of the profitability of the business. This may be further analysed into identifiable constituent parts. At its highest level this is the 'Profit and Loss Account' for the business as a whole. The next level of business evaluation is the identification of those parts of the business for which meaningful costs and associated income can be determined. For example, profitability statements can be prepared separately for the Freight business and the Passenger business, and also for sub-divisions of these main businesses. These identifiable parts of the business can be called 'Profit Centres'.

In addition, overall and localised cost control and productivity monitoring down to Cost Centre level, is accomplished through the budgeting process in which predetermined levels of activity



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and associated expenditure and income (where appropriate) are measured against actual performance.

1.4.3 The application of traffic costing

The application of Traffic Costing requires an understanding of railway operations. The analyst needs to identify the various processes that are involved in the provision of train services in order to prepare a meaningful analysis of the available financial and statistical data. The costs of some of these processes will vary proportionally with the volume of service or traffic activity on the railway. Other cost will only change as performance requirements trigger the provision of additional resources (e.g. a 'step change') There are other costs which do not appear to vary with the volume of activity e.g. the provision of basic track and signalling facilities.

1.4.4 Finance and costing main recommendations and action required

- present accounts in accordance with generally accepted accounting practice
- adjust depreciation charge to reflect true replacement costs
- introduce budgetary control and cost centres
- establish traffic costing on a route and material base

1.5 Economic evaluation and traffic forecasts

An economic evaluation of the national progress is discussed and projections for inflation and other financial parameters given.

1.5.1 Railway traffic forecasts for 1998-2002

The railways have prepared railway traffic forecasts based on performance results expected for 1997, which were subsequently transmitted to the Transportation Ministry on 30/05/97. Yearly increases are evaluated on the basis of economic production indexes published by the State, per type of goods (coal, oil, minerals, metallurgy, etc.), and according to production perspectives of major customers. Therefore, potential freight forwarding volumes are defined at a domestic level on a yearly basis and reflect the volume of internal and imported freight traffic. An excerpt of economic indexes is included in annex 4 and a list of the main railway customers is included in annex 5. Yearly development percentages were determined as follows:

| | |
|-------------------|--------|
| 1998 against 1997 | + 1.5% |
| 1999 against 1998 | + 2.5% |
| 2000 against 1999 | + 3.0% |



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2001 against 2000 + 0.7%

2002 against 2001 + 0.7%

It was subsequently admitted that to evaluate the overall freight traffic level, (imported goods and transiting goods included), similar percentages would be applied to estimate yearly volumes of charged tonnes/km.

1.5.2 Railway freight charging forecasts:

A 25% increase is expected in 1998, applying quarterly indexes:

1st quarter 106

2nd quarter 108

3rd quarter 105

4th quarter 104

It should be noted that this new increase is compounded with the 34% 1996 increase.

(28.9% for international freight traffic - 43.7% for the internal Kazakhstan traffic).

For 1997, the increase will be similar to that of 1996. During the 1st quarter of 1997, tariffs were increased by 7.5% (5.2% for international freight traffic - 13.4% for internal freight traffic). During the second quarter, the increase was 7.2% on an average (3.3% for international traffic and 13% for internal traffic).

For the following years, increases will take place every 6 months as described in the following paragraph:

1999: 16% - 2000: 13.5%

1.6 1.6 Management information systems

KTZ requires a new Management Information System. The existing management information system was installed in Kazakhstan in 1970 in accordance with to the specification laid down in Moscow. A review of hardware and software has been carried out and recommendations made.

1.6.1 System design requirements

The following gives an outline, which could contribute to the more effective management of KTZ.



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1.6.1.1 Freight Transport Management System (F.T.M.S.)

The main activity of KTZ is the transportation of goods from one place to another. This includes:

- moving the goods : transportation function
- pricing and invoice services : commercial function
- maintaining the rolling stock in proper condition: rolling stock function

At this time, only the transportation function is computerised (ASOUP system). Other processes are implemented manually. It is recommended to computerise following applications:

1.6.1.2 Freight Information Application (F.I.A.) - ASOUP

The F.I.A. should assist wagon booking possible at short notice. Detailed information on commodity, revenues, tonnes, loads, wagon types, wagon.km, origin-destination pairs and revenue could be collected to produce freight traffic statistics for use by marketing, staff and for rolling stock maintenance.

1.6.1.3 Freight Marketing Management Application (F.M.M.A.)

F.M.M.A. should implement all truly commercial functions:

- customers files,
- information to clients,
- real time computation of costs,
- pricing and invoicing,
- delivering statistics on sources of revenue.

It is important to implement it first in a single "information centre" in Almaty, after which it would be decentralised.

1.6.1.4 Wagon Use Application (W.U.A.)

The main trigger for maintenance jobs is the time wagons were available for work, instead of some more relevant parameters such as tons.kilometers worked.

It is therefore recommended to significantly improve the maintenance policy, and to build the appropriate information system.

W.U.A. is an obvious component of the Rolling Stock Management Application.



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1.6.2 Passenger Management System (P.M.S.)

Passenger transportation, while obviously less critical than the transportation of freight, is of vital importance to the railway.

The existing P.M.S., EXPRESS 2, meets today's requirements. Further investment at this stage can hardly be justified on pure economic grounds.

1.6.3 Administration Management System (A.M.S.)

1.6.3.1 Finance and Accounting Management Application (F.A.M.A.)

KTZ has contracted with SAP for an ambitious project in this area. This project is at the present time in the pilot implementation phase in Almaty. Full implementation is expected by end of 1999, which is quite ambitious.

1.6.3.2 Personnel Management Application (P.M.A.)

Presently, there is no computerised tool for personnel management in KTZ. Each entity manages its personnel with the budget allocated by the Financial Department of Head Office. The daily routine personnel management duties (benefits, payroll, etc.) are decentralised and located on site and at unit level using mostly hand written forms. As a result, no reliable consolidation is done at Head Office level. Thus, it is highly recommended that a (standard) Personnel Management Application be implemented.

1.6.4 Maintenance Operation System (M.O.S.)

1.6.4.1 Infrastructure Management Application (I.M.A.)

- The increasing complexity in maintenance requirements has presented a challenge to operators. The infrastructure requirements range from activities concerning construction, maintenance and repairs of railway lines, construction works, signalling and automation systems. The purpose of the Infrastructure Management Application is to provide reliable information across the organisation covering the infrastructure area.

1.6.4.2 Rolling Stock Management Application (R.S.M.A.)

The Rolling Stock Management Application should provide a complete solution, including application software and adequate hardware. The solution should include technical documentation management for the rolling stock.

1.6.4.3 Train Circulation Management Application (T.C.M.A)

The main objectives of the Train Circulation Monitoring Application are to provide timely and reliable information across the company, concerning the train movements. The application should provide information covering circulation requirements, circulation timetables and planning, circulation statistics, analysis and forecasts.



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1.6.5 Management information systems main recommendations and action required

- implement new management information system as a matter of urgency
- study telecommunication infrastructure
- study possible joint venture with private telecom co

1.7 Train Operation

The train speeds are on average less than 40 km/h due to the following reasons:

- too many and too long stops. The long distance trains sometimes have the same halts as the local trains. Duration of stops is often 20 to 30 minutes.
- technical limitations of rolling stock.
- too many stops in marshalling yards for freight trains
- many speed restrictions on main lines due to track conditions
- too many technical inspections en route; there is a wagon and coach inspection every 150 kilometres even though all wagons and coaches are equipped with roller bearings.

1.7.1 Operation Key Parameters

The maximum line speed is 120 km/h. Locomotives generally have a maximum speed of 100 km/h, except the VL80 electric locomotives, which can run 110 km/h. The majority of coaches can run 160 km/h and the freight wagons generally 120 km/h.

Most of the lines are equipped with multi aspect colour light signals and automatic or semi-automatic block. Block sections are usually 2.5 kilometres long, average distance between stations is 13 kilometres. Loop tracks in stations have a length of 850 metres.

The permissible axle load is 23 tons; maximum train length 800 metres and the maximum gross weight is 3600 tons.

Locomotives are equipped with in-cabin signalling and train radio. Telecommunication facilities are generally good.

1.7.2 Safety

There is no doubt that KTZ is a very safe railway and has a very good safety record. After the latest reorganisation in July 1997, overall safety standards have been made the responsibility of the Technical Department, which is headed by the first Deputy Director. This department ensures, that KTZ operates to standards laid down by the ministry, that rules and regulations



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are properly observed, that technical engineering standards are properly certified, that all equipment, installations and facilities meet agreed qualities and that the staff is competent. The department will also be involved in the investigations on serious accidents.

Safety procedures and supervisions are clearly laid down. There are comprehensive books of rules, regulations and instructions and the areas of responsibility and required knowledge for each grade or post are well defined. A booklet lays down the groups of personnel by which testing committees should be formed. The groups of grade and the posts that should be examined are clearly defined, as well as the frequency in which such examinations should be conducted. Records of tests have to be kept.

1.7.3 Evaluation of Operation Performance

The Core Network

Looking at the operation figures of KTZ it becomes evident, that traffic loads are not evenly distributed. In terms of freight traffic we have identified that:

- 2% of the total line lengths handles 20 to 40 million tons per annum
- 7 to 10% handle 10 to 20 million tons per annum
- 27% handle 5 to 10 million tons per annum
- 64% handle less than 5 million tons per annum.

Of course passenger traffic plays a different role than freight traffic in the national context. Kazakhstan is a large country and at present, other modes of transport are not yet as developed as the railway and at least for the present time, the railway may have to maintain the network as it is. Any investments at present should be channelled into the lines, which are the most important ones.

For the other lines of the network we see the following long-term options:

- rehabilitation of these lines in a way to reduce operating costs
- transferring these lines to other ownership, like private investors or regional authorities
- closure of these lines, if socially or politically feasible

The same applies to commuter traffic.

1.7.4 Rail operations main recommendations

- reduce journey times less station stops less slow orders
- improve efficiencies in locomotive and driver utilisation



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- reduce no of marshalling yards
- reduce no of stations
- transfer drivers to new business units
- develop unit load trains

1.8 Railway infrastructure

The railway infrastructure is basically sound and has been maintained in a conservative fashion in accordance with the norms, which have been laid down by Ministry of Railways in Moscow. These norms should now be reviewed and a new philosophy adopted for track maintenance and track renewal. In order to improve the quality of track condition and introduce cost reductions it is necessary to move to mechanised maintenance of the track. A new method in determining when track should be renewed is required.

Priority attention should be given to the elimination of speed restrictions (slow orders). Recommendations are made for investment in track maintenance and track recording equipment. The track fastening system currently in use in KTZ is unsatisfactory and should be changed to a type of fastening which introduces a satisfactory toe load onto the rail. The report envisages reducing the current number of staff from 26,000 to 13,000 persons. This calls for a radical change in the management of track maintenance

There is a total of over 27,000 kms of track in the KTZ railway system.

1.8.1 Track maintenance

Current track maintenance on a day to day basis is 93% by manual means, and 7% with mechanised equipment. Track gangs are equipped with an electrical generator and electric hand tools including saws, drills and hand tampers. Vehicles are available for transport, usually consisting of trucks, tractors and trailers in rather poor condition. A shortage of replacements means that many defective sleepers and other track materials remain in the track.

1.8.2 Track renewals

Great reliance is placed by KTZ in the Russian system of Intermediate Maintenance and Heavy maintenance and generally there is little replacement of track materials between these cycles. Heavy maintenance, which is effectively total renewal of the track and ballast, occurs in R 65-rail track after the passage of 750 million gross tonnes. Two to three intermediate maintenance operations are carried out on the track between renewals consisting of replacement of 30% to 50% of defective materials together with ballast cleaning and ballast renewal. These works are carried out with manpower and equipment from the main track renewal depots in the region.

Track renewal or Heavy maintenance is carried out with two self propelled gantry cranes the sequence of operations being as follows:



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1.8.3 Proposed track maintenance and track renewal strategy.

Since the rails concrete sleepers, crushed stone ballast and formation on the KTZ, are well designed and adequate for the present speeds and axle loads on the KTZ system, every effort should be made to extend the life in service of these materials in the track and to re-use rails and other serviceable material arising from the closure of lines, singling of lines and rationalisation of station layouts. The process of total renewal of track with new expensive materials should cease and be replaced by a process of renewing track with second hand reconditioned rails and sleepers where available in serviceable condition.

Allied to this strategy KTZ should embark on a planned programme of intensive maintenance of in track materials on a system wide basis to improve the performance of the existing track. Such intensive maintenance will consist of plan patching timber sleepers, overhaul of fastening components in concrete sleepers, repair and welding build up on switches and crossing nose and wing rails, patching in crossing timber in turn out and crossover connections, overhaul and replacement of insulated joints with glued joints.

1.8.4 Investment in infrastructure

1. A programme of investment in Infrastructure is recommended and includes investment in eliminating speed restrictions, track maintenance equipment and track recording car and transport vehicles.

1.8.5 Infrastructure main recommendations and action required

- introduce mechanised maintenance
- change philosophy in relation to track renewal
- prepare contract documents for new maintenance machines
- prepare plan for downsizing workforce
- introduce training programmes for mechanised maintenance staff

1.9 Rolling stock

The Kazakhstan Railways was a part of the railway network of the former Soviet Union, and is the largest network (13,500 km) and own the most important fleet of the TRACECA.

The railway freight traffic was one of the most important in the world. After the dissolution of the Soviet Union, it has dropped dramatically from 407 billion tonne-km in 1990 to 109 billion tonne-km in 1996.

It is not clear if the bottom of the cycle has been reached or not.



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Passenger traffic dropped as well from 20,6 billion passenger-km in 1993 to 13,4 billion passenger-km in 1995.

All electrically powered trains can theoretically operate at 100 kph (locomotives speed limit), but in practice the speed limit is 80 kph due to the poor conditions of the track and some of the coaches.

1.9.1 Locomotives

KTZ has a large fleet of locomotives.

The scrapping program shows that no new Diesel-Electric locomotives are necessary before 2007. Existing locomotives are not reliable and are not fuel oil and lubrication oil efficient. A solution to these problems is to replace the old diesel engine and auxiliary equipment by GE components. The cost of this replacement is about 0.7 M\$. One modified TE10 locomotive appears to be operationally satisfactory (12.000 km/month). The investment should be returned in about 4 years.

1.9.2 Coaches

There are a sufficient number of coaches for the current passenger service in the whole Kazakh railways, manufactured either by Deutsche WagoNoau Ammindorf in Germany or by Russian plant in Tver.

50% of the fleet are less than 15 years old and most is in a quite poor condition due to the lack of spare parts.

A rehabilitation and investment plan is proposed to improve the commercial quality.

1.9.3 Wagons

The current fleet is over-sized for the current freight traffic levels. There is a serious lack of spare parts and the reserve fleet is used to provide parts to the operating fleet. As a result, most of the wagon operating fleet is in quite a good condition. There is however a lack of tank wagons.

A rehabilitation and investment plan has been developed.

1.9.4 Maintenance policies

The key recommendation is to leave aside the maintenance policy inherited from the past and to design procedures adapted to the real wear and tear of the wagons, coaches and locomotives and grant significant responsibilities and achievable objectives to the maintenance managers and workers.



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1.9.5 Locomotives Depots and Workshops

All the repairs and overhauls should be performed in Kazakhstan and there should not be any need to have this work carried out outside the country.

The number of depots is far in excess and a list of the depots that should be closed is given.

Almaty and Kazalinsk workshops should continue to function as the main facility for performing TR3 repairs for Diesel-Electric locomotives. Akmola shop should perform the same repairs for Electric locomotives.

Chu and Atbasar workshop, are well equipped and should be made the main workshops for Diesel-Electric and Electric locomotives respectively.

An investment plan is proposed.

1.9.6 Coaches Depots and Workshops

All the repairs and overhauls should be performed in Kazakhstan and there should be no need to export the coaches outside the country for major overhaul.

The number of depots should be reduced and Almaty workshop should be improved to perform all repair and rehabilitation work required.

Local improvements, handling equipment ,machinery and a new paint shop should be purchased.

1.9.7 Wagons Depots and Workshops

The number of Depots is far in excess and should be reduced from 21 to 12. In addition, the number of Workshops can be reduced 16 to 3 located in Akmola, Borovoye and Kzyl-Orda.

1.9.8 Rolling stock main recommendations

- change maintenance procedures for locos, carriages and wagons
- review number of locomotive depots carriage and wagon shops
- prepare specifications for new plant and equipment

1.10 Environmental considerations

A review of the environmental laws as they effect railways work and operations is discussed.



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1.10.1 Legislation

The law stipulates the legal, economic and social basis for the protection of the environment. It safeguards the interests of present-day and future generations by reducing industrial pollution and conserving biological diversity. It also regulates the rational use of natural resources.

The law defines the legal, economic, social and organisational basis of areas classified as sensitive. Taken into account are: the rights and responsibilities of citizens and associations, areas of competence of authorities, organisation, nature of the classified sites (forests, deposits, springs, gardens etc.), the procedures for classification (local or national), the protection and restoration of the wildlife, the treatment of disputes and international co-operation.

Any project which changes the nature of a locally designated site (quarry or new line, for example) must obtain the authorisation of the local representatives of the Ministry of Environment and Bio-resources. For a nationally designated site, the designation can be removed only by parliament.

The law obliges the transporter to have equipment which corresponds to health and safety requirements and which satisfies working and ecological conditions of protection in conformity with international standards. It was modified by the decree of 27 January 1996 which obliges the transporter to insure his passengers.

Wild and domesticated animals form an essential part of the heritage of the Republic. Present and future generations must be educated to respect nature.

The rights of employees to protection at work is covered in law. The law details the general principle of national policy in this area, that is the prevention of accidents, the effects of the work on health and the restriction of pollution caused by industry. It applies to all activities and all companies.

1.10.2 Conclusion

The rapid evolution of legislation and regulations aimed at improving conservation of the environment as well as awareness and the growing weight of public opinion on this subject impose new constraints on companies.

1.11 Human resources

Railway employees including civil servants get general workers status and are ruled under the working code of the Republic of Kazakhstan. Current retirement is 63 for male employees and 58 for female workers. The railway has responsibility for a number of social activities including accommodation, education and medical treatment including the operation of hospitals. The process of transferring these responsibilities to other authorities is now taking place.

In order to meet the challenges particularly in the management of change it is necessary to introduce many new training programmes in marketing and business subjects. It is also



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suggested that a selective group of management visit installations in the west in order to obtain a transfer of information.

1.11.1 Optimum target

The staff target proposed below for the 2,007 horizon consider all investments completed and the railway fully modernised and reorganised. In this respect, European ratios are applied whenever possible in order to determine the optimum staffs target. For some specific activities, it is proposed or to sub-contract (buildings maintenance for instance), or to fully privatise or separate / transfer (civil engineering constructions, water distribution, etc.)

In 1996 staff numbers were 146,642. It is recommended that this will be reduced to 61,875 by the year 2007.

1.11.2 Human resources main recommendations

- divest all non core activities ,hospitals, education, farms
- prepare human resource plan for new organisation
- plan staff exits
- develop training programmes
- organize study tours for young managers
- recruit marketing and finance experts
- introduce no recruitment policy except for some specialists

1.12 Business plan- Kazakhstan railway 2000

For this plan to be successful it is necessary to invest in the next few years. Investments include machines for transforming the infrastructure from a manual maintenance system to one of mechanised maintenance. Proposals are also included for the upgrading facilities for rolling stock maintenance. There is a requirement to upgrade the management information system and provision for this investment is provided. Due to scarce financial resources there has been a lack of investment in the track structure. This has resulted in a large number of speed restrictions being imposed and the problem is also addressed in the investment plan.

1.12.1 Financial Forecasts

Financial Forecasts, reflecting optimistic and pessimistic traffic scenarios, have been prepared for Kazakhstan Railways covering the period 1997 to 2007. For simplicity the financial forecasts have been prepared in constant prices thereby eliminating the effects of



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inflation. The details of these forecasts are contained in the section on the KTZ Business Plan. Kazakhstan railways 2000

For KTZ to prosper in a competitive and market economy it will be necessary to embrace the most up to date management techniques which are available. The biggest challenge facing management is the management of change process, which is necessary to achieve a successful conclusion. It calls for a complete change of culture and involves all levels of staff. Techniques involving the costing of traffics just in time techniques, world class manufacturing techniques, quality programmes are all part of modern management.

Investments as outlined in the report are assessed. These amount to \$300m approx. It is pointed out also that expenditures of the order of \$60m per annum on track renewal as distinct from maintenance costs will be required to maintain the infrastructure.

While an economic case for investment in new passenger coaching stock cannot be made this situation will change if satisfactory public service obligation agreements are entered into with the government.

It is expected that KTZ will return to a profitable situation in a couple of years.

Business plan Kazakhstan railways 2000 main recommendations and action.

- Introduce management of change procedures
- Change culture of organisation

1.13 Regional co-operation

There is good co-operation between the Railways of the Central Asian Republics and there is no reason to believe that this will change. The railways all use the same rolling stock, the same track standards, and rule books. There is even a common operating language, i.e. Russian.

1.13.1 Possible areas for development of co-operation

1.13.1.1 Intermodal traffic

The TRACECA Study on Tariffs and Timetabling, carried out by SISIE-Calberson, identified a number of problems in the intermodal area. Rail costs are good generally by comparison with road. There are however bottlenecks on the TRACECA route, notably at Poti where the intermodal facilities are overloaded and the rates are high.

1.13.1.2 Rolling stock purchasing, leasing and maintenance

The consultants are of the view that there is a limited potential for increasing co-operation in the maintenance area between the different railways. Generally the distances involved are very long so that moving rolling stock around to other systems workshops would give rise to decreased availability and would reduce the potential for dealing with breakdowns and



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emergencies. There are, however, some areas in which maintenance is shared on an advantageous basis, notably Kyrgyzstan, Tadjikistan and Uzbekistan.

1.13.1.3 Development of regional track access

The principle of access to the infrastructure of the railway companies should be expanded and encouraged. It should be possible for trains, including locomotives to be operated outside their own particular system on an agreed basis. This will reduce time lost at border crossings and make for more efficient use of staff and equipment. It will also encourage competition, which should lead to better fares and quality of service in the passenger area.

Open access to freight operators, both private and public, would also result in improvements in efficiency, service and rates for customers. There are particular opportunities for block train operation here, whether within a national system or operated cross-border.

1.13.1.4 Infrastructure charging

Implementation of the recommendations for the establishment of infrastructure departments and the introduction of a track charging system will provide a more realistic basis for traffic costing. Opportunity should be taken to review the charges for track usage between the different countries. Efforts will have to be made to arrive at a more flexible approach in this area so that new lines will not be proposed to obviate using the track in an adjacent system.

1.13.1.5 Interoperability

While all the countries at the moment are using rolling stock and equipment in accordance with former soviet standards, this position may change in the future. Some of the railways may purchase equipment from outside the CIS. It is essential that specifications for these procurements, while meeting international standards, should also be compliant with the present Central Asian (CIS) railway standards. Otherwise the danger is that new equipment and standards may hinder the present smooth interoperability.

1.13.1.6 Information Technology

The installation of a modern IT system, supported by a new communications system is proposed for the Central Asian railways. Experts from the UIC are preparing proposals for the telecommunications system under Module E of this project. The report is due by June 1998. New hardware and software is envisaged to provide a platform for the necessary MIS systems.

1.13.1.7 Marketing

The railway product must be presented and marketed as a single unit, both internally and internationally. The railways cannot be competitive without having a joint approach. An image must be created which will become recognisable to the public at large. A common approach to this must be established.

1.13.1.8 Training Programmes

The railway sector in each of the Central Asian countries is generally well served with technical training institutes. However, in the move to the commercial restructured railway



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there is a need for training in disciplines new to the traditional railway, such as marketing, Information Technology, business management and organisation principles. It is suggested that this training should be organised on a regional basis to minimise costs and improve regional interaction.

1.13.2 Technical assistance for support of regional co-operation

Implementation of the proposals outlined above to further collaboration between the railways requires high level commitment and the dedication of the relevant Ministries and higher railway management's. Appropriate railway experts will have to be assigned to various tasks. They will have to adapt to new technology and ideas. This process should be assisted by technical co-operation using external experts.



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Introduction

2. Introduction

This is the final report of the Restructuring of Kazakhstan Railways (KTZ) which is being financed under the European Union TACIS programme in conjunction with the European Bank for Reconstruction and Development. The project is being carried out by C I E CONSULT in association with SYSTRA. The project commenced in August, 1997 and the Inception Report was issued in September 1997. The main beneficiaries of the report are the Government of Kazakhstan as represented by the Ministry of Transport and Communications and Kazakhstan Temir Zholy Kazakhstan Railways.

Fourteen experts who carried out their research work in Kazakhstan compiled the report. The experts were very much assisted by their counterparts in KAZAKHSTAN TEMIR ZHOLY (KTZ) and other local experts.

A list of expert staff is given in ANNEX NO 2.

The purpose of the report is to assist the KTZ and the Government of Kazakhstan in detailed planning of restructuring to transform the railway into a commercially driven, financially self-sustaining industry.

2.1 Republic of Kazakhstan

On the break-up of the Soviet States Kazakhstan became an independent state in 1991. It has a population of seventeen million (an increase of 1.4 million people since the last census in 1989) and a G D P per person of \$ 2900 U S.

Kazakhstan is situated in the centre of the Eurasian continent and in the west-northwest and north borders with the Russian Federation. In the south and southeast it borders with Turkmenistan, Uzbekistan, and Kirghyzstan Republic. In the south east and east it borders the Chinese Peoples Republic.

Annex No 2.2 shows the geographical relationship between Kazakhstan and the neighbouring states.



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Kazakhstan is very rich in mineral and oil resources. It has large resources of oil in the Caspian Sea area and is also rich in coal, iron, tungsten, and chromium and lead deposits.

Forty four per cent of the population are reported to be living in urban areas. The largest city in Kazakhstan is Almaty which has a population of over one million inhabitants. Karaganda has a population of over five hundred thousand while Shymkent, Pavlodar, Semipalatinsk, Ust Kamenogorsk and Jambyl have populations over three hundred thousand. Akmola, Atubinsk, Petropavlovsk, Temirtau, Kostanay, and Uralsk have populations exceeding two hundred thousand. As of December 1997 Akmola has been designated as the capital of Kazakhstan in place of Almaty.

Since becoming independent state serious efforts have been made to take the country into a market economy and attract outside investment to develop the natural resources of the country. A number of joint stock companies have been formed and the government has been very successful in attracting outside investment particularly in the oil industry. The privatisation of state run industry is progressing at a very fast pace. There is talk of the Chinese investing in new oil pipe lines to the east. The building of new pipeline to Iran is being discussed as is a new pipeline to Turkey which would supply oil from the Caspian Sea area to Europe and the west. At a recent meeting between the Presidents of Kazakhstan and the United States it was agreed to strengthen the regional co-operation including the establishment of an east-west Eurasian transport corridor. The European Union through a TRACECA project has identified possible transport corridors for development.

2.2 Kazakhstan Temir Zholy

Kazakhstan Temir Zholy (Kazakhstan railways) is the backbone of the transport in the country. Prior to the break-up of the Soviet Union Kazakhstan railways were part of the Soviet Ministry of Railways (MPS). The three railways in Kazakhstan (Almatinskaja, Tselinnaja and Zapadno-Kazakhskaja) consisted of 13,528 route kms of rail track including 5,500 km of double track. Nearly 3,500 kms of the route is electrified. Kazakhstan railways as in other member states of the former Soviet Union have suffered a severe drop in traffic falling by some 60% since 1990. Kazakhstan tariffs also lagged behind the general price inflation, while huge arrears of unpaid freight charges accumulated. Consequently railway finances have sharply deteriorated, despite strong restraint on expenditure including routine maintenance, capital replacement, and new investments. For many employees payments are behind schedule.

The economy of Kazakhstan depends heavily on the railways carrying approx. 80% of the freight traffic. While the modal split may change in the future the railway will continue to play a dominant role in the country's economic development. As the economies of the central Asian states and China improve new business opportunities will present themselves to an efficient railway.

Kazakh Temir Zholy (KTZ) is the 7th largest railway in the world and is now reaching a critical stage in preparing itself to prosper in the new market economy. Its financial situation is precarious. By western accounting standards it is estimated that the railways made a pre-tax loss in 1996 of Tenge 20 billion (\$266 m U S). Obviously this matter has to be addressed as a matter of urgency. It would appear that operating expenses exceed revenues by approx. 30%. KTZ are also burdened with large amounts of accounts payable which may be counter balanced somewhat by accounts receivable although there is a view that a large portion of this may have to be written off as bad debts. In order to retain its transit traffic, which



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accounts for 20% of the volume and 40% of the revenue it is necessary to retain close liaison with adjoining railway companies particularly in relation to agreed tariffs.

2.3 KTZ Restructuring

In January 1997 restructuring of the railways began with the amalgamation of the three railway companies into one company (KTZ). In July 1997 six railway divisions were created.

Turkistan Railways in the south

Akmola Railways in the north

Sary-Arka Railways in the centre

Almaty Railways in the southeast.

Semipalinsk Railway in the north east

West Kazakhstan Railways in the west.

A map of the railway system is shown in annex no 2.

The railways have continued to reduce its staff from 198,248 in 1990 to 151,771 in 1997. Looking at transport related staff the reduction has been less dramatic from 142,170 in 1990 to 125,995 in 1997. Unfortunately during the same period traffic units reduced from 426 billion to 127 billion (traffic units are defined as billion tons freight and billion passenger-kms for passengers). This and the lack of sufficient tariff increases essentially caused the problem, which the railway finds itself in today. The railway having to carry a huge social service obligation, which now is being addressed, did not improve this. It has to a large extent been inhibited from responding to the changed circumstances by very rigid rules and norms laid down in the old Soviet regime. This must now be addressed and this is particularly addressed in Infrastructure, Rolling Stock and Operation chapters.

If KTZ is to survive in a new market and competitive economy it will have to have a change of culture and work to new procedures and norms.



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Legal situation

3. Legal situation

The main task of the legal expert is stated 1 to be:

Examination of the legal framework and status of the Railway, its respective powers, obligations and responsibilities and its relationships to the Ministry of Transport and Communications and other Government agencies including price control and anti-monopoly authorities.

3.1 Legal Framework - Summary

Railways in Kazakhstan are part of the network developed by the former Soviet Union and were regulated accordingly. With independence an entirely new situation arises. Based upon an examination of the legal instruments referred to below, and interviews with personnel in the Ministry of Transport and Communications (including the head of its legal department) and in the railway organisation, the developments since independence are described in outline in this report.

In the former USSR railways were divided into 27 separate administrations, which reported to Moscow. Three of these administrations were located in Kazakhstan, covering respectively the regions of Western Kazakhstan (West Kazakhstan Railway), Northern Kazakhstan (Tselinnaya Railway) and Southern Kazakhstan (Almaty Railway). Within these three administrations there were a total of 14 "subsidiaries".

After Kazakhstan became an independent republic, an Order of the Government placed the enterprises of the USSR administration (including these three administrations) under the jurisdiction of the State. A copy of the Order was not available at the time of writing.

¹ Terms of Reference for CENTRAL ASIAN RAILWAYS RESTRUCTURING Module A 4.1.2



Legal situation

The three administrations referred to above continued their separate existence without specific legal regulation, and came to be regarded as individual enterprises and companies. What had changed was that the control exercised by Moscow had ended, but had not yet been replaced by an equivalent system in Kazakhstan. The Government represented by the Ministry of Transport and Communications dealt with them on an ad hoc basis pending the determination of a comprehensive policy. In the meantime, consultants were studying the matter, and the results of these studies would have been awaited with interest by the Government and the Ministry of Transport and Communications.

During this period, the matter of legislating for railway transport was not overlooked. Law No. 156-XIII, later discussed in this report, dealt comprehensively with transport matters, including railway transport. In particular, it took into State ownership the railway infrastructure.

The earlier consultants recommended the retention of the three administrations as separate independent railway companies. The consultants approach might have had the result of making the process of re-organisation three times more difficult and it might in practice have fragmented the country's railway infrastructure. In any event, the Government rejected it and a different strategy adopted. This strategy was developed in consultation with the European Bank (EBRD), the leading financial institution expected to provide loans for the capital expenditure program.

The Government acted comprehensively to address the re-organisation and took the following steps:

On the 31st. January 1997 by Order # 129 it established KAZAKHSTAN TEMIR ZHOLY ("KTZ") as a Republican State Enterprise as a legal person with its own charter. The details of this are discussed below.

The Ministry through KTZ has re-organised the 14 "subsidiaries" of the three former administrations into 6 subsidiaries of KTZ. At the time of writing it appears that the legal process relating to this is nearing completion; the management structures have already been determined. These are established as State Enterprises with KTZ as the founder, and are not joint stock companies.

The infrastructure, being the track, signalling, power supply and communications system will continue to be State property, to be managed by KTZ on behalf of the State.

The process of re-organisation with a view to eventual privatisation continues; the process being the creation of business units within KTZ and its 6 subsidiaries, incorporation of joint stock companies for these units initially with 100% State ownership with subsequent participation by investors and reduction of the State holding. Already a large number of business units have been privatised.

It is planned to remove from KTZ the function of railway safety supervision and place it within the Ministry.

3.1.2 BYLAWS of the Republican State Enterprise "KAZAKHSTAN TEMIR ZHOLY" ("KTZ") (1997) provide that:



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- the authorised body for KTZ is the Ministry of Transport and Communications²;
- KTZ combines economic methods of management with centralised management of transport system³;
- KTZ may form subsidiaries; bylaws for subsidiaries require Ministry approval⁴;
- KTZ may be a founder (participant) in joint ventures and joint-stock companies⁵;
- KTZ is a legal person⁶;
- KTZ may own property subject to the right of state property⁷;
- Privatisation of KTZ entities requires Government decision⁸;
- Normative for distribution of KTZ income are subject to Ministry approval⁹;
- the basic activities, purposes, functions and powers of KTZ are as set out and include the development of KTZ as the unified railroad network of Kazakhstan¹⁰;
- KTZ operations are controlled and audited by the Ministry of Transport and Communications ,and where relevant, by financial, bank and other agencies legally responsible for controlling the activities of State enterprises¹¹;

²Article I.4

³Article I.2

⁴Article I.6

⁵Article I.7

⁶Article I.10

⁷Article I.12

⁸ *ibid.*

⁹Article I.13

¹⁰Article II.

¹¹Article II.7



Legal situation

- Management of KTZ is by its General Director, appointed (and dismissed) by the Ministry of Transport and Communications. The General Director in turn nominates the Deputies General Director and Head of Financial Department who are appointed (and dismissed) by the said Ministry. The General Director acts as Chief Executive of KTZ¹²;
- the Ministry of Transport and Communications controls: the size of the labour fund; the salaries of the General Director, the Deputies General Director, the Head of Financial Department; bonus and other encouragement systems¹³;
- a Board, which is a consultative body, is appointed by the Director General¹⁴;
- The relationship between the Ministry of Transport and Communications and KTZ is as defined by the Decree "Concerning State Enterprise" and these BYLAWS¹⁵.

Small segments of KTZ railway pass through the territory of neighbouring States and vice versa. This is regulated by agreements between Governments - the effect being to allow KTZ full control over its railway outside Kazakhstan on a reciprocal basis. A Council of Railways in C.I.S. countries meets and regulates these arrangements.

The Ministry of Transport and Communications performs licensing of railway operators; the anti-monopolies Committee set the access charges.

The existence of a Draft Railway Code is a positive indication of recognition by the Government of the need to provide an effective legal environment for railway transportation in Kazakhstan.

3.2 Monopoly and Price Control Issues

Levels of tariffs and price control are exercised by the anti-monopolies Committee, which considers that KTZ is a natural monopoly. However, this does not extend to privately owned companies providing railway transport services, where prices are freely negotiated.

Pending the enactment of new legislation, the anti-monopolies Committee uses the general status of and is subject to the Ministry of Economy and Trade, which in turn is independent of the Ministry of Transport and Communications. Previous legislation on the subject has been terminated. The decision of the anti-monopolies committee is final.

¹²Article III

¹³Article III.3

¹⁴Article III.4

¹⁵Article III.5



Legal situation

3.3 Transport Law

Law No. 156-XIII of the Republic of Kazakhstan "Concerning Transport in the Republic of Kazakhstan" (1994) provides that:

railways shall be State property¹⁶;

land used by railways is recognised as land of transport¹⁷;

The activities of railways are regulated by the State by way of legislative regulation, licensing, taxation, crediting, financing and price formation, conducting investment, uniform social and scientific and technological policies and the supervision of compliance...¹⁸;

administration of transport shall be carried out by a body of the State administration, presently the Ministry of Transport and Communications¹⁹;

commercial and entrepreneurial activities shall be carried out on the basis of a licence²⁰;

unprofitable passenger conveyance shall be subsidised²¹;

tariffs in general are freely determined by the operators; the State may impose tariffs to implement social policy or to overcome monopolistic activities²²;

carriers are to be licensed and to have certified means of transport²³;

the Civil Code, this law, transport law and other legislative acts and transport agreements shall determine the contract of carriage²⁴

¹⁶Article 3

¹⁷Article 4

¹⁸Article 5

¹⁹Article 6

²⁰Article 7

²¹Article 9

²²Article 10

²³Articles 11 & 15



Legal situation

combined ("mixed") transport is to be organised by the State administration bodies²⁵;

children under 7 years (5 years for international travel) travel free, and under 15 at 50% of full cost²⁶;

certain categories of passengers must be carried free or at reduced rates - those State bodies who establish these categories "determine" the source of financing²⁷;

operative staff must have appropriate qualifications and undergo medical examination²⁸;

in emergency situations the State authorities may suspend contracts and requisition services to be reimbursed from the Budget²⁹;

compliance and inspection shall be undertaken by the body of the State administration stipulated in the legislation³⁰;

International treaties and agreement are for the State administration to conclude - carriers may develop foreign economic collaboration³¹.

3.4 The Railway Code

The enactment of a new Law providing for a comprehensive Railway Code is under discussion and that legislation is intended to be in place in 1998. There are three drafts - (i) an early draft prepared by a working group within the railways, (ii) the "Scott Wilson Kirkpatrick" draft and (iii) a third draft presently in course of preparation by the legal department of the Ministry.

²⁴ Articles 11,13,17,18,19,20,23 & 24

²⁵ Article 12

²⁶ Article 13

²⁷ *ibid.*

²⁸ Article 16

²⁹ Article 22

³⁰ Article 25

³¹ Article 25



Legal situation

The first draft envisages a railway system of the former USSR model. Having regard to recent developments, and in particular its origins within the now defunct railway administrations, it is unlikely to influence the shape of the final draft to any important extent.

The second draft is in the form of a model recommended by earlier consultants for use in the Central Asian countries.

The completion of the third draft has been deferred pending completion of the planning process concerned with the re-construction of railways in Kazakhstan.

It is certainly the case that local circumstances will vary, and law, which is adopted, must take this into account. Indeed, in order to achieve precisely the same objectives in two different jurisdictions would almost certainly require some differences of approach in each.

The process of completing the draft will take the following form - the draft will be discussed by the Department of Transport and Communications with the lawyers of KTZ, then with the Ministry of Economy and Trade, then with the Ministries of Finance and Justice. Following this process of consultation, the final version will be prepared and submitted to the Government for enactment into legislation.

3.5 Recommendations:

- It is recommended that the Charter of KTZ should be changed to accommodate the organisational structure, accounting and reporting procedures contained in the management re-organisation proposals listed in the re-structuring study.
- The pending enactment of a Railway Code offers a unique opportunity to establish a legal environment within which railway transport will prosper and better serve the interests of the State and the interests of its customers.
- The open and progressive approach taken by the Ministry and by Mrs. Shpinyova of its legal department should continue.

It is recommended that when revising the draft, the following issues be addressed:

- The code should legislate for railway transport as a system of transport.
- In the case of KTZ it should provide that management, within the context of the performance agreement referred to below, shall be independent in the direction, management and administration of KTZ and from the administrative and economic control and internal accounting of the State, and managed according to the principles which apply to commercial companies.
- It should provide for a definition of what constitutes "railway infrastructure"; railway infrastructure should be owned by the State; management of the infrastructure should in future be undertaken on behalf of the State by KTZ on the basis of a commercially orientated contract, to be interlinked with the performance agreement referred to below.



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In this way the State will be fully informed of where money is being spent and on the physical state of the infrastructure and participate in the planning process in accordance with the objectives for railway transport.

- It should require that the accounting system of KTZ clearly separate infrastructure matters from other activity and that separate accounts are maintained for public service obligations thus ensuring transparency in financial matters.
- Organising formally separate companies, divisions or profit centres within what is today KTZ, as is happening already, would meet this purpose.
- It should facilitate the corporatisation of KTZ.
- It should provide that an access fee be charged in respect of each service (passenger and freight) for the use of the railway infrastructure - to be paid by all operators including KTZ (into the infrastructure fund).
- It should provide that KTZ when offering services, as operator should primarily have regard to commercial considerations.
- It should provide for a system of licensing the competence of railway operators and their rolling stock, to apply to international (including state railway companies) as well as to national operators. All licensed operators should be entitled as of right to access to the railway infrastructure on non-discriminatory terms.
- It should provide that the State (as opposed to KTZ itself) might make regulations to provide for the public safety of railway operations.
- It should define the role of the State, to be exercised through the Ministry of Transport and Communications. This role should include the following functions:
 - entering into agreements with KTZ on the maintenance and specification for development of the infrastructure and the cost and time within which this will be done;
 - entering into agreements with KTZ and other railway operators for the discharge of Public Service Obligations (including free and concessionary travel) on a contractual and commercial basis;
 - entering into a performance agreement with KTZ and monitoring compliance; in this connection it is believed that if KTZ exchanges its monopoly for a system of ongoing performance agreements (with appropriate adjustments mechanisms for accommodating unforeseen circumstances) greater trust will be established in the relationship. For example, in the case of representation in CIS railway matters, the State will have confidence that its policies will be pursued by KTZ, and KTZ will have confidence that it has the support of the State when pursuing its objectives;
- specifying the form of accounts to be maintained by KTZ and other reporting requirements;



Legal situation

- undertaking the function of price control (which should be removed from the anti-monopolies Committee), where the protection of customers in monopolistic situations is necessary;
- licensing the competence of railway operators and their rolling stock;
- supervising public safety in railway operations by establishing a railways inspectorate with right of access to inspect the railway infrastructure; the inspectorate to request where necessary the State to make regulations relating to the public safety of railway operations;
- Setting terms for third party access for operating trains on the railway infrastructure generally, and ensuring that the user fees payable to the infrastructure manager are adequate and non-discriminatory vis a vis KTZ and other users.

It is clear that these objectives cannot all be implemented in the short term, therefore the Railway Code should make provision for transitional arrangements during the intervening period.

The approach used in drafting should be to set a framework within which there will be flexibility that will enable the development without legal impediment of a successful railway transport system.

These recommendations highlight a number of important matters, which should be addressed when revising the draft railway code, and are not intended to be seen as covering the other necessary matters, which will be legislated for in the railway code.

INSTITUTIONAL AND MANAGEMENT ORGANISATION

4. Institutional and management organisation

4.1 Introduction

4.1.1 Role of Railway in National Transport Strategy

As Kazakhstan is a large land-locked nation, the railways play an extremely important role in national transport strategy.

Declining traffics eroded the revenue base, as did controlled prices which did not grow in pace with inflation. As a result little money was put into maintaining or repairing the infrastructure, leaving a significant related backlog.

The main issues facing the Government now could be summarized as follows, probably in that order:

- How to ensure that the necessary works on the railways could be carried out, ensuring that the infrastructure remains in proper condition using as little financial resources as possible?
- Similarly, how to ensure that investment in rolling stock and maintenance facilities would be kept to a minimum, and typically, without support from the State budget?
- How to ensure that trains would run effectively and safely in accordance with expectations of passengers and shippers?
- How to ensure that prices charged allow the providers of services a decent return on the capital invested and a decent salary for their employees, while making sure that they keep being motivated to reduce their costs and increase their efficiency.



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4.1.2 Change to market economy

Before the break-up of the Soviet Union, the railway operated in a very protected environment, with a virtual monopoly in certain types of transport, particularly long-distance freight transport.

With the coming of a market economy, the railway must compete on price and service with other modes of transport.

It is in the interest of the State to open up the railways to market competition, because this will increase efficiency, lower costs to customers and provide higher levels of service. Nevertheless, the Government will want to maintain ownership of the railway infrastructure and regulate the competitive environment, because the railway are of national strategic importance, they are energy efficient and environmentally friendly, and also provide certain socially-beneficial transport services.

While maintaining public ownership of the infrastructure and wishing to expand services, the State also wants to save public money. Attraction of private capital into railway service, is one way the State can encourage the much-needed investment, consistent with saving public money.

The change to a market economy therefore raises some conflicting interests, which require resolution in a new State/Railways relationship.

4.1.3 International Experience

Most of the issues that impinge on the relationship between the State and the railway are common to other countries with market economies. Therefore, much can be learned from other countries that have struggled with the issues and derived solutions to meet the needs. The experience of Western European countries is especially relevant.

4.2 Policy Issues

4.2.1 Market Orientation/Railway Divesting

KTZ will increasingly face competition from other modes of transport in a free market economy. Already there is significant competition from buses and private cars for passenger traffic. This can be expected to grow with improvements in roads infrastructure, and increase in income.

Greater competition can also be expected for freight traffic.

The railway itself is divesting to meet the challenges and opportunities of new market situation.

The State/Railway relationship must also be restructured to meet the new situation.



INSTITUTIONAL AND MANAGEMENT ORGANISATION

4.2.2 Harmonisation of Competition

It is in the interests of the State to have competition in the transport sector in such a way that hidden subsidies are eliminated, and that there is a "level playing field" for the different transport modes.

This is particularly relevant as between road and rail. The costs of the road infrastructure is often hidden in central and local Government accounts, and is not recovered from the cars, buses and trucks that provide transport service. On the other hand, the costs of the railway infrastructure can be clearly identified and are charged in full to the railways.

4.2.3 Investment

Kazakhstan is a country trying hard to develop its economy and improving the living standard of its population. In order to achieve this, capital investment is necessary. As money is scarce it must to a certain extent come from abroad. As the experience in other parts of the world has shown, railway investing and streamlining can essentially reduce the financial burden on the government (and the tax payer) and set free capital that might be used to develop the railway system faster or spent for other purposes.

4.2.4 Public Service Obligation (PSO)

The primary objective of the State should be to ensure the continuing availability of transportation services to the public at affordable prices, to be performed in a cost-effective way, so as to minimize the drain on public funds.

This PSO is typically represented by an obligation to provide adequate capacity on specific routes with specified frequency of service and quality of service.

If no competitor is willing to offer this service, the Regulator in the Ministry of Transport can transfer this obligation onto the public operator. (The role of the Regulator is defined later).

Conversely, if adequate competition is available, the Regulator may transfer this obligation onto another operator, or only monitor that competitors do actually compete.

Different situations exist for commuting services on the one hand and for long-distance international services on the other hand.

4.2.5 Price Controls

If no or only limited competition exists for the provision of services under a PSO, the Regulator will define the maximum level for prices the operator is allowed to charge customers.

This level typically allows the operator to cover legitimate costs and a reasonable profit.



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If the price level does not allow the operator to cover its costs, and it cannot be raised for social or other considerations, it is traditional practice that the State would reimburse the difference, so as to allow the operator to deliver the service.

4.2.6 Human Resources

Over-staffing has been a major problem of most railways all over the world. KTZ is no exception of this trend. The decline in traffic since the breakup of the Soviet Union has made has made the over-staffing situation worse.

In addition the railway undertakes a range of social services (education and health care) which would normally be provided by other state authorities, and which should be divested.

These give rise to very substantial human resources challenges in the years ahead. The State wishes the railway to become efficient, which implies staff cuts; yet the State does not want to increase unemployment. The task of re-training and redeployment of excess staff will be difficult and costly. The State should subsidize the railway in this task and not allow the full financial burden to fall on KTZ.

4.2.7 Third Party Access

As the political aim should not be to privilege KTZ and maintain it in the status of rail traffic monopolist but to encourage efficient rail transport on a general basis, third parties should not only be allowed to build and operate and access lines - as already happens - but to operate passenger and freight trains on the main network. There they would be in competition with KTZ. They would have to pay the same user fees as the KTZ Passenger and Freight Business Units and should not be discriminated in any way. Law should regulate the licensing of these railway enterprises.

Competitive pressure, cost reduction and innovative ideas would result from this new possibility. It would be irrelevant whether the operators were state-owned or private. Own account traffic should continue to be permitted and should be further encouraged.

4.2.8 Privatisation/Corporatisation

Our recommendations on internal reorganization involve splitting KTZ into separate, autonomous entities to improve their management. Some of these entities may further be "corporatised", creating separate legal entities. These changes would greatly facilitate subsequent privatization.

The tax laws could support or discourage corporatisation. If the tax laws do impose a financial burden on corporatisation, they should be changed.



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4.3 Proposals for a new state/railway relationship

4.3.1 Principles for a new framework

The experience in the countries of Western Europe with a tradition of State owned companies and heavy State participation in the economic activity of the country has shown that in the long run this is not only very costly but also very often inefficient. State run Enterprises have enormous difficulties to compete with private ones in the deregulated market. That is why there should be a decisive move towards separating economic activities as strictly as possible from true Government functions such as ensuring fair competition in the market, safety control, regional development, social welfare etc.

The hierarchical subordination of the railways under the Government can lead and mostly does lead to management decisions that are not compatible with the entrepreneurial, particularly commercial, interests of the railways, which will have to respond to the free transport market.

As was the case in Western European countries before the Divesting of their railways it seems that the Kazakhstan Government plays a multi-functional role vis-a-vis KTZ, namely as

- the industrial supervisory authority, above all concerning the elaboration of and respect for the safety regulations;
- the required of services of public interests from the railway;
- the owner of the railway organization;
- the financing body of large parts of KTZ's capital needs;
- The political institution getting involved in railway matters on behalf of the general interest of the country.

These five functions are carried out arbitrarily in daily-administrated management. The result is a lack of transparency in the relationship between State and railways, which makes it difficult to fix business responsibility, and prevents a clear answer to question whether KTZ as a whole or its individual performances are micro-economically profitable or not. It also bears the heavy risk that public money is wrongly allocated and thus wasted.

The existing relationship between State and KTZ should be changed in the sense that entrepreneurial and state functions should be clearly separated and excessive involvement of the State in the business management of railways eliminated.

4.3.2 Regulation

It may be argued that some level of supervision by the State will always exist, where the State exercises following roles.

- guardian and possibly owner of the main railway facilities, considered as national strategic asset, to be kept in proper condition;



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- owner of railways assets, and of shares of companies owning railways assets, which must earn a decent return on their value;
- guardian of the safety of the general public;
- Guardian of the interest of the public, which needs transportation services to be available, at a fair price.

We propose that the Government of Kazakhstan should create a new position of Regulator. In the Ministry of Transport and Communications the Office of the Regulator will have a small staff with the necessary financial and technical expertise. The Regulator, on behalf of the Government, will be responsible for:

- the safety standards, and control their proper enforcement;
- the so-called PSO for Public Service Obligation, to be rendered by specific operators, and control the prices charged;
- The negotiation of a Performance Agreement with KTZ, and monitoring that KTZ complies with the Agreement.

4.3.3 Performance Agreement

The general purposes of KTZ will be defined as:

- The operation of a Railway on the Kazakhstan State railway system.
- Provision of passenger and freight services in a commercial manner.
- Regulation of the use of the railway infrastructure by other enterprises permitted to operate thereon.
- Undertaking other related and ancillary activities as determined by the Government or Board.

There will be a Performance Agreement agreed between the Government and KTZ, which will include the following provisions:

- Period of Agreement (five years would be reasonable);
- Use of state-owned property (land, buildings, equipment, etc.) by KTZ, especially land usage and development;
- Definition of what constitutes the railway infrastructure;
- General policy of Government for the period of the Agreement;
- General policy of KTZ with focus on provision of passenger and freight services, renewal of infrastructure, financial management and Divesting.



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The Performance Agreement will contain the following provisions:

- Mission Statement for KTZ, to be set by the Government and agreed by the Railway.
- Strategy, which is the framework for achievement of KTZ's Mission.
- Specific Objectives, under the Strategy in the areas of:
 - the Customer
 - Passenger Services: operations, tariffs, and marketing
 - Freight Services: marketing and operations
 - International Dimension
 - Infrastructure Renewal
 - Information Technology
 - Improvement of Management
 - Human Resources
 - Public Service Obligations and related Social Fares
 - Social Services
 - Finance, Accounting & Costing Systems
 - Investment Plan
 - Performance Factors
 - Execution of Contract

4.4 Divesting Agency

A very significant and challenging task involved in the re-structuring of KTZ relates to the wide range of activities, which are outside the core railway business of providing safe, competitive and efficient transport services. The involvement of Railway in these non-core activities was due to public policy under the Soviet system. The railway readily undertook these other activities and carried them out very well. The standards achieved by the KTZ in education and health services are considered to be superior to the standards of the public health and education authorities.

However, in the new situation of a free- market economy, these non-core activities should be divested, to allow KTZ management to concentrate on serving railway customers, upgrading services, and improving performance and efficiency. Some of the non-core activities could be



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divested in the short term; others will take a much longer time. The process of divestment is a complex and a difficult task, calling for special skills. In order to achieve the divestment efficiently, we propose the creation of a Divesting Agency. Non-core activities should be transferred to the Divesting Agency, which will be responsible for divestment and also responsible for management of the activities until such time as they can be divested.

The non-core activities to be transferred to the Divesting Agency fall into three groups, as follows:

- **Social Services.** These include health services and educational facilities, which should be transferred to the relevant public authorities. Excess employees of KTZ should also be transferred to this group for re-training and redeployment.
- **Enterprises Ready For Privatization.** There are some enterprises such as the Concrete Sleeper Manufacturing Factories, which could be privatized in the short to medium term. All options should be considered, including joint venture or management buy-out. Surplus property and buildings should also be sold for maximum price.
- **New Construction Activities.** These activities should be separated from those concerned with on-going maintenance and upgrade of infrastructure, which belong in the Infrastructure Service Unit. New construction activities would potentially be privatized or part privatized. The Infrastructure Unit should be free to contract out new construction work to private constructors in order to get the best possible deal for KTZ, to economize on the use of public funds.

The cash flows generated by divesting of non-core activities and assets can be used to finance the social costs of Divesting (e.g. re-training), or used for productive investment in core railway activities.

4.5 Management Organisation

4.5.1 Introduction

Kazakhstan Temir Zholy is facing formidable challenges, with a very substantial decline in traffic volumes since achieving independence. There is a great need for a greater efficiency, better customer service, and a reduction in costs leading to improved financial performance and for control of investment expenditures.

International practice in Railway organisation now generally favours separate funding and accounting for infrastructure, which is seen as a public-owned national asset. There is a need for a greater commercial freedom and accountability in the provision of passenger and freight services. There is a growing trend internationally to allow third party access to national rail system. There is already limited third party access to the KTZ rail system. There is potential to expand third party access for freight services. There is also potential for early provision by third parties for passenger services.



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4.5.2 Current KTZ Organisation Options

A proposed new management structure has been tabled for consideration, see Annex No 4.1

We consider that the new management structure under consideration has considerable merit and goes a long way to preparing KTZ to operate in the new market environment, with greater control of operating costs and investment, and improved customer service. We fully support the creation of units for provision of passenger and freight services, with profit responsibility. We fully support the creation of a separate infrastructure unit. We would consider that the traffic Management Centre would operate more effectively as part of the infrastructure unit. We consider greater emphasis should be given to Rolling Stock maintenance through creation of a Rolling Stock Service Unit. We consider that corporate level services would be more effectively managed by grouping them in a Corporate Service Unit. We consider that core railway business will be more effectively managed by allocating non-core activities to a new Divesting Agency, with responsibility for (a) social services (health, education, re-training), (b) enterprises that can be privatised in the short to medium term.

4.5.3 Organisation Principles

Traditionally railways organised their management structures on functional principles. This involved grouping of activities according to their different functions. The functional approach has been widely applied in many types of enterprise, and has many advantages. However, a functional-type organisation structure has certain disadvantages. Functional departments can become too focused on their own speciality, losing sight of overall objectives of the enterprise. Only the Chief Executive can be held responsible for profit performance.

Most railways in other countries, which have re-organised in recent years, have moved away from a functional-type organisation structure to the creation of Separate Business Units (SBUs) within the enterprise. SBUs have their own product or service line, have their own marketing, sales and operations, with real profit responsibility. Sometime SBUs are established as separate legal corporations. SBUs develop their own missions and goals, within the framework of the corporate mission, and prepare their own strategic plans. SBU managers require the entrepreneurial skills of managers of private business. They may or may not have competition.

The proposed organisation structure will support the following objectives:

- clear accountability to the Government of Kazakhstan for the custody and operation of valuable and strategically vital national assets;
- provision of customer-focused transport services in a commercial manner in competition with other modes of transport;
- logical grouping of activities and functions to achieve efficiency and effectiveness;
- clear accountability within KTZ ;
- good communications internal and external;
- achievement of financial objectives;



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- Restructuring of non-core activities.

4.5.4 Proposed Organisational Structure

The proposed organisation structure is outlined in Annex 4.1

4.5.4.1 REGULATOR

A Regulator, who will be appointed by and responsible to the Government, will monitor the Board and all the activities of KTZ. The office of the Regulator will have a small staff who will be responsible for ensuring that KTZ meets its Public Service Obligations, monitor public safety, and will negotiate the Performance Agreement with KTZ and issue appropriate licences. The role of the office of the Regulator is discussed in further details in the previous section.

4.5.4.2 Board of Directors

Management of KTZ will be delegated by the Government to the Board of KTZ. The Government will appoint the Chairman and Board Directors.

The number of Directors on the Board must be large enough to ensure a good range of expertise and representation, but not so large to become cumbersome. We suggest that a good compromise would be about ten Board members, plus the Chairman. The Chairman could be a full-time executive appointment, who would be Chief Executive Officer of KTZ.

The membership of the Board should be made up as follows:

- Two representatives of the Government;
- Five non-executive Directors who reflect the interests of Business/financial institutions, major KTZ freight customers, the transport sector and the travelling public;
- Three executive directors who would each be the Head of one of KTZ's major Units.

The responsibilities of the Board of KTZ will be:

- Establish objectives and policies for KTZ in harmony with Government policy, Public Service Obligation, legal requirements and the Contract Plan between the Government and KTZ
- Establish a management organisation structure for KTZ, and appoint the top management team;
- Approve annual budget and targets for KTZ in total, and for each of the Units;
- Monitor the progress of KTZ in comparison with objectives, budgets and plans, and timely recommend corrective action if appropriate;
- Safeguard the assets of KTZ;



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- Protect the interests of customers and staff;
- Report to the Government on the discharge of its responsibilities.

The Chairman/Chief Executive will have an office with a small staff responsible for Board secretariat, and public relations and will be responsible for implementing Board policy.

4.5.4.3 Chief Executive

The Chief Executive is responsible to the Board for the overall performance of KTZ. The Chief Executive prime role is the co-ordination of the activities of the Passenger and Freight BUs, and the Infrastructure and Rolling Stock Service Units. In this role the Chief Executive will be supported by a headquarters team, who will supply services that are more economic to supply centrally, or are more appropriate to the corporate level. These headquarters' services will be grouped under a Head of Corporate Services Unit and Head of Administration.

4.5.4.4 Deputy Chief Executive

In order to drive the substantial change that is required it is suggested that a Deputy Chief Executive be appointed to drive this change from the top. This is a very important position and if the Divesting Agency mentioned in the Report is held within the railway it should be the responsibility of the Deputy Chief Executive to direct this also.

All privatisation issues should also be dealt with in this department.

It is proposed that this position would also have responsibility for safety, auditing regional co-ordination real estate and legal departments.

4.5.4.5 Mainline Passenger Business Unit

The Passenger Business Unit will have its own marketing and sales operations, accounting and human resources functions. It will develop and sell passenger services on the long distance/international and commuter markets. It will operate its own rolling stock, including locomotives. The rolling stock may be owned by the Passenger BU, or may be leased from the Rolling Stock Service Unit. The Passenger BU with contract with the Rolling Stock Unit for major maintenance and overhaul on rolling stock. It will contract with the Freight BU for reciprocal use of locomotives, are required to minimise operating costs.

The Passenger BU will employ and manage its own staff, including loco drivers and station personnel. It will contract with the infrastructure Unit for use of infrastructure (track, electric power supply and building). It will operate its own services under the control of the Traffic Control Centre in Infrastructure Unit.

The Passenger BU will operate as a self-contained business with profit responsibility, in collaboration with the other Units in KTZ, and in harmony with overall KTZ objectives and policies.



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The main functions of The Passenger Business Unit will be:

- provision of cost effective and safe public passenger transport in harmony with KTZ Public Service Obligation;
- development of safe attractive services for passengers to meet market needs, and which are competitive with other forms of transport;
- achievement of financial and other targets as set by Passenger BU and approved by the Board of KTZ.
- management and development of staff;
- contract with Rolling Stock Unit for maintenance of rolling stock, with Infrastructure Unit for use of infrastructure, and with other suppliers for required services;

4.5.4.6 Suburban Rail Services

This unit would have the responsibility of arranging the franchises for suburban rail services through the country. It would have the responsibility of over-seeing the transition of the services being transferred from KTZ to private companies in some cases and arranging contracts with local authorities for the provision of specific services. The overriding principle as far as the railway is concerned is that the railway should make a profit or at the very least break even. Where KTZ operates the service consideration should be given to a cost plus contract, with appropriate incentive mechanisms.

4.5.4.7 Freight Business Unit

Like the Passenger Business Unit the Freight Unit will also be a self-contained unit with profit responsibility. It will be structured internally with senior managers responsible for operations, marketing/sales, accounts and human resources.

The main functions of the Freight Business Unit will be:

- development and marketing of freight services to meet market needs, in competition with other forms of transport;
- transport of goods, national and international, in a safe, secure, reliable and cost-effective manner;
- achievement of financial and other targets set by Freight BU, and approved by Board of KTZ.
- management and development of staff;
- contract with Rolling Stock Unit for maintenance and overhaul of rolling stock, including locomotives. (Possibly contract for lease of rolling stock, if owned by Rolling Stock Unit);
- contract with Infrastructure Unit for use of infrastructure (track, power supply, freight yards and depots);



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4.5.4.8 Rolling Stock Service Unit

We propose the establishing of Rolling Stock Service Unit, which will carry out maintenance and overhauls for the Passenger and Freight Business Units on locomotives, passenger carriages, and freight wagons. It will operate as an autonomous enterprise with its own technical, workshops, accounts and human resource managers. It will negotiate contracts for the supply of maintenance services to the Passenger and Freight Business Units.

The option should be kept open for the Rolling Stock Unit to own rolling stock, which it would then lease to the Passenger and Freight Units to other licensed operators.

The Rolling Stock Unit will be encouraged to provide engineering services to third parties on a commercial basis. There should be potential for expansion of profitable business, especially from industrial railways and other Central Asian Railways.

The principal functions of the Rolling Stock Service Unit will include:

- major maintenance and overhaul of rolling stock, including locomotives (diesel and electric), passenger carriages and freight wagons;
- contract with Passenger and Freight Business Units, and third party customers where profitable, for major maintenance, overhaul and other engineering services;
- development of best practice methods, systems, equipment and workshops for engineering work;
- management, training and development of staff;
- achievement of financial and other targets set by Rolling Stock Unit and approved by Board of KTZ.

4.5.4.9 Infrastructure Service Unit

We propose the establishment of an Infrastructure Service Unit, which will group together all the activities, and functions that are associated with the railway infrastructure. This will facilitate transparency of accounting for the infrastructure, which is to be seen as a national asset in public ownership. It will also facilitate charging Passenger and Freight BUs for the use of the infrastructure, and also for charging commercial rates to third party operators, if third party access is granted at some time in the future.

The principal functions of the Infrastructure Unit will be:

- provision of a safe track system as required by the Regulator, in accordance with agreed quality standards, in a cost effective manner;
- provision of a safe and efficient signalling and communication system;
- provision of a power supply system for electric traction;
- provision of buildings (stations, yards, depots) to Passenger and Freight BUS;



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- management of new construction (to be carried out by KTZ construction group or private constructors);
- management and development of staff;
- preparation of an infrastructure strategy and plan, to be approved by the Board of KTZ ;
- achievement of financial and other targets.

4.5.4.10 Corporate Services Unit

The principal functions and services to be included in the Corporate Services Unit are the following:

- **Corporate Planning** which will draw together the plans of the operating units, combined with the plans of the Divesting Agency , to ensure that the plans are in harmony with one another, and also in harmony with KTZ overall objectives and plans.
- **International Affairs** dealing with international affairs ,delegations, visits etc.
- **Treasury** which will liaise with Government, banks and international agencies for provision of capital, monitor capital spending and manage KTZ 's debt.
- **Information Services**, covering statistics and the operation of the Central Computer System.

4.5.4.11 Corporate Administration

- **Central Human Resources** will establish policies to be followed by the operating units, and provide some personnel services, e.g. pensions, senior management training.
- **Accounting** including international accounts/agreements and will liaise with agencies and railway systems outside Kazakhstan.
- **Procurement** including contracts with outside agencies barter arrangements etc.

4.5.5 Divesting Agency

Under an earlier tradition, the Railway became heavily involved in a wide range of services and activities, which are not core railway business. In the current situation, where the railway must provide market-driven services to its customer, which are competitive with other modes of transport, it is vital that the railway divests itself of these non-core activities.

We propose the creation of a Divesting Agency , to which the non-core activities will be transferred, so that they can be better managed, and then divested in the short or long term.

These non-core activities fall into three groups. The first group is social and non-commercial; divestment will be a long-term goal.



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The second group is commercial or semi-commercial. Some could be divested in the very short term; others will take much longer to achieve the right conditions for divestment. Options for privatization could include joint ventures, with KTZ retaining a share holding in partnership with private companies and individuals.

Any commercial activity related or not to railway business, which could significantly compete for non-railway business, or whose railway business may be substantially open to competition, is a potential candidate for privatization.

The third group is those entities within KTZ concerned with major construction projects. These entities have potential for privatization in whole or in part, but they have vital long-term strategic interest to KTZ. The future of this group is closely connected with the amount of investment that the Government will allocate for major new projects, such as electrification and construction of new railway lines. Therefore, privatization may be contingent on such future business, and delicate to organize at this time.

The principal activities that will come under the Divesting Agency are the following:

Social/Non-commercial

- Schools, kindergartens and other educational services. These provide highly valued services to KTZ employees and their families. They should be transferred to state educational authorities when the state services are able to provide a comparable level of service.
- Hospitals, clinics. KTZ should plan to always provide some level of medical service to employees, but at a much lower level than at present. Most health care services and facilities should be transferred to state health authorities when they are able to provide a comparable level of services.
- Excess employees of KTZ should be transferred to the Divesting Agency for re-training, followed by redeployment or outplacement.

Commercial

- The KTZ -owned concrete sleeper manufacturing plants, farms etc should be privatised.
- KTZ should look at privatising mechanised maintenance of the track.
- Rail welding depots should be privatised.
- Some maintenance facilities for rolling stock should be privatised.
- Track renewals should be privatised.

4.5.6 GENERAL

Various Organisational Charts are shown in Annex No 4



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Financial situation

5. Financial situation

5.1 Introduction

During the inception phase of the project the consultants worked closely with the EBRD mission and were provided with access to all of the financial data that has been collected by the bank during its visits to Kazakhstan. In addition the consultants had the opportunity to meet Mr. John Winner and his team of experts who are working on the development of a draft business plan for KTZ. These contacts proved to be extremely valuable in enabling the CIE Consult / Systra team to gain an understanding of the current financial position of KTZ, the difficulties that have been faced in recent years and the actions that are being taken by KTZ management to improve the situation.

A review was conducted of the balance sheet data for 1995, 1996 and the first quarter of 1997. The half-year results for 1997 were being prepared by KTZ's finance department during August 1997 and were not available for review during the project. The financial statements were presented in the format used by KTZ for statutory reporting purposes to the national fiscal authorities. These statements are not audited and are not prepared according to international accounting practice. The financial statements have not been subjected to a rigorous independent financial audit so it is not possible to determine if they represent a "true and fair view" of the performance of the company or of the value of its assets and outstanding liabilities. KTZ is taking very positive steps to improve that quality of its financial data and a number of staff in the finance department are undergoing training to familiarise them with Generally Accepted Accounting Practice (GAAP).

In order to present the financial results in an internationally acceptable format it is necessary to make a number of adjustments to the officially published data. The main adjustments that are required are in the following areas :

- Reclassification of costs that are currently reported as profit distributions. These relate to payments of staff bonuses and costs associated with maintaining "social infrastructure" that continue to be funded by KTZ . In common with other railways in the former Soviet Union KTZ provided staff with an extensive range of housing, medical, and recreational



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services that are more properly the responsibility of other municipal or national authorities. It is planned to transfer the responsibility for these activities out of the railways when agreement can be reached on who will take responsibility for them. In the interim period KTZ has informed the consultants that they are reducing the amount of expenditure in the social services area to provide only essential facilities.

- Adjustment of the depreciation charge to reflect the need to provide for the replacement of assets at current prices. In determining the size of the replacement costs depreciation provision it is essential that realistic view be taken of the quantity of assets that will be needed by KTZ to continue its operations in the future.
- Bad debts write-off and provision for doubtful debts. KTZ is constrained by current regulations, which prohibit the writing off of debts without prior approval.

The remainder of this report contains

- a review of the financial performance of KTZ during 1996 and an indication of the current trends based on the financial data for the first quarter of 1997,
- a review of the financial position of KTZ as determined by its balance sheets for 1995, 1996 and the first quarter of 1997
- the recent changes in the working capital requirements of the company and its immediate liquidity position

5.2 Financial Performance of KTZ

5.2.1 Classification of Activities

KTZ presents its income statement data in a format that was used by the railways of the former Soviet Union. It classifies its activities as

Transport related activity, which covers the revenue and costs associated with the actual transportation of freight and passenger traffic.

Auxiliary activity, which includes the revenues and costs associated with industrial production carried out by the railway for its own use or for external parties. This category also includes the costs of "capital repair" of railway assets.

Other sales, this covers the revenue and costs associated with the provision of non-transport services, the sales of goods (assumed to include the disposal of goods received in barter transactions which are not required for use by the railway), and the lease of assets to outside parties.

Non-sales operations, this includes gains and losses on foreign currency transactions, income from securities and shares, demurrage charges, and penalties incurred for slow transportation. KTZ also writes off bad debts under this heading and the 1996 accounts included the write-off of 6,500 million tenge owed by Russian Railways)



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5.2.2 Profitability

The data contained in the following table was extracted from KTZ's internal statistical summary of activities for the first quarter of 1997. It shows that volumes of freight and passenger traffic continued to decline in the first quarter. The most significant reduction in freight traffic was in the transportation of coal & coke although it appears that this reduction had been anticipated in the KTZ plan for quarter 1. The 10% decline in passenger traffic was not foreseen in the plan, which had assumed that the total volume would remain static.



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KTZ Statistical Data Quarter 1, 1996 vs. Quarter 1, 1997

| Statistics | Actual Quarter 1 1996 | Plan Quarter 1 1997 | Actual Quarter 1 1997 |
|-----------------------------|--------------------------|------------------------|--------------------------|
| Freight Tonnes (mils) | 39.5 | 36.9 | 34.9 |
| Freight Tonne Kms (mils) | 31,473 | 27,260 | 27,242 |
| Passenger Kms (mils) | 3,178 | 3,180 | 2,860 |
| Employees total | 163,293 | 153,311 | 150,789 |
| Employees in Transportation | 126,921 | 129,041 | 127,975 |

Transportation Revenue : Freight and Passenger Services

Despite the reduction in the volume of freight traffic the revenue earned of 16,957 million tenge (approx. \$226 million) was up by 28% compared to the same period last year , and it exceeded plan by approximately 12%. KTZ has been increasing its tariffs on a regular basis.

Passenger revenue of 1,803 million tenge (approx. \$24 million) was down 19% compared to plan and reflected the decline in the number of passengers carried.

Transportation Expenditure : Freight and Passenger Services

The consolidation of the administration of KTZ, which occurred at the beginning of 1997, has resulted in a reduction in the total number of staff employed. The employment data for the first quarter of 1997 shows that the number of staff now classified as being directly involved in the provision of transport services has actually increased by 1,054 to a total of 127,975 and it was planned to increase this to 129,041. Total salary costs for quarter 1 of 1997 were 3,835 million tenge (approx. \$51 million dollars) which was slightly higher than the quarterly average for 1996. This figure does not include the payment of bonuses to staff, which is treated as a distribution of profits in the KTZ accounts.

Expenditure on materials of 1,853 million tenge (approx. \$24.7 million) in quarter 1 was only 18% of the total materials expenditure for the whole of 1996. This could be attributed to seasonal factors such as a reduction in maintenance and repair activity during the winter months.

Fuel and energy costs of 3,383 million tenge (approx. \$45 million) in quarter 1 were 32% of the total for 1996 despite a decline in the volume of freight and passenger traffic. Motive power costs accounted for approximately 25% of total transportation expenditures in the first quarter of 1997.

KTZ revalued its fixed assets as of 1st April 1997 and the impact of this revaluation is not reflected in the depreciation charges for the first quarter. The assets were revalued according to fixed coefficients. The coefficient applied to assets described as "transportation means" was 1.83. The actual depreciation for the first quarter was 1,515 million tenge (approx. \$20



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million) which was significantly lower than the amount that should be provided to replace the assets of KTZ.

Transport Net Result : Freight and Passenger Services

The net result for transport activities for the first quarter was a reported profit of 4,966 million tenge (\$66 million) or a 26% margin which was a considerable improvement compared to a 14% margin reported for the year 1996.

Auxiliary Activity Revenue

The reported revenue from auxiliary activities for quarter 1, 1997 was 1,969 million tenge (approx. \$26 million) and represented only 19% of the total revenue earned in this category during the full year 1996.

Auxiliary Activity Expenditures

Total expenditure on auxiliary activities was 3,385 million tenge (approximately \$ 45 million) was slightly below the quarterly average for 1996. Payroll related costs and expenditure on materials were below the average levels recorded for 1996 but fuel and power costs increased significantly.

Auxiliary Activity Net Result

KTZ reported a net loss of 1,416 million tenge (approximately \$19 million) on auxiliary activities for the first quarter of 1997.

Other Sales Revenue & Expenditures

There was no reported revenue under this category during the first quarter of 1997. Total reported expenditures were 31.5 million tenge (approx. \$0.42 million).

Other Income & Expenditures

Other income from non sales activities during quarter 1, 1997 was 639 million tenge (approx. \$8.5 million) During 1996 KTZ reported 7,399 million tenge in other income which consisted mainly of gains on foreign currency transactions of 5,303 million tenge, demurrage charges, income from financial securities and joint venture shares.

Other expenses for the first quarter of 114 million tenge (approx. \$1.5) which was only a fraction of the level of other expenses recorded for 1996 of 6,922 million tenge (\$92.3 million). The bulk of the other expense category in 1996 consisted of the write-off of debts owed by the Russian Railways which amounted to 6,500 million tenge (approx. \$86.7 million) and the payment of compensation for slow transport of 422 million tenge (approx. \$5.6 million).

Adjustments required to KTZ reported net result

In calculating its reported net result KTZ adjusts the total expenditure by eliminating amounts that it classifies as "internal turnover" and "work -in-progress". Adjustments of this type are acceptable were goods are being manufactured for inclusion in inventory or the work is of a



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Financial situation

capital nature. These adjustments have been retained in the summary income statements presented in this report.

Certain categories of expenditure are treated as "distributions from profit" by KTZ but should be regarded as costs in the calculation of the net result. In 1996 KTZ made distributions of 6,175 million tenge (approx. \$82 million), classified as "other" in the description of income utilisation.

This amount was broken down as shown in the following table:

Utilisation of Income 1996 – Other

| Description | Millions of tenge |
|---|----------------------|
| Financing of Social Sphere | 5,104 |
| Financing of power structures | 34 |
| Penalties | 355 |
| Compensation for fuel | 151 |
| Development of internal farming | 139 |
| Losses from write-off of fixed assets | 119 |
| Disbursements to labour unions | 79 |
| Other expenses | 194 |
| Total | 6,175 |
| Amount already included as a cost of Transport & Auxiliary activity in the summary income statement | 4,148 |
| Adjustment required to reported expenditures | 2,027 |

The maintenance and operation of social services for railway employees accounted for the bulk of this expenditure. KTZ hopes to transfer the responsibility for the maintenance and operation of the social services outside the railway to other government ministries or to municipal authorities. Of the total amount of 6,175 million tenge an amount of 4,148 million tenge is already accounted for in the summary income statement as direct expenditure relating to transport and auxiliary activities and the additional amount of 2,027 million tenge is treated as an increase in total expenditure in the calculation of the adjusted net result for 1996.



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Profit distributions, which are classified by KTZ as payments to the consumption fund mainly relate to the payment of staff bonuses and these should also be treated as operating expenses.

The breakdown of the consumption fund for 1996 is shown in the following table :

| Description | Millions of Tenge |
|--|-------------------|
| Annual bonuses to the staff | 702 |
| Regular bonuses to the staff | 76 |
| Material assistance and social privileges | 1,362 |
| Entertaining, cultural, sport & other activities | 170 |
| Assistance to retired staff and veterans | 199 |
| Loans and grants for housing to the staff | 506 |
| Bonuses to non-staff | 68 |
| Amounts to cover losses for 1995 | 1,230 |
| Total | 4,313 |

The total amount of expenditure in the "consumption fund" has been reclassified as a cost of KTZ in calculating the net result for 1996.

According to the industry rate agreement between the Government of Kazakhstan, the railway administration and the railway employees labour union for 1996, all expenses relating to the consumption fund, social utilities maintenance etc. are mandatory.

The total adjustments required to the KTZ reported expenditure for 1996 in respect of social expenditure, consumption fund and internal accounting adjustments resulted in an increase in total costs of 4,135 million tenge. By contrast the net adjustment required to the accounts for the first quarter of 1997 was a credit of 718 million tenge (approx. \$9.6 million). This effectively means that the size of the internal accounting credits for items such as "work-in progress" expenditures exceeded any payments made in respect of social facilities and the consumption fund. It is not clear at this time if this is simply a timing difference caused by a delay in making payments or if it is the result of a permanent reduction in the amount of expenditure on social facilities and staff bonuses.

KTZ Adjusted Net result

The adjusted net result before tax for 1996 was a profit of 1,890 million tenge (approx. \$25 million at the current exchange rate of 75 tenge : 1 US\$). Because taxable profit is calculated before the deduction of expenses incurred for operating social facilities and the payment of staff bonuses, KTZ was faced with a tax liability of 4,068 million tenge (approx. \$54 million).



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The adjusted net result for the first quarter of 1997 was a profit of 4,760 million tenge (approx. \$ 63 million) which was 2.5 times higher than the adjusted net result for the whole of 1996. The reported tax liability of 1,018 million tenge (approx. \$13.6 million) only 21% of the adjusted profit figure for the quarter.

Replacement Cost Depreciation

The depreciation provisions provided in the 1996 accounts and in the accounts for the first quarter of 1997 are based on historical asset values that have not been adjusted. A revaluation of assets occurred on the 1st of April 1997 but the impact of this revaluation is not reflected in the summary income statement data provided in this report. It has been calculated that the additional depreciation that was required for 1996 to reflect the replacement cost of assets was 22,298 million tenge (approx. \$297 million). This assumes that the replacement of all existing locomotives, wagons, passenger carriages and tracks are being provided for at current prices.

The replacement cost depreciation provision estimated that for quarter 1 was 6,725 million tenge (approx. \$89 million). The net loss for 1996 after the depreciation adjustment is 21,098 million tenge (approx. \$281 million) and for quarter 1, 1997 the net loss is 1,965 million tenge (approx. \$26 million).

5.3 Financial Position of KTZ

The data presented in the KTZ balance sheet has not been subjected to an independent financial audit to verify its accuracy. This factor must be borne in mind when making any assessment of the financial position of KTZ.

Total Capital Assets and Non-Circulating Assets

There was no significant movement in the balance reported between the end of 1996 and the end of the first quarter 1997. Again it should be noted that the revaluation of the assets on 1st April, 1997 is not reflected in the data presented here.

Total Reserves and Expenditures

The increase in total reserves and expenditures shown in the balance sheet at the end of the first quarter of 1997 was 423 million tenge (approx. \$5.6 million). The increase in production reserves accounted for 322 million tenge of the increase. Production reserves (inventory) increases as a result of the receipt of goods obtained in barter transactions. The total stock of production reserves stood at 13,024 million tenge (approx. \$173 million) at the end of the first quarter. It is not known if this inventory has a net realisable value equivalent to the quoted figure but it seems unlikely as KTZ has received goods in barter transaction in the past that were not of direct use to the railway. KTZ management has indicated that they are actively working on reducing the quantity of unnecessary items held in inventory. It is possible that a portion of the production reserves may have to be written-off in the future.

Accounts Receivable

There was a very significant decline in the size of KTZ's accounts receivable balance as reported in the quarter 1, 1997 balance sheet. Total accounts receivable dropped from 30,043 million tenge (approx. \$400 million) to 19,598 million tenge (approx. \$261 million) which is a



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reduction of 35%. It is understood that the remaining balance includes bad debts which arose as a result of the privatisation process which has led the government to promise privatised railway clients that their debts will be written-off without any compensation being paid to the railway. The consultants requested an analysis of the debtor's balance indicating the amount of bad debt that remains on the books but this had not been received at the time this report was written.

Accounts Payable and Other Liabilities

There was a dramatic reduction in the level of accounts payable and other liabilities during the first quarter of 1997. The total reported liabilities declined from 49,410 million tenge (approx. \$659 million) to 30,796 million tenge (approx. \$ 411 million) which is a reduction of 18,614 million tenge (approx. \$248).

The major change occurred in accounts payable for commodities, works and services where a reduction of 18,333 million tenge (approx. \$ 245 million) was reported. It should be noted that KTZ continues to report substantial amounts due to employees in the form of unpaid salaries and bonuses, unpaid social insurance, and substantial amounts due to the state in the form of unpaid taxes. KTZ has been effectively borrowing from its employees and the state during its financial crisis and it continues to do so.

5.3.1 Working capital and liquidity

Working Capital Requirement

The working capital requirements of KTZ, defined as current assets minus current liabilities, are positive and have been increasing. The requirement at the end of 1996 was 2,159 million tenge (approx. \$ 29 million) and this had increased to 10,254 million tenge (approx. \$ 137 million) at the end of quarter 1, 1997. The size of the current assets balance continues to be the main problem due to the level of production reserves i.e. stock of goods received in barter transactions.

Cash balance

KTZ's cash balance at the end of quarter one was 1,723 million tenge (approx. \$23 million) which was up on the year end balance of 828 million tenge (approx. \$ 11 million). The available cash was insignificant compared to the amount of debts outstanding in respect of unpaid salaries and bonuses, social insurance and state taxes.



Financial situation

5.3.2 Financial Statements

5.3.2.1 KTZ Income Statement

KAZAKHSTAN TEMIR ZHOLY - FINANCIAL RESULTS FOR RAIL TRANSPORT ACTIVITIES

(000,000's Tenge)

| Transportation Revenue | Full Year | First Quarter | Quarter 1 as a % of 1996 |
|--|-------------------|-------------------|--------------------------|
| | 1996 | 1997 | |
| Freight | 53,567,458 | 16,957,155 | 32% |
| Passenger | 8,106,112 | 1,803,167 | 22% |
| Total Transport Revenue | 61,673,570 | 18,760,322 | 30% |
| Transportation Expenditure | | | |
| Payroll | 13,716,994 | 3,834,596 | 28% |
| Social Insurance | 4,354,536 | 1,287,417 | 30% |
| Materials | 10,534,775 | 1,852,665 | 18% |
| Fuel | 5,794,896 | 1,785,249 | 31% |
| Power Supply | 4,795,755 | 1,597,832 | 33% |
| Depreciation | 4,981,184 | 1,515,439 | 30% |
| Other | 8,791,721 | 1,920,956 | 22% |
| Total Transport Expenditure | 52,969,861 | 13,794,154 | 26% |
| Net Result : Transport Activities | 8,703,709 | 4,966,168 | 57% |



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| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

Kazakhstan Temir Zholy : Financial Results for Auxiliary Activities

| | | | |
|--|-------------------|-------------------|------------|
| Auxiliary Revenue | 10,184,316 | 1,969,214 | 19% |
| Auxiliary Expenditures | | | |
| Payroll | 2,880,823 | 557,510 | 19% |
| Social Insurance | 922,461 | 184,027 | 20% |
| Materials | 2,620,885 | 448,148 | 17% |
| Fuel | 1,318,039 | 490,961 | 37% |
| Power Supply | 1,376,735 | 511,505 | 37% |
| Depreciation | 402,886 | 103,738 | 26% |
| Other | 5,010,788 | 1,088,951 | 22% |
| Total Auxiliary Expenditures | 14,532,617 | 3,384,840 | 23% |
| Net Result Auxiliary Activities | -4,348,301 | -1,415,626 | 33% |



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Financial situation

Kazakhstan Temir Zholy : Financial Results for Other Sales Activities

| | | | |
|--|-----------|---------|----|
| Total Other Sales Revenue | 4,964,944 | 0 | 0% |
| | | | |
| Total Other Sales Expenditures | 3,772,839 | 31,581 | 1% |
| | | | |
| Net Result Other Sales Activities | 1,192,105 | -31,581 | |

Kazakhstan Temir Zholy : Other Income & Expenditures

| | | | |
|-------------------------------------|-----------|---------|------|
| Total Other Income | 7,399,337 | 638,591 | 9% |
| | | | |
| Total Other Expenditures | 6,922,145 | 114,007 | 2% |
| | | | |
| Net Other Income/Expenditure | 477,192 | 524,584 | 110% |



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Financial situation

| | | | |
|--|--------------------|-------------------|--|
| Adjustments: | | | |
| Social Services Expenditures/Consumption Fund (+6,339,898) | | | |
| Internal turnover (- 2,012,498) | 4,135,006 | -716,898 | |
| Work-in-progress (- 192,394) | | | |
| Total Adjustments | 4,135,006 | -716,898 | |
| Net Result | 1,889,699 | 4,760,443 | |
| Income tax | 4,068,479 | 1,018,085 | |
| Retained Loss after tax | -2,178,780 | 3,742,358 | |
| Additional Depreciation (EBRD estimate) | 22,987,207 | 6,725,316 | |
| Adjusted Net Loss | -21,097,508 | -1,964,873 | |

Financial situation

5.3.2.2 KTZ Balance Sheet Data

Traceca : Central Asia Railway Restructuring Project

Module A : Kazakhstan Railways (KTZ)

Comparative Balance Sheet Data

KTZ Balance Sheet Data 01.04.1997 - Translation of Original Kazakh Version

ASSETS

in '000's Tenge

| 01/01/96 | 01/01/97 | 01/04/97 |
|----------|----------|----------|
|----------|----------|----------|

Capital assets & Other non-circulating assets

| Non material assets | | | | |
|-----------------------|--|--------------------|--------------------|--------------------|
| 10 | Prime Cost | 17,317 | 31,146 | 33,215 |
| 11 | Depreciation | 1,924 | 6,601 | 8,092 |
| 12 | Net Book Value | 15,393 | 24,545 | 25,123 |
| Capital Assets | | | | |
| 20 | Prime Cost | 147,301,485 | 202,369,321 | 203,703,635 |
| 21 | Depreciation | 54,156,901 | 78,462,519 | 80,797,780 |
| 22 | Net Value | 93,144,584 | 123,906,802 | 122,905,855 |
| 30 | Equipment to be installed | 275,624 | 181,946 | 165,058 |
| 40 | Non-completed capital investment | 6,060,979 | 5,943,753 | 6,183,073 |
| 50 | Long Term Financial Investments | 97,355 | 241,721 | 195,108 |
| 60 | Accounts receivable from founders | - | - | - |
| 70 | Other non circulating assets | 1,787,682 | - | - |
| 80 | Total Capital Assets & Non Circulating Assets | 101,381,617 | 130,298,767 | 129,474,217 |



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Financial situation

| in '000's Tenge | | 01/01/96 | 01/01/97 | 01/04/97 |
|------------------------------------|--|-------------------|-------------------|-------------------|
| Reserves & Expenditures | | | | |
| 100 | Production Reserves | 10,713,755 | 12,701,549 | 13,023,655 |
| 110 | Cattle and Domestic Animals | 128,650 | 118,486 | 104,500 |
| | Low value & Quickly Depreciating | | | |
| 120 | Prime Cost | 840,483 | 1,532,693 | 1,696,991 |
| 121 | Depreciation | 353,856 | 677,344 | 758,994 |
| 122 | Net Value | 486,627 | 855,349 | 937,997 |
| 130 | Non Completed Production | 289,796 | 221,375 | 251,927 |
| 140 | Future Period Expenditure | 168,075 | 265,555 | 297,336 |
| 150 | Finished products | 59,217 | 68,492 | 78,491 |
| | Commodities | | | |
| 160 | Sales Price | 643,280 | 629,344 | 539,428 |
| 161 | Added price (margin) | 83,836 | 70,191 | 64,931 |
| 162 | Purchase Price | 559,444 | 559,153 | 474,497 |
| 180 | Other reserves and expenditures | 69,426 | 39,112 | 83,828 |
| 190 | Total reserves and expenditures | 12,474,990 | 14,829,071 | 15,252,231 |



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Financial situation

5.3.2.3 KTZ Balance Sheet Data (continued)

| <i>in '000's Tenge</i> | | 01/01/96 | 01/01/97 | 01/04/97 |
|---|---|--------------------|--------------------|--------------------|
| Cash Accounts & Other Assets | | | | |
| | Accounts with debtors: | | | |
| 200 | For commodities, works & services | 24,970,033 | 21,426,188 | 16,962,783 |
| 201 | VAT | 3,414,099 | 793,073 | - |
| 205 | For commodities, works & services excl. VAT | 21,555,934 | 20,633,115 | 16,962,783 |
| 210 | For promissory notes received | 3,667 | 82,715 | 23,087 |
| 220 | With affiliates | - | - | - |
| 230 | With Budget | 72,079 | 59,155 | 37,224 |
| 240 | With employees for other operations | 321,575 | 395,339 | 478,813 |
| 250 | With Other Debtors | 3,873,673 | 8,120,440 | 1,492,164 |
| 260 | Advances paid to suppliers | 587,969 | 735,268 | 285,485 |
| 270 | Short term Financial Investments | 177,470 | 543 | 1,740 |
| | Monetary assets: | | | |
| 280 | Cash | 2,210 | 10,396 | 11,237 |
| 290 | Bank Accounts | 220,050 | 225,951 | 763,627 |
| 300 | Hard currency bank accounts | 1,101,876 | 175,362 | 194,315 |
| 310 | Other cash of cash equivalent | 1,664,212 | 429,081 | 761,361 |
| 320 | Other Working Assets | 918,879 | 16,494 | 316,605 |
| 330 | Total cash accounts & other assets | 30,499,594 | 30,883,859 | 21,328,441 |
| 360 | BALANCE ASSETS | 144,356,201 | 176,011,697 | 166,054,889 |



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Financial situation

LIABILITIES

in '000's Tenge

| 01/01/96 | 01/01/97 | 01/04/97 |
|----------|----------|----------|
|----------|----------|----------|

Source of own assets

| | | | | |
|------------|--|-------------------|--------------------|--------------------|
| 400 | Equity | 219,189 | 671,492 | 661,329 |
| 410 | Reserve Fund | 83,206 | 109,585 | 109,962 |
| 420 | Special funds | 99,541,361 | 132,821,787 | 133,878,961 |
| 430 | Special subsidies and financing | 727,508 | 646,682 | 609,006 |
| 440 | Rental obligations | - | - | - |
| 450 | Undistributed profit of previous years | 347,307 | - | - |
| | Profit (Memo only) | | | |
| 470 | current year | - | 3,255,352 | 5,694,208 |
| 471 | utilized | - | 3,847,270 | 2,099,539 |
| 472 | non distributed profit of current year | | - | - |
| | Losses (deduct from equity & reserves) | | | |
| 475 | previous years | 1,577,564 | 7,648,285 | - |
| 476 | current year | | - | - |
| 480 | Total source of own assets | 99,341,007 | 126,601,261 | 135,259,258 |



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Financial situation

KTZ Balance Sheet Data (continued)

| Accounts & other liabilities | | 01/01/96 | 01/01/97 | 01/04/97 |
|------------------------------|---|--------------------|--------------------|--------------------|
| 500 | Long term bank credits | 70,680 | 296,590 | 311,937 |
| 510 | Long term Loans | - | - | - |
| 600 | Short term bank credits | 327,318 | 12,039 | 7,543 |
| 610 | Bank credits to employees | 9,661 | 738 | 98 |
| 620 | Short term loans | 637 | - | - |
| | Creditors | | | |
| 630 | for commodities, works & services | 31,507,620 | 27,015,526 | 8,563,895 |
| 631 | VAT | 2,683,680 | 118,748 | - |
| 635 | for commodities, works & services excl. VAT | 28,823,940 | 26,896,778 | 8,563,895 |
| 640 | For promissory notes given | - | - | - |
| 650 | For salaries | 2,386,354 | 2,501,697 | 2,946,592 |
| 660 | Social Insurance & provisions | 1,408,239 | 1,701,473 | 943,205 |
| 670 | Property & individual insurance | 1,236 | 3,840 | 4,347 |
| 680 | Affiliates | - | - | - |
| 690 | Non-budget debts | 375,426 | 200,127 | 504,342 |
| 700 | Budget debts | 2,255,522 | 6,043,794 | 6,587,430 |
| 710 | Other creditors | 654,829 | 356,589 | 216,173 |
| 720 | Advances received from customers | 3,214,157 | 4,400,803 | 4,260,772 |
| 725 | Debts from founders | 1,088 | - | - |
| 730 | Future period benefits | 590,292 | 603,934 | 558,253 |
| 735 | Consumption funds (salaries) | 4,217,490 | 6,360,030 | 5,870,976 |
| 740 | Future payments & expense reserve | 678,306 | 27,750 | 9,175 |
| 750 | Dubious debts reserve | 19 | 4,254 | - |
| 760 | Other short term liabilities | - | - | 10,893 |
| 770 | Total Accounts & Other Liabilities | 45,015,194 | 49,410,436 | 30,795,631 |
| 800 | BALANCE LIABILITIES | 144,356,201 | 176,011,697 | 166,054,889 |



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5.3.2.4 KTZ Summarised Balance Sheet Data

Traceca : Central Asia Railway Restructuring Project

Module A : Kazakhstan Railways (KTZ)

Comparative Summary Balance Sheet Data

| in '000 Tenge | 01/01/96 | 01/01/97 | 01/04/97 |
|---|--------------------|--------------------|--------------------|
| Capital assets & other non-circulating assets | 101,381,617 | 130,298,767 | 129,474,217 |
| Current assets | 39,986,236 | 44,872,140 | 34,850,132 |
| Cash at bank and in hand | 2,988,348 | 840,790 | 1,730,540 |
| | 144,356,201 | 176,011,697 | 166,054,889 |

| in '000 Tenge | 01/01/96 | 01/01/97 | 01/04/97 |
|---|--------------------|--------------------|--------------------|
| Capital, reserves & long term liabilities | 104,307,483 | 133,285,631 | 141,451,346 |
| Current liabilities | 39,711,102 | 42,713,289 | 24,595,902 |
| Short term credit | 337,616 | 12,777 | 7,641 |
| | 144,356,201 | 176,011,697 | 166,054,889 |



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| <i>in '000 Tenge</i> | 01/01/97 | 01/04/97 | Variation |
|-----------------------|-----------|------------|-----------|
| Long term resources | 2,986,864 | 11,977,129 | 8,990,265 |
| Working capital needs | 2,158,851 | 10,254,230 | 8,095,379 |
| Net cash | 828,013 | 1,722,899 | 894,886 |



Cost and Financial Analysis

6. Cost and Financial Analysis

6.1 Financial analysis and control

Due to lack of a suitable M I S it has proved very difficult to get the necessary data to clearly examine the financial state and prospective profitability of the railways constituent businesses.

6.1.1 An Outline Approach to Railway Business Evaluation.

Financial analysis and control concerns the overall financial evaluation of the profitability of the business. This may be further analysed into identifiable constituent parts. At its highest level this is the 'Profit and Loss Account' for the business as a whole. The next level of business evaluation is the identification of those parts of the business for which meaningful costs and associated income can be determined. For example, profitability statements can be prepared separately for the Freight business and the Passenger business, and also for sub-divisions of these main businesses. These identifiable parts of the business can be called 'Profit Centres'.

In addition, overall and localised cost control and productivity monitoring down to Cost Centre level, is accomplished through the budgeting process in which predetermined levels of activity and associated expenditure and income (where appropriate) are measured against actual performance.

6.1.2 Budgetary control and cost centres

The Budget Process is a means of setting out the plans of an organisation. The process for the railway should start by agreeing the amount (volume) of traffic, both freight and passenger, that will be carried in the future period and the revenue to be earned; and also identifying the resources necessary to achieve that business plan.



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Cost and Financial Analysis

The revenue income for the railway is earned by selling services--to freight customers, and by carrying passengers. Such income will only materialise if the railway provides the service that the customer requires and at a price that seems reasonable. The planning of service provision starts with market research to know what the customer wants by way of a transport service, and how the railway can satisfy these needs by running trains commensurate with the assessed demand. A budget of expected income is prepared for each Profit Centre - that is, each identifiable portion of the overall business for which a reasonable assessment can be made of the revenue income, and the associated costs of production.

The expenditure budget is the financial measure of the use of resources and facilities necessary to achieve the production of the transport service. The various functions within the railway organisation (selling/marketing, operations, maintenance and infrastructure, etc.) will each have input into the overall production plan. The cost of that input will be reflected in their individual budgets.

Financial and management control may be exercised through the setting of targets or budgets. To be effective the output should be managed in small packages--that are in defined parts of the production area, which is the responsibility of one manager or supervisor. This area of responsibility is called a Cost Centre. A single manager may be responsible for several Cost Centres.

In assessing the costs associated with a Profit Centre, some costs centres will provide work or services to only one profit centre whereas most cost centres will provide service to several Profit Centres and some means will be required to apportion the costs between them. The method apportionment will vary according to the type of work or service performed and the ability to measure the output to provide a fair method of sharing these joint costs. The method may be based on share of the total hours of use or distance travelled, or quantity of stores consumed e.g. fuel for locomotives can be assessed as 'litres per gross tonne kilometre' x cost per litre issued; the time cost for using rolling stock would be calculated in terms of 'cost per hour in service'.

6.1.3 Business units

Business units can be defined as those elements of activity, within the overall Railway organisation, where the income and expenditure associated with production of the service/activity are identifiable, thus enabling a view to be taken of the 'profitability' of that activity.

The main activity of a Railway is the production of Passenger and Freight train services. There may, in addition, be several other activities undertaken by the Railway, which it is appropriate to regard as businesses. Examples of these additional business units include the 'Industry Units' and the "Management of the Railway Infrastructure",

The State may assume ownership and responsibility for the railway infrastructure, but the day to day management of the Railway Infrastructure may be delegated to the Railway, for the duration of an 'Operating Contract' between the State and the Railway.

The Business Units must be meaningful and practical, and be able to determine both receipts and costs, if they are to be used as a basis for business evaluation and decision making. The use of resources and their associated costs must be sufficiently particular to the specific services of the Business Unit to make their identification and method of allocation to that business appear to be sensible. That is, after time for adjustment and understanding the



Cost and Financial Analysis

methodology, these costs could be 'avoided' by the railway in the absence of that specific Business Unit. Receipts also must be reasonably attributable to the services provided, although some 'joint revenue' (between competing and connecting business units) may be inevitable.

The proposal for creation of Business Unit reporting can be accomplished using present manual accounting systems, but would also work more efficiently if the railway adopted a computerised Financial Accounting and Management Reporting system (MIS).

Making progress towards the efficient management of these Business Units may suggest certain organisational changes, which will provide for executive responsibility for managing and controlling the income and expenditure attributable to each Business Unit. As an initial stage, it is suggested that the railway identify Business Units for Passenger; Freight; Infrastructure; and possibly also for certain 'Industrial Units'

6.1.4 Traffic costing or business evaluation

The main aim of Traffic Costing or Business Evaluation is to assist management to understand the commercial viability of the various 'transport products' (Block train freight services, wagon load freight, express passenger or local passenger trains) that are provided by the railway company. The process of Traffic Costing is not the same as an annual 'profit and loss account', but is an assessment of the economic value to the business, and therefore uses a 'longer term' (or smoothed average) view of costs.

Traffic Costing may be used to provide an advisory service to the Marketing Departments as an *aid* to understand tariff setting and profitability; and also by the financial planning department for use in determining longer-term strategy and investment decision making.

6.1.4.1 The application of traffic costing

The application of Traffic Costing requires an understanding of railway operations. The analyst needs to identify the various processes that are involved in the provision of train services in order to prepare a meaningful analysis of the available financial and statistical data. The costs of some of these processes will vary proportionally with the volume of service or traffic activity on the railway, whereas other cost will only change as performance requirements trigger the provision of additional resources (e.g. a 'step change') There are other costs which do not appear to vary with the volume of activity e.g. the provision of basic track and signalling facilities.

6.2 Calculation of unit costs

The calculation of unit costs appropriate to the activity involves the identification of the activity and the application of the related production statistics. For example, fuel for train working may be expressed as a cost per gross-tonne-kilometre, whereas train crew or locomotive drivers can be measured as a cost per productive driving hour--derived from the cost of salaries and other directly associated payroll costs for loco drivers at the depot which provides the train service, divided by the number of productive train hours worked by that depot, over the same financial period.



Cost and Financial Analysis

6.2.1 An approach to measuring cost and profitability of Railway Traffic

The value of railway traffic may be assessed by measuring the current income against the identifiable direct expenditure incurred in carrying the traffic, and viewing the (positive) balance as a contribution to the indirect joint and common costs of all other expenditure, such as Administration and the cost of providing and maintaining the Infrastructure.

From information available at the depots it is possible to analyse the staff costs in the Locomotive department to Drivers, by type of traction. Thus it is possible to establish an approximate cost for drivers costs for passenger and freight working.

There appears to be an adequate source of expenditure analysis at locomotive department depot level to provide a form of 'Depot Costing System' which can identify cost of maintenance by type of traction, or at least by 'workshop' within the repair works.

Fuel for traction may be allocated between passenger and freight on the basis of the gross-tonne-kilometres produced.

Part of the Infrastructure costs may be debited to passenger on the basis that a portion of track maintenance costs are incurred because of the higher standard of track required to run a passenger service. Similarly the standard of provision and maintenance of signalling equipment is higher passenger routes.

6.2.2 Proposed cost and profitability analysis system

In proposing a costing system for any business, it must be recognised that the prime purpose of the system should be to provide meaningful information on a regular basis to managers at the lowest possible level, so that they can fully appreciate the costs and "profitability" of their part of the organisation, measured against an agreed budget or "transfer price" within the business sector. The objective must surely be to assist in the promotion of a business that provides "value for money spent".

A suitable Cost and Revenue Analysis System will require to reflect the various "business activities" of the railway. In any railway the basic unit of production is a train. The costing and revenue analysis system is therefore attempting to identify the costs and revenue associated with the running of a train service.

The first main division is to identify the Core Business—that is to account for Passenger, Freight, and Other Activities in such a manner that the cost of providing the service can be matched with the revenue generated by that part of the business activity. It may then be possible to further sub-divide each activity into sectors to which revenue and costs can be specifically identified.

6.2.3 Identification and allocation of costs

A clearer understanding of how costs arise, and of asset utilisation will help to identify any over provision of facilities, and point the way toward a more profitable railway. Costs on a railway arise and change in several different ways, depending on the nature of the cause of the cost.



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Cost and Financial Analysis

All costs incurred by KTZ will be accounted for via a Cost Centre and can be compared each accounting period with a cost centre Budget. Each cost centre can also calculate Productivity Indicators, which can be used in comparing the work output, appropriate to the cost centre. For example a train crew depot could calculate the total number of traincrew man-hours as a ratio of the productive train hours worked from that depot, and the civil engineer can calculate the number of man-hours per kilometre of track maintained in the month.



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Economic analyses and traffic forecasts

7. Economic analyses and traffic forecasts

7.1 Introduction

The study provides an economic development perspective of Kazakhstan railways for 1998-2002 as well as commentary on Kazakhstan railway proposals for future years.

A review of the general economic development of Kazakhstan and analysis of restructuring schedule prepared by Kazakhstan railways is given in Annex No 7.1.

The study is focused on the following issues:

- freight and passenger traffic forecasts,
- performance result forecasts per type of traffic,
- impact of competition.

7.2 Railway traffic forecasts

This study should have had additional detailed data regarding freight and passenger traffic for the 1996 and 1997 fiscal years:

- per rail line section
- per type of freight transported
- per type of traffic:
 - freight transiting and internal
 - international, regional, suburban for passengers.



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Economic analyses and traffic forecasts

Due to the reorganisation performed and particularly to the elimination of the three former networks, Management was only able to obtain partial information. Based on these data, during the summer of 1997, Management prepared railway traffic and performance result forecasts for 1998-2002, which is included in annex 7. These forecasts were prepared on the basis of data recorded during the 1996 fiscal year and of the developments, which have occurred during the first two quarters of 1997.

According to Management, performance results for the first 9 months of 1997, which are included in annex 7, confirm the validity of existing forecasts.

Performance results are still not available for the month of October 1997; however, railway traffic has recovered sharply which has led Management to review positively its forecasts for 1998 and for the following years. The Railways could take advantage of a production recovery as reflected in the figures published by INCON CONSULTING LTD, in October 1997 (excerpt included below), (of 31, KAZYBEKbi 50, ALMATY, 480091, KAZAKHSTAN)

7.2.1 Economy

General Situation

Between January and September 1997, the following indicators were established:

Production volume of industrial goods (works, services) for household sector, between January and September 1997.

| | Volume of goods at current wholesale prices, mln. Tenge | | | Indexes of goods volume in % | | |
|--------------|---|----------------|------------------------|-------------------------------|----------------------------------|--|
| | August 1997 | September 1997 | January-September 1997 | September 1997 to August 1997 | September 1997 to September 1996 | January-September 1997 to January-September 1996 |
| TOTAL | 70,685 | 65,394 | 592,956 | 97,8 | 106,0 | 103,6 |

Given the lack of detailed statistical data and in view of the limited amount of time available to perform this study, it was decided to analyse the forecasts prepared by the Railways and to include comments and observations in order to be able to deduce our own forecasts.

7.2.2 Freight traffic forecasts

Performance results provided for 1995-96 and the third quarter of 1997.

| Designation | 1995 | 1996 | 1997 9 first months | 1997 (forecasts) |
|----------------------------------|---------|---------|--|---------------------|
| million of tonnes/km transported | 124,503 | 112,780 | 79,500 of which 9,500 transiting | (103,200) |



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Economic analyses and traffic forecasts

| | | | | |
|---------------------------------|---------|---------|--------|-----------|
| thousands of tonnes transported | 157,472 | 140,150 | 99,870 | (126,600) |
| including: | | | | |
| • coal | 79,500 | 71,440 | 27,900 | |
| • ore | 18,661 | 15,438 | 11,900 | |
| • oil | 11,552 | 12,688 | 12,500 | |
| • grain | 6,258 | 4,413 | 4,800 | |
| • ferrous metals | 3,737 | 3,089 | 4,200 | |
| • fertilisers | 3,183 | 3,199 | 2,100 | |
| • construction materials | 1,646 | 978 | 4,500 | |

The signs of recovery announced by the Railways in October are not sufficient for 1997 to reach the 1996 level. However, we can still consider that the lowest ebb took place at the end of the summer of 1997, which is also confirmed by domestic macro economic indexes.

Note: The figures bracketed in the 1997 table reflect tonnes/km expressed in millions. We were not able to collect data in thousands of tonnes as for 1995 and 1996. Railway traffic forecasts for 1998-2002

The railways have prepared railway traffic forecasts based on performance results expected for 1997, which were subsequently transmitted to the Transportation Ministry on 30/05/97. Yearly increases are evaluated on the basis of economic production indexes published by the State, per type of good (coal, oil, minerals, metallurgy, etc.), and according to production perspectives of major customers. An excerpt of economic indexes is included in annex 4.

. Yearly development percentages were determined as follows:

| | |
|-------------------|--------|
| 1998 against 1997 | + 1.5% |
| 1999 against 1998 | + 2.5% |
| 2000 against 1999 | + 3.0% |
| 2001 against 2000 | + 0.7% |
| 2002 against 2001 | + 0.7% |

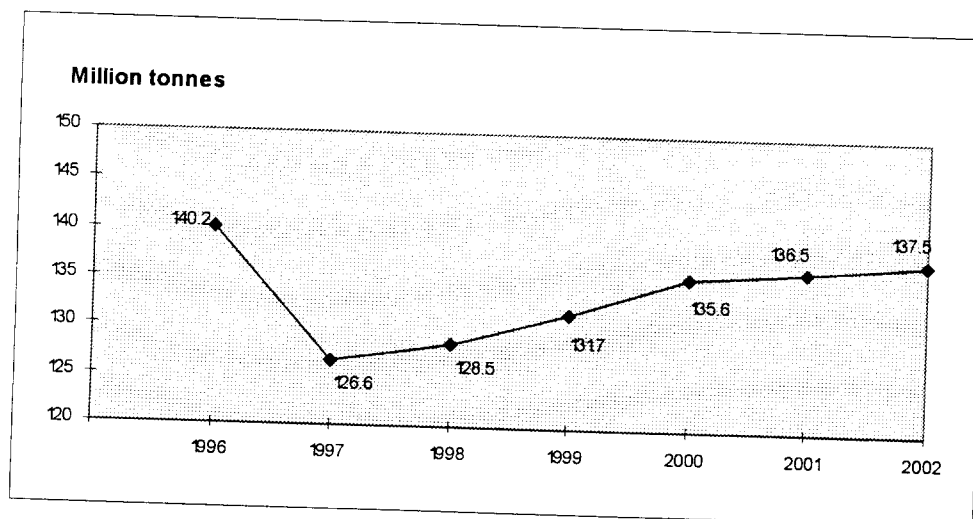
It was subsequently admitted that to evaluate the overall freight traffic level, (imported goods and transiting goods included), similar percentages would be applied to estimate yearly volumes of charged tonnes/km.



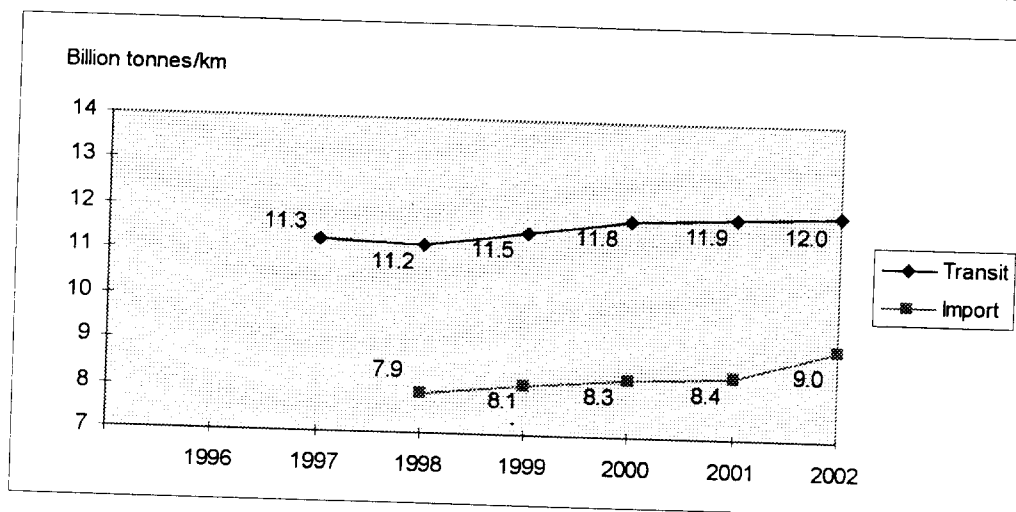
Economic analyses and traffic forecasts

1) Development forecasts of forwarded freight in million tonnes:

(Internal traffic + exports)

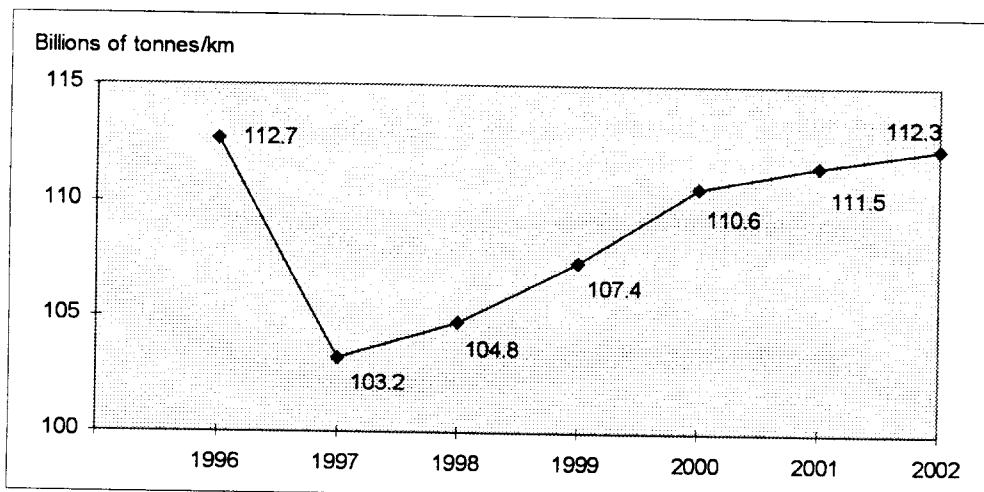


2) Development forecasts of transiting and imported goods (billion tonnes/km)

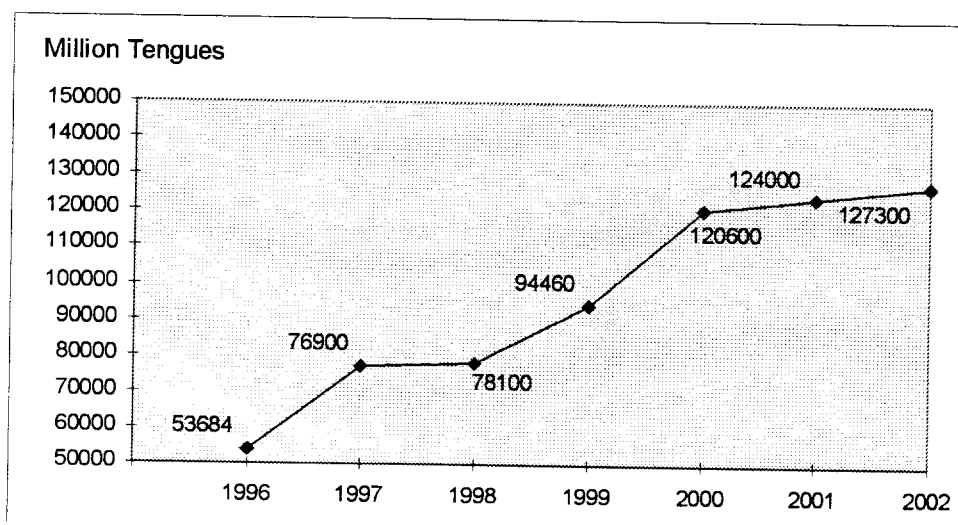


Economic analyses and traffic forecasts

3) Development forecasts of charged tonnes/km (billions)



4) Development forecasts of revenue according to the freight traffic, expressed in million Tenges



Tariff increases already implemented or planned are included in the revenue forecasts. Therefore, for the 1996 and 1997 fiscal years, despite an 8% drop in freight traffic volume, revenue should increase by 43%.

Economic analyses and traffic forecasts

The table below allows a year-by-year evolution comparison between traffic volumes expressed in charged tonnes/km and revenue.

| Designation | 1996 to 1997 | 1997 to 1998 | 1998 to 1999 | 1999 to 2000 | 2000 to 2001 | 2001 to 2002 | % Overall from 1997 to 2002 |
|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----------------------------------|
| Freight traffic volume | -8% | +1.5% | +2.5% | +3.0% | +0.7% | +0.7% | +8.8% |
| Freight revenue | +43% | +1.5% | +21% | +27.7% | +2.8% | +2.7% | +65.5% |

The Railways expect major tariff increase in the next five years.

7.2.3 Freight traffic forecasts for 2000-2030

The Railways provided us with long-term freight traffic forecasts, which were presented in July 1997 to the Transportation Ministry. The following figures are based on a moderate economic development. A 1% to 1.5% a year increases in freight traffic volumes has been expected.

| Designation | 2000 | 2010 | 2020 | 2030 |
|---|-------|------------------|------------------|------------------|
| Freight traffic forwarded (internal traffic + exported goods) in million tonnes. | 135.6 | 146.0 (107.6) | 155.0 (106.2) | 165.0 (106.4) |
| Overall freight traffic volume in billion charged tonnes/km. (internal + exported goods + goods transiting + imports). | 110.6 | 117.2 (106.0) | 125.0 (106.7) | 132.0 (106.0) |

Note: the figures in between parentheses reflect 10-year percentage forecasts.

All of the above forecasts for the period between 1998 and 2030 are, according to the selected criteria, highly consistent with official production economic indexes for the country.

7.2.3.1 Railway freight charging forecasts:

A 25% increase is expected in 1998, applying quarterly indexes:

1st quarter 106

2nd quarter 108



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Economic analyses and traffic forecasts

3rd quarter 105

4th quarter 104

It should be noted that this new increase is compounded with the 34% 1996 increase.

(28.9% for international freight traffic - 43.7% for the internal Kazakhstan traffic).

For 1997, the increase will be similar to that of 1996. During the 1st quarter of 1997, tariffs were increased by 7.5% (5.2% for international freight traffic - 13.4% for internal freight traffic). During the second quarter, the increase was 7.2% on an average (3.3% for international traffic and 13% for internal traffic).

For the following years, increases will take place every 6 months as described in the following paragraph:

1999: 16% - 2000: 13.5%

Railway traffic forecasts do not include any data regarding operation-related expenses. We however found some information regarding tariff policy forecasts which include data on yearly operations related expenses estimated to range between 16% and 21% each year.

The only data that we were able to collect regarding expenses are 1996 data. That year, the freight traffic cost/benefit ratio would have been broken down as follows:

| | | |
|--------------------------|---------|-------------------|
| Freight traffic revenue | 49,277 | million Tenges |
| Freight traffic expenses | 40,551 | million Tenges |
| Freight traffic profits | 8,726 | million Tenges |
| Charged tonnes/km | 112,682 | million tonnes/km |
| Revenue per tonne/km | 0.437 | Tenges |
| Expenses per tonne/km | 0.360 | Tenges |

Revenue posted a 17.6% profit.

Between 1996 and 1997 figures have increased as reflected in the following table:

| | 1996 | 1997/9months | increase |
|-----------------------|--------|--------------|----------|
| Revenue per tonne/km | 0.437T | 1.520T | +247% |
| Expenses per tonne/km | 0.360T | 0.457T | +27% |

The substantial increase in revenue per tonne/km results from tariff increases primarily affecting domestic traffic.



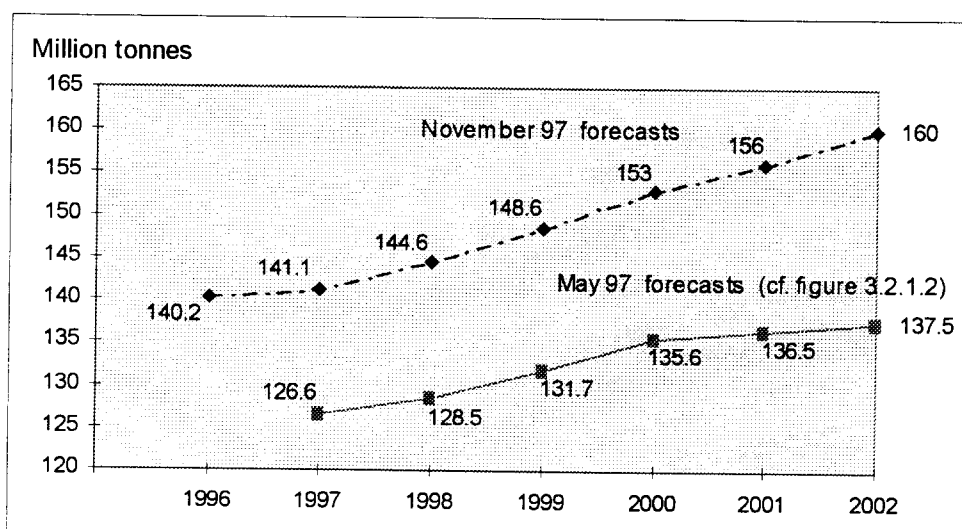
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Economic analyses and traffic forecasts

7.2.4 New freight traffic forecasts based on performance results obtained in October 1997

Freight traffic forecasts for freight forwarded from Kazakhstan has been established on the basis of 1997 performance results. The increase in traffic noticed in October 1997 has modified basic data. Consequently, we were provided with new forecast data May 1997 and November 1997 forecast data are included in the graph below.

Expected increase in forwarded freight calculated in million tonnes



There is a major discrepancy between the initial May forecasts and those prepared in November. The Railways justify these new figures by taking into consideration two events:

- the substantial traffic recovery which took place in October
- The integration of new crude oil traffic towards China, following recent governmental agreements. Pipelines should not be ready for use for oil transport before the year 2000-2001.

The impact of these reviews at an overall traffic level (specifying charged tonnes/km including imported and transiting goods) was not determined during our stay. Railway traffic forecasts made by the consultants

7.2.4.1 Freight traffic forecasts

Forecasts should be based on 1997 performance results. The statistical data available for the first nine months of 1997 are not expressed in tonnes/km. The October recovery has not yet been translated into categories of goods. It is therefore highly difficult to determine the actual freight traffic increase per category of goods.

Official indices published by the Government have been used to determine yearly increase percentages.



Economic analyses and traffic forecasts

The statistical data available for 1997 is used to compare different types of freight categories against 1995 and 1996 figures. However, given that statistical data only reflect 9 months of the year, we should remain cautious for certain categories of freight traffic are seasonal, and others can vary according to the year (e.g. agricultural production).

Taking into account all of the above mentioned reservations, it seems that:

- the volume of coal transported is decreasing,
- the volume of ore, oil, metals, construction materials transported is increasing as a result of the industrial production recovery.
- The tariff policy implemented by the Railways may result in additional losses, in the medium and long term:
- changes at the level of energy sources,
- increasing capital investments allocated to pipeline construction projects,
- relocation of processing plants.

Most of the above listed risks are taken into account in our proposals. They are the direct consequence of the development of a market economy whose objectives are to minimise costs.

These issues are particularly relevant in view of the fact that Western railway networks are being impacted by freight traffic reductions. In addition, consequences stemming from the globalisation of the economy and the competition from other transportation modes should also be taken seriously.

The November 1997 forecasts provided by the Railways estimated that in the year 2002, freight traffic should reach 160 million tonnes. The overall traffic expected, expressed in tonnes/km was not specified.

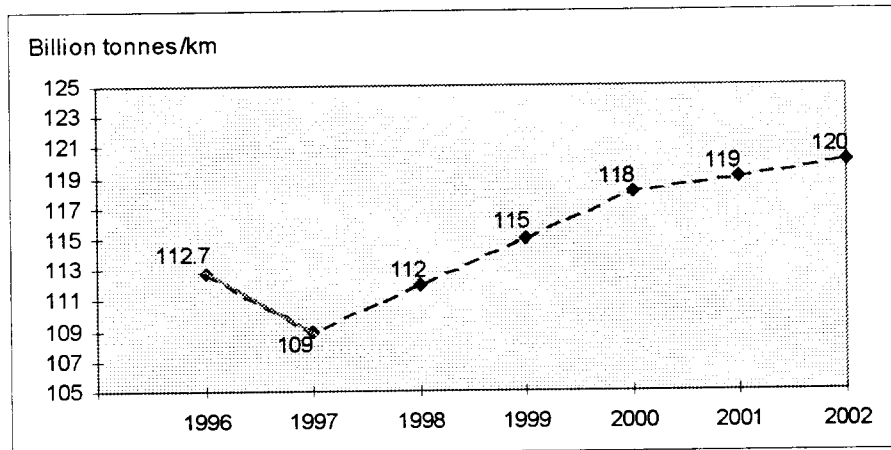
Based on the previous fiscal years, it seems that this overall traffic could amount to 130 billion tonnes/km (transiting and imported goods included).

In order to take into consideration potentially decreasing freight traffic, for 2002, we should consider that freight traffic would reach 120 billion tonnes/km, against 109 billion tonnes/km in 1997. Given the 7% improvement against May 1997 forecasts, the Railways should consider lowering their tariff increase estimates while ensuring similar revenue levels.



Economic analyses and traffic forecasts

Traffic forecasts expressed in billions of charged tonnes/km could be broken down as follows (based on the above mentioned considerations):



7.2.5 Passenger traffic forecasts

7.2.5.1 Results available for 1995-1996 and the third quarter of 1997:

| Designation | 1995 | 1996 | 1997 9 first months | 1997 (forecasts) |
|-------------------------------|-------------------------|-------|------------------------|---------------------|
| Billion passengers kilometres | 13.2 | 14.2 | 9.8 | 12.5 |
| including : | | | | |
| • international | Statistics not the | | 3.4 | 4.3 |
| • regional | available due to | | 6.1 | 7.8 |
| • suburban | railway networks merger | | 0.3 | 0.4 |
| Revenue in million Tenges | 7,382 | 8,106 | 5,990 | 8,130 |
| including : | | | | |
| • international | Statistics not the | | 2,042 | 2,772 |
| • regional | available due to | | 3,767 | 5,113 |
| • suburban | railway networks merger | | 181 | 245 |



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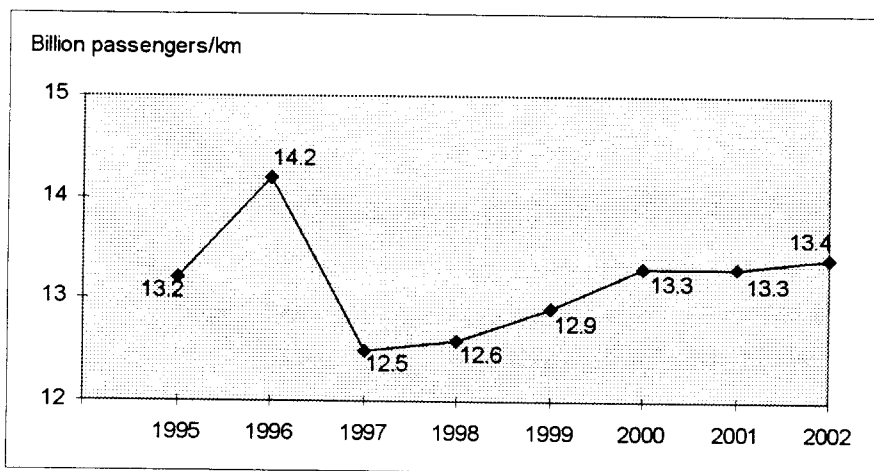
Economic analyses and traffic forecasts

The overall passenger traffic volume dropped in 1997 in comparison with both 1996 and 1995 levels. However, through the application of tariff measures, there was an overall increase in revenue.

7.2.5.2 Railway traffic forecasts between 1998-2002

As for freight traffic the railway is expecting a 1-3% increase in passenger kms. Despite this the 1996 traffic volumes will not be reached by the year 2002.

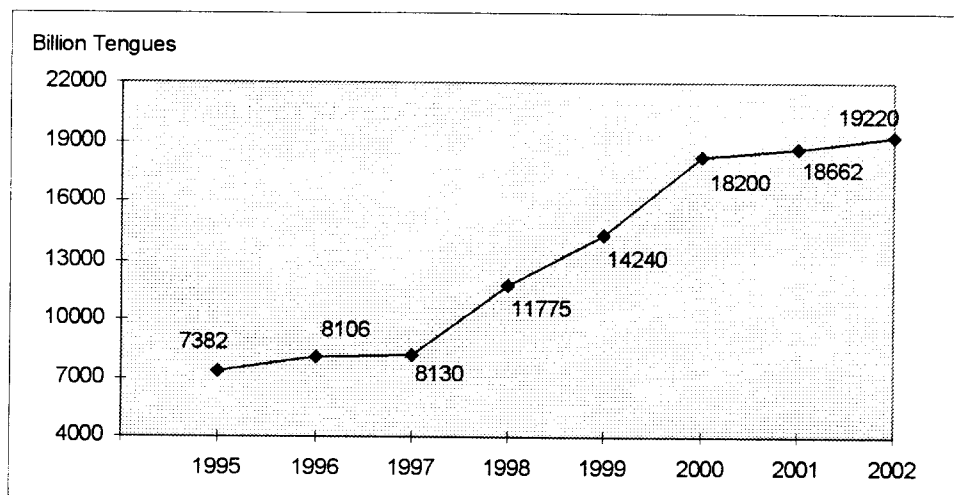
1) Passenger traffic forecasts in billion passengers/km



The railways expect a recovery to take place in 1998, taking into consideration a possible scheduling and comfort level improvement, and a slow increase from the year 2000.

Economic analyses and traffic forecasts

2) Revenue increase forecast according to passenger traffic levels, expressed in billion Tenges



The increase in revenue volume is substantial against traffic increases. Therefore, both figures are represented in a single percentage table, on a yearly basis.

| Designation | 1996 to 1997 | 1997 to 1998 | 1998 to 1999 | 1999 to 2000 | 2000 to 2001 | 2001 to 2002 | % Overall from 1997 to 2002 |
|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|-----------------------------|
| passenger traffic | -12% | +0.8% | +2.4% | +3.1% | 0% | +0.8% | +7.2% |
| passenger revenue | 0% | +44.8% | +20.9% | +27.8% | +2.5% | +3% | +136.4% |

The railways expect a strong increase in passenger tariffs in the next five years

7.2.5.3 Railway passenger traffic forecasts between the year 2000 and 2030

| Designation | 2000 | 2010 | 2020 | 2030 |
|---|------|-----------------|-----------------|-----------------|
| Overall traffic volume in billion passengers/km | 13.3 | 13.8 (103.8) | 14.3 (103.6) | 15.0 (104.9) |

Note: The above figures in between parentheses reflect the increase percentage per decade.



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Economic analyses and traffic forecasts

The railways do not expect to reach the 1996 level in terms of passenger traffic before the year 2020.

7.2.5.4 Railways forecasts regarding tariffs for passenger transport:

A 15% increase in passenger tariffs is already scheduled for 1998. There is no precise forecast for the following years. Given the expected revenue and the increase in railway traffic, tariffs should be increased by 220% between 1997 and the year 2002. Based on the yearly percentages, increases should be the highest in the following years: 1997, 1998, 1999 and 2000.

Passenger and freight traffic are affected by similar conditions in terms of operations related expenses. These expenses should increase every year by 16 to 21%. The issue of offsetting passenger traffic losses was never mentioned other than in forecasts through a company in charge of managing passenger services (Passenger Central Railway Agency).

The passenger traffic cost/benefit ratio for 1996 could be rebuilt:

| | | |
|------------------------------|--------|----------------------|
| • passenger traffic revenue | 7,772 | million Tenges |
| • passenger traffic expenses | 12,334 | million Tenges |
| • number of passengers/km | 14,228 | million passenger/km |
| • losses | 4,562 | million Tenges |
| • revenue per passenger/km | 0.546 | Tenge |
| • losses per passenger/km | 0.321 | Tenge |
| • cost per passenger/km | 0.867 | Tenge |

Revenue only covers 63% of actual expenses.

In the year 2002, according to railway traffic and revenue forecasts, revenue per passenger/km could reach 1.434 Tenge, which corresponds to the application of a 2.62-multiplying coefficient for tariffs during the course of 6 years, (this coefficient is included in the forecast plan prepared by the Railways)

For the first 9 months of 1997, the passenger cost/benefit ratio is broken down as follows:

| | | |
|------------------------------|--------|-----------------------|
| • passenger traffic revenue | 5,990 | million Tenges |
| • passenger traffic expenses | 13,002 | million Tenges |
| • number of passengers/km | 9,800 | million passengers/km |
| • losses | 7,012 | million Tenges |
| • passenger/km revenue | 0.611 | Tenges |



Economic analyses and traffic forecasts

- passenger/km losses 0.715 Tenges
- cost per passenger/km 1.327 Tenges

Expenses are only calculated in an approximate way. The final cost/benefit ratio for the first 3 quarters has not yet been established.

Revenue should only cover 46% of actual expenses although they have increased by 11.9%. Railway traffic has decreased sharply (12% estimated over the entire year). The cost per passenger/km has increased by 53%.

7.2.5.5 Passenger traffic forecasts based on performance results Oct 1997

Following a significant recovery in 1996, passenger traffic should reach 12.5 billion passenger/km in 1997, i.e. marking a 12% decrease.

The future of passenger traffic depends upon the following factors:

- comfort level improvements and faster trips
- improved schedules
- tariffs

The new management organisation system should play a major part in the improvement process. The new proposed Central Agency may operate on the basis of the two following assumptions to improve passenger traffic levels:

- Placing the suburban network in the hands of local authorities so that the Railways no longer are liable for related losses. The Railways with the Government's approval keep their tariff policy forecasts, i.e. application of a 2.62 coefficient between 1998 and 2002. The number of trains should be reduced in order to reduce costs. The impact of competition should be felt more sharply (cars, trucks and aeroplanes).

For example, currently, to travel between ALMATY and AKMOLA, using a comfortable train in a two-passenger compartment, round trip tickets cost 4000 Tenges for a 20 hour long trip. Plane tickets are 8640 Tenges for a 4-hour trip from downtown to downtown.

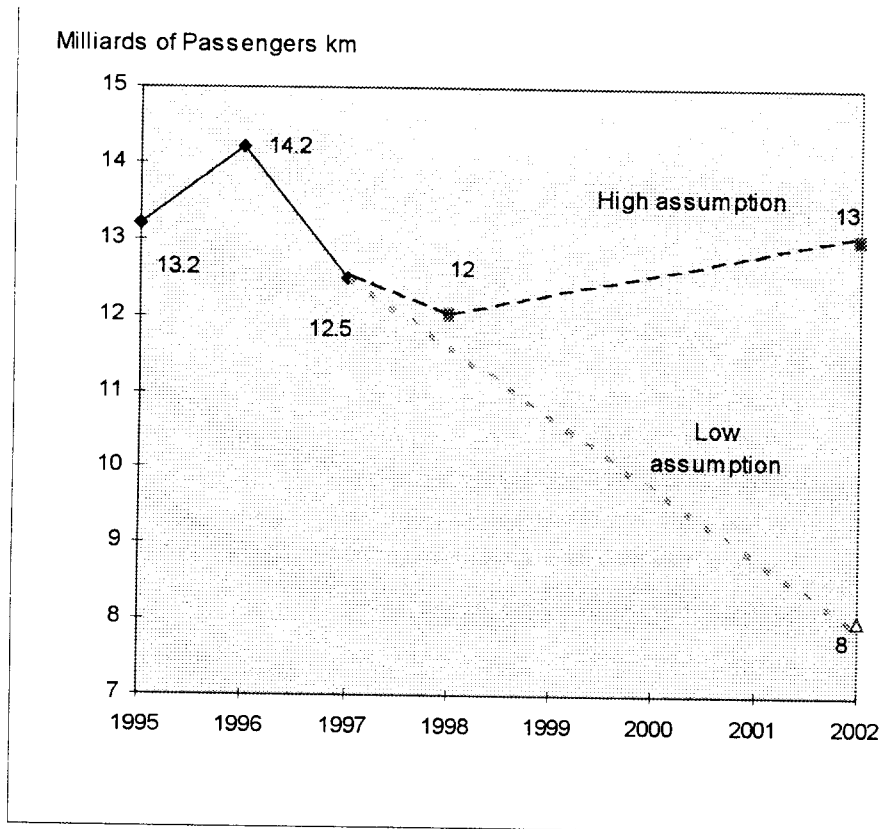
If the Railways were to apply the expected tariff increase (using a 2.62 multiplying coefficient), and if KAZAKHSTAN AIR LINES were to only apply a 20% increase in ticket price between 1998 and 2002, the price of a plane ticket would be the same as that of a train ticket.

The following graph is based on the two above described assumptions:

- a high assumption close to the Railways forecasts in terms of traffic volume and estimated revenue
- a low assumption resulting in a 8 billion passengers/km traffic in 2002, generating 13 to 14 million Tenges in revenue instead of the estimated 19 or 20 million Tenges.



Economic analyses and traffic forecasts



Economic analyses and traffic forecasts

7.3 Conclusion

The available statistical and accounting data are not sufficient to perform detailed railway traffic forecasts. We should have been able to study the average transportation distances per category of goods, or the volume of freight transported by rail line section. As far as passenger traffic is concerned, we should have been able to define revenue and costs by type of train (international, regional and suburban). The lack of information did not allow us to perform the above-listed analyses.

The country's economy has undergone a recovery, which has resulted in increasing freight traffic levels since last October. The Railways, having to face increasing levels of traffic, should not delay the upgrading of existing installations and equipment which has become an urgent necessity.

Passenger traffic is much more critical. Setting up a Centralised Railway Agency has been an improvement, however this body should be allocated all the necessary resources and powers required implementing new measures. The Agency will not be able to make spectacular headway by itself. Support from the Railway Management and from the State is crucial.

Managers in charge of defining the passenger tariff policy should receive special training. Their training should focus on market economy and management system principles. Reviewing the tariff policy is a preliminary condition with a view to establishing a new system.

A data processing and exploitation system should be set up to help in the decision-making process. One of the pressing issues, which should be resolved at once, is related to data base configurations. Two solutions could be implemented:

- create statistical and accounting data base used by the Kazakhstan Railways for self-management purposes.
- use of existing data supplied by the M.P.S. in Moscow, and possible additional data.
- Expenses were not adequately monitored. This is a major issue for the Railway Management.

The above listed measures are necessary within the framework of a market economy. Moving from a centralised to a market economy requires major cultural change. Training is the key and should help managers understand market economy principles. It is management's challenge to convince all employees for the need to change.



Management information systems

8. Management information systems

8.1 Overview

The information system of the Kazakhstan Railways was designed, developed and installed in the late 1970's according to maintenance and operation rules defined in Moscow. These systems were designed to help achieve higher technical efficiency, possibly at the expense of economic efficiency (longer routes than needed, too many shunting operations partially offset by higher trainloads,).

They consist mainly of two large applications:

- ASOUP for freight,
- EXPRESS 2 for passenger business.

Virtually nothing has changed since independence.

A few offices have computers; they are not networked, and are mainly used for word processing.

A new processing centre has been proposed for Almaty. At this time the focus is laid on improving existing applications. There is an opportunity to re-think the information system according to the new needs of users, and making the best possible use of the existing technology.

Telecommunications are based on Soviet technology.



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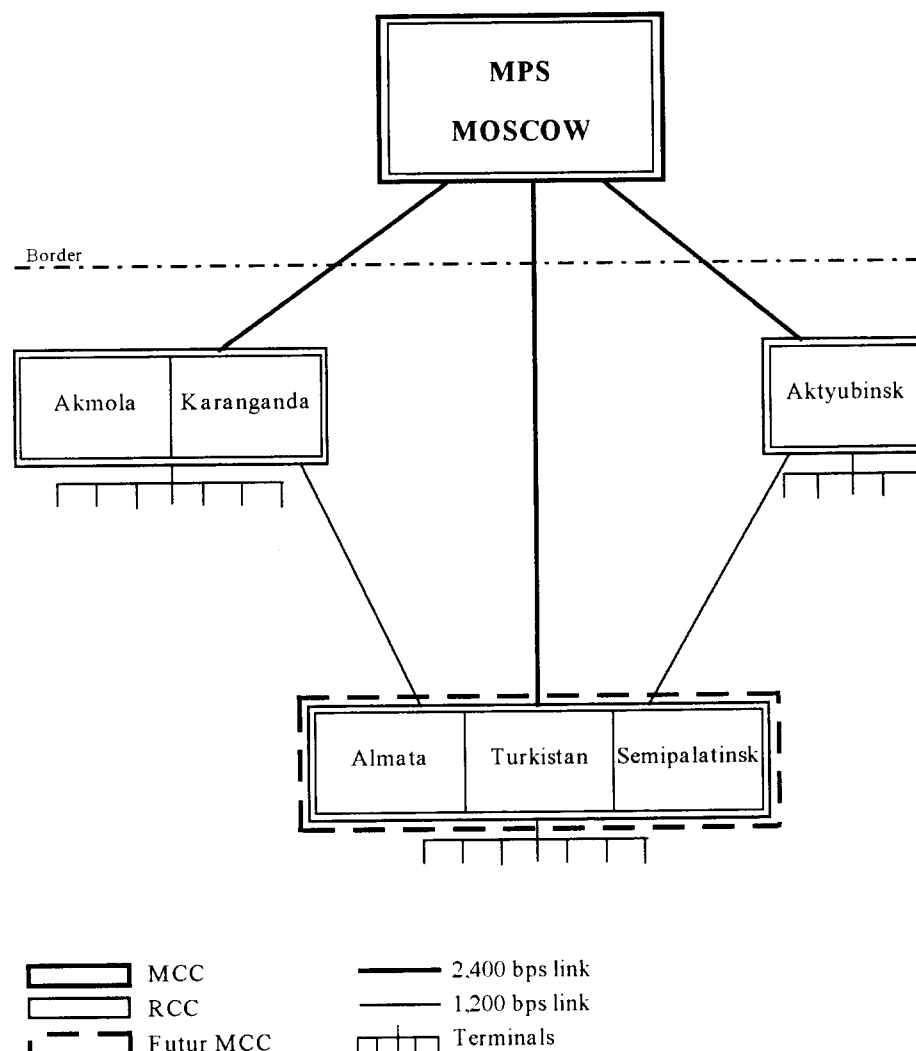
Management information systems

8.2 Existing Management Information Systems (M.I.S.)

8.2.1 M.I.S. structure

Though KTZ regional operations were delegated to six regional entities after the January 1997 reorganisation, MIS operations are still based on the previous three Regional Computing Centres (RCC). They jointly employ 1300 people, who are overall underqualified for the work.

The RCCs collect information from 4,500 terminals located in the stations, important yards, central traffic control (CTC) and some divisions. The RCCs are also connected to the Main Computer Centre (MCC) located in Moscow.



OSZhd (CIS Railways Transport Council, operating since 1992) countries are in the process of defining a new convention regulating cross border information exchanges - format and contents. The last - 18th - session of OSGD meetings took place in Tallinn, Estonia on May



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26th and 27th, 1997. The 20th or 21st meeting, i.e. by the end of 1997 or the beginning of 1998 expects signature of the agreement.

As a result of the new convention, KTZ will be able to channel data flows through Almaty, where they can be used for their own purposes, and relevant data forwarded to neighbouring countries.

It will also create the possibility of choosing their own information systems, to replace ASOUP and EXPRESS, or to influence more strongly the further development of the systems.

8.2.2 Software

Originally, MPS planned the implementation of 18 MIS modules, to be developed by Moscow. The five main companies of the MPS are :

- (Technology Bureau for Construction and Projects in Moscow)
- ACOUGT
- VNIGGUE
- TSITTRANS
- GUE VTS MPS Russia

All were not developed, and only two ASOUP and express 2 were implemented in Kazakhstan. They have been operating since the 1970s. Local adaptations were made.

8.2.2.1 Passenger Information System (P.I.S.) - EXPRESS 2

The EXPRESS 2 system collects data concerning regional and international passenger traffic.

EXPRESS 2 handles the sale of tickets, seat reservations, cashier operations, tracking of parcels and mail items. This system was implemented in Kazakhstan in 1982. Prior to this, each railway had its own system. EXPRESS 2 is connected to the MCC in Moscow. The points of sale are equipped with a PC connected to the RCC. Any type of ticket can be sold, one-way or return, from or to all stations in Kazakhstan and the CIS republics. The fare structure is incorporated into the system and updated locally.

Station terminals are hooked up to the RCC, which processes all data. Again, the results for a given month are available on the 10th of the next month.

Suburban traffic data are centralised at the regional division level and sent each month to the computer centre.

A new version of this system EXPRESS 3 will be in operation by 2000 and will provide additional information on passenger traffic. The system will operate on IBM 9672 computers (S/390 system). Moscow will develop this system.



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8.2.2.2 Freight Information System (F.I.S.) - ASOUP

ASOUP works on-line with the MCC in Moscow. It provides access to a data base containing train-specific information such as train number, trailing load, net loads, type of lading, consignee, origin and destination, wagon tracking, location of the shipment in each train; plus train planning data such as traffic movement plans, wagon and locomotive utilisation and penalties for wagon idle time.

8.2.2.3 Other existing applications

The other data processing methods are also inherited from MPS in the USSR times prior to independence. It has a built in batch processing orientation ; on line transaction processing is practically non existing, and can not be implemented without significant changes in architecture.

No maintenance management system exists, in spite of large amounts of money at stake.

The same applies to accounting and human resources management.

The financial department makes use of a dedicated decision support system that delivers profitability measures for the various activities of the Railways. This software, " SysManagement ", was introduced as part of the Traceca Tarification project, and personnel of KTZ and colleagues in the other Traceca countries were trained to use it and to apply consistent economic principles.

" SysManagement " could be integrated with the SAP based systems being implemented by KTZ (see below).

8.2.2.4 Applications being implemented

Railway management

S.A.P. - System R3

Up to April 1997 MIS were manual systems. In April 1997 KTZ committed to purchase an integrated MIS based on SAP's R3 platform, covering the following areas:

- finance and accounting, including clients and suppliers,
- controlling and budgeting,
- fixed assets planning and accounting,
- purchasing and inventory management,
- maintenance (including planning, scheduling and spare parts management),
- sales.

Implementation should proceed according to the following schedule :



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Phase 1 : May 1997 - March 1998

Financial accounting, budgeting and management accounting; pilot implementation in Almaty only, based on 260 networked PCs.

Phase 2: April 1998 - December 1998

Extension to other regions, including Almaty region (beyond headquarters), Akmola and Western Kazakhstan region.

Addition of further functions ... treasury management, sales, maintenance,...

Phase 3: January 1999 - December 1999

Generalisation to the whole country, overall 1500 workstations connected.

This project is quite ambitious – short time frame, wide functional coverage, large geographical coverage, and high number of people to train. 42 KTZ and 6 SAP employees are working full time on it.

SAP was apparently contracted with directly by KTZ, with no outside funding.

8.2.3 Hardware

Basically all RCCs have the same type of computer hardware and dataprocessing functions as are found in all the independent republics of the former USSR. The mainframes are IBM 4381 and Hitachi 33.

Almaty RCC

| | Main frame |
|--------|--|
| F.I.S. | 2 Hitachi EX-33 (12 Mips / 32 MB RAM / 60 GB HDD / 16 canals) 1 IBM 4381 R14 (6 Mips / 32 MB RAM / 60 GB HDD / 18 canals) |
| P.I.S. | 2 IBM 4381 R13 (6 Mips / 16 MB RAM / 15 GB HDD / 6 canals) |
| Others | 3 EC-1036 (0.16 Mips / 4 MB RAM / 1.6 GB HDD / 5 canals) |

These computers were bought second-hand.

Akmola RCC

| | Main frame |
|--------|---|
| F.I.S. | 2 IBM 4381 R14 (3.8 Mips / 32 MB RAM / 10+10 GB HDD / 6+6 canals) |



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Management information systems

| | |
|---------------|---|
| P.I.S. | 2 IBM 4381 R13 (3.8 Mips / 32 MB RAM / 10+10 GB HDD / 12+12 canals) |
|---------------|---|

Aktyubinsk RCC

| | Main frame |
|---------------|--|
| F.I.S. | 2 Hitachi EX-27 (9.2 Mips / 64 MB RAM / 20 GB HDD / 16 canals) |
| P.I.S. | 2 IBM 4381 R13 (3.5 Mips / 16 MB RAM / 10 GB HDD / 8 canals) |
| Others | 2 IBM 4381 R13 (3.5 Mips / 16 MB RAM / 10 GB HDD / 8 canals) |

These computers were bought second-hand and installed in 1996.

There are about 500 personal computers at KTZ's. These PCs are IBM-compatible 286s, 386s and 486s. About 80 percent of them are networked with the main computer system, and the remainder is operated independently. There are also about 2,000 to 2,500 teletype and telegraph display stations.

The P.I.S. and the F.I.S. operates with antiquated terminals (like EC 7927-01 type of IBM 3270).

The S.A.P. system will be implemented in its pilot phase with 260 Pentium based PCs and RISC technology for the main frame (< biblio >) by the end of 1997. KTZ planned to install 1,500 PC-Terminals in 1998/1999.

Local Computer Conditions

Many of the offices we visited are equipped with PCs. This equipment is mainly used for word processing and other packaged software.

8.2.4 Communications

8.2.4.1 Hardware

Communications within KTZ are based on

- twisted pair wires laid alongside the track,
- internal telephone network and access to KT network,
- radio transmission with locomotives,
- internal data transmission.



Management information systems

8.2.4.2 Transmission systems

The transmission systems covered here are those which link various stations and other locations used by KTZ. These are all older carrier systems of Russian origin using frequency division multiplexing (FDM). They fall into two categories, the buried copper cables and the open wire lines. There are no microwave systems although a contract has been let to Siemens for a microwave system from Aktyubinsk to Uralsk on the north-west section near the Russian border.

- Open wire lines

The open wire transmission carrier equipment is old. The first system was installed in 1905 on the Turkistan-Arys section. These systems have been or are being discontinued worldwide. Most of the open wire lines are found in the western region, including most of the line from Tashkent through Aktyubinsk on to Russia. The open wire lines make up over 50% of the total transmission link route.

The open wire carrier transmission equipment has a 3-channel and a 12-channel carrier system. In general these systems are noisy and limited to telegraph speeds for data.

- Cable links

Buried cables make up the other half of transmission links. Cables are jacketed and armoured for direct burial in a trench on the right of way. Cables are buried at a depth of 0.8 to 1.2 meters - standard for cold climates. There are problems of corrosion in many places due to water ingress, which may be accelerated by chemical contaminants in certain areas.

The cable reel sizes are limited by weight to lengths of between 850 to 1,000 meters. This means a splice at intervals of 1,000 meters at best. In addition, cables must be spliced at every signal and electric switch need to be controlled in the CTC zones. Finally, amplifiers are necessary every 20-km on average, adding further splice locations.

Splice points are problem points in any cable system. The most of the corrosion problems occur at splices.

Transmission circuits from the two systems described above are used for the following:

- to link the various private telephone exchanges of the railways,
- for dispatcher communications to stations,
- for linking radio base stations to dispatch,
- for station-to-station telephone,
- for control of signals and electric switches (CTC),
- for data transmission.



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8.2.4.3 Data transmission

Dedicated lines are allocated to the MIS department for their data communication needs. These lines operate at maximum 1,200 bps.

Interruptions in line transmission lasting more than one hour at a time occur about three times a week; these disruptions are effectively more harmful. It is likely than the situation is worsening, though no statistics are available.

KTZ's MIS systems still depend on the Russian Railways' centralised MIS in Moscow. Because of the poor quality of transmission, KTZ leases lines from the Telecommunications Company to ensure data communications between their computer centres and Moscow. Because the Russian Railways are planning to install a packet data network, KTZ may be forced to adopt similar systems or become autonomous.

In 1995 X25 software was installed on 5 sites, in order to allow them to connect to Russian X25 networks.

Future developments requiring linking the KTZ MIS computers into a network will be dependent on improved quality and possibly higher transmission capabilities.

8.2.4.4 Telephone network

Old crossbar and step-by-step exchanges of BuKTZarian and Russian origin represent the bulk of telephone exchanges. The majority of intra-railway long distance communication is handled through operators and patch-boards. In 1996, four new digital PABXs were installed in the KTZ, supplied by a joint venture Kazak company in Pavlodar.

8.2.4.5 Radio systems

The radio system is used to communicate with trains. There is a base station at every station and all operating locomotives are equipped with a radio in the cab. The radio system uses lines from the transmission system to link the base stations and the control traffic centres.

Two types of radios exist: a 2 Mhz system which is used on electrified sections only and a VHF radio system at 150-156 Mhz. All locomotives are equipped with a radio. Passenger locomotives have both radios. Freight locomotives only have the VHF radio.

8.3 Planning for MIS requirements

8.3.1 General considerations

We may distinguish between :

- increasing the functional coverage
- upgrading the systems



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8.3.1.1 Existing systems (ASOUP and EXPRESS)

The only significant flaw in the existing systems, besides relying on obsolete telecommunication technology (which can be remedied separately), is their absolute dependency on Moscow for development, implementation and, most importantly, operation.

It must be stressed however that joint work on, and joint use of technically or operations orientated software systems is highly desirable, as trains cross national boundaries, and there is a considerable common culture, including the use of the Russian language.

Focus should therefore be laid on making these systems more balanced, carefully avoiding unnecessary dependency on centralised data processing or data flows. Most data collected in Kazakhstan are primarily of use to Kazakh railways and their customers, and KTZ should arrange to collect and process data for their own and the common purposes.

The standards to be provided by OSGD will make this possible; KTZ can therefore anticipate and implement information systems that make use of the data traditionally available only from Moscow.

8.3.1.2 Increased functional coverage

It can be argued that many management processes could be computerised at KTZ.

Computerisation is however only part of the picture; remodelling management processes, to ensure that MIS will support company strategy and allow management to make the economically and operationally right decisions, is an absolute requirement.

Therefore, the focus should be laid on prioritising and putting into perspective the need for implementing computer software, hence allowing rough scheduling, sizing and technical definition of future related investment. It will however fall short of a full-fledged computerisation master plan.

8.3.2 System design requirements

We are listing here the main systems, which could contribute to a more effective management KTZ.

8.3.2.1 Freight Transport Management System (F.T.M.S.)

The main activity of KTZ is the transportation of goods from one place to another. This includes:

- to actually move the goods : transportation function
- to price and invoice services : commercial function
- to maintain the rolling stock in proper condition: rolling stock function

In order to improve their competitiveness, KTZ should:



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- improve the quality of service without compromising on safety issues
- reduce operating costs

At this time, only the transportation function is computerised (ASOUP system). Other processes are implemented manually. It is recommended to computerise following applications:

8.3.2.2 Freight Information Application (F.I.A.) - ASOUP

The existing F.I.A., called ASOUP, delivers the expected services, and will keep doing so for the next five years, according to KTZ experts. Even if it was designed a long time ago, the functions implemented cover most existing needs.

As its effectiveness is highly dependent on the telecommunication systems being used, it is appropriate to await these systems being upgraded. This would allow KTZ to postpone making decisions on this matter for another five years, at which stage the hardware used by ASOUP would be obsolete and possibly worn out.

In the short term however, more terminals are needed for inputting data in the field, using the existing telecommunication network.

The F.I.A. should make wagon booking possible at short notice. Detailed information on commodity, revenues, tonnes, loads, wagon types, wagon.km, origin-destination pairs and revenue should be collected to produce freight traffic statistics for use by marketing, tariff staff and rolling stock maintenance.

8.3.2.3 Freight Marketing Management Application (F.M.M.A.)

F.M.M.A. should implement all truly commercial functions:

- customers files,
- information to clients,
- real time computation of costs,
- pricing and invoicing,
- delivering statistics on sources of revenue.

It is important to implement it first in a single "information centre" in Almaty, before it would be decentralised, pending implementation of better information systems.

8.3.2.4 Wagon Use Application (W.U.A.)

The main trigger for maintenance jobs is time related, instead of some more relevant parameters such as tons.kilometers.

It is therefore recommended to significantly improve the maintenance policy, and design appropriate information system.



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W.U.A. is an obvious component of the Rolling Stock Management Application.

8.3.2.5 Passenger Management System (P.M.S.)

Passenger transportation, while obviously less critical than the transportation of freight, is of vital importance to the country.

The existing P.M.S., EXPRESS 2, meets today's requirements. Further investment at this stage can hardly be justified on pure economic grounds, and won't be justifiable possibly for the next five years.

Equipping further stations is however thinkable, pending improvement of telecommunication systems.

The Russian developer of EXPRESS is due to release version 3 soon, which would deliver more detailed information on revenues, passengers, passenger km, O/D statistics; in particular detailed marketing information using train numbers and types of seating and also fares, which would enable KTZ to implement modern marketing practices.

8.3.3 Administration Management System (A.M.S.)

8.3.3.1 Finance and Accounting Management Application (F.A.M.A.)

KTZ has contracted with SAP for an ambitious project in this area. This project is at the present time in the pilot implementation phase in Almaty. Full implementation is expected by end of 1999, which is quite ambitious.

8.3.3.2 Personnel Management Application (P.M.A.)

Presently, there is no computerised tool for personnel management in KTZ. Each entity manages its proper personnel with the budget allocated by the Financial Department of Head Office. The daily routine personnel management duties (promotions, benefits, payroll, etc.) are decentralised and located on site and at unit level using mostly hand written forms. As a result, no reliable consolidation is done at Head Office level. Thus, it is highly recommended that a (standard) Personnel Management Application be implemented.

This application is part of the S.A.P. project and should be implemented at the end of 1998. For this reason it's not considered in the investment plan.

8.3.4 Maintenance Operation System (M.O.S.)

8.3.4.1 Infrastructure Management Application (I.M.A.)

The increasing complexity in maintenance requirements has presented a challenge to operators. The infrastructure requirement range from activities concerning construction, maintenance and repairs of railway lines, construction works, signalling and automation systems. The purpose of the Infrastructure Management Application is to provide reliable information across the organisation covering the infrastructure construction and maintenance



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projects, investments for railway infrastructure, resources allocation and utilisation. The proposed system will provide the following benefits:

- maintenance management,
- infrastructure projects management,
- cost control,
- investment control,
- Resources control.

8.3.4.2 Rolling Stock Management Application (R.S.M.A.)

The Rolling Stock Management Application should provide a complete solution, including application software and adequate hardware. The solution should include technical documentation management for the rolling stock.

The Application Software should provide the following modules:

- rolling stock assets management,
- maintenance management,
- store and stock control,
- rolling stock technical documentation management.

All the modules should share a common rolling stock inventory database.

8.3.4.3 Train Circulation Management Application (T.C.M.A)

The main objectives of the Train Circulation Monitoring Application are to provide timely and reliable information across the company, concerning the train circulation services to be offered for freight and passenger operators. The application should provide information covering circulation requirements, circulation timetables and planning, circulation statistics, analysis and forecasts.

8.3.5 Integration requirements

Integration of applications is an extremely important requirement under KTZ needs. Apart from the general requirements of interfacing, it is essential that the applications be able to pass the relevant data accurately and rapidly between each other and permit easy integration with future MIS components, without requiring the duplicated efforts of input or other processing.

The application software should execute in an integrated fashion across all hardware platforms/levels on the processors and communicate with each other via the system network, to accomplish the specified response time.



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The solution must follow some integration principles, as:

- entry of data at the point of activity,
- well-defined procedures for dependent transactions without compromising on system
- timely availability of data where needed,
- interfaces / integration with the existing or new applications,
- open to integrate further application,
- open for functional upgrade and application development.

The integration of applications should cover:

- integration between each application's modules,
- integration between the applications, as following :

Infrastructure Management Application - Train Circulation Monitoring

- speed restrictions due to the infrastructure technical status,
- clearance gauges,
- line sections closed for maintenance or repairs works,
- basic data for time tables (distances, line's profile, maximum speeds, etc...).

Train Circulation Monitoring Application - Freight Transport Management Application

- transport requirements,
- time tables and circulation programs,
- circulation tariffs for freight trains.

Infrastructure Management Application - Freight Transport Management Application

- clearance gauges (for loading);
- infrastructure's tariffs for the freight transport.

Infrastructure Management Application - Rolling Stock Management Application

- clearance gauges;
- technical conditions required for rolling stock;

Rolling Stock Management Application - Freight Transport Management Application



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- freight wagons allocation (active wagon fleet),
- locomotives and crew allocation for freight trains,
- rolling stock's tariffs for the freight transport,
- wagons and locomotives current activity.
- integration of each application with the Financial and Accounting Application :

Infrastructure Management Application

- maintenance costs,
- expenditures,
- incomes,
- materials purchasing and providers' list,
- infrastructure's fixed assets,
- infrastructure's investments data.

Rolling Stock Management Application

- maintenance costs,
- expenditures,
- incomes,
- rolling-stock assets,
- rolling stock and materials purchasing and providers' list.
- *Train Circulation Monitoring Application*-circulation costs,
- expenditures,
- incomes,
- materials purchasing and providers' list.

Freight Transport Management Application

- costs,
- expenditures,



Management information systems

- incomes,
- materials purchasing and providers' list,
- transport contracts data.

8.3.6 System architecture

8.3.6.1 Client / Server requirements

MIS architecture should comply to open system standards thereby reducing dependence on a single hardware Supplier, protect KTZ against rapid obsolescence and escalating maintenance costs, and insure interoperability of all the system applications.

The system architecture should take advantage of client/server processing. The Application Software, either customised or developed, shall have the following characteristics:

- **Configurability**

The applications should be reconfigurable so it can be adapted to meet the needs of the KTZ according to its restructuring processes.

- **Platform neutrality**

The application architecture must be independent of the platform(s) on which it is deployed. All operation system, communication and database services should be implemented as abstractions. The final objective should be to be able to deploy any component of the application on a multitude of platforms from a single set of source code. One important objective is to locate the application function close to the business expertise.

- **Extensibility**

The applications components should be extended without modification of the basic code. Where possible, the business rules, which are likely to vary between Clients, should be separated from the core business logic. In this perspective, the development staff should be able to define subclasses of an object class to add new functionality for the application.

- **Interoperability with other software applications**

All the applications must provide two-way interfaces for industry-standard compound document technology (i.e. OLE). They must be able to exploit the capabilities of products like spreadsheets, word processors, graphic packages, and multimedia presentation.

- **Ease of maintenance**

The architecture must ensure that local programmers may maintain the application components. The architecture should divide the complexity of the applications into manageable domains with well defined, narrow interfaces. It also should include tools that help the change management and version control.



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- ***Ease of learning and use***

Considering that each personnel staff member, using the applications, are assuming more diverse responsibilities and are interacting with many different components of the KTZ information system, they do not have the time for long learning curves. In this perspective, the application software must be easy to learn, intuitive and must reflect the mental picture of the business objects, associations and work activities with which users are familiar to.

The user interface must be consistent between components and be consistent with industry standards. The user interface and the reports must be in Russian language.

8.3.6.2 System Architecture for Data Warehouse

For the management information system is required a Data Warehouse architecture with the following components:

On Line Analytic Processing component which will be the link between the users' applications and the data available from the data warehouse. This component will have the following functions:

- embodies the enterprise business model;
- dynamically maps between the business model and the data model which represents the underlining data available from the data sets;
- provides customized views of the data;
- provides an Application Programming Interface (API) for users' applications and support standard data interchange formats both to standard front-end tools (like spreadsheets) and to GroupWare distribution tools;
- provides predictable response time;
- incorporates query policing and scheduling capabilities to reject (or at least check) queries that appear to have long execution times and to allow prioritizing and deferred execution of acceptable queries.

Integrated Data Sets component, which provides the data for analysis component and is conceptually a single database holding integrated enterprise data. It may be possible that these data sets provide data back to the operational environment, and in this case the operational data should be held in a physically separate database to avoid decision queries impacting operational response times. The Integrated Data Sets shall be:

- read-only : users cannot update it, in order to preserve the simple, consistent view of corporate data,
- responsive : must support the required query response time and must not impact the operational performance,
- secure and manageable.

The primary data for the Data Sets comprise:



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- current operational enterprise data,
- held in physically heterogeneous and disparate data sets and/or machines,
- divers represented,
- duplicated, especially when packaged applications are used,
- change of data field use over time,
- owned by different departments,
- historical operational enterprise data, generally between 5 and 10 years of information, for trend analysis,
- external data.

The data stored in the Integrated Data Sets should be:

- summarized data,
- detailed current and near-current data,
- summarized historic data.

Syntheses Process component must extract, cleanse, transform, integrate and migrate the disparate primary data to achieve the integrated view presented by the Data Set. It must, therefore address all the aspects of the primary data presented above. Management and automation of the synthesis process shall be ensured through the meta data component. The synthesis process is the most important in the development phase, for:

- identification of sources for required data,
- integration of data from different sources,
- elimination of duplicates,
- insertion of missing data,
- mapping data onto Integrated Data Set schemes,
- management of the initial transfer to the Integrated Data Set,,
- management of updates to the Integrated Data Set,
- management of requests to reach-through to source data via the Integrated Data Set.

Meta Data component, containing "data about the data", and are:



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- analysis meta data, with the business model, the data description corresponding to the views of the business model and the mapping between the data description and the Integrated Data Set,
- synthesis meta data, with details of the source (platform, DBMS, schema), details of data items to be extracted, mapping of items and business rules for transforming data.



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8.4 Software requirements

8.4.1 Administration Management System (A.M.S.)

8.4.1.1 Finance and Accounting Management Application (F.A.M.A.)

At the present time the new Finance and Accounting Management Application, S.A.P., is in the pilot implementation phase in Almaty.

Consulting services are expected for implementing it, as significant customisation is needed for the application to successfully contribute to implementing changes at KTZ.

The TRACECA "Tariff and Timetable Structure" project, which implemented Systra's software package "SysManagement" evidenced serious shortcomings in the generation and use of accounting and statistical information.

Other applications bundled with the SAP package may also need customisation.

8.4.1.2 Personnel Management Application (P.M.A.)

It is highly recommended to implement a Personnel Management Application (personnel database) to be organised into three levels: local, regional and national.

Main functions of the Personnel Management Application should be the following:

Local Personnel Management Application

The local database will insure main basic daily routine tasks, for instance:

- data acquisition of daily, weekly and monthly elements for the pay of employees,
- data acquisition of conventional items such as : (education / diploma, grade and function, address, family composition and modifications, attribution of specific benefits (clothes, free passes, etc), training, etc...).

Regional Personnel Management Application

This base should aggregate the most essential information provided by local level. In addition, other modules should be integrated at the regional level such as:

- recruitment,
- changes in grade and jobs/functions decided at regional level,
- existing staff number agreed and existing for each unit (depots, sections, stations),
- affairs related to insurance funds and pension funds.



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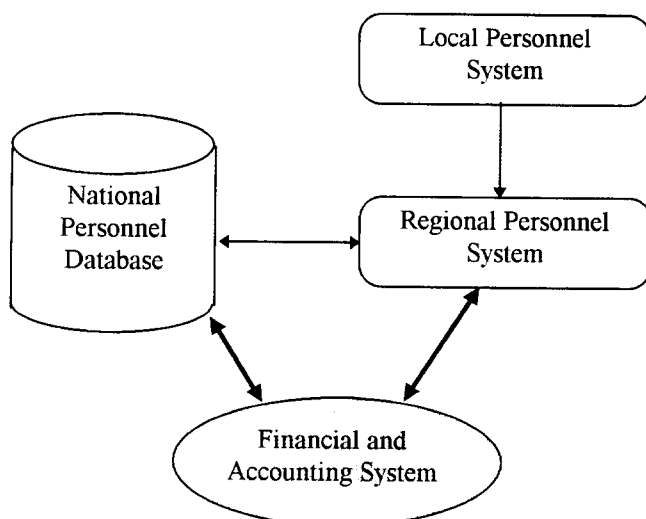
National Personnel Management Application

The role of the national personnel database is to consolidate regional information to be used as a management tool for KTZ: personnel statistics of any kind (grade, functions, age, location,). With the knowledge in real time of the personnel situation, it is easy for the Personnel Manager to take adequate decisions related to decide on personnel policy matters, particularly in managing the steering of staff downsizing and retraining.

In addition, at this level, another module related to Managers recruitment and career follow-up should be implemented.

Insurance and pension funds should be managed also at this level.

The architecture of the computerised personnel management system could be the following:



Personnel Management Application - Interfaces

Advantages of a computerised Personnel Management Application:

It will allow KTZ to:

- provide reliable personnel information and improve the quality of personnel management,
- centralise and control the information at Head Office level in order to take suitable decisions.
- regroup local centres for managing personnel, which will allow a reduction in administrative staff by about 25% to 30 % when the system will be fully implemented.

Option :

In order to improve the recruitment process, it is also proposed, as an option, to provide to personnel in charge a computerised tool (computerised tests) to recruit staff. The main functions are the following:



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- collation, numerical, verbal, arithmetical and abstract reasoning test,
- concrete spatial test,
- perceptive test,
- syntactic verbal test,
- attention, supervision and performance test,
- psychomotor test.

8.4.1.3 Freight Marketing Management Application (F.M.M.A.)

This application follows external and internal objectives :

External objectives

- generate more detailed invoices, in accordance with established international practices,
- reduce the clients' administrative burden,
- open the system to outside clients and railways.

Internal objectives

- follow trends in the market (detailed statistics),
- reduce costs,
- improve the management tools and acquire a better understanding of costs and profitability by activity,
- foster decentralisation and decrease reaction time to information generated in the field,
- improve commercial documentation and automate its production,
- computer assisted preparation of contracts and shipping documents and automated circulation to interested parties,
- real time pricing, invoicing and accounting for entries directly related to the movement of freight.

Operating procedures

FMMA could be based on a shipments file, generated tentatively during commercial negotiations, confirmed at the signing of a contract, and fed with relevant information as the status of the contract changes, or as updates on the location of the shipment become available.



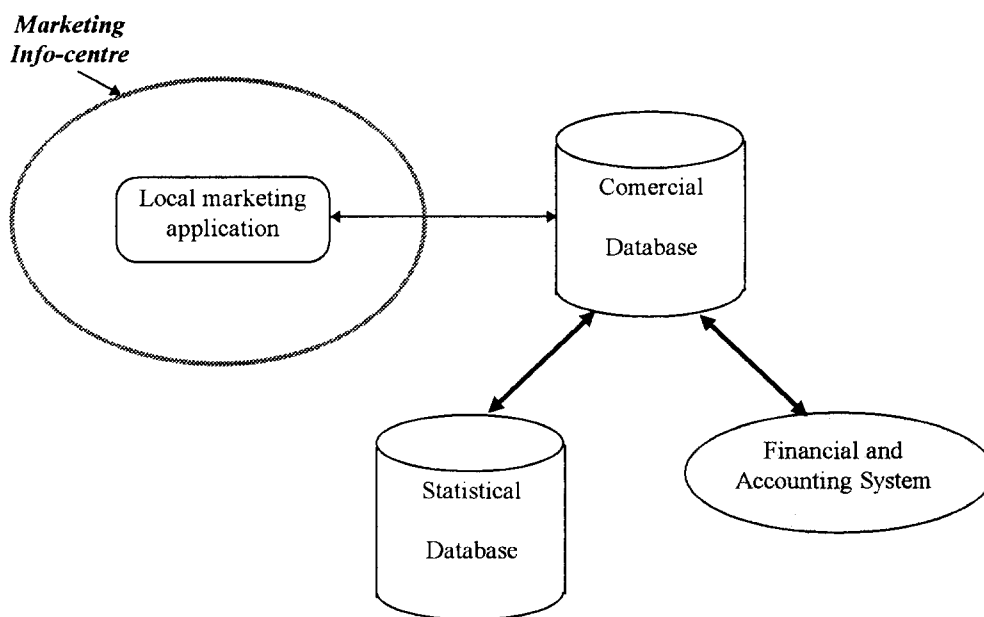
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Management information systems

This file could be linked to a Commercial DataBase (CDB) which would also include client-related information, and allow shipment data to be consolidated on a customer basis.

It would typically have a client server architecture, with a central data repository, a local data repository for active shipments, allowing local operators to carry out most tasks without loading transmission lines nor the central processor, and, most importantly, without being dependant on the performance of the telecommunication lines.

A beta test could be organised quickly in Almaty with a handful of the 40 freight forwarders dealing with KTZ.



Freight Marketing Management Application - Interfaces

8.4.1.4 Infrastructure Management Application (I.M.A.)

For the Infrastructure Management Application the KTZ needs a complete solution, including application software, available on the market, and adequate hardware and software architecture. The solution should be based on GIS, with adequate hardware for graphical workstations and servers.

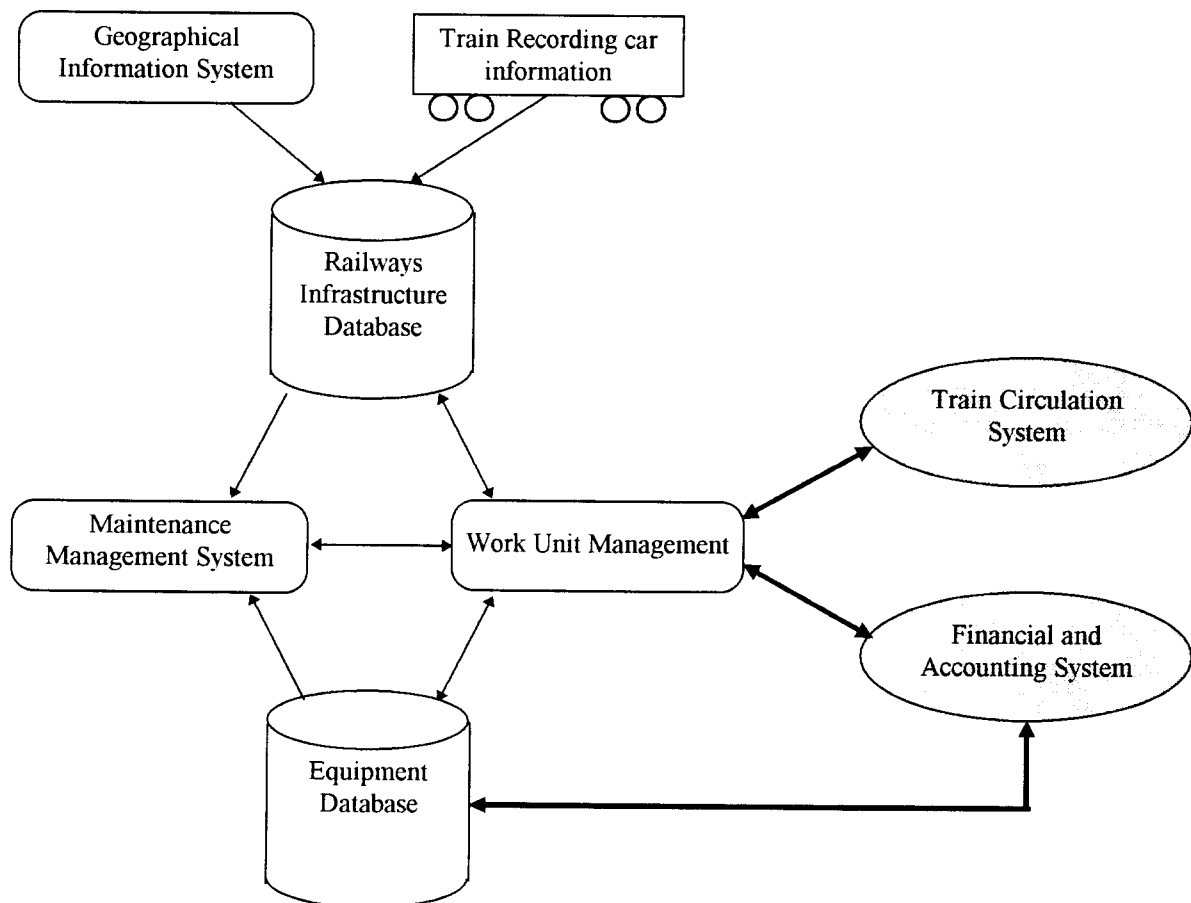
The main objective of the Infrastructure Management Application is to provide reliable information for the Infrastructure Business Sector, covering the infrastructure assets management, maintenance works management, resources, costs and investments control, projects control.

The application should provide informational support for the Infrastructure Business Sector activities, as a management and control instrument, in order to ensure its operational and financial autonomy.

Management information systems

The Infrastructure Management Application should have a modular structure, its modules being integrated through a client/server architecture and sharing a common railway infrastructure database.

The Infrastructure Management Application streamlines the business process by minimising the paper flow process and performs electronic transactions in an efficient and practical manner for maintenance and engineering activities. Management reports and enquiries will be provided to ensure independent operation and financial management of the Infrastructure Business Sector.



Infrastructure Management Application - Interfaces

Geographical Railway Infrastructure Database Management

The Geographical Railway Infrastructure Database Management Module contains technical and administrative data, for all components of the Railway Infrastructure. Those databases will serve as the repository of data used in the Geographic Information System and the Railway Infrastructure Management.

The Geographical Railway Infrastructure Database Management module, built on GIS architecture, will ensure common data for all the infrastructure sub-sectors.



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Management information systems

This module should be able to:

- hold survey legal and technical data for railway infrastructure components (Parcels, Buildings, Rail platform, Rail profile, Rail geometry, Construction and structural works, Bridges, Tunnels, level crossings, track, switches, signalling installations, electrification installations, telecommunication installations,...),
- hold financial data for railway
- hold legal data for railway
- set up and maintain railway infrastructure maps,
- restrict screen access to user sections and authorised personnel only,
- convert survey data from the standard general survey data,
- monitor access rights, by hierarchical levels,
- hold special information concerning circulation restrictions on each infrastructure element,...

Train Recording Car

The Train Recording Cars provides all technical measure data. This study plans to invest in two of them.

Maintenance Management Module

The Railway Infrastructure and Equipment Management Databases should utilise Maintenance Management Module for support of infrastructure maintenance activities. This area represents the maintenance planning activities needed for all infrastructure components.

This module should be able to:

- define maintenance projects in detail (costs, location, facilities, resources),
- develop and update complete cost estimates for maintenance work projects,
- provide maintenance and repairs standards,
- amend categories of labour and activities codes, including current and middle term repairs and capital overhaul,
- track and analyse maintenance costs, by jobs, type, location,
- provide capability to hold information on the repair histories and maintenance cost,
- make the planning procurement of track steel materials (such as rails, switches, fastening, welding, etc.) sleepers, ballast, etc...



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- provide capability to analyse and identify quantity, quality and types of used rails and switches for rail recycling process.

Work Unit Management

Once the maintenance activity has been planned, Work Unit Management should provide the Project Administration and Production Control needed to perform the maintenance.

The work unit management should support workshops activity scheduling and monitoring, local resources management, and work unit accounting.

This module should be able to:

- set up and update information about work unit fixed assets,
- set up and update information about works in progress (costs, locations, facilities, resources),
- develop and update work scheduling, resources allocation,
- manage local materials consumption and needs,
- track works in progress (both on technical and costs aspects), by infrastructure sub-sectors and their respective elements (track, bridge, tunnel, signal, switch, etc...),
- update information about technical description and status of the infrastructure elements in its responsibility (track, bridges or signals, switches, etc...),
- provide integration with the Financial and Accounting system for maintenance activities,
- provide integration with Train Circulation Monitoring for infrastructure utilisation, including tonnage by section,
- provide integration with Equipment Management Module for equipment allocation and utilisation,
- provide current reporting for the work in progress (status, costs, resources, equipment),
- provide reports (track, bridges and construction works quality status, installations technical status, electric power installations status, telecommunication and data transmission installations status, current and historical maintenance works, by infrastructure elements), equipment utilisation and costs,...)

Equipment Management

Equipment Management Module contains all technical data, maintenance requirements and maintenance history data for all equipment used in infrastructure maintenance or construction projects.

The Equipment Management Module should be established for equipment used in infrastructure maintenance or construction projects.



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This module should be able to:

- set up and amend system reference data about infrastructure equipment inventory,
- set up, for each equipment type, technical data, financial data and utilisation data,
- subgroup equipment by infrastructure sub-sectors (track, installation, telecommunication),
- track equipment use, by type, time, work unit, etc...
- maintain equipment specifications,
- track equipment as an individual asset item and/or as an item associated with other equipment,
- record the run hours and produce analysis/comparison of this data against budgeted utilisation,
- use common reference masterfile with Work Unit Management module for equipment allocation and utilisation report,
- provide integration with the Financial and Accounting system for equipment costs,
- maintain equipment activity and repair history,
- provide equipment utilisation inquiry facility,
- produce equipment allocation statistics,
- provide detailed analysis of equipment use, costs, technical status,
- provide detailed analysis of movements in equipment inventory.

8.4.1.5 Rolling Stock Management Application (R.S.M.A.)

For the Rolling Stock Management Application the KTZ need a complete solution, including application software and adequate hardware. It should include, also Technical Documentation Management for the rolling stock.

The rolling-stock requirements include:

- Detailed information pertaining to all wagons and locomotives in active or passive fleets.
- Maintenance related activities for all rolling-stock assets.
- Store and stock control functions required in the maintenance units.
- Management of all rolling-stock technical documents.
- The purpose of the Rolling-Stock Management Application is to provide:



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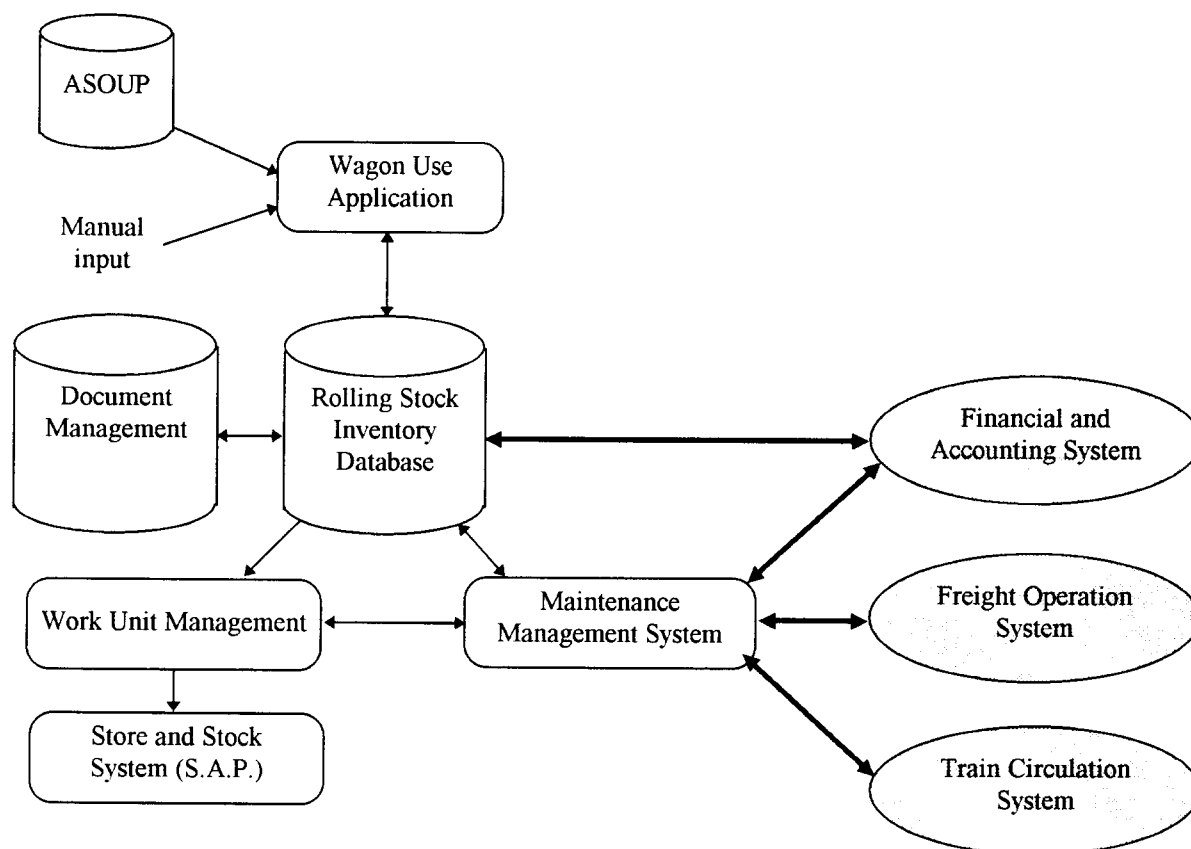
- reliable information across the organisation covering the existing wagon and locomotive fleets,
- railway rolling-stock investments,
- Resources allocation and utilisation,
- maintenance activity.
- Rolling-stock database management.
- Cost control and documents management.

The R.S.M.A. should provide the following modules:

- rolling stock inventory database management,
- maintenance management,
- store and stock control,
- rolling stock technical documentation management,
- work wagon module.

All the modules should share a common rolling stock inventory database.

Management information systems



Rolling-Stock Management Application - Interfaces

Rolling-Stock Inventory Database Management

The Rolling-Stock Inventory Database Management module should store data containing financial, technical, and historical data about each rolling-stock element for all wagons and locomotives in active or passive fleets.

This module should be able to:

- set up and update a rolling-stock element, by code, type, vendor, construction year,
- set up and update information about financial characteristics of the rolling-stock element (initial value, liquidities, maintenance expenditures),
- set up and update information about technical characteristics of the rolling-stock element, with component limits for maintenance,
- set up and update information about the day-to-day activity of the rolling-stock element (current operation, repairs, lend),
- hold historical data about each rolling-stock element, for its entire life cycle.

Management information systems

Maintenance Management

The Maintenance Management module should provide support for the rolling-stock maintenance activities, both for wagon and locomotive sub-sectors, from the top management level down to the work units.

This module should be able to:

- set up and update the rolling-stock inventory database,
- develop, update, track and analyse cost for maintenance works,
- provide maintenance and repairs standards and part exchange methodology, both for wagons and locomotives,
- provide capability to amend categories of labour and activities codes,
- provide capability monitor the rolling-stock fleet which is in the work unit responsibility,
- provide assistance in elaboration of the operational plan for rolling-stock, based on all necessary planning data for maintenance and operation of each rolling-stock unit (locomotives, freight wagons, passenger coaches, etc...),
- develop yearly/monthly/daily maintenance plans, at work unit level, centralise them to regional and central levels, analyse and distribute revised plans and work orders,
- provide capability to track maintenance works and compare their performance against plan,
- provide capability to hold information on the repair histories and maintenance costs, by work unit.

Store and Stock Control

The Store and Stock Control functions should be provide by the S.A.P. system and used for the stock management in the maintenance unit's stores. It should share a common stock item/vendor database with other modules: purchase order processing and accounts payable from the financial and accounting system.

This module should be able to:

- set up a reference data,
- input stock movements and stock adjustments,
- track material receipts to related purchase orders,
- track material issues and returns to cost centres, activities and work orders,
- group items of stock based on the stock item coding structure,



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- maintain the multiple cost of each stock item and value stock item balances based on weighted average cost,
- charge external work orders, for materials issued,
- reconcile materials received to purchase orders,
- record and track discrepancies in material received,
- maintain, for each stock item, inventory control information,
- provide facility to obtain stock item details by multiple data elements.

Document Management

The Document Management module should be used for all the rolling-stock technical documentation. The data should be concentrated in a central database with possibilities to transfer a document, at request, to a regional server. The updating of documents should be the responsibility of the central office.

This module should be able to:

- hold documents profile data,
- hold all drafts related to a rolling-stock element (wagon, locomotive),
- manage the document work-flow,
- set up and maintain document versions,
- hold different document formats.

Wagon Use Module (W.U.M.)

WUM would allow KTZ to schedule repair and maintenance works on wagons according to the time they were effectively used, as opposed to time lapsed since the last time in the workshop. This could generate substantial savings, and possibly also a better security and reliability.

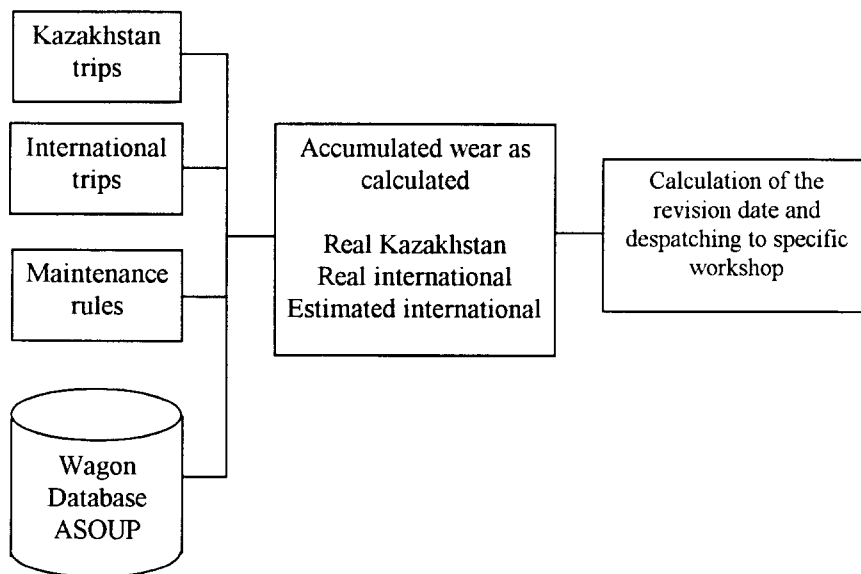
ASOUP can deliver the needed data.

Running time for national wagons crossing the national border may be either

- estimated from time away, using conversion tables to be drawn up, or
- communicated by the partner railways which would operate according to the same principles



Management information systems



Wagon Use Application - Calculations

The W.U.A. should consist of:

- wagon technical management database containing all technical data, being structural or status related (live information)
- statistical or historic information could be archived separately

Data consistency is a critical requirement.

8.4.2 Train Circulation Monitoring Application (T.C.M.A.)

The Train Circulation Monitoring Application should be constituted on the three following modules:

8.4.2.1 Computer aided-design of timetable

In order to guarantee efficient management of the railway traffic, it is necessary to study the timetables, the times of departure and arrival, the passing times, the stopping times in stations, so that all the trains run harmoniously, without coming up against signals set at danger and in compliance with signalling rules.

The purpose of the module for computer-aided design of timetables is to enable the timetable engineers to:

- study the consequences of any modification in the infrastructure or in the performance levels of the rolling stock,
- adapt a transport programme on the basis of a new study,

Management information systems

- calculate standard running for the various train categories,
- detect and examine the consequences of the different types of signals on a given transport programme,
- identify various possibilities.

The timetable design software should be a programme running on a microcomputer with which the operator, the timetable engineer will dialogue via the screen.

This tool, it should be possible to:

- display the space - time diagram showing all the trains and the train under consideration,
- examine the interference with other trains,
- take into account the modifications entered by the timetable designer and help him solve the problems thus generated.

The Computer aided-design of timetable should have a modular structure, its modules sharing data with the Infrastructure Management Application regarding the circulation conditions and resources.

Most importantly, the tool can be used by the despatching centre to adapt to unanticipated circumstances.

8.4.2.2 Computer aided-design of rosters

Management of railway rolling stock is optimised by the use of rosters.

The purpose of making rosters is to obtain the best possible utilisation of rolling stock.

A roster is the graphic representation of how locomotives haul trains in succession to serve mainly a given area for a certain period. Trains are planned according to certain criteria in roster days. A roster day is a number of trains, which can be hauled by one locomotive.

Computer-aided design of rosters links the roster offices and the operating centres from the data processing viewpoints.

The software should be designed to carry out the following tasks, for the duration of a seasonal schedule:

- assist with the design and setting up of the theoretical rosters (locomotives and staff),
- help implementing the technical means to enable local staff to modify rosters designed by central staff, in case of changing conditions, or even to set them up themselves,
- using near optimum economic conditions archived in a special purpose library, and thus easily falls back on optimum conditions even when the users request adaptations.

Computerising roster design aims at:



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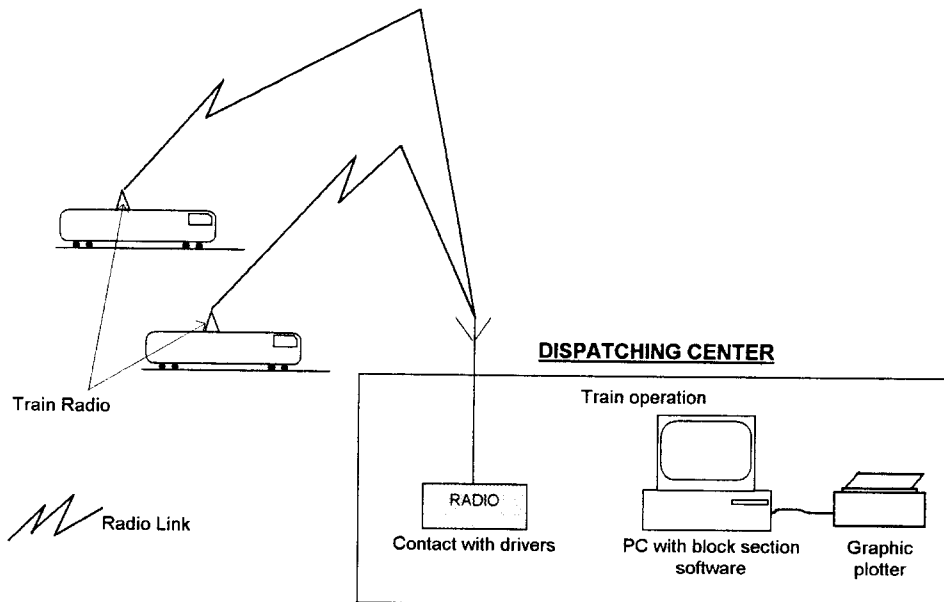
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- reducing the time required for building up a roster by automating the process, and eliminating all controls because internal consistency and consistency with all known data about trains planned, are built in,
- ensuring graphic display for more convenient use.

8.4.2.3 Control of train operation using computer systems and radio links

On most lines, transmission of information between the train crew and the dispatcher would keep using radio links.

The dispatcher could make an effective use of modern software for the follow up of trains and track sections. The computer, using information input would then assess critical situations by dispatcher, on the basis of what is transmitted orally by the train crew. Track occupancy could be displayed on a computer screen.



Management information systems

8.5 Hardware requirements

This section is based on KTZ self assessed requirements, as listed in the document "KTZ plan survey of the technical renovation of the points of data collection and distribution". The time available did not allow accounting of the needs of each and every department of KTZ.

Plan Survey of the Technical Renovation of the Points of Data Collection and Distribution of "Kazakhstan Temir Zholy" RSE on Typical ASOU - JT System in Use

- Types of the outdated periphery equipment (terminals) installed at the points of data collection and distribution, its general technical characteristics.

| N o | Equipment name | General technical characteristics | Year of production |
|-----|--|---|--------------------|
| 1 ? | Teletyping apparatus F-2000 country - manufacturer: GDR | Microprocessor control exchange code - International Telegraph Code No 2 (ITC2), transmission velocity 50/75/100 baud's, synchronization of characters is start-stop, printing velocity is max 50 characters/sec. | 1987-88. |
| 2 ? | Teletyping apparatus F-1100 country - manufacturer: GDR | Electronic exchange code is International Telegraph Code No 2 (ITC2), transmission velocity is 50/75/100 baud's, synchronization of characters is start - stop printing velocity is max 800 characters/min. | 1984-85. |
| 3 ? | Electronic receiver F-1200 (without keyboard) country - manufacturer: GDR | Electronic exchange code is International Telegraph CODE 2 (ITC2) transmission velocity is 50/75/100 baud's, synchronization of characters is start-stop, printing velocity is max 800 characters/min | 1985-88. |

Management information systems

| N° | Equipment name | General technical characteristics | Year of production |
|-----|--|---|--------------------|
| 4 ? | Teletyping apparatus T-100 country - manufacturer: Czechoslovakia | Electromechanical exchange code is International Telegraph Code No 2 (ITC2) transmission velocity is 50/75/100 baud's synchronization of characters is start - stop | 1987 |
| 5 ? | Teletyping apparatus RTA-80 Country - manufacturer is the USSR. | Electronic exchange code is International Telegraph Code No 2 (ITC2) transmission velocity is 50/100 baud's, character synchronization is start - stop printing velocity is max 400 characters/min. | 1984-87 |
| 6 ? | PC of different assembly | Type 286, 386 | 1985-94. |
| 7 ? | Displaying monitors | Monitors with printers in local ASOU complexes of sorting yards on the basis of electronic machines CM2M, EC1010 | 1979-88. |

Management information systems

2. Places of Location and the Number of Terminals in Need of Replacement (TLT - teletyping apparatus, PC - Personal Computer or ASOUS terminal)

| Data collection point | Sary-Arka | | Almaty | | Akmola | | Semei | | Turkestan | | West - Kazakhstan | |
|-----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------------|-----------|
| | PC | TLT | PC | TLT | PC | TLT | PC | TLT | PC | TLT | PC | TLT |
| Freight Service Office | 17 | 0 | 0 | 0 | 18 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Maintenance Service Office | 4 | 15 | 4 | 8 | 4 | 36 | 11 | 16 | 17 | 37 | 22 | 66 |
| Sorting Yard ASOU System | 20 | 22 | 10 | 0 | 20 | 29 | 0 | 0 | 30 | 0 | 15 | 0 |
| Management Staff (Administration) | 4 | 0 | 23 | 17 | 57 | 24 | 2 | 4 | 16 | 3 | 17 | 20 |
| TOTAL | 45 | 37 | 37 | 25 | 99 | 89 | 14 | 21 | 63 | 41 | 54 | 86 |

The total number of terminals needing replacement is 611 (299 teletyping machines, 312 worn out PCs)

3. General Equipment Demand (PC: personal computers, LAN: servers) necessary for KTZ RSE Computerisation Program Implementation.

Table 1 Equipment distribution according to Main Destinations



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| | Number of PCs required | Number of LAN - 1st level servers required | Number of LAN 2nd level servers required | Number of LAN 3rd level servers required | Number of LAN 4th level servers required |
|--|------------------------|--|--|--|--|
| Additional supply of working places of SAP R3 system | 500 | 0 | 30 | 0 | 0 |
| Accounting system automation | 1200 | 20 | 0 | 0 | 0 |
| Additional supply of data collection points on typical working systems (Automated working places of the mass profession employees, information collection and storage) | 7300 | 361 | 12 | | 0 |
| Creation of local computer networks for KTZ RSE management (General Directorate, Railway Management, Affiliated enterprises) | 1800 | 0 | 0 | 16 | 7 |
| Additional supply of the terminals of "Express" automated passenger ticket reservation system | 100 | 7 | 0 | 0 | 0 |
| TOTAL | 10900 | 388 | 42 | 16 | 7 |

LAN of the 1st level - up to 10 workstations.

LAN of the 2nd level - 10-50 workstations.

LAN of the 3rd level - 50 - 200 workstations.



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LAN of the 4th level - 200 - 600 workstations,

PC - working station is a personal computer of Pentium 166 MHz-type, a modem and/or network map, UPS at the average price of \$1,500

Table 2. Equipment distribution according to business units

| | RSE General Directorate + CC | Affiliated Computing Centers (CC) | Railway Management staff | Major Interlocking Stations | Line enterprises | Total |
|---|------------------------------|-----------------------------------|--------------------------|-----------------------------|------------------|-------|
| Number of units | 1 | 2 | 6 | 30 | 400 | |
| HardWare | | | | | | |
| PC type P166, 16MB RAM, 2.5Gb HDD | 600 | 100 | 100 | 50 | 20 | 10900 |
| Servers of the following types: P2 266, 128Mb RAM, 12Gb HDD (SAP, Lotus Note, MQ, Vweb) | 7 | 2 | 1 | 0 | 0 | 17 |
| Servers of P2 233, 64Mb RAM, 8Gb HDD (SAP, Lotus Note, MQ, Web) type | 0 | 0 | 0 | 1 | 1 | 430 |
| Net printer for large operation groups | 10 | 3 | 4 | 1 | 0 | 70 |
| Net printer for medium operation groups | 20 | 8 | 10 | 3 | 0 | 186 |
| Net printer for small operation groups | 25 | 20 | 20 | 5 | 2 | 1135 |

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Management information systems

| | RSE General Directorate + CC | Affiliated Computing Centers (CC) | Railway Management staff | Major Interlocking Stations | Line enterprises | Total |
|------------------------------|---------------------------------------|--|--------------------------------|-----------------------------------|---------------------|-------|
| UPS for servers | 7 | 2 | 1 | 1 | 1 | 447 |
| UPS for an operation station | 600 | 100 | 100 | 30 | 20 | 7600 |
| NetWare | | | | | | |
| | 1 | 1 | 1 | 0 | 0 | 9 |
| Bay Stack 5000 | 5 | 3 | 1 | 0 | 0 | 17 |
| Bay Stack 3000 | 4 | 3 | 3 | 1 | 0 | 58 |
| Bay Stack 52 | 0 | 0 | 0 | 0 | 1 | 400 |
| Cisco Router 7000 | 1 | 0 | 0 | 0 | 0 | 1 |
| NIC | 607 | 102 | 101 | 51 | 21 | 11447 |
| Bay Networks FRAD 630 | 0 | 1 | 1 | 1 | 1 | 438 |

**Table 3. Equipment Inventory (PC)
(Without aged PCs of 286, 386 type of 1990-1994 production)**



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| | RSE General Directorate + CC | Affiliated Computing Centers (CC) | Railway Administrations | Major Interlocking Stations | Line enterprises | Total |
|---|------------------------------|-----------------------------------|-------------------------|-----------------------------|------------------|-------|
| Number of units | 1 | 2 | 6 | 30 | 400 | |
| HardWare | | | | | | |
| Number of PC (total) | 281 | 103 | 224 | 137 | 221 | 966 |
| Number of servers (total) | 2 | 4 | 4 | 2 | 20 | 32 |
| Net printer for large operation groups | 0 | 0 | 0 | 0 | 0 | 0 |
| Net printer for medium operation groups | 0 | 0 | 0 | 0 | 0 | 0 |
| Net printer for small operation groups | 0 | 0 | 2 | 5 | 2 | 9 |

The total number of PCs at the RSE KTZ is 2,372, including:

- The amount of modern PCs (of 486 type and up, capable of operating within modern data transmission systems) is 998.
- The number of outdated PCs of non-adaptable parameters is 1,374 (30 per cent of which need maintenance and repair).



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8.5.1 Telecommunication infrastructure

The opportunity or the need for new infrastructure is obvious; no detailed studies have however been made, that would help making technical choices, nor assessing timing and sizing of the investment.

Furthermore, it can be argued that KTZ can take advantage of three important factors in planning for the future:

- the right of way covers all significant parts of the country; cable of any technology can be inexpensively laid alongside the track, and be used with excellent safety,
- most of the existing infrastructure is absolutely obsolete, and KTZ need not make any compromise in making technical decisions for the future, thereby selecting the most suitable technologies,
- the sheer size of their needs allows KTZ to implement medium or large-scale systems by themselves, or to negotiate with strategic partners.

The first of these will be addressed in the part of this study carried out by UIC.

Technical choices must be made regarding transmission systems across the country and within buildings: fibre optics technology, coaxial or twisted pair, depending on expected volumes and actual use.

These must also be made regarding the actual functions that the systems will be expected to implement (voice, data, possibly video), and the networking technologies (telephone exchanges, inter- / intranet, LAN / WAN,).

For instance, the choice of high performance digital exchange technology removes much of the need for traditional computer networking, with added flexibility.

Nevertheless, reference is made to the Infrastructure Maintenance 2 TACIS project in assessing the condition of the equipment. The conclusions of that report are set out as follow:

- **Replacement of transmission backbone** (open wire by optical cable for long distance, including all digital multiplex and power supply equipment with batteries, and copper cable for permanent way distribution) :
 - Aktyubinsk / Uralsk (Russian border) - 550 km : 9,200,000 US\$
 - Kzyl-Orda / Arys - 393 km : 6,600,000 US\$
 - Mointly / Sajak - 336 km : 5,800,000 US\$
- **Improvement of existing cable performance** :
 - replacement of 100 km of cable and 200 junction boxes : 1,000,000 US\$
- **Replacement of operating telephones (dispatcher)** :



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- replacement of 100 station operator consoles and 4 main dispatching system concentrators : 980,000 US\$
- **Replacement of radio equipment :**
 - replacement of 50 fixed base radio and 20 on-board equipment for train/dispatcher radio system :
 - replacement of 30 fixed base radios and 50 hand held radios for shunting radio system : 900,000 US\$
- **Replacement of administrative telephones (PABX) :**
 - 4 PABX of 500 lines, 8 PABX of 500 to 1000 lines, 13 PABX of 1000 to 2000 lines and telephones sets, distributions cables and connectors): 10,800,000 US\$

A project financed by the Japanese is already in progress between Druzhba and Aktogay (320 km). It consists of the installation of 2 copper buried cables along the line with multiplex systems, and the replacement of all telephone equipment in the railway stations, for a total cost of 5,000,000 US\$.

Kazakhstan needs to update his telecommunication network. KAZAKTELECOMM plans to install a new optic fibre network in the country. **KTZ can negotiate with KAZAKTELECOMM for the installation of a new optical cable network and the use of the network.**

8.5.2 Project and training requirements

All suppliers should be requested to quote for all the following items (products and services):

- definition of the solution,
- project management,
- application software packages, being in operation at a transport company,
- hardware and system software for the Solution provided,
- database Management System Software,
- training of Information Technology (IT) people and of application users,
- implementation of the application at the places agreed with KTZ.

8.5.3 M.I.S. Investment Plan

The M.I.S. investment plan does not include the projects in progress as the Financial and Accounting System S.A.P. already funded. Telecommunications are not included either.



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The hardware estimated unit costs square with the Kazakhstan prices. Consulting fees are at market rates.

Hardware investment:

| HARDWARE | | Qty | Unit cost (US\$) | Cost (US\$) | Total cost (US\$) |
|---|-----------|--------------|------------------|-------------------------|-------------------|
| Replacement of actual PC | | 312 | 1,500 | 468,000 | 468,000 |
| Express 2 | Terminals | 100 | 1,000 | 100,000 | 135,000 |
| | LAN 1 | 7 | 5,000 | 35,000 | |
| Operating PC | PC | <u>2,800</u> | 1,500 | 4,200,000 | 5,272,000 |
| | LAN 1 | <u>200</u> | 5,000 | 1,000,000 | |
| | LAN 2 | 12 | 6,000 | 72,000 | |
| Head offices | PC | <u>400</u> | 1,500 | 600,000 | 798,000 |
| | LAN 3 | 16 | 8,000 | 128,000 | |
| | LAN 4 | 7 | 10,000 | 70,000 | |
| SAP | PC | 500 | 1,500 | 750,000 | 930,000 * |
| | LAN 2 | 30 | 6,000 | 180,000 | |
| Accounting | PC | 1,200 | 1,500 | 1,800,000 | 1,900,000 * |
| | LAN 1 | 20 | 5,000 | 100,000 | |
| Printers | | 1,400 | 500 | 700,000 | 700,000 |
| Network | | 1 | 2,000,000 | 2,000,000 | 2,000,000 |
| Teletyping | | 299 | 500 | 149,500 | 149,500 |
| | | | | Total | 12,352,500 |
| * : not included in the investment plan | | | | Total Investment | 9,522,500 |

The quantities underlined and italic have been re evaluated in accordance with the systems proposed.



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Management information systems

Software investment:

| SOFTWARE | Qty | Unit cost | Sub-Total cost (US\$) | Total cost (US\$) |
|----------|-----|-----------|-----------------------|-------------------|
|----------|-----|-----------|-----------------------|-------------------|

Project Management

| | | | | |
|------------|----|---------------|---------|---------|
| Consultant | 22 | 35,000 USD/m. | 770,000 | 770,000 |
|------------|----|---------------|---------|---------|

Assistance S.A.P. implementation

| | | | | |
|------------|----|---------------|---------|---------|
| Consultant | 11 | 27,000 USD/m. | 297,000 | 297,000 |
|------------|----|---------------|---------|---------|

Marketing Management Application

| | | | | |
|---------------------------|---|------------------|---------|---------|
| Software | 1 | 300,000 USD/lic. | 300,000 | 435,000 |
| Implementation - Training | 5 | 27,000 USD/m. | 135,000 | |

Infrastructure Management Application

| | | | | |
|---------------------------|---|------------------|---------|---------|
| Software | 1 | 250,000 USD/lic. | 250,000 | 358,000 |
| Implementation - Training | 4 | 27,000 USD/m. | 108,000 | |

Rolling Stock Management Application

| | | | | |
|---------------------------|---|------------------|---------|---------|
| Software | 1 | 550,000 USD/lic. | 550,000 | 712,000 |
| Implementation - Training | 6 | 27,000 USD/m. | 162,000 | |

Train Circulation Management Application

| | | | | |
|--|---|------------------|---------|------------------|
| Software | 1 | 500,000 USD/lic. | 500,000 | 608,000 |
| Implementation - Training | 4 | 27,000 USD/m. | 108,000 | |
| Systems specifications and design | 1 | 800,000 USD | 800,000 | 800,000 |
| Program development and testing | 1 | 500,000 USD | 500,000 | 500,000 |
| | | | | 4,480,000 |



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Management information systems

M.I.S. Investment Plan for the first five years:

| Item | Year 1 (US\$) | Year 2 (US\$) | Year 3 (US\$) | Year 4 (US\$) | Year 5 (US\$) | Total (US\$) |
|--------------------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| Hardware | | | | | | |
| Replacement of actual PC | 468,000 | - | - | - | - | 468,000 |
| Express 2 | Terminals | 100,000 | - | - | - | 100,000 |
| | LAN 1 | 35,000 | - | - | - | 35,000 |
| Operating | PC | 1,260,000 | 2,100,000 | 840,000 | - | 4,200,000 |
| | LAN 1 | 300,000 | 500,000 | 200,000 | - | 1,000,000 |
| | LAN 2 | 21,600 | 36,000 | 14,400 | - | 72,000 |
| Head offices | PC | 180,000 | 300,000 | 120,000 | - | 600,000 |
| | LAN 3 | 38,400 | 64,000 | 25,600 | - | 128,000 |
| | LAN 4 | 21,000 | 35,000 | 14,000 | - | 70,000 |
| Printers | 210,000 | 490,000 | - | - | - | 700,000 |
| Network | 800,000 | 800,000 | 400,000 | - | - | 2,000,000 |

Management information systems

| Item | Year 1 (US\$) | Year 2 (US\$) | Year 3 (US\$) | Year 4 (US\$) | Year 5 (US\$) | Total (US\$) |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Teletyping | 149,500 | - | - | - | - | 149,500 |
| Sub-Total | 3,583,500 | 4,325,000 | 1,614,000 | 0 | 0 | 9,522,500 |

| Software | | | | | | |
|--|---------|---------|---------|---------|---------|---------|
| Project Management | 154,000 | 154,000 | 154,000 | 154,000 | 154,000 | 770,000 |
| Assistance S.A.P. implementation | 110,000 | 110,000 | 77,000 | - | - | 297,000 |
| Marketing Management Application | 87,000 | 217,500 | 130,500 | - | - | 435,000 |
| Infrastructure Management Application | 35,800 | 143,200 | 143,200 | 35,800 | - | 358,000 |
| Rolling Stock Management Application | - | - | 213,600 | 284,800 | 213,600 | 712,000 |
| Train Circulation Management Application | - | - | 182,400 | 304,000 | 121,600 | 608,000 |
| Systems specifications and design | 400,000 | 200,000 | 200,000 | - | - | 800,000 |
| Program development and testing | - | 200,000 | 100,000 | 50,000 | 150,000 | 500,000 |

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Management information systems

| | | | | | | |
|---------------------|------------------|------------------|------------------|----------------|----------------|-------------------|
| Sub-Total | 786,800 | 1,024,700 | 1,200,700 | 828,600 | 639,200 | 4,480,000 |
| Other (5 %) | 218,515 | 267,485 | 140,735 | 41,430 | 31,960 | 700,125 |
| Grand Totals | 4,588,815 | 5,617,185 | 2,955,435 | 870,030 | 671,160 | 14,702,625 |
| | 31% | 38% | 20% | 6% | 5% | 100% |

The M.I.S. investment plan is estimated to cost about US\$ 15 million.



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Management information systems

8.5.4 Benefits expected from the proposed investments

8.5.4.1 General considerations

The rate of return from a computer system varies tremendously across the spectrum of applications and the rationale involved for the implementation of the renovation:

- accounting,
- management,
- operations (and further depending on circumstances),
- computerisation of previously manual processes,
- improvement of existing processes,

Replacement of obsolete systems.

Benefits can be ordered into three broad classes:

1. Direct savings:
 - labour, related costs (office, space,...),
 - increasing maintenance expenditures for obsolete applications.
2. Indirect or induced benefits:
 - quality improvements; potentially quite large for M.I.S. type applications,
 - operational savings (... shorter routes, better utilisation rate), and maintenance related savings (less breakdowns, better energy efficiency), to be split between lower operating costs and lower capital requirements; these benefits could be translated directly into class 1 savings for the purpose of calculating rates of return,
 - better managerial decisions owing for instance to better knowledge of costs (better pricing, better capital allocation decisions,...).
3. Intangibles:

Some projects or investments do actually impact attitudes and expectations of people in a profound way; such changes may be crucial for the success of the undertaking as a whole.

Image building is a deciding parameter for any enterprise undergoing profound changes: towards customers, and also towards employees.



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Management information systems

Customers may only come if they have the proper confidence in the supplier delivering the agreed upon services; they may also only be willing to pay the price expected for the base service or for the value added services if the image of the suppliers right.

Highly qualified engineers and managers will only join if they feel that the job is interesting, will lead to results, and that the image of their new employer will enhance their own image and their career. This is particularly true if the salary levels are not too generous, as is currently the case for KTZ.

Breaking away from past practices and past image may be a decisive factor for the success of KTZ restructuring.

In practice, each application yields benefits in each of the three classes; making choice a matter of judgement as much as a matter of measurement.

In a modern enterprise, even more so in one operating in a stable environment, typically most class 2 and class 3 benefits have been taken advantage of; mostly class 1 arguments and figures justify investment.

In an enterprise facing difficult managerial and business changes, even more so in a low or moderate wages country, class 1 benefits would be typically comparatively much lower.

Investment control (including expenses for major overhaul of rolling stock and permanent way), operational efficiencies, and customer satisfaction leading to improving market share or higher prices, hide much more significant stakes.

Management information systems

8.5.5 Estimation of benefits derived from recommended investments

The major benefit expected derives from improved management practices, leading to a better control of the above mentioned stakes.

| Application | Benefits |
|---|--|
| F.M.M.A. Freight Marketing Management Application | <ul style="list-style-type: none"> • follow trends in the market (detailed statistics) so as to adapt capacity on scheduled service, and to better define the service needed, • reduce administrative costs (making price quotations, finalising contracts, despatching of contracts, shipping documents, and related operating instructions, invoicing, automated related accounting entries), • acquire a better understanding of costs and profitability by activity, • foster decentralisation and speed up decision making by headquarters upon request from the field, • improve commercial documentation (precision, ergonomoy) and automate its production. |
| I.M.A. Infrastructure Management Application | <ul style="list-style-type: none"> • increased relevance of maintenance and repair operations actually carried out, and increased effectiveness of maintenance policy, possibly leading to savings in overall maintenance costs of 20% for a given level of availability of the infrastructure, • computerised planning and control helps ensure that scheduled operations are really carried out, leading to a more effective maintenance, • automation of information flows leads to reduction in needed administrative staff (possibly 5% of total staff). |
| R.S.M.A. Rolling Stock Management Application | <ul style="list-style-type: none"> • availability driven maintenance policy allows a streamlining of human and material resources needed to achieve a given level of availability of units, sub assemblies and components, possibly leading to very substantial savings in maintenance expenditures (30% ?), a more reliable availability of the fleet, and the related need for a smaller size fleet of rolling stock. |
| T.C.M.A. Train Circulation Management Application | <ul style="list-style-type: none"> • improved design and setting up of the theoretical rosters (locomotives and staff), leading to better productivity and utilisation rates (5 to 15%), • improved adaptation to changing circumstances, leading to better quality of service (time reliability), and marginally better efficiencies (reduced re-routing and waiting times for staff and rolling stock). |

It is estimated that modern management information systems would generate savings of a minimum of 20% of the expenses associated with the cost of maintaining the infrastructure



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Management information systems

and rolling stock. Depending on sub systems, the investment would be returned in a few months after successful implementation.

A quick return on investment is expected from all systems directly impacting on operations, i.e. all systems but the financial and human resources systems. In effect, the stakes handled are a considerable multiple of the investment required, and these systems immediately and visibly improve economic efficiency.

This alone would plead for a priority implementation of these systems, possibly at the expense of financial and human resources ones.

This approach may however be misleading, as the actual capture of the expected benefits, and the related monitoring by top management and the regulatory body do actually require:

- the right people with the right training in the right place, reporting adequately on needs and achievements; the training and deployment of managers with the appropriate skills is a difficult and time critical activity, which actually conditions the whole change process at the railway,
- that the whole process be actually integrated in an effective budgetary and reporting process; failing this, there is more than a strong chance that managers could not be held accountable for the expected benefits, and that individual benefits expected from individual systems would not add up to tangible economic benefits for the railway.

We would therefore recommend that the financial and human resources systems would be implemented in priority, possibly bundled with other systems, so that reporting systems would be tightly integrated.

Computerisation is however only part of the picture; remodelling management processes, in order to ensure that MIS will support company strategy and allow management to make the economically and operationally right decisions, is an absolute prerequisite.

It should be noted that the applications proposed here purpose to improve management processes internally; they do not impact information exchange with other CIS countries. Even application like ASOUP, EXPRESS2 and others, which do exchange data with other CIS countries may be modified however, without any adverse consequences, to the extent that the standards for information exchange are met, which have been defined by OSZhD.

Main items:

- First, absolute priority is the present implementation of the Finance and Accounting system (S.A.P.); related assistance is relevant.
- Second, equally important and quite urgent:
Maintenance Management (Infrastructure and Rolling Stock, distinct applications),
Marketing Management,
and Train Circulation.
- Third, equally important but not urgent (not included in the investment plan):
Freight Information System (successor to ASOUP)
Passenger Information System (successor to EXPRESS 2). The Russian developer will release some time in the future version 3.0; financial estimates are not readily available.

The M.I.S. investment plan is estimated to cost about US\$ 15 million.



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Details of the internal rate of return for the investment is given in Chapter 14.



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Railway operations

9. Railway operations

9.1 Objectives of this Report

The objective of the task was to analyse the operational efficiency of Kazakhstan Railways and the identification of possible improvements by low cost investments. The railway operations have been reviewed, and proposals for cost reductions in railway operations have been made.

All efforts have to bear in mind that the former Soviet Union Railways achieved a grade of compatibility of systems that is unique in the world. This compatibility opens great possibilities for future markets to railway authorities like KTZ and should be maintained.

9.2 Introduction

Once a part of the former Soviet Union railway system the present KTZ railway infrastructure was designed to handle large quantities of goods and large numbers of passengers. Since freight and passenger volumes have dropped significantly, it can be assumed, that line capacity constraints do not exist under the present traffic volumes. Since there is no prospect for traffic volumes to rise again to previous levels, it is likely to remain as at present for the foreseeable future.

With the severe drop in transportation quantities that followed the breaking up of the Soviet Union and the independence of the Republic of Kazakhstan, the needs for a re-orientation of KTZ became evident.



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Railway operations

9.3 The Railway Network

KTZ is operating a large railway network with a length of 13,280 line kilometres, of which 8,820 kilometres consist of single track and 5,078 kilometres of double track. Approximately 3,300 kilometres are electrified with 25 kV AC. The gauge is 1520 millimetres. On the network, KTZ is operating both passenger and freight services. The load on the network is very unevenly distributed:

- 2% of the total line lengths handles 20 to 40 million tons per annum
- 7 to 10% handle 10 to 20 million tons per annum
- 27% handle 5 to 10 million tons per annum
- 64% handle less than 5 million tons per annum.

The network has 700 stations, where train crossings are possible. The network consists mainly of three lines. These are:

- The former Stelinaya network with its main north – south line, partly electrified, connecting the Trans Siberian with Uzbekistan via Akmola, Chu and Chengeldy. At Akmola it receives the line from the coal area of Ekibasuz, the busiest line of the KTZ network and a west branch coming from Tobol and the Russian border.
- The former West Kazakhstan network with the south – northwest line from Ayr to Akturbinsk and Ozinky, which connects Uzbekistan to Russia. At Kandagach the line receives the western branches coming from Atyrau and Aktau on the Caspian Sea.
- The former Almaty network with a north – east line from Chu to Semipalatinsk. At Aktogay it receives the east branch coming from Drujba at the Chinese border and a west branch coming from Mointy on the Chu – Akmola line.

Stations are categorised in 6 categories, large stations and categories I –V according to their size. The following table shows the regional distribution of the stations in the categories.

| Railway districts | Main stations | Category I | Category II | Category III | Category IV | Category V | Total |
|-------------------|---------------|------------|-------------|--------------|-------------|------------|-------|
| West | 3 | 7 | 8 | 11 | 27 | 154 | 210 |
| Semei | 2 | 4 | 5 | 5 | 12 | 57 | 85 |
| Sary-Arka | 2 | 5 | 12 | 6 | 7 | 37 | 69 |
| Akmola | 5 | 10 | 5 | 22 | 31 | 99 | 172 |
| Turkestan | 3 | 6 | 9 | 5 | 24 | 86 | 133 |
| Almaty | 2 | 1 | 4 | 7 | 17 | 90 | 121 |



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Railway operations

| | | | | | | | |
|--------------|-----------|-----------|-----------|-----------|------------|------------|------------|
| Total | 17 | 33 | 43 | 56 | 118 | 523 | 790 |
|--------------|-----------|-----------|-----------|-----------|------------|------------|------------|

This table includes the following stations, for which a categorisation of their main functions is made:

| Function of the station | West | Turkestan | Semei | Sary-Arka | Akmola | Almaty | Total |
|-------------------------|------|-----------|-------|-----------|--------|--------|-------|
| Marshalling Station | 3 | 1 | 1 | 1 | 3 | 2 | 11 |
| Freight Station | 10 | 10 | 6 | 18 | 12 | 3 | 59 |
| Line Station | 14 | 10 | 7 | 6 | 15 | 6 | 58 |
| Intermediate Station | 183 | 112 | 71 | 44 | 142 | 110 | 662 |

9.4 Mode of Operation

The mode of operation in KTZ is based on the standards set during the time of the Soviet Union. All standards and rules for railway operations, for train configuration, marshalling, operation control and timetable planning methods etc. are still based on the rules valid prior to independence. Every aspect of operations focused on achieving a fail safe proof railway system with several layers of redundancy.

Traffic is widely controlled and co-ordinated by Central Traffic Control Centres. There are 14 CTC districts.

Large stations have individual signal boxes. Small wayside stations are equipped with control panels. In case of failure of the Central Traffic Control local operation from these panels is possible. The CTC Centres are equipped with the following technology:

- PCH (1970)
- Niva (1980)
- Minsk (1990)

All three systems have automatic route setting. The block system is either automatic or semi-automatic. PCH and Niva are relay-based systems, while the Minsk system is electronic.

Shunting operations within station limits and in marshalling yards is locally controlled. These movements are negotiated between the station's operator and the dispatcher. The local operator sets the routes for the shunting movements.

Larger stations, such as Chu, Almaty and Akmola are controlled locally.



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Railway operations

9.5 Train Operation

About 80% of the network is equipped with colour light signals, track circuits, automatic or semi-automatic block and electric switching points. The average length of block sections is about 2,500 metres. The average distance between stations on main lines is around 15 kilometres, on secondary lines around 30 kilometres.

Train operations are widely controlled and co-ordinated by Central Dispatching Centres.

About 66% of the lines in Kazakhstan are remote controlled by CTC Centres. Larger stations have their own signal boxes and wayside stations have operating panels. In case of failure of the Central Traffic Control local operation from these panels is possible.

The operation control system is organised in three levels:

| | |
|---|---|
| Central Traffic Controllers: | are in charge of overall traffic control |
| Controllers at major stations: | are in charge of traffic in their stations |
| Panel Operators at wayside stations: | are operating local equipment of the station in case of CTC failures on behalf of the Traffic Controller and during shunting manoeuvres in their stations |

The central controller's record the train runs on train graphs using different colour pens for different categories of trains. These categories are:

- passenger trains
- express passenger trains
- freight trains
- mixed freight and passenger trains
- service trains
- single locomotives

Basis for the train runs is the so called Master Graph.

The master graphs are well prepared and provide information on the following characteristics of the line:

- maximum gross weight of passenger trains



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Railway operations

- maximum weight of freight trains
- maximum number of wagons in line sections
- average trip time between stations

The central controllers announce their dispositions to the local controllers at the major stations and, if necessary to the local panel operators at wayside stations.

Generally passenger services operate long distance routes connecting regional centres. There is a tendency to provide overnight services and to reach the destination in the early hours of the morning. The coaches are traditionally equipped for long overnight journeys.

Freight trains operate from marshalling yard to marshalling yard. As a result, journey times are long and freight traffic is rather work intensive. This does not apply to coal traffic, where block trains are operated between the coal areas and the destinations. And coal traffic amounts to 50% of the KTZ freight traffic volume.

Container traffic with modern 20 and 40 foot containers is still not very much developed. Traditionally the Soviet Union transport system had its own container norms with smaller units. KTZ is operating 32 large container terminals and 34 middle size terminals. Containers of 3 ton, 5 ton and up to 20 ton are transported. Transport is handled with CIS (Community of Independent States) countries, and so called third countries. There is some container traffic from central Asia, transit from Russia, and China to Kazakhstan. Container traffic is performed in normal trains. Containers have to be transhipped at the Chinese border because of different gauges.

9.6 Safety

There is no doubt that KTZ is a very safe railway and has a very good safety record. After the latest reorganisation in July 1997, overall safety standards have been made the responsibility of the Technical Department, which is headed by the 1st Deputy Director. This department ensures, that KTZ operates to standards laid down by the ministry, that rules and regulations are properly observed, that technical engineering standards are properly certified, that all equipment, installations and facilities meet agreed qualities and that the staff is competent. The department will also be involved in the investigations on serious accidents.

Safety procedures and supervisions are clearly laid down. There are comprehensive books of rules, regulations and instructions and the areas of responsibility and required knowledge for each grade or post are well defined. A booklet lays down the groups of personnel by which testing committees should be formed. The groups of grade and the posts that should be examined are clearly defined, as well as the frequency in which such examinations should be conducted. Records of tests have to be kept.

There are standard instructions covering the procedures for conducting investigations on accidents.

The basic rules and regulations KTZ is presently observing are the ones applied by the Ministry of Railways in Moscow.



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Railway operations

According to KTZ statistics the following accidents have happened in the first nine-month of 1997.

| Classification of events | Number of events |
|--|------------------|
| serious accidents (catastrophes) | 2 |
| accidents | 2 |
| derailments | 31 |
| unintended uncoupling of passenger coaches | 15 |
| unintended uncoupling of freight wagons | 164 |

Safety of train movements is in the responsibility of the locomotive crew. There is no additional personnel for the safety on board of the trains.

9.7 Operation Key Parameters

9.7.1 Maximum speed and speed restrictions

There are two categories of maximum speeds:

- 100 kph for passenger trains
- 80 kph for goods trains

On main tracks, a 40 km/h speed restriction is applied to pass switching points in diverging direction.

In addition to this general restriction, there are two types of locally applied speed restrictions:

- permanent speed restrictions
- temporary speed restrictions

The permanent speed restrictions are published in a booklet that is valid for the duration of the timetable period. The temporary speed restrictions are introduced on the spot in case of track failures, maintenance activities or other related reasons.

There are more than 300 speed restrictions between Baquash and Karaganda on the electrified main line, between Aktogay and Semey on the east line and between Bejneau and Aqttau on the west line. In addition there are over 50 restrictions over bridges.



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9.7.2 Axle Load, Train Lengths Train Loads

The maximum permissible axle load is 23,5 tons. The maximum trainload is 3600 tons. The maximum number of wagons is 60 wagons for goods trains and 23 coaches for passenger trains. Maximum train length is 850 metres.

The length of loop tracks is between 850 and 1,050 metres.

Maximum speeds for rolling stock can be seen in the following table.

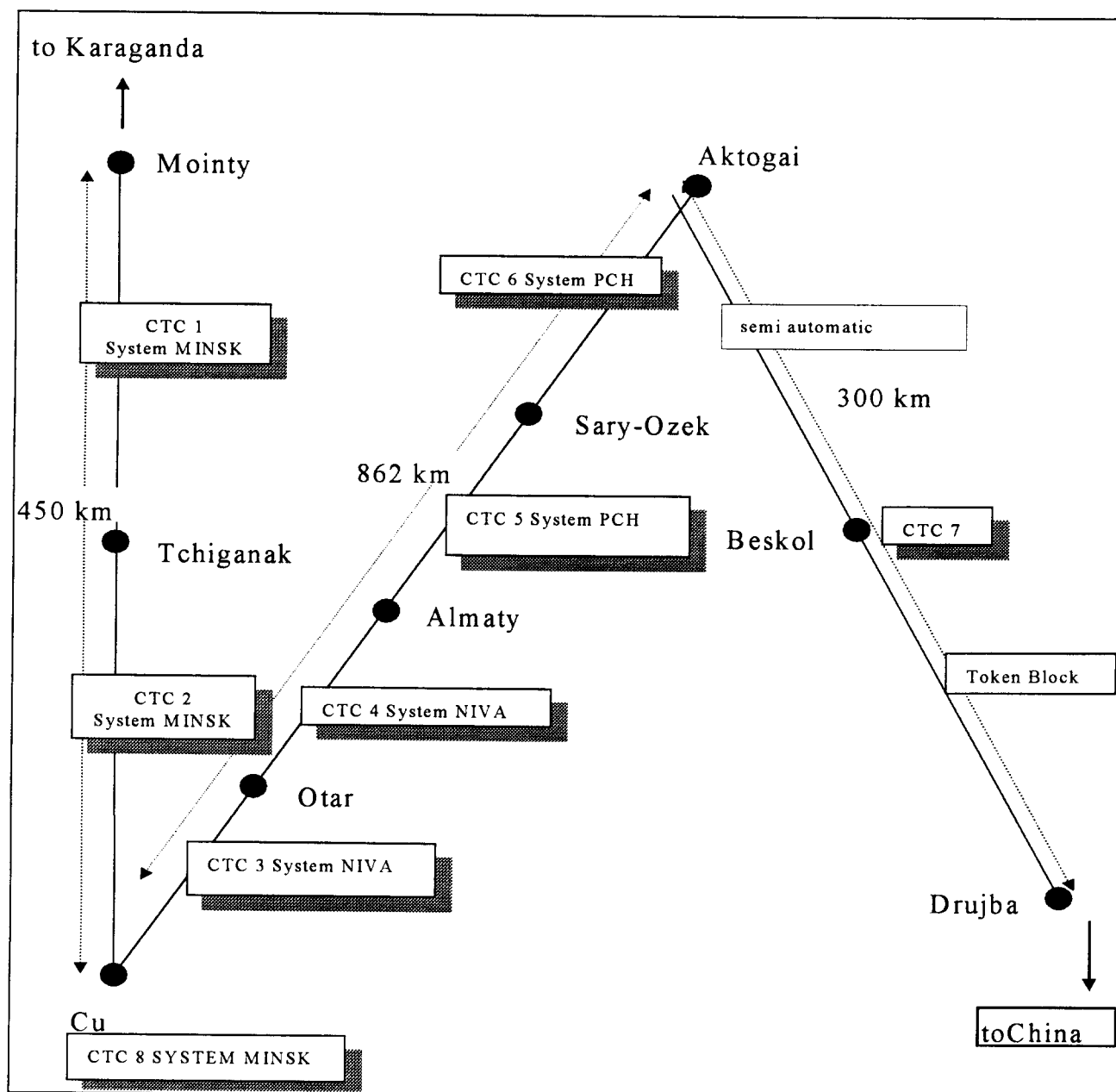
| Type of Rolling Stock | State of Loading | maximum speed |
|-----------------------|------------------|--|
| goods wagons | loaded | 90 km/h |
| | empty | 100 km/h |
| refrigerator wagons | loaded/empty | 120 km/h |
| passenger coaches | | 160 km/h – 200 km/h |
| locomotives | | 100 km/h plus a 15% reserve for diesel locomotives 140 km/h for TP 70 for electric locomotives (15 units available) |

Table 1; Maximum speed of rolling stock

9.7.3 Signalling equipment

Approximately 80% of the entire KTZ network is equipped with colour light signals, automatic or semi-automatic block system, track circuits and electric switching points. All stations have at least two loop tracks. In about 66% of the network, Central Traffic Control Centres (CTC) control traffic. There are 14 CTC districts in the network. The next sketch shows the control area of the CTC districts located in Almaty:

Railway operations



Like in all the former Soviet Union Railways, in Kazakhstan the signalling equipment has been installed in two major investment phases:

- during the 60's and early 70's most of the lines were equipped
- during the 80's signalling equipment of part of the main lines as well as the major stations has been replaced by more modern equipment

The CTC Centres are equipped with the following technology:

- PCH; the oldest system, based on relay technology with push button operation



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- Niva; using relay technology and some electronic circuits with push button operation
- Minsk; based on electronic integrated circuit cards with numeric keyboard command device

All three systems have automatic route setting. The block system is either automatic or semi-automatic.

The stations are equipped with two types of Russian equipment:

- installed before 1978; about 30% of the installations
- installed after 1978, about 70% of the installations

The stations are equipped with two types of Russian made signalling equipment:

- before 1978 type with push-button panels
- after 1978 type with display board and operator command console

9.7.4 Block System

The distance between two stations is divided into block sections, which do not exceed 2.5 kilometres on main line. On double track sections, for operations on the wrong side of the track, trains run from station to station without intermediate signals.

The railway lines with automatic block system (station and open line) are equipped with 50 Hz track circuits (track release installation).

The automatic train running control (frequency impulses) transmits the aspect of the fixed signals to the driver's cabs through track circuits, which are coded.

9.7.5 Automatic train running control

The automatic train running control system transmits the aspects of the signals into the driver's cab and automatically applies the train brakes, if the driver runs over a signal showing a halt aspect. This feature is available on main lines only.

9.7.6 Train Radio system

The main lines are equipped with a train radio system. It allows the driver to communicate with the central controller, station controllers and other locomotive drivers.

9.7.7 Level Crossings

All level crossings are equipped with train operated automatic warning light signals. In addition some of the level crossings are equipped with automatic barriers. At some of the



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level crossing protecting signals, showing a blue light, when the level crossing is closed, are installed.

Some level crossings are guarded by a gateperson. These gatepersons are just watching the crossing. They have no facilities to interfere with train operations in case of emergency.

9.7.8 Equipment Failures in the CTC System

The following table shows the equipment failures and other failures in connection with the CTC system, which have been reported in the first six-month of 1997.

| Total CTC Faults | 3,958 | |
|------------------------------|-------|-------|
| signalling and communication | 847 | 21.4% |
| track failures | 1,847 | 46.7% |
| power supply | 693 | 17.5% |
| operation | 21 | 0.5% |

The total number of 847 signalling and telecommunication failures appeared on the following systems:

| Type of equipment | Number of faults | Percent on total failures |
|-------------------------|------------------|---------------------------|
| electric | 418 | 49% |
| automatic blocking | 333 | 39% |
| semi-automatic blocking | 34 | 17.5% |
| others | 62 | 0.5% |

9.7.9 Telecommunication Equipment

For operating and management purposes the following telecommunication infrastructure is installed:

- Central dispatcher to local operator (dispatching)
- Station operators along the line with each other (dispatching)
- Central dispatcher to locomotive drivers (radio communication with trains)



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- Station inspectors to locomotive drivers (radio communication with trains)
- Locomotive drivers to each other (radio communication with trains)
- Shunting personnel to locomotive drivers and station operator (station radio)
- Party lines for permanent way maintenance staff
- Party lines for telecommunication and signalling maintenance staff
- Communication for remote control
- Local lines between two railway stations; these also include the telephones at the signals and turnouts at the entry and exit area.
- Administrative and managing communication for all the staff (private switching telephone network PSTN)
- Teleprinter links with other networks
- Data transmission links with the main railway stations and other railway networks
- Public address systems at larger stations
- Loudspeaker announcement systems at marshalling yards

9.8 Rolling Stock

9.8.1 Locomotives

KTZ has Diesel Electric as well as Electric locomotives. The number of locomotives in service, the total number available and the usage of these locomotives are indicated in the table below:

| Series | Type | Usage | No. in Service | No. total |
|---|-----------------|-----------------------------|----------------|------------|
| VL 60 | electric | main line passenger | 54 | 59 |
| VL 80 T | electric | main line freight | 111 | 194 |
| VL 80 S | electric | main line freight | 223 | 386 |
| Total main line electric locomotives | | | 388 | 639 |
| 2 TE 10 D | diesel electric | main line freight/passenger | 51 | 68 |



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| | | | | |
|--|-----------------|-----------------------------|-------------|-------------|
| 2 TE 10 L | diesel electric | main line freight/passenger | 25 | 132 |
| 2 TE 10 M | diesel electric | main line freight/passenger | 190 | 485 |
| 2 TE 10 V | diesel electric | main line freight/passenger | 74 | 369 |
| 3 TE 10 M | diesel electric | main line freight passenger | 91 | 220 |
| TE3 | diesel electric | main line freight | 20 | 84 |
| Total main line diesel electric locomotives | | | 451 | 1358 |
| TEM2 | diesel electric | shunting | 331 | 522 |
| CME3 | diesel electric | shunting | 69 | 100 |
| Total shunting locomotives | | | 400 | 622 |
| Total locomotives | | | 1239 | 2619 |

Table 2; KTZ locomotives

The present average daily requirements of locomotives are given in the table below:

| Average daily requirement of locomotives | | |
|--|-----------------|-----|
| Passenger services | diesel electric | 120 |
| | electric | 50 |
| Freight services | diesel electric | 400 |
| | electric | 250 |
| Shunting services | | 300 |

Table 3; Average daily requirement of locomotives

The diesel electric locomotives are assigned to depots, which are located, approximately 250 kilometres from each other. Two different modes of locomotive assignment are practised:

9.8.1.1 Locomotive assignment to Passenger Services

Locomotives stay with the passenger trains over a long distance. Locomotive crews are changed en route, according to plans.

Locomotive assignment to Freight Services

The locomotive crews are assigned to their locomotives. They pick up their locomotives at their depots and return them after the working time. The working time is approximately 7 to 8 hours per day, the distance covered during that time is only around 300 kilometres on



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average. In previous time this system used to be quite effective, because the number of trains was high enough to avoid waiting times at turning stations.

At present times, with low traffic volumes, this leads to a very low utilisation of locomotives. The annual running performance is only around 75,000 kilometres per year.

9.8.1.2 Shunting Services

The number of deployed shunting locomotives is very high. Usually, at least two shunting locomotives are assigned to the stations for twenty four hours a day. The introduction of shunting locomotive rostering based on the timetables and the station service requirements would lead to significant savings in operating costs for shunting locomotives and services.

9.8.2 Passenger Coaches

KTZ owns a great number of passenger coaches of different kinds, either manufactured in former east Germany or in the Russian plant of Tver. The following breakdown shows the types of coaches of KTZ's fleet and the numbers, in which they are available:

| Type of coach | Berths/seats | Fleet size |
|---------------------------|--------------|--------------|
| Reserved seat coaches | 60 | 1,197 |
| Standard sleeping coaches | 54/81 | 601 |
| Comfort sleeping coaches | 36/38 | 20 |
| Comfort sleeping coaches | 16/24 | 34 |
| Comfort sleeping coaches | 33 | 3 |
| Commuter coaches | 68 | 25 |
| Total | | 1,880 |
| Restaurant car | | 102 |
| Post and luggage cars | | 203 |
| Total | | 2,185 |

Table 4: KTZ coach fleet

The actual requirement is estimated to be 1,900 coaches. The surplus of coaches is not very high. Taking into consideration, that about 50% of the coach fleet require spare parts, which are not available at present, investment in this sector is urgently required. An investment proposal is given in Chapter 11, Rolling Stock.



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9.8.3 Wagons

KTZ has a large fleet of wagons and the fleet is rather young and in good condition. The fleet of wagons is oversized. Around 40% of the whole fleet are considered to be reserve fleet. Cannibalising the reserve fleet is common practice, due to lack of spare parts. The following table gives details on the wagon fleet.

| Type of wagon | No. axles | Load limit | Tare | Useful space | Fleet |
|---------------------|-----------|------------|---------------|-------------------------|---------------|
| Covered Wagon | 4 | 60 – 68 t | 22 – 26.5 t | 90 – 120 m ³ | 16,630 |
| Low sided wagons | 4 | 60 – 69 t | 21 – 25.5 t | 50 – 76 m ² | 38,750 |
| | 6 | 94 t | 32.4 t | 104 m ² | |
| | 8 | 125 t | 43.6 t | 140 m ² | |
| Flat wagons | 4 | 50 – 60 t | 20 – 22.7 t | 37 m ² | 12,557 |
| Tank wagons | 4 | 50 – 60 t | 21.8 – 25.6 t | 50 – 72 m ³ | 11,106 |
| | 8 | 120 t | 48.8 t | 140 m ³ | |
| Refrigerator Wagons | 4 | 30 – 49 t | 28.5 – 32.5 t | 54 – 82 m ³ | 2,240 |
| Others | | | | | 14,489 |
| Total | | | | | 95,772 |

9.9 Technical Inspections, Locomotive Changes and Crew Changes

As mentioned before, freight trains undergo a technical inspection at intermediate stations. These technical inspections are laid down in the freight train timetable for each division. The following table shows, where technical inspections, locomotive changes and locomotive crew changes are performed in Almaty division:

| Names of Stations where technical services and changes of locomotives are performed | even direction | | odd direction | |
|---|-----------------|------|-----------------|------|
| | Kind of Service | Time | Kind of Service | Time |
| | | | | |



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| | | | | | | | | |
|-------------|----|----|----|----|----|----|----|----|
| Aktogai | TI | CL | | 30 | TI | CL | CC | 30 |
| Malai | TI | CL | CC | 30 | TI | | CC | 30 |
| Ush-Tobe | TI | CL | | 30 | TI | CL | | 30 |
| Sary – Ozek | TI | CL | CC | 30 | TI | CL | CC | 30 |
| Almaty I | TI | CL | CC | 30 | TI | CL | CC | 30 |
| Otar | TI | CL | CC | 30 | TI | CL | CC | 30 |
| Chu | TI | CL | CC | 30 | TI | CL | CC | 30 |

TI = Technical Inspection

CL = Change of Locomotive

CC = Change of Locomotive Crew

9.10 Evaluation of Operation Performance

9.10.1 The Core Network

Looking at the operation figures of KTZ it becomes evident, that traffic loads are not evenly distributed. In terms of freight traffic we have identified that:

- 2% of the total line lengths handles 20 to 40 million tons per annum
- 7 to 10% handle 10 to 20 million tons per annum
- 27% handle 5 to 10 million tons per annum
- 64% handle less than 5 million tons per annum.

Of course passenger traffic plays a different role than freight traffic in the national context. Kazakhstan is a large country and at present, other modes of transport are not yet as developed like the railway and at least for the time being, railway has to maintain the network as it is.

For the other lines of the network we see the following long-term options:

- rehabilitation of these lines in a way to reduce operating costs
- transferring these lines to other ownership, like private investors or regional authorities



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- closure of these lines, if socially or politically feasible

The same applies to commuter traffic.

9.10.2 Passenger Traffic

KTZ operates passenger services on almost all the network lines. Both international, domestic and commuter services are operated. In 1996 the passenger traffic was at a level of 14 billion passenger kilometres.

The timetable for passenger trains is compiled annually. During the summer period additional passenger trains are operated, which are also included in the timetable. There are several categories of trains, differing from each other in trip length, speed and number of stops. These categories are:

- Express Passenger Trains
- Passenger Trains
- Local Trains
- Mail & Luggage Trains
- Freight & Passenger Trains
- Commuter Trains

The categories differ in trip lengths, speed and type of coaches. All trains are operated in train pairs.

9.10.2.1 Express Passenger

Express passenger trains are the highest train category. They stop only at major stations. They operate over long distances and consist of up to 25 coaches. Most of the coaches in use are sleeping coaches. Not all of the coaches run the full running distance. Some of them are attached or removed at intermediate stations. Some passenger trains are „branded“. That means they carry a name, which makes it easy for the customers to identify the trains and which is used to give the trains a certain identity. The seats are reserved via the Moscow based passenger booking system Express 2. Reservation is possible from 40 days ahead of the journey to 15 minutes in advance of the departure.

KTZ is at present operating the following Express Passenger Trains:

| Train Number | from | to | Trip time (h) | Brand name | No. of coaches |
|--------------|--------|----------|---------------|------------|----------------|
| 1/2 | Almaty | Shimkent | 16 | Otar | 18 |
| 4/3 | Akmola | Almaty | 24 | Astanalyk | 11 |



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| | | | | | |
|-------|-----------|----------------|----|--------------|----|
| 5/6 | Tashkent | Moscow | 59 | Uzbekistan | 20 |
| 7/8 | Almaty | Moscow | 77 | Kazakhstan | 25 |
| 10/9 | Aktobe | Almaty | 43 | | 25 |
| 14/13 | Almaty | Urumehi | 35 | Zhibek Zholy | 12 |
| 15/16 | Almaty | Petrovpavlovsk | 33 | Zhetysu | 18 |
| 17/18 | Bishkek | Moscow | 75 | Kyrgystan | 16 |
| 19/20 | Semey | Arys I | 39 | Semey | 14 |
| 21/22 | Almaty | Nukus | 49 | Aral | 18 |
| 23/24 | Dushambe | Moscow | 89 | | 15 |
| 39/40 | Akmola | St. Petersburg | 65 | | 11 |
| 42/41 | Konstanai | Almaty | 39 | Konstnailyk | 18 |
| 46/45 | Navlodar | Almay | 36 | Bajnaul | 15 |
| 47/48 | Almaty | Konstanai | 39 | | 25 |
| 50/49 | Akmola | Tashkent | 36 | | 21 |
| 52/51 | Almaty | Zashchita | 30 | | 24 |
| 53/54 | Almaty | Turkestan | 20 | | 14 |
| 56/55 | Kzyl | Kokshetau | 47 | | 15 |
| 58/57 | Volgograd | Tashkent | 64 | | 16 |
| 64/63 | Moscow | Leninogorsk | 79 | | 19 |
| 69/70 | Akmola | Zaashehita | 33 | | 8 |
| 71/72 | Akmola | Moscow | 59 | | 18 |
| 84/83 | Moscow | Almaty | 78 | | 19 |
| 85/86 | Tashkent | Moscow | 65 | | 19 |



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9.10.2.2 Passenger Trains

The next lower category is the Passenger Trains. Passenger trains are long distance trains as well, but stop at more stations. There are international passenger trains as well as domestic ones. The coaches are usually lower comfort coaches than these of the express passenger trains.

The following passenger trains are presently operated:

| Train number | from | to |
|--------------|--------------|------------------|
| 171/172 | Almaty | Astrakhan |
| 175/176 | Novokuznetsk | Almaty |
| 177/178 | Almaty | Tashkent |
| 181/182 | Karaganda | Novokuznetsk |
| 185/186 | Bishkek | Mezdurechensk |
| 187/188 | Bishkek | Dzhala-Abad |
| 191/192 | Blisk | Leninogorsk |
| 197/198 | Akmola | Kiew |
| 199/200 | Tashkent | Irkutsk |
| 202/201 | Almaty | Novosibirsk |
| 203/204 | Almaty | Sverdlowsk |
| 205/206 | Bishkek | Sverdlowsk |
| 207/208 | Uralsk | Volgograd |
| 211/212 | Ashgabat | Moscow |
| 219/220 | Karaganda | Moscow |
| 225/226 | Karaganda | Konstanai |
| 236/235 | Samara | Andizhan |
| 235/236 | Omsk | Akmola |
| 239/240 | Pavlodor | Presnogorkovskya |
| 241/242 | Akmola | Uralsk |



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| | | |
|---------|-------------|-----------|
| 245/246 | Omsk | Karaganda |
| 269/270 | Omsk | Pavlodar |
| 282/281 | Ufa | Tashkent |
| 287/288 | Akturbinsk | Moscow |
| 289/290 | Kzyl – Orda | Moscow |
| 295/296 | Tashkent | Kharkov |
| 295/297 | Moscow | Samarkand |

During the summer period an additional 8 train pairs are operated.

9.10.2.3 Local Trains

The next lower category of trains is the local trains. They are domestic trains, which operate in a range of up to 500 kilometres. They are composed of an average of 8 to 10 coaches, mainly open seat coaches and one or two berth sleeper coaches. The local trains stop at every station. The duration of stops at small stations is 1 minute, at larger stations between 2 and 30 minutes.

Following we have analysed the particulars of two example trains, which represent the majority of the local trains

The first train is train number 626 from Esil to Akmola:

| | |
|--------------------------------|-----------------------|
| distance Esil – Akmola: | 376 kilometres |
| total travelling time: | 523 minutes (8 h43 m) |
| number of stops: | 23 |
| total stoppage time: | 64 minutes (1h 04 m) |
| total running time: | 459 minutes (7h 39 m) |



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| | |
|-------------------------------|---------|
| average trip speed: | 45 km/h |
| average running speed: | 50 km/h |

The second train is train number 621 from Kustani to Arkaluk

| | |
|------------------------------------|------------------------|
| distance Kustani – Arkaluk: | 602 kilometres |
| total travelling time: | 952 minutes (15h52 m) |
| number of stops: | 40 |
| total stoppage time: | 186 minutes (3h 06 m) |
| total running time: | 459 minutes (12h 46 m) |
| average trip speed: | 38 km/h |
| average running speed: | 47 km/h |

The following local trains are presently operated:

| Train number | from | to |
|--------------|-----------|------------|
| 604/603 | Uralsk | Akturbinsk |
| 606/605 | Karaganda | Balkhash |
| 607/608 | Karaganda | Karagaily |
| 610/609 | Karaganda | Zhezkazgan |



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| | | |
|---------|---------------|--------------|
| 611/612 | Cheliabinsk | Zhelygora |
| 616/618 | Kazalinsk | Turkestan |
| 620/619 | Balkhash | Aktogai |
| 621/622 | Kustanai | Arkaluk |
| 624/623 | Petroparlovsk | K- Borovoye |
| 625/626 | Akmola | Esil |
| 641/642 | Zashchita | Zyrianovsk |
| 653/654 | Emba | Sarakulskaya |
| 656/655 | Akmola | Aisary |
| 670/669 | Parlodar | Omsk |
| 673/674 | Barnaul | Zashchita |
| 675/676 | Akmola | Pavlodar |

9.10.2.4 Mail and Luggage Trains

The next category are the mail and luggage trains. These trains are long running trains that stop at every station. As the name indicates, their main purpose apart from providing passenger transport from smaller stations, they provide transport for mail and luggage services.

KTZ is presently operating the following mail and luggage trains:

| Train number | from | to |
|--------------|---------------|----------|
| 918/917 | Beneu | Kungrad |
| 922/921 | Moscow | Tashkent |
| 930/929 | Petropavlovsk | Tashkent |
| 941/942 | Novosibirsk | Tashkent |

Due to the numerous stops the trains have incredibly long travelling times. The concept of these trains is antiquated and should be replaced by a more modern one.

9.10.2.5 Mixed Trains

Mixed trains are a category that combines passenger and freight transport in the same train. KTZ is presently operating the following mixed trains:



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| Train number | from | to |
|--------------|--------------|-------------------|
| 952/951 | Kurgan | Presnogorkovskaya |
| 954/953 | Konstanai | Novolshimskaya |
| 958/957 | Taldy-Korgan | Kok – Su |
| 961/960 | Konenchnaya | Semipalatinsk |

9.10.2.6 Commuter trains

Commuter services are operated in the following areas:

- Kokshetau
- Akmola
- Pavlodar
- Karaganda
- Konstanai
- Zashelita
- Almaty
- Zhambi
- Shimkent
- Kzyl-Orda

What is called commuter traffic by KTZ, is actually a regional traffic with trip distances of up to 350 km, and a very low train density of 1 to 4 trains per day. All trains are locomotive hauled. Modern urban transport vehicles like EMUs and DMUs are not in use.

With a fast growing motorisation and improvements in regional bus services, the slow and rather uncomfortable commuter train services will eventually face growing competition by other transport modes. A number of second hand busses have already been brought in from Germany to upgrade the services provided by the country's bus network.

The biggest population centres in Kazakhstan are:

| | |
|-----------|-----------|
| Almaty | 1,147,000 |
| Karaganda | 613,000 |
| Shimkent | 410,000 |



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| | |
|-----------------|---------|
| Semey | 339,000 |
| Pavlodar | 337,000 |
| Ust-Kamenogorsk | 330,000 |

Akmola, the new established capital is rather small, but is supposed to increase population in the next few years.

To explain the nature of the commuter services provided by KTZ, we have selected Almaty and Akmola regions, which reflect the general commuter concept perfectly.

The details on Almaty region commuter traffic are:

| Between | Distance | Trains per day | T-sets needed | Travelling time |
|---------------------|----------|-----------------------|---------------|-----------------|
| Almaty – Otar | 123 km | 1 train per direction | 1 train set | 5 h 36 m |
| Almaty – Uzun Agach | 61 km | 1 train per direction | 1 train set | 3 h 10 m |
| Almaty – Sary Ozek | 121 km | 1 train per direction | 1 train set | 5 h 20 m |

In Akmola Region KTZ operates commuter traffic between the following destinations.

| Between | Distance | Trains per day | T-sets needed | Travelling time |
|----------------------|----------|------------------------|---------------|-----------------|
| Kokshetau - Ermintau | 344 km | 1 train per direction | 1 train set | 7 h 57 m |
| Akmola – Anar | 68 km | 1 train per direction | 1 train set | 1h 58 m |
| Akmola – Atbazar | 193 km | 1 train per direction | 1 train set | 3 h 59 m |
| Akmola – Boravoje | 183 km | 1 train per direction | 1 train set | 3 h 53 m |
| Akmola – Ak Kule | 86 km | 2 trains per direction | 3 train sets | 2 h 17 m |

Coach turnaround plans

It lies in the nature of KTZ's passenger services that a rather high number of coaches are needed to meet the needs of the timetable. The train runs are long, sometimes several days. The following example shows a typical example of a train turnaround:

Train pair No. 7/8, a branded train named „Rapid Kazakhstan“ operates between Almaty and Moscow on a daily basis. Following, we give the details of this train:

| | |
|--------------------------|----------|
| distance Almay – Moscow: | 4,062 km |
|--------------------------|----------|



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| | |
|-------------------------------|--|
| total travelling time: | Moscow – Almaty = 4,630 minutes (77 h10 m) Almaty – Moscow = 4,510 minutes (75 h10 m) |
| number of stops: | Moscow – Almaty = 46 Almaty – Moscow = 44 |
| total stoppage time: | Moscow – Almaty = 590 minutes (9h50m) Almaty – Moscow = 500 minutes (8h10m) |
| total running time: | Moscow – Almaty = 4,030 minutes (67h20m) Almaty – Moscow = 4,030 minutes (67h20m) |
| average trip speed: | Moscow – Almaty = 53 km/h Almaty – Moscow = 54 km/h |
| average running speed: | Moscow – Almaty = 60 km/h Almaty – Moscow = 60 km/h |

For the part of the distance on the KTZ network from Almaty to Uralsk the figures look as follows

| | |
|----------------------------------|---|
| distance Uralsk – Almaty: | 2,766 km |
| total travelling time: | Uralsk – Almaty = 3097 minutes(51h37m) Almaty – Uralsk = 2961 minutes (49h21m) |



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| | |
|-------------------------------|--|
| number of stops: | Uralsk – Almaty = 30 Almaty – Uralsk = 31 |
| total stoppage time: | Uralsk – Almaty = 316 minutes (5h16m) Almaty – Uralsk = 308 minutes (5h08m) |
| total running time: | Uralsk – Almaty = 2781 minutes (46h21m) Almaty – Uralsk = 2653 minutes (44h13m) |
| average trip speed: | Uralsk – Almaty = 53 km/h Almaty – Uralsk = 56 km/h |
| average running speed: | Uralsk – Almaty = 60 km/h Almaty – Uralsk = 62 km/h |

The turnaround plans for the coaches are very sophisticated and the coaches have high kilometre performance to all international standards. For our example train, 4 rakes of coaches are needed (see following sketch), which sums up to a total of 72 coaches. The average running performance is approximately 1,000 kilometres per day or 265,000 kilometres per year.

The train is composed in a way that the coaches Almaty – Moscow are always in the front part of the train. The coaches, which are added or removed en route, are added or removed at the back. The train composition is shown in the following table.

| Type of coach | Coach No. | from / to | seat/berth capacity |
|---------------|-----------|-----------------|---------------------|
| baggage | | Moscow – Almaty | |
| open seat | 1 | Moscow – Almaty | 54 seats |
| open seat | 2 | Moscow – Almaty | 54 seats |
| open seat | 3 | Moscow – Almaty | 54 seats |



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| | | | |
|--------------------------------|----|------------------------------|-------------------|
| open seat | 4 | Moscow – Almaty | 54 seats |
| open seat | 5 | Moscow – Almaty | 54 seats |
| open seat | 6 | Moscow – Almaty | 54 seats |
| compartment (4 berth) | 7 | Moscow – Almaty | 36 berth |
| compartment (4 berth) | 8 | Moscow – Almaty | 36 berth |
| restaurant car | | Moscow – Almaty | |
| compartment w. Radio (4 berth) | 9 | Moscow – Almaty | 22 berth |
| sleeper, luxury (2 berth) | 10 | Moscow – Almaty | 18 berths |
| compartment (4 berth) | 11 | Moscow – Almaty | 36 berths |
| compartment (4 berth) | 12 | Moscow – Almaty | 36 berths |
| compartment (4 berth) | 13 | Moscow – Almaty | 36 berths |
| compartment (4 berth) | 14 | Moscow – Almaty | 36 berths |
| compartment (4 berth) | 15 | Moscow – Almaty | 36 berths |
| compartment (4 berth) | 16 | Moscow – Almaty | 36 berths |
| compartment (4 berth) | 17 | Uralsk – Almaty | 36 berths |
| open seat | 18 | Uralsk – Almaty | 54 seats |
| open seat | 19 | Uralsk – Almaty | 54 seats |
| open seat | 20 | Mangylchlak – Almaty | 54 seats |
| compartment (4 berth) | 21 | Mangylchlak – Almaty | 36 berths |
| compartment (4 berth) | 22 | Atyraov – Almaty | 36 berths |
| open seat | 24 | Zhanatas – Almaty | 54 seats |
| open seat | 25 | Zhanatas – Almaty | 54 seats |
| | | total seat capacity: | 594 seats |
| | | total berth capacity: | 436 berths |



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| | | |
|--|------------------------|----------------------------|
| | total capacity: | 1030 passengers |
|--|------------------------|----------------------------|

9.10.3 Freight Traffic

In the freight sector all kinds of commodities are transported, especially coal, iron ore and other mineral products. Coal is amounting to around 40 % of the total traffic volume of around 180 million tonnes and 120 billion ton kilometres in 1996.

The Freight traffic is marshalled in a number of marshalling yards spread out over the network. KTZ distinguishes between three categories of marshalling yards:

- network marshalling yards
- district marshalling yards
- small formation and distribution yards

9.10.4 Numbers of trains per day in different line sections

The following tables show the trains that are scheduled in the present timetable. While all passenger trains are operated, not all freight trains are operated on a daily basis, due to lack of load.

A. Trains in Almaty division

| Line sections | | Freight Trains | | Passenger Trains | | Total |
|---------------|--------------|----------------|---------------|------------------|---------------|-------|
| | | even direction | odd direction | even direction | odd direction | |
| Almaty I | Almaty II | 5 | 5 | 21 | 20 | 51 |
| Druzbha | Aktogai | 5 | 5 | 1 | 1 | 12 |
| Ush-Tobe | Taldi-Koran | 2 | 2 | - | - | 4 |
| Ush-Tobe | Taldy-Tekely | 2 | 2 | - | - | 4 |
| Aktogai | Sary-Ozek | 15 | 16 | 10 | 10 | 51 |
| Sary-Ozek | Almaty | 20 | 16 | 10 | 10 | 56 |
| Almaty | Chu | 24 | 22 | 19 | 19 | 84 |

B. Freight trains in West Kazakhstan Railways

| Line sections | Freight Trains |
|---------------|----------------|
|---------------|----------------|



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| | | even direction | odd direction | Total |
|--------------|--------------|----------------|---------------|-------|
| Kandagach | Akturbinsk | 15 | 15 | 30 |
| Kandagach | Emba | 22 | 22 | 44 |
| Emba | Chelkar | 22 | 22 | 44 |
| Saksaulskaya | Chelkar | 19 | 19 | 38 |
| Kazalinsk | Saksaulskaya | 19 | 19 | 38 |
| Kazalinsk | Dzhusaly | 20 | 20 | 40 |
| Kzyl Orda | Dzhusaly | 20 | 20 | 40 |
| Kzyl Orda | Chiily | 21 | 21 | 42 |
| Chiily | Turkestan | 21 | 21 | 42 |

C. Trains in Dzambul Division

| Line sections | | Freight Trains | | Passenger Trains | | Total |
|---------------|----------|----------------|---------------|------------------|---------------|-------|
| | | even direction | odd direction | even direction | odd direction | |
| Chu | Mointy | 21 | 20 | 9 | 9 | 59 |
| Chu | Telkubas | 38 | 43 | 16 | 16 | 113 |
| Chu | Kemer | 23 | 21 | 19 | 19 | 82 |
| Zanatas | Dzhambul | 9 | 13 | 16 | 16 | 54 |

D. Trains in Shimkent Division

| Line sections | | Freight Trains | | Passenger Trains | | Total |
|---------------|-----------|----------------|---------------|------------------|---------------|-------|
| | | even direction | odd direction | even direction | odd direction | |
| Turkestan | Arys | 20 | 20 | 10 | 10 | 60 |
| Arys | Chengeldy | 14 | 14 | 20 | 18 | 66 |
| Shimkent | Chengeldy | 10 | 10 | - | - | 20 |
| Arys | Shimkent | 21 | 21 | 17 | 16 | 75 |



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Railway operations

| | | | | | | |
|-----------|-----------|----|----|----|----|----|
| Tiulkubas | Shimkent | 26 | 26 | 17 | 17 | 86 |
| Tiulkubas | Kazy-Kurt | 4 | 4 | - | - | 8 |
| Shimkent | Kazy-Kurt | 8 | 9 | - | - | 17 |
| Kazy-Kurt | Toguz | 8 | 8 | - | - | 16 |

No similar data have been provided for the other divisions.

9.11 Organisation and Staffing

In July 1997 a new KTZ organisation structure has been introduced. The various facets of railway operation functions are now located with the following departments:

- Passenger Department with traffic and operation
- Traffic department, with traffic planning and freight and commercial
- Technical Department, with Safety

A Deputy Director heads each department.

At the end of 1996 KTZ employed a total number of 126,937 staff of which 12,042 were working with the operation department, 7,565 with freight services and 3,940 with passenger services.

9.12 Proposals for Improved Efficiency in Railway Operation and Cost Reductions

Kazakhstan Railways have once been among the most efficient and busiest railways of the world. Now, with traffic volumes in both passenger and freight traffic dropped, the Railways are overstocked with assets and overstaffed with personnel. This causes unnecessary maintenance and staff costs. Numbers of stations and halts that allow crossings of trains, number and length of block sections exceed by far the needs of present and expected traffic volumes. This results in proposals for infrastructure adjustments.

KTZ is operating a safe railway, designed to transport large quantities of freight and high numbers of passengers. In a changed environment, after the independence of the Republic of Kazakhstan, KTZ has more or less continued previous operations on a low-key level. The existing oversized infrastructure has remained and has not been adapted to changed traffic conditions.

In addition, marketing structures have not yet been developed and the railway finds itself in a marketing environment, unfavourable of KTZ, namely in the field of passenger services.

Following, recommendations are made for the operation sector to overcome this situation.



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Railway operations

9.12.1 Problem areas identified

Problem areas that have been identified by the consultant are:

- over-dimensions and weaknesses of infrastructure
- too many stations
- too many tracks
- too many marshalling yards
- too many block sections
- container facilities not developed
- operation programme
- train speeds are too low
- trains are too long
- train runs do not meet the demands of the customers
- operation methods
- too many personnel involved
- utilisation of locomotives and locomotive crews is low
- no scheduling for freight services
- too much marshalling of freight trains
- concept of no block trains not consequently developed
- marketing concept
- dis-advantages for the railway in competing transport modes

9.12.2 List of recommended actions

The following list of recommended actions relates to operations, but also to organisational aspects. It is a list of proposed actions to be implemented in order to improve efficiency, productivity and performance of KTZ. The justification for each recommendation and a proposal for an approach is given below.



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Railway operations

| N° | Action definition | Who | When |
|----|--|-----|--------------|
| 1 | Increase the speed for both passenger and freight trains. This can be achieved in the first instance by reducing the number of speed restrictions. Provision has been made in the investment proposals to achieve this. | KTZ | ASAP |
| 2 | Less marshalling for freight trains and improved grouping system; closing of unnecessary marshalling yards. The introduction of more block trains will assist this process. | KTZ | ASAP |
| 3 | Re-schedule passenger services; introduce several train categories with different speeds and comfort standards. As the economy develops there will be a demand for shorter journey times and more comfortable trains. Competition from road transport will increase. | KTZ | ASAP |
| 4 | Improve locomotive and locomotive crew productivity. It will be necessary to remove restrictive practices which now exists such as locomotives being confined to limited distances from their home depot. It is recommended that one person operation of locomotives be introduced as soon as possible thereby getting substantial productivity gains in the driver area. | KTZ | ASAP |
| 5 | Give up technical inspections at wayside stations. Improvements in technology will allow for less technical inspections and better performance. | KTZ | ASAP |
| 6 | Identify the stations no longer needed for crossings and passing of trains and remove the switching points, the loop track, the signal and telecom installations. There is an urgent need for a study to be carried out to determine the minimum number of stations required to meet future business needs. The consultants suggest that a substantial number could be closed. | KTZ | next 5 years |

Railway operations

| | | | |
|----|---|--------------------|--------------|
| 7 | Review the track requirements of all remaining passing stations, marshalling yards and larger stations for what is actually needed and remove the access track | KTZ | next 5 years |
| 8 | Develop facilities to handle 20 and 40-foot containers. Future traffic trends will show an increase in the volume of container traffic and block trains and KTZ should now plan for this growth business. | KTZ | next 5 years |
| 9 | Transfer commuter services to local authorities. As these services are primarily for the benefit of the local community it is logical that the local authorities should at the very least pay for them. | KTZ, Government | next 5 years |
| 10 | Open the network to other operators; introduction of a train path management. The consultants recommend the setting up of an infrastructure division, which would allow for third party access to the railway thereby creating a competitive environment. | KTZ, Government | next 5 years |

9.12.3 Justification for recommendations

The justification for the recommendations are given in annex no 9.



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Railway infrastructure

10. Railway infrastructure

10.1 Introduction

The Mercer-Report prepared in May 1996 containing a chapter entitled "Operating and maintaining Kazakhstan's Railways under changing conditions" dealing with Infrastructure was reviewed. Discussions were held in Almaty Mr. Kazatov Ermek - Head of track Maintenance for KTZ and his deputy Mr. Shariphant, location visits were made to Almaty, Akmola and Aktubinsk - west Kazakhstan regions to assess track conditions and to see some works in progress. Due to the very large distances involved and the limited time scale, it was only possible to see representative track conditions at the locations visited.

10.2 Summary of main features of KTZ track

| | |
|----------------------------------|-----------|
| Route Km | 13,280 km |
| Track Km | |
| Main Track | 18,757 km |
| Passing | 928 km |
| Station of Yard Track | 7,557 km |
| Total track Km | 27,239 km |
| Double Track | 5,078 km |
| Electrified Lines Track Km | 5,836 km |
| Signal System Track km | |
| CTC Dispatch Controlled | 12,641 km |
| Station control and Lights Block | 2,906 km |
| Others | 2,692 km |



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Railway infrastructure

| | |
|---------------------------------------|-------------|
| Bridges | 3,946 No. |
| Culverts | 5,935 No. |
| Rails | |
| 75 kg/m | 850 km |
| 65 kg/m | 17,710 km |
| 50 kg/m | 4,473 km |
| 43 kg/m | 3,281 km |
| Continuous Welded rail | 4,734 km |
| Max. Axle load | 23.5 Tonnes |
| Gradient - generally flatter than 1 % | |
| Present speeds | |
| Passenger Trains | 60 -100 kph |
| Freight Trains | 60 - 90 kph |

10.2.1 Trackwork

Historically, rail traffic density in Kazakhstan was very high and the railways were maintained to a high standard with extensive double track, many passing sidings and loops, CTC Signalling and electrified lines with a high standards of safe operation. Since the break up of the Soviet System in 1990, freight traffic has fallen to one third of its previous level and passenger traffic has more or less stabilised. Due to financial constraints, the supply of materials for maintenance and renewal of the track have not been available, leading to reduction in train speeds which if allowed to continue will lead to the KTZ being less competitive.

10.2.1.1 Rails

About 90% of mainline track comprises R65 rail laid on timber and concrete sleepers with 20% of rails on concrete welded into 800 m lengths. About 832km of mainline track adjacent to Russia is laid with R75 rail. The remaining 5% of track in secondary lines, sidings and yards are laid with R43 and R50 rail.

10.2.1.2 Timber sleeper track

On timber sleeper track the rail is secured to steel baseplate by spikes driven into the sleeper on either side of the rail foot. The baseplate is in turn secured to the sleeper by separate spikes. A pilot hole 14 mm dia is predrilled in the sleeper before driving the 16 mm square spikes. Most timber sleeper track shows significant plate cutting into the timber, projecting spikes, splitting and decay of the wood. Timber sleeper track generally has rails of 25 m length with fishplated joints. The joints generally are well supported and are not dipped, although there is considerable rail end batter and chipped rail ends, which require welding repairs.



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10.2.1.3 Concrete sleeper track

On concrete sleeper track the rail is secured to the sleepers using the standard Russian KB fastening system which consists of a two hole cast steel baseplates secured to the sleeper by means of inverted T bolts, which fit into precast holes in the sleeper of varying cross section, enlarged at the extremity to receive the inverted T bolt. The bolt is then turned through 90 degrees to hold it in position, and secured by means of a spring washer hexagon top nut tightened down on the baseplate. The rail, in turn is fastened to the baseplate by means of inverted U clips and inverted T bolts which fit into split, cast in place housings on the baseplate, and screwed down with a hexagon top nut and spring washer.

The concrete sleepers are prestressed and cast on the long line system to Russian design and perform satisfactorily under load and shows no sign of structural failure.

10.2.1.4 Ballast

Track ballast used at present on KTZ is generally crushed granite, clean and well graded in the lower sieve sizes, placed and compacted to proper profile. With the passage of time however and with spillage from traffic, plus spillage of oil from locomotives, the stone ballast becomes polluted and about 4000 km of track ballast has a pollution level greater than 20%. On the main line tracks radiating east and carrying the heaviest traffic west and north of Akmola, asbestos waste has been used as track ballast. This asbestos material, when well laid and compacted to proper profiles forms a very adequate supporting medium for the track, but can only be maintained by manual means.

10.2.1.5 Formation

The Railway track is built on a shallow embankment in generally good formation conditions and no signs of pumping joints or other failures were evident at the locations visited. Access to the railway is generally available by road vehicles.

10.3 Present track maintenance and track renewal practices in KTZ

10.3.1 Track maintenance

Current track maintenance on a day to day basis is 93% by manual means, and 7% with mechanised equipment. A maintenance foreman responsible for about 10 km of track supervises a gang of 5 to 7 people reporting to a Track master who is responsible for about 50-70km and 5 to 7 gangs. The gangs are equipped with an electrical generator and electric hand tools including saws, drills and hand tampers. Vehicles are available for transport, usually consisting of trucks, tractors and trailers in rather poor condition, A shortage of replacements means that many defective sleepers and other track materials remain in the track.



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10.3.2 Track renewals

Great reliance is placed by KTZ in the Russian system of Intermediate Maintenance and Heavy maintenance and generally there is little replacement of track materials between these cycles. Heavy maintenance, which is effectively total renewal of the track and ballast, occurs in R 65-rail track after the passage of 750 million gross tonnes. Two to three intermediate maintenance operations are carried out on the track between renewals consisting of replacement of 30% to 50% of defective materials together with ballast cleaning and ballast renewal. These works are carried out with manpower and equipment from the main track renewal depots in the region.

Track renewal or Heavy maintenance is carried out with two self propelled gantry cranes the sequence of operations being as follows:

- Lift out old track panels and place on wagons by leading gantry crane.
- Plough out ballast to side of embankment by two bulldozers.
- Grade formation by mechanised grader.
- Lay new track panels with second gantry crane.
- Joint up and secure fishplates
- Place stone ballast with hopper wagons on first pass
- Lift and vibrate track and ballast with large VPO machine
- Place stone ballast in second pass, lift and vibrate again as necessary with VPO machine
- Final tamping with a 07 or 08 type Plasser tamping machine.

The work is carried out in a 5 to 7-hour possession period and involves about 130 to 150 people on site. After an interval to allow the track to consolidate under the passage of traffic, long welded rail in 800 m. lengths is introduced as a separate operation.

10.4 Track condition

In general track alignment and longitudinal level at most of the locations visited was reasonably satisfactory taking account of the fact that maintenance is by manual means. Joints are well supported and packed and there is little evidence of dipped joints. There is however substantial damage and chipping to rail ends at joints which could be repaired by welding. In timber sleeper track, many sleepers are decayed, spikes are loose or projecting so that they are ineffective, and there appears to be no programme of routine repairing or replacement of sleepers. Shortage of replacement material due to financial constraints is the most frequent complaint of supervisors both for plain track and for switch and crossing work in yards. The life of the existing material in switches and crossings could be extended by welding build up and by better maintenance.



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In concrete sleeper track, the KB fastening system already described gives rise to almost continuous maintenance and bolt and nut tightening. Being a rigid fastening system the forces and loads from the rails are transmitted directly to the baseplate, leading to loosening of the securing T bolt. The rubber pad under the baseplate is a rather weak material and under heavy traffic it fails, and does not provide any resilience. The rigid fastening system does not provide the same restraint to longitudinal rail movement as experienced with elastic clips.

There is considerable side wear on railheads in curves and in switches and crossings in yards and there is no efficient rail lubrication units provided either locally or in the locomotives.

Insulated joints are of an old out of date type having heavy paper inserts and give rise to the need for constant maintenance and should be replaced with proper glued joints. Such glued joints can be manufactured in rail welding depots to a good standard in factory conditions.

10.5 Track components

10.5.1 Rails

The R65 and R50 rails are satisfactory and can be expected to continue in service for their full life.

10.5.2 Concrete sleepers

The concrete sleepers are structurally sound and in properly maintained conditions will give a life exceeding 50 years.

10.5.2.1 Concrete sleeper baseplates and fittings

The baseplates are satisfactory; the sleeper T head bolt securing the baseplate can become loose and subject to heavy corrosion. A continuing programme of replacing these bolts and keeping the nuts tight as routine maintenance should be pursued by KTZ maintenance staff.

The rubber pad under the baseplate is ribbed and is of a rather soft quality. With loose base plates and bolts the pad is squashed and forced off the sleeper face. The use of a heavier quality of rubber for pads needs to be investigated and put on trial. Replacing damaged rubber pads needs to be actively pursued as a routine maintenance activity.

10.5.2.2 Rail fastenings

The KB fastening securing the rail foot to the concrete sleeper baseplate is adequate, but being a non-elastic clip is subject to considerable pressure and loosening of the securing nut. When the fastening becomes loose the traffic forces are more easily transferred to other components and loose baseplates and T head bolts arise, allowing pads to be extruded. The KB fastening needs regular tightening and is therefore very costly to maintain over long periods.

The pad under the rail foot is a better quality material than that under the baseplate and will not give rise to any problems if the fastenings are well maintained.



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10.5.2.3 Alternative rail fastening for concrete sleepers

Vossloh Werke have successfully developed an elastic clip which combined with the provision of a bolt having a square section can be applied with the KTZ baseplate, and this has been tested out successfully in the Baltic States. The use of such a clip on concrete sleeper track generally, or indeed even on curves where highest forces occur would reduce maintenance considerably and allow full CWR conditions to apply. The cost of the assembly is about \$13 US per sleeper and based on 1854 per Km the cost per Km is \$24,102 US.

10.5.2.4 Timber sleepers

The quality of the timber sleepers seen during the visits to the various locations did not appear to be very good, and they appeared to be poorly creosoted, and there appeared to be little penetration of the creosote preservative. The reason for this may be that they are probably not properly dried prior to preservative treatment and the moisture content is too high and accordingly even in vacuum conditions the absorption of creosote is very low. Further more the pinewood is soft and in poorly maintained track conditions the sleeper baseplate cuts into the timber.

Replacement timber sleepers appear not to have a pilot hole drilled in the sleepers to accommodate the driving of the securing spike, and accordingly the sleeper splits in several places allowing repeated wetting and drying of the timber setting up decay conditions. Tighter control on the quality of the timber sleepers at the purchasing stage would pay some dividends.

10.5.3 Points and crossings

The long timbers in points and crossings work have the same difficulty and problems as the timber sleepers.

The steelwork in point and crossings is adequate, although it was noted that the crossing nose was subject to severe wear in some cases arising from excessive wear on the wing rail running surface. The switch design is good and apart from side wear, no other defect arises.

It was noted during the visit to Atbasar in the Akmola region that KTZ had newly installed 1:in 11 Turnout Units on concrete bearers, and these look to be well designed, and will give a good life in service. The KB fastening continues to be used in these units, and it is strongly recommended that KTZ introduce the Vossloh Werke clip as standard on these units, so that they can then be welded into CWR track.

10.5.4 Track ballast

The quality of the track ballast seen on inspection visits was very variable; extending from gravel ballast heavily polluted to good quality clean crushed stone. It is important that a good specification for track ballast be developed by KTZ and that careful investigation is carried out to get a source or sources of hard wearing stone such as granite with a low wet attrition value, for best performance under concrete sleepers. The crushed stone ballast should be angular, with all dimensions nearly equal, graded in size, with test values, such as aggregate crushing value (ACV) of 30% max. with wet attrition value of 7% max.. A typical grading specification



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requires the ballast to consist of a mixture of sizes, mainly between 50mm and 28mm such as shown in the following table:

| Square sieve | %age passing |
|--------------|--------------|
| 63mm | 100 |
| 50mm | 97/100 |
| 28mm | 0/20 |
| 14mm | 0 |

10.5.5 Glued block joints

The glued block joints seen in Continuously Welded Rail (CWR) and insulated joints generally are poor and makeshift. It is strongly recommended that KTZ investigate and adopt a reliable glued joint of proprietary manufacture, such as the Permalin Edilon used by Railtrack in the UK or the Elektro Thermit MT joint used by the Irish Railways. It is also recommended that glued joints be preassembled in workshop/ factory conditions in a rail length of about 9m, which is then cut in and welded into CWR track. The approximate cost of such a proprietary joint is about 450DM, but its high cost will pay handsome dividends in durability and reliability in service.

10.5.6 Rail flange lubrication equipment

On the curved track of the KTZ system significant side wear of the rail head occurs, resulting in the need to change rails in curves frequently, and the premature life expiry of the rail. KTZ do not have equipment for rail flange lubrication and it is strongly recommended that they investigate what type of equipment is available on the market, and acquire a suitable lubrication system.

In the past many railway engineers dealt with this problem by acquiring locally fitted lubricant ejectors of proprietary manufacture on the high leg of straight track just ahead of the curve entry or tangent point. The activation of a plunger on the equipment by the passage of the train wheel ejects the lubricant on to the wheel flange and it is carried over the length of the curve depositing a film of lubricant on the running edge of the rail head. While this type of equipment is successful in many locations, it is however difficult to maintain and accordingly its reliability suffers, and eventually falls into disuse, and it is felt that it would not be provide a suitable for a system so geographically as the KTZ system.

The Consultants recommendation in respect of rail flange lubrication on curves on the KTZ system is to adopt recently developed Locomotive mounted equipment in which lubricant is delivered through air pressurisation of the lubricant reservoir via a feed line to a dosing pump. The dosing pump is designed to discharge a clearly defined lubricant quantity to the spray nozzle assembly, which applies it to the proper area of the wheel flange. The system has been developed and is marketed by ' De Limon Fluhme GMBH, 4011 Dusseldorf, Postfach 102052 40227 Germany. A most recent development on the system is the use of a proven storage electronic programmable controller enabling:

- Tangent track-dependant control of pump



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- Time dependant control of pump
- Curve dependant control of pump.

The equipment has been operational in Ireland on the Irish Railways and has proven to be very effective.

10.6 Level crossings

The surface of Public Road level crossings leaves a lot to be desired. A programme of surface improvement works should be in KTZ's annual programme to provide patent precast concrete or rubberised units on an on going basis to make the crossings more safe and to reduce the maintenance of road surfacing.

10.7 Track recording and ultra sonic inspection

Track geometry measuring coaches towed by locomotive are run over the track system on a monthly basis, but these units are old and out of date, and fall far short of the information given by modern track recording cars. There is extensive use of ultrasonic rail inspection units operated by two man teams and pushed manually over each rail. Heavy rail inspection cars operating at 50 kph using both ultra sound and induction techniques are run over the track on a monthly basis. It is probable that the rails are over inspected for the present level of traffic, as inspection cycles can be increased if no flaws are detected

10.8 Present organisation of track maintenance

The organisation structure of track maintenance is set out in the diagrams and charts included as Annex No 10 to this report. KTZ is divided into 6 regions, each region being divided into 61 sections for maintenance, 24 depots for track renewal and works, 4 machine depots, 3 welding depots, 2 stone ballast quarries, and 11 snow protection districts. The maintenance sections are further subdivided into trackmasters length of between 50 to 70km with 5 to 7 brigades or gangs covering between 5 and 10km supervised by a track foreman.

In the Ak-mola Railway and railways in the northern areas of Kazakhstan the winters are extremely severe with high winds and heavy snow drifts, and the railway has established special work groups to provide protective tree planting on each side of the track, to reduce the effects of drifting snows in high winds. Snow ploughing and snow disposal equipment figures very highly in maintaining the railway in these regions in winter conditions.

10.9 Proposed track maintenance manning levels

Consequent on the introduction of mechanised track maintenance with the purchase of tamping / lining machines, ballast regulators, ballast cleaners, sleeper inserters, powered tools, improved transport facilities for men and materials, combined with upgraded track in continuously welded rail conditions, it will be possible to undertake staff reductions on a phased basis over a period of five years. In the interim period between the present time and the completion of investment in mechanised maintenance equipment, it is highly



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recommended that KTZ embark on the intensive maintenance programme already outlined. This work consists of replacing defective materials, plan patching of timber sleeper track, where all defective sleepers, baseplates and spikes will be marked in advance, replacement material delivered, and amalgamated manpower from the existing gangs and the track relaying depots assembled to execute the work.

10.10 Staff reductions - remanning

The first step in any planned reduction of staff in the track maintenance area is to put a ban on the recruitment of new staff, and replacement staff who retire due to age, illness, or disability. This procedure alone can be quite effective in reducing staff over a five year period and depending on the age profile of track maintenance staff in service, a reduction of at least 25% can be expected.

The next step is to plan the staff reductions that will follow mechanisation of track maintenance. The best way of doing this is to establish from the payroll and cost allocation over the most recent two years the amount of hours undertaken annually to carry out the basic activities by manual means of:

- Track packing and lifting
- Track aligning and slewing
- Ballast cleaning and profiling
- Repair of joints
- Repair of fastenings
- Weeding
- Drainage
- Track inspection, gauging and examination of defects
- Replacing fishplates
- Replacing sleepers
- Changing defective rails

Against the annual hours expended on these activities, an assessment can now be made of the savings in hours arising from the introduction of mechanised, maintenance equipment, based on the outputs of machines already discussed in paragraphs 3, 4, and 6. This is the process on which most West European and North American railway administrations have introduced their mechanisation, and have proven to be satisfactory.

Combined with full mechanisation, backed up by 8 man mobile gangs equipped with proper transport, power tools consisting of rail saws, drills, powered spanners, portable tamping



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units, the following typical manning organisation should be possible as a first stage of remanning on KTZ :

10.10.1 Single track

- Mobile gang of 8 men to cover 32 to 36 km
- Track patrol 5 men to cover 32 to 36km

10.10.2 Double track

- Mobile gang of 8 men to cover 18 to 20 km
- Track patrol 5 men to cover 18 to 20km

In the first phase of the remanning, it is not proposed to make any change in the boundaries of the Track Districts, which average about 200 route km, but to fit the new mobile gang lengths within the existing boundaries. Each Track District should have one or two Trackmasters as required, to co-ordinate the activities of the Trackmasters, and each Trackmaster should supervise two Mobile Gangs.

The following examples give an indication of what can be achieved:

KAZAKHSTAN TRACK DISTRICT NO. 2 WEST KAZAKHSTAN RAILWAY

Length = 164km Total staff at present =236 Single Track

| Staff | Present | Proposed |
|----------------------|--------------------|------------|
| Senior Track Masters | 0 | 1 |
| Track Masters | 8 | 2 |
| Track Foremen | 16 | 5 |
| Trackmen | 117 | 40 |
| Track Patrol | 50 | 25 |
| Defectoscope | 25 | 12 |
| Others | 20 | 20 |
| Total | 236 | 105 |
| Saving | 131 = 55.5% | |



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SARY SHAGAN TRACK DISTRICT NO. 26 ALMATY RAILWAY

Length = 178km Present staff =435 Double Track

| Staff | Present | Proposed |
|----------------------|------------------|------------|
| Senior Track Masters | 0 | 1 |
| Track Masters | 18 | 5 |
| Track Foremen | 53 | 10 |
| Trackmen | 237 | 80 |
| Track Patrol | 75 | 50 |
| Defectoscope | 23 | 12 |
| Others | 29 | 25 |
| Total | 435 | 183 |
| Saving | 252 = 58% | |

DZHALTYR TRACK DISTRICTS NO. 19 AKMOLA RAILWAY

Length=170 km Total Staff = 516 Double Track

| Staff | Present | Proposed |
|----------------------|---------|----------|
| Senior Track Masters | | 2 |
| Track Masters | 14 | 5 |
| Track Foremen | 41 | 10 |
| Trackmen | 266 | 80 |
| Track Patrol | 100 | 50 |
| Defectoscope | 28 | 18 |



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| | | |
|---------------|------------------|------------|
| Others | 67 | 45 |
| Total | 516 | 210 |
| Saving | 306 = 59% | |

The three examples taken give an indication of the possible reduction in track maintenance staff, and can be regarded as a long-term target for KTZ. The calculation of the manning will of course have to be carried out in a much more scientific manner than that outlined above and allowance will have to be made for local features and conditions and the quality of the track materials.

Provision in the manning levels will have to be made for trackage at stations and in yards, although it is envisaged that many stations will be closed entirely, and trackage removed. Similarly major rationalisation of yards will lead to significant reduction in trackage and the removal and recovery of track material.

Provision will also have to be made for the mechanised maintenance staff who will operate and maintain the mechanised maintenance fleet. In the above assessment account has not been taken of level crossing attendance personnel, and here again there is the possibility of reduction in their numbers, since most of the major crossings are already automated.

10.11 Rationalisation of staff at track relaying depots

In the same way as the track maintenance staff in the Districts will be critically examined as to how they can be reduced and made to operate more efficiently, it is necessary for KTZ to look at the organisation of the 3162 staff in the track relaying depots as to how their productivity can be increased. While the timescale of the project did not permit the Consultant to examine these depots closely, it did appear that the depots could play a greater role in providing the nucleus in both machines and manpower in carrying out track upgrading with second hand material, plan patching of timber sleepers, and other intensive maintenance activities. The depots generally have up to and over 150 people available and these people could be broken down into smaller groups to work with specialised machines in association with the track maintenance staff in the Districts on a variety of activities in the initial stages of, and in preparation for full mechanisation.

10.12 Management of a modern mechanised track maintenance system

With the introduction of a modern fleet of track maintenance machines in KTZ, consideration will need to be given to the organisation and management of the fleet in conjunction with the new manning levels involved. In each of the Railway Regions a Senior Engineer will co-ordinate and programme the tamping / lining machines allocation to the Regions.

The work output of the machines will be planned on the information on track conditions provided by the Track Recording car, which will be required to run the KTZ main line system



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at least twice annually. Target track standards will need to be set up and specified for each main line of the system, depending on the density and speed of freight traffic, and the line speed required for passenger trains.

Since the output from the Track Recording car can be digitised, the information it produces can be combined with the information on track components and track condition in each km of line, to back up the introduction of a Computer based track management information system. All of this MIS will enable machines to be directed to the track locations, where conditions are suitable for their operation, and where they can be most effective. Since machines are expensive in first cost, it is essential that they operate on a continuous basis and should at least be operated on two 8 hour shifts over 24 hours. Regular planned docking of the machines for repair and overhaul will need to be built into the annual programme.

It is recommended that key personnel who will be involved in the management of mechanised maintenance from each region get the opportunity to visit other railways who have successfully introduced, and are operating a modern system, so that they can absorb the philosophy, and get hands on experience of best practices.

10.13 Crew selection and training

Modern tamping/lining machines have become very sophisticated and carry extensive computer and electronic equipment for measuring, lifting and aligning track. Accordingly crews should be selected with care, and should be taken preferably from middle twenties to forty age group, and should have a familiarity with modern electronic equipment. Initial training will be given by the equipment supplier and this requirement should be built into the tender documents, and it will be beneficial to specify that supplier provides facilities for annual refresher courses. Shop fitters and electricians who carry out the workshop overhaul and maintenance of these machines, will also need specialised training, which is best provided at the suppliers works preferably during the construction of the new machine fleet.

10.14 Proposed track maintenance and track renewal strategy.

Since the rails concrete sleepers, crushed stone ballast and formation on the KTZ, are well designed and adequate for the present speeds and axle loads on the KTZ system, every effort should be made to extend the life in service of these materials in the track and to re-use rails and other serviceable material arising from the closure of lines, singling of lines and rationalisation of station layouts. The process of total renewal of track with new expensive materials should cease and be replaced by a process of renewing track with second hand reconditioned rails and sleepers where available in serviceable condition.

Allied to this strategy KTZ should embark on a planned programme of intensive maintenance of in track materials on a system wide basis to improve the performance of the existing track. Such intensive maintenance will consist of plan patching timber sleepers, overhaul of fastening components in concrete sleepers, repair and welding build up on switches and crossing nose and wing rails, patching in crossing timber in turn out and crossover connections, overhaul and replacement of insulated joints with glued joints.



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It has been estimated that closure of lines, singling of track, removal of loops and station layout rationalisation will produce enough reusable track material to satisfy the KTZ needs for eight to ten years and yield enough switch and crossing components for twenty years. This premise is not however accepted by KTZ, who are reluctant to see any track reduction of their route system, other than rationalisation of stations and yards. KTZ do however accept that a longer life span can be got from the existing rails than has been theoretically possible under the passed tonnage directive formerly used, particularly when reconditioning, cropping and welding of serviceable rails is available, and this will help in reducing the demand for new rails in the next 5 years.

KTZ should accordingly plan and programme the recovery of this reusable material in conjunction with the track renewal need, using the track panel depot equipment in lifting the track, its disassembly, reconditioning and reassemble for track renewal. Recovered serviceable rails, should be classified, sent to welding depot for cropping and welding, rail head reprofiling and welding into 800m lengths, for subsequent rerailing in the track by the Track Panel depot teams.

In the densely trafficked lines East, West and North of Akmola having asbestos waste ballast and timber sleepers, KTZ should plan to phase out timber sleepers as they become life expired and renew track with reconditioned rail and new concrete sleepers, while at the same time ploughing out the asbestos waste ballast and lay new granite ballast, to full ballast profile for CWR conditions.

KTZ should generally adopt the policy of extensive rail welding and the elimination of joints in all track work carried out with reconditioned materials on a programmed basis.

Regular and progressive ballast cleaning and ballast renewal should be carried out by KTZ in all areas where ballast pollution is greater than 20% and particularly in station and yard areas where locomotives are standing. More attention should be paid to keeping drains open and to making new drainage in station and yard areas.

KTZ should introduce as soon as possible a system of mechanised maintenance with tamping/lining machines, ballast regulators, sleeper inserters, backed up by 8 man mobile gangs equipped with modern powered tools and a suitable vehicle.

KTZ should endeavour to equip all their mainline track locomotives with on board rail flange lubrication equipment to reduce the amount of side wear on rails in curves. KTZ should consider the provision of the Vossloh Werke elastic epsilon clip fastening on the KB baseplate in conjunction with all work involving reconditioned concrete sleepers. This fastening has been laid on test in both plain track and curves in the Baltic States and is performing very satisfactorily.

KTZ should introduce the standard Vossloh Werke, Pandrol, or Nabla elastic clip fastening on all concrete sleepers manufactured in Kazakhstan.

KTZ needs to draw up a new set of Kazakhstan standards and guidance instructions for all their track maintenance staff and these standards should not be a redraft of the old Soviet standards, but should be based on more modern and commercially minded railways.

KTZ should ensure that sufficient members of its key track maintenance staff get an opportunity to spend periods with a suitable west European or American railway administration so that they can gain experience of modern mechanised system of track maintenance.



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10.15 Equipment

Since 93% of present track maintenance in KTZ is by manual means, the equipment for track maintenance is limited to 4 to 5 machines for lifting and aligning track and for tamping. These machines are manufactured under license from Plasser and Theurer, but generally have a low annual output and are subject to frequent breakdown. Effectively therefore all packing and aligning of the track has to be done by the existing gangs with the limited tools at their disposal and with heavy concrete sleeper track very little packing and aligning can be attempted.

On the other hand the track Panel Relaying Depots are very well equipped and at the Depot visited at Sorokovaya the following was noted:

- Workshop with pits for repair of vehicles and on track machines fully equipped line with twin overhead gantries for fabrication of timber sleeper and concrete sleeper panels.
- Hydraulic equipment for spike driving and electric equipment for nut screwing.
- Automatic sleeper treatment machine for drilling and preparing sleepers securing baseplates and spike driving when making timber sleeper panels.
- Equipment for disassembly of track panels.
- Equipment for reconditioning track panels.
- Full range of heavy equipment for track renewals including the following:
 - Two on track cantilever gantry cranes for panel laying.
 - Small Bulldozer for squaring rail joints.
 - Grading machine for levelling and grading formation
 - Range of wagons for new and old panels
 - Ballast hopper train of 20 wagons
 - Three locomotives
 - VPO machine for lifting and vibrating track to consolidate ballast.
 - Full range of snow blowing equipment including Blowers, wagons loaders and snow ploughs.
 - Range of small electric power tools
 - Electric Generator and tractor for mobile welding.

In summary the track panel Depots are very well equipped by any standard. In addition KTZ has available a range of self powered on track cranes which can carry points and crossing



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components, sleepers and other materials and distribute them along the track. KTZ also have personnel carriers and small inspection cars, which can run at line speed.

10.15.1 Workshop for repair of track machines

The main workshop for the repair of track machines is located at Almaty No. 1 station. The workshop is very large, and is equipped with very heavy overhaul equipment for dealing with snow ploughing, and snow blowing machines, the heavy track panel laying machines, the large earthmoving machines and all on track machines on the KTZ system. The workshop is presently under the control and supervision of the Almaty Railway Region, but it is proposed to transfer it to the KTZ headquarters track management division shortly. About 100 large diesel engines are totally overhauled there annually, and the staff of the workshop totals 77 people. The workshop is well equipped with lifting gear and overhead gantries, and has a fine machine shop. This workshop can be modified further to cater for the maintenance and repair of the proposed new mechanised track maintenance fleet of machines.

10.15.2 Rail welding depots

There are three main rail-welding plants in Kazakhstan, none of which were seen by the infrastructure expert due to the time and distance situation. The plant at Borovoe is the oldest having been built in 1970, and is understood to be in reasonable condition, and has adequate equipment to produce good welds. The plant at Dzhusaly on the Turkestan Railway was built in 1974 and is stated to be in satisfactory condition. The plant at Lugovaya near Chu on the Almaty Railway was built in 1988 and is in good condition.

10.15.3 Concrete sleeper manufacturing equipment

There are three major concrete sleeper-manufacturing plants in Kazakhstan, two of which were visited by the Consultant.

The plant at Aktyubinsk is situated in the industrial zone of the city, and was closed at the time of the visit. The Consultant however met the Chief Engineer and the Technical Manager, and it was explained that the factory has now been taken over by a private company who are planning to carry out an upgrade of the plant and machinery to improve the technical aspects of the production, and are making a major investment in the project. The design for the upgrade of the factory were drawn up by the Moscow Institute, and in so far as could be ascertained did not provide for any significant change in the sleeper design or the fastening system.

The old casting lines were on the long line system, with eight casting lines very highly automated, well-equipped with stressing wire handling machines, and hydraulic stressing jacks. The present staff was not aware of the annual output of the factory, but the Consultant estimates that it could have been between 750,000, and 1,000,000 units. Adjacent to the factory there was a manufacturing facility for the production of sleeper moulds and for the repair of all of the factory equipment and machinery. The new owners of the factory intend to sell their product to KTZ and to neighbouring Railways.

The concrete sleeper factory in the Akmola Railway is located at Vishnyovka, and was built in 1980, and is understood to be in satisfactory condition.



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The concrete sleeper factory at Almaty is located near Almaty 1 station, and has been privatised since 1995. The factory is modern, fully mechanised in all activities, has two casting and stressing lines, and has the capability to produce up to one million units annually. The cement, aggregate, sand and concrete making is fully automated, and sleepers after casting are steam cured. Present manufacture is based on the KB fastening system, but negotiations are ongoing with European suppliers to adopt a modern elastic fastening of the Vossloh Werke or Pandrol type.

10.16 Investment in infrastructure

A programme of investment in Infrastructure has been agreed between KTZ and the EBRD to cover the following items:

| Description | Amount million \$ |
|---|----------------------|
| 1. Track materials to eliminate speed restrictions | 15 |
| 2. Purchase of 600,000 sleeper sets of elastic clips and fastening system for concrete sleepers | 5 |
| 3. Provision of mechanised track maintenance equipment consisting of: | 78.5 |
| 20 High capacity Tamping/Lining machines @ \$ 2m | |
| 10 Ballast Regulators @ \$ 1m | |
| 20 Sleeper Inserters @ \$ 0.5m | |
| 6 Hi Rail vehicles with tools and radio @ \$ 0.5m | |
| 10 Transport vehicles @ \$ 0.5m | |
| 1200 Power tools - complete range @ \$ 8,500 | |
| 4. 2 Ballast cleaning machines @ \$ 2m | 4.0 |
| 5. 1 Rail grinding train | 4.0 |
| 6. 1 track recording car | 2.5 |
| 7. Rail rehabilitation equipment | 8.0 |
| Total: Investment in Infrastructure | 117.0 |
| 8. KTZ Project to complete the electrification of Almaty / Otar | 14.0 |



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1. There are more than 300 speed restrictions between Balqash and Karaganda on the electrified mainline, between Aktogay and Semey on the East line and between Bejneau and Aqtau on the West line. In addition there are 50 restrictions over bridges.

The elimination of those speed restrictions by replacing defective track materials is estimated to cost \$ 15.

2. KTZ up to the present continue to use the Russian KB fastening system and baseplate in their new concrete sleepers. It is now proposed to introduce modern West European type elastic fastenings in any new concrete sleepers manufactured in future, and 5 million USD is being provided for an initial purchase of 600,000 sets.
3. Since 93% of current track maintenance is by manual means, there is an immediate need to introduce modern mechanised maintenance systems in KTZ. Based in 13000 track km of main line and tamping 60% of track every two years, a work load of 4000km per year is established. Taking an output of 200 km/year for modern tamping/lining machines and taking account of a working year of 6 to 9 months depending on location, an estimated 20 machines are required. It is commonly established practice, that 1 ballast regulator will service two tamping machines, so that there is a requirement for 10 ballast regulators.

The replacement of defective timber and concrete sleepers in conjunction with routine day to day maintenance is important and can be substantially mechanised by the use of sleeper inserting machines which eliminate the manual handling of timber and concrete sleepers and achieve high production. This work can be organised on a production line basis with sleeper inserters working in tandem with ballast regulators and tamping/lining machines, or alternatively the work can be organised at local level by allocating sleeper inserters to locally amalgamated gangs.

Mobile repair workshops to keep the mechanised fleet in good running order and avoiding frequent and unnecessary docking, of machines will be needed, and provision is made for 6 vehicles costing \$3m. Material and personnel transports, which can be off tracked on site, will be required and provision is made for 10 vehicles at a cost of 5m.

KTZ Track Maintenance staff has little on no power tools and it is intended to commence equipping the work gangs by purchasing the followings

200 Rail Saws

200 Rail Drills

200 Rail End straightening units

200 Powered fastening/ fishbolt spanners

200 Sleeper drills

200 Rail changing units

1200Units @ average \$8,500 = \$ 10m



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4. Two Ballast Cleaning machines are provided for at a cost of \$4m to develop a programme of undercutting and cleaning crushed stone ballast where it has a pollution level greater than 20%. This equipment can if required be made available to remove asbestos waste ballast where this is desirable.
5. Experience in Europe, the USA and Australia have shown that rail grinding in situ and reprofiling the rail head can prolong rail life and reduce wheel wear of wagons. Provision is made for the purchase of a rail grinding train to suit KTZ conditions, at a cost of \$4m.
6. The present track recording cars used by KTZ are old, troublesome and out of date. It is proposed to purchase a modern track recording car to run the KTZ system twice annually, provide all parameters of track information and condition in graphical or digital form. A suitable type machine is the Plasser and Theurer EM 120, which costs \$ 2.5m.
7. KTZ have now adopted the policy of recovering redundant track materials, reconditioning the rails, cropping rail ends and welding into long strings, thus saving on the purchase of new rail. The purchase of modern high capacity rail rehabilitation equipment is estimated to cost \$8m.
8. The railway north and East of Chu to Otar is electrified. There is a strong case to extend the electrification from Otar on to Almaty, a distance of 100 km, and the estimated cost is \$ 14.

It will be necessary to carry out an economic and financial analysis of the project to evaluate the justification-see chapter 14.

10.17 Track renewal costs

The total cost of renewal of 1km of track in KTZ is set out in the following table:

COST of 1km. Of TRACK RENEWAL

| Description | Track in R65 panels with Concrete sleepers | Track with Continuously welded rails | Total cost |
|----------------------------------|--|--------------------------------------|-------------------------|
| Total cost | 13 660 607 tenge | 9 616 973 tenge | 23 277 580 tenge |
| Including | | | |
| Salaries/ wages | 57 291 tenge | 16 892 tenge | 74 183 tenge |
| Materials | 8 962 777 tenge | 7 634 396 tenge | 16 597 173 tenge |
| Machines & Mechanisms | 36 876 tenge | 15 350 tenge | 52 226 tenge |
| Social security | 17 976 tenge | 5 866 tenge | 23 842 tenge |
| Employment Fund | 1 198 tenge | 391 tenge | 1 589 tenge |



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| Description | Track in R65 panels with Concrete sleepers | Track with Continuously welded rails | Total cost |
|------------------------------|--|--------------------------------------|-------------------------|
| Total direct cost | 9 076 118 tenge | 7 672 895 tenge | 16 749 013 tenge |
| Overheads | 3 989 884 tenge | 1 803 130 tenge | 5 793 014 tenge |
| Other expenses | 516 557 tenge | 93 102 tenge | 609 659 tenge |
| Project research work | 10 085 tenge | | 10 085 tenge |
| Contingencies | 67 963 tenge | 47 864 tenge | 115 809 tenge |
| Labour cost | 2 586 | 810 | 3396 |
| | | | |

The costs/km amounts to \$310,367 US and includes all material, labour, direct manufacturing costs, salaries, social service charges, overheads and contingencies. This compares well with costs of £283,000 per mile for similar work in Irish Railways.

Basic concrete sleepers are priced at 2,100 tenge or \$28 US each and costed for 1854 No. per km at 3,893,400 tenge or \$51,912 US.

Sleeper associated materials (baseplates, rubber pads, nuts, bolts, washers, insulators, clips and dowels etc.) amount to 4,474,594 tenge or \$59,661 US.

Broken stone ballast is provided for at 1232 cubic metres per km and at unit cost of 270 tenge or \$3.6 US, which seems to be inadequate to provide the type of good clean well graded granite ballast or similar required in a modern railway. Transport costs for stone ballast amount to 262,143 tenge or \$3,495 US per km, which is about right. The provision of 850 tenge or \$11.3 US for insulated joints per km is in itself an indication of the poor quality of these joints.

R65 rails are priced at 58,300 tenge or \$777 US per tonne amounting to 7,902,113 tenge or \$105,361 US per km including necessary fish plates and bolts.

Track renewal with new rails and timber sleepers will cost \$232,000 US.

Track renewal with second hand rails and concrete sleepers will cost \$182,000 US.

Track renewal with second hand rails and new timber sleepers will cost \$132,000 US.



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10.18 Bridges

The bridge maintenance annual budget is 700,000,000 Tenge, which includes expenditure on bridge reconstruction where necessary. Bridge design for new construction and for reconstruction is carried out by the Almaty Institute of Design a subsidiary of KTZ. Contractors are used extensively for major works, while the 366 people in the bridge brigades carry out routine maintenance. Each track district has a six man bridge brigade.

The total number of bridges on the KTZ system is 3530.

The number of pipeline bridges is 41

The number of footbridges is 77

The number of steel bridges is 256

The number of weak and defective bridges is 553

Defective bridges requiring priority repairs:

priority 1 33

priority 2 13

priority 3 97

priority 4 19

priority 5 151

priority 6 222

The 33 bridges in the priority 1 category have speed restrictions and are in the regions as follows:

| | | |
|------------|--------|--|
| Akmola | 7 no. | Six of the steel bridges are structurally satisfactory, but have defective waybeams |
| Almaty | 5 no. | One steel bridge needs renewal Three bridges on the Aktogay/Druzba line have defective waybeams due to being under water damage One bridge in Almaty has defective steelwork |
| Aktyubinsk | 14 no. | Eight steel bridges have defective timber waybeams. Three bridges have been damaged by flooding Two bridges have defective concrete |



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| | | |
|-----------|-------|--|
| Turkestan | 3 no. | One concrete bridge has heavily corroded reinforcement Two steel arch bridges are very old and need renewal |
| Sara Arka | 2 no. | One concrete bridge has corroded reinforcement and poor concrete One steel bridge has defective deck |
| Semey | 2 no. | One bridge has defective timber waybeams One bridge has a problem with expansion joints |

It is recommended where possible that waybeam type bridges be renewed with ballasted bridges.

10.19 Signalling and telecommunications

Meetings were held in Railway Headquarters with Messrs Tulabaev Murat and Semionov Sergei Vachislavovich. Most of the mainline track in the KTZ system have centralised traffic control and full auto block working. There are control centres at Almaty, Akmola, Shimkent, Aktubinsk, Karaganda, and Semipalatinsk. The block section between stations are controlled by the autoblock system, in which coded track circuits are used throughout providing train detection, block signalling controls and locomotive cab signalling data.

Autoblock allows for following train movement with signals placed at braking distance. The system allows for several trains in the section at the same time and was designed to handle large volumes of traffic. With the decline in traffic since 1991, the KTZ system can be considered as being oversignalled and extensive costs are being incurred in maintaining the system. There is potential for substantial signalling savings by downgrading the existing system to the present traffic needs, by line closures, singling of track and removal of surplus connections and rationalisation of station and yard trackwork.

Maintenance of signalling and telecommunications is a separate service in KTZ and involves about 13,000 employees. Responsibility for Train Radio is within the Signalling and Telecommunication service.

The mainline Almaty to Akmola, Almaty/ Aktogay, and the lines east, west and north of Akmola have underground telecommunications cable, while other routes are served by pole lines.

The Japanese Bank is understood to be financing the laying of a new cable route from Aktogay to the Chinese border.

The signalling system is of old technology and KTZ should now be planning for its renewal with a state of the art system.



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10.20 Level crossings

There are in total 1089 level crossings on the KTZ system. The major public road level crossings are protected by automatic half barriers (AHBs), with resident crossing keepers. The AHBs include twin flashing red lights, located on the right hand side of the road at each side of the crossing. These flash in sequence immediately prior to the approach and during the passage of rail traffic.

A single white flashing light fitted above each of two twin red light units at the crossing protects less important crossings. The following are the statistics for the KTZ system:

| | |
|---|-----|
| Automatic barrier crossings | 116 |
| Push button control barriers | 29 |
| Auto lights and bells with flashing white light | 305 |
| Auto lights only | 757 |

10.20.1 Signalling equipment

The signalling system is generally in good condition and functions satisfactorily, and it is possible with the present level of maintenance to keep 70% of the existing installation for up to a further 15 years, provided that investment is allowed to buy spare parts, instrumentation, and tools to the extent of \$1mUS

Rehabilitation of some sections of the main lines will need to be considered over future years to provide an acceptable level of service.

10.20.2 Telecommunications equipment

The communications network works satisfactorily, but with an increasing number of faults which can be expected to accelerate in the next few years due to equipment obsolescence. An investment of \$0.75mUS is needed for new instrumentation and tools in the short term. For the older telecommunications installations over 30 years old, their replacement on the main corridors should be planned in future years.

10.20.3 Overhead line equipment

Some essential parts of the OHLE system will need to be replaced in the next few years in order to maintain an acceptable level of service, and part of the mechanical equipment will need to be replaced as they become life expired



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Petuhov Victor ---Head of Machines and Mechanisms Division

Zolotuhin Vladinir --Head of Technical Division

Dronov Victor ---Executive Director of Joint Stock Company ' Bent '

Bayaskulov Tolepkul---Chief of Almaty Track Machines Repair Depots

In Akmola :

Reshkke Adolf Uylievich ---Deputy Head of Track Division

Broslovski Naum Livovich----Head of Technical Services

In Aktubinsk :

Isagaliev Bulat----Chief of Track Service of West Railways

Bugenbaev Adilhan --Chief Specialist of Bridge Division

Buranbaev Biktemir----Acting Head of Track Service



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Railway rolling stock

11. Railway rolling stock

11.1 Locomotives

11.1.1 Overview

KTZ has a large fleet of both electric and diesel-electric locomotives, all built in the Former Soviet Union.

The electric locomotives are reliable in the general sense, however, the wiring has a thin insulation and KTZ experiences problems with short circuits. With proper level of maintenance, these locomotives should be able to provide many years of reliable service (35 years).

The main line diesel electric locomotives have very serious problems because they were delivered with very unreliable engines and auxiliary mechanical equipment. These locomotives have an unacceptable level of failures, specifically with the cooling systems and the mechanical components. The Lubrication oil leaks shows also the serious maintenance problems. They can last about 30 years (18 years according to KTZ engineers) but the material costs for spare parts and components will be higher as well as fuel consumption.

A solution to these problems is to replace the old diesel engine and auxiliary equipment by GE components. The cost of this replacement is about 0.7 M\$. One modified TE10 locomotive appears to be operationally satisfactory (12.000 km/month).

TEM2 shunting locomotives are robust enough to provide reliable service for 35 years.

The number of locomotives in service is 451 Diesel-Electric (1,361 in the fleet), 388 Electric (639 in the fleet) and 402 Diesel-Electric Shunters (628 in the fleet).

For freight services, KTZ mechanical engineers estimate that 400 Diesel-Electric (TE10) and 250 Electric (VL80) locomotives are required.



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For passenger services, they estimate that 120 Diesel-Electric (TE10) and 50 Electric (VL60) locomotives are required.

This means that 520 Diesels locomotives are required (1361 in the fleet) and 841 are in surplus, that 300 VL80 Electric locomotives are required and 340 are surplus and that the fleet of VL60K Electric locomotives is sufficient to handle present traffic levels.

The tables below describe type and description of the locomotive's fleet.

| SERIES | TYP E | AVERAGE AGE | POWER | AXLE ARRANG | AXLE LOAD | MAX SPEED | TOTAL INVENT | TOTAL IN SERV |
|--------|----------|----------------|---------------|----------------|--------------|--------------|-----------------|------------------|
| VL60 | E | 33 | 4,5 kW | COCO | 23 | 100 | 59 | 54 |
| VL80T | E | 18.5 | 2x 3,160kw | 2BOBO | 23 | 110 | 194 | 111 |
| VL80S | E | 11 | 2x3,160kw | 2BOBO | 24 | 110 | 386 | 223 |
| 2TE10D | DE | 33 | 2x2,200hp | 2COCO | 21.6 | 100 | 68 | 51 |
| 2TE10L | DE | 24 | 2x2,200hp | 2COCO | 23 | 100 | 132 | 25 |
| 2TE10M | DE | 12.5 | 2x2,200hp | 2COCO | 23 | 100 | 485 | 190 |
| 2TE10V | DE | 18.5 | 2x3,000hp | 2COCO | 23 | 100 | 369 | 74 |
| 3TE10M | DE | 14.5 | 3x3,000hp | 3COCO | 23 | 100 | 220 | 91 |
| TE3 | DE | 34.5 | 4,000hp | COCO | 21.5 | 160 | 84 | 20 |
| TEM2 | S | 19.5 | 1,200hp | COCO | 21 | 100 | 522 | 331 |
| CME3 | S | 9 | 1,200hp | COCO | 20.2 | 90 | 100 | 69 |

E: Electric Locomotives

DE: Diesel-Electric Locomotives

S: Shunting Locomotives

11.1.2 Scrapping program

The following scrapping program assumes that the electric locomotives, diesel electric locomotives and shunters have average useful service lives of 35, 20 and 35 years respectively.



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Railway rolling stock

In consequence, 500 TE10M, 580 TE10 and 620 shunting locomotives should be available in 2007.

| SERIES | TYPE | AVERAGE AGE | TOTAL INV 96 | TOTAL INV 2002 | TOTAL INV 2007 | TOTAL INV 2012 |
|--------|------|-------------|--------------|----------------|----------------|----------------|
| VL60 | E | 33 | 59 | 0 | 0 | 0 |
| VL80T | E | 18.5 | 194 | 194 | 194 | 130 |
| VL80S | E | 11 | 386 | 386 | 386 | 386 |
| 2TE10D | DE | 33 | 68 | 0 | 0 | 0 |
| 2TE10L | DE | 24 | 132 | 0 | 0 | 0 |
| 2TE10M | DE | 12.5 | 485 | 485 | 349 | 0 |
| 2TE10V | DE | 18.5 | 369 | 287 | 0 | 0 |
| 3TE10M | DE | 14.5 | 220 | 220 | 150 | 0 |
| TE3 | DE | 34.5 | 84 | 0 | 0 | 0 |
| TEM2 | S | 19.5 | 522 | 522 | 522 | 258 |
| CME3 | S | 9 | 100 | 100 | 100 | 100 |

11.1.3 Recommendations

Because of the large surplus of the existing Diesel-Electric locomotives, no investment in new locomotives is necessary for the next 10 years.

KTZ can continue to operate with the existing fleet by cannibalising and purchasing spare parts (wheels and bearings).

Nevertheless, a problem will occur after 2007. A replacement plan should be put in place.

The analysis in section 11 shows that it is recommended to replace the engine by GE component on 40 2TE10 (80 engines)

There will be a shortage of 50 electric locomotives for passenger trains, in the next 5 years, but the VL80 electric locomotives could be used as replacements.

Because of the large surplus of electric locomotives for freight, it seems very desirable to continue the expansion of the electric traction system.



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Railway rolling stock

11.1.4 Rehabilitation and investment plan

| | Prices in M\$ | NO | YEARS 1998/2002 | YEARS 2003/ 2007 | YEARS 2008/2012 |
|--|------------------|-----|--------------------|---------------------|--|
| NO of Electric locomotives for freight at the end of the period | | | 580 | 580 | 510 |
| NO of Electric locomotives for passengers at the end of the period | | | 0 | 0 | 0 |
| NO of Diesel-Electric locomotives for freight at the end of the period | | | 992 | 499 | 0 |
| Converted Diesel locomotives | 0,7 | 80 | \$56mUS | 0 | 0 |
| New Diesel locomotives | 2 | 500 | 0 | | 100/ Year 500/ 5 Years \$1000m US |
| TOTAL | | | \$56mUS | 0 | \$1000 m |
| NO of locomotives to maintain at the end of the period. | | | 820 | 820 | 820 |
| TOTAL | | | \$56 m | 0 | \$1000 m |
| | | | | | |

11.2 Coaches

11.2.1 Overview

There are 2,185 coaches in the whole Kazakh railways manufactured either by Deutsche WagoNoau Ammindorf in Germany or by Russian plant in Tver.

50% of the fleet are less than 15 years old and most is in a quite poor condition due to the lack of spare parts.

However, the number of coaches is sufficient for the current passenger service level.



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The tables below describe the size, type, and breakdown per age of the coach's fleet.

| Type of vehicle | Couches/seat | before 1961 | before 1971 | before 1981 | before 1986 | before 1991 | after 1991 | Total |
|------------------------|--------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| Reserved Seat Cars | | 4 | 95 | 526 | 205 | 351 | 16 | 1197 |
| Standard Sleeping Cars | 54/81 | 2 | 170 | 95 | 121 | 177 | 36 | 601 |
| Comfort. Sleeping Cars | 36/38 | | | 7 | | 10 | 3 | 20 |
| Comfort. Sleeping Cars | 16/24 | | | 5 | 29 | | | 34 |
| Comfort. Sleeping Cars | 33 | | 3 | | | | | 3 |
| Commuter Cars | 68 | 25 | | | | | | 25 |
| Total | | 6 | 293 | 633 | 366 | 538 | 55 | 1880 |
| Restaurants Cars | | | 24 | 18 | 34 | 17 | 9 | 102 |
| Others | | 37 | 131 | 27 | 2 | 4 | 2 | 203 |
| Total | | 43 | 448 | 678 | 402 | 559 | 66 | 2185 |

Railway rolling stock

| Type | Dimensions (m) | Weight (t) | Couchettes / Seats | Speed limit (km/h) |
|-----------------------|------------------|------------|--------------------|--------------------|
| Suburban cars | 23.6 x 3.1 x 4.4 | 49 | 68 / - | 160 |
| Compartment cars | 23.6 x 3.1 x 4.4 | 52 | 54 / 81 | 160 |
| Sleeping cars | 23.6 x 3.1 x 4.4 | 52 | 36/ 38 | 160 |
| Comfort Sleeping cars | 23.6 x 3.1 x 4.4 | 64 58 | 16 / - 24 / - | 160 |
| Comfort Sleeping cars | 26.1 x 2.9 x 4.2 | 55 | 33 / - | 200 |
| Post & luggage cars | 23.6 x 3.1 x 4.4 | 47 | | 160 |
| Restaurant cars | 23.6 x 3.1 x 4.4 | 54 | | 160 |

11.2.2 Recommendations

The minimum coach fleet is estimated at 1,900 to meet the current (and future) needs. Half of the fleet was purchased after 1980. These recently acquired coaches will be in operation at least till 2010. The life span of the coaches is 28 years according the Soviet standards. If there were no coach rehabilitation or acquisition, the number of coaches in operating condition would be 1,735 in 2000, 1055 in 2010 and 625 in 2015. As a result, it is recommended to rehabilitate the coaches whenever possible and acquire new coaches too according to the following rehabilitation and investment plan.

11.2.3 Rehabilitation and investment plan

| | Prices in \$m | YEARS 1998/2000 | YEARS 2001/2010 | YEARS 2011/2015 |
|--|---------------|---|--|--|
| NO of Coaches at the end of the period | | 1735 | 1055 | 625 |
| Rehabilitated Coaches | 0,12 | 40 Coaches/Year 120 Coaches/3 Y \$15m | 40 Coaches/Year 400Coaches/10Y \$50m | 20 Coaches/Year 100 Coaches/5Y \$12m |



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Railway rolling stock

| | | | | |
|--|-----|-----------------|-----------------|-----------------|
| New Coaches | 0,7 | 40 Coaches/Year | 40 Coaches/Year | 40 Coaches/Year |
| | | 120 Coaches/3 Y | 400Coaches/10Y | 200 Coaches/5Y |
| | | \$84m | \$280m | \$140m |
| Total number of Coaches at the end of the period | | 1975 | 2095 | 1965 |
| Spare parts | | \$3m | \$10m | \$5m |
| TOTAL | | 102 MUS | 340 MUS | 157 MUS |

This investment plan proposes that 40 coaches be rehabilitated every year for the next 10 years in the Almaty passenger Coach Facility at a cost about \$120,000 each. Starting in 2001, KTZ should begin to purchase 40 new coaches per year for a price of \$700,000. This price is based on a coach with dual heating systems but no air conditioning.

11.3 WAGONS

11.3.1 Overview

There are 95,772 wagons in the whole Kazakh railways and 40% of the fleet is less than 15 years old. However, the wagon fleet is over-sized for the current freight traffic levels. The reserve fleet is estimated at about 40 % of the whole fleet. There is a serious lack of spare parts and the reserve fleet is used to provide parts to the operating fleet. As a result, most of the wagon operating fleet is in quite a good condition.

It is difficult to determine exactly how many of these wagons are presently in operating conditions because of the wide spread cannibalising that has been occurring.

The tables below describe type and description of the wagon's fleet.

11.3.2 Characteristics of wagons

| Type | No. of axles | Load limit | Tare | Useful space | Total fleet |
|----------------|--------------|------------|-------------|-------------------------|-------------|
| Covered Wagons | 4 | 60 - 68 t | 22 - 26.5 t | 90 - 120 m ³ | 16630 |



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| | | | | | |
|---------------------|---|-----------|---------------|------------------------|---------------|
| Low sided wagons | 4 | 60 - 69 t | 21 - 25.5 t | 50 - 76 m ² | 38.750 |
| | 6 | 94 t | 32.4 t | 104 m ² | |
| | 8 | 125 t | 43.6 t | 140 m ² | |
| Flat wagons | 4 | 60 - 70 t | 20 - 22.7 t | 37 m ² | 12.557 |
| Tank wagons | 4 | 50 - 60 t | 21.8 - 25.6 t | 50 - 72 m ³ | 11 106 |
| | 8 | 120 t | 48.8 t | 140 m ³ | |
| Refrigerator wagons | 4 | 30 - 49 t | 28.5 - 32.5 t | 54 - 82 m ³ | 2 240 |
| Others | | | | | 14.489 |
| Total | | | | | 95 772 |

Speed limit of all types of wagons: 120 km/h

Average service life: 35 years.

11.3.3 Recommendations

The minimum wagon fleet is estimated at about 52,000 to meet the current (and future) traffics compared to 95,000 available today. If there were no wagon rehabilitation or acquisition, the number of wagons in operating condition would be 52,000 in 2010 and 41,800 in 2015. As a result, there is no need for significant investment till 2010. Even it was theoretically suitable to start purchase in 2010, it is recommended to start acquisition earlier so as to break down the investment costs over more years. It is not recommended to carry out much wagon rehabilitation because it will not be worthwhile in most cases.

11.3.4 Rehabilitation and investment plan

| | COST US\$ | YEARS 1998/2000 | YEARS 2001/2010 | YEARS 2011/2015 |
|---------------------------------------|--------------|--------------------|--------------------|--------------------|
| NO of Wagons at the end of the period | | 52000 | 52000 | 41800 |



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Railway rolling stock

| | | | | |
|---|-------|---|--|---|
| Tank Wagons | 22000 | 50 Tanks/Year -150 W/3 Years \$3,3m | 50 Tanks/Year - 500 W/10 Years \$11m | 50 Tanks/Year -250 W/5 Years \$5,5m |
| New Wagons | 30000 | 0 | 500 W/an -5000 W/10 Years \$150m | 500 W/Year -2500 W/5 Years \$75m |
| Total number of Wagons at the end of the period | | 52000+150 | 52000+5650 | 41800+8400 |
| Spare parts | | \$0,016/Km \$3m | \$10m | \$5m |
| Total | | \$6,3m | \$171m | \$127,5m |
| | | | | |

The scrapping of wagons will the use of cannibalised spare parts and decrease the maintenance costs.

11.4 Maintenance policies

11.4.1 Overview

The maintenance rules are inherited to the Soviet norms and are now managed by the Ministry of Transport and not by the Railways. There is no connection between the maintenance procedures and the maintenance needs.

For wagons or coaches the current rules are based on time and not operated kilometres. The same maintenance operations are carried out for a wagon or coach that has remained in a depot than for a wagon or coach that has been extensively used. Similarly, the Soviet norms specify that axles and bearings have to be removed and inspected every year and this results in a significant number of workshop for axles (1 per depot) and spare parts (90,000 bearings per year).

This makes on the one hand unnecessary maintenance expenses and on the other hand lack of maintenance.

The maintenance managers have a good knowledge of the current maintenance rules but have a poor understanding what should be done to make it more efficient.



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11.4.2 Recommendations

The key recommendation is to leave aside the maintenance policy inherited from the past and to design procedures adapted to the real wear and tear of the wagons, coaches and locomotives and grant significant responsibilities and achievable objectives to the maintenance managers and workers.

To meet this goal, the following changes have to be implemented:

- Place the maintenance policy under the Railways and not the Ministry of Transport as today. The Railways should be able to determine the necessary changes in the maintenance procedure on their own based on their maintenance needs.
- Design maintenance procedures based on the number of kilometres run by the Rolling Stock. The various maintenance operations will be programmed on a kilometre basis and not on a time basis as currently. This requires the implementation of an information system with train consists, engines tracking and numbers of kilometres run.

For example, for the coaches, the maintenance by km in place of time should avoid ½ TR operation per year: 300.000 km (2 years and half) in place of every year (120.000 km).

- Develop a feed back system for maintenance operations in which the main technical problems are listed with a description of the technical solutions to tackle them.
- Review the tasks to be carried out for each maintenance procedure to take account of the improvement of the engine condition due to the rehabilitation and acquisition programmes.
- Change the procedure for axle maintenance. The current maintenance procedure is ill-designed and paves the way for a high consumption of axles and bearings that is too time and money consuming. The procedure should be changed so as to reconcile the balance between maintenance cost and quality. The axles should be checked less often and the axle maintenance facilities should be reduced to a few workshops only. For example, 5 years is the normal practice in North America for service wagons in place of 1 year in KTZ.
- Redefine the hot box detection. Under the current procedure, the hot box detectors are located every 40 km and trains are stopped for 30 minutes every 150 km that is about every 2 hours.
- Review the working hours for coach's maintenance. The coaches are extensively used during week ends between Friday afternoon and Monday morning. The working hours have to be adjusted so as to concentrate the work on week days.



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11.5 Locomotives depots and workshops

11.5.1 Overview

In the past, KTZ did not handle all overhauls in its many depots. Running repairs known as TR1, TR2, and TR3 are performed after 3 months, 1 year and 2 years respectively in one of the 36 depots located around the network. An intensive overhaul known as a KR-1 used to be performed approximately every 5-7 years in Ukraine (80%), Russia (10%) or Uzbekistan (10%). The most intensive overhaul, known as a KR2, was scheduled five years after the KR1 overhaul in the same shops.

KTZ has not any KR2 overhauls performed in many years. The financial crisis since 1990 has caused it to program fewer overhauls than are normally required.

As a result the TR3 repairs now performed in KTZ depots included activities normally associated with KR-1 overhauls.

After looking at the equipment and machinery in KTZ depots, it appears that all repairs and overhauls could be performed in Kazakhstan, and there is no need to have the work carried out outside the country.

Planning and reorganisation of the work is required, but the basic skill and equipment are already in place in Kazakhstan.

All locomotive depots are responsible for the operation of locomotives and the management of drivers, first level of maintenance (running repairs) and overall maintenance and for the movement of trains.

Maintenance procedures and the scheduling of inspections and repairs for each locomotive are appropriate for the existing locomotives' technologies.

Some modifications will decrease the frequency of repairs, and thus labour and material costs (wheelsets for example).

11.5.2 Description of the maintenance schedule

| TYPE | JOB | PLACE |
|-------------|---------------------|-------------------|
| TO1-T02-TO3 | INSPECTIONS | Depot |
| TR1-TR2-TR3 | RUNNING MAINTENANCE | Depot or Workshop |
| KR1-KR2 | OVERHAULS | Workshop |



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The number of depots is far in excess, because of the practice of assigning locomotives to depots that do not leave their districts.

The work force in the depots appears to be very skilled, well equipped and able to perform all repairs and overhauls.

The tables below present

- the list of the locomotive depots, the levels of running repairs conducted at each and an initial indication of which depots could be closed.
- the current schedules and material costs (if available) for each major repair level.

11.5.3 Locomotive Depots

(Recommended closures marked X in table)

| LOCATION | CLOSE ? | RUNNING REPAIRS PERFORMED | | | OVERHAULS | |
|-----------------|------------|------------------------------|------|------|-----------|------|
| | | TR-1 | TR-2 | TR-3 | KR-1 | KR-2 |
| Novoishimiskaya | | d | | | | |
| Kurort-Borovoye | X | d | | | | |
| Akmola | | d+e | d | e | | |
| Esil | X | d | | | | |
| Atbasar | | d+e | | e | e | e |
| Kushmurun | | d | d | d | | |
| Kustanai | X | d | | | | |
| Ermentau | X | d | d | | | |
| Pavlodar | | d | d | | | |
| Ekibastuz | X | d,e,em,dm | d | d | | |
| Karaganda | | d,e,em | d | e | | |
| Balkhash | | d | | | | |
| Agadyr | X | d | | | | |
| Shana-Arka | X | d | | | | |

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| | CLOSE | RUNNING REPAIRS PERFORMED | | | OVERHAULS | |
|---------------|-------|---------------------------|---|---|-----------|---|
| | | | | | | |
| Kzyl-Orda | | d | d | | | |
| Kazalinsk | | d | d | d | | |
| Saksaulskaya | X | d | d | | | |
| Chelkar | | d | | d | | |
| Emba | X | d | d | | | |
| Aktyubinsk | | d | d | | | |
| Shubar-Kuduk | X | d | | | | |
| Ilesk | X | d | | | | |
| Uralsk | | d | | d | | |
| Makat | | d | d | | | |
| Mangyshlak | | d | | | | |
| Atyrau | X | d | | | | |
| Turkestan | X | d | d | d | | |
| Arys | X | d | | | | |
| Djambul | | d | | e | | |
| Chu | | d | | d | d | d |
| Sary-Shagan | X | | d | | | |
| Zashita | | d | d | d | | |
| Almaty | | d | d | | | |
| Sari-Ozek | X | d | | | | |
| Matai | | d | | | | |
| Ayagus | X | d | d | | | |
| Charskaya | X | d | | | | |
| Semipalatinsk | | d | d | | | |



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d = diesel-electric / e = electric / em = electric multiple unit / dm = diesel multiple unit

11.5.4 Maintenance Schedule

| SERIES | UNITS | MAINTENANCE SCHEDULES | | | | | |
|--|---------------|-----------------------|---------|-----------|----------|------------|--------|
| | | TO-3 | TR-1 | TR-2 | TR-3 | KR-1 | KR-2 |
| MAIN LINE ELECTRIC LOCOMOTIVES | | | | | | | |
| VL60 | Km (1,000) | | 14 | | 380 | 760 | 2300 |
| | Duration | | 15 hr. | cancelled | 3.5 days | | |
| VL80 | Km (1,000) | | 14 | | 400 | | |
| | Duration | | 15 hr. | cancelled | 3.5 days | | |
| ELECTRIC MULTIPLE UNITS | | | | | | | |
| all | Km (1,000) | | | 150 | 300 | 600 | 1800 |
| | Time Interval | 5 days | 50 days | | | 4 yr. max. | - |
| | Duration | 4 hr. | 9 hr. | 2 days | 7.2 days | | |
| MAIN LINE DIESEL-ELECTRIC LOCOMOTIVES | | | | | | | |
| TE10 | Km (1,000) | 7.2 | 29 | 115 | 210 | 680 | 1,360 |
| | Time Interval | 17 days | 2.3 mo. | 9.2 mo. | 18 mo. | 4.5 yr. | 10 yr. |
| | Duration | 10 hr. | 40 hr. | 5 days | 6 days | | |
| TE3 | Km (1,000) | 7.5 | 30 | 120 | 210 | 720 | 1,440 |
| | Time Interval | 18 days | 2.5 mo. | 10 mo. | 18 mo. | 5 yr. | 10 yr. |
| | Duration | 8 hr. | 36 hr. | 4.5 days | 4.5 days | | |



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| DIESEL-ELECTRIC SHUNTING LOCOMOTIVES | | | | | | | |
|---|---------------|---------|---------|-------|--------|---------|--------|
| all | Km (1,000) | - | - | - | - | - | - |
| | Time Interval | 30 days | 7.5 mo. | 5 mo. | 30 mo. | 7.5 yr. | 15 yr. |
| | Duration | - | - | - | - | - | - |

11.5.5 Diesel-Electric Locomotives Workshops

Inspections are made in two main workshops located at Almaty and Chu and the traction motor shop at the Almaty Passenger workshop.

The workshop at Chu is larger and better equipped to carry out KR1 and KR2 overhauls activities. The capacity is about 150 overhauls per year if fitted with the appropriate equipment.

The Almaty workshop is fully equipped and capable of handling all running repairs plus KR1 and KR2. The present equipment should be adequate but it will require upgrading to modern standards and technologies.

The traction motor shop at Almaty passenger Coach facility is equipped to remanufacture enough traction motors to satisfy all of KTZ's requirements. It has the capacity to repair about 4000 traction motors per year.

The press for traction motor armature assembly is the only equipment, which should be replaced in the KTZ engineers opinion.

11.5.6 Electric Locomotives Workshops

Inspections are made into two main workshops located at Atbasar (VL80) and Akmola (VL60).

Both workshops have traction motors' areas. However, Atbasar could be designed as the major traction motor repair facility as well the overhaul activities. The Atbasar workshop is the larger of the two workshops and should be able to perform

- 70 KR1 and KR2 per year (sufficient for a fleet of 350 locomotives).
- 1200 rebuilt traction motors per year.

11.5.7 Recommendations

11.5.7.1 First and Second level of Maintenance

The maintenance facilities should be reduced and the work consolidated into a fewer number of specialised shops.



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The running depots should be established at 500 km apart (depending of the fuel and sand capacity for the locomotives and the cycles of the train crew).

These depots would perform preventative maintenance inspections to ensure that locomotives can reach the next depot without incident or component failures. They would also be responsible for sanding and fuelling, changing brake shoes and checking liquid levels (lubrication oil and water). Crew dormitories if not already existing, should be provided so the away crews can rest for at least 8 hours.

The information system for the treatment of the failures should be improved. The personnel at the depots should ensure that any defects noted by the drivers and assistants are fixed in the depot. The main locomotive shops and maintenance planners should be advised about defects that can be handled at the depot. The driver and assistant should also investigate any operational failures to determine the reason of the failure and the corrective action needed.

Depots should have only stock consumable such as fuel, oils, greases, sand, brake shoes and any component parts, which have had a history of operational failures

Almaty and Kazalinsk workshops will continue to function as the main facility for performing TR3 repairs for Diesel-Electric locomotives. Akmola shop should perform the same repairs for Electric locomotives.

11.5.7.2 Third and Fourth Levels of Maintenance

We assume that the existing locomotives will continue until the end of their useful life without the introduction of new types.

Chu and Atbasar workshop, well equipped, should be made the main workshops for Diesel-Electric and Electric locomotives respectively.

11.5.7.3 Other facilities

A lot of repair capacity in the depots is existing, such as traction motor repairs, wheelshops, etc. The shops in better condition and the more favourable locations should be consolidated and used to repair major components as supply source points.

11.5.8 EQUIPMENT AND MACHINERY REQUIREMENTS

Inspection of the main workshops revealed the need for some specialised equipment, which would enable KTZ to improve its maintenance activities and to enhance its independence from foreign suppliers. The following equipment should be purchased:

| Type | NO | Coast each | Total cost |
|------|----|------------|------------|
|------|----|------------|------------|



Railway rolling stock

| | | | |
|--|----|-------------|-------------|
| Electric/Hydraulic Forklifts (for materials handling) | | | |
| 4 of each for Chu, Almaty, Atbasar and Akmola | 16 | \$25,000 = | \$ 400,000 |
| 2-ton capacity | 16 | 40,000 = | 640,000 |
| 5-ton capacity | | | |
| 60 kW Heat Treating Furnaces (Electric) for Atbasar and Akmola | | | |
| 500 mm L x 500 mm H x 1,000 mm D | 1 | \$8,000 = | 8,000 |
| 700 mm L x 700 mm H x 2,000 mm D | 1 | \$10,000 = | 10,000 |
| Blacksmith's Air Hammer for Atbasar Bogie Repairs | | | |
| 60-ton capacity | 1 | \$100,000 = | 100,000 |
| Portable Locomotive Jacks for Akmola | | | |
| 35 to 40 ton capacity | 12 | \$20,000 = | 240,000 |
| Total | | | \$1,398,000 |

The existing machine tools vary considerably in age. The oldest date to 1940. They should be replaced as the budget allows with modern equipment from suppliers who can be relied upon to continue to produce spare parts for long periods.

After the initial investment of \$1,400,000, an allowance of \$500,000 per year has been made in the investment plan for the continuing acquisition of new machinery and equipment for the main shops.



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11.5.9 Investment plan

| | Cost in \$m | YEAR 1998 | YEARS 1999/2000 | YEARS 2001/2010 |
|----------------------------|-----------------|--------------|---------------------|---------------------|
| Machinery and equipment | \$0.5m /year | \$1.4m | \$0.5m/year \$1m | \$0.5m/year \$5m |
| Local improvement | | \$1m | \$1m/year \$2m | \$1m/year \$10m |
| TOTAL | | \$2.4m | \$3m | \$11m |

11.6 Coaches depots and workshops

11.6.1 Overview

The running repairs for wagons are known as T01 (prior every trip), T02 (every 6 months) and T03 (every 12 months).

The overhauls are KR1 (every 5 years) and KR2 (every 20 years).

The extensive running repairs are more stringent than are common in Europe. The removal of bearings so frequently (every T03) probably does more harm than good because the re-built bearings are seldom as reliable as the originals. KTZ justifies these levels of repair simply as being the old Soviet norm.

There are 6 depots for light maintenance (Akmola, Almaty, Aktyubinsk, Karangada, Pavlodar and Kustanai) and 3 workshops (Almaty and 2 workshops used for wagons as well, Xilorda and Borovoy) for heavy maintenance and general rehabilitation.

The workshops and depots are poorly maintained, the access paths to the rolling stock and equipment are run down, the heating systems are not working well, some of the machines are getting old. There is a serious lack of handling facilities.

However, the maintenance facilities have enough capacity and maintenance equipment to carry out the maintenance of the coaches they are assigned.

In spite of these deficiencies, the employees appear to be skilled and qualified to undertake all maintenance requirements

There are no painting workshop and no construction of passenger coaches in Kazakhstan.



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11.6.2 Recommendations

The number of depots should be reduced.

The only workshop remaining, Almaty workshop should be improved to perform all repair, overhaul and rehabilitation work required.

11.6.3 Investment plan

The following investments will be necessary, including;

- a new paint shop in Almaty in 1999, to ensure that the metal exterior of the coaches is maintained in good condition- \$1M of which 50% is imported from the west.
- handling equipment for the workshops- \$900,000 for the next 3 years.
- local improvements to renew depots and workshop- M\$5, all local funds.
- workshop machinery and equipment to keep the equipment modern- M\$10 imported from the west.

| | \$m | | YEARS 1998/2000 | YEARS 2001/2010 |
|-------------------------|-----------------|--|-----------------------|-----------------------|
| Local improvements | \$0.5m/ year | | \$0.5m/Year \$1.5m | \$0.5m/Year \$3.5m |
| Handling equipment... | \$0.3m /year | | \$0.3m/Year \$0.9m | 0 |
| machinery and equipment | \$1m /year | | \$1m/year \$3m | \$1m/year \$7m |
| New paint shop | \$1m | | \$1m | 0 |
| TOTAL | | | \$6.4m | \$10.5m |

Railway rolling stock

11.7 Wagons depots and workshops

11.7.1 Overview

There are 21 depots for light maintenance and 16 workshops for heavy maintenance and general renewals.

In Kazakhstan, there is only one workshop dedicated to KR (heavy maintenance every 10 years) of all type of wagons, based in Akmola. This shop also has modern maintenance facilities for bogies and axles (4000 axles are repaired every year). This shop, modern enough for the maintenance needs only local refurbishment (heating system, access path etc.) and improved material handling.

In Chimkent, there is a workshop dealing with the maintenance and repair of refrigeration wagons. The workshop carries out DR only (light maintenance every year) and no KR. The workshop is quite old and some of the tools need to be replaced.

Generally, the core of the maintenance facilities has sufficient capacity, but needs modernisation and maintenance of the workshop and depot buildings (cleaning, painting, heating, etc.)

11.7.2 Wagon Maintenance Depots

| DEPOT | YEAR. CONST | | NO SPOT | QUANTITY OF REPAIRS | | | TYPES OF W REPAIRED | |
|-------------------|-------------|------|---------|---------------------|---------|-----------|----------------------------|---------------------|
| | BUIL T | REB | | CAPACI TY | IN 1992 | /DA Y (1) | NOW | FUTURE |
| Arys (2) | 1936 | 1976 | 6 | 2 570 | 2 971 | 11,6 | Platform, Other Covered | Platform Service |
| Chimkent | 1935 | 1989 | 7 | 3 430 | 3 822 | 14,9 | Covered Open, Platform | Open |
| Dzhambul | 1924 | 1970 | 9 | 3 860 | 2 393 | 9,3 | Covered Open, Tanks | Tanks ???? |
| Ayaguz (2) | 1935 | 1960 | 6 | 2 570 | 2 075 | 8,1 | Covered Open, Platforms | Covered Hoppers |
| Semipalatinsk (2) | 1936 | 1969 | 6 | 2 570 | 3 144 | 12,2 | Covered Open, Platforms | Open |



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Railway rolling stock

| DEPOT | YEAR. CONST | | NO | QUANTITY OF REPAIRS | | | TYPES OF W REPAIRED | |
|-----------------|-------------|------|----|---------------------|-------|------|---|---------------------|
| | 1939 | 1982 | | 5 140 | 3 620 | 14,1 | Covered | Open |
| Zashita (2) | 1939 | 1982 | 12 | 5 140 | 3 620 | 14,1 | Covered Open, Platforms | Open Othesr |
| Borovoye | 1935 | 1987 | 8 | 6 000 | 3 506 | 13,6 | Covered Platform | Others |
| Atbasar | 1943 | now | 12 | 6 000 | 1 687 | 6,6 | Covered Platform, Open | Covered PF?? |
| Zheleznorudnaya | 1965 | 1970 | 6 | 2 060 | 2 737 | 10,6 | Platform, Open | Platform |
| Kushmurun (2) | 1942 | 1967 | 6 | 2 070 | 2 787 | 10,8 | Covered, Open | Hoppers |
| Ekibastuz 1 | 1987 | - | 13 | 10000 | 5 443 | 21,2 | Platform, Open | Open |
| Ekibastuz 2 | 1972 | - | 10 | 5 800 | 5 723 | 22,3 | Open | Open |
| Pavlodar | 1978 | 1992 | 10 | 5 900 | 5 730 | 22,3 | Open, Tank, Platform | Tanks |
| Karabas (3) | 1980 | - | 2 | 300 | 415 | 1,6 | Open | Open |
| Karaganda | 1935 | 1978 | 12 | 6 200 | 5 777 | 22,5 | Platform, Open | Open |
| Balkhash (3) | 1938 | 1971 | 6 | 3 500 | 3 450 | 13,4 | Open Tanks | Service Other |
| Kazalinsk (2) | 1936 | 1983 | 5 | 2 500 | 2 239 | 8,7 | Hoppers, Covered Open, Container | Covered PF?? |
| Chelkar (3) | 1936 | 1991 | 5 | 2 500 | 1 975 | 7,7 | Platform, Open Service, Cement | Platform Service |
| Uralsk (2) | 1936 | 1982 | 6 | 3 000 | 2 237 | 8,7 | Cement, Open Container, Covered Hoppers | Open Others |



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Railway rolling stock

| DEPOT | YEAR. CONST | | NO | QUANTITY OF REPAIRS | | | TYPES OF W REPAIRED | |
|---------------------|-------------|------|----|---------------------|-------|------|----------------------------------|-----------------|
| | 1944 | 1983 | | 3 000 | 3 381 | 13,2 | | |
| Guriev (Atyrau) (3) | 1944 | 1983 | 8 | 3 000 | 3 381 | 13,2 | Container, Tank Open, Hoppers | Tanks |
| Kyzyl-Orda | ?? | 1986 | 6 | 3 000 | 3 091 | 12,0 | Covered Platform, Open | Coaches Open |
| TOTAL | | | | 81 970 | | 0,0 | | |

(1) = Assumes 257 working days per year.

(2) = Technical changes are required.

(3) = Reconstruction is required.

11.7.3 Recommendations

The number of depots and workshops operated is excessive and should be reduced.

The number of depots can be reduced from 21 to 12 even if inspections are scheduled annually.

In addition, the number of workshops should be reduced from 16 to 3 located in Akmola, Borovoye and Kyzyl-Orda. All these workshops should have complete wheelshops attached, and only these shops should perform wheelset changes.

Railway rolling stock

11.7.4 Proposed wagon repair facilities

| | COVER | PLATFORM | OPEN | TANKS | OTHERS | TOTAL |
|---------------------------------------|--------|----------|--------|-------|--------|--------|
| CAPITAL REPAIRS (KR) | | | | | | |
| NO KR/year planned | 1 566 | 1 310 | 3 628 | 994 | 1 823 | 9 321 |
| NO KR/year - Wagons Required | 547 | 304 | 2 484 | 792 | 1 149 | 5 276 |
| NO of Workshops - Now | | | | | | 16 |
| NO of Workshops - Future | | | | | | 3 |
| Proposed Workshops & Responsibilities | | | | | | |
| AKMOLA | X | X | X | | | |
| BOROVOYE | | | | X | | |
| KZYL-ORDA | | | | X | X | |
| ANNUAL REPAIRS (DR) | | | | | | |
| NO DR/year planned | 15 663 | 13 100 | 36 282 | 9 938 | 18 227 | 93 210 |
| NO DR/year - Wagons Required | 5 470 | 3 040 | 24 840 | 7 920 | 11 488 | 52 758 |
| NO of Workshops - Now | | | | | | 21 |
| NO of Workshops - Future | | | | | | 12 |
| Proposed Workshops & Responsibilities | | | | | | |
| ARYS | 2 570 | 1 285 | 1 285 | | | 2 570 |
| CHIMKENT | 3 430 | | | 3 430 | | 3 430 |
| DJAMBUL | 3 860 | | | | 3 860 | 3 860 |
| SEMIPALATINSK | 2 570 | | 2 570 | | | 2 570 |



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Railway rolling stock

| | | | | | | | |
|------------|--------|-------|-------|--------|-------|--------|--------|
| BOROVOYE | 6 000 | | | | | 6 000 | 6 000 |
| ATBASAR | 6 000 | 3 000 | | 2 100 | | 900 | 6 000 |
| EKIBASTUZ | 10 000 | | | 10 000 | | | 10 000 |
| PAVLODAR | 5 900 | | | | 5 015 | 885 | 5 900 |
| KARAGANDA | 6 200 | | | 6 200 | | | 6 200 |
| KAZAKLINSK | 2 500 | 1 250 | 1 250 | | | | 2 500 |
| URALSK | 3 000 | | | | 3 000 | | 3 000 |
| KZYL-ORDA | 3 000 | | | 3 000 | | | 3 000 |
| Capacity | 55 030 | 5 535 | 5 105 | 24 730 | 8 015 | 11 645 | 55 030 |

11.7.5 Investment plan

The following investments is necessary:

- a new wheelshop equipment in 1998-1999. It is assumed that it will cost \$2 M.
- acquire new materials handling equipment for depots and workshops, and \$900.000 has been allocated for the 3 next years.
- renew depots and workshops and imported machinery and equipment for about M\$3,9 to keep the wagon maintenance efficient.
- new paint shop for wagons rather to use manual methods outside for a cost of \$1 M, 50% imported from the west.



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Railway rolling stock

| | \$m | NO | YEARS 1998/2000 | YEARS 2001/2010 |
|-------------------------|-----------------|----|-----------------------|---------------------|
| Local improvements | \$0.3m/ year | 10 | \$0.3m/Year \$0.9m | \$0.3m/Year \$3m |
| Handling equipment... | \$0.3m /year | 3 | \$0.3m/Year \$0.9m | 0 |
| Machinery and Equipment | \$1m /year | 10 | \$1m/year \$3m | \$1m/year \$7m |
| New wheelshop | \$1m | | \$1m/year \$2m | 0 |
| New paint shop | \$1m | 1 | \$1m | 0 |
| TOTAL | | | \$7.8m | \$10m |

11.8 Technical and Financial analysis of the replacement of the TE10 engine by a GE component.

See Annex No 11 for details.



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Environment considerations

12. Environment considerations

12.1 Policy and national legislation on the environment

12.1.1 Introduction

Before the 1991 partition, bills were passed by the parliament of the Soviet Union and applied to all the republics. They could not be modified at a local level but took into account certain regional differences (local practices, climate, and economy).

Following the break-up of the USSR, the New Constitution of the Republic, drawn up in Almaty in 1995, stipulates in Article No 92 that all laws are to be reviewed so as to apply in Kazakhstan and so be incorporated into the laws of the Republic, with October 1st 1997 as the closing date. Until such time as they are fully revised, any old laws, which have not yet been examined, will remain in force provided they do not conflict with the new constitution. All laws referring to the railway have been revised.

12.1.2 Legislation

Law of 15 July 1997, This national law on the protection of the environment replaces the law of 18 June 1991 on the protection of the environment in the Kazakhstan Republic.

This law stipulates the legal, economic and social bases for the protection of the environment. It safeguards the interests of present-day and future generations by reducing industrial pollution and conserving biological diversity. It also regulates the rational use of natural resources.

Taken into account are: the rights and duties of citizens and associations, the areas of competence of the authorities, the responsibilities and duties of industrialists, the treatment of



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industrial and household waste, the definition of standards for waste products, the certification of all commercial products, an evaluation of existing impacts, ecological appraisal, the classification of units with "characteristics of value", damaged sites, the treatment of disputes and international co-operation.

Law of 15 July 1997, A law on the protection of sensitive areas (New Law).

This law defines the legal, economic, social and organisational bases of areas classified as sensitive. Taken into account are: the rights and responsibilities of citizens and associations, areas of competence of authorities, organisation, nature of the classified sites (forests, deposits, springs, gardens etc.), the procedures for classification (local or national), the protection and restoration of the wildlife, the treatment of disputes and international co-operation.

Any project which changes the nature of a locally designated site (quarry or new line, for example) must obtain the authorisation of the local representatives of the Ministry of Environment and Bio-resources. For a nationally designated site, the designation can be removed only by parliament.

Law of 18 March 1997, Law of the Kazakhstan Republic on ecological evaluation.

The basis of this law is paragraph No 6 "ecological evaluation" in the old law of 18 June 1991 on the protection of the environment in the Republic of Kazakhstan and is embodied in paragraph No 11 of the new national law on protection of the environment. It will be discussed in more detail later.

Law of 21 September 1994, Law on transport.

This law obliges the transporter to have equipment which corresponds to health and safety requirements and which satisfies working and ecological conditions of protection in conformity with international standards. It was modified by the decree of 27 January 1996 which obliges the transporter to insure his passengers.

Law of 21 October 1993: Law on the protection, reproduction and use of animals.

Wild and domesticated animals form an essential part of the heritage of the Republic. Present and future generations must be educated to respect nature.

Law of 22 January 1993, Law on protection at work.

The object of this law is to ensure the rights of employees to protection at work. It details the general principle of national policy in this area, that is the prevention of accidents, the effects of the work on health and the restriction of pollution caused by industry. It applies to all activities and all companies.

Draft law on the treatment of industrial and household waste.

12.1.3 Regulation

Directives:



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All laws are supplemented by directives. They embody the details, determine the responsibilities and the procedures to be followed, they are working documents. It is these documents which trigger action. Very few directives have been modified, only the date has changed.

The Ministry of Environment and Bio-Resources is responsible for producing and publishing its own directives. They are used as they stand by all state-owned or private services, which come under the aegis of the environmental policy laid down by the State.

Directives have also been produced to apply to the achievement of large national and international projects (inter-State transport of oil by pipeline, new railway line).

Codes:

Forest and Water codes.

Standards:

The environmentalists have as their references for waste, standards applicable to each type of pollution (air, earth, water, noise, vibration) and methods of calculation. These standards date from the Soviet era and have been adopted by the Kazakh State. They have changed very little since they were created. They are applicable whatever the sector of activity, existing or planned, but vary in certain cases according to the site (town, countryside, and industrial zone).

There are also a proliferation of methods, provisions, indications, rules and recommendations for all ecological aspects and working conditions.

12.2 Ministry of environment and bio- resources

For details see Annex No 12

12.3 Ministry of transport office specialised in railways

12.3.1 Definition and role

The Ministry of Transport has a design office specialising in railways (kazgiprojeldortrans), which is responsible for planning all new or modernisation projects (new lines, electrification, modernisation of depots).

This design office was created in 1988 from two institutions, the first on a national level (USSR) concentrated on large projects, and the second ensured the design of small local projects in Kazakhstan.

It also co-ordinates the relationships and suggestions from all the players concerned in a project (Ministries, municipal technical departments, administrations).



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Among the specialists in all the disciplines required to draw up plans, environmentalists, in accordance with the law of 18 March 1997 which stipulates that each project must be subjected to an ecological appraisal, analyse for each project the techniques used to comply with the environmental standards, determine the potential impact on the environment during and after the work and propose measures to mitigate or eliminate adverse effects.

12.3.2 Initial state and management of the environment by the railway

12.3.2.1 Structure and organisation

The current structure (October 97) of the Kazakh railway (KTZ), divides the national territory into six regions:

The railway in

- ALMATY,
- TURKESTAN,
- the WEST,
- SARY-ARKA,
- SEMIPALATINSK and
- AKMOLA.

These regions are managed from Almaty by the General Administration of the Railway.

On the management side, the two engineers responsible for the environment are part of the "Safety and Environment" section, which is linked to the technical department.

Their functions are many:

- they follow legislative changes and interpret them,
- they provide training,
- they distribute information and define directions,
- they monitor the application of the regulations either directly on site or by studying the activity reports of the railway companies.

The press, echoing complaints from people living near the railway, also plays the role of informing.

Those responsible work also with the municipal authorities to reduce adverse environmental effects caused by the railway and they co-operate with the representatives of the Ministry of Environment. They propose to these Ministry projects for adapting or modifying existing legislation



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Inspecting the load and state of wagons is also part of their responsibilities.

As at management level, the regions have an ecological department (eleven environmentalists for all the regions); in the operating centres (depots, workshops), the chief engineer is responsible for the environmental impact caused by their activity.

12.3.3 Almaty depot

12.3.3.1 Location

Located to the south of the town of Almaty and 12 km from the head office of the railway, the depot manages the maintenance and repair of 150 diesel locomotives. Since the reduction in traffic, several small depots, which were located on the edge of the town, have been amalgamated. In October 1997, 1960 staff worked there.

The maintenance cycles (TO 3, TR 1, TR 2, TR 3) are based on the distance covered by the locomotives. After 800,000 km they return to the factory for a complete overhaul. All have exceeded their planned lifetime.

12.3.3.2 Main adverse effects

Water

For its needs, the depot is connected to the town drinking water supply. This water is collected in the neighbouring mountains or comes from artesian wells (there are no wells on the land covered by the depot). It is purified, treated then analysed by the town's technical health laboratory, which authorises its distribution.

The quality of the water is checked regularly by the epidemiology laboratory controlled by the Ministry of Health.

This drinking water is used for the personal needs of the staff but also for the company's industrial requirements.

The water then flows into the communal sewage system or is recycled if it has been used for steam cleaning locomotive parts and is consequently contaminated with diesel, grease and solvents.

The recycling principle can be split into two phases:

- in the first, the contaminated water recovered in pits is moved either by gravity or pumping into a collection tank where the water and greasy elements are separated by density. The fuel thus salvaged is used to power the boilers in the depot.
- in the second, a "chemical" separator built in 1986 by Vastok-Aqua (a Kazak company) extracts the remaining pollutants still present in the water, at approximately 7%. The purified water is re-introduced into the collection tank. For the last remaining residues, after treatment in a regeneration workshop, they are used as lubricants. This modern and well-maintained recycling system works well.



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Environment considerations

A large part of the depot, track floor as well as cess is soaked in diesel which has leaked from the locomotives. Concrete channels or tanks are designed to collect this fuel and to send it by gravity or pumping to the treatment tank. A large part of this device is no longer working or does not cover all the areas affected by the pollution.

Solid waste

When the locomotives are no longer reparable, they are dismantled. The useful parts are kept. Others (metal ones) are sorted and sent to recycling companies. Those which cannot be re-used at all are mixed with the town's household waste or are stored in a corner of the depot with soil, rubble and used ballast (polluted or not).

Old batteries are partly recycled.

Air

Boilers salvaged from old steam locomotives provide heating for the buildings and production of steam required in the workshops. Although forbidden by the regulations, this practice is the direct consequence of the lack of resources they suffer from. The atmospheric discharges caused by burning the diesel fuel used in these boilers are in excess of the limits allowed.

An industrial boiler has, in fact, been delivered but the lack of capital has halted assembly. 1.5 million tenges (about twenty thousand dollars) are required to complete installation. Such an installation will bring the discharges within the ranges required and give a saving in fuel running costs of 5 to 7%.

Discharges into the atmosphere from diesel locomotives are characterised by large emissions of SO₂ and particles (15 kg per hour of running or 18 kg for very old diesels). This pollution is especially apparent in the depots where locomotives are moved.

12.3.4 Effects caused by railway operations

Maintenance and track renewal

Work to maintain and renew the track is carried out according to the tonnage moved. Rails, which can no longer be used for main lines, are utilised on lower grade tracks. At the end of their useful lives, the rails are stored and then sent to Russia where they are recycled. Russia supplies Kazakhstan with new rails since it has no factory for manufacture this type of equipment.

The sleepers, both concrete and wooden, are renovated and only very worn wooden sleepers are rejected and given to people living near the track to heat their houses.

The ballast is always renewed from the top and when no longer viable, regardless of whether it is contaminated or not, is used to infill the depressions formed by the removal of earth for embankments or it is spread along the track within the "100 metre strip" (this "100 metre strip" is discussed in more detail in paragraph 4.4 "Measures taken..."). Supplies of new ballast come from state-owned quarries and stone-crushing mills.

The railway does not possess its own machinery capable of cleaning and grading ballast and the Russians rent equipment of Austrian origin.



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Environment considerations

During routine maintenance or renovation, no special precautions are taken in rural areas, only work in built-up areas may be subject to restrictions imposed by town councils.

Weeding:

The products used are on a list produced by the Ministry of Health. Their use is forbidden in water collection areas.

At the moment, the department, which is responsible for the spraying equipment, is unable to use its machines since they are not valid.

Weeding is therefore carried out manually with the help of shepherds along the track who collect the grass to feed their herds of sheep.

It should be noted that the climate is such that the growing season lasts only two months.

Quarries and depots:

During the construction of the railway, material for embankments and from cuttings was removed or added within the "100 metre strip" without the need for special authorisation.

Noise and vibration:

Although standards exist, this environmental aspect has never really been an issue. The large area on either side of the permanent way as well as the low speeds used mean that noise and vibration has never given rise to complaints from people living near the track or from town councils.

In addition, there is no sound protection along the permanent way (walls, barriers) anywhere in Kazakhstan.

Wildlife:

The Kazakh rail network does not cut through areas classified as protected or sensitive and, in addition, the lack of fencing along the line allows animals to cross.

However, as far as large animals are concerned, once their habitual paths have been recorded, a special system has been designed by the people in charge of the environment: it consists in channelling the animals using fencing erected along the track to direct them towards a specially constructed crossing. They cross over the rails and drivers are required to slow on approaching them.

As for birds, the only danger to them is linked to electrified tracks. A directive from the Ministry of the environment requires designers and the railway to examine this problem and to find solutions suited to existing installations.

Built-up areas:

In built-up areas (towns and villages), the width of the strip reduces adverse environmental effects caused by the railway.



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On the other hand, in many cases, holiday homes (datchas) built within the strip on either side of the track and tolerated insofar as they were of "insubstantial" construction and easily demolished, have become permanent. In the long term they may cause problems linked to their closeness to the permanent way.

In the countryside, the environmentalist does not affect rural settlements since few Kolkozs are located along the track.

Waste water:

The law requires each company to treat its own wastewater in water treatment plants. Although large railway centres respect these conditions and satisfy health standards, in the countryside many do not have any or have faulty installations.

This is the case, among others, at the Almaty passenger carriage cleaning station, which uses detergents and solvents.

During work on site for the construction or repair of large structures for example, no special precautions are taken regarding waste.

Problems with pollution of ground water are starting to become apparent in some places, especially in the countryside. The causes are varied:

- direct discharge of untreated waste water,
- leaching from household waste
- industries

Air:

Apart from the impact on the environment caused by smoke from diesel locomotives which is dealt with earlier in this report, the railway uses in its works 213 sources of combustion (boilers).

Only half of these boilers have scrubbing systems. For the remaining ones, a plan to bring them into conformity with the standards is in the pipeline but the high cost of a filter (6,600 dollars) may cause the current situation to continue for some time.

In addition, 90% of passenger carriages are still heated individually by coal-burning stoves..

Asbestos:

Law now forbids the use of asbestos. The small amounts used in construction reduce problems linked to its use but there is no technique in Kazakhstan for recycling this material.

Solid waste products:

For solid waste products, the method of disposal depends on their classification:

- inert waste is, most frequently, deposited at household waste disposal sites with the agreement of the owner;



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Environment considerations

- toxic waste must be stored in special facilities.

12.3.5 Measures taken to reduce adverse environmental effects by KTZ and the Ministry

Health protection area:

Each working business must, in accordance with the nature of the products it manufactures or the nature of its activity, be surrounded by a health protection area (green space). The size of this area depends on the health classification of the business.

Samples are taken by inspectors attached to the Ministry of the Environment to determine the extent of the area polluted by noxious substances. The company can, as a result, be forced to change the boundaries of its protection area.

Waste water:

All waste water must be treated in a water treatment plant. Each business or community must have its own plant and is responsible for monitoring it. For the representatives of the Ministry, samples are taken up-stream and down-stream of the discharge and are compared. Fines can be levied if standards are not met.

"100 metre strip":

During construction of the rail network, a wide strip of land, not technically necessary for construction, was acquired by the State. This 50-metre strip of land on either side of the tracks, which was not to be built on, was designed to "insulate" the railway.

Its use is reserved for the needs of the company for its maintenance work and is also used for telecommunication cables. Incidentally, this strip may be cultivated and insubstantial holiday homes may be built on it but all industrial activity is banned.

Artesian wells:

Sources of drinking water are protected by three protective areas.

Within the first area closest to the source, all business activity and building is forbidden. It often incorporates its own water treatment plant.

Within the second area, activity is limited to gardening or agriculture (except for cattle breeding and the use of chemical products) and building is not allowed.

Within the third area, small holiday homes are allowed (dachas) but no industrial activity is allowed.

Quarries and depots:

No authorisation is required for the extraction and deposit of materials required by the railway on land owned by it. But the topsoil is put aside and then replaced over the existing area. A programme of landscaping (tree planting) or a return to agriculture is then carried out.



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Environment considerations

Opening a quarry outside railway-owned land requires authorisation from the Ministry of the Environment and Bio-Resources (including ballast, amongst others).

Nature areas and cultural heritage:

The new laws on the environment protect sites of special interest and important monuments.

The classification of sites and monuments is not much of a constraint for the design offices: in cases of the fortuitous discovery of an archaeological site, for example, the few built-up areas and the immensity of the steppe allow the route to be easily changed.

Solid waste:

For household waste, the current policy is in favour of recycling. In Almaty, for example, the waste is sorted and 40% is recycled (glass, metal etc.) The rest is taken to dumps since law does not allow incineration.

To store the toxic waste generated by industry, monitored facilities have been created (areas belonging to a business or a company) and they can be set up only with the authorisation of the Ministry of the Environment and Bio-Resources following study of the project.

The region of Almaty does not have this type of facility so industries retain responsibility for their own toxic waste with the Ministry reserving the right to monitor them. In this as well, the policy is for reduction and recycling of toxic waste.

Three parties monitor the potential impact on the environment; the owner, the Ministry of the Environment and the epidemiology department attached to the Ministry of Health. It is the responsibility of the co-ordinating committee in the town where the storage facility is located to correlate the various analyses.

12.4 Health, safety and working conditions

At head office, the seven people in charge work with the environmentalists in the "Safety and Environment" section, which is attached to the technical department.

This function is carried out in each rail region by, on average, four to six people. Their obligations are identical to those of the people responsible for the environment, that is to say to inform, co-ordinate activity, provide training and monitoring (see paragraph 4.1 "Structure and functions").

For the centres (workshops, depots, districts) with fewer than 500 staff, the work is carried out at regional level; otherwise a post of specialist engineer for safety at work will be created and, in addition, an instructor if the centre has more than 1,000 employees.

During the USSR era, there was no law about legislation at work, only standards. This lack has now been remedied since Parliament passed, on 22 February 1993, the Law on safety at work. This law is based on the experience of other countries, especially German legislation.

As for standards, some have been amended and republished (for some, only the place and date of printing have been changed). In any case, it has not been shown that they needed basic modification.



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The way legislation is moving appears to be positive. It now takes account of industrial illnesses and a five-year plan to improve working conditions has been set up. It recommends, amongst other things, that women should be exempted from hard labour and night working.

Once every three years, a representative from a laboratory approved by the Ministry of Labour inspects centres. Its report details priority investments and recommends compensation (bonuses, extra holidays or early retirement) for workers subject to difficult working conditions.

12.5 Key points in the restructuring process

12.5.1 Description of the project

Investments offered for the project of modernising the Kazakh rail network, which could have adverse environmental effects, can be broken down into two:

- a) the purchase and refurbishing of rolling stock and maintenance equipment and work on renovation workshops and depots.
- b) work on the infrastructure at those points, which are, at the moment, subject to speed restrictions.

The equipment is made up of:

- units for the mechanised maintenance of the tracks (tamper, track liners, sleeper layers etc.),
- new engines for diesel locomotives with renovation of the workshops and stabling facilities
- a track geometry measuring coach
- two machines for ballast cleaning.
- a rail-grinding train.

As far as the infrastructure is concerned, the work of restoring the formation of the Kazakh railway is concentrated mainly on those sections which have speed restrictions and where the line electrification between Otar and Almaty (150 km approx) is to be pursued.

This restoration applies to the formation but also to unstable civil engineering structures, which are subject to speed restrictions and of which 33 have been classified as top priority.



Environment considerations

12.5.2 Nature of the elements in the project likely to have an environmental impact

12.5.2.1 Impact linked to the project

The modernisation of the Kazakh rail corridors involves a wide range of work including the reinforcement of embankments, the replacement of faulty rails and sleepers, the decontamination of the formation, electrification, the reconstruction or repair of civil engineering structures and the replacement or improvement of signalling and telecommunications.

It also involves more specific local objectives such as the renovation of workshops and depots.

The environment will be affected by the manufacture, production and transport of materials. In most cases, these will all be associated with industrial activity.

But there will also be an effect on the environment as a result of nuisance caused by work on the formation and the renovation of installations linked to the activity of the railway.

12.5.2.2 Supplies

Such a big project will use large quantities of materials, both for adding material and for removing and recycling waste products.

The quantities of main materials required for rehabilitating the tracks are, on average per kilometre of track as follows:

- 130 tonnes of replacement rails
- 500 to 1600m³ of new ballast
- 1870 sleepers
- and the raw material required to reinforce the embankments

Apart from the rails, which will be acquired in Russia, the quarried material will come from existing sources in the country and manufactured products will be produced in large part within the Republic. This is the case, amongst others, for the equipment required for electrification of the tracks which was formerly supplied in its entirety by Russia and of which half the production has been taken over by local factories.

Ballast:

The supply of ballast will have environmental effects linked to this type of work:

- extension of operations at the extraction site with the consequent destruction of agricultural land and forest,
- risk of blighting the countryside



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- risk of polluting or lowering the water table,
- discharge of dust into the air and water
- noise associated with the quarrying of rocks and with crushing of same,
- road traffic inherent in this type of activity.

It should be remembered that the opening of a quarry is subject to authorisation by the Ministry of the Environment and Bio-Resources following procedures which take into account the environmental impact of any such activity.

Sleepers:

Their manufacture does not involve the large-scale use of natural resources: made of wood and in limited numbers, they will be supplied by local sawmills.

As for those made of concrete, they will be produced in national factories. The quarries which will supply the ingredients for concrete generate the same type of environmental impact as ballast quarries.

Material for filling embankments:

The amounts of raw material required for restoring the formation will be limited since no changes in route are planned and it can be extracted from land owned by the railway after the areas and quantities to be removed have been determined by geologists as is done at present.

12.5.2.3 Work and maintenance

The start of work will have an impact on the areas to be renovated whether on track or large structures. Nuisance will be created by the work but also by the mobile workshops needed to maintain the track machines and by the working sites set up temporarily to repair or rebuild large civil engineering structures.

The replacement of existing elements in the renovated sectors will produce over the various phases of the work, large quantities of waste, requiring means of transport, storage or discharge. But a large part of these waste products can be recycled.

The main environmental effects are shown below:

- clearing or destruction of vegetation,
- use of water resources,
- risk of pollution of the water table or water courses,
- noise and vibration caused by tamping the ballast, grinding the rails and the movement of site plant,
- discharge of dust,



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- discharge into the atmosphere of smoke from the diesel locomotives and lorry traffic,
- disruption of rural and town activities (schools, hospitals etc.),
- traffic hindering with lengthened travel times,
- safety problems,
- visual intrusion,
- diverse waste products.

12.5.3 Effects linked to improvements in traffic flow

Modernising the network will increase its use because of reduced journey times and increased capacity of the lines.

This improvement will bring with it effects such as:

- increase in smoke emissions on non-electrified lines,
- increase in power consumption,
- more noise,
- risks of sound pollution at night linked to larger amounts of traffic.

12.6 Measures to reduce these effects

12.6.1 Introduction

This part of the report describes the measures and procedures, which will be enforced to control and manage the impact of work on the environment. These measures are described here in broad lines. They will have to be described in detail at a later date and will have to form an integral part of the project design process. Those in charge of carrying out the work will have to observe them.

No part of the project will be authorised or started before the appropriate measures to reduce the impact on the environment have been adopted.

12.6.2 Measures linked to supplies

The treatment of the environmental aspects associated with activities in the supply chain are the responsibility of:

- either the General Management of the Railway,



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Environment considerations

- or suppliers.

Although the General Management of the Railway is not capable of imposing conditions concerning the environment outside its control, it will make every effort to ensure that its suppliers adhere to the best methods of mitigating any adverse effects on the environment.

It may, in this matter, consult the Ministry of the Environment and Bio-Resources.

Ballast:

Companies controlling ballast quarries, will have to be subject to a certain number of measures in order to reduce or eliminate adverse environmental effects caused by their activities. Such measures will include:

- damping down of raw materials in stock,
- -acoustic insulation of noisy workshops,
- -use of settling tanks to reduce discharge of mud into water courses,
- restrictions on working hours to limit the noise from the factory and from movement of traffic if built-up areas are adjacent or close to lorry movements,
- protection by anti-dust screens of stone-crushing equipment and conveyors,
- washing the wheels of vehicles as they leave the site,
- protection of fuelling and maintenance sites for vehicles to avoid leaks of hydrocarbons,
- restoration by landscaping (planting, infilling, shaping) of extraction sites no longer in use.

Sleepers:

The production of concrete sleepers can also involve measures including:

- management of extraction sites for the aggregates required for the manufacture of concrete, as laid,
- treatment of waste water before discharge into the environment,
- sound insulation of noisy production units.

Materials for embankment filling:

The excavations created by the removal of materials for embankments on railway land, will be subject to special measures:

- the topsoil will be put aside and grassed and then replaced on the work site when the work is finished,
- waste non-polluted ballast as well as any other inert waste can be dumped there,



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- landscaping of the site (plantings) will be carried out when the work is completed.

12.6.3 Measures linked to the work

Modernisation work can be carried out over relatively short periods. The duration and frequency of the work is based on a compromise between the requirements of the work and the need to minimise interruption to rail traffic. The direct effects are of limited duration. Nonetheless the possibility of cumulative effects and the risk of pollution must not lead to an under-estimation of these kinds of nuisance.

The rail corridors and other areas which may be disturbed over the course of the project will be inspected before work is started. This inspection will be carried out by qualified environmental staff belonging to the rail Regions and experts in different disciplines (wildlife, hydrology etc.) The project will, as laid down in the legislation, be communicated to the Ministries concerned for their approval.

All sites of special interest found must be treated in a special way.

The measures to reduce the environmental impact of the work are detailed below.

Brush clearing:

The areas of traffic movement of the plant on site must be reduced if possible, special trees must be protected, any rare or protected species must be transplanted and uncontrolled burning which could start fires must be avoided.

Water:

The use of water resources must be studied with care. Even if a company is working in zones designated as non-sensitive, it must take every precaution not to pollute surface or underground water or the soil. It must also anticipate incidents and have plans for corrective measures in addition to preventative measures.

Hydrocarbon pollution:

- to avoid accidental leakages of hydrocarbons from site plant, it must be inspected regularly,
- parking area surfaces must be sealed with a waterproof covering and run-off water collected,
- storage tanks will be placed in special areas away from possible impacts and fitted with a safety holding tank.

Oil pollution:

- the waste oil from equipment will be removed in sealed drums and recycled,
- the correct amounts of oil for stripping large structures must be used and be 100% vegetable on sensitive sites.



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Mud pollution:

- the cleaning of plant will be carried out in areas put aside for this use and site vehicles will not cross water courses by fording (water directed through conduits).

Concrete pollution:

- to avoid leaks, the equipment used to transport concrete together with the manufacturing centres will have to be regularly inspected,
- emptying and cleaning of plant must be carried out in areas put aside for the purpose,
- particular attention must be observed if concrete is injected to strengthen the track formation: surveys and tests must be carried out beforehand.

Collection of water:

- septic tanks, installed before work is started will hold foul water,
- for run-off water, the areas to be sealed with a waterproof layer are as follows: the parking areas for plant, draining, cleaning and fuel-storage areas, supply sites and areas where concrete is manufactured.

These areas must be bounded by ditches to collect polluted water, such ditches to be of a sufficient size to protect against accidents. The water will then be recovered and treated in degreasing-settling tanks of the correct size or any other cleaning devices before being allowed to rejoin the existing hydraulic network.

Influence on water flows:

- discharge of waste is forbidden if the waste has not been treated and the filtration systems maintained in such a way as to avoid filling, silting, clogging,
- for supply, forbid or limit connections and pumping, which will disrupt existing systems (supply to people, ponds, and irrigation).

Noise and vibration:

Although temporary and brief, the impact of site noise and, to a lesser degree, vibration, are problems, which must not be neglected: they can even be the most annoying kind of disruption for people living near the track.

Any nuisance caused will be tolerated better if a campaign of information is carried out beforehand. Any such campaign must not, however, be substitute for real measures:

- in sensitive areas, use temporary acoustic barriers,
- the site equipment and plant must conform to current standards,
- choose sites for equipment as far from houses as possible,



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- site movements should not, if possible, use public roads (creation of tracks)
- in built-up areas, plan working hours to fit in with the times when people nearby are relaxing.

Traffic and safety:

Problems of traffic and safety are elements, which cause annoyance to people living nearby and belong to the domain of the environment.

The following measures are obligatory for road traffic serving the site when it impinges on public roads:

- the site routes must be agreed with town councils, to avoid residential areas, town centres and market places,
- site accesses must be correctly sign-posted (especially for the emergency services),
- arrivals and departures of vehicles should be spread out over the day to avoid congestion,
- lorries are to be cleaned before going onto public roads and precautions must be taken to ensure that the load is secure by the use of nets or tarpaulins if necessary,
- all public or private routes must be reinstated (access to agricultural land, for example), either on site or by the use of temporary deviations.

Emission of dust:

In dry weather, routes used by site traffic and raw materials used for the formation must be damped down; chalk treatment must be avoided in windy conditions.

Exhaust gas from locomotives and site plant:

The equipment which will be used for rehabilitation of the permanent way will be acquired or refurbished in large part by means of the loan from the EBRD and will conform to current standards.

Waste:

A large proportion of the waste products will be recycled. The rails will be stored and then used on lower grade lines (secondary lines, marshalling yards etc.) At the end of their useful life, they will be sent to Russian foundries for melting down.

Ballast, which cannot be re-used as ballast can be recycled as foundations for roads, for reinforcing the formation or could be made available to town councils.

That which is too polluted to be used again (from depot or marshalling yards for example) can be stored in sealed dumps owned either privately or by the railways; the owner of the dump being responsible for inspection and monitoring.

Wooden sleepers which cannot be used again are given to the people living close to the track or are burned on site (any poisonous fumes given off by the burning sleepers which were



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originally soaked in creosote are at a very low level since the effects of wear and time greatly reduce the levels).

As for concrete sleepers, when crushed, they can be used, amongst other things, to reinforce roads.

Waste produced by restoration work in the rolling stock maintenance and storage depots will have to be sorted and then directed to the appropriate dump according to their degree of toxicity. All hazardous waste will be carried by authorised transporters with the producer of the waste remaining responsible for their final destination.

Waste linked to human activities must not be buried or left on site at the end of the work but collected and sent to a household waste dump.

5.19.4 Measures linked to operations

Noise:

Noise is a local nuisance which depends on operating conditions throughout the infrastructure (speed and frequency of trains) and its impact is directly linked to the proximity of residential areas.

In Kazakhstan, people living near the railway have not voiced any complaints. No claims have come to the attention of those in charge of protecting the environment either with the railway or in the Ministry. It is true that the acquisition by the State of a strip of land 50 m wide on either side of the track during construction of the network greatly reduces the perception of railway noise.

But recently the newspapers have been publishing complaints made by town councils about nuisance caused by the railway (air and ballast pollution). And, in the medium term, it may be thought that, because the rule of no construction within the 50m strip has not been respected, and making comparisons with the reactions of people in western countries for whom noise has become the most frequently quoted source of irritation, this aspect will take on an increasingly important character.

Noise is defined as a mixture of undesirable sounds causing some level of unpleasant reaction. To measurable physical levels (sound levels), we can add physiological levels (different perception according to individuals).

The effects of noise on man can be physical and psychological: loss of hearing, poor sleep, increases in stress levels. Or it may have indirect effects: difficulties in communicating, feeling of invasion of personal space, influence on behaviour.

Noise caused by railways, unlike road traffic noise, is cyclical (quiet periods between trains), comes and goes suddenly and is fleeting by its very nature. Various studies in Europe have concluded that annoyance caused by rail noise is, when measured on an equal footing, clearly less than that produced by road traffic. A difference of at least 5-dB (A) is currently accepted as being the difference between these two modes of transport.

Noises produced by a train can be grouped under four headings:

1. engine noise



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2. movement noise,
3. aerodynamic noise,
4. other sources, in particular braking.

For engines, diesel engines are those, which produce most problems associated with, noise (engine, cooling fans).

Movement noise results from the rail/wheel contact, the main cause being irregularities in the surface of the wheels and rails.

Aerodynamic noise, caused by the interaction of air with the vehicles, becomes significant only at high speeds and so can be disregarded here.

For other sources, the noise of braking, running over metal bridges, wheel skidding in curves and the noise of wheels over rail joints must be mentioned.

To my knowledge, no serious study of noise levels has been carried out in Kazakhstan and it would be safe to assume that the maximum acceptable noise level of 65-dB (A) is exceeded in built-up areas where traffic is at its densest. In addition, there are no sound barriers in the Republic.

As a comparison, French legislation relating to classic railways (high-speed lines are excluded), the guide for overland transport recommends maintaining the day (0800 - 2000h) at less than 65 dB (A) in low noise areas and at less than 70 dB (A) in areas where background noise is higher than 65 dB (A).

A decree being drawn up in which more stringent standards are laid down for railways is to be published shortly.

Measures to mitigate or protect against railway noise can be of various kinds. They involve action on rolling stock, track and the installation of specific equipment:

- for rolling stock, the measures to be adopted are: reprofiling the wheels, sound insulation of the engines and cooling fans and a less noisy system of braking,
- for the track, rectification of corrugations and defects on the surface of the rails, elimination of rail joints in built-up areas, sound-proofing of the deck on steel bridges,
- the specific equipment to protect houses are anti-noise screens, earth banks (or barriers) which could be landscaped (grassed, planted with trees) and protection for the facades of houses.

The increase in traffic expected following the modernisation of the network will raise noise levels but it can be reasonably assumed that it will be compensated for by the stricter and more frequent inspection of the causes of this phenomenon (wheels, rails).

Electrification:



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For the management of KTZ, electrification appears to be one of the solutions to environmental problems. An article in the internal periodical "The Railway" was sub-titled "Electrification protects the environment".

It cannot be denied that this technology has several advantages. To quote some:

- less noisy and less polluting locomotives (no more fuel leaks onto the ballast, no more smoke, problems which are felt particularly acutely in towns),
- savings in power consumption, maintenance of locomotives and therefore operating costs.

However, for Kazakhstan, the drawbacks associated with this technology are:

- the cost of the work,
- frequent power cuts interrupting running.

KTZ has undertaken to electrify the Chuu-Almaty line of which the Chuu-Otar section is completed. For the remaining 150 km to link to Almaty, financial aid is part of the Tacis/Traceca restructuring programme.

Fines have been imposed on the power generators to compensate KTZ for cost incurred when its trains are halted as a result of power cuts.

12.7 Costs linked with environmental measures

It is not possible to calculate precisely a cost for environmental measures for a project, which is only in outline form. Reliable estimates could be given only after the final plans for the project are available. Also, these costs are often included in sub-items of engineering budgets and are implied in the manufacturing standards to be observed by companies.

For example, following rehabilitation of the rail network, sound protection (anti-noise walls, earth banks) cannot be planned until the production of reliable estimates of traffic and an initial survey of existing noise at the sites potentially involved. In addition, this type of protection is neither used nor manufactured in this country.

There is also an important problem, which will have to be settled by the General Management of the Railway. In fact, the land on either side of the track (100 m band) is partly occupied by initially temporary residences (holiday homes) but which have become permanent: it would be useful to know KTZ's policy with regard to resolving this problem in the future.

Whatever the situation, the measures described in the preceding paragraphs must be incorporated into the specifications of companies carrying out the work or supplying materials and taken into account when designing the project.

Nonetheless, it seems prudent to put aside, out of the total amount of the loan allocated for the work, a certain percentage, which will correspond to the cost of the measures to be applied to mitigate the adverse environmental impact of the project. For this, I will take as a reference, a recent study carried out in Poland for the European Commission (FAR programme): it bore on the modernisation of the E-30 line and concerned the rehabilitation of a 200-km section. The conclusion of this study showed that the calculated supplementary



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costs were 2% of the total amount of the project (estimated April 1997). However, this percentage must be considered to be at the low end of the range, a figure of 5% seems to be closer to reality, taking past experience into account.

Certain needs not forming a direct part of the objective of this project were raised by my opposite numbers in the course of the various meetings I had with them during this mission. They concerned the purchase of filters for the boilers (six thousand six hundred dollars multiplied by one hundred for all the boilers), the finance needed to continue construction of the boiler at the Almaty depot (twenty thousand dollars) and the purchase of a portable analysis equipment for taking samples on site (smoke, soil, water).

For the Almaty depot, when in the future the problem of leaks from diesel locomotives and tankers has been resolved, an in-depth cleansing of the site should be envisaged.

12.8 Action plan for managing the environment

This paragraph describes several procedures, which could be implemented to improve consideration of the environmental impact caused by the modernisation, maintenance and operational work of the railway. These procedures are paths to explore rather than prescriptions.

Organisation:

- The structure operated at the moment by KTZ appears to be sufficient: ecologists are present in Management, in the Regions and in large operating centres. To perform their tasks, they can call on the support of representatives from the Ministry of the Environment, the Ministry of Health and the technical departments operated by towns. It is their responsibility, in concert with all the players involved, to co-ordinate actions. This does not appear to be the case at the moment.
- During the work, in order to involve each company, a member of its staff should be in charge of organising and monitoring environmental protection measures on site. Being responsible for and directly involved in the procedure, he will have the means to influence the way it is implemented. He will be the point of contact for KTZ and all parties involved (members of Parliament, councillors, associations, State departments, and residents) in applying correctly the directions laid down in the contract.
- An organisation created for each large project (the threshold could, for example, be the amount of the investment), will be responsible for monitoring by checking on commitments entered into. It will continue to operate for three or five years following completion of the work, and this will allow it to check on the application and permanence of the measures planned during the project design (planting, specific crossings for fauna, water management etc.).

Application of legislation:

One of the major difficulties for those responsible for the environment, in spite of sanctions applied, is to persuade the companies involved in the rail industry (workshops, depots) to respect the legislation. This lack is only in part due to ignorance and is the result of a lack of resources which makes any improvement in the short term unlikely if nothing is done to remedy the situation.



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- One possible solution would be to launch an awareness and information campaign aimed at KTZ management to draw their attention to the major problems of pollution and their long term consequences (costs of restoration measures, negative aspects of the railway). The Company must move from a defensive position to a clearly offensive policy to show that using the railway in preference to other modes of transport is a means of protecting the environment.

Training:

Another line would be to set up an Environmental Quality Action Plan (EQAP). This plan applicable to all sectors of the Company but above all to industrial ones, consists of an internal process of raising awareness of the environment. Its broad lines are:

- conferences for all staff on such themes as water and waste products, with the participation of outside partners,
- creation of voluntary working groups to suggest ways of improving the treatment of certain waste products.

Experience has shown that interesting proposals always emerge from this policy, proposals such as reducing the production of waste products by acting on the conditioning of raw materials, recycling internally some of the used material, recycling or upgrading certain waste products.

12.9 Conclusion

The rapid evolution of legislation and regulations aimed at improving conservation of the environment as well as awareness and the growing weight of public opinion on this subject impose new constraints on companies.

It would be a pity if the Republic of Kazakhstan were to miss this opportunity.

All the more so since this country has suffered ecological catastrophes whose effects seem to be, for the moment damning (Aral Sea and Semipalatinsk).

The State has made a sustained legislative effort but although there are competent personnel, the lack of financial resources makes, for the moment, any serious consideration of the environmental problems illusory, above all for non-spectacular effects.

The railway still enjoys an almost complete monopoly, inherited from the previous situation, for passenger and goods transportation. This is lucky for the environment since railway transport is, in this respect, the least polluting method of transport.

It behoves those in charge, both at ministerial level and at Company level, to build on this advantage by promoting awareness and respect for the environment by all.



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Human resources

13. Human resources

13.1 PREAMBLE

The present study was prepared mainly through interviews of persons in charge in various positions in KTZ. Statistics for 1996 and the 97 first quarter were made available. Other reports were read and particularly the MERCER Report « Moving Kazakhstan's Railways to a Market Economy » dated September 1996 who describes the current situation up to mid '96 and propose recommendations.

The objective of the present report is thus to be as useful and pragmatic as possible taking into account the fast pace in which reforms are implemented into « Kazakhstan Temir Zholy » (KTZ).

The HRM Consultant takes this occasion to thank all KTZ persons who participated actively in the preparation of the present report - particularly those working in the Personnel Department - by providing data, advice and friendship.

13.2 DIAGNOSIS OF PRESENT SITUATION

13.2.1 Overall organisation

13.2.1.1 . New railway organisation (July '97)

« Kazakhstan Temir Zholy » (KTZ) results from a Government decision (January 1997) to merge the three former Kazakh railways regions (Almaty, Tselinnaya and West Kazakhstan Railways) inherited from the former USSR railway organisation (MPS) which had split during 1990. These three regions, organised into 14 districts, were since then, to a large extent, quite autonomous.



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In January 1997, the Government decided to reunify the railway into one entity with head office in Almaty. In the meantime, the MOTC Railway Department was transferred to Akmola in July '97.

At the same time (July '97), the decision was taken to reorganise the railway into 6 geographical Regions or Divisions replacing the three former regions and the 14 former districts as follows:

1. Turkistan Railway in the south including 2,5 former districts
2. Akmola Railway in the north including 4 former districts
3. Sary-Arka Railway in the centre including 1 former district
4. Almaty Railway in the south-east including 1,5 former district
5. Semipalatinsk Railway in the north-east including 2 former districts
6. West Kazakhstan Railway in the west including 3 former districts.

Data collection will be reorganised accordingly and, concerning personnel matters, a new form is under preparation in order to collect and aggregate personnel data taking into account this new organisation. The new information system will be implemented for the year 1998.

13.2.1.2 Head Office organisation

At present (September '97), under the Chief Executive the Head Office is organised into 6 major Departments and 5 support services.

Departments

- Infrastructure or Technical Department
- Operations Department
- Freight Department
- Passenger Department
- Finance Department
- Legal & Personnel Department

Support services for the Chief Executive

- Senior Staff Management (recruitment, appointment and transfer of top managers)
- Railway Advisory group
- Safety Audit



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- Railway Police
- Secretariat

A total of 700 employees are appointed at present to head office. It is planned to increase this to 860 people when the reorganisation is completed by the beginning of the year '98.

13.2.1.3 Legal & Personnel Department organisation

The legal sector is composed of legal advisors specialised in social law code.

The Personnel sector is organised in:

- personnel administration service
- personnel policy and training service (and related training centres)
- medical service
- educational institutions service
- railway gazette (weekly railway newspaper issued from August '97)
- farms management service (deleted in August '97)

Persons in charge of these services were interviewed and the following is a synthesis of the information collected from these meetings.

13.2.2 Employees' status

The railway staff, including civil servants (from July '97), get the general workers status and are ruled under the « Working code of the Republic of Kazakhstan ». A complementary code is applied to railway employees. Major components of these codes are the following:

13.2.2.1 Retirement

Retirement date was fixed at 60 for men and 55 for women, but since July'96, the date of possible departure will be delayed by 0,5 year per year until employees are 63 years old (men) and 58 years old (women) at year 2001. The pension is paid by the Government. The railway pays monthly 30% of the total payroll to the governmental pension fund. The pension amount is based on the average of two last months of activity depending also on number of years at work (2% per year of activity).

13.2.2.2 Separation process

The law still fully protects employment. A new law is under discussion to get more flexibility. At present, it is possible to dismiss people only for disciplinary reasons and not for economic reasons. In case of joint ventures or concessions, staff must be kept with the joint venture or concessions. Nevertheless, the Government can accept a transfer on its payroll after negotiations. In that case, a specific ad hoc agreement is needed. The new social code will be



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discussed in the Parliament during the last quarter of '97 for application during '98. This new code, if issued, should bring more flexibility regarding employment. For instance today, in case of dismissal, a 3-month pay allocation is generally provided as a severance package. This could be changed in the near future.

Social activities

Before '90, social activities contributed to 2/3rd in the staff monthly salary (houses, schools, medicine, food, etc.). The process of transfer of social activities is under way to private or respective Ministries as follows:

- **Flats** were transferred to personnel 2 years ago (the railway building maintenance department was reduced by 1,833 staff)
- As per December'96, 377 **schools (basic education)** were run by the railway: 185 kindergartens, 186 primary, junior and secondary schools and 6 social organisations. On the 1st of January of 1997, 171 schools were transferred to local authorities and the railway closed 83 schools.

As per September'97, 123 schools are still run by the railway with a budget of 776 millions tenge. The Government participate for 479 millions and the remainder (297 millions) is to be funded by the railway. To face this shortage of funds, the railway has decided to merge schools and regroup them into « complex schools » particularly in the most remote centres.

As per January'98, it is planned to get 55 « complex schools » for a total budget of 400 millions tenge corresponding only to the state participation for that year, the other schools being closed.

- As per September '97, the situation for **specific railway schools** is the following :

The *Academy of Transport and Communications* was transferred to the Ministry of Education and its two subsidiary institutes (north and south) transferred to municipalities. KTZ contracts with the Academy to get young railway engineers trained (4 to 5 years) and to provide refresher courses to middle and top management (2 weeks per group). This contract represents 90% of the total Academy activity.

« *Teknikums* » or *technical colleges*' (6) dedicated to train young railway technicians (3 years) were transferred to the Ministry of Education, which pays teachers salary. KTZ contracts with them to train their required future technicians. KTZ contracts represents nearly 100% of the total *teknikum* activity, but persons in charge are already looking for other contracts in order to diversify their activities out of the railway.

The same decisions were taken for *other professional schools* (15) in charge of training young workers (2 years duration). KTZ contracts for its own needs.

KTZ, in addition, owns 5 *technical schools* to train its staff in 23 railway specialities for durations of 10 months (September to June). Some refresher courses for workers are carried out in these schools. They are the only schools remaining with KTZ.

- As per December'96, 92 **medical centres** were run by the railway. Since January the 1st of 97, 42 hospitals and 34 care centres were transferred to local authorities. The following



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day, 36 hospitals were closed, the municipalities having no money to handle them. The following are still kept within the railway

- 16 hospitals (3 of them are financed by the state and 13 by the insurance fund (see below),
- 16 recruitment centres attached to hospitals,
- 85 medical centres located in the shops and locomotives depots.

During 1998, it is envisaged to transfer to the Health Authority another total of 8 hospitals.

In '90, 30,000 staff worked in the medical sector. They are today (mid'97) about 6,000 of which 5,540 are paid by the railway medical insurance fund (see below), and 460 are paid by the railway. In 1998, only 400 employees working in the shops in the medical sector will be paid by KTZ.

- As per January 13, 1996, a **medical insurance fund** was created in the railway as a subsidiary of the national medical insurance fund. This is funded through a monthly payment by the railway of 3% of the total payroll (active and non-active people). With this fund, railway staff get free medical care for current illness. The Government is in charge of funding cares for severe sickness. A computerised database was set up in the railway building to manage the 255,000 files (active and retired personnel).
- **Agricultural activities** (144,000 hectares, 22,000 sheep, 5,000 pigs, 4,000 cows, 2,000 horses, etc.). Decision for transfer to private hands mainly through a tendering process was taken in July '97 and the transfer is to be implemented step by step, the food being a very sensitive problem connected with workers (canteens, payments in kind,). This service was said to be not part of the Personnel Department any more.

13.2.2.3 Trade unions

There is still only one trade union in the railway but there is legal possibility to have more. Employees pay a non-compulsory 1% of their salary to the trade union (taken from source). The trade union manages social activities and participates to regular negotiations regarding salaries, working conditions, etc.

13.2.2.4 Training organisation

The USSR educational system was considered as one of the most efficient in the world even though the technology taught was often outdated. Railways provided in the past full education for their employees playing the role of the Ministry of Education « a state in the state ». To day, the separation between what is relevant for the Ministry of Education and what is relevant for the Ministry of Transport is mostly completed. Outlines of the educational system is as follows:

- playground from 2 to 6 years old
- primary school (4 years) from 7 to 10 years old
- junior school (5 years) from 11 to 15 years old (9th class)



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- secondary school (2 years) from 16 to 17 years old (11th class)
- possibility to enter other higher schools (for 2 years to become a technician) or the University (for 4 to 5 years to become Engineer).

Examinations include every level. In addition, tests are required to enter a higher level. The railway organisation was duplicating this system for its own employees (generally children of railway staff).

As said above, situation changed dramatically in the last two years and the separation between relevant Ministries is almost completed. KTZ continues to train its employees by contracting the training activity with the former institutions.

13.2.2.5 The Academy

The Academy of Transport and Communications in Almaty - formerly a subsidiary of Tachkent Railway University - deals with railways, waterways and road transport training. It was recently (August 17, 1995) transferred to the Ministry of Education. This Academy organised into 6 faculties delivers engineer diplomas (4/5 years study at a cost of \$1,100 per student per year) and refresher courses for middle managers and top managers. The Academy is fully equipped with 63 laboratories and a vast library and trains more than 5,000 people per year in 32 specialities.

One of the faculty deals with « qualification improvement » of railway managers consisting in providing training sessions of 2 weeks duration for groups of about 15 to 20 people in various specialities. For instance, for the year 96/97, 31 groups representing a total of 531 managers went to refresher courses at this faculty. The detailed programmes still focus priority on technical aspects and very little is done for commercial or modern management matters.

A contract was signed on May, 19, 1997 (valid until December, 31, 1998) between KTZ and the Academy with precise railway needs (for instance, 460 young people entered railway engineering in '96 in 20 specialities in addition to the above refresher courses for managers), The cost to be paid by KTZ to the Academy.

KTZ, at present, pays for the studies and recruits systematically the new engineers. Students are contracted to work with the railway for at least 3 years.

It was said that a complete review of staff needed in the new railway organisation will be carried out by the Personnel Department as soon as possible in order to determine the real needs of KTZ and adapt the number of people to be trained accordingly.

13.2.2.6 The « Teknikums » or Technical Colleges

There are 6 « teknikums » in Kazakhstan concerned with railway specialities. They are located at Pavlodar, Almaty, Akmola, Aktiubinsk, Kazyl-Orda and Petropavlosk. These teknikums were recently transferred to the Ministry of National Education with a « college » status. Their vocation is to train future technicians or middle management with a 3-year specialised course duration for students entering after 11th class or 4-years duration for students entering after 9th class. Young students enter these technical colleges through competition. For example, for the Almaty Teknikum, there were 5 candidates for one place for the 97/98-year.



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The Ministry of Education pays for the teachers but in August '98, the college will have to be self-sufficient and be financed mostly by contractors. Already, KTZ contracts with these colleges to get qualified technicians in the various railway specialities.

General subjects represents 30% and railway subjects 70%. In the case of Almaty College, there are 970 students and about 75% of this total are children of railway staff. In the near future, the college will have to diversify with other transport mode contractors in order to reduce its dependency on KTZ to succeed in becoming self-sufficient in '98.

13.2.2.7 The Technical schools

The vocation of technical schools is to prepare qualified workers in every speciality. Youngsters enter these schools when they have their 9th class completed. They get technical skills qualification over a 2-year period.

Railway technical schools were also recently transferred to the Ministry of Education who pays for the teachers. Now, for railway needs in specific specialities, a contract is signed between each school and the local regional railway authority.

13.2.2.8 The Railway schools

KTZ finances its own technical schools (5) for specific needs such as track maintenance, signalling, operations, driving, etc. A total of 23 specialities are concerned. These schools belong to KTZ, which pays for teachers, building maintenance, etc.

These schools are located at Almaty, Pavlodar, Karaganda, Taraz (ex-Djambul) and Aktiubinsk. The duration of the sessions is generally of 10 months from September to June for major specialities. Refresher courses are also provided in these schools for a duration of 1 or 2 weeks.

A total of 1,320 people are at present studying in the above 5 schools and during the last year, 439 people attended refresher courses.

13.2.2.9 Summary of problems to be resolved

Teachers are highly qualified and the training is of very good quality even though the techniques are not often up to-date. Money is also short to keep good teachers and maintain the buildings properly. Nevertheless, the contracting approach seems excellent in present times.

KTZ should very quickly carry out a detailed study to know its short and medium term needs in staff number and qualification. At present, KTZ still continues more or less to plan as in the past, i.e. recruiting all young completing their exams, but this is no more realistic in a competitive environment. This aspect will be looked into details in the following recommendation section.

The problem arising is also the need for qualified teachers for the new disciplines required in an open economy such as: marketing techniques, commercial behaviour, management information systems, human resources management in the new environment, law, customs, accounting, international finance, banking systems. Recommendations will be made to overcome this problem later in the document.



Human resources

13.2.3 Distribution of employees per function

13.2.3.1 Situation as per December'96

As per December 1996, 126,937 staff members were appointed to railway core activities. The distribution was as follows:

- Locomotive Department : 33,119
- Wagon & Coaches Department : 27,142
- Operations Department : 12,042
- Freight Services : 7,565
- Passenger Services : 3,940
- Track Department : 26,385
- Signal & Tel. Department : 11,190
- Energy Department : 5,554

Including non-core activities where 30,223 employees are accounted for in '96, the total staff number was 157,160 distributed per category of employees as follows:

- Workers : 128,492
- Middle management : 16,827
- Top management : 6,823
- Employees (Finance) : 5,018

The Personnel Department because of lack of a computerised personnel database made no age-pyramid available.

Evolution from 1990 to 1996

Freight traffic dropped from about 407 billion tonne-km in 1990 to 113 billion tonne-km in 1996 and passenger traffic dropped as well from nearly 20 billion passenger-km in 1990 to 14 billion passenger-km in 1996.



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During the same period (1990-1996), employment (including non-core activities) decreased from about 200,000 people in 1990 to 157,160 end of 1996 meaning that when traffic decreased by 3/4, employment decreased by only 1/4. Therefore, there is no tight link between employment targets and current levels of traffic as shown in the following table.

| Year | Freight traffic (billion ton-km) | Passenger traffic (billion pass-km) | Traffic Units (billion) | N° Employees (non-transport) | N° Employees (Transport) | N° Employees TOTAL |
|---------------------|----------------------------------|-------------------------------------|-------------------------|------------------------------|--------------------------|---------------------------|
| 1990 | 407 | 19.7 | 426.7 | 56,078 | 142,170 | 198,248 |
| 1991 | 374 | 19.4 | 393.4 | 53,325 | 144,202 | 197,527 |
| 1992 | 286 | 19.7 | 305.7 | 45,030 | 142,968 | 187,998 |
| 1993 | 192 | 20.5 | 212.5 | 36,627 | 134,508 | 171,135 |
| 1994 | 147 | 17.4 | 164.4 | 33,706 | 127,540 | 161,246 |
| 1995 | 125 | 13.4 | 138.4 | 34,639 (1) | 127,003(1) | 161,642(1) |
| 1996 | 113 | 14.2 | 127.2 | 30,223 | 126,937 | 157,160(1) |
| 1997 (1st 6 months) | 52.6 (1st 6 months) | 5.9 (1st 6 months) | 58.5 (1st 6 months) | 25,776 (1st 6 months) | 125,995 (1st 6 months) | 151,771(1) (1st 6 months) |

NOTE: figures marked (1) are KTZ sources « form n°1- T (YTO-1) » from the Statistics Department. The other figures are from the « form n°1-k (YTO-8ts) », also from the Statistics Department. An explanation related to the discrepancies between these two sources was not convincing and it was proposed to resolve this problem with the new form to be put in place beginning of 1998.

Until now, departures in railway core activities are mostly compensated with recruitment (or transfers from non-core activities) as 125,995 employees are appointed in the railway core activities at the end of the second quarter of 1997 for 126,937 in December 1996. Anyhow, in 6 months, KTZ downsized of 5,389 employees (942 for the core activities and 4,447 for the non-core activities). The downsizing process is progressing.

As regards recruitment in 1996, a total of 15,509 employees were recruited from the employment market compared to a net total departures of 23,274 employees. For the first 6 months of 1997, 8,238 employees were recruited compared with a net total departures of 8,091. Turnover is high, but so is recruitment.



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13.2.4 Compared productivity ratios

The productivity (traffic units per employee) fell dramatically during the last seven years from 3 million traffic units per employee in 1990 to 998,000 traffic units in 1996. An employee is three times less productive in 1996 than in 1990 as shown in the following table.

| Year | Freight traffic (billion ton- km) | Passenger traffic (billion pass- km) | Traffic Units (billion) | N° Employees (Transport) | Traffic Units per Employee (000) |
|-------------------|---|---|-------------------------------|--------------------------------|--|
| 1990 | 407 | 19.7 | 426.7 | 142,170 | 3,001 |
| 1991 | 374 | 19.4 | 393.4 | 144,202 | 2,728 |
| 1992 | 286 | 19.7 | 305.7 | 142,968 | 2,138 |
| 1993 | 192 | 20.5 | 212.5 | 134,508 | 1,580 |
| 1994 | 147 | 17.4 | 164.4 | 127,540 | 1,290 |
| 1995 | 125 | 13.4 | 138.4 | 127,003 | 1,090 |
| 1996 | 113 | 14.2 | 127.2 | 126,937 | 998 |
| 1997 | 52.6 | 5.9 | 58.5 | 125,995 | 929 |
| (1st 6 months) | (1st 6 months) | (1st 6 months) | (1st 6 months) | (1st 6 months) | (estimation for '97) |

13.2.4.1 Analysis of employees' turnover

Employee's turnover is an aspect which is important to be looked at since 25,133 employees left the railway in '95, 23,274 in 1996 and 8,091 during the first 6 months of 1997 (transfers to or from one region to another one are not taken into account).

In 1996, 23,274 employees left the railway including 16,182 for personal reasons (retirement, dismissal, etc.) and 1,908 for disciplinary reasons, mainly absenteeism

During the first 6 months of 1997, 8,091 employees left the railway including 6,480 for personal reasons (retirement, dismissal, etc.) and 705 for disciplinary reasons. Compared with '95 and '96, there is a decrease in number of departures but they are still numerous.

The reasons for those departures as expressed in interviews are the following:



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- low level of pay (or no pay for some categories),
- hard working conditions (climate),
- emigration mainly to Russia and other countries,
- transfer to private companies or joint ventures for highly qualified employees (as for telecom),
- housing problems (since the privatisation of houses, transfers are more difficult and no more houses are built),
- low careers prospect because of the restructuring.

This should be taken into account in the perspective of downsizing. Attrition is certainly a powerful means to regulate the staff number.

13.2.4.2 Present method for appointing staff

Top Managers are selected and appointed by the Chief Executive and his team of Deputies. The organisation chart of the management level for each region is « recommended » by Head Office. Norms dating back from 1987 are at present under review in the process of the present reorganisation.

For the other levels, the number of staff is determined into two ways: technical norms crossed with a budget envelope determined on the basis of traffic revenues. In practice, with the envelop provided by Head Office (Finance Department), regions can organise themselves as they wish taking into account budgetary constraints. Thus, the process is very decentralised and a great autonomy is given to the regional networks / divisions to recruit, assign and dismiss.

A meeting is organised quarterly at head office level in order to review, supervise and monitor staff organisation and distribution based on the budget provided to each region by head office.

It was said that a detailed study would be carried out as soon as possible by the Personnel Department to revise organisation charts and determine new staffing norms in the process of the reorganisation under way.

13.2.5 Costs

13.2.5.1 Overall employees costs

The total salary costs supported by KTZ were 17,267 million tenge in 1996 for 157,160 staff for an average cost per employee of 409,950 tenge. Fringe benefits of 34% of these costs are incurred.



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6.2.5.2 Employee monthly salary

The average monthly salary (in Tenge) per staff category differs from one region to another region as follows:

| Staff Category | Average cost | ALMATY | TSELINNYE | WEST KAZAKH |
|-------------------|--------------|--------|-----------|-------------|
| Workers | 8,674 | 6,736 | 8,580 | 11,884 |
| Middle management | 11,752 | 8,586 | 10,482 | 16,697 |
| Top Management | 14,693 | 10,875 | 12,409 | 22,236 |
| Employees | 8,457 | 5,930 | 8,561 | 11,361 |

The average monthly salary of one employee (all categories average) was 9,258 tenge in 1996 and the average annual salary and fringe benefits of a KTZ employee are equivalent to \$1,500.

The Finance Department said that the average monthly salary of one employee would be in a range of 10,900 tenge in 1997. The average annual salary and fringe benefits is equivalent to \$1,750 in 1997.

13.2.6 New orientations for Human Resources Management

The following orientations was decided during 1995 / 1997 period:

13.2.6.1 Transfer of non-core railway activities

- The process is under way for kindergartens, primary and secondary schools. Only specific railway schools will be kept within KTZ.
- Hospitals and care centres have been transferred to local authorities. Only 16 hospitals are still kept with the railway. The creation of a medical insurance fund (January '96) financed by a 3% payment of the total KTZ payroll should compensate for the loss of such medical centres.
- Houses were transferred mainly to employees.
- Most agricultural activities should be transferred to private owners by the end of '97.

Thus, in 1998, most of the social sphere will be transferred from KTZ to other authorities.

13.2.6.2 Staff reductions to increase productivity

To reduce the debt of the railway and increase productivity, KTZ decided to:



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- get rid of non-core activities and the related staff,
- create and encourage joint ventures transferring the related staff to these joint ventures,
- then to adapt staff number to traffic (and revenue).

Staff downsizing process is progressing, mainly with non-core activities. The new organisation (new head office in Almaty and 6 geographical divisions) should allow a better control of staff number, but a specific management information system should be put in place as soon as possible.

The perspective of partial privatisation is also envisaged by KTZ. In this context, there is still a pending question : is it better to reduce staff before or after the integration of private participation?

- if downsizing takes place before, the sale of such activities will be more attractive to private investors, but KTZ takes for itself the risks of social problems;
- if downsizing takes place after, social risks are left to private companies who could be more reluctant to invest.

This political / social dimension should be taken into account, but one is encouraged by the accelerated pace of downsizing by using natural attrition.

Communication is a key element in the restructuring process and for this reason, KTZ decided to replace the three former gazettes published in the three ex-regions by a new newspaper called « Kazakhstan Temir Zholy », published at Head Office level in order to demonstrate that KTZ is a unified railway company.

This weekly newspaper (presently 4 pages in A2 format) was issued in August '97 (n°1 on the 1st of August.). A team of professional (20 people including 8 journalists and 4 correspondents) well equipped with up to-date equipment makes it. 27,000 copies are presently produced and dispatched all over the country, mainly for railway staff.

The Chief Executive and his Deputy from the Personnel Department chair the editorial board.

13.2.7 Productivity target

In this new context, KTZ is also fully conscious that the drop of productivity is a burden for KTZ and it is necessary to recover a higher productivity level in the new competitive environment. Only two possibilities allow productivity improvement: increased revenue (traffic and tariff increases) and / decreasing staff number. As regarding traffic forecasts, it was estimated that the traffic in 2002 would be more or less the same as for 1996. In this respect, if the staff productivity target is established at 3 million traffic units (mainly freight) per employee as it was the case in 1990, the target staff number for KTZ should be in the range of 42.400 employees. Such a decrease of staff may be not acceptable rapidly mainly for social reasons. Anyhow, downsizing process should be accelerated in order to reach an acceptable productivity level. In this context, an attrition programme for up to 40,000 employees over 3 years from 1998 is proposed.



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Furthermore, the introduction of new technology in the railway will require new skills, which do not exist today in KTZ. Therefore, a manpower development programme should be implemented in order to meet new KTZ requirements in terms of skills and productivity. The following sections propose approaches and recommendations for downsizing purpose, manpower development and management.

13.2.8 Staff requirements per major functions

13.2.8.1 Present situation (as per December 1996)

NOTE: Figures taken into account below corresponds to the 126,937 staff number of the core railway activity as given in the KTZ form n°1-k (YTO-8ts), plus overall management (3,833), plus procurement (3,234) plus civil engineering constructions (12,518) giving a total of 146,522 employees. The difference (10,638) with the overall total of 157,160 corresponds to various activities including social and medical activities.

In addition, staff in charge of traffic management (12,042) is split into the following business or service units as follows: infrastructure management for 60%, passenger activity for 30% and freight activity for 10%. This estimation corresponds to the average distribution of work of station staff into these three activities.

Overall management function

(medical and social activities are not taken into account)

Management: 3,833

Procurement: 3,234

Infrastructure service unit

Track maintenance: 26,385

New construction works: 12,518

Signal & telecommunications: 2,861

Buildings and others: 8,329

Electrical maintenance (various): 4,661

(Catenary): 893

Traffic operations (60% of 12,042): 7,225

Freight business unit

Freight activity: 7,565

Freight activity in stations:



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| | |
|---|----------------|
| Traffic staff (10% of 12,042) | 1,204 |
| <i>Passenger business unit</i> | |
| Passenger activity: | 3,940 |
| Control in stations & trains: | 5,354 |
| Traffic staff (30% of 12,042): | 3,613 |
| <i>Rolling stock driving and maintenance service unit</i> | |
| Locomotives (drivers): | 11,922 |
| Locomotive maintenance: | 21,197 |
| Wagons & coaches maintenance: | 21,788 |
| TOTAL: | 146,522 |

13.2.8.2 Optimum target

The staff target proposed below for the 2,007 horizon considers all investments completed and the railway fully modernised and reorganised. In this respect, European ratios are applied whenever possible in order to determine the optimum staff target. For the other activities such as operations, freight and passenger activities, a decrease of 35% is applied, percentage recently agreed by the new Ministry of Transport (M. Kaliev). For some specific activities, it is proposed or to sub-contract (buildings maintenance for instance), or to fully privatise or separate / transfer (civil engineering constructions, water distribution, etc.).



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Human resources

1996 Year 2007 STAFF TARGET

Overall management function

(medical and social activities are not taken into account)

| | | |
|---|----------------|--|
| Management : | 3,833 | 700 + (200 x 6 regions) = 1,900 |
| Procurement : | 3,234 | 1,800 |
| <i>Infrastructure service unit</i> | | |
| Track maintenance : | 26,385 | (0.5 x 26,000 track/km) =13,000 |
| New construction works : | 12,518 | (separated / privatised) |
| Signal & telecommunications : | 2,861 | (0,08 x 13,500 line/km) = 1,080 |
| (buildings / others) : | 8,329 | (local sub-contracts) |
| Electrical maintenance (various) : | 4,661 | (local sub-contracts / separate) |
| (catenary) : | 893 | (0.1 x 5,836 track/km) = 585 |
| Traffic operations (60% of 12,042) : | 7,225 | (minus 35%) = 4,700 |
| <i>Freight business unit</i> | | |
| Freight activity : | 7,565 | (minus 35%) = 4,920 |
| Freight activity in stations : | | |
| Traffic staff (10% of 12,042) | 1,204 | (minus 35%) = 780 |
| <i>Passenger business unit</i> | | |
| Passenger activity : | 3,940 | (minus 35%) = 2,560 |
| Control in stations & trains : | 5,354 | (minus 35%) = 3,480 |
| Traffic staff (30% of 12,042) : | 3,613 | (minus 35%) = 2,350 |
| <i>Rolling stock driving and maintenance service unit</i> | | |
| Locomotives (drivers) : | 11,922 | (single manning i.e.minus 40%)= 7,150 |
| Locomotives maintenance : | 21,197 | (5,5 x 900 loc.needed =) 4,950 |
| Wagons & coaches maintenance : | 21,788 | (2 x 2,185 coaches =) 4,370 |
| (0.15 x 55,000 wagons needed =) 8,250 | | |
| TOTAL : | 146,522 | 61,875 |

A reduction from 146,522 to 61,875 employees is a major challenge to the management of KTZ.



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- KTZ requires vast internal re-organisation including privatisation process, new track and rolling stock maintenance rules, organisation and equipment / tools, etc.
- KTZ requires also large investment in communications, computer systems and up to date equipment to carry out track and rolling stock maintenance.

A 10-year period from 1998 seems to be necessary before these large reductions can be accomplished.

This does not mean that there will be a corresponding saving in labour expenses. The removal of most of social services provided presently by KTZ will require salary increase in real terms to replace these services. In addition, employees who will remain or be hired in future will be better trained and will demand higher salaries if KTZ expects to retain their services. Thus, in the long term, there should be far fewer employees, but they will be much more technically skilled and better paid.

13.2.9 Means to reach the downsizing objectives within a 10-year perspective

13.2.9.1 Appropriate means

In the Mercer report are listed a series of means in order to reduce employment, presenting the pros and cons for each method:

- attrition,
- buyouts,
- early retirement,
- reassignment to non-rail operations,
- retraining and placement,
- spinning-off facilities, and
- involuntary terminations.

It is proposed that KTZ focus on four major means: spinning-off facilities, attrition, early retirement, retraining and re-assignment.

Spinning-off facilities

KTZ has already embarked in this process with the social sphere and construction units. This process should be accelerated particularly with construction works companies (12,518 employees) and building maintenance units dispatched all over the railway network. If transformed into independent enterprises along with their employees, it should not be difficult socially to reduce KTZ staff number by using this method.



Human resources

Attrition

Attrition is presently the most powerful employment reduction mechanism in KTZ if one looks at the results of 1995 and 1996. The net departures in 1995 was 25,133 employees and 23,274 in 1996 e.g. nearly a third of the total staff number in two years. This goes on during 1997 when 8,091 employees left the railway in 6 months. By this means alone (most positions vacated should not be filled), KTZ could reduce drastically very quickly the overall staff number.

The risk for KTZ is that qualified and experienced employees leave the railway and KTZ should continue to train new recruits in order to fill vacancies.

In order to retain trained staff KTZ will have to investigate incentive-based salaries for certain categories of staff.

Early retirement

Because recruitment will be needed to integrate new skills in the railway such as catenary specialists, electrical, telecom technicians, marketing specialists, computer network specialists, etc, and because it will not be possible to retrain old staff, it should be a good measure to implement an attractive pre-retirement scheme in order to reach the two targets: decreasing staff number and re-balancing the overall personnel age-pyramid. This scheme consists mainly of proposing to over 55 years old personnel to leave the railway with the same pension amount (or another allocation) as if they were leaving at 60 / 62. The Government or, better KTZ directly, could be asked to cover this increased pension expense.

Retraining and re-assignment

External recruitment is high (15,509 employees in '96 and 8,238 employees for the first 6 months of '97) and very costly because the railway pays for long years of training in various levels of schools. The definition of retraining and re-assignment is mainly to get an « internal recruitment » through retraining of surplus employees in some activities to be transferred to activities where staff is needed. The objective is to maximise geographical and job flexibility. This is generally well accepted because it is a positive action. Other advantages, the duration of a « retraining » being much shorter than vocational training, and is less costly.

For instance, surplus administrative staff can be easily re-trained to sell tickets in a station. An electrical worker in a workshop can easily be transferred through retraining to catenary maintenance, etc. The cost of such a measure could be equivalent to a 1-year salary per retrained employee. This will include time needed for retraining (average 4 to 6 months) plus an attractive allocation to allow an eventual relocation if needed.

13.2.9.2 Cost of the programme

A \$20m programme to encourage the voluntary departure of 40,000 employees is recommended

This programme might be extended or combined to take account of the above proposals.



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13.2.10 New skills and training required

13.2.10.1 Problems to be solved

As previously described the technical base of KTZ employees is solid even though technology taught and used is not always up to date for financial reasons. When analysing curricula provided in the railway schooling system, some major items are missing for known reasons. They are:

general fields

- marketing and commercial
- western accounting and finance management
- information systems management
- modern human resources management (competency based management)
- foreign languages (English mainly)
- organisation (cost-efficiency) and management (such as team building) at different levels of the organisation

technical fields

- implementation and maintenance of modern telecommunication systems
- computer network systems management
- mechanised maintenance of the track
- cost-efficient rolling stock maintenance
- environmental matters

As the teaching skills are not currently available in Kazakhstan it is recommended that external assistance be sought

13.2.10.2 Recommendations

Various solutions can be envisaged in order to solve this major problem. Anyhow, in a perspective of dissemination, these solutions should rely on the present educational organisation by:

- involving rectors and directors of academies, universities, institutes, technikums and colleges in a process of change in order to implement the modification of present curricula provided, (through a specific TACIS programme for instance, with the help of universities such as « The Kazakhstan Institute of Management - KIMEP » and the « Kazakh State Academy of Management - KazGAU » located in Almaty),



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- involving KTZ Top Managers in the process of change by organising study tours in Western Europe or Northern America,
- retraining some young motivated teachers / managers - with high potential - in economics in order to adapt their courses / knowledge to the new environment (a specific 2-year course MBA) could be organised in the Almaty « Kazakhstan Institute of Management, Economics and Strategic Research » - KIMEP - for instance),
- twinning KTZ railway educational system with western equivalents in order to exchange information related to operational practices,
- working with local institutes such as « KIMEP » or KazGAU in order to provide specific training which is missing in the public system, (through evening courses) in view of offering to young managers and teachers - with high potential - the possibility to adapt to the new environment.

Such measures should have a powerful and quick impact on the KTZ organisation. The dissemination of new modern management techniques and practices should be implemented in parallel with the educational system (through retrained teachers).

The cost of such measures can be estimated as follows:

- 60 study tours of 3 weeks each (\$4,500 per person + cost of organisation in the western country estimated at \$30,000 for a group of 15 = about \$400,000)
- 4 specific 3-week duration seminars tailor-made by KIMEP for top managers related to organisation, finance, commercial and human resources management (\$25,000 per seminar x 4 = \$100,000). This type of seminar could be duplicated as required.
- 60 retrained young teachers / managers for a 2-year course at KIMEP (\$4,000 x 60 = \$240,000 ,
- funding economical studies (4 years for a BA) in KazGAU for 60 students to be recruited later in KTZ will cost approximately \$290.000 (\$1,200 x 4 years x 60 students)
- evening classes courses for accounting, finance, etc. for employees for a lump sum of \$200,000.

An estimated total of \$1.2 m would be required to implement such a programme, which should be a wise and efficient investment. A global coherent project could be built and proposed to international bodies such as TACIS in order to provide such funds required for implementation.

This type of proposal were discussed with railways managers, and a proposal was made by the Consultant - based on a similar experience in Russia funded by TACIS - to be forwarded to the local TACIS bureau through KTZ and the Ministry of Transport (see proposed Terms of Reference in Annex 13.4).



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Human resources

13.3 Summary of recommendations related to HRM

13.3.1 List of recommended actions

The following list of recommendations related to personnel proper, but also to organisational aspects, is a list of proposed actions to be implemented in order to improve personnel development and management:

| N° | Action definition | Who | When |
|----|---|--|------------------------------|
| 1 | Appointment of a Personnel Manager (PM), | GM | ASAP |
| 2 | Implement study tours for young managers with high potential | GM/TACIS | ASAP |
| 3 | Design new job ladder and career paths adapted to new organisation | PM/TU | ASAP |
| 4 | Design new organisations for every KTZ units <ul style="list-style-type: none"> existing n° of staff per level and skill required n° of staff per level and skill based on targets n° of surplus staff or staff to be recruited or re-assigned | Task force (Pers/Infra/ Com/Tract- Rol St.) | ASAP then each year |
| 5 | Prepare agreements with TU and Government regarding : <ul style="list-style-type: none"> attractive pre-retirement scheme attractive transfer scheme (through retraining) to encourage professional and geographical mobility and flexibility | PM TU Government | ASAP |
| 6 | <ul style="list-style-type: none"> Re-organise Personnel Department and study a new suitable personnel management information system for KTZ as a whole | GM PM | ASAP |
| 7 | Completion of the social sphere transfer (medical, schools, water supply, etc.) to public authorities | GM | under way |
| 8 | Prepare a new motivating salary scale in order to retain best employees and increase motivation and productivity | PM/ TU | |
| 9 | Implement competency based management and, as a minimum, a yearly individual evaluation through interviews (objectives / results) | PM | |



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Human resources

| N° | Action definition | Who | When |
|----|---|-----|-----------|
| 10 | Recruit some marketing and finance specialists who are needed at present and freeze other recruitment. | PM | each year |
| 11 | Implement retraining programme in order to allow « internal recruitment » | PM | ASAP |
| 12 | Train future instructors mainly for commercial and finance specialities (through KIMEP and KazGAU Institutes) | PM | ASAP |
| 13 | Procurement of computerised tests for recruitment | PM | optional |

13.3.2 Justification

The justification for the recommendations is given in Annex No13.



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Business plan - Kazakhstan railways 2000

14. Business plan - Kazakhstan railways 2000

14.1 Investment programme

The report sets out a number of areas where investment is required. These are set out on the following pages. It should be said that some of the main recommendations this report cannot be fully implemented unless investments are made. The investment plan gives recommendations for the years 1998 until the year 2002 a five-year plan.

While dealing with this plan one has to be conscious of KTZ ability to fund such investments and while in the past KTZ have not provided enough in their depreciation provisions (by western accounting standards) this point has now been addressed in the business plan which follows in this chapter.

The programme calls for major expenditures in infrastructure and rolling stock. The most pressing need is to eliminate temporary speed restrictions as soon as possible. The plan should allow the infrastructure engineers to plan their work programme over the next five years bearing in mind the recommendations made in this report.

If KTZ are to get the staff savings outlined it is necessary to take steps to introduce mechanised maintenance methods as soon as possible. This will have the added value of giving also superior horizontal and vertical track alignment. In turn this will reduce the level of track maintenance required.

It is generally accepted that the current track fastening used on KTZ is unsatisfactory and provision is made in this plan to address this problem.

In order to clearly and scientifically identify track areas in need of maintenance provision has been made for a track-recording car, which will identify these areas.

Ballast on KTZ system is badly polluted with oil as a result of poorly performing locomotives. Ballast also deteriorates in service and new ballast cleaners (or undercutters) will deal with that problem without unduly disturbing the track.



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Rail grinding greatly increases the rail life and the purchase of a rail-grinding machine is included in the investment programme.

Re-engining of locomotives, rehabilitation of passenger coaches, new wagons and rehabilitation of depots are provided for in the plan.

KTZ requires a new management information system. This is probably one of the most urgent investments required and one, which gives a payback in a very short time.

The completion of the electrification between Otar and Almaty is of great strategic importance completing the electrification from the north of the country to Almaty and a \$14m provision is made.

A separate study is required to carry out an economic evaluation of this project in order to justify the investment

In order to accelerate staff departures provision is made for severance payments.

Investment plans for the years 1998-2002 are set out in the following pages. These investment plans take account of the proposals contained in this report.

KTZ INVESTMENT PROGRAMME 1998 – 2002

| | 1998 | 1999 | 2000 | 2001 | 2002 | TOTAL |
|------------------------------|--------|--------|--------|--------|--------|--------|
| | \$mill | \$mill | \$mill | \$mill | \$mill | \$mill |
| MIS | 5 | 5 | 3 | 1 | 1 | 15 |
| Eliminate Speed Restrictions | 15 | | | | | 15 |
| New Fastenings | 3 | 2 | | | | 5 |
| Maintenance Machines | 10 | 50 | 18.5 | | | 78.5 |
| Ballast Cleaners | 0.5 | 3.5 | | | | 4 |
| Rail Grinding Machine | 0.5 | 2.5 | 1 | | | 4 |
| Track recording car | 0.5 | 2 | | | | 2.5 |
| Rehabilitation equip | 2 | 4 | 2 | | | 8 |
| Loco rehabilitation | 12 | 11 | 11 | 11 | 11 | 56 |
| Spare Parts | 1 | 1 | 1 | 1 | 1 | 5 |
| Tank wagons | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 5.5 |



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| | | | | | | |
|-------------------------------|-------------|------------|-------------|-------------|-------------|--------------|
| Wagon spare parts | 1 | 1 | 1 | 1 | 1 | 5 |
| Mech maintenance equip | 2.4 | 1.5 | 1.5 | 0.5 | 0.5 | 6.4 |
| Upgrade workshops for coaches | 2.8 | 1.8 | 1.8 | 1.5 | 1.5 | 9.4 |
| Upgrade workshop for wagons | 3.6 | 2.6 | 2.6 | 1.3 | 1.3 | 11.4 |
| Staff severance | 20 | | | | | 20 |
| Coach rehabilitation | 5 | 5 | 5 | 5 | 5 | 25 |
| Otar - Almaty | 7 | 7 | | | | 14 |
| Total | 92.4 | 101 | 49.5 | 23.4 | 23.4 | 289.7 |

The completion of the electrification of the railway between Akmola and Almaty and is of vital strategic importance offering improved operating performance.

In order to maintain the assets of the infrastructure in a suitable condition it will be necessary to invest approx. \$60mpa in TRACK RENEWAL on an ongoing basis. While some railways treat this as a capital item it is assumed that this will be provided for in the revenue budget.

KTZ will also have to consider the provision of new passenger rolling stock and as can be seen later this investment cannot be justified on purely economic grounds within the railway. If however a public service agreements were reached with the government regarding the provision of national mainline rail services the situation would change.

The economic justification for the investment in MIS, infrastructure and rolling stock improvements are given in the following pages.



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14.2 Economic justification

The investment plan proposed for the Kazakhstan Railways includes investments for the modernisation of both the assets and the maintenance facilities of infrastructure, rolling stock and Management Information System (MIS).

The aim of this investment plan is to:

- improve infrastructure and reduce maintenance costs
- improve rolling stock and reduce maintenance costs
- improve train operation and reduce related costs
- up-grade the MIS to generate savings in railway operation and management

The justification of this investment plan has been evaluated based on a cost-benefit analysis.

14.2.1 Method for cost-benefit analysis

A cost-benefit analysis is used here to evaluate the outcome of the proposed investment plan based on its economic benefit. The present situation with minimum investment is referred to as the do-minimum scenario. This scenario is compared to scenarios with investments referred to as the do-something scenarios. The differences in the costs and benefits between the doing minimum and the doing something are computed and the difference in economic benefit between the various scenarios can be therefore appraised.

The cost-benefit analysis compares the value in monetary terms of all the significant positive and negative financial effects of each scenario. Costs mainly consist in the investment costs for the up-grade of railway facilities and their maintenance. Benefits include savings in staff expenses due to increase in productivity and therefore staff reduction as well as savings in other operating costs such as energy, materials and spare parts.

Railway investments typically provide a stream of costs and benefits over a long time. It is therefore necessary to have a method for comparing and combining costs and benefits incurred at different times. The underlying principle is that benefits and costs incurred today are worth more than the same quantities incurred in the future, and the further into the future they are, the less they are worth. This is not because of inflation, since the whole calculation is carried out at constant prices, but represents the real economic phenomenon that resources today are preferred to resources in the future.

The way in which the lower value of future costs and benefits is incorporated in the cost-benefit analysis is by discounting. A sum of money S in year 1 is valued in year 0 as $S/(1+r)$, where r is the discount rate. A stream of sums, S_i in years 1, 2, ..., i is valued in year 0 as :

$$\sum S_i/(1+r)^i$$



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The discounted value in year 0, or more generally in any base year, of a stream of benefits over time is the present value (PV) of the stream, and the discounted value of a stream of benefits less costs is the net present value (NPV) of the stream. The value of the discount rate which sets the NPV to 0 is the internal rate of return (IRR).

The choice of the discount rate, r , is important. The value of the discount rate used in this cost-benefit analysis is 8 % ($r = 0.08$). This is to be consistent with the similar analysis carried out for the other TRACECA railways based on an 8 % discount rate and to enable comparison between investment plans in different countries.

In terms of valued effects, the economic outcome of a cost-benefit analysis is summed up in the NPV of a scheme, which is the present value of the difference between the benefits and the costs. If the NPV of a scheme is positive and therefore the IRR superior to the discount rate, then its benefits exceed its costs, and the project is therefore worthwhile. In the case of mutually exclusive schemes, one would want the one with the highest NPV. This is a form of optimization. Finally, if there is a cost budget constraint, is optimal to adopt the scheme with the highest ratio NPV/cost, until the budget is exhausted.

The costs and benefits of the different scenarios are based on data provided by the technical experts in railway infrastructure, rolling stock and MIS. For justification of these data, the reader can refer to the relevant technical reports.

In most cases, it is not possible to isolate and estimate the costs and benefits of a specific investment as it is closely connected to other investments. In such cases, the investments are put together in the same package and evaluated in the cost-benefit analysis as a whole. This is the reason why NPVs and IRRs have been calculated for the railway infrastructure, the rolling stock and the MIS investment plans as a whole.

The cost-benefit analysis have been carried out with different discounting periods depending on the type of investment due their differences in life span and breakdown of costs and benefits over the time.

Only monetary costs and benefits to the Kazakhstan Railways have been taken into account in this cost-benefit analysis. Monetary costs and benefits to other economic factors including the public authorities and the passengers and freight forwarders have not been included.

Due to the lack of data on sensitivity of passenger and freight demand with respect to travel time, value of time and statistics on accidents and value of life and limb, it was not possible to attach a monetary value to the increase in passenger and freight demand, the passenger time savings and the reduction in accidents. As a result, these economic benefits are not included in the cost-benefits analysis.

This however does not bias the results significantly. The proposed investment plan is not expected to generate significant additional traffic on its own. In addition, timesavings are relatively marginal and the value of time of passengers and freight is low in Kazakhstan. Finally, the reduction in accidents, mainly derailments, may generate some benefits but nevertheless marginal compared to the total costs and benefits of the proposed investment plan.

As a result, the NPVs and IRRs produced in this report are likely to be rather conservative.



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14.2.2 Cost-benefit analysis for investment in infrastructure

| Main calculation hypothesis and results | |
|---|---|
| Do-minimum scenario | Costs include maintenance staff only |
| Do-something scenario | Costs include investment in fixed assets, maintenance staff, staff redundancy |
| Discounting period | 20 years |
| IRR in % | 28 |

See annex 14 for detail of calculation.

The investment plan for infrastructure generates significant capital investment. However, the savings in maintenance staff due to restructuring of the infrastructure maintenance activity and the acquisition of new assets are much higher. As a result, the investment plan produces a good IRR of 18 % and is consequently justified under the assumptions above. Allowing for the longer life span of the track the IRR increases significantly to 28%.

14.2.3 Cost-benefit analysis for investment in rolling stock

For the whole investment plan:

| Main calculation hypothesis and results | |
|---|---|
| Do-minimum scenario | No costs |
| Do-something scenario | Costs include renewal and acquisition of new locomotives, coaches and wagons and modernization of the maintenance facilities, benefits include savings in operation of locomotives and in maintenance staff for locomotives, coaches and wagons |
| Discounting period | 18 years |
| IRR in % | NPV is negative, US\$ -806 million |

Note: This investment plan includes the conversion of the TE10 locomotives.

See annex 14 for detail of calculation.



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On the one hand, the investment plan for rolling stock generates very high capital investment in renewal and acquisition of locomotives, coaches and wagons and in their maintenance facilities. On the other hand, the savings in rolling stock operation and maintenance staff are very low compared to the related expenses. As a result, the investment plan produces a negative NPV of US\$ - 806 million and is consequently not justified on an economic basis under the assumptions above. However, this investment is justified for the permanence of railway operation. The reader can refer to the technical report for justification.

For the conversion of the TE10 locomotives only:

| Main calculation hypothesis and results | |
|---|---|
| Do-minimum scenario | No costs |
| Do-something scenario | Costs include conversion of the existing locomotives, benefits include savings in operating costs |
| Discounting period | 18 years |
| IRR in % | 51 |

See annex 14 for detail of calculation

As far the conversion of the TE10 locomotives only is concerned; the conversion cost is quite low compared to the expected savings in operating costs. As a result, the locomotive conversion produces an excellent IRR of 51 % and is consequently fully justified under the assumptions above.

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14.2.4 Cost benefit analysis for investment in maintenance facilities

| Main calculation hypothesis and results | |
|---|---|
| Do-minimum scenario | Increase of maintenance cost by 3% yearly |
| Do-something scenario | Costs include improvement of maintenance facilities; benefits include savings in maintenance labour cost. Staff reductions are estimated at 16000 people on a five year plan |
| Discounting period | 20 years |
| IRR in % | 31.80 |

See annex 14 for detail of calculation.

Improvement of maintenance facilities is showing a significantly high IRR, based on a staff reduction target of nearly 40%, including higher wage increase in the project case. If the railways are in a position to reach this target, this investment is fully justified.

14.2.5 Cost-benefit analysis for investment in MIS

| Main calculation hypothesis and results | |
|---|---|
| Do-minimum scenario | No costs |
| Do-something scenario | Costs include investment in hard and software, benefits include savings in railway operation and management |
| Discounting period | 5 years |
| IRR in % | 281 |

See annex 14 for detail of calculation.

The investment plan for MIS has a low cost compared to the other investment plans. However, the savings in railway operation and management are very high. As a result, the investment plan produces an excellent IRR of 281 % and is consequently fully justified under the assumptions above. The MIS should be up-graded in the very short-term to benefit from the expected savings as soon as possible.



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14.2.6 Conclusion

The up-grade of the MIS will act as a lever for the whole railway company and should be implemented as soon as possible.

The modernization of the infrastructure is expected to produce some savings in the medium and long term.

The conversion of the TE10 locomotives is expected to produce significant savings.

The benefits expected from the overall investment plan are closely linked to the restructuring of railway operation and management so as to produce gains in productivity. As a result, it is necessary to implement the restructuring strategy and the investment plan jointly to draw maximum benefit of the exercise.

14.3 Business plan

14.3.1 Organisation description

Kazakhstan Temir Zholy is the national railway organization of the Republic of Kazakhstan. It was formally part of the Ministry of railways of the former Soviet system. On the declaration of Kazakhstan independence it came under the control of the Ministry of Transport and Communications of Kazakhstan.

14.3.2 Organisation activities

KTZ manages its own infrastructure and operates freight and passenger railway services throughout Kazakhstan including commuter services in the larger conurbations. In addition it is responsible for a multitude of non-core activities such as health care, education and farming activities.

14.3.3 Organisation mission

To satisfy customer needs in providing a national rail service that is safe, customer friendly, reliable, competitive and cost effective.

14.3.4 Organisation vision

To be a modern competitive railway, retaining and growing its market share, providing value for money services and fulfilling its role as the key element in the nations transport infrastructure.

14.3.4.1 Objectives

- to develop a new state/ railway relationship and introduce performance related agreements



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- Implement new managerial organization and develop business and service units
- Introduce western accounting standards.
- Develop new commercially oriented management focussed on developing profitable traffics.
- Introduce railway legislation, which will assist the railway in achieving its objectives.
- Evaluate the profitability of railway traffics
- Introduce new management information system
- Reduce journey times for freight and passenger trains.
- Introduce more block freight trains
- Maintain the infrastructure using mechanised maintenance
- Change the approach to track renewals
- Change the maintenance policies for locomotives, carriages and wagons.
- Protect the environment when carrying out works
- Transfer non-core activities to more appropriate authorities.
- Train staff in new management approaches and management techniques.
- Protect future environment
- Customer standards and expectations will increase in the future

The competitive scene will change rapidly. As the economy develops demands will be made for an improved roads infrastructure. There will be more competition on the freight and passenger business.

The trend to privatization will continue and bring competition onto the railway itself.

14.3.5 Key assumptions

In preparing the financial projections for the business plan the following assumptions have been made.

The investment programme as outlined in this report will be implemented.

Tariffs will be increased in accordance with the plan.

Staff numbers will be reduced from 146,000 to 62,000 over the period of the plan.



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Since this report was completed certain changes have occurred. The Anti Monopolies Commission has agreed to an increase in tariffs of 25% for freight traffic and 20% increase in passenger tariffs. These increases are to be applied at quarterly intervals during 1998. A methodology for establishing depreciation values for trackwork has been developed which would suggest that this should be in the region of \$60m per annum. This gives a total depreciation of \$360m per annum when everything is fully depreciated to replacement values. Traditionally KTZ have used low depreciation figures by western standards. It is now proposed to build up this depreciation over a number of years. While the Winner report assumed that the social costs, which the railway has to bear, would be removed in 1998, it is now proposed that this will be scaled down to a reasonable amount over a number of years.

With the reduction of the depreciation value coupled with an improved trading position it is possible that KTZ will break even in 1998.

14.3.6 Financial Forecasts

Introduction

Financial Forecasts, reflecting optimistic and pessimistic traffic scenarios, have been prepared for Kazakhstan Railways covering the period 1997 to 2007. For simplicity the financial forecasts have been prepared in constant prices thereby eliminating the effects of inflation.

14.3.6.1 Profit & Loss (Optimistic Forecasts)

Revenue Forecasts

- *Freight Traffic*

Freight Tonne Kilometres are projected to decline in 1997 by 8.4% compared to 1996. It is now believed that the decline has finally bottomed out and there will be modest growth in the period up to 2007. Freight traffic will reach 112.335 million tonnes kilometres by the year 2002 which will return KTZ to the level of traffic it experienced in 1996 and by 2007 freight traffic will reach 116,001 million tonnes kilometres which represents 12% growth compared to the forecast position for 1997.

The projected freight tonnage for 1997 is 170.2 million tonnes, which is down 8.4% on the figure for 1996. The projected growth in the period up to 2007 will result in a total of 190.3 million tonnes being carried in that year which represents growth of just under 12% for the ten year period.

Revenue for 1997 is projected to be 76,355 million tenge, which is approximately 42% up on the revenue for 1996. The nominal percentage change in the average tariff per tonne kilometre in 1997 was 54.9 % which equates to a real increase of 31% after adjusting for annual inflation of 18.2%. The reduced yield was a result of the decline in freight traffic between 1996 and 1997.

Coal & Coke traffic is projected to decline by over 30% in 1997 to a low of 29,121 million tonne kilometres. The specific price increase applied to coal and coke traffic in 1997 was 100% in nominal terms or 69.2% in real terms. Modest growth 8.7% in the period up to 2007 will result in traffic growing to 31,667 million tonne kilometres which represents only 75% of the level of traffic carried in 1996.



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Oil traffic is projected to grow by 26.6% in 1997 compared to 1996 and to grow by a further 13.5% up to the year 2000 when traffic will stabilise at 21,912 million tonne kilometres for the remainder of the forecast period. A tariff increase of 40% was applied in 1997, which represents an increase of 18.2 % in real terms. A further real tariff increase of 12.4 % is anticipated in 1998. The combination of tariff increases and traffic growth will result in revenue rising to 18,899 million tenge by 2000 an increase of 27.6% compared to 1997.

Ore traffic is projected to remain constant in 1997 at the level of 13,051 million tonne kilometres. By 2007 traffic is projected to increase to 13,847 which represents cumulative growth of 6%. The tariff per tonne kilometre increased by 40% in nominal terms in 1997, which represented a real increase of 18.4%. A further real increase of 12.4 % is projected for 1998.

Building Materials traffic is projected to decline by 20% in 1997 and by a further 5% in 1998. Traffic is assumed to stabilise in 1999 and to grow by 14% up to the year 2007. The tariff per tonne kilometre increased by 40% in nominal terms in 1997, which represented a real increase of 18.4%. A further real increase of 12.4 % is projected for 1998.

Grain traffic is projected to remain constant in 1997 at the level of 7,856 million tonne kilometres with slight growth in the years up to 2000 bringing total traffic to 7,955 million tonne kilometres. Traffic is assumed to stabilise at this level up to the year 2007. The tariff per tonne kilometre increased by 40% in nominal terms in 1997, which represented a real increase of 18.4%. A further real increase of 12.4 % is projected for 1998.

Other traffic grew by 2.7% in 1997 compared to 1996. This represents approximately 5% of the total traffic carried by KTZ but it is projected to grow by 21% up to the 2007. The tariff per tonne kilometre increased by 40% in nominal terms in 1997, which represented a real increase of 18.4%. A further real increase of 12.4 % is projected for 1998.

Transit traffic represents in excess of 20% of the total traffic carried by KTZ. This percentage was confirmed to the consultants by KTZ staff in the course of interviews. It has been assumed that transit traffic will remain constant in 1997 and grow by approximately 12% up to 2000. Growth in transit traffic between 2001 and 2007 is projected to be in the order of 8.5%. The tariff per tonne kilometre increased by 30% in nominal terms in 1997, which represented a real increase of 10%. No further real price increases have been assumed in the revenue projections.

- *Demurrage & Wagon Hire Charges*

Demurrage and Wagon Hire charges of 2,251 million tenge have been projected for 1997, which represents approximately 2.5% of revenue from transportation. Revenue from this sources is assumed to grow in line with freight traffic volumes and consequently it increases to 2,530 million tenge by the year 2007.

- *Passenger Traffic*

Passenger traffic declined from a total of 14,199 million passenger kilometres in 1996 to 12,495 million tonne kilometres in 1997, which represents a reduction of 12%. No significant growth in passenger traffic has been assumed in the period up to 2007 with average annual growth being less than 1%. Total passenger traffic in 2007 is projected to be 13,742 million passenger kilometres.



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The average passenger tariff increased by 13.6 % in nominal terms but after adjusting for inflation in 1997 this represented a decrease of 3.9% in real terms. The forecasts include provision for a real increase of 6.8% on average in 1998 with prices being held constant in real terms thereafter.

The combined effect of the real price increase in 1998 and modest growth in traffic volumes means that passenger revenue will grow from 8,338 million tenge in 1997 to 9,795 million tenge in 2007 an increase of 17.5%.

- *Other Transport Revenue*

Other transport revenue of 786 million tenge for 1997 is projected to decline to 466 million tenge by 2002 and to remain stable thereafter. These revenues are earned from loading and unloading of wagons for customers and it is assumed that these services will be privatised which will result in the decline in revenue from this activity.

- *Auxiliary Activities Income*

It has been assumed that KTZ will shed its internal production and manufacturing units by 1999 through a process of privatisation.

- *Sale of Non Transport Goods & Services*

Revenue from the sale of non-transport goods and services is projected to remain constant at the 1997 level throughout the period of the projections.

- *Gain/Loss on Foreign Currency Transactions*

Account has been taken of KTZ's projected foreign currency gains for 1997 however the forecast for period up to 2007 excludes possible gains or losses from this source.

- *Other Income*

KTZ's miscellaneous income for 1997 of 21 million tenge has been projected to continue at the same level up to the year 2007.

14.2.2 Expenditure Forecasts

- *Staff Costs*

The most significant single change in KTZ during the next ten years will be the restructuring of the organization and the reduction in the number of staff employed. The number of people employed in the core railway transportation activity is shown as declining from 135,275 in 1997 to only 65,094 in the year 2007. The staff reduction process will be concentrated in the period 1998 to 2001 with a total reduction of 57,347 employees (42%). Reductions in the years 2002 to 2007 will be more gradual.

As restructuring and staff reductions will need to be accompanied by retraining and the redistribution of workloads then it has been assumed that the remaining staff will be compensated by wage increases in excess of the level of inflation. It has been assumed that wage levels will increase by 2%



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per annum in real terms in the period 1998 to 2000. No further real increases have been projected in the period 2001 to 2007.

Staff costs fall by 55% between 1997 and 2007 due to the projected reductions in manpower levels.

- *Social Insurance Payments*

Social Insurance payments are calculated as a proportion of the wages costs and equate to approximately 30% of the total wages bill. In the forecasts social insurance costs have been assumed to fall in line with the total wages costs of KTZ.

- *Consumption Fund & Development Fund Payments*

These items of expenditure are currently treated as distributions of profits by KTZ but for the purpose of the analysis of KTZ's profitability they have been treated as normal expenditure. They have been assumed to vary in line with the numbers of staff employed in the core transportation activity and so these costs also decline during the period of the forecasts.

- *Materials*

Materials expenditure varies in line with the activity levels in each railway departments. It is, however, believed that expenditure on materials has been artificially depressed in recent years due to the financial difficulties experienced by KTZ. In order to compensate for these factor adjustments have been made in the following areas. Expenditure on Electric and Diesel Locomotive maintenance materials has been uplifted by 25% in the years 1999, 2000 and 2001 to improve allow for increased maintenance activity. Expenditure on Wagon and Passenger Coach maintenance materials has been uplifted by 25% in the year 2000 and 2001 to allow for improvements in the condition of the fleet.

Expenditure on Track materials has not been assumed to decline but to remain constant at the 1997 levels. This assumes that KTZ will continue to renewal and repair work on its track in a planned manner and that improvements in labour productivity achieved through the introduction of mechanised track maintenance machinery will enable KTZ to carry out its planned track work in a more efficient manner.

A conservative view has therefore been taken of the projected level of materials expenditure, which show costs rising by 11% between 1997 and 2007.

- *Fuel*

The Locomotive Department accounted for 85% of the fuel consumption of KTZ in 1997. It has been assumed that fuel expenditures decline throughout the period of the projections due to re-engining of the fleet following the successful trials carried out on the 2TE10. It has been assumed that the cumulative savings on locomotive fuel will result in a decline of 47% in fuel costs between 1997 and 2007.

Total expenditure on fuel by KTZ is expected to drop from 6,692 million tenge in 1997 to 3,778 million tenge in 2007.



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- *Electric Power Supply*

The Locomotive department consumes 73% of the energy used by KTZ for the operation of Electric Locomotives. The energy consumption costs of this department are projected to rise throughout the period of the forecast in line with traffic levels. Power consumption by other departments is projected to decline in line with reductions in staff levels. Total energy costs are shown as declining by 1% in the period up to 2007.

- *Other Operating Expenses*

Other Operating Expenses are projected to decline by 24% during the period of the forecast due largely to reductions in activity by the civil construction department and the electrification and power supply units who it is understood perform general maintenance activities. The Human Resources expert has proposed the contracting out of much of this work with corresponding reductions in staffing and expenditure levels in these departments.

- *Contract Costs - Civil Works and Electrical Services*

It has been noted that much of the work of these departments involves the provision of internal services to KTZ, which could more economically be provided by outside contractors. For the purpose of the financial projections it has been assumed that the staff costs and other costs of these two departments of KTZ will be reduced over the next ten years. Outside contracts will be retained to provide building and electrical services to KTZ and the assumed contract costs have been shown separately in the projected income statement.

- *Insurance, Miscellaneous Taxes, Transport Service Penalties*

The cost of insurance, miscellaneous taxes and transport service penalties have been assumed to vary in line with the level of railway activity.

- *Bad Debts*

KTZ has experienced problems in collecting freight revenues. Management has been making efforts to reduce the size of the problem by attempting to collect overdue accounts and withholding services from clients with poor payment records. Bad Debts represent approximately 6.8% of the freight revenue for 1997 and this is projected to reduce to 4.3% in 1998 and to 2.4% in 1999. During the period 2000 to 2001 bad debts are expected to represent less than 2% of freight revenue annually.

- *Barter Conversion Costs*

KTZ has also been experiencing problems as a result of payment for freight transportation services being made in the form of barter goods. Whilst KTZ has made efforts to ensure that the goods it receives from barter transactions are of direct use to the railway i.e. rails, sleepers, fuel etc, it also receives goods that cannot be used. These goods must be sold or traded for goods and services that are required. Barter Transactions therefore have a cost associated with them, which effectively increases the operating costs of KTZ. On average during 1997 it is understood that barter transaction costs were in the order of 6% on average. As KTZ management is making efforts to increase the level of cash payments and eliminate as many barter transactions as possible the forecasts assume that barter transaction costs will be reduced in 1998 to 5% of freight revenue and in 1999 to 4.4%. From



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2000 onwards it is assumed that barter transaction costs will be approximately 2.5% of freight revenue.

- *Social Needs Expenditures*

In common with other railways of the Former Soviet Union KTZ has carried a burden in relation to the provision of social services such as medical facilities, schools, and community housing. Efforts have been made by KTZ to divest itself of some of these responsibilities but it has been assumed in the preparation of these forecasts that the railway will continue to fund a base level of services for the foreseeable future. Expenditure has been fixed at 33% of the level of costs reported for 1996.

- *Value Added Tax*

Net value added tax is estimated at 20% of KTZ revenue less 20% of KTZ expenditures on which VAT is charged. Standard accounting practice would be to exclude VAT from revenue and expenditure reporting and to show the net amount due as accounts payable balance only. As KTZ include VAT in their revenue calculations and in their reported expenditure it was decided to show the net VAT payable as an additional cost item in the financial projections.

- *Total Operating Expenses*

Total operating expenses, before depreciation, have been projected to decline from 79,553 million tenge in 1997 to 64,684 million tenge by the year 2007 a reduction of 19%.

- *Operating Profit Before Depreciation*

Growing revenue and declining operating cost result in a growth in operating profit throughout the period of the forecasts. Operating profit as a percentage of total revenue improves from 15.1% in 1997 to 39.5% in 2007. Solid growth in revenue coupled with reductions in staff costs, traction fuel, bad debt provisions and barter transactions costs account for the improvement in financial performance.

- *Replacement Cost Depreciation*

Replacement cost depreciation has been calculated using the actual number of locomotives required by KTZ, the required fleet of wagons and passenger coaches and the length of mainline track. The current cost of each of these items has been used to estimate the size of the depreciation provision.

The replacement cost depreciation has been phased in gradually during the period 1997 to 2000. By the year 2001 KTZ is being charged with the full calculated replacement cost depreciation charge.

- *Operating Profit after Replacement Costs Depreciation*

Projected operating profit after depreciation for 1997 is 2,180 million tenge and KTZ is expected to generate profits at a steadily rising rate throughout the period of the forecasts rising to 16,507 million tenge in 2007.



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- *Interest on Loans*

Interest expense is based on KTZ's existing medium and long term loan obligations and a projected EBRD loan of 78.5 million dollars for purchase of mechanised infrastructure maintenance machines. KTZ's projected profitability and available cash is more than adequate to meet existing and projected loan interest and principal repayments.

- *Income Tax*

Income tax for KTZ is based on estimates of revenue and operating costs for core railway activities and income from other sources. Account has been taken of allowable deductions in the calculation of the taxable amount. The taxation charge is based on the rules currently in force and any variation in tax legislation will have an impact on the amount of taxation paid in the future.

14.3.6.2 Cash Flow Forecasts (Optimistic)

The cash flow forecasts prepared for KTZ reflect a steadily improving cash inflow position due largely to growth in freight revenues. Auxiliary income has been assumed to cease in 1999 as a result of the disposal/privatisation of these activities.

It has been assumed that there will be an increase in the accounts receivable balance due to the growth in freight revenue. Receipt of loan funds in the years 1998 through 2000 also boost the cash balance.

The two main cash outflows are the payment of operating expenses and the projected expenditure on capital investment. Operating expenses decline throughout the period of the forecast largely due to the projected reductions in staff numbers. Capital expenditure in the years 1998 through 2002 reflects the investments funded by the Japanese loan and the investment in mechanised track equipment, which it is assumed, will be funded by an EBRD loan.

It has also been assumed that KTZ will maintain its accounts payable balance at existing levels throughout the period of the forecast.

In the projections prepared by the consultants KTZ generates significant cash surpluses. These can be used to fund the development of viable investment projects identified by the railway, which produce a financial return. Given the projected availability of cash KTZ should be able to proceed with many essential development projects from its own internal resources.

14.3.6.3 Balance Sheets (Optimistic)

The growth in fixed assets in the projected balance sheets is the result of the capital investment programme. Capital work in progress has been treated as part of fixed assets for the purpose of preparing these projections.

Current assets grow dramatically throughout the period of the forecast due to the large cash surpluses being generated. These are assumed to be available for investment by KTZ in projects, which have been identified by the railway. Accounts receivable levels are assumed to increase largely as a result of revenue growth. Inventory levels have been held constant in the forecasts.



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Accounts payable and accruals have been assumed to remain constant throughout the period of the forecast.

Long terms loans increase up to 2002 as a results of the amounts provided to KTZ under the terms of the Japanese loan and assumed EBRD loans to fund the current investment programme. Thereafter they decline due to capital repayments during the period of the forecasts.

Capital and Reserves increase through the period. A new account < Replacement Cost Depreciation Reserve > has been included in this section to reflect the excess of historical cost depreciation over replacement cost depreciation. This reserve has the effect of balancing out the negative impact of the accumulated accounting losses that are generated in the profit and loss account as a result of charging depreciation at replacement cost levels.

14.3.6.4 KTZ Financial Projections (Pessimistic)

A set of financial projections has been prepared which use a pessimistic freight traffic projection. All of the costs assumptions have been left unaltered so the variations in the profit & loss account, cash flow statements and balance sheets are attributable to reductions in freight traffic volumes and revenue.

Optimistic and pessimistic operating statistics are given in the following pages.

Full details are given in Annex No 14.

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KAZAKHSTAN RAILWAYS

OPTIMISTIC SCENARIO

OPERATING STATISTICS

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|--|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Key Assumptions | | | | | | | | | | | | |
| Inflation rate [relates current to previous year's expenses] | | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Key Operating Statistics | | | | | | | | | | | | |
| Freight tonnes (000) | 192,586 | 170,164 | 172,292 | 176,273 | 181,104 | 182,468 | 183,936 | 185,858 | 187,457 | 188,402 | 189,354 | 190,313 |
| Freight tkm (000,000) | 112,689 | 103,205 | 104,752 | 107,405 | 110,651 | 111,467 | 112,335 | 113,427 | 114,369 | 114,912 | 115,460 | 116,011 |
| Ave. length of haul | 585 | 607 | 608 | 609 | 611 | 611 | 611 | 610 | 610 | 610 | 610 | 610 |
| Passenger km (000,000) | 14,199 | 12,495 | 12,595 | 12,897 | 13,297 | 13,297 | 13,404 | 13,471 | 13,538 | 13,606 | 13,674 | 13,742 |
| Locomotive km (000) | 168,109 | 161,187 | 150,572 | 139,638 | 132,522 | 126,377 | 121,079 | 121,854 | 122,515 | 122,889 | 123,265 | 123,644 |

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| | Actual 1996 | Forecast 1997 | Forecast 1998 | Forecast 1999 | Forecast 2000 | Forecast 2001 | Forecast 2002 | Forecast 2003 | Forecast 2004 | Forecast 2005 | Forecast 2006 | Forecast 2007 |
|----------------------------|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Train km (000) | 134,179 | 128,915 | 120,440 | 113,284 | 109,796 | 106,894 | 104,425 | 105,038 | 105,559 | 105,854 | 106,150 | 106,449 |
| Wagon km (000,000) | 4,611 | 4,195 | 4,245 | 4,344 | 4,469 | 4,503 | 4,540 | 4,590 | 4,627 | 4,648 | 4,669 | 4,690 |
| Employment - core activity | 146,143 | 135,275 | 110,738 | 95,357 | 85,123 | 77,928 | 72,670 | 69,108 | 67,296 | 66,061 | 65,430 | 65,094 |
| Percentage change | | -7.4% | -18.1% | -13.9% | -10.7% | -8.5% | -6.7% | -4.9% | -2.6% | -1.8% | -1.0% | -0.5% |

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KAZAKHSTAN RAILWAYS

OPTIMISTIC SCENARIO

PROFIT AND LOSS ACCOUNT 1996 - 2007

(All Data is in Millions of Tenge)

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Operating Revenue | | | | | | | | | | | | |
| Freight Business | 53,824 | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,920 | 91,794 | 92,537 | 92,971 | 93,408 | 93,849 |
| Demurrage & Wagon Hire | 2,079 | 2,251 | 2,285 | 2,343 | 2,413 | 2,431 | 2,450 | 2,474 | 2,495 | 2,506 | 2,518 | 2,530 |
| Passenger Business | 8,339 | 8,338 | 8,979 | 9,194 | 9,478 | 9,478 | 9,554 | 9,602 | 9,650 | 9,698 | 9,746 | 9,795 |
| Other Transport Revenue | 666 | 786 | 746 | 694 | 642 | 538 | 466 | 466 | 466 | 466 | 466 | 466 |
| Total Transport Revenue | 64,909 | 87,730 | 96,945 | 99,242 | 102,125 | 102,682 | 103,390 | 104,336 | 105,147 | 105,641 | 106,139 | 106,640 |
| Auxiliary Activities Income | 2,005 | 2,370 | 2,370 | - | - | - | - | - | - | - | - | - |
| Sales of Non Transport Goods & Services | 1,192 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |
| Gains or Loss Foreign Currency Transactions | 5,302 | 3,447 | - | - | - | - | - | - | - | - | - | - |

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Business plan - Kazakhstan railways 2000

| | Actual | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast |
|---|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Other Income | 18 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| Total Revenue | 73,426 | 93,733 | 99,502 | 99,429 | 102,312 | 102,869 | 103,577 | 104,523 | 105,334 | 105,828 | 106,326 | 106,827 |
| Operating Subsidy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Operating Revenue | 73,426 | 93,733 | 99,502 | 99,429 | 102,312 | 102,869 | 103,577 | 104,523 | 105,334 | 105,828 | 106,326 | 106,827 |
| Operating Expenses | | | | | | | | | | | | |
| Salary - per accounts | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Social Insurance | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 |
| Consumption Fund (Other Employee Benefits) | 3,121 | 2,728 | 2,233 | 1,923 | 1,717 | 1,571 | 1,465 | 1,394 | 1,357 | 1,332 | 1,319 | 1,313 |
| Materials | 10,535 | 12,259 | 12,079 | 12,131 | 12,795 | 13,728 | 13,643 | 13,605 | 13,568 | 13,571 | 13,581 | 13,584 |
| Fuel | 5,795 | 6,693 | 6,678 | 6,491 | 6,301 | 5,813 | 5,375 | 4,989 | 4,639 | 4,321 | 4,036 | 3,778 |
| Electrical power supply | 4,796 | 5,030 | 4,933 | 4,909 | 4,921 | 4,902 | 4,898 | 4,909 | 4,923 | 4,935 | 4,951 | 4,969 |
| Other operating expenses | 8,792 | 10,165 | 9,835 | 9,487 | 9,192 | 9,052 | 8,907 | 8,841 | 8,781 | 8,773 | 8,774 | 8,769 |
| Contract Costs - Civil Works | 0 | 0 | 0 | 126 | 280 | 377 | 437 | 474 | 498 | 513 | 523 | 529 |
| Contract Costs - Electrical Services | 0 | 0 | 0 | 0 | 135 | 232 | 289 | 324 | 348 | 357 | 360 | 362 |
| Insurance [reserve fund] | 78 | 84 | 85 | 87 | 90 | 90 | 91 | 92 | 92 | 93 | 93 | 94 |

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Business plan - Kazakhstan railways 2000

| | Actual | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Taxes [other than income tax] | 355 | 2,100 | 2,105 | 2,115 | 2,127 | 2,130 | 2,133 | 2,137 | 2,140 | 2,142 | 2,144 | 2,146 |
| Transport service penalties | 422 | 457 | 464 | 476 | 490 | 494 | 497 | 502 | 506 | 509 | 511 | 514 |
| Bad Debt | 4,700 | 5,168 | 3,622 | 2,063 | 1,669 | 1,583 | 1,593 | 1,611 | 1,621 | 1,627 | 1,633 | 1,640 |
| Barter Conversion | 0 | 2,431 | 1,936 | 1,336 | 611 | 435 | 374 | 342 | 346 | 348 | 350 | 353 |
| Social Needs Expenditures | 5,050 | 2,414 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 |
| Value Added Tax (Net) Treated as a Cost | 0 | 10,897 | 13,003 | 12,343 | 12,891 | 12,959 | 13,245 | 13,533 | 13,782 | 13,944 | 14,094 | 14,241 |
| Total Operating Expenses | 61,716 | 79,553 | 75,272 | 70,115 | 68,705 | 67,776 | 66,553 | 65,796 | 65,354 | 65,019 | 64,822 | 64,684 |
| Operating Profit Before Depreciation | 11,710 | 14,180 | 24,230 | 29,314 | 33,607 | 35,092 | 37,024 | 38,727 | 39,980 | 40,809 | 41,504 | 42,143 |
| Depreciation | 4,981 | 12,000 | 15,000 | 18,000 | 22,500 | 26,250 | 26,416 | 26,015 | 25,613 | 25,638 | 25,677 | 25,636 |
| Operating Profit after Depreciation | 6,729 | 2,180 | 9,230 | 11,314 | 11,107 | 8,842 | 10,609 | 12,712 | 14,367 | 15,172 | 15,827 | 16,507 |
| Interest - Japanese Loan | - | 231 | 322 | 382 | 443 | 441 | 427 | 419 | 393 | 368 | 343 | 318 |
| Interest - German Loan | - | 4 | 3 | 2 | 1 | 0 | - | - | - | - | - | - |
| Interest - EBRD Loan | - | - | 55 | 320 | 404 | 392 | 338 | 282 | 227 | 171 | 115 | 58 |
| Interest - Bank Borrowings | - | - | - | - | - | - | - | - | - | - | - | - |
| Extraordinary items | 7,849 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Profit / (Loss) before tax | -1,120 | 1,945 | 8,851 | 10,611 | 10,259 | 8,009 | 9,844 | 12,011 | 13,747 | 14,633 | 15,369 | 16,132 |

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| | Actual | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Income Tax | 1,774 | 3,257 | 4,729 | 4,727 | 4,406 | 3,697 | 4,241 | 4,886 | 5,400 | 5,650 | 5,853 | 6,062 |
| Profit Retained | -2,894 | -1,312 | 4,122 | 5,884 | 5,852 | 4,311 | 5,603 | 7,124 | 8,347 | 8,983 | 9,516 | 10,070 |
| Operating Profit before Depreciation % | 15.9% | 15.1% | 24.4% | 29.5% | 32.8% | 34.1% | 35.7% | 37.1% | 38.0% | 38.6% | 39.0% | 39.5% |

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KAZAKHSTAN RAILWAYS

PESSIMISTIC SCENARIO

OPERATING STATISTICS

| | Actual 1996 | Forecast 1997 | Forecast 1998 | Forecast 1999 | Forecast 2000 | Forecast 2001 | Forecast 2002 | Forecast 2003 | Forecast 2004 | Forecast 2005 | Forecast 2006 | Forecast 2007 |
|--|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Key Assumptions | | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Inflation rate [relates current to previous year's expenses] | | | | | | | | | | | | |
| Key Operating Statistics | | | | | | | | | | | | |
| Freight tonnes (000) | 192,586 | 170,164 | 172,292 | 176,273 | 181,104 | 182,468 | 183,471 | 181,291 | 181,645 | 181,505 | 181,373 | 181,251 |
| Freight tkm (000,000) | 112,689 | 103,205 | 104,752 | 107,405 | 110,651 | 111,467 | 112,109 | 110,405 | 110,742 | 110,757 | 110,778 | 110,804 |
| Ave. length of haul | 585 | 607 | 608 | 609 | 611 | 611 | 611 | 609 | 610 | 610 | 611 | 611 |
| Passenger km (000,000) | 14,199 | 12,495 | 11,500 | 10,500 | 9,500 | 8,500 | 8,075 | 7,671 | 7,288 | 6,923 | 6,578 | 6,248 |
| Locomotive km (000) | 168,109 | 161,187 | 150,572 | 139,638 | 132,522 | 126,377 | 120,940 | 119,645 | 119,934 | 119,983 | 120,036 | 120,093 |

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| | Actual | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast |
|----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Train km (000) | 134,179 | 128,915 | 120,440 | 113,284 | 109,796 | 106,894 | 104,317 | 103,288 | 103,520 | 103,562 | 103,606 | 103,653 |
| Wagon km (000,000) | 4,611 | 4,195 | 4,245 | 4,344 | 4,469 | 4,503 | 4,531 | 4,469 | 4,482 | 4,481 | 4,481 | 4,482 |
| Employment - core activity | 146,143 | 135,275 | 110,738 | 95,357 | 85,123 | 77,928 | 72,670 | 69,108 | 67,296 | 66,061 | 65,430 | 65,094 |
| Percentage change | | -7.4% | -18.1% | -13.9% | -10.7% | -8.5% | -6.7% | -4.9% | -2.6% | -1.8% | -1.0% | -0.5% |

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KAZAKHSTAN RAILWAYS

PESSIMISTIC SCENARIO

PROFIT AND LOSS ACCOUNT 1996 - 2007

(All Data is in Millions of Tenge)

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|--------------------------------|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Operating Revenue | | | | | | | | | | | | |
| Freight Business | 53,824 | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,722 | 89,174 | 89,386 | 89,357 | 89,332 | 89,311 |
| Demurrage & Wagon Hire | 2,079 | 2,251 | 2,285 | 2,343 | 2,413 | 2,431 | 2,445 | 2,408 | 2,415 | 2,416 | 2,416 | 2,417 |
| Passenger Business | 8,339 | 8,338 | 8,236 | 7,539 | 6,841 | 6,143 | 5,827 | 5,525 | 5,249 | 4,986 | 4,738 | 4,500 |
| Other Transport Revenue | 666 | 786 | 746 | 694 | 642 | 538 | 466 | 466 | 466 | 466 | 466 | 466 |
| Total Transport Revenue | 64,909 | 87,730 | 96,203 | 97,587 | 99,488 | 99,347 | 99,460 | 97,573 | 97,516 | 97,225 | 96,952 | 96,694 |
| Auxiliary Activities Income | 2,005 | 2,370 | 2,370 | - | - | - | - | - | - | - | - | - |
| Sales of Non Transport Goods & | 1,192 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |

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| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Services | | | | | | | | | | | | |
| Gains or Loss Foreign Currency Transactions | 5,302 | 3,447 | - | - | - | - | - | - | - | - | - | - |
| Other Income | 18 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| Total Revenue | 73,426 | 93,733 | 98,759 | 97,774 | 99,675 | 99,534 | 99,647 | 97,760 | 97,703 | 97,411 | 97,139 | 96,881 |
| Operating Subsidy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Operating Revenue | 73,426 | 93,733 | 98,759 | 97,774 | 99,675 | 99,534 | 99,647 | 97,760 | 97,703 | 97,411 | 97,139 | 96,881 |
| Operating Expenses | | | | | | | | | | | | |
| Salary - per accounts | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Social Insurance | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 |
| Consumption Fund (Other Employee Benefits) | 3,121 | 2,728 | 2,233 | 1,923 | 1,717 | 1,571 | 1,465 | 1,394 | 1,357 | 1,332 | 1,319 | 1,313 |
| Materials | 10,535 | 12,259 | 12,069 | 12,106 | 12,754 | 13,671 | 13,577 | 13,470 | 13,417 | 13,405 | 13,399 | 13,387 |
| Fuel | 5,795 | 6,693 | 6,618 | 6,368 | 6,118 | 5,604 | 5,164 | 4,692 | 4,350 | 4,043 | 3,770 | 3,525 |

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Business plan - Kazakhstan railways 2000

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Electrical power supply | 4,796 | 5,030 | 4,915 | 4,868 | 4,857 | 4,821 | 4,797 | 4,739 | 4,716 | 4,695 | 4,678 | 4,662 |
| Other operating expenses | 8,792 | 10,165 | 9,828 | 9,473 | 9,172 | 9,027 | 8,878 | 8,780 | 8,714 | 8,700 | 8,693 | 8,682 |
| Contract Costs - Civil Works | 0 | 0 | 0 | 126 | 280 | 377 | 437 | 474 | 498 | 513 | 523 | 529 |
| Contract Costs - Electrical Services | 0 | 0 | 0 | 0 | 135 | 232 | 289 | 324 | 348 | 357 | 360 | 362 |
| Insurance [reserve fund] | 78 | 84 | 83 | 84 | 85 | 84 | 84 | 82 | 82 | 81 | 81 | 81 |
| Taxes [other than income tax] | 355 | 2,100 | 2,101 | 2,107 | 2,114 | 2,114 | 2,114 | 2,107 | 2,107 | 2,106 | 2,105 | 2,104 |
| Transport service penalties | 422 | 457 | 464 | 476 | 490 | 494 | 496 | 489 | 490 | 490 | 491 | 491 |
| Bad Debt | 4,700 | 5,168 | 3,622 | 2,063 | 1,669 | 1,583 | 1,589 | 1,577 | 1,577 | 1,574 | 1,571 | 1,568 |
| Barter Conversion | 0 | 2,431 | 1,936 | 1,336 | 611 | 435 | 372 | 335 | 333 | 331 | 328 | 326 |
| Social Needs Expenditures | 5,050 | 2,414 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 |
| Value Added Tax (Net) Treated as a Cost | 0 | 10,897 | 12,874 | 12,052 | 12,426 | 12,367 | 12,541 | 12,326 | 12,415 | 12,430 | 12,438 | 12,444 |
| Total Operating Expenses | 61,716 | 79,553 | 75,042 | 69,611 | 67,914 | 66,790 | 65,410 | 63,834 | 63,157 | 62,610 | 62,207 | 61,865 |

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| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Operating Profit Before Depreciation | 11,710 | 14,180 | 23,717 | 28,163 | 31,761 | 32,743 | 34,237 | 33,926 | 34,546 | 34,801 | 34,932 | 35,015 |
| Depreciation | 4,981 | 12,000 | 15,000 | 18,000 | 22,500 | 26,250 | 26,408 | 25,864 | 25,448 | 25,456 | 25,480 | 25,422 |
| Operating Profit after Depreciation | 6,729 | 2,180 | 8,717 | 10,163 | 9,261 | 6,493 | 7,828 | 8,062 | 9,098 | 9,345 | 9,452 | 9,594 |
| Interest - Japanese Loan | - | 231 | 322 | 382 | 443 | 441 | 427 | 419 | 393 | 368 | 343 | 318 |
| Interest - German Loan | - | 4 | 3 | 2 | 1 | 0 | - | - | - | - | - | - |
| Interest - EBRD Loan | - | - | 55 | 320 | 404 | 392 | 338 | 282 | 227 | 171 | 115 | 58 |
| Interest - Bank Borrowings | - | - | - | - | - | - | - | - | - | - | - | - |
| Extraordinary Items | 7,849 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Profit / (Loss) before tax | -1,120 | 1,945 | 8,338 | 9,459 | 8,413 | 5,660 | 7,064 | 7,361 | 8,478 | 8,806 | 8,994 | 9,218 |
| Income Tax | 1,774 | 3,257 | 4,573 | 4,378 | 3,847 | 2,986 | 3,398 | 3,457 | 3,789 | 3,867 | 3,900 | 3,942 |
| Profit Retained | -2,894 | -1,312 | 3,764 | 5,082 | 4,566 | 2,674 | 3,666 | 3,893 | 4,689 | 4,939 | 5,094 | 5,276 |
| Operating Profit before Depreciation % | 15.9% | 15.1% | 24.0% | 28.8% | 31.9% | 32.9% | 34.4% | 34.7% | 35.4% | 35.7% | 36.0% | 36.1% |



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14.4 Restructuring process

Kazakhstan Railways faces a major challenge in changing from an engineering - operations functional led organization to a business led organization which will prosper in a free market economy. Perhaps the biggest challenge will come in trying to change the culture of the organization and have decisions made at the lowest possible level of the organization. This transition has been successfully completed in many western countries in the last number of years.

14.4.1 Management of change

It is proposed that this management of change be driven from the top of the organization. It is therefore recommended that the responsibility for implementing the changes necessary should lie with the Deputy Chief Executive as indicated in the organization charts. His responsibility would transgress all businesses and disciplines. It is suggested that change management teams be set up in all the businesses. Clear targets should be set and time frame for achievement set. It must be recognized that a number of the changes cannot be achieved without investment. Experience has shown that substantial progress in cost cutting can be achieved even without major investment. These areas should be tackled first.

It is envisaged that substantial progress can be made once the need for this change is recognized.

14.4.2 Transfer of social services to other authorities.

A special organization should be set up outside the responsibility of the railway and the Ministry of Transport and Communications. The financial responsibility should be removed from the railway and this newly created organization should manage the placement to local or other organisations. It is suggested also that this body could take responsibility for retraining redundant staff thus accelerating the return to railway profitability.

Restructuring deals with the strategically significant changes that affect the railway as a going concern. Ultimately the value is measured in terms of the railway to satisfy its freight customers and passengers in competition with other service providers.

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In examining the restructuring process four basic approaches should be adopted to solve problems in accordance with quality management principles.

- **Define the problem** This has been done by KTZ management and the Ministry of Transport and Communications
- **Analyse the problem** This has been completed by the Mercer report, The Winner report, and now the C I E Consult-Systra report sponsored by TACIS.
- **Generate solutions** This has been completed in the Winner and C I E Consult-Systra reports
- **Plan** For such a major change in philosophy it is necessary to plan very carefully for the transition from a centrally controlled railway industry subject to the old Soviet norms for railway operations to a customer oriented market driven railway industry
- **Implement** This offers the biggest challenge to railway management. It calls for a complete change in culture and an enthusiasm for change. It is clear to the consultants that this enthusiasm is presently present in the existing KTZ management if one were to judge by the rapid progress that has been made in KTZ in the last couple of years. To implement such a radical change calls for the involvement of all staff at all levels in the organization. It calls for an excellent communications process so that all staff realises the necessity for change and accept it.

14.5 Management Style

A railway pursuing commercial objectives has a totally different management approach from one, which focuses on producing transportation with little regard to the amount of equipment, employed, the productivity with which it is used or the resulting costs. Equally important is the fact that business has now to be obtained against powerful competition and changing economic and social factors and is no longer directed to rail by decree.

Institutionally, these factors are recognized in the proposed new status of KTZ, including the new statutory background, the contract relationship with Government, the Performance Agreement and the Public Service Contracts for unremunerative services, which will have been signed with Government and local authorities. The Director General and the Directors will have full and accountable responsibility for achieving results and are strengthened in this by their membership of the Executive Board, which may also include members with wider responsibilities in Government and industry, who can contribute different expertise, experience and guidance.

The approach of management to its task - its working styles - is now different. It focuses, particularly, upon:

- the overriding need to secure profit;



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- determination to provide railway service only for traffic types and flows which can be made profitable;
- recognition that many previous railway activities are not profitable and cannot be made so and therefore must not be pursued by KTZ unless directed by Government and accompanied by full financial compensation;
- a critical approach to productivity and economy;
- a thorough understanding of customers' interests, business activities and processes and the mutual benefits arising from jointly planned movements by rail;
- a complete knowledge of the activities, charges, strengths and weaknesses of competitive transport systems;
- a comprehensive understanding of railway costs, their causes and the way they behave under the influences of changes in volume, operating methods or external influences etc;
- the application of a frugal instinct, which seeks to achieve the maximum output from the minimum input of resources;
- the devolution of responsibility and accountability to the lowest possible level where a comprehensive view can be obtained and effective decisions taken. This dictates the subordinate organization structure and guides the concentration of traffic and location of operational resources which will maximise the potential for productive results and delegated responsibility and authority;
- the support of this delegation of management by a firm system of control made possible by a comprehensive computer driven management information system. This operates by the input of data at original source through the distributed computer network and new communications links and the production of information in forms meaningful to each level and location of management;
- the principle that plans and budgets begin at the lowest level and are consolidated and developed as they move up the chain to the Director General by monitoring, rectification and improvement.

14.6 Marketing, product development and planning

The KTZ of 2000 will be a market oriented business and must provide services, which the customer requires at a price he is prepared to pay but which meet all the financial needs of KTZ to cover its operating costs and provisions for the future to keep it in business. It follows from this that KTZ must know all about its customers - existing and potential; their areas of business and processes, their opportunities for using other forms of transport; what they can afford or are willing to pay for transport; how their transport requirements can best be met by railways; what steps can or should be taken to shape movement patterns to assist KTZ in providing the best and the most economical patterns to mutual advantage.

This wide spread of knowledge is what is meant by knowing the market or "marketing" and KTZ must become fully competent in this area. It must develop experts in the markets for



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particular commodities of goods or passenger services, who will be able to guide KTZ in understanding the needs of their customers and converting them into service specifications which will tell the operating department how they should be met. This knowledge will be the basis of all future investment in physical assets - each project must be supported by an evaluation of the way in which it will encourage new business or help existing business to be more profitable.

The accumulation of marketing ideas and project plans forms the overall business plan, which in turn is backed up by the operating plan, which describes how the business plan is to be serviced and the engineering plan which detail the resources used and technical activities which are in support. The financial aspects of each of these plans are revealed in the budget - the financial plan - and there will be an investment plan which will contain all the proposals for investing in new assets to maintain the railway in good physical state or improve its quality and to meet new opportunities.

14.7 Strengths ,weaknesses opportunities and threats

There is a common method used in assessing businesses. This S W O T S analysis can be applied to the railway.

14.7.1 Strengths

- monopoly situation
- large country
- good basic rail system
- commitment of management to change
- exclusive rights of way
- speed of change

14.7.1.1 Strengths commentary.

- One of the major strengths of the railway at the moment is that it has a virtual monopoly in the transport of long distance freight and passenger traffic. This monopoly is likely to be diluted in the new market economy.
- Kazakhstan is one of the largest countries in the world and therefore involves long travelling distances which results in large tonnes kms and large passenger kms
- The railway infrastructure is basically sound and while there is a backlog of maintenance and track renewal this should be addressed in the coming years.



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- The consultants acknowledge management's commitment to change. This has been demonstrated by the corrective actions, which have already been taken in the divesting of educational institutions and hospitals and in the privatisation of a number of enterprises.
- The railway has a major asset in its infrastructure. It has an exclusive right of way connecting the major cities of the state. This right of way could be of major benefit if for instance KTZ were to enter into a joint venture in telecommunications transmission area. This has proved very lucrative in some western countries
- The consultants have been very impressed at the speed with which KTZ have been able to effect change.

14.7.2 Weaknesses

- small number of major commodities transported
- low population in a large country

14.7.3 Weaknesses

- lack of western business skills
- lack of modern management information system
- slow speeds
- diesel locomotives

14.7.3.1 Weaknesses commentary

- KTZ obtains most of its freight revenue from the transportation of a relatively small number of commodities such as coal and oil. It is likely that the traffic in oil will diminish when new oil pipelines now being discussed come into operation. KTZ have already suffered a decline in coal traffic to Russia and this emphasises the vulnerability of being dependent on a limited number of traffics.
- The fact that Kazakhstan which is five times the size of France with only a population of seventeen million inhabitants makes the profitable operation of long distance passenger traffic very difficult.
- KTZ has operated in the past in a very protected environment. It now enters into a market economy, which will call for new business skills. The consultants are aware that new programmes such as M B A s are being considered by management institutions in Kazakhstan. This will fulfil a requirement in business education.



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- The lack of a modern management information system is a major weakness in KTZ. Proposals to address this situation are addressed in this report.
- Due to lack of investment in recent years a large number of speed restrictions are currently in place throughout the railway system. This problem has been addressed in this report.

The performance of the diesel electric on KTZ is unsatisfactory and requires engine replacements and rehabilitation.

14.7.4 Opportunities

- country's economic growth
- vast natural resources
- growth of business to the east and to the west
- lower cost base
- increase tariffs
- increased speeds
- new focused business units
- management of change
- privatisation
- added value

14.7.4.1 Opportunities commentary

- As the economy of Kazakhstan grows new opportunities will present themselves to a vibrant railway industry.
- Growth means greater demand for transport, which is efficient and cost effective.
- Kazakhstan has vast reserves of natural resources. These resources are now being exploited which should present new business opportunities for KTZ .
- Transit traffics between east and west are likely to increase in the future presenting further opportunities for KTZ.
- An opportunity now exists for KTZ to lower its cost base, which will allow it to compete with any competition, which might present itself in the foreseeable future.



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- KTZ has operated a low tariff policy for some years. While there has been progress in improving tariffs in recent times KTZ has some way to go to bring tariffs in line with tariffs in adjoining states.
- With increased investment it will be possible to remove speed restrictions, thus allowing faster speeds, shorter journey times, faster turnaround times for rolling stock.
- A unique opportunity exists for the creation of focused business units as discussed in this report. Modern business practice calls for the companies to get closer to its customers. The proposals in this report will allow the railway to do just that.
- KTZ has already shown its ability to take corrective action and face change. The management of change process will allow it to penetrate all levels in the organization.
- With the opening up of the infrastructure to third party access privatization of some services inevitable. This will be lucrative for the infrastructure division and may drive the business units into greater efficiencies.
- An organization should add value at every level. It should be focused with clear objectives and measurement put in place to measure progress.

14.7.5 Threats

- new oil pipelines
- proposed investment in road infrastructure
- lack of a level playing field between road and rail operations
- new TRACECA transport corridors
- third party accesses to infrastructure
- privatisation
- lack of investment in railways

14.7.5.1 Threats commentary

- The new oil pipelines now proposed are undoubtedly a threat to the transport of oil by rail. There is a time lag, which should allow KTZ to plan for this and identify alternate traffics.
- As the economy in Kazakhstan improves the demand for improved road infrastructure will increase. As the road infrastructure improves road transport will improve and will present threats to certain railway traffics.
- Another threat exists in the way that road infrastructure investment is treated in comparison to the approach to railway infrastructure investment. Traditionally investment for roads comes from central and local government while railways is expected to fund its own investment.



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- The proposed new TRACECA rail corridors could present a threat to some rail traffic, which currently pass through Kazakhstan.
- While third party access to the rail infrastructure presents opportunities to the infrastructure unit it may present threats to the business units.
- Privatization of services could present a competitive threat to some railway operations.

If there is insufficient investment in the railways it will become uncompetitive in a new market economy.

14.7.6 The railway for the year h2000

If the reforms outlined in this report are implemented successfully the following scenario is likely to emerge which should ensure a sustainable future for KTZ giving a customer focused service.

- A profitable sustainable railway industry
- Access available to third parties
- Operation of some private trains
- Maintenance facilities privatized
- Fast comfortable passenger trains
- Catering on trains franchised to private industry
- Faster freight trains
- More unit load trains
- Better trained workforce
- Better paid workforce
- Management using the most up to date state of the art management techniques
- Modern management information systems
- Possible very lucrative joint venture in telecommunication transmission
- Vastly reduced workforce

The challenge is great but the results will be very rewarding.



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14.8 Future technical assistance

In order to implement a number of the recommendations in this report it will be necessary for KTZ to have outside assistance and a proposal for suggested assistance in a number of areas is given in Annex no14.



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Regional co-operation

15. Regional co-operation

15.1 Introduction

There is good co-operation between the Railways of the Central Asian Republics and there is no reason to believe that this will change. The railways all use the same rolling stock, the same track standards, and rule books. There is even a common operating language, i.e. Russian. However, interoperability standards have to be maintained. Maintenance procedures have to be modernised and improved on. There are many advantages to be gained from joint purchasing of equipment including spare parts. The railways have to be marketed as a unit to improve their competitiveness in the international market. IT systems must be seen as a unified system to avoid duplication and the limitation of capability.

In the EU considerable efforts have been devoted to ensuring efficient interoperability, better management and more transparent financial transactions. The institutional position of the railways has been improved and a number of new laws drafted to ensure that there is harmonisation of competition between the different modes. As a result the point of view of the railway has become clearer in the political area resulting in a more sympathetic understanding of the problems of railway transport. The future of the railways in the EU is now irrevocably bound up with continuing co-operation and closer working between the different systems. It is recognised that the railways have a major role in the development of the common market.

A Regional Collaboration Conference, funded under the TRACECA programme, was held in Dublin from the 31st March to the 4th April 1998. Senior representatives of the railways of Kazakhstan, Uzbekistan and Turkmenistan attended this. There was an extensive discussion on areas of possible regional co-operation. A protocol (Annex 15) was signed on behalf of the participating railways which undertook to see how and when further regional collaboration could be further progressed.

Collaboration among the Central Asian Railways is just one part of the greater picture of collaboration in all sectors of the economy in the region. Considerable economic benefits are to be gained through this approach.



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Regional co-operation

Below are listed the areas for development of future co-operation. Some of the topics are complex and there is a need for further examination and elaboration. It is recommended that technical assistance be provided to support the efforts of the railways in this area, with a view to a steady increase in universally beneficial regional collaboration.

15.2 Possible areas for development of co-operation

15.3 Intermodal traffic

The TRACECA Study on Tariffs and Timetabling, carried out by SISIE-Calberson, identified a number of problems in the intermodal area. Rail costs are good generally by comparison with road. There are however bottlenecks on the TRACECA route, notably at Poti where the intermodal facilities are overloaded and the rates are high. This situation is being dealt with by investment in port facilities. Marketing is not good. Price alone will not attract the desired business volumes. The route must be sold to shippers.

The study identified the need for improvements in:

- Pricing and invoicing
- Documentation
- Conditions of carriage
- Information

The conclusions reached in the study were that there should be:

- Improvements of services for western clients including simple documentation and direct trains
- New pricing policy including more flexibility
- Improved marketing
- Implementation of common operator principle

Implementation of the common operator principle will require that a company or joint entity be set up. It will be necessary to:

- Select a key man as the Managing Director.
- Appoint Board of Directors
- Incorporate the Common Operator Company under private law
- Institute a new law based on European model



Regional co-operation

- Ensure adequate capitalisation
- Ensure open competition

The potential for increased intermodal business is substantial. To improve market share the railways must increase their co-operation and improve their performance, as already outlined.

The railway companies have some reservations about the proposals but it is anticipated that with further discussion, the difficulties can be overcome. A further study on an intermodal company is scheduled to start in May 1998.

15.4 Rolling stock purchasing, leasing and maintenance

The consultants are of the view that there is a limited potential for increasing co-operation in the maintenance area between the different railways. Generally the distances involved are very long so that moving rolling stock around to other systems workshops would give rise to decreased availability and would reduce the potential for dealing with breakdowns and emergencies. There are, however, some areas in which maintenance is shared on an advantageous basis, notably Kyrgyzstan, Tadjikistan and Uzbekistan.

There is considerable scope for improving maintenance performance through the use of replacement units. This practice needs to be introduced in all the states. Rolling stock availability could be improved enormously if replacement units such as engines and electrical units were readily available to deal with failures on a plug-in basis. There is an obvious need for a centralised company/ies, which would repair such units on a production basis. As well as improving availability, this will also have the very desirable effect of improving engineering standards thus further enhancing performance. A company of the type required could be set up on a joint venture basis with the involvement of all the railways.

In the longer term, consideration should be given to the setting up of a leasing company, which would provide rolling stock on long/short term leases. If required, arrangements could be made for the leasing company to maintain the equipment on a kilometre running charge. This principle is well established in Western Europe. The company could also expand into the area of purchasing, so that orders for the different companies could be pooled. There are obvious financial advantages arising from this form of large-scale procurement. This company could also be set up on a joint venture basis with participation of the railway companies.

15.4.1 Development of regional track access

The principle of access to the infrastructure of the railway companies should be expanded and encouraged. It should be possible for trains, including locomotives to be operated outside their own particular system on an agreed basis. This will reduce time lost at border crossings and make for more efficient use of staff and equipment. It will also encourage competition, which should lead to better fares and quality of service in the passenger area.

Open access to freight operators, both private and public, would also result in improvements in efficiency, service and rates for customers. There are particular opportunities for block train operation here, whether within a national system or operated cross-border.



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15.4.2 Infrastructure charging

Implementation of the recommendations for the establishment of infrastructure departments and the introduction of a track charging system will provide a more realistic basis for traffic costing. Opportunity should be taken to review the charges for track usage between the different countries. Efforts will have to be made to arrive at a more flexible approach in this area so that new lines will not be proposed to obviate using the track in an adjacent system.

15.4.3 Interoperability

While all the countries at the moment are using rolling stock and equipment in accordance with former soviet standards, this position may change in the future. Some of the railways may purchase equipment from outside the CIS. It is essential that specifications for these procurements, while meeting international standards, should also be compliant with the present Central Asian (CIS) railway standards. Otherwise the danger is that new equipment and standards may hinder the present smooth interoperability.

A considerable proportion of the current rolling stock and other equipment of the railways is out of date and in need of replacement. This is a situation which is facing all the Central Asian Railways. They must ensure that the introduction of modern technology will be seamlessly inserted into the existing systems without any negative effects on interoperability.

A protocol on standards for the five railways should be discussed and agreed. Procurement procedures will also need updating and modernisation in a co-ordinated fashion. This is referred to elsewhere in this report under recommendations for technical assistance in procurement.

15.4.4 Information Technology

The installation of a modern IT system, supported by a new communications system is proposed for the Central Asian railways. Experts from the UIC are preparing proposals for the telecommunications system under Module E of this project. The report is due by June 1998. New hardware and software is envisaged to provide a platform for the necessary MIS systems. Transfer of information between the systems is an essential ingredient of the proposal. Common protocols will be necessary. This project will not realise the huge advances projected without maximum co-operation between the managers and experts in the different railway systems. There must be consultation at regional level on the procurement of hardware and software to deal with the common computer protocols already referred to and also to ensure that best possible prices are secured for the installation of this equipment on an all system basis. Given that the software requirements are essentially the same for each country (although varying in scale) there is a clear advantage in common procurement of the IT package.

15.4.5 Marketing

The railway product must be presented and marketed as a single unit, both internally and internationally. The railways cannot be competitive without having a joint approach. An image must be created which will become recognisable to the public at large. A common approach to this must be established. It will in time be necessary to market the passenger services,



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particularly tourist traffic, abroad. This can obviously be done more efficiently, with greater impact and at lower cost, on a combined basis. It is also vital to market the freight services as already discussed in the intermodal section above.

15.4.6 Training Programmes

The railway sector in each of the Central Asian countries is generally well served with technical training institutes. However, in the move to the commercial restructured railway there is a need for training in disciplines new to the traditional railway, such as marketing, Information Technology, business management and organisation principles. It is suggested that this training should be organised on a regional basis to minimise costs and improve regional interaction.

15.5 TECHNICAL ASSISTANCE FOR SUPPORT OF REGIONAL COOPERATION

Implementation of the proposals outlined above to further collaboration between the railways requires high level commitment and the dedication of the relevant Ministries and higher railway management's. Appropriate railway experts will have to be assigned to various tasks. They will have to adapt to new technology and ideas. This process should be assisted by technical co-operation using external experts.



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ANNEXES

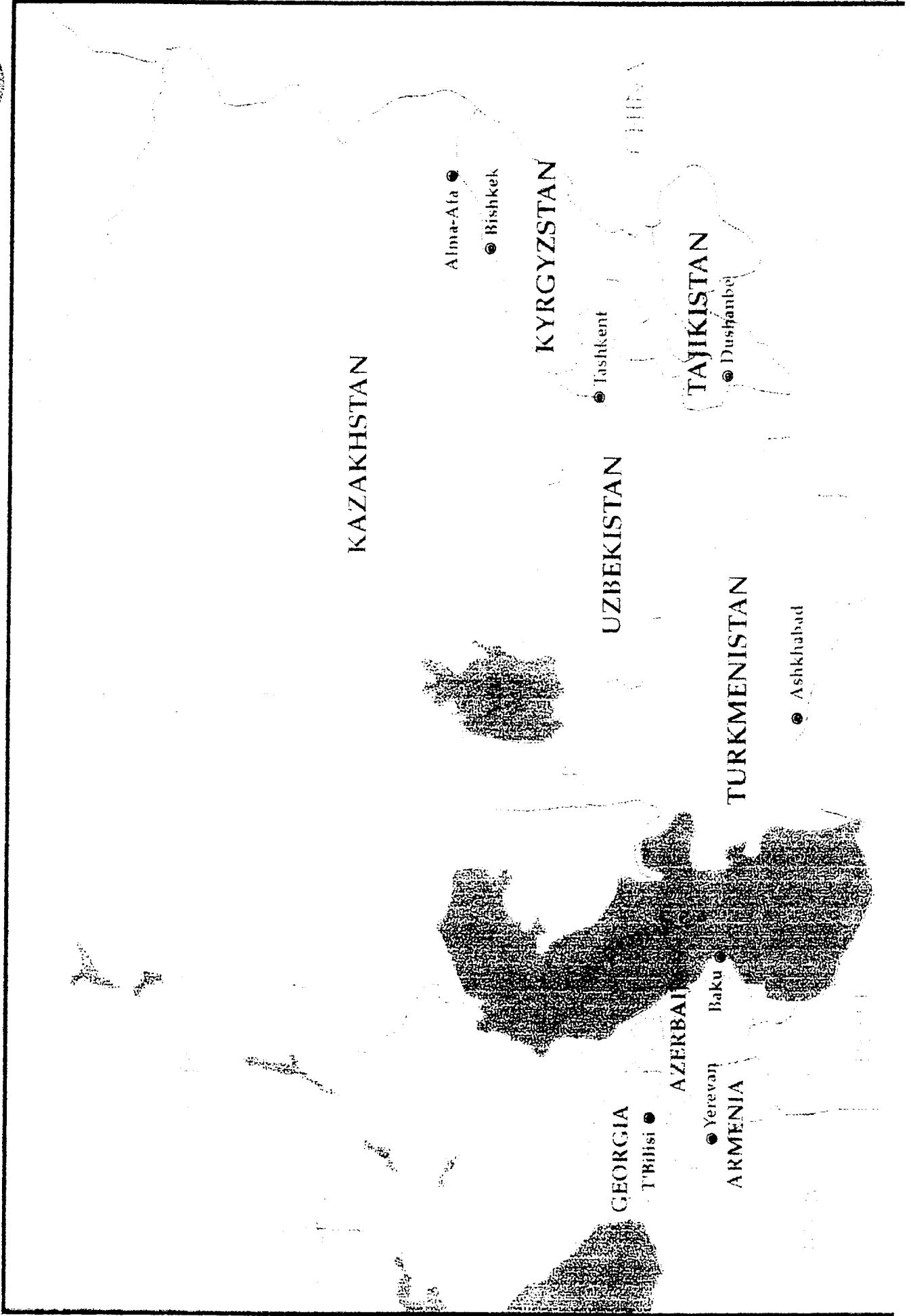
1. List of annexes
(the numbers refer to chapter numbers)
2. List of experts
Map of Central Asia
Map of railways
4. Management organisation charts
7. Review of economic development of Kazakhstan
Programme-railway transport development 1997-2010
9. Operations justification for recommendations
10. Infrastructure organisation
11. Financial aspects of the modification of 2TE10 locomotives
12. Ministry of Environment and BIO-Resources
13. H R Recommendations justifications
14. Investment-economic evaluation
Business plan financial tables
Technical assistance proposal

Annex 2

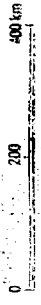
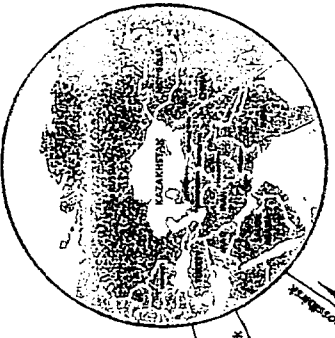
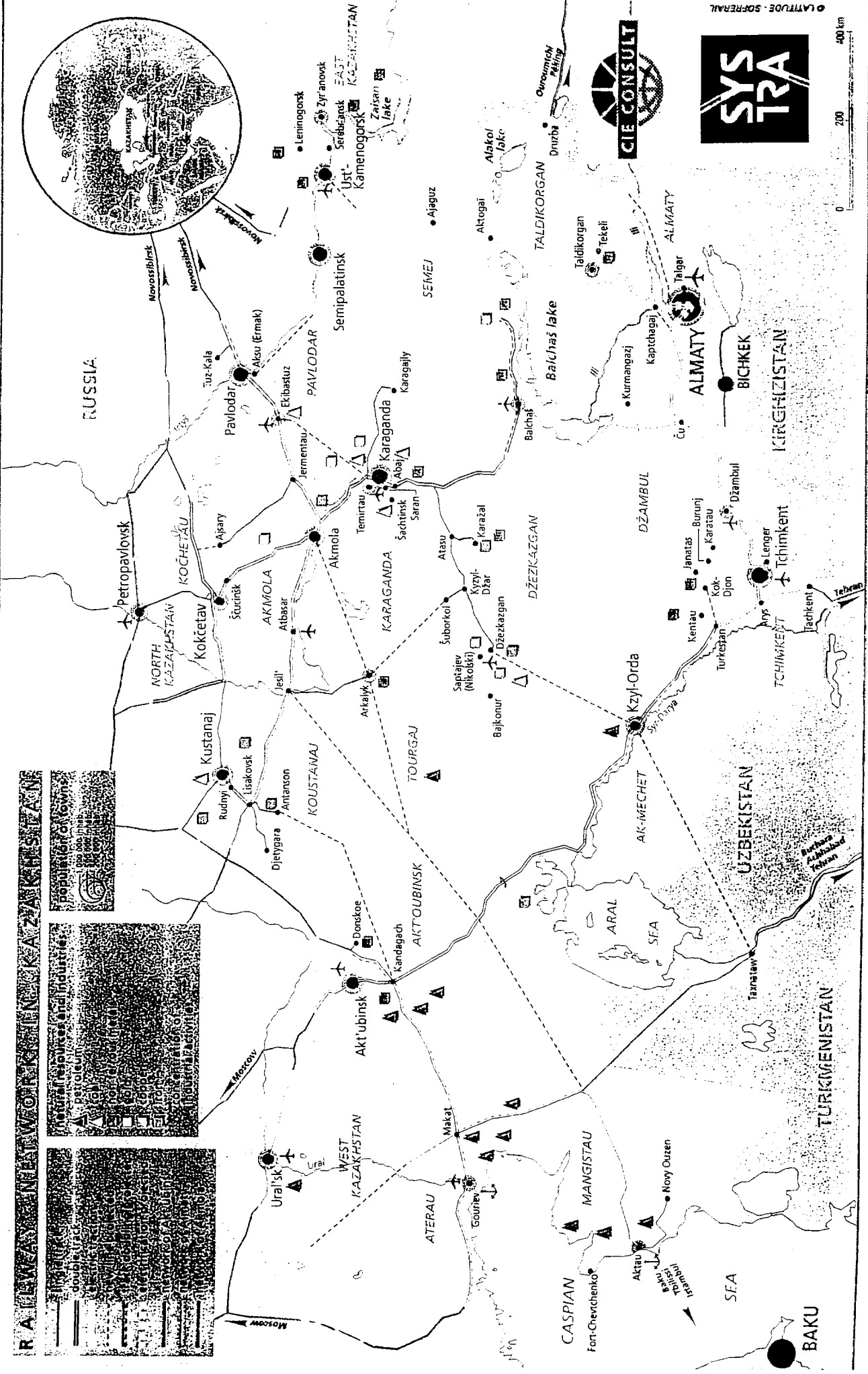
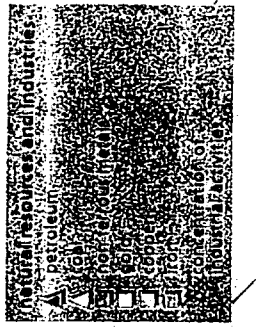
LIST OF EXPERTS

| | |
|------------------|--------------|
| PROJECT DIRECTOR | J F HIGGINS |
| PROJECT MANAGER | D WATERS |
| INSTITUTIONAL | V HERRIAU |
| LEGAL | M CARROLL |
| ECONOMICS | M HATTON |
| FINANCIAL REVIEW | G OMAHONY |
| FINANCE COSTING | J CRAWFORD |
| OPERATIONS | T BAAKE |
| ROLLING STOCK | A CAZARRE |
| INFRASTRUCTURE | P O JENNINGS |
| MIS | O DEREUDRE |
| HUMAN RESOURCES | J P BHAUD |
| ENVIRONMENT | C HURAND |

TRACECA STATES



RAILWAY NETWORK IN KAZAKHSTAN

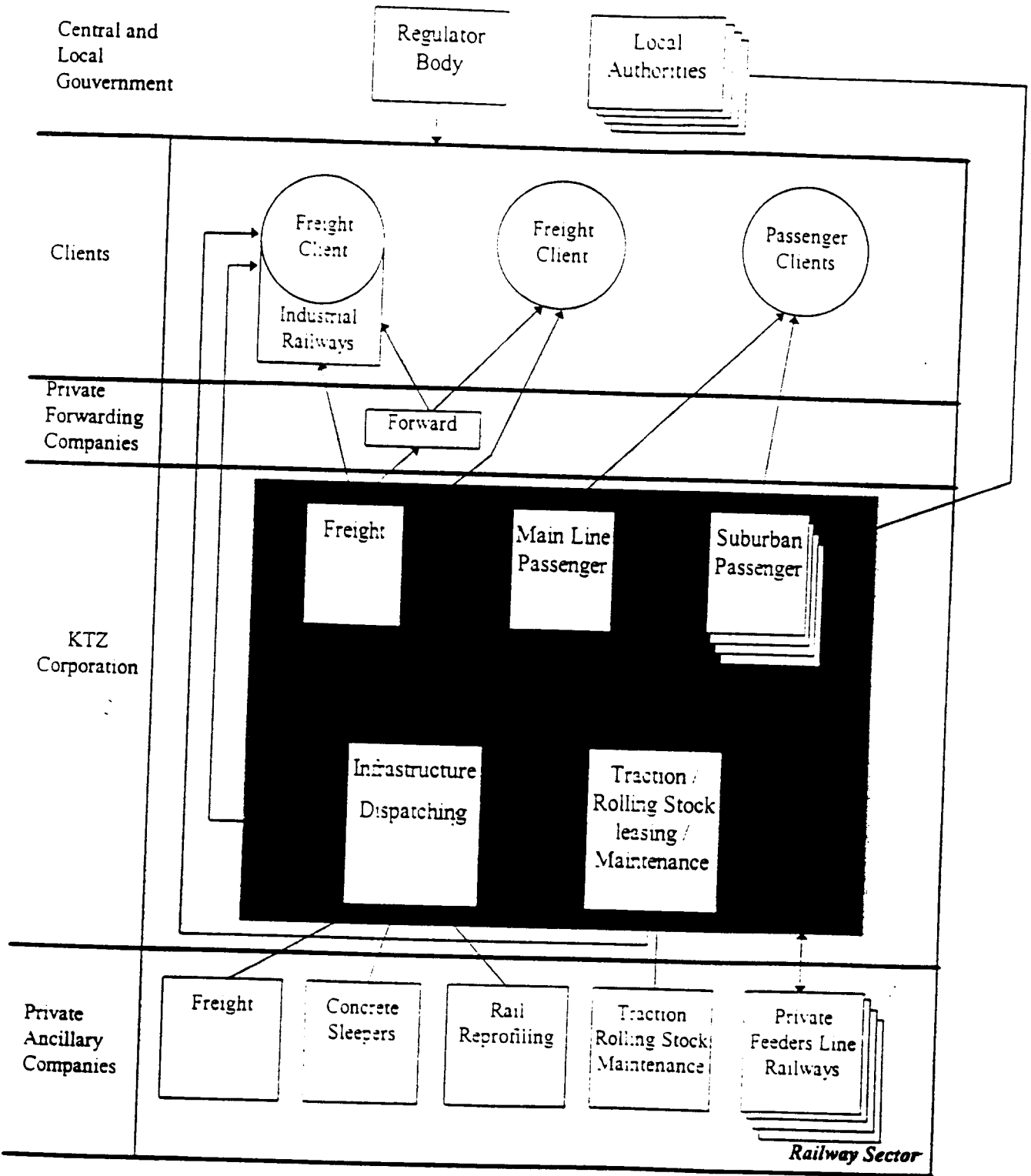


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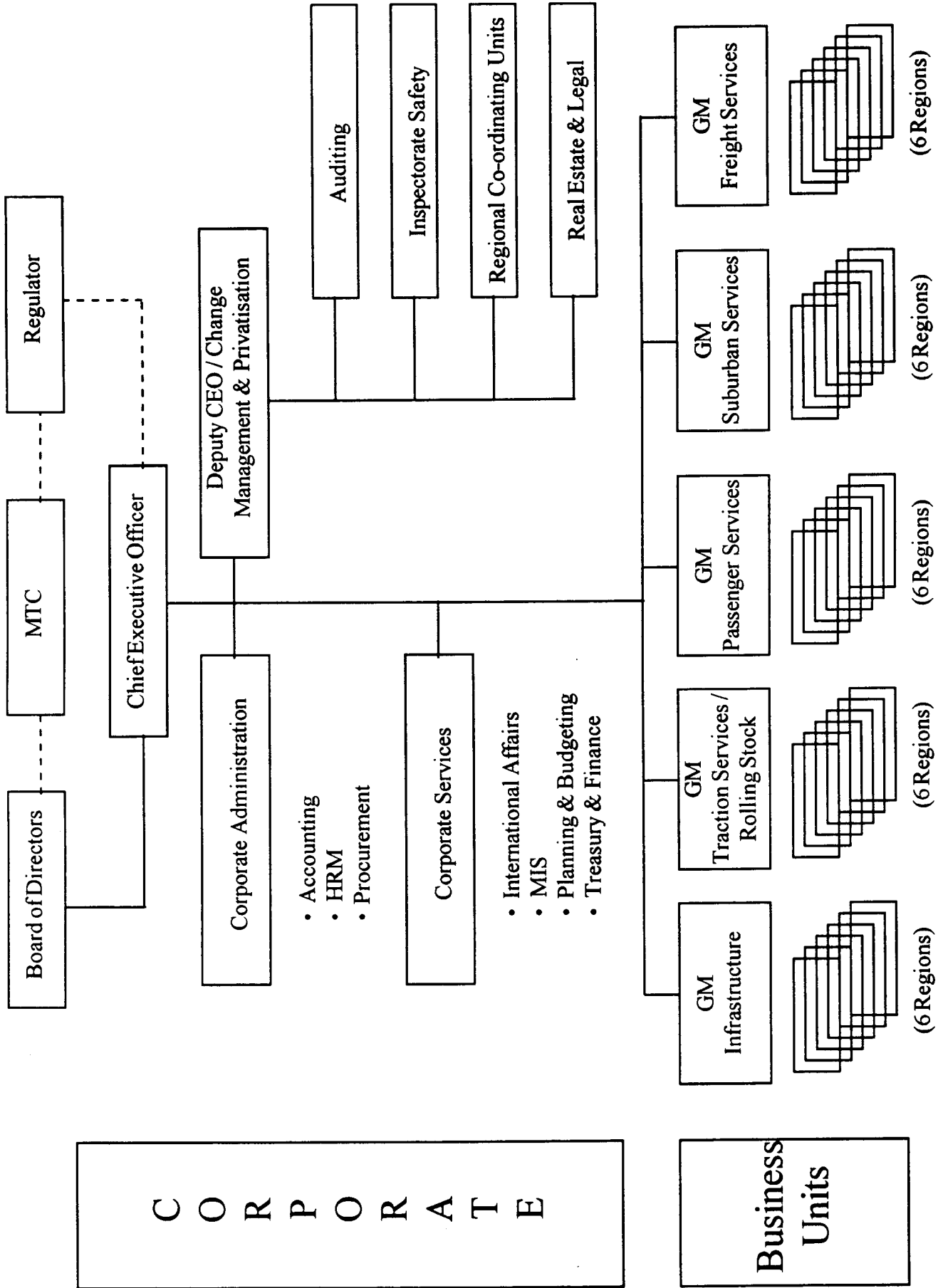
Annex No 4

MANAGEMENT ORGANISATION CHARTS

Restructuring of Railway Sector



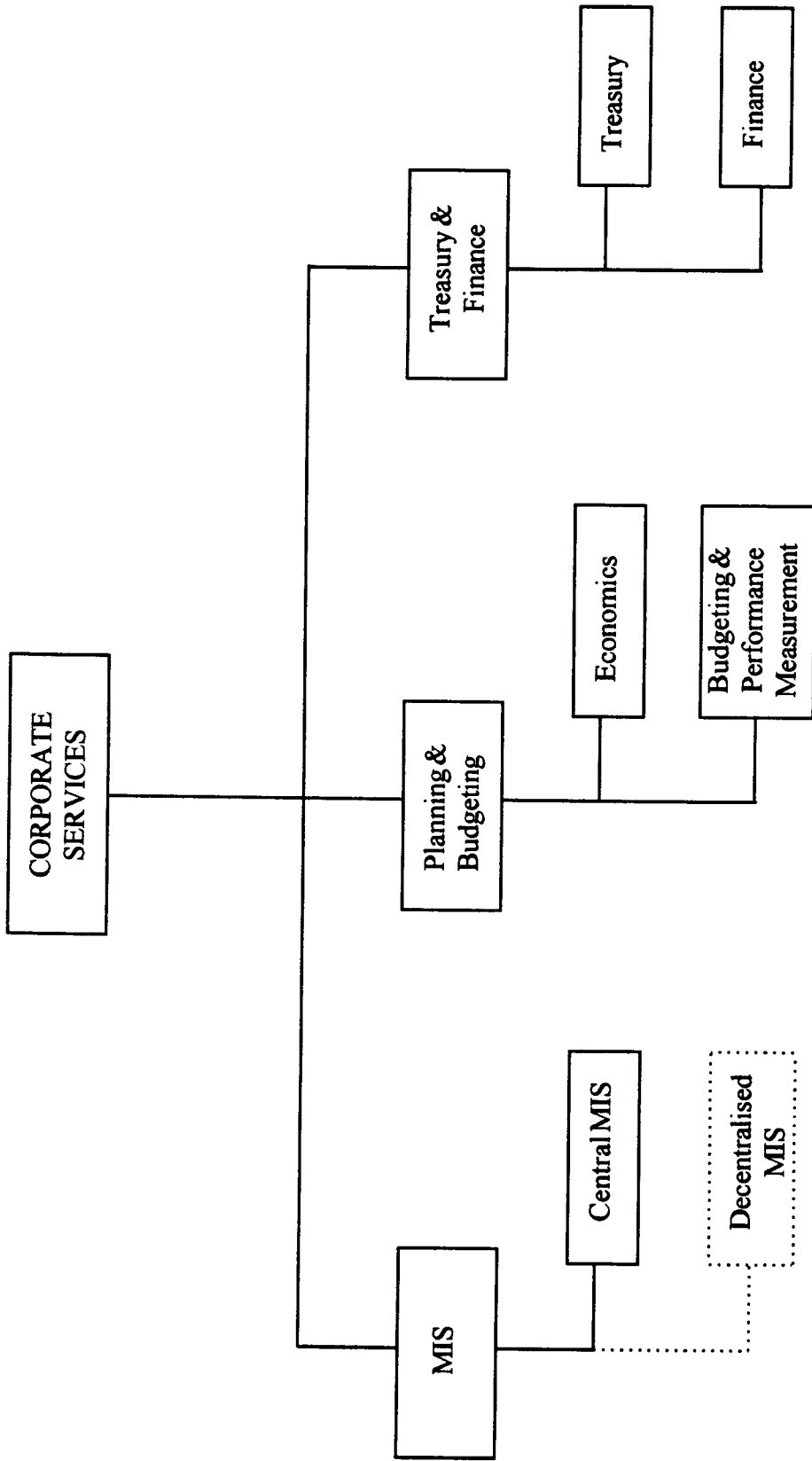
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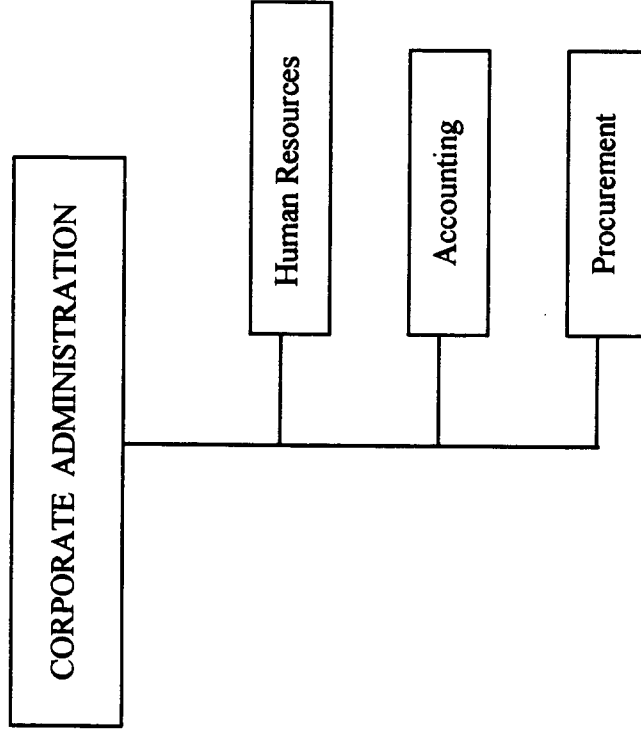
C O R P O R A T E

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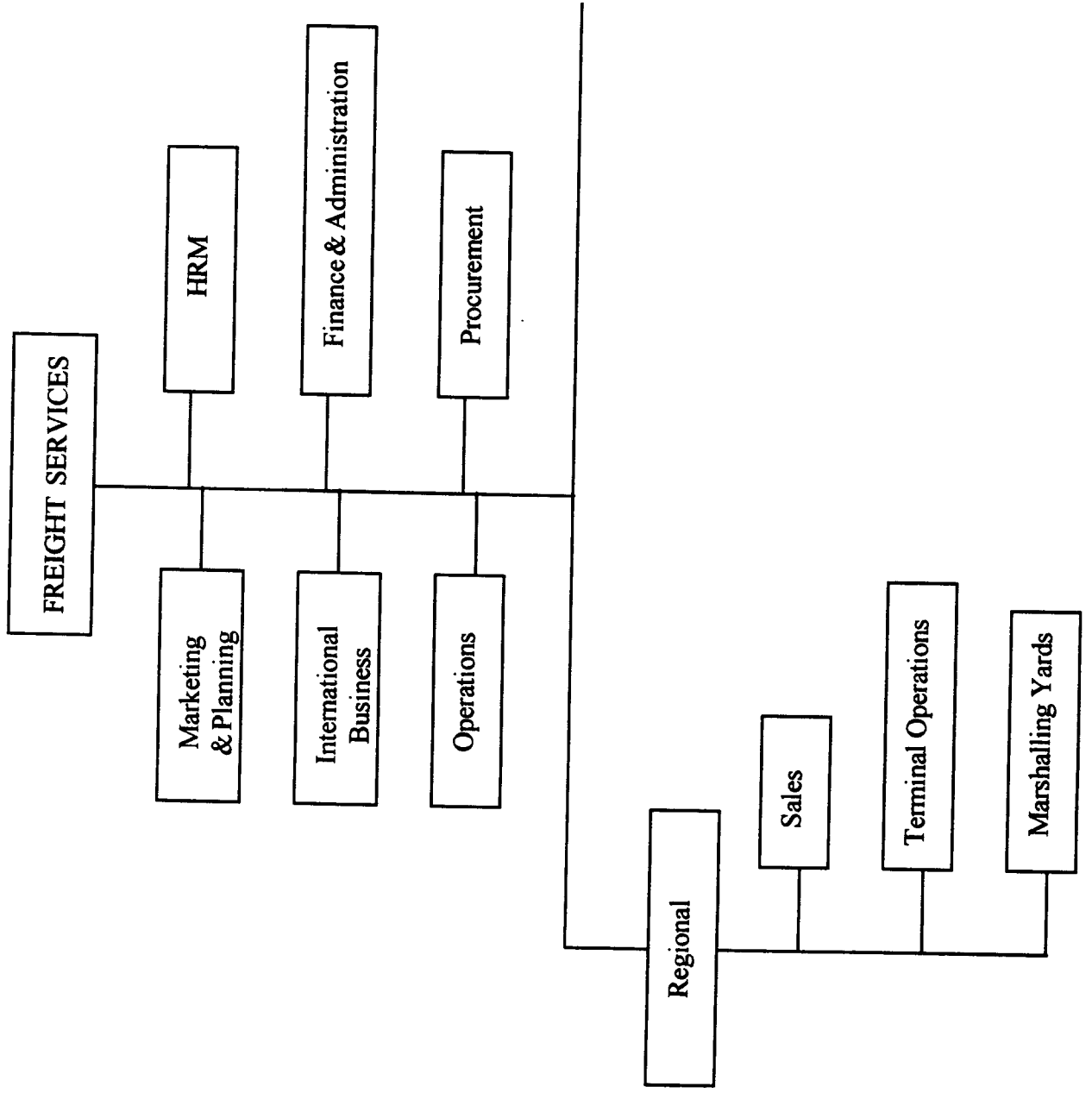
CORPORATE SERVICES



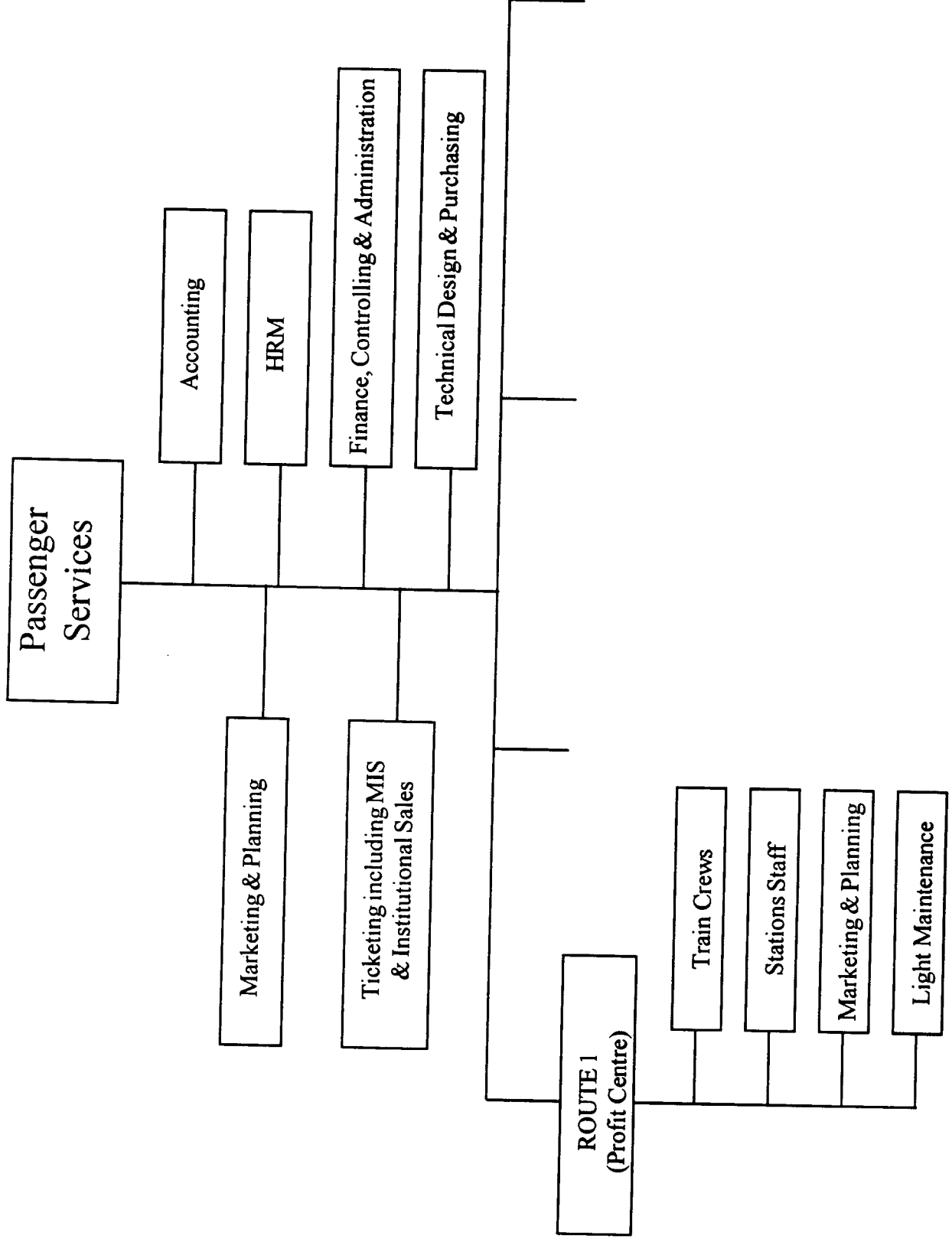
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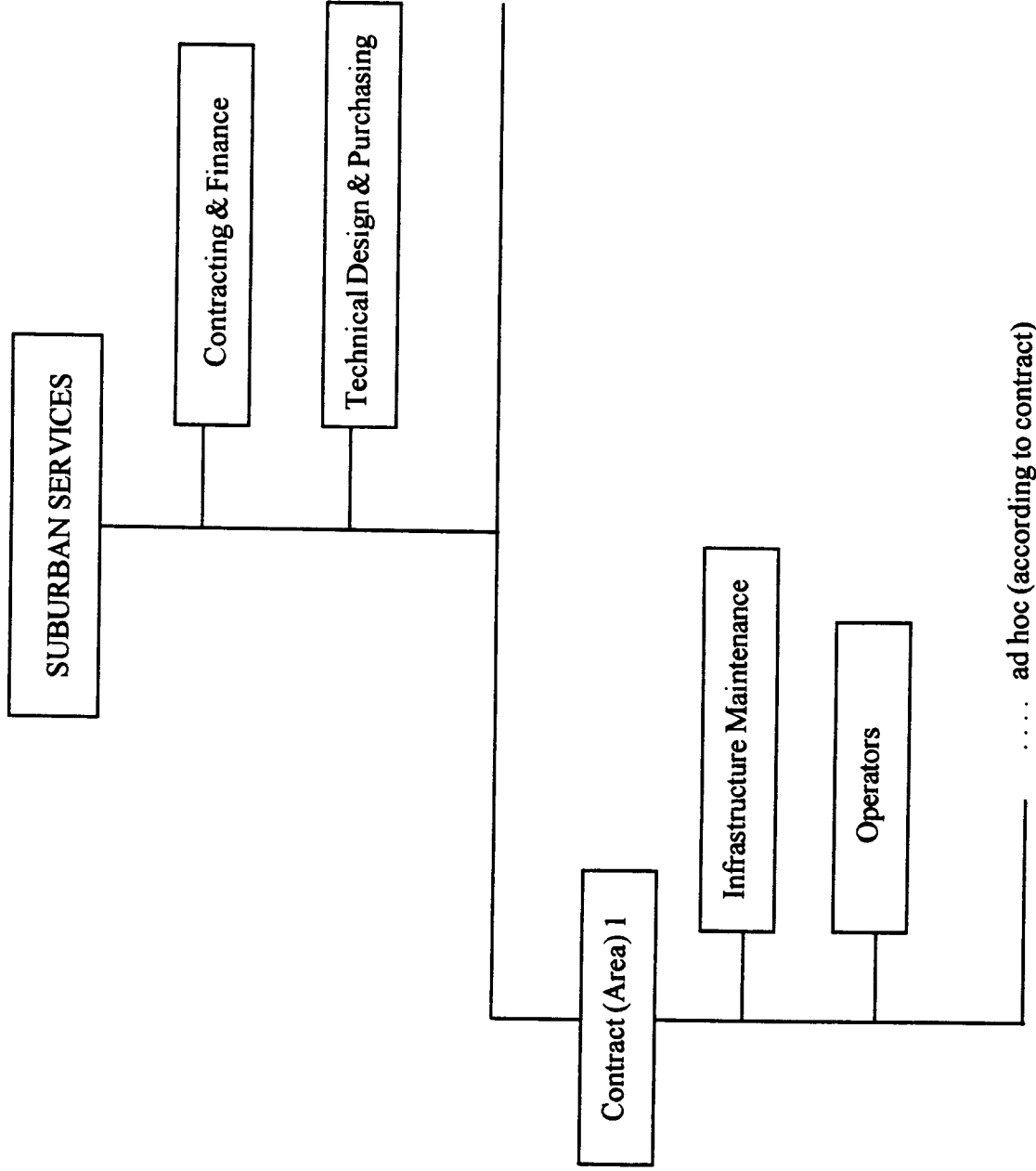
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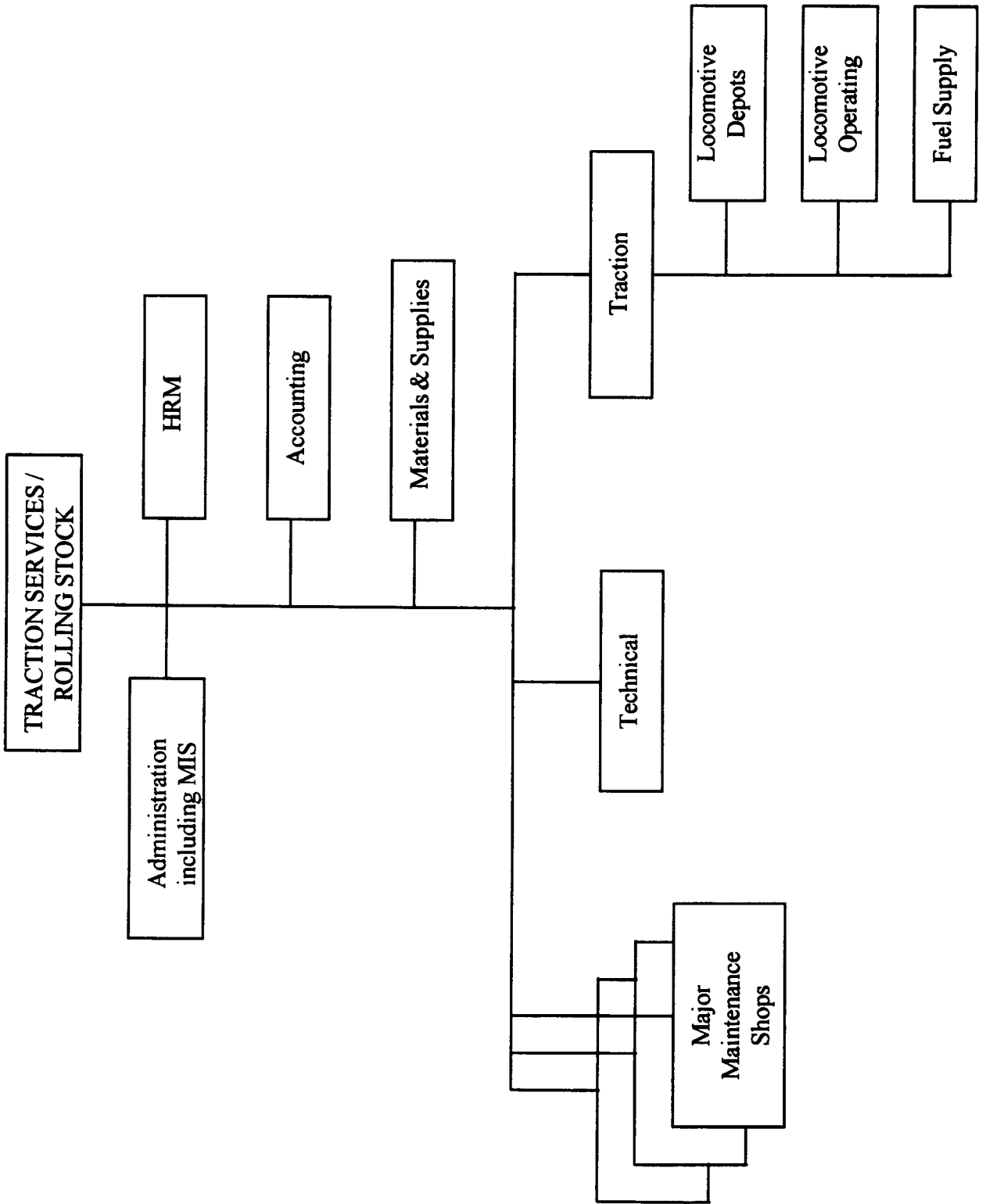
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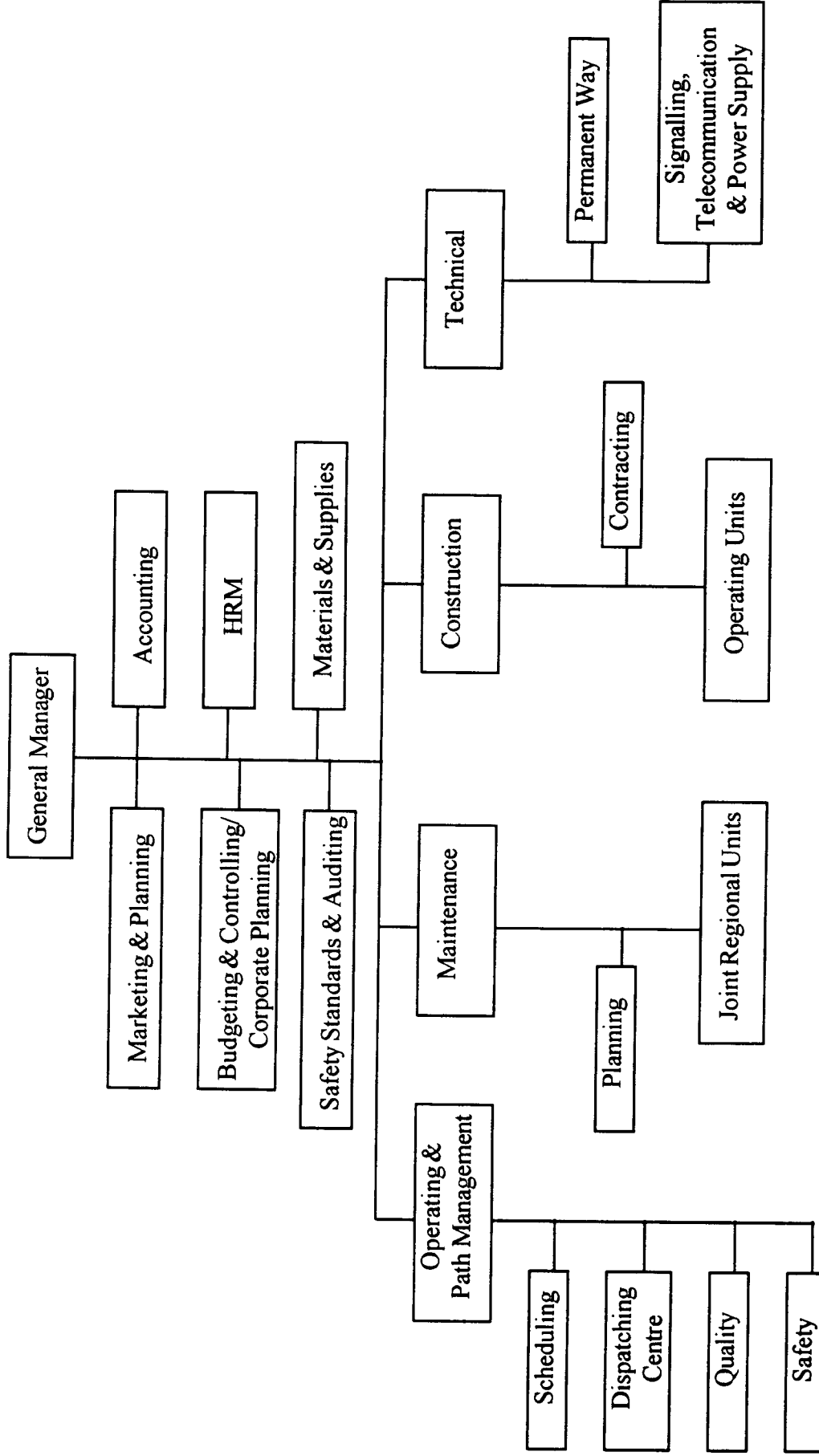
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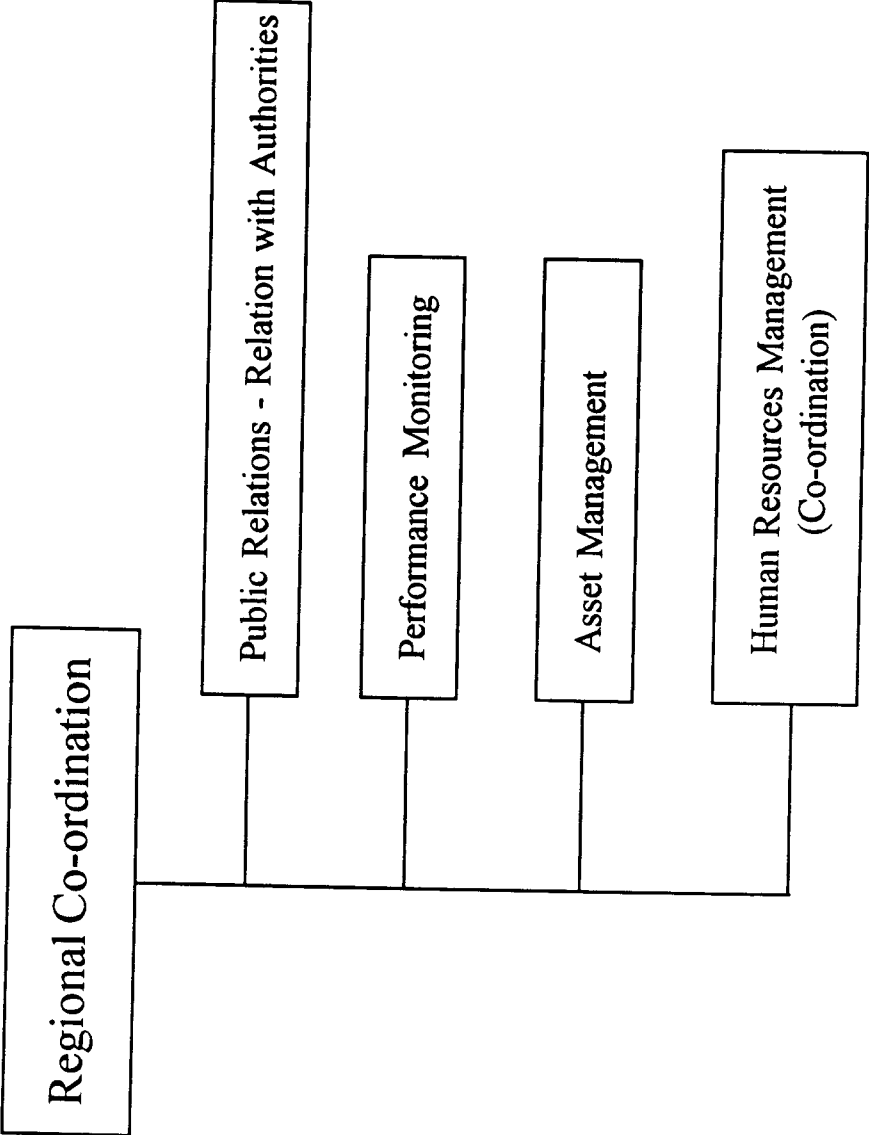
TRACTION SERVICES



INFRASTRUCTURE BU



REGIONAL CO-ORDINATING UNIT(S)



Tentative

Annex No 7

**REVIEW OF ECONOMIC DEVELOPMENT OF
KAZAKHSTAN**

**PROGRAMME OF THE RAILWAY TRANSPORT 1997-
2010**

Economic developments perspectives of Kazakhstan between 1998 and 2002

The study:

The study focuses mainly on major macro economic indexes and information collected through various organisations, including:

- the French Embassy's Economic Expansion Office in ALMATY,
- The Planning Department of the Economy and Trade Ministry of the Kazakhstan Republic,
- The Kazakhstan Central Bank Statistics Department.

Gross Domestic Product

Gross domestic product is currently estimated at 60% of its value for the year 1990. It has decreased sharply between 1990-1995. The actual recession ended in 1996 when the gross domestic product increased by 0.5% in comparison with 1995. By 2009-2010, the Government intends to have the gross domestic product reach the same level as in 1990. In 1997, the gross domestic product reached 22.7 billion US Dollars as against 20.7 in 1996. The following GDP growth perspectives are expressed in percentage terms against the previous year's GDP:

| | |
|------|-------------------|
| 1996 | 0.5% |
| 1997 | 2.0% |
| 1998 | 3.00% |
| 1999 | 3.00% |
| 2000 | 4.5 to 5.0% |
| 2001 | 4.5 to 5.00% |
| 2002 | 4.00% |
| 2010 | 3 to 4.00% a year |

The yearly GDP increases can be justified as of 1997 due to the following situations:

- industrial production recovery (+4.9% between July 1997 and July 1996),
- restructuring of the agricultural sector into a more industrialized system,
- general recovery of the construction industry due to an increase in capital investment (+15% in 1997 against 1996, according to forecasts),
- improvement of service quality.

From the year 2000-2001, North East of the Caspian Sea oil production will increase due to the construction of a new pipeline running to the Russian port of NOVOROSIISK on the Black Sea.

These forecasts did not take into account the recent agreements signed between the Chinese and Kazakhstan Governments regarding the exploitation of oil resources of the UZEN site and the construction of a pipeline between this site and the Chinese border. In addition, we were informed that the President of the Republic recently created two agencies:

- the Agency for Strategic Planning,
- the Agency for Resource Planning.

The above listed agencies were set up to prepare 10 year development plans: 2000-2010, 2010-2020, 2020-2030, the main objective of these plans being to optimise the exploitation of natural resources in order to increase revenue and to attract foreign investors.

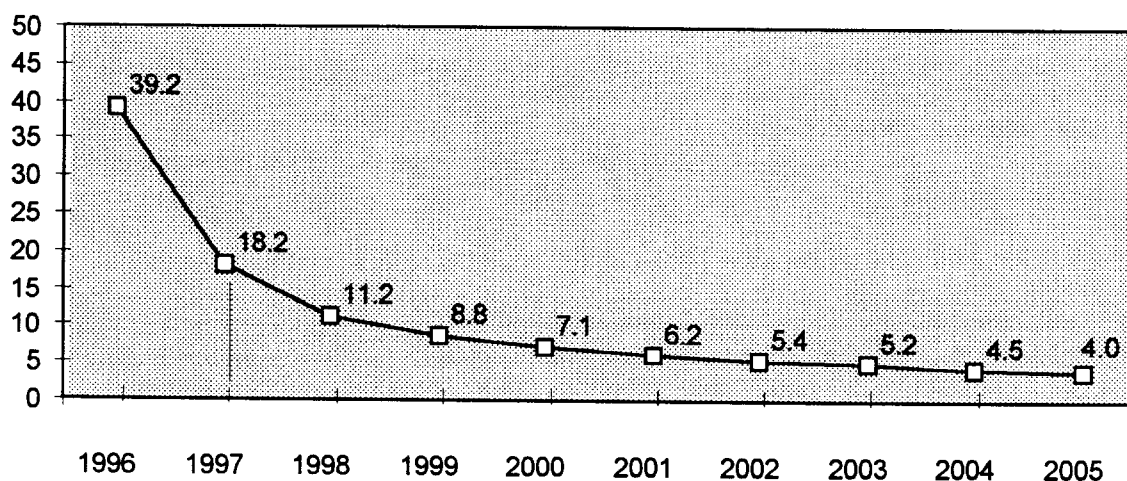
Based on the information collected at the level of the Ministry of Economy and Trade, the Government should implement measures to resolve a number of problems:

- increase revenue to finance the numerous capital investments required,
- improve the standard of living of the local population. It is estimated that 60% of the population are on or below the poverty line,
- changes affecting retirement plans and the creation of retirement funds,
- seeking ways to fight the underground economy which currently accounts for 27 to 30% of the gross domestic product; the underground economy is mainly made up of underground illegal oil, gas oil, and alcohol trades especially with China, of drug produced in the southern part of the country, of moonlighting which would involve 1.5 millions of persons,
- reduce tax fraud and review tax exemption privileges granted to certain major corporations i.e. KARMET „KARAGANDA-METAL“ (an Indian company enjoying a ten year tax exemption).

Inflation

A new currency (the Tenge) was created as of 11/15/93. It generated a major inflationary pressure which was reduced in October 1994. In December 1995, the inflation rate was still as high as 105.4. The graph below focuses on average inflation rates since 1996 and up to the year 2005. Between 2005 and 2010, forecasts were based on 3 and 4% inflation rates.

Average annual inflation rates



Note: the 98-budget project was prepared on the basis of an average 11.2% inflation rate.

Budgetary deficit

The budgetary deficit was limited to 2.9% of the gross domestic product for the 1996 fiscal year. Initially, the inflation rate was supposed to reach 3.1% in 1997. This figure was reviewed in July and it was established that an additional 36 billion Tengges would be required. The 1997 budgetary deficit will then represent 3.7% of the gross domestic product.

For 1998, the budgetary deficit accepted by the Government will account for 5.5% of the gross domestic product. Such an increase results from the creation of a pension fund and from the retirement plan modification.

We were not provided with any additional forecast for future years; however the budgetary deficit should remain within the level set by the International Monetary Fund, i.e. between 2.7 and 3.5% of the gross domestic product.

Balance of Trade

Kazakhstan mainly exports cereals, oil and iron-free metals. The country imports mechanical construction goods and consumer goods. The following table describes the amount of imports and

exports in millions of US Dollars for 1996 and forecasts for 1997 and 1998. We were not given any forecasts regarding the 1999 - 2002 period.

| YEARS | EXPORTS | IMPORTS | BALANCE |
|---------------|-----------|-----------|---------|
| 1996 | 6,301 | 6,633 | 332 |
| 1997 | 6,609 | 6,966 (1) | 357 |
| 1998 | 7,006 (1) | 7,457 (1) | 451 |
| (1) Forecasts | | | |

The trade deficit varies between 5.2 and 6.4% of overall exports. It has increased slightly during the last 3 years due to increased consumer goods requirements. This trend should revert by the year 200-2001, due to increasing oil export volume.

The gross external debt

Data regarding the gross external debt between 1993 and 1997 is included in the following table. They are expressed in millions of US Dollars.

| Situation as of | Overall amount of gross external debt | Amount guaranteed by the State and percentage of the overall debt | Amount not guaranteed by the State | Amount of cross-company contractual debts |
|-----------------|---------------------------------------|---|------------------------------------|---|
| 12/93 | 1,973.8 | 1,765.6 (89.5%) | 0 | 208.2 |
| 12/94 | 3,258.4 | 2,715.8 (83.3%) | 0 | 542.6 |
| 12/95 | 3,197.8 | 2,050.5 (64.1%) | 176.2 | 971.1 |
| 12/96 | 3,788.1 | 2,621.5 (69.2%) | 264.3 | 902.3 |
| 03/97 | 4,081.4 | 2,637.5 (64.6%) | 267.9 | 1,176.0 |
| 06/97 | 4,390.4 | 2,769.8 (63.1%) | 344.2 | 1,276.4 |

The external gross debt is increasing rapidly. The State is gradually withdrawing by keeping the warranty level practically steady.

No information regarding the evolution of the external debt is available. The external debt is currently increasing without any type of warranty or monitoring and consequently additional supervision will be required in the years to come.

The gross external debt by inhabitant currently amounts to USD 266.1. It accounts for 19.3% of the GDP and 65.4% of yearly overall exports.

The currency situation

The current currency situation seems satisfactory. Net external assets are 7.7% higher than at the same date in 1996.

Net cash reserves of the Central Bank of Kazakhstan have increased by 1.1% at the end of July 1997 compared to their level in June 1997. Foreign currency availability increased by 2.3 billion Tongues between June and July 1997.

TRACECA - Central Asia Railway Restructuring

Module A : Kazakhstan

The monetary supply amounted to 152.8 billion Tenges at the end of August 1997. The exchange rate between US Dollars and Tenges was stable during the first months of 1997. Below is a description of the evolution of their parity since the creation of the local currency in 1993:

| | | | | |
|-------|-------------|---|-------|--------|
| 93 | 1 dollar US | = | 5.26 | Tenges |
| 94 | " | = | 35.64 | " |
| 95 | " | = | 60.95 | " |
| 01/96 | " | = | 67.30 | " |
| 12/96 | " | = | 72.54 | " |
| 01/97 | " | = | 74.70 | " |
| 02/97 | " | = | 75.63 | " |
| 03/97 | " | = | 75.44 | " |
| 04/97 | " | = | 75.24 | " |
| 05/97 | " | = | 75.46 | " |
| 06/97 | " | = | 75.50 | " |
| 07/97 | " | = | 75.53 | " |

The labour market - wages

Out of an overall population of 16,583,000 inhabitants, 3,900,000 are active. The official unemployment rate was 288,800 in January 1997 and 271,700 at the end of July, which includes 40% of unemployed workers living in rural areas. Based on a public opinion poll, the above figures only accounted for 20 to 25% of the actual unemployed population, which confirms that 1,500,000 people moonlight. The number of jobs according to official statistics is decreasing (4,452,000 in 1995 - 4,331,000 in 1996 - 3,631,000 in July 1997).

The average salary was 7,506 Tenges in January 1997 and 7,961 Tenges in July 1997, a 1.3- % increases against the month of June.

As an indication, and by comparison with wages, the following is a list of utility costs:

| | |
|--------------------------|--|
| Electricity: | 4 Tenges per KWH |
| Gas: | 37 Tenges per person |
| Cold water: | 73 Tenges per person monthly |
| Hot water: | 191 Tenges per person monthly |
| Central Heating: | 13 Tenges per square meter occupied |
| Waste disposal: | 22 Tenges per person monthly |
| Residential maintenance: | 8 Tenges per m2 |
| Radio connection: | 23 Tenges monthly |
| TV antennae: | 5 Tenges monthly |
| Telephone: | 270 Tenges monthly for a private line 180 Tenges monthly for a shared line. |

In the field of railway transportation, wages currently account for 25% of overhead expenses. Social contributions are calculated according to wages (7.5% of wages).

Wages, which are currently low, will be increased in the next five years although we have not been given any figures. As a result we cannot assess the impact of this increase on future costs.

Capital Investments

The volume of capital investments within the country remains low and has been decreasing since 1995.

Capital Investments in Billions of Tenges:

| | |
|-------|---|
| 1992: | 0.0005 |
| 1993: | 4.2 |
| 1994: | 51.1 |
| 1995: | 131.2 |
| 1996: | 92.5, of which 70 stem from foreign financing sources |
| 1997: | 49.5 for the first semester. |

Financing capabilities are limited and it seems that by July 1997, potential foreign investors were still not fully reassured by the new reformed legal framework of February 1997. One can wonder whether the objective set for 1997 (+15% against 1996, i.e. 106 billion Tenges) will be reached.

In 1996, foreign capital investments stemmed from the following countries:

| | |
|-----------------|------|
| USA: | 66% |
| South Korea: | 9% |
| United Kingdom: | 6% |
| France: | 4% |
| India: | 4% |
| Turkey: | 3.9% |

General evaluation

The increasingly stable situation in 1996 seems to be confirmed in 1997:

- satisfactory inflation rate,
- budgetary deficit under control,
- a contained trade balance deficit, and a decreasing ratio compared with gross domestic product due to increasing exports and to the fact that Kazakhstan has kept a convertible currency,
- currency situation and satisfactory foreign exchange reserves.

Despite the stabilisation of the economy, the growth rate has increased slowly. This can be explained by the unassertiveness of structural reforms.

In 1994, 1995 and 1996, the main purpose of reforms was to stabilise the economy by encouraging free trade, free enterprise, a free currency exchange and a free currency market.

The privatisation process, the restructuring of banks and the modernisation of the industrial infrastructure has been slow.

The railways have suffered from these setbacks, major restructuring being still at the planning stage though most of social problems have been recently solved.

Capital investments dependent upon finance resources remains relatively low compared to the actual needs of the country.

The labour market and the living conditions of a major portion of the population remain relatively precarious.

In order to continue its economic stabilisation program, Kazakhstan has a number of assets, not the least of which is the fact that authorities are willing to maintain rigorous budgetary and monetary conditions.

The optimisation of the exploitation of natural resources should generate substantial influx of foreign currency. The exploitation of oil fields seems to be improving due to the elimination by Russian authorities of export restrictions towards world markets, and, also due to the recent opening of this market towards China.

Development perspectives for the Kazakhstan Railways for 1998-2002

The study is focused on the following issues:

- an analysis of restructuring plans scheduled by the Kazakhstan Railways which could have development impacts,
- freight and passenger traffic forecasts,
- performance result forecasts per type of traffic,
- impact of competition.

Analysis of the restructuring schedule prepared by the Kazakhstan Railways

We were given a railway transportation development program project for the Republic of Kazakhstan between 1997-2010, entitled „option n°3“. The program is attached in Annex 1.

This program was sent to the Transportation Ministry for approval by the Government. It was prepared by the Railways in compliance with the Government's decision dated January 31, 1997,

n°129, and entitled „Reorganisation of Railway companies of the Kazakhstan Republic based on the privatisation and restructuring program affecting State properties in the Kazakhstan Republic for 1996-1998, validated by the Kazakhstan Republic Government's provision n°246 dated February 27, 1996.“

Following is a list of the above project's objectives:

- conservation of major rail tracks as State property,
- optimization of the railway transportation structure,
- attracting capital investment,
- creating and developing a competitive market, to be controlled by the railway transportation authorities,
- improving railway transportation service quality and reviewing the tariffing policy,
- developing the branch, based on railway traffic volume forecasts up to the year 2000.

„The application of drastic reforms is based on a gradual restructuring and privatisation of the railways“. The restructuring program prepared by the railways specifies which steps should be taken first.

Transfer of social issues to local authorities

In the course of 1997, local authorities will become responsible for social services. The railways will continue to manage 7 hospitals in order to maintain an internal company health department. Local authorities will manage 76 hospitals and 16 will be managed jointly by the Railways and a medical insurance fund.

As far as schools are concerned, the Railways will continue to manage:

- 14 secondary schools out of 114,
- 37 primary schools out of 184.

Cultural centres, stadiums, retirement homes, drug stores and grocery stores will be gradually privatised over time.

The privatisation process presents difficulties due to property problems and to the joint action of two managing bodies:

- the Department of Privatization of the Ministry of Finance which wishes to act rapidly,
- the Transportation Ministry which wishes to slow down the privatization process.

The restructuring of social services will free the railways from a heavy burden. It is a complex process carried out jointly with trade unions and which should no cause any social upheavals. During

the first nine months of 1997, the Railways were still spending 1,373 million Tenges for social services out of 58,304 million Tenges in traffic revenue, i.e. 2.35%, and this despite the transfers of responsibility already performed.

Privatisation by stockholding

Privatisation by stockholding is scheduled in two stages:

1st stage of the privatisation process between 1997 and 2001

During the 4th quarter of 1997, a State affiliated company will be created for passenger transportation. This company will manage all the operations-related activities including luggage forwarding, mail, rolling stock maintenance and repairs, and the management of passenger traffic installations and personnel (stations, seat reservation services, ticketing, car parks, etc.) During the 2nd quarter of 1998 this company will be privatised. The State will own 100% of its shares which will be available for an initial public offering.

Tariffs and the list of services available will still be drawn up in agreement with the Ministry of Economy and Trade and the Transportation Ministry. Tariffs regarding sleeper cars and 1st class cars will be deregulated.

From January 1st, 1998, a major portion of the rolling stock fleet will be sold (tank wagons for the transportation of acid materials, refrigeration wagons, etc.). Railway-related industrial activities will also be up for sale. The privatisation process will remain the same, i.e. by setting up joint-stock companies and through public offerings.

These measures will affect:

- ballast quarries,
- construction and repair plants (GEDLORSTROY),
- repair and construction trains,
- motor vehicle fleets,
- rail welding trains (JOUSSALY-BOROVOYE-LUGOVAYA),
- 24 stations managing the track mechanical equipment and the plants producing reinforced concrete sleepers and treating wooden sleepers (AVRIZ-VICHIEKS-AKTUBINSK).

During the 2nd quarter of 1998, freight stations (loading and unloading, forwarding, wagon orders, duty declarations, terminal transportation) will follow a similar process resulting in the creation of Transportation Complex Service Centres.

During this time, and through the first semester of 1999, the following individual operation units will be privatised:

- maintenance and steam cleaning stations,
- track and wagon repair workshops,
- track mechanical and experimental workshops,
- water, power supply units, signaling and telecommunication stations which do not pertain to main lines.

In 1998, the management of the following non-operational units will be transferred to local authorities:

- remaining schools and medical centers,
- retail and grocery stores in major cities,
- sewing workrooms,
- farms,
- railway sections with narrow tracks.

2nd stage of the privatisation process (1999-2005)

The organisation of regional passenger traffic along with local administrations will be completed by then.

The main focus at this stage will be to separate main track and structural operating companies from joint-stock transportation companies. This will concern:

- standard repair shops of wagon depots,
- standard repair shops of locomotive depots,
- spare part/equipment units and workshops.

During this second stage of the privatisation process, suitable management systems will also be implemented. By the end of the 2nd stage, the creation of joint-stock companies will have been completed.

Scheduled improvements

Improvement of tariff regulations

Up to the year 2000, tariff regulations will continue to be ruled by the State.

In 1999, the surplus in freight traffic revenue will no longer be used to offset the passenger traffic deficit.

According to the decisions made, tariffs will be increased substantially. One can only wonder how the Government will react to this increase in tariffs.

The increase will be calculated by multiplying 1996 tariffs by a 2.3 coefficient for the year 2000. The above-described increase will take place gradually:

| | | |
|---------------|----------------|-------|
| 1998 tariffs: | 1997 tariffs + | 50% |
| 1999 tariffs: | 1998 tariffs + | 16% |
| 2000 tariffs: | 1999 tariffs + | 13.3% |

From 2001, the State should no longer be involved in setting freight traffic rates.

Optimisation of capital investments through selection criteria

The document that was given to us does not provide details either of profitability calculations or of the date or optimum time to carry out the action plan based on updated profits. These concepts which make up criteria under market economy conditions should be developed in this country.

Railway capital investments financed by equity capital

This program covers the 1997 - 2010 period, and it was determined that 18 billion Tenges were required to finance priority investments.

List of capital investments scheduled including external financing and joint State financing

This list is included in annex 3 with schedules and indication of the financing sources.

Improvement of the Kazakhstan Transportation efficiency

The measures included in the program (see annex 1), are meant for the re-organisation of local transportation modes while insisting on railway transportation priority concerns, i.e.:

- development of rapid passenger rail lines,
- creation of rapid freight trains,
- improvement of transportation services to Kazakhstan ports (see the port of Aktan on the Caspian Sea),
- improvement of payment systems through the computerization of this system and preparation of freight transportation documents.

Improvement of railway transportation efficiency at the level of economic bodies

Communication between the Railways (General Management and Networks) and regional organisations should be improved. Local agreements should also be signed in order to implement tariff modifications.

It is also recommended to optimise existing resources (rolling stock, installations, land development, real estate, etc.).

The development of co-operation with other transportation companies of neighbouring countries

This section focuses on the need to improve connections at borders and accesses to ports.

Improvement of productivity and motivation

The program defined by the Railways lists major areas of research and development required to optimise productivity.

It is specified that railway networks should be staffed after the model of other foreign railway companies and, above all, matches the traffic and operation conditions.

Improvement of personnel training

In this section, certain figures are provided although the training cost is not specified:

- 400 people should be trained in the field of economic engineering by the Academy of Transportation and Communications of Kazakhstan,
- 460 people should be trained in market economy principles,
- 3500 people should be trained in modern railway technology in foreign countries or in other CIS countries.

Technical development perspectives

The schedule set for modern technology development covers the 1997-2001 period. It is also recommended to implement an M.I.S. It is obvious that this is a priority goal.

The organisation of train traffic, stations, railway networks and rail lines

In this paragraph it is recommended to use all the components of modern technology to optimise transportation and traffic masterplans.

Implementation of a joint program and rational use of wagons pertaining to other states

International clauses regulating payment, service, maintenance, repair and return of inter-State traffic should be drawn up.

Technologies for the preservation of resources

A list of options available to use modern preservation techniques is given for the various railway fields:

- track and infrastructure,
- diesel and electric locomotives,
- hauled vehicles,
- traction power supply,
- telecommunication systems.

Observations regarding the restructuring program

This document provides accurate data regarding privatisation. It lists a set of objectives together with actual schedules. Important data are provided regarding capital investment projects.

When reading this action plan covering the 1997/2010 period, we can infer that it was prepared by the Railway Management to increase responsibilities at all levels within the railway company. Each private or public operating unit will have to define its goals based on existing tracks. This method is not constraining and allows increased responsibility of participants, while requiring thorough monitoring of developments. Such a restructuring program can be criticised for not specifying the resources available to participants.

The lack of any type of figure makes it impossible to evaluate the impact of such a restructuring program in the economic study. At this point, only the fact that the social burden has decreased can be taken into consideration.

Railway traffic forecasts

This study should have required additional detailed data regarding freight and passenger traffic for the 1996 and 1997 fiscal years:

- per rail line section
- per type of freight transported
- per type of traffic:
 - freight transiting and internal
 - international, regional, suburban for passengers.

Due to the reorganisation performed and particularly to the elimination of the three former networks, Management was only able to obtain partial information. Based on these data, during the summer of 1997, Management prepared railway traffic and performance result forecasts for 1998-2002 which

TRACECA - Central Asia Railway Restructuring

Module A : Kazakhstan

are included in annex 2. These forecasts were prepared on the basis of data recorded during the 1996 fiscal year and of the developments which have occurred during the first two quarters of 1997.

According to Management, performance results for the first 9 months of 1997 which are included in annex 3, confirm the validity of existing forecasts.

Performance results are still not available for the month of October 1997; however, railway traffic has recovered sharply which has led Management to review positively its forecasts for 1998 and for the following years. The Railways could take advantage of a production recovery as reflected in the figures published by INCON CONSULTING LTD, in October 1997 (excerpt included below), (of 31, KAZYBEKbi 50, ALMATY, 480091, KAZAKHSTAN)

Economy

General Situation

Between January and September 1997, the following indicators were established:

Production volume of industrial goods (works, services) for household sector, between January and September 1997.

| | Volume of goods at current wholesale prices, mln. Tenge | | | Indexes of goods volume in % | | |
|--------------|---|----------------|------------------------|-------------------------------|----------------------------------|--|
| | August 1997 | September 1997 | January-September 1997 | September 1997 to August 1997 | September 1997 to September 1996 | January-September 1997 to January-September 1996 |
| TOTAL | 70,685 | 65,394 | 592,956 | 97,8 | 106,0 | 103,6 |

Given the lack of detailed statistical data and in view of the limited amount of time available to perform this study, it was decided to analyse the forecasts prepared by the Railways and to include comments and observations in order to be able to deduce our own forecasts.

PROGRAMME

of the railway transport development in the Republic of Kazakstan for the period between 1997-2010

The present programme is elaborated according to the Decree of the government of the Republic of Kazakstan as of January 31, 1997, N 129, "On reorganization of Kazakstan railway enterprises": in accordance with the "Programme of the State Property Privatization and Restructuring in the Republic of Kazakstan between 1996-1998", approved by the resolution of the government of the Republic of Kazakstan dated February 27, 1996.

The present programme stipulates raising of effectiveness of the sector's activity by means of conducting radical reforms at a railway transport.

The objectives of the programme are:

- reservation of main lines as objects of natural monopoly, as an exclusive state property;
- optimization of a railway transport structure;
- attraction of investments;
- establishment and subsequent development of competable, self-regulating service market of railway transport;
- improvement of the tariff policy for the railway services;
- development of the sector taking into account strategic research for forthcoming transportations during the period up to 2000.
- Carrying out of radical reforms implies restructuring and step by step privatization in the sector.

RAILWAY TRANSPORT RESTRUCTURIZATION IN THE REPUBLIC OF KAZAKSTAN

The railway transport restructurization provides:

- optimization of basic production and its subsidiaries;
- passing of the social service items to the management of the local governmental bodies;
- processes of share-holding, privatization, and selling off.

The main arterial railroads as a state-owned monopoly include main railway and station tracks, signalling and telecommunications systems, energy supplies, software wireless, train thrust (engine appliances), and railway management.

Another railway services are planned to be transferred to the joint-stock companies, and later, to be privatized.

The process of the railway restructurization and privatization consists of two stages.

FIRST STAGE (1997-2001)

In the first quarter of 1997, a state-owned railway subsidiary named "Passenger Conveyance" which includes passenger rolling-stock, some of station-located establishments, railway stations, reserving systems charged with the selling off the railway tickets, railway services, and passenger train depots.

The state-owned subsidiary "Passenger Conveyance" will be controlled and financed by the state-owned company "Kazakstan Temir Zholy".

The subsidiary's structural units and services providing repairing works and maintenance will be segmented in order to reach their economic efficiency.

"Passenger Conveyance" will be responsible for the interurban and international passenger conveyances.

"Passenger Conveyance" is targeted to transfer into the joint-stock company with the 100% state-owned authorized fund in a second half of 1998. With regards to subsidiary's changes, a new joint-stock company will acquire new rights and obligations including the right to freely access to the railway lines throughout Kazakstan and the right to carry out mail freightage and services.

The freight charges and services quality will be fixed by the Department for Price Regulation under the Ministry for Economy and Trade and the Ministry for Transport and Telecommunications of the Republic of Kazakstan.

After having regulated relations with the joint-stock company and used financial and discount order established by the Ministry for Transport and Telecommunications of Kazakstan, the government may pay for services at a price which is considerably lower than the ones fixed by the "Passenger Conveyance". Also, the government may design low prices for interurban survey whereas "Passenger Conveyance" itself will be allowed to define and fix tariffs for passenger high class services including sleeping-cars and first-class carriages. This will permit both to make control price level for the first and foremost services more stable and to develop and to improve the services' quality.

The leadership of the program of grants allocated by the Republican budget will be implemented by an authorized body.

The disadvantageous suburban transport should be financed by the local executive bodies together with an authorized body.

The local executive bodies should submit a list of suggested services to the joint-stock company in order to establish grant's value. The ownership and responsibility for the rolling-stock carrying out suburban conveyance will be defined during the process of funds' distribution. The local executive bodies are to take a share in the joint-stock company's

authorized fund with charges to sign contracts on technical services ultimately putting five-year contracts into operation.

The railway passenger rolling-stock costs much, and it needs major repairs. The state interested in more lower passenger tariff rates will be careful in leading price policies. With regards to this situation, the joint-stock company is delegated a task of signing a long-term contract on grants according to the "coefficient for transport price" with the Ministry for Transport and Telecommunications of Kazakhstan with the aim to provide low prices and high quality of rendered services, and to attract additional financial sources to renovate the rolling-stock.

After the market services improve, the state owning the shares in the joint-stock company "Passenger Conveyance" may sell its share-block or pass some of the services to any transport company.

In the first quarter of 1998, a considerable part of a special rolling-stock including acid tanks and refrigerator trucks is supposed to be sold. This will create favourable conditions for establishing competing companies.

Further optimization of the sector's structure foresees the reorganization procedures in a railway complex to single out a number of divisions into independent legal entities with their subsequent corporatization.

The process of separation of auxiliary divisions implementing industrial repairing and construction will be completed.

Following objects are subject to subsequent privatization:

- Zholomansky and Berchugursky road metal plant;
- subsidiary enterprise - "Zheldorstroy" repair-construction operational service;
- track laying trains;
- motor depots
- Dzhusaly, Borovskoy and Lugovskoy rail welding trains;
- 2+ track machine stations;
- concrete constructions plant;
- others
-

With the aim of establishing new market of services for freight transportations, complex, transport-forwarding services for the railway customers, it is planned in the second half of 1998 on the basis of enterprises involved in the process of freight transportation formation: freight stations, districts of loading-unloading work, to establish a joint-stock company "Center of Complex Transport Service" which will provide a customer all complex of transportation services ranging from the registration of order to the loading into a waggon. Using a new system of service, freight owner can also registrate customs declaration, temporary storage of freight, and if needed, its delivery to a final point of destination.

Nickeltau - Donskoye, Esil - Arkalyk, Karaganda - Karagaily, Tobol - Dzhetygara, Burul - Zhanatas, Maraldy - Turkala, Yermentay - Aisary.

Preservation of an enterprise's profile for a considerable period of time must be the main and obligatory condition during signing sell off and management contracts.

With the purpose of coordination between enterprises' activities and financial improvement in the sector, it is expedient to hand over the state-share in the authorized funds of the following joint-stock companies: Rysty - AEVRZ and Akmola waggon-repairing plant, Arus impregnation treatment of sleepers, Vishnevka and Aktubinsk "concrete" sleepers, Almaty electromechanical plant to the management of the state-owned enterprise "Kazakstan Temir Zholy":

SECOND PART (1999-2005)

Organization of regional passenger transportations with contributions of local executive bodies.

The main and basic process for the present stage is to single out from main lines enterprises and structural divisions of operational activity ensuring transportation process itself with further corporatization:

- repair base of freight waggon depots;
- repair base of locomotive depots (routine, depot, plant repairs);
- waggon freight depots with inventory waggon fleet;
- logistics services.

Picking out the waggon fleet from the railway system will be executed according to many criteria including prime implementation of state demand, centralized train regulating of empties, coaches, ensuring security of traffic, coordination of operational expenses that influences the cost of transportation service, etc.

Simultaneously, during the process of optimization for both services and enterprises will be realized in stated legislative order or privatized their structural divisions. In the process of formation of such enterprises, optimal requirements of the divisions including financial ones will be determined, management structure will be worked out and, in future, the technology of providing services and work for the railways will be improved with regards to the market relations, and management links will be developed.

Subsequent selection of locomotive depots with an inventory locomotive park establishing on their base independent joint-stock companies will be performed after finishing of two previous stages.

IMPROVEMENT OF TARIFF POLICY FOR RAILWAY TRANSPORT SERVICES

For the period until 2000, it is expedient to preserve state regulation for the railway tariffs carrying out their annual stage by stage growth. Starting from 1999 a cross financial assistance to the passenger transportations for the account of freight transportations.

It's stipulated to raise the railway tariffs in 2000 against 1996 approximately between 2-3 times. Tariff increase for adducing production of railway transport in the next 3 years must constitute:

in % against last year

| | |
|------|------|
| 1998 | 50.0 |
| 1999 | 16.0 |
| 2000 | 13.5 |

Stated tariffs increase between 1998-2000 will allow railways to improve the situation with the maintenance of technical means which requires high expenses, i. e. to provide appropriate number of required capital repairs of locomotives, freight waggons and passenger coaches park, capital and medium track repairs, electroprovision equipment, signalling and communications, and other as well as renewal of capital assets.

With the aim to attract additional transportations and to increase profits, a flexible tariff policy should be conducted. It is planned to be transferred to free charge tariffs and, starting from 2001, it's stipulated to abolish state regulation of tariffs for the freight traffic. This will be set and regulated by the railway itself.

While level of rates should ensure profitability of each railway shipment and may vary depending on the following factors:

- volume of shipped freight
- direction (route) of freight shipment
- season (time) of shipping (summer, winter, season for shipping perishable products etc.)
- urgency and necessity of providing stable and continuous transportation (provided an enterprise does not have storage facilities for raw materials, spare parts, equipment, i.e. loading from car to track and establishing of "carrying capacity" reserve on railway);
- possibility to arrange transportation of freight by exit routes;
- requirement to have a certain type of rolling stock and possibility to use direction of passing empty car traffic volume in transportation;
- value of freight.

MODEL OF CAPITAL INVESTMENT FINANCING

The main criteria in making decisions about beginning of construction should be high efficiency of capital investments while planning should be made on the basis of requesting bids. Involved non-state capital investments, direct investments, loans and leasing should be directed to the most effective areas. There is a necessity to develop principles and conditions of legal and economic mechanisms of attracting non-state and foreign capitals for technical reequipment, updating and development of rail transport.

INVESTMENT USING RAILWAY'S OWN FUNDS

(August 1997 - December 2010)

The main sources of capital investment funding limited by the State budget should be railway's own funds with allocation of 16-18 billion tenge that are intended to be used for construction of primary objects in 1998-2010.

1. FINANCING OF CONSTRUCTION OBJECTS BY FUNDS OF "KAZAKSTAN TEMIR ZHOLY"

(million tenge)

| Denomination of construction objects | Plan of capital investments 1997 | Approximate level of capital investments directed at construction | | |
|--|----------------------------------|---|-----------|-----------|
| | | 1998-2000 | 2001-2005 | 2006-2010 |
| 1 | 2 | 3 | 4 | 5 |
| Development of Druzhba station and reconstruction of open line track Druzhba-Gosgraniza (1 st turn) | 153.0 | 980.0 | 3000.0 | 3200.0 |
| Strengthening of railway Aktogai-Druzhba (except) | 130.0 | 730.0 | 400.0 | |
| Electrification of districts: - Chu-Alma-ata (164.4 km) | 786.0 | 3400.0 | 4412.0 | - |
| - Kustanai-Zhelezorudnaya (43.2 km) | - | - | - | 293.0 |
| - Pavlodar-Ekibastuz (234.1 km) | - | 2500.0 | 4000.0 | - |
| - Alma-ata-Sary-Ozek (191.2 km) | - | 2000.0 | 5900.0 | 4100.0 |
| - Sary-Ozek-Aktogai (365.4 km) | - | - | 2700.0 | 10000.0 |
| Construction of optical-fibrous main lines of communications at the direction Turkestan-Ozinki (2 968 km) | - | - | 3200.0 | 3100.0 |
| Introduction of figures junctions of commutation with changing of telephone and telegraph stations at the direction Turkestan-Ozinki | - | - | 300.0 | 300.0 |
| Establishing of dispatch management units with providing of microprocessor dispatch centralization at the direction Turkestan-Ozinki | - | - | 150.0 | 150.0 |
| Main directions of information infrastructure development basing computer technique, including: | | | | |
| a) establishment of base program-technical complex on the basis of existing in operation programs and technical means | - | | 1000.0 | 1000.0 |
| b) establishment of common informational space of Republican State Enterprise "Kazakhstan Temir Zholy" | - | | 500.0 | 200.0 |
| TOTAL: | 1069.0 | 9613.0 | 25562.0 | 22343.0 |

2. FINANCING OF CONSTRUCTION OBJECTS FROM FOREIGN LOANS FACILITIES (OECF JAPAN) AND COFINANCING FROM THE BUDGET OF THE REPUBLIC OF KAZAKSTAN.

(million tenge)

| Denomination of construction objects | Plan of capital investments 1997 | Approximate level of capital investments directed at construction | | |
|---|----------------------------------|---|-----------|-----------|
| | | 1998-2000 | 2001-2005 | 2006-2010 |
| 1 | 2 | 3 | 4 | 5 |
| Development of railway transport capacities (Druzhba station. 1 turn), including: | 1327.0 | 4275.0 | 300.0 | - |
| - project management (general work) | 429.0 | 390.0 | - | - |
| - strengthening of equipment of Druzhba station | 112.0 | - | - | - |
| - reconstruction of passenger coach factory on the basis of Alma-Ata-1 depot | 253.0 | 2052.0 | 300.0 | - |
| - rehabilitation of Beskol-Druzhba | - | 533.0 | - | - |
| - round-about way of Alakol lake (building of new railway) | 422.0 | 1049.0 | - | - |
| - renewal of telecommunication lines Druzhba-Aktogai | 105.0 | 251.0 | - | - |

DIRECT INVESTMENTS STRATEGY FOR BUILDING OF NEW RAILWAY LINES

In view of appropriate interested entities of the Republic of Kazakstan according to technical-economic regulations it is planned a construction of new railway lines having, mainly, national and regional significance, in the period under review.

- Charskyay-Ust-Kamenogorsk (142 km) - US\$165 million, investors: JSC "Altienergo", JSC "Ust-Kamenogorsk Titanium-Magnesium Plant", JSC "Zyryanovsk Lead Plant" and others;
- Konechnaya-Akcu (184 km) - US\$250 million, investors: coal industry and non-ferrous metallurgy enterprises;
- Kzyl-Orda-Zhezkazgan (480 km) - US\$500 million, investors: JSC "Balhashmys", "Zhezkasgantsvetmet", "Kazakhmanganese", joint venture "Kumkol-Lukoil".

Main sources for financing of these lines construction must be facilities of interested investors, republican and local budgets.

It is necessary to work out cooperation with:

- financial institutions - plan on the level of investments for the period up to 2000 for attraction of Kazakstani and foreign firms for organization of base for repair of upper track (mechanization of labor, welding of rails). liquidation of districts with low traffic on the distance Alma-Ata-Akmola (high-speed traffic). modernization of electric locomotives VL-80 on the basis of locomotive depot of Atbasar station. Akmola (capital repair) and diesel locomotives at locomotive depot Chu (capital repair). rehabilitation of railway lines, at a district Aktogai-Chengeldi-Ozinki. Beineu-Aktau port. diagnosis and forecast of the activity of Kazakstan railways feasibility study of organization of high-speed traffic at a distance Alma-Ata-Akmola (1325 km)

GREATER EFFICIENCY DUE TO INTERACTION BETWEEN RAILROAD TRANSPORT AND ITS USERS AND CUSTOMERS OF THE REPUBLIC OF KAZAKSTAN

In order to provide a regular regime for the railway transport and with regards to growing competition, it is necessary to revise the mechanism of interaction between railroad transport and its users and to introduce mixed with water and car transport facilities. Now, the transport market study should be begun.

Main ways providing transport demand:

- to develop transport services considering into attention growing requirements for services quality;
- to introduce long-term contract conveyance;
- to make quality of international transit conveyance competable;
- to provide passengers and goods safe conveyances;
- to develop high-speed passenger coaches and bring a quality of rendered services to a more high level;
- to provide advertising company for transporting services promotion;
- to introduce a monitoring over transport-users solvency;
- to establish sector and road service centers providing them with the necessary software facilities;
- to improve the order of transport payments, to speed up a procedure of registration freight documents, to introduce electronic document circulation;
- to introduce high-speed freight waggons in the transitting destinations;
- to promote interaction between railroad and sea conveyances of the Republic of Kazakstan.

EFFICIENCY INCREASE DUE TO INTERACTION BETWEEN RAILWAY TRANSPORT WITH THE CUSTOMERS

Increase in railway income and profit depend on service quality improvement. Therefore, the state subsidiaries are charged with:

- regular interaction with the regional bodies;
- participating in the drafting of different programs and projects concerning railway transport development and reconstruction, accumulating the funds allocated by the railway organizations, regional and local budgets, and private companies;
- developing economic measures which provide compensation for big expenses of the rail road companies;
- developing signing of the contracts providing tariff benefits for the local goods conveyance. These "Kazakhstan Temir Zholy" expenses should be paid by the local budget which is expected to grant compensation payments or tax benefits to "Kazakhstan Temir Zholy";
- developing communication and reference services, particularly, in the regions, by installing additional telephone exchanges and broadening regional communication networks;
- making use of premises, facilities, equipment, land lots, and other properties of the company more efficient.

DEVELOPMENT OF COOPERATION WITH OTHER TRANSPORT ENTERPRISES OF THE REPUBLIC OF KAZAKHSTAN

With the aim of cooperation with other transport companies, it is necessary to:

- work out business-plans and take an active part in the development and modernization for the container terminals which pass over the frontier posts, sea and river ports, railway junctions (attracting foreign investments);
- create a stack of services and use modern combined conveyance;
- design new routes for the container conveyance of perishable goods transported in high-speed trains;
- establish new structures which will be involved in the combine conveyance;
- sign contracts working out effective technologies according to a scheme "sea port - adjoining station" together with the sea and river steamship companies;
- to design normative acts with the aim of applying modern technologies;
- apply new tariff regime considering into account season irregularity of navigation;
- make overload conveyance ("train-steamer") more efficient and establish mixed railway-sea/river companies;
- establish new transport service ventures, reduce a number of storages, take control over deliveries according to the schedule.

SCHEME FOR PRODUCTION OUTPUT AND INCENTIVE INCREASE

The output increase could be reached due to:

- balance between a number of railway staff and the conditions and actual volume of the work;
- appliance of modern technologies;

- reduction of manpower work. growth of a process of mechanization and automatization for the technological services and railway and rolling-stock repairs. gradual transition to the one-locomotive engineer system in the railway scarce lots under the goods traffic;

The measures which should be taken for the conditions and payments improvement:

- regulation of wages according to the "Railway Tariff Agreement". improvement of a fixed-tariff work;
- provision with the unite tariff system for paying out wages;
- growth of the output by eliminating of wage-levelling payments and granting remunerations to those who considerably contribute to the process;
- financial stimulation for the successful work;
- balance between the low wages of some railway workers and the living wage of a certain region.

STAFF SELECTION

With the aim of speeding up reforming process at the railway transport. it is necessary to regularly reinforce an operating staff with new specialists who acquire good experience in the fields of international transport legislation, marketing, fiscal, bank, financial and customs systems, book-keeping, external trade, adjoint industries, which is very useful for the successful reforming. With regards to reforming process, about 400 engineers and economists and 460 additional engineers are expected to improve their professional skills in the Kazak Academy for Transport and Communications. Plus, about 3.500 people should be trained for different so-called mass professions. In addition, it is supposed to put into practice training for the Kazak transport engineers overseas. Of particular importance should be a preparation of management staff for the work at all managing levels.

TARGET FOR TECHNOLOGICAL DEVELOPMENT (1997-2001)

The scientific and technical policies conducted in the technical, software, and economic fields of the transport sector should be aimed to provide high-level safety, services, and efficiency of the railway transport. With regards to the new policies, the Academy for Transport and Communications and the State Institute of Scientific and Technical Research and Planning in the railway transport should be admitted very useful and important for the railway transport development. The scientific research in the railway transport sector will be resulted in:

- establishment absolutely new management systems where modern software technologies will be applied;
- utilization of lazer technologies for processing, and introduction of integrating control and automatic production of information;

- mechanical strength and safety of the mechanical construction units and different technical parts and details used in the urgent situation.

RAILWAY TRAFFIC, AND FUNCTIONING OF RAILWAY STATIONS AND JUNCTIONS

The process of conveyance is successful when the services quality is high, and the technological process is efficient. In order to reach good ultimate results in the perfection of conveyance, all management functions must be concentrated in the dispatching central office. The dispatcher central office having at its disposal different diagrams, schedules, and train patterns must be charged with making decisions upon trains making up, dispatch and arrival. A railway traffic should be automated.

JOINT USE OF WAGGONS BELONGING TO FOREIGN STATES

In order to make a waggons' fleet more efficient, a system of interstate payments for the fleet's joint use must be introduced.

Ways for system's appliance are:

- defined approach of railway stations and junctions a waggon's utility which depends on which state it belongs;
- control over waggons' location and utility which is taken by the waggon complex "Dispark";
- trusty and reliable system of mutual payments for waggons' joint utility;
- efficient maintenance and overhaul of the waggons belonging to "Kazakstan Temir Zholy";
- new ways of the waggon urgent return to the owner.
- The technical state of both waggon and container fleet must be improved by joint utility of a rolling-stock and waggon urgent return to the state owning the waggon.

TRANSITION TO RESOURCE-MAINTAINED TECHNOLOGIES

With regards to transition to the resource-saved technologies, it is necessary to take measures in.

TECHNICAL FACILITIES MAINTENANCE AND REPAIRS:

- effective installation of a repairing shop where the repairing bases would be differentiated according to the types of a rolling-stock;
- restoration of rolling-stock parts and details by using new materials;
- gradual transition from train fixed-term repairs to the repairs considering actual technical conditions of a rolling-stock;
- railway maintenance and repairing works based on using modern technologies and equipment;
- establishment of special train repairing companies;
- introduction of a new system for energy supplies differentiating energy tariffs during a day.

RAILWAY ECONOMY

- revision of a railway economy, improvement of the railway conditions, exclusion of a waggon overloading conveyance, regulation of waggons number in the railway, rehabilitation and making use of old materials, elimination of an intensive side-rail depreciation in the curved railway sites;
- development of a non-jointed railway with the aim to reduce deficit in wood sleepers and to apply glue-bolted isolating junctions;
- appliance of snow- drift prevention facilities;
- introduction of a new system of estimation for the railway facilities and new abnormal parameters, providing regular control over railway destinations.

ROLL-STOCK ECONOMY:

to carry out effective works modernizing tractive rolling-stock and including:

- electric locomotives with an alternating current of Walt80 having all existing indices;
- diesel locomotive with 2TE10 having all existing types.

With the aim of increasing of roll-stock's efficiency and transition to a new actual system of repairs and maintenance, building in, compatible and stated technical diagnostic facilities should be applied. These facilities will take control over the technical state of junctions, aggregates, and systems, and accumulate information on the technical state of locomotives and its junctions.

TRAIN ECONOMY:

- appliance of absorbing automatic coupler facilities and diagnostic equipment for revealing defects of the truck part castings, automative coupler facilities, wheels, pins, and bears in the automatic brake equipment;

- appliance of new technological processes providing strength for the train parts (pivots, truck, body, and automatic coupler details) by means of arched, gas-heat, and inductive processes;
- transition from an overall train fleet criteria of repairing to the system of individual train maintenance and repairs.

TRACTIVE ENERGY SUPPLIES:

- to lower energy costs by using of new technical facilities in the construction of fittings, bearing and supporting details, thermoresistant cables in the contact network and current collector parts, unified block-constituted tractive substations made on plant;
- to introduce a deteriorating limit for the junctions and details in the equipment of electric meters according to energy use by different railway junctions and trains' speed;
- to replace currently operated energy remote-control systems by automatic ones.

AUTOMATIZATION AND TELECOMMUNICATIONS:

Full modernization of a currently operated telecommunication network should be provided using digital fiber-optical and radio-relay telecommunications, and digital commutator junctions.

It is necessary to apply:

- digital code automatic blocking on the microelectronic element base;
- electronic centralization on the basis of microelectronic techniques using currently operated cable networks.

The dispatching control systems must be modernized by installing of microprocessors DTS which have a wide range of capacities. Also, the remote-control systems should be applied.

Annex No 9

OPERATIONS

JUSTIFICATION OF RECOMMENDATIONS

Annex No 9

JUSTIFICATION OF RECOMMENDATIONS

The justifications and the proposals for an approach for the recommended actions are the following :

Recommendation n°1

The low train speeds are not justified by any technical parameters. Both track and rolling stock parameters allow higher running speeds. At present the track allows maximum speeds of 100 km/h for passenger trains and 80 km/h for freight trains. The speed limits for locomotives is set at 100 km/h, the speed limit for coaches and wagons is higher.

Short term

We recommend an immediate speed increase for passenger services to 100 km/h and for freight trains to 80 km/h. The timetables have to be revised, the engineering recovery times have to be reduced, stops on line stations have to be reduced to 2 minutes.

KTZ has recently carried out a similar exercise for two train pairs between Almaty and Akmola, reducing the travelling time from 24 hours to 19 hours just by shortening the stops and by cancelling some of the recovery reseres.

Mid term

After a track rehabilitation and upgrading programme and the purchase of new locomotives for passenger services, the maximum speed for high comfort passenger trains should be raised to 120 km/h, that for freight trains to 100 km/h.

Approach

Based on the present train passenger train programme, the timetables for passenger trains should be re-calculated for a general maximum speed of 100 km/h. The existing speed restrictions have to be taken into consideration.

A clear line for stops for the different categories of trains should be established, following sequence:

| Train Category | Stops at |
|----------------|--|
| Intercity | cities with more than 30,000 inhabitants |
| Passenger | cities with more than 10,000 inhabitants |
| Mail & Baggage | stops at all stations |

For freight traffic the speed should generally be increased to 80 km/h

Recommendation n°2

The freight operations concept should be improved. The train runs have to be prolonged, the number of marshallings have to be reduced, the grouping system has to be improved and block trains have to be operated, where ever possible.

Looking at the map of shunting stations of KTZ it becomes evident, that there is a large number of shunting stations in the network. The number of shunting stations derives from the former high traffic volume.

We recommend the number of marshalling stations to be reduced.

- the local train formation and distributing yards have to be checked individually to establish, if they are still important
- the district marshalling yards have to be checked accordingly
- the system of network marshalling yards has to revised according to the present traffic flows.

Where there are marshalling yards neighbouring each other, like at Akmola and Sorokovaya and Semipalatinsk and Semei, one of them should be closed.

Explanations:

network marshalling yard

district marshalling yard

local train formation and wagon distribution yards

35 + 16 indicates the number of arrival and classification tracks

Block Trains

Wherever possible, block trains should be introduced. Cement and oil traffic have been indentified as possible areas to introduce block trains.

In general, the main advantage of rail goods traffic lies in transporting large quantities of goods over long distances. Wherever possible, block trains should be implemented.

The benefits of block trains are:

Reduction of transport times; having positive effects both for the railway and the customers. Reducing the transport time increases the customer's acceptance for the rail services, lead to a higher competitiveness of the railway against other modes of transport and reduces operating costs by saving unnecessary shunting work.

Wagon and locomotive turn-around times can be reduced, which leads to a better rate of utilisation of the rolling stock.

Recommendation n° 3

The entire passenger concept should be revised. A clear concept of train categories should be introduced.

Recommendation n° 4

The productivity of both locomotives and personnel need to be improved. In order to achieve this it is necessary to:

- increase the daily running performance of locomotives,
- introduce rosters for assignment of locomotives,
- introduce individual duty rosters for locomotive crews.

The present daily average running performance of locomotives is very low. We recommend the locomotives to be assigned to a train from start to beginning. The locomotives should be rostered according to the freight and passenger timetables.

With longer locomotive runs, a large number of depots can be closed.

Fueling facilities should be provided, wherever shunting locomotives are deployed.

The locomotive crews can be changed en route, if the drive exceeds the working time of 8 hours.

For the working time of drivers we propose to change the working time regulations in a way, that the daily working time might be up to 12 hours, but the average weekly working time should not exceed 40 hours. This gives a higher flexibility in the assignment of locomotive personnel. This method is common practice in many European railways. An example for such a duty plan is given below:

| Week day | working time in hours |
|----------------------|------------------------------|
| Monday | 8 |
| Tuesday | 12 |
| Wednesday | 8 |
| Thursday | 6 |
| Friday | 6 |
| Weekly total: | 40 |

Personnel and locomotives should be strictly rostered individually.

Locomotive personnel should on the long run be transferred to the operations department and a bonus / malus system for timetable keeping should be incorporated in their payment schemes.

Additionally, on the long run we propose one man operation of locomotives. The technical preconditions are already installed. We are aware of the fact, that this will be a sensitive issue as it has been in various European railways before.

Recommendation n° 5

The practice of technical inspections of wagons approximately every 500 kilometres should be given up for the following reasons

- all wagons are equipped with roller bearings
- hot box detectors are installed on the main lines

The method in practice is time and personnel consuming. Technical inspections should be performed only at stations where trains begin or end.

Recommendation n° 6

The average distance between stations on the KTZ lines is approximately 15 kilometres on main lines and 30 kilometres on secondary lines. This is, in many cases way above the requirements

needed for the present and future operations programme. We recommend to close the stations no longer needed for crossings and passings and to remove the access tracks and switching points.

For this purpose it is necessary to conduct line capacity calculations. We propose calculations based on the internationally recognized Method of Line Capacity Calculation according to UIC 405 R.

Introduction

All future planning on the KTZ network makes it necessary to establish universally recognised principles for assessment and development of the lines of the network.

One of these internationally recognised principles to be applied by KTZ railways in assessing the lines, is a harmonised method for determination of line capacity. The use of this method, explained in leaflet UIC 405 R, will provide the conditions necessary for establishing a picture of the capacity of a line section and identifying the necessary infrastructure to operate a train programme. Railways are advised to apply the method, particularly for calculating the capacity of lines.

Principles of the method

The method has been developed with the following criteria:

- The method must be applicable for any railway. For this reason, the method chosen does not require data processing equipment.
- The method must be simple and applicable without incurring undue expenditure.
- The capacity determined by this method must take into account the parameters of all trains running on this line and the relative proportion of trains in the various categories.
- The method must also take into account the existing conditions of the line, such as the divisions into block sections and the type of signalling installations.

Recommendation n° 7

In many stations and marshalling yards tracks have been seen which have not been used for a long time. These tracks should be taken out and the material should be sold or be taken on stock as spares.

Recommendation n° 8

Container terminals with the capacity to handle modern 20 and 40 feet containers should be developed.

KTZ is operating 32 large container terminals and 34 middle size terminals. Containers of 3 ton, 5 ton and up to 20 ton are transported and handled. In strategic places facilities to handle 40 feet containers should be established.

We recommend the following locations:

- Drushba
- Semipalatinsk
- Almaty
- Akmola
- Arys
- Kandagach

Recommendation n° 9

It was our original intention to propose commuter traffic to be handed over to local authorities, but our investigation has shown, that, what is called commuter traffic in KTZ is no commuter traffic to European standards. The trains are running long distances and there is no density of the services. In most of the cases only one train pair per day is operated.

It is understood that the government wants to keep these train services for social reasons. It is not clear whether the government will ever pay for them. An agreement should be reached with local authorities to participate in the costs. The appropriate law is in place, but nobody ever enforced it.

Recommendation n° 10

In the course of the next five years the railway network should be opened to other operators, both domestic and international. There are already some pilot projects with privately operated container trains on the way in the region.

For KTZ the possible corridors to market train paths in the nearer future are:

Drushba – Aktogai – Almaty – Chu – Arys – (Tashkent)

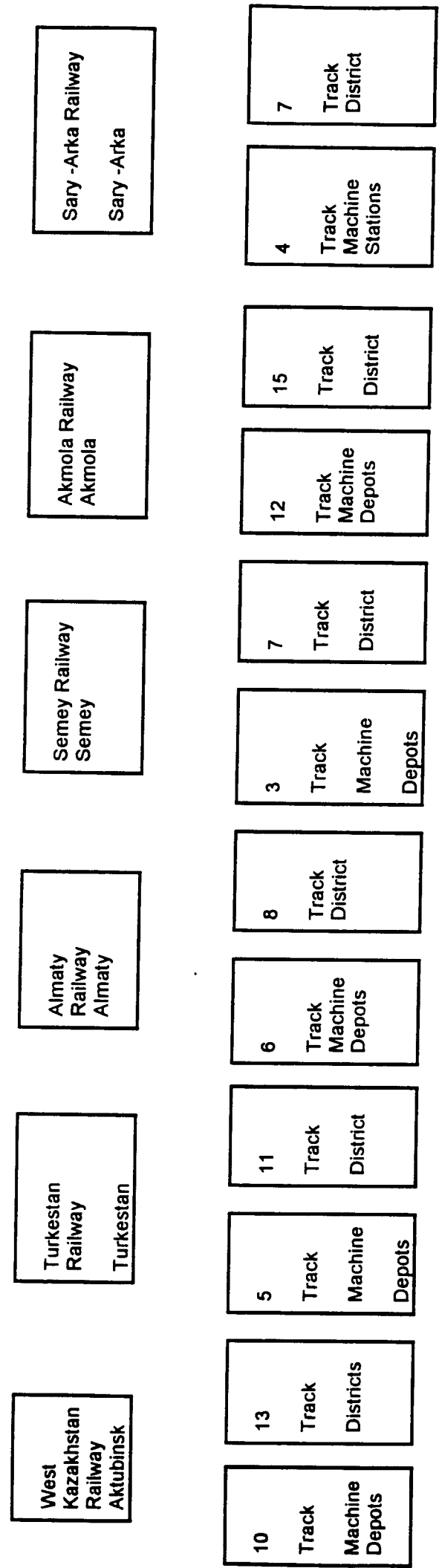
Drushba – Aktogai – Sayak – Mointy – Akmola - Russia

KTZ should assess the value of train paths and should market these train paths.

Annex No 10

INFRASTRUCTURAL ORGANISATION

Railway infrastructure



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.

Annex No 11

FINANCIAL ASPECTS OF THE MODIFICATION OF 2TE10 LOCOS

1. Technical and Financial analysis of the replacement of the TE10 engine by a GE component.

This analysis has studied the technical and financial aspects of the modification of a fleet of about 100 loco 2TE10.

This modification consist to replace the diesel engine and auxiliary equipment by GE components (including Diesel engine, Generator, Air Compressor, Cooling circuit,).

We have made the following assets;

1. The replacement the equipment should add 15 years to the life of the locomotives.
2. The selected loco should be about 10 to 12 years old and electrical systems in good condition and overdue of KR2.
3. UZ will made a KR2 during the modification and especially replace the Traction Motors, wheels, etc.

Considering that the replacement of the engine will add about 15 years to the life span of the locomotives, we decided to study the effects on 15 years.

The data come from the railways.

1. Analysis of the Maintenance and Accidental Repairs

During this period of 15 years, the maintenance plans, the number of Accidental repairs and the stop times will have a significant impact.

2. TE10 engine

The following tables gave the total Maintenance and Accidental repairs costs for a TE10. More ever, the theoretical availability rate is precise.

| | |
|-------------------|--------|
| Hypothesis | |
| Km/year | 110000 |
| Hours/year | 3000 |

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| Maintenance Repairs | | | | | | |
|--|-------|--------|--------|--------|--------|---------|
| Maintenance Operation | T03 | TR1 | TR2 | TR3 | KR | TOTAL |
| NO of Operaration for 15 years | 270 | 62 | 11 | 8 | 3 | |
| Average stop duration /OP (h) | 24,8 | 50,1 | 238 | 298 | 502 | |
| Average stop duration /OP for 15 years (h) | 6696 | 3106,2 | 2618 | 2384 | 1506 | 16310,2 |
| Average stop duration /OP for 1 year (h) | 446,4 | 207,08 | 174,5 | 158,9 | 100,4 | 1087,3 |
| Cost / OP (\$) | 285 | 950 | 20130 | 49875 | 66500 | |
| Total cost for 15 years (\$) | 76950 | 58900 | 221430 | 399000 | 199500 | 955780 |
| Total cost for 1 year (\$) | 5130 | 3926,7 | 14762 | 26600 | 13300 | 63718,7 |

| Accidental Repairs | |
|---|---------|
| NO AR/1.000.000Km | 95 |
| Average stop duration /RA (h) | 115 |
| NO AR/year | 10,45 |
| AR stop duration/year (h) | 1201,75 |
| Total cost for 15 years=Maintenance cost (\$) | 955780 |
| Total cost for 1 year=Maintenance cost (\$) | 63718,7 |

| | |
|--|----------|
| Total cost for Maintenance and AR for 15 years (\$) | 1911560 |
| Total cost for Maintenance and AR for 1 year (\$) | 127437,4 |

| | |
|------------------------------|------|
| Availability Rate (%) | 73,9 |
|------------------------------|------|

1. TE10 modified with a GE Engine

| | |
|-------------------|--------|
| Hypothesis | |
| Km/year | 110000 |
| Hours/year | 3000 |
| Hour cost (\$) | 5 |

| Maintenance Operation | 1/92 days | 1/year | 1/2 years | 1/3 years | 1/4 years | KR | Total |
|--|-----------|--------|-----------|-----------|-----------|--------|---------|
| NO of Operation for 15 years | 29 | 13 | 6 | 4 | 2 | 1 | |
| Average stop duration /OP | 1,5 | 1,3 | 4,8 | 2 | 0,5 | 30 | |
| Average stop duration /OP for 15 years (h) | 43,5 | 16,9 | 28,8 | 8 | 1 | 30 | 128,2 |
| Average stop duration /OP for 1 year (h) | 2,9 | 1,1 | 1,92 | 0,5 | 0,067 | 2 | 8,5 |
| Cost / OP (\$) | 39 | 31,7 | 121,3 | 10 | 5 | 1745 | |
| | | | | | | | |
| Total cost/OP (\$) | 918 | 81,7 | 1812,9 | 10 | 65 | 40164 | |
| Total cost for 15 years (\$) | 26622 | 1062,1 | 10877,4 | 40 | 130 | 40164 | 78895,5 |
| Total cost for 1 year (\$) | 1774,8 | 70,8 | 725,16 | 2,7 | 8,7 | 2677,6 | 5259,7 |

| | |
|-------------------------------------|-------|
| Accidental Repairs | |
| Average stop duration /AR (h) | 8 |
| NO AR/year | 1 |
| AR stop duration/year (h) | 8 |
| Material cost for 1 year (\$) | 800 |
| Total cost for 1 year (\$) | 840 |
| Total cost for AR for 15 years (\$) | 12600 |

| | |
|--|---------|
| Total cost for Maintenance and AR for 15 years (\$) | 91495,5 |
| Total cost for Maintenance and AR for 1 year (\$) | 6099,7 |

| | |
|--|------|
| Theoretical Availability Rate (%) | 99,8 |
|--|------|

In this study, we do not take account of the duration for the transport of the locomotives to their depots.

We have considered that the cost of the AR is equivalent to the cost of the maintenance repair. Usually, we consider that this cost is 10% higher.

The availability rate of 74% for the TE10 given by the railways should be decreased to about 70% in our opinion.

The Theoretical Availability Rate of 99,8% for the modified locos is too high. In fact, the remaining equipment of the TE10 (Traction Motors, Bogies, Brake system, etc.) responsible of 20% of the AR, should impose a decrease of this ratio to about 90%.

In consequence, the difference of the two ratios, about 20%, should allowed KTZ to use 80 modified locos in place of 100 TE10.

1. **Analysis of the Fuel oil and Lubrication oil costs.**

| Hypothesis | |
|-------------------------------------|-----|
| Cost of 1t of Fuel oil (\$) | 150 |
| Cost of 1 t of Lubrication oil (\$) | 500 |

1. **Fuel oil**

| | Russian Engine | GE Engine |
|------------------------------|----------------|-----------|
| K/loco for 1 year (t) | 934 | 533 |
| K/100 locos for 1 year (t) | 93400 | 53300 |
| K/100 locos for 15 years (t) | 1401000 | 799500 |
| Cost for 1 year (M\$) | 14.01 | 7.995 |
| Cost for 15 years (M\$) | 210.15 | 119.9 |

This data gave by the railways can be verified by the following calculation;

- the total Fuel consumption per year is about 4,4MT , about \$60.000.
- the number of locomotives is about 500
- the cost of 1t of Fuel is about \$150

The result is about 800 t per locomotive and per year.

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This consumption per locomotive is astonishing, because if we made a calculation using the following ratios (gave by KTZ and GE engineers) the results are very different.

| | TE10 | Modified locomotives |
|------------------------------------|----------------|----------------------|
| Fuel consumption kg. | 0.21 kg./hp-hr | 0.16 kg./hp-hr |
| Average daily running time (hr) | 8 | 8 |
| Horse power | 3,000 | 3,000 |
| Consumption per day (t) | 5 | 3,84 |
| Number of day running | 350 | 350 |
| Consumption per year (t) | 1750 | 1344 |
| Consumption per year /100 Loco (t) | 156100 | 134400 |
| Cost for 1 year (M\$) | 26,2 | 20,16 |
| Cost for 15 years (\$) | 393 | 302,4 |

1. Lubrication oil

| | Russian Engine | GE Engine |
|------------------------------|----------------|-----------|
| K/loco (t) for 1 year | 10,96 | 5 |
| K/100 locos (t) for 1 year | 1096 | 400 |
| K/100 locos for 15 years (t) | 16440 | 6000 |
| Cost for 1 year (M\$) | 0,548 | 0,2 |
| Cost for 15 years | 8,22 | 3 |

If we use the ratios utilised by the KTZ engineers, the results are also very different.

| | Russian Engine | GE Engine |
|------------------------------|--------------------------------------|--|
| K/loco for 1 year | 4% of the total Fuel oil consumption | 0,5% of the total Fuel oil consumption |
| K/loco for 1 year (t) | 70 | 7 |
| K/100 locos (t) for 1 year | 7000 | 700 |
| K/100 locos for 15 years (t) | 105000 | 10500 |
| Cost for 1 year (M\$) | 3,5 | 0,35 |
| Cost for 15 years (M\$) | 52,5 | 5,25 |

1. Total running costs

We saw before that 80 modified locos are enough in place of 100 TE10 to assume the same operations.

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In consequence, we can start the investment plan using 80 modified locos, compared to 100 TE10.

| | TE10 Loco | | Modified Loco | |
|--|-------------|--------------|---------------|----------------|
| | 1 Year | 15 Years | 1 Year | 15 Years |
| Maintenance and AR costs for 1 Loco (\$) | 127.438 | 1.911.560 | 6.099,7 | 91.495,5 |
| Maintenance and AR costs for the equivalent of 100 Locos (M\$) | 12,7 | 191,1 | 0,488 | 7,3 |
| Fuel oil (M\$) | 14 | 210,1 | 8 | 120 |
| Lubrication oil (M\$) | 0,548 | 8,22 | 0,195 | 2,932 |
| TOTAL (M\$) | 27,3 | 409,5 | 8,678 | 130,177 |
| | | | | |
| Economical effect (M\$) | | | -18,6 | -279,3 |

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If we use the ratios we will have the following results.

| | TE10 Loco | | Modified Loco | |
|--|------------------|--------------|----------------------|---------------|
| | 1 Year | 15 Years | 1 Year | 15 Years |
| Maintenance and AR costs for 1 Loco (\$) | 127.000 | 1.900.000 | 6.099,7 | 91.495,5 |
| Maintenance and AR costs for the equivalent of 100 Locos (M\$) | 12,7 | 191,1 | 0,488 | 7,3 |
| Fuel oil (M\$) | 26,2 | 393 | 20,16 | 302,4 |
| Lubrication oil (M\$) | 3,5 | 52,5 | 0,35 | 5,25 |
| TOTAL (M\$) | 42,5 | 638,2 | 21 | 315 |
| | | | | |
| Economical effect (M\$) | | | -21,5 | -323,2 |

The difference per year is -\$21,5 mus in place of \$18,6 mus

1. Cost of the modification

| | |
|-------------------|---|
| Hypothesis | |
| Hour cost (\$) | 5 |

| | |
|------------------------------------|-------------------|
| Cost of 1 GE Equipement (\$) | 650.000 |
| Cost of 80 GE Equipements (\$) | 52.000.000 |
| Transport cost of 1 GE Equip (\$) | 24.000 |
| Transport cost of 80 GE Equip (\$) | 1.920.000 |
| Tools (\$) | 400.000 |
| Modification duration/ 1 Motor (h) | 2.000 |
| Modification cost/ 1 Motor (h) | 10.000 |
| Modification cost/ 80 Motors (h) | 800.000 |
| Total cost (\$) | 55.124.000 |

The total modification cost will be about \$M55, compared to the \$M18,6 profits per year on the running costs.

These calculations show that if the modifications are done in one year, that the investment should be paid in 4 years (3,65 years with the ratios).

These locos should be in operation until 2015.

1. Conclusion

A unit of a 2TE10 is constituted of 2 locomotives of 3000 hp. A new CC locomotive TERA1 (RE mean Russian and American) should be produce in Ludinova (Russia) for a cost of \$3 mus after 1999 with a General Motor engine. This locomotive of 4000 hp should be capable to hauled 4500t (the average train weight is about 3000t) on a gradient of 9‰ ($\gamma=0,33$ compare to 0,22 of a TE10). The speed limit will be 115 km/h.

We will have the same advantages with this locomotive than with 2 modified locomotives, in terms of Operating costs. Moreover, this locomotive is designed for 35 years.

The problem is that if they buy new locomotives, they should be obliged to

- modify Depots and Workshops
- make workers training's on new technologies
- buy new tools
- buy new spare-parts
- etc.

Moreover, due to the future development of the track electrification, we recommend to modify a part of the fleet than buy new one's.

Annex No 12

MINISTRY OF ENVIRONMENT AND BIO RESOURCES

MINISTRY OF ENVIRONMENT AND BIO-RESOURCES

1. Organisation

This Ministry was created in 1988 and, since then, its structure has continually evolved. In addition, a presidential decree of 10 October 1997 promises a restructuring of all ministries so as to raise the credibility of the administration and to reform its organisation.

So, the Ministry of Environment and Bio-Resources will become the Ministry of Environment and Natural Resources. Only the department of ecological surveys will not be changed, the others will be reorganised and a new Geology department may be added to this Ministry.

The services making up the Ministry are:

- The Agency for monitoring the natural environment,
- The Agency for hydrometeorological monitoring,
- The department for ecological surveys and rational use of natural resources,
- and the section of State survey and of radioactivity.

In order to fulfil its obligations as laid down by Parliament, the Ministry has divided the country into 16 regions plus a separate part made up of the town of Almaty. These regions have, on a smaller scale, the same organisational structure as the Ministry with each one employing, on average, 45 people.

All projects costing more than 5 million dollars are examined by the Ministry and the relevant region; the others by the region alone and, in the case of small projects, the technical departments of the town when there is an ecological service.

The essential functions of the staff are to monitor and give technical assistance to public utilities for them to conform to the standards (drinking water network, schools, hospitals etc.).

This help is financed by the "fund for the protection of the environment" paid for by companies.

1. Ecological survey (law of 18 March 1997)

The objective of this law is to forecast and eliminate the negative impact of industrial and domestic activity on the environment, health and life of the people of the Republic.

Ecological survey consists in analyzing the compliance of an existing or planned business to the standards produced by scientific circles.

It defines the competencies of the State, the content of the survey file, the time scale and the period of validity, financing, checks and disputes and international co-operation.

2. Monitoring and analysis

The monitoring of projects is solely designed to check that the standards have been complied with, that all adverse environmental effects have been taken into account and that measures have been taken to reduce or eliminate them.

For existing businesses, the monitoring takes two forms.

Firstly, the legislation obliges companies to carry out their own checks by taking samples and analyzing them, and to communicate the results to the Regional Department of the Ministry.

The companies concerned can be private and state-owned (e.g. the railway). The frequency with which inspections are carried out depends on the classification of the company: for those in categories 1 and 2, one per year; for those in categories 3 and 4, one every 5 years. The inspections concern water, the earth and air.

In practice, this procedure is not always carried out for various reasons:

- lack of equipment or resources (especially in the case of small companies),
- unwillingness,
- or quite simply ignorance of the legislation.

It should be noted, in addition, that the powers of the Ministry are more those of suggestion than compulsion with respect to enforcement of the standards.

Secondly, the regional departments of the Ministry carry out sampling themselves and are subject to the same schedule as the companies.

The regional agencies of the Ministry have their own analytical laboratory, which allows them to compare their results with those of the companies' laboratories.

Analyses of the air in towns have shown that some are above the limits. The substances analyzed are:

- dust,
- sulphur dioxide (SO₂),
- carbon monoxide (CO),
- and nitrogen dioxide (NO₂).

A list of the main towns above the limits: Aktyubinsk, Almaty, Balkach, Djambul, Tchymkent, Ekibastouze, Karaganda, Kustanay, Leninogorsk, Pavlodar, Temirtaou, Ustkamenogorsk.

1. Programme and fines

Each company, which is not conforming, is subjected to an improvement programme lasting three years, which defines the objectives to be attained. If these objectives are not reached, the company is subject to a system of fines linked to the extent by which the limits have been exceeded.

In general, the fines are substantial and may encourage the company to invest in improving its purification processes. But for those companies with little capital, conformity is an objective, which is too difficult to reach, and the fines have no effect.

The fines are paid into the "fund for the protection of the environment".

2. Dangerous goods

It is a department of the Ministry of Environment and Bio-resources, which manages the area of dangerous goods.

To regulate transport of this type of goods, Kazakhstan has signed a Convention with 12 partner countries. These countries are former USSR Republics and former member countries of the CIS. This Convention was based in part on the recommendations of the UNO and the RID (Regulation of Dangerous Goods).

The decree of 30 June 1997 defines the list and class of dangerous products as well as the procedures applicable to their transport (national and international). For imported products whose composition is unknown to the authorities, the file in the worldwide database can be consulted.

Industrial waste is included in the list of dangerous goods. These goods are divided into 4 classes according to their degree of hazard with Class No 1 being the most hazardous.

Article no 32 of the law on the protection of the environment make provision for each company which manufactures or transports dangerous products to underwrite a certificate of ecological indemnity.

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This certificate ensures that, in case of accident, the industrialist or the transporter will pay for all damage caused to the environment.

Annex No 13

HUMAN RESOURCES JUSTIFICATION FOR RECOMMENDATION

JUSTIFICATIONS

Justifications for each recommended action are the following:

Recommendation n°1

Personnel management is not personnel administration. It seems that a trained professional with western practices should be more useful and efficient to implement the new personnel policy proposed.

Recommendation n°2

Please see the reference to overseas training on previous page

Recommendation n°3

At present, there is no personnel management in the personnel department because of lack of job definitions connected with grades and lack of computerised database. The approach has to be completely re-thought by setting up and coding new job ladders (and new job definitions) compulsory in the new future organisation broadly as follows:

(Infrastructure)

- track maintenance job ladder (worker A, B,... / Team leader A, B... / Chief of district A, B, ... / Chief of section A, B, ... / Inspector A, B...)
- electrical infrastructure maintenance job ladder related to signaling, telecom, catenary, energy specialities (worker, team leader, chief of district, chief of section, inspectors)
- train traffic management job ladder (worker (points/signal), team leader, station master, inspector)

(Transport services)

- passenger commercial job ladder (ticket vendor, team leader, inspector, conductor in station or in trains, team leader)
- freight commercial job ladder (vendors, loading / unloading workers, team leaders, inspectors)

(Support services for transport)

- station services job ladder for shunting (workers, team leader)
- driving job ladder (assistant driver, driver, team leader, inspector)
- rolling stock maintenance job ladder (worker, team leader, middle manager, manager, inspector with basic specialty as mechanical and electrical)

(Common Services)

- administrative job ladder (employee, team leader, inspector with the following specialties personnel, finance, procurement, computers)
- social & medical job ladder (strictly related to personnel at work)

Recommendation n°4

As explained below each KTZ unit requires unique tool for personnel management. It consists of an organisation chart where workload and tasks are defined, number of employees required and skills. A summary page should show the existing staff, the required staff and the gap (surplus or needs). Skills are expressed for workers in a simple manner as: low skilled job (L), middle skilled job (M) and high skilled job (H). An example of a summary page for workshop is shown below:

| Job definition | Team leader (mechanical) | Workers (L, M, H) | Required (based on workload) | Gap |
|---|-----------------------------|----------------------|------------------------------------|-----------|
| Bogie shop management | 1 | | 1 | = |
| diagnostic / checking / training | | 2 H | 1 | +1 |
| repositioning, repair and repositioning | | 5 M | 4 | +1 |
| Cleaning | | 3 L | 2 | +1 |
| Maneuver | | 2 L | 2 | = |
| TOTAL | 1 | 12 | 10 | +3 |

The same process should be implemented for stations, sections, administrative departments, etc. Then, solutions should be found to solve the gap between existing and required staff number.

A task force is necessary to implement such a study in each place. Personnel department and technical departments should be involved in the assessment of the workload and for deciding the

staff number required and skills. A neutral consultant could help with the implementation follow up and ease the decision process.

Recommendation n°5

The proposal of an attractive pre-retirement scheme was presented. An attractive transfer scheme with retraining is another necessary mean to adapt number of skilled staff required to workload. The transfer scheme (reassignment) is desirable avoiding costly external recruitment. With the investments envisaged in KTZ, certain categories of personnel in some places will be no more needed. These personnel should be retrained and transfer to other places.

Everybody knows the difficulties to move people (housing problems, schools, etc.). Therefore, only an attractive allowance and housing benefits, etc. could encourage staff to be retrained and to move. Based on local problems in Kazakhstan, this should be studied in detail to find the right level of benefits, which could be attributed to personnel in such cases.

Recommendation n°6

Presently, personnel management is weak at Head Office level because this function is diluted to various entities. It is proposed to strengthen the personnel management under the authority of a Personnel Manager (see recommendation n°1) in order to give full coherence to KTZ Personnel management. The following proposals give an idea of how could be organised a modern Personnel Department.

Proposed organisation for HRM

NOTE: The future organisation of KTZ into business units and service units should integrate metrically the geographical/divisional component of the overall organization.

Head Office level

All policies, rules and procedures should be defined at head office level to be applied at operational levels. The organisation could be the following:

- *Personnel Administration*

relations with trade unions

status modifications, studies related to job ladders salary scales, etc.

legal affairs

train passes and other benefits

- *Recruitment*
 - definition of job with technical departments
 - tests and relations with the medical service,
 - recruitment rules and selection process,
 - exams and concours (organisation)
- *Managers' careers management*
 - recruitment and follow-up (succession plan)
 - studies related to key posts in the organisation
 - administration, salaries and benefits
- *Personnel Management*
 - pro-active studies
 - determination of staff required (studies)
 - organisation and method for personnel management
 - social observatory and internal communication
 - audit and control
- *Training*
 - definition of policy and methodology
 - organisation and control (with technical departments)
 - management of KTZ training centres and sub-contracts with other bodies
- *Social affairs*
 - definition of the social policy
 - insurance's and pensions
 - housing, mortgages, etc.

- *Medical affairs*
policy and medical organisation for employee at work
hygiene and safety
audit and control
- *Computers*
organisation and methods
personnel computerised data base management and operations
statistics

Regional level

Correspondents for each Head Office Personnel section should be assigned at this level in order to aggregate personnel management data at regional level. Recruitment for workers and middle management should be processed at this level. Personnel evaluation (2nd level) could be finalised at this level.

Site level (station, workshop, section)

Units should be regrouped in order to get a suitable size for cost-efficient management purpose (from 3 to 700 persons). On this basis, a personnel manager should be appointed for each regrouped unit. This position should be linked with the regional level with computer network. Major tasks will be the following :

- personnel follow-up and management
- relations with trade unions
- follow-up of personnel files
- feeding the regional personnel computerised data base,
- personnel evaluation (1st level)
- benefits, sanctions, etc.

This proposal allows decentralisation of responsibilities as well as centralisation of personnel management. This is possible only with an efficient computerised network.

Recommendation n°7

This action is under way and should be completed during 1998. Activities such as water supply should also be transferred to local authorities.

Recommendations n°8 and 9

The present turnover can be used as a tool to reduce staff number for some time, but the danger is to see highly skilled staff leaving the railway. In the new organisation highly trained employees should be kept within the railway and it seems that only good carrier perspectives and competitive salaries will allow retaining these employees.

The present salary scale gives the priority to seniority instead of competency. This should be completely modified in order to encourage motivated employees.

Recommendation n° 9 has to be studied in the perspective of a new salary scale. Objectives should be given to employees and personnel should be assessed on their results. A yearly evaluation when the team leader discuss in a formal interview with his employees in order to assess the gap between targets / means and results obtained is a powerful management tool. Individual training needs should be assessed during this interview to get a correct image of what should/could be provided for the following year based on eventual future assignment or new workload.

Recommendation n°10

KTZ has started to recruit new skills required in the railway. From a broad point of view, commercial, accounting, finance specialists are needed as well as some specific categories of engineers such as computer network and telecom specialists. New blood is required in KTZ in order to improve KTZ efficiency and modify organisational behaviors. It should be wise to recruit some young business graduates with MBA s.

Recommendation n°11

Although in recommendation 10 the point is made that new blood is required, it should also be possible to retrain existing staff, with potential, to fill some of the skills vacancies, which will arise in the future.

Recommendation n°12

Dissemination of new knowledge's and new practices throughout the organisation is a major issue. This could be obtained by appointing in key posts retrained managers and also by using the training organisation as well. In this respect, it is of utmost importance to retrain teachers when appropriate in order to get modernised curricula particularly in introducing a commercial approach for every problem.

Regarding the contents of courses, concepts of quality for the customer and cost for the company should be introduced in every major curriculum. Regarding pedagogical aspects, teachers should be retrained also with modern pedagogy in order to modify behaviors related to training. A contract with KIMEP Institute for these matters could help in solving this problem.

Recommendation n°13

A recruitment process based only on competency and skills is essential for every company. In order to avoid nepotism or other ethnical favoritism, it is proposed to use computerised tests for recruitment as used in many railways (as for French Railways). This allows more transparency in the recruitment process where the only criteria for a pre-defined job is skill and ability to perform..

Annex No 14

**INVESTMENT ECONOMIC EVALUATION
BUSINESS PLAN FINANCIAL TABLES
TECHNICAL ASSISTANCE PROPOSAL**

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Module A : Kazakhstan

| EVALUATION OF INVESTMENTS : MIS | | | | | | |
|---|----------|---------|---------|---------|---------|--------|
| | 1998 | 1999 | 2000 | 2001 | 2002 | Total |
| Costs | | | | | | |
| Hardware and software | 4.589 | 5.617 | 2.955 | 0.87 | 0.671 | 14.702 |
| Benefits | | | | | | |
| Total benefits in % of total operating costs | 0 | 1 | 4 | 6 | 8 | |
| Total operating costs, optimistic scenario | 1,003.62 | 934.864 | 916.071 | 903.685 | 887.371 | |
| Total benefits, optimistic scenario | 0 | 9.349 | 36.643 | 54.221 | 70.99 | |
| Benefits - costs | -4.589 | 3.732 | 33.688 | 53.351 | 70.319 | |
| Net Present Value with 8 % discount rate over 1998-2002 | 112.765 | | | | | |
| Internal Rate of Return over 1998-2002 | 281.37 | | | | | |

Note 1 : Total operating costs include the following :

| | |
|-------------------------|--------------------|
| Materials | Depreciation |
| Fuel | Financial expenses |
| Electrical power supply | Corporate tax |

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Other operating expenses
Contract Costs - Civil Works
Contract Costs - Electrical Services
Insurance [reserve fund]
Taxes [other than income tax]
Transport service penalties
Bad Debt
Barter Conversion
Social Needs Expenditures
Value Added Tax (Net) Treated as a Cost

Note 2 : US\$1 = 75 Tenge

Note 3 : Total operating costs for the pessimistic scenario were not made available by CIE

Conclusion :

Based on the assumptions above, the implementation of the project is economically justified as soon as 2000 and generates tremendous savings the following years.

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Module A : Kazakhstan

EVALUATION OF INFRASTRUCTURAL INVESTMENT

| SO | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | TOTAL | | |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|--------|
| Maintenance staff cost | 50.06 | 51.56 | 53.11 | 54.70 | 56.34 | 58.03 | 59.77 | 61.57 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | 63.41 | |
| Total | -50.06 | -51.56 | -53.11 | -54.70 | -56.34 | -58.03 | -59.77 | -61.57 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -63.41 | -1269.49 | |
| S1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maintenance staff cost | 51.03 | 48.22 | 45.01 | 41.35 | 36.51 | 32.50 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | 33.47 | |
| Leaving bonus | 0.00 | 2.68 | 2.81 | 2.95 | 3.10 | 3.26 | | | | | | | | | | | | | | | | | | |
| Investment | 30.00 | 30.00 | 30.00 | 27.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Total | -81.03 | -80.90 | -77.82 | -71.31 | -39.61 | -35.75 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -33.47 | -24.92 | -879.94 | |
| Life extension | 35.00 | | | | | | | | | | | | | | | | | | | | | | | |
| Residual value | 0.00 | 1.50 | 3.00 | 4.05 | | | | | | | | | | | | | | | | | | | 8.55 | |
| S1-S0 | 4.03 | -29.34 | -24.71 | -16.61 | 16.73 | 22.28 | 26.30 | 28.09 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 29.94 | 38.49 | 424.55 |
| | 4.03 | -25.31 | -50.03 | -66.64 | -49.90 | -27.62 | -1.32 | 26.77 | 56.71 | 86.65 | 116.59 | 146.53 | 176.47 | 206.42 | 236.36 | | | | | | | | | |

IRR 28.04%

VAN (0%)
424.55 F

TRACECA - Central Asia Railway Restructuring

Module A : Kazakhstan

EVALUATION OF INVESTMENTS : ROLLING STOCK

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | | |
|--|------|------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|-------|------|------|-------|----------|
| ROLLING STOCK INVESTMENT PLAN | | | | | | | | | | | | | | | | | | | | | | |
| IN MILLIONS US\$ | | | | | | | | | | | | | | | | | | | | | | |
| Locomotives including upgrade of existing locomotives and acquisition of new locomotives | 0 | 0 | 40.6 | 40.6 | 40.6 | 40.6 | 40.6 | 0 | 0 | 0 | 0 | 0 | 200 | 200 | 200 | 200 | 200 | 0 | 0 | 0 | 0 | |
| | | | | | | | 203 | | | | | | | | | | | | | | 1000 | |
| Coaches | 0 | 0 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 31.4 | 31.4 | 31.4 | 31.4 | 31.4 | 31.4 | |
| | | | | | 102 | | | | | | | | | | 340 | | | | | | 157 | |
| Wagons | 0 | 0 | 2.1 | 2.1 | 2.1 | 17.1 | 17.1 | 17.1 | 17.1 | 17.1 | 17.1 | 17.1 | 17.1 | 17.1 | 17.1 | 25.5 | 25.5 | 25.5 | 25.5 | 25.5 | 25.5 | |
| | | | | | 6.3 | | | | | | | | | | 171 | | | | | | 127.5 | |
| Locomotive maintenance | 0 | 0 | 2.4 | 1.5 | 1.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | 2.4 | | 3 | | | | | | | | | | 5 | | | | | | | |
| Coach maintenance | 0 | 0 | 2.133 | 2.133 | 2.133 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | | | 6.399 | | | | | | | | | | 10.5 | | | | | | | |
| Wagon maintenance | 0 | 0 | 2.6 | 2.6 | 2.6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | | | 7.8 | | | | | | | | | | 10 | | | | | | | |
| Total investments | 0 | 0 | 83.833 | 82.933 | 82.933 | 94.25 | 94.25 | 53.65 | 53.65 | 53.65 | 53.65 | 53.65 | 53.65 | 253.65 | 253.65 | 256.9 | 256.9 | 256.9 | 56.9 | 56.9 | 56.9 | 2151.899 |

TRACECA - Central Asia Railway Restructuring

Module A : Kazakhstan

| | | | | | | | | | | | | | | | | | | | |
|---|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|--------|--------|--------|
| Benefits – Investments in million US\$ | -65.233 | -64.333 | -64.333 | -72.65 | -72.65 | -30.89 | -30.89 | -30.89 | -30.89 | -30.89 | -30.89 | -230.89 | -230.89 | -230.89 | -231.54 | -231.54 | -31.54 | -31.54 | -31.54 |
|---|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|--------|--------|--------|

Net Present Value with 8 % discount rate over 1998-2015 in million US\$

-806.467

Internal Rate of Return over 1998-2015

TRACECA - Central Asia Railway Restructuring

Module A : Kazakhstan

EVALUATION OF INVESTMENTS : REENGINEING

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | |
|-----------------------------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Costs | | | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benefits in operating costs | | | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 |
| Benefits - Costs | | | -36.4 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 |

Net Present Value with 8 % discount rate over 1998-2015

123.391

Internal Rate of Return over 1998-2015

51.05%

Conclusion :

The conversion of the TE10 locomotives is economically justified with an IRR of 51 %.

The investment in coaches and wagons is not economically justified because it does not generate significant savings in operating and maintenance costs compared to the investment cost.

However, this investment is justified based for the permanence of railway operation.

KAZAKHSTAN RAILWAYS

OPTIMISTIC SCENARIO

OPERATING STATISTICS

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|--|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Key Assumptions | | | | | | | | | | | | |
| Inflation rate [relates current to previous year's expenses] | | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Key Operating Statistics | | | | | | | | | | | | |
| Freight tonnes (000) | 192,586 | 170,164 | 172,292 | 176,273 | 181,104 | 182,468 | 183,936 | 185,858 | 187,457 | 188,402 | 189,354 | 190,313 |
| Freight tkm (000,000) | 112,689 | 103,205 | 104,752 | 107,405 | 110,651 | 111,467 | 112,335 | 113,427 | 114,369 | 114,912 | 115,460 | 116,011 |
| Ave. length of haul | 585 | 607 | 608 | 609 | 611 | 611 | 611 | 610 | 610 | 610 | 610 | 610 |
| Passenger km (000,000) | 14,199 | 12,495 | 12,595 | 12,897 | 13,297 | 13,297 | 13,404 | 13,471 | 13,538 | 13,606 | 13,674 | 13,742 |
| Locomotive km (000) | 168,109 | 161,187 | 150,572 | 139,638 | 132,522 | 126,377 | 121,079 | 121,854 | 122,515 | 122,889 | 123,265 | 123,644 |
| Train km (000) | 134,179 | 128,915 | 120,440 | 113,284 | 109,796 | 106,894 | 104,425 | 105,038 | 105,559 | 105,854 | 106,150 | 106,449 |
| Wagon km (000,000) | 4,611 | 4,195 | 4,245 | 4,344 | 4,469 | 4,503 | 4,540 | 4,590 | 4,627 | 4,648 | 4,669 | 4,690 |

| | Actual | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast |
|----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | |
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Employment - core activity | 146,143 | 135,275 | 110,738 | 95,357 | 85,123 | 77,928 | 72,670 | 69,108 | 67,296 | 66,061 | 65,430 | 65,094 | |
| Percentage change | | -7.4% | -18.1% | -13.9% | -10.7% | -8.5% | -6.7% | -4.9% | -2.6% | -1.8% | -1.0% | -0.5% | |

KAZAKHSTAN RAILWAYS

OPTIMISTIC SCENARIO

PROFIT AND LOSS ACCOUNT 1996 - 2007

(All Data is in Millions of Tenge)

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Operating Revenue | | | | | | | | | | | | |
| Freight Business | 53,824 | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,920 | 91,794 | 92,537 | 92,971 | 93,408 | 93,849 |
| Demurrage & Wagon Hire | 2,079 | 2,251 | 2,285 | 2,343 | 2,413 | 2,431 | 2,450 | 2,474 | 2,495 | 2,506 | 2,518 | 2,530 |
| Passenger Business | 8,339 | 8,338 | 8,979 | 9,194 | 9,478 | 9,478 | 9,554 | 9,602 | 9,650 | 9,698 | 9,746 | 9,795 |
| Other Transport Revenue | 666 | 786 | 746 | 694 | 642 | 538 | 466 | 466 | 466 | 466 | 466 | 466 |
| Total Transport Revenue | 64,909 | 87,730 | 96,945 | 99,242 | 102,125 | 102,682 | 103,390 | 104,336 | 105,147 | 105,641 | 106,139 | 106,640 |
| Auxiliary Activities Income | 2,005 | 2,370 | 2,370 | - | - | - | - | - | - | - | - | - |
| Sales of Non Transport Goods & Services | 1,192 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |
| Gains or Loss Foreign Currency Transactions | 5,302 | 3,447 | - | - | - | - | - | - | - | - | - | - |
| Other Income | 18 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| Total Revenue | 73,426 | 93,733 | 99,502 | 99,429 | 102,312 | 102,869 | 103,577 | 104,523 | 105,334 | 105,828 | 106,326 | 106,827 |

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Operating Subsidy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Operating Revenue | 73,426 | 93,733 | 99,502 | 99,429 | 102,312 | 102,869 | 103,577 | 104,523 | 105,334 | 105,828 | 106,326 | 106,827 |
| Operating Expenses | | | | | | | | | | | | |
| Salary - per accounts | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Social Insurance | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 |
| Consumption Fund (Other Employee Benefits) | 3,121 | 2,728 | 2,233 | 1,923 | 1,717 | 1,571 | 1,465 | 1,394 | 1,357 | 1,332 | 1,319 | 1,313 |
| Materials | 10,535 | 12,259 | 12,079 | 12,131 | 12,795 | 13,728 | 13,643 | 13,605 | 13,568 | 13,571 | 13,581 | 13,584 |
| Fuel | 5,795 | 6,693 | 6,678 | 6,491 | 6,301 | 5,813 | 5,375 | 4,989 | 4,639 | 4,321 | 4,036 | 3,778 |
| Electrical power supply | 4,796 | 5,030 | 4,933 | 4,909 | 4,921 | 4,902 | 4,898 | 4,909 | 4,923 | 4,935 | 4,951 | 4,969 |
| Other operating expenses | 8,792 | 10,165 | 9,835 | 9,487 | 9,192 | 9,052 | 8,907 | 8,841 | 8,781 | 8,773 | 8,774 | 8,769 |
| Contract Costs - Civil Works | 0 | 0 | 0 | 126 | 280 | 377 | 437 | 474 | 498 | 513 | 523 | 529 |
| Contract Costs - Electrical Services | 0 | 0 | 0 | 0 | 135 | 232 | 289 | 324 | 348 | 357 | 360 | 362 |
| Insurance [reserve fund] | 78 | 84 | 85 | 87 | 90 | 90 | 91 | 92 | 92 | 93 | 93 | 94 |
| Taxes [other than income tax] | 355 | 2,100 | 2,105 | 2,115 | 2,127 | 2,130 | 2,133 | 2,137 | 2,140 | 2,142 | 2,144 | 2,146 |
| Transport service penalties | 422 | 457 | 464 | 476 | 490 | 494 | 497 | 502 | 506 | 509 | 511 | 514 |
| Bad Debt | 4,700 | 5,168 | 3,622 | 2,063 | 1,669 | 1,583 | 1,593 | 1,611 | 1,621 | 1,627 | 1,633 | 1,640 |
| Barter Conversion | 0 | 2,431 | 1,936 | 1,336 | 611 | 435 | 374 | 342 | 346 | 348 | 350 | 353 |
| Social Needs Expenditures | 5,050 | 2,414 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 |
| Value Added Tax (Net) Treated as a Cost | 0 | 10,897 | 13,003 | 12,343 | 12,891 | 12,959 | 13,245 | 13,533 | 13,782 | 13,944 | 14,094 | 14,241 |

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Total Operating Expenses | 61,716 | 79,553 | 75,272 | 70,115 | 68,705 | 67,776 | 66,553 | 65,796 | 65,354 | 65,019 | 64,822 | 64,684 |
| Operating Profit Before Depreciation | 11,710 | 14,180 | 24,230 | 29,314 | 33,607 | 35,092 | 37,024 | 38,727 | 39,980 | 40,809 | 41,504 | 42,143 |
| Depreciation | 4,981 | 12,000 | 15,000 | 18,000 | 22,500 | 26,250 | 26,416 | 26,015 | 25,613 | 25,638 | 25,677 | 25,636 |
| Operating Profit after Depreciation | 6,729 | 2,180 | 9,230 | 11,314 | 11,107 | 8,842 | 10,609 | 12,712 | 14,367 | 15,172 | 15,827 | 16,507 |
| Interest - Japanese Loan | - | 231 | 322 | 382 | 443 | 441 | 427 | 419 | 393 | 368 | 343 | 318 |
| Interest - German Loan | - | 4 | 3 | 2 | 1 | 0 | - | - | - | - | - | - |
| Interest - EBRD Loan | - | - | 55 | 320 | 404 | 392 | 338 | 282 | 227 | 171 | 115 | 58 |
| Interest - Bank Borrowings | - | - | - | - | - | - | - | - | - | - | - | - |
| Extraordinary Items | 7,849 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Profit / (Loss) before tax | -1,120 | 1,945 | 8,851 | 10,611 | 10,259 | 8,009 | 9,844 | 12,011 | 13,747 | 14,633 | 15,369 | 16,132 |
| Income Tax | 1,774 | 3,257 | 4,729 | 4,727 | 4,406 | 3,697 | 4,241 | 4,886 | 5,400 | 5,650 | 5,853 | 6,062 |
| Profit Retained | -2,894 | -1,312 | 4,122 | 5,884 | 5,852 | 4,311 | 5,603 | 7,124 | 8,347 | 8,983 | 9,516 | 10,070 |
| Operating Profit before Depreciation % | 15.9 | 15.1% | 24.4 | 29.5% | 32.8% | 34.1% | 35.7 | 37.1% | 38.0% | 38.6% | 39.0% | 39.5% |

KAZAKHSTAN RAILWAYS

OPTIMISTIC SCENARIO

CASH FLOW STATEMENT 1997 - 2007

(All Data is in Millions of Tenge)

| | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| RECEIPTS | | | | | | | | | | | |
| Freight Business | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,920 | 91,794 | 92,537 | 92,971 | 93,408 | 93,849 |
| Demurrage & Wagon Hire | 2,251 | 2,285 | 2,343 | 2,413 | 2,431 | 2,450 | 2,474 | 2,495 | 2,506 | 2,518 | 2,530 |
| Passenger Business | 8,338 | 8,979 | 9,194 | 9,478 | 9,478 | 9,554 | 9,602 | 9,650 | 9,698 | 9,746 | 9,795 |
| Other Transport Revenue | 786 | 746 | 694 | 642 | 538 | 466 | 466 | 466 | 466 | 466 | 466 |
| Auxiliary Activities Income | 2,370 | 2,370 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sales of Non Transport Goods & Services | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |
| Gains or Loss Foreign Currency Transactions | 3,447 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Income | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| Operating Subsidy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decrease in Accounts Receivable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Capital Grant - Repayment of Loans | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Grants | | | | | | | | | | | |

| | Forecast 1997 | Forecast 1998 | Forecast 1999 | Forecast 2000 | Forecast 2001 | Forecast 2002 | Forecast 2003 | Forecast 2004 | Forecast 2005 | Forecast 2006 | Forecast 2007 |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Loans received - Japanese | 4,567 | 2,964 | 1,979 | 2,055 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loans received - German | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loans received - EBRD | 0 | 728 | 3,638 | 1,346 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 98,335 | 103,193 | 105,046 | 105,713 | 102,869 | 103,577 | 104,523 | 105,334 | 105,828 | 106,326 | 106,827 |
| PAYMENTS | | | | | | | | | | | |
| Operating Expenses | 79,553 | 75,272 | 70,115 | 68,705 | 67,776 | 66,553 | 65,796 | 65,354 | 65,019 | 64,822 | 64,684 |
| Increase in Inventory | 1,000 | 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Increase in Accounts Receivable | 3,000 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Decrease in Accounts Payable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Repayment Short Term Loans | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Capital Investment | 4,601 | 3,691 | 5,617 | 3,401 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interest - Loans | 235 | 379 | 703 | 848 | 833 | 764 | 701 | 620 | 539 | 458 | 375 |
| Loan Repayments - Japanese | 0 | 0 | 0 | 0 | 0 | 389 | 778 | 778 | 778 | 778 | 778 |
| Loan Repayments - German | 27 | 27 | 27 | 27 | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loan Repayments - EBRD | 0 | 0 | 0 | 0 | 650 | 698 | 751 | 808 | 868 | 933 | 1,003 |
| Interest - Bank Borrowings | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Profit Tax Paid | 2,886 | 4,361 | 4,727 | 4,486 | 3,875 | 4,105 | 4,725 | 5,272 | 5,588 | 5,802 | 6,010 |
| Total | 91,316 | 84,731 | 81,689 | 77,968 | 73,655 | 73,010 | 73,251 | 73,331 | 73,291 | 73,293 | 73,350 |
| Cash Increase / (Decrease) | 7,018 | 18,462 | 23,356 | 27,745 | 29,214 | 30,567 | 31,272 | 32,002 | 32,537 | 33,033 | 33,477 |
| Balance Previous Year | 841 | 7,859 | 26,321 | 49,678 | 77,423 | 106,636 | 137,204 | 168,475 | 200,478 | 233,014 | 266,047 |

OPTIMISTIC SCENARIO

BALANCE SHEET 1996 - 2007

(All Data is in Millions of Tenge)

| | Estimated 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|------------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Fixed Assets | | | | | | | | | | | | |
| Gross Fixed Assets & Capital WIP | 208,526 | 213,127 | 216,819 | 222,436 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 |
| Less: Historical Cost Depreciation | 78,469 | 84,725 | 91,119 | 97,623 | 104,296 | 111,071 | 117,846 | 124,621 | 131,397 | 138,172 | 144,947 | 151,722 |
| Net Fixed Assets | 130,057 | 128,403 | 125,700 | 124,812 | 121,540 | 114,765 | 107,990 | 101,215 | 94,440 | 87,665 | 80,889 | 74,114 |
| Financial Long Term Assets | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 |
| Total Fixed Assets | 130,299 | 128,645 | 125,942 | 125,054 | 121,782 | 115,007 | 108,232 | 101,457 | 94,682 | 87,907 | 81,131 | 74,356 |
| Current Assets | | | | | | | | | | | | |
| Cash | 841 | 7,859 | 26,321 | 49,678 | 77,423 | 106,636 | 137,204 | 168,475 | 200,478 | 233,014 | 266,047 | 299,524 |
| Accounts Receivable | 30,043 | 33,043 | 33,543 | 34,043 | 34,543 | 35,043 | 35,543 | 36,043 | 36,543 | 37,043 | 37,543 | 38,043 |
| Inventory | 14,829 | 15,829 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 |
| Total Current Assets | 45,713 | 56,731 | 76,193 | 100,050 | 128,295 | 158,008 | 189,076 | 220,847 | 253,350 | 286,386 | 319,919 | 353,896 |

| | Estimated 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|------------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Current Liabilities | | | | | | | | | | | | |
| Accounts Payable & Accruals | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 |
| Bank Borrowings | - | - | - | - | - | - | - | - | - | - | - | - |
| Short Term Loans | 13 | - | - | - | - | - | - | - | - | - | - | - |
| Tax payable | 6,044 | 6,415 | 6,783 | 6,782 | 6,702 | 6,525 | 6,661 | 6,822 | 6,951 | 7,013 | 7,064 | 7,116 |
| Total Current Liabilities | 42,726 | 43,084 | 43,452 | 43,451 | 43,371 | 43,194 | 43,330 | 43,491 | 43,620 | 43,682 | 43,733 | 43,785 |
| Net Current Assets / (Liabilities) | 2,987 | 13,647 | 32,742 | 56,599 | 84,924 | 114,815 | 145,746 | 177,356 | 209,730 | 242,704 | 276,186 | 310,111 |
| Long Term Loans | 297 | 4,871 | 8,535 | 14,124 | 17,498 | 16,827 | 15,740 | 14,211 | 12,625 | 10,979 | 9,268 | 7,487 |
| Net Assets | 132,989 | 137,421 | 150,149 | 167,529 | 189,208 | 212,994 | 238,238 | 264,602 | 291,787 | 319,632 | 348,050 | 376,981 |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)

OPTIMISTIC SCENARIO

| Summary by Expense Type | Actual | | | | | | | | | | Projected | | | | | | | | | | | | | |
|-------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--|--|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> | <u>2008</u> | <u>2009</u> | <u>2010</u> | <u>2011</u> | <u>2012</u> | <u>2013</u> | <u>2014</u> | <u>2015</u> | <u>2016</u> | <u>2017</u> | | |
| Salary | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 | | | | | | | | | | | | |
| Social Insurance | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 | | | | | | | | | | | | |
| Materials | 10,535 | 12,259 | 12,079 | 12,131 | 12,795 | 13,728 | 13,643 | 13,605 | 13,568 | 13,571 | 13,581 | 13,584 | | | | | | | | | | | | |
| Fuel | 5,795 | 6,693 | 6,678 | 6,491 | 6,301 | 5,813 | 5,375 | 4,989 | 4,639 | 4,321 | 4,036 | 3,778 | | | | | | | | | | | | |
| Power | 4,796 | 5,030 | 4,933 | 4,909 | 4,921 | 4,902 | 4,898 | 4,909 | 4,923 | 4,935 | 4,951 | 4,969 | | | | | | | | | | | | |
| Depreciation | 4,981 | 15,849 | 37,042 | 32,790 | 28,045 | 27,416 | 26,416 | 26,015 | 25,613 | 25,638 | 25,677 | 25,636 | | | | | | | | | | | | |
| Other | <u>8,792</u> | <u>10,165</u> | <u>9,835</u> | <u>9,487</u> | <u>9,192</u> | <u>9,052</u> | <u>8,907</u> | <u>8,841</u> | <u>8,781</u> | <u>8,773</u> | <u>8,774</u> | <u>8,769</u> | | | | | | | | | | | | |
| Total | 52,970 | 69,125 | 87,173 | 80,745 | 75,048 | 73,628 | 71,152 | 69,709 | 68,583 | 68,099 | 67,778 | 67,437 | | | | | | | | | | | | |
| Change from prior year | | 30.5% | 26.1% | -7.4% | -7.1% | -1.9% | -3.4% | -2.0% | -1.6% | -0.7% | -0.5% | -0.5% | | | | | | | | | | | | |

| | Actual | | | | | | | | | | Projected | | | | | | | | | | | | | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------|
| Summary by Operating Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 3,722 | 4,012 | 3,807 | 3,643 | 3,547 | 3,477 | 3,454 | 3,453 | 3,456 | 3,458 | 3,460 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 | 3,462 |
| Locomotive | 18,524 | 20,069 | 40,795 | 36,014 | 30,903 | 29,807 | 28,058 | 27,076 | 26,275 | 25,996 | 25,761 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 | 25,433 |
| Wagons | 10,348 | 12,918 | 12,611 | 12,514 | 12,973 | 13,505 | 13,359 | 13,224 | 13,167 | 13,156 | 13,161 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 | 13,167 |
| Track | 11,657 | 22,746 | 22,415 | 22,111 | 21,831 | 21,519 | 21,237 | 21,111 | 20,990 | 20,876 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 | 20,818 |
| Civil construction | 919 | 1,081 | 666 | 415 | 260 | 164 | 104 | 66 | 42 | 27 | 18 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| Signalling & Communications | 2,497 | 2,841 | 2,016 | 1,569 | 1,307 | 1,138 | 1,027 | 950 | 891 | 843 | 820 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 | 808 |
| Electrification & power supply | 1,379 | 1,601 | 1,112 | 829 | 665 | 568 | 511 | 476 | 453 | 444 | 441 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 | 439 |
| Divisions Management | <u>3,924</u> | <u>3,858</u> | <u>3,750</u> | <u>3,651</u> | <u>3,561</u> | <u>3,451</u> | <u>3,401</u> | <u>3,353</u> | <u>3,308</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | <u>3,299</u> | |
| Total | 52,970 | 69,125 | 87,173 | 80,745 | 75,048 | 73,628 | 71,152 | 69,709 | 68,583 | 68,099 | 67,778 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | 67,437 | |
| Change from prior year | | 30.5% | 26.1% | -7.4% | -7.1% | -1.9% | -3.4% | -2.0% | -1.6% | -0.7% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% |

| | Projected | | | | | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Actual | | | | | | | | | | | | |
| Salary by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 1,855 | 1,974 | 1,812 | 1,678 | 1,594 | 1,537 | 1,517 | 1,513 | 1,513 | 1,513 | 1,513 | 1,513 |
| Locomotive | 3,586 | 3,632 | 3,184 | 2,805 | 2,563 | 2,340 | 2,172 | 2,020 | 1,995 | 1,971 | 1,948 | 1,910 |
| Wagons & Coaches | 2,357 | 2,647 | 2,430 | 2,354 | 2,281 | 2,167 | 2,059 | 1,956 | 1,910 | 1,899 | 1,899 | 1,899 |
| Track | 2,630 | 3,109 | 2,854 | 2,620 | 2,405 | 2,165 | 1,948 | 1,851 | 1,758 | 1,670 | 1,625 | 1,625 |
| Civil construction | 169 | 199 | 102 | 52 | 26 | 13 | 7 | 3 | 2 | 1 | 0 | 0 |
| Signalling & Communications | 1,228 | 1,401 | 847 | 564 | 409 | 314 | 255 | 216 | 187 | 165 | 155 | 150 |
| Electrification & power supply | 407 | 469 | 274 | 173 | 121 | 91 | 75 | 65 | 59 | 57 | 56 | 56 |
| Divisions Management | <u>1,484</u> | <u>1,274</u> | <u>1,218</u> | <u>1,167</u> | <u>1,122</u> | <u>1,059</u> | <u>1,032</u> | <u>1,005</u> | <u>980</u> | <u>975</u> | <u>975</u> | <u>975</u> |
| Total | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Change from prior year | | 7.2% | -13.5% | -10.3% | -7.8% | -7.9% | -6.4% | -4.8% | -2.6% | -1.8% | -1.0% | -0.5% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)

OPTIMISTIC SCENARIO

| Employment by Operating Unit | Actual | Projected | | | | | | | | | | | |
|---|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger, Freight & Commercial Service | 23,547 | 21,192 | 19,073 | 17,312 | 16,127 | 15,555 | 15,350 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 |
| Locomotive | 32,883 | 28,181 | 24,220 | 20,925 | 18,744 | 17,116 | 15,884 | 14,769 | 14,585 | 14,411 | 14,245 | 13,965 | 13,965 |
| Wagons & Coaches | 27,142 | 25,785 | 23,206 | 22,046 | 20,944 | 19,897 | 18,902 | 17,957 | 17,534 | 17,430 | 17,430 | 17,430 | 17,430 |
| Track | 26,385 | 26,385 | 23,747 | 21,372 | 19,235 | 17,311 | 15,580 | 14,801 | 14,061 | 13,358 | 13,000 | 13,000 | 13,000 |
| Civil construction | 12,518 | 12,518 | 6,259 | 3,130 | 1,565 | 782 | 391 | 196 | 98 | 49 | 24 | 12 | 12 |
| Signalling & Communications | 11,190 | 10,803 | 6,402 | 4,180 | 2,970 | 2,278 | 1,852 | 1,568 | 1,362 | 1,201 | 1,127 | 1,088 | 1,088 |
| Electrification & power supply | 5,411 | 5,276 | 3,020 | 1,873 | 1,281 | 968 | 795 | 693 | 627 | 602 | 594 | 589 | 589 |
| Divisions Management | <u>7,067</u> | <u>5,134</u> | <u>4,811</u> | <u>4,520</u> | <u>4,258</u> | <u>4,022</u> | <u>3,916</u> | <u>3,815</u> | <u>3,719</u> | <u>3,700</u> | <u>3,700</u> | <u>3,700</u> | <u>3,700</u> |
| Total | 146,143 | 135,275 | 110,738 | 95,357 | 85,123 | 77,928 | 72,670 | 69,108 | 67,296 | 66,061 | 65,430 | 65,094 | 65,094 |
| Change from prior year | | -7.4 | -18.1 | -13.9 | -10.7 | -8.5 | -6.7 | -4.9 | -2.6 | -1.8 | -1.0 | -0.5 | -0.5 |

| Materials by Operation Unit | Actual | Projected | | | | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger, Freight & Commercial Service | 206 | 238 | 239 | 240 | 243 | 243 | 244 | 244 | 245 | 245 | 246 | 246 |
| Locomotive | 2,424 | 2,768 | 2,753 | 2,902 | 3,070 | 3,358 | 3,295 | 3,267 | 3,235 | 3,243 | 3,252 | 3,253 |
| Wagons & Coaches | 1,876 | 2,150 | 2,158 | 2,175 | 2,744 | 3,439 | 3,448 | 3,461 | 3,471 | 3,476 | 3,481 | 3,487 |
| Track | 5,244 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 |
| Civil construction | 178 | 210 | 137 | 89 | 58 | 38 | 24 | 16 | 10 | 7 | 4 | 3 |
| Signalling & Communications | 197 | 231 | 207 | 189 | 176 | 166 | 158 | 152 | 147 | 142 | 140 | 139 |
| Electrification & power supply | 213 | 248 | 173 | 127 | 99 | 82 | 72 | 65 | 61 | 59 | 59 | 59 |
| Divisions Management | <u>196</u> | <u>216</u> | <u>213</u> | <u>209</u> | <u>206</u> | <u>203</u> | <u>202</u> | <u>201</u> | <u>200</u> | <u>199</u> | <u>199</u> | <u>199</u> |
| Total | 10,535 | 12,259 | 12,079 | 12,131 | 12,795 | 13,728 | 13,643 | 13,605 | 13,568 | 13,571 | 13,581 | 13,584 |
| Change from prior year | | 16.4% | -1.5% | 0.4% | 5.5% | 7.3% | -0.6% | -0.3% | -0.3% | 0.0% | 0.1% | 0.0% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)
OPTIMISTIC SCENARIO

| | Actual | Projected | | | | | | | | | | | |
|---|---------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Fuel by Operating Unit | | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 85 | 99 | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 101 | 101 | 101 | 101 |
| Locomotive | 4,886 | 5,639 | 5,711 | 5,577 | 5,424 | 4,965 | 4,549 | 4,181 | 3,841 | 3,527 | 3,244 | 2,987 | 2,987 |
| Wagons & Coaches | 343 | 393 | 370 | 359 | 348 | 337 | 327 | 317 | 313 | 312 | 312 | 312 | 312 |
| Track | 225 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 |
| Civil construction | 109 | 129 | 84 | 55 | 35 | 23 | 15 | 10 | 6 | 4 | 3 | 2 | 2 |
| Signalling & Communications | 34 | 40 | 35 | 32 | 30 | 28 | 27 | 26 | 25 | 24 | 24 | 24 | 24 |
| Electrification & power supply | 38 | 44 | 31 | 23 | 18 | 15 | 13 | 12 | 11 | 11 | 10 | 10 | 10 |
| Divisions Management | <u>76</u> | <u>84</u> | <u>82</u> | <u>81</u> | <u>80</u> | <u>79</u> | <u>78</u> | <u>78</u> | <u>77</u> | <u>77</u> | <u>77</u> | <u>77</u> | <u>77</u> |
| Total | 5,795 | 6,693 | 6,678 | 6,491 | 6,301 | 5,813 | 5,375 | 4,989 | 4,639 | 4,321 | 4,036 | 3,778 | 3,778 |
| Change from prior year | | 15.5 | -0.2 | -2.8 | -2. | -7.7 | -7.5 | -7. | -7.0 | -6.9 | -6.6 | -6.4 | -6.4 |
| Power Supply by Operation Unit | | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 344 | 403 | 403 | 404 | 406 | 406 | 406 | 407 | 407 | 407 | 407 | 407 | 407 |
| Locomotive | 3,636 | 3,685 | 3,717 | 3,775 | 3,843 | 3,862 | 3,884 | 3,914 | 3,942 | 3,961 | 3,980 | 3,999 | 3,999 |

| | Actual | Projected | | | | | | | | | | |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> |
| Wagons & Coaches | 145 | 167 | 157 | 152 | 147 | 143 | 139 | 135 | 133 | 132 | 132 | 132 |
| Track | 83 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| Civil construction | 32 | 38 | 25 | 16 | 11 | 7 | 4 | 3 | 2 | 1 | 1 | 1 |
| Signalling & Communications | 198 | 233 | 209 | 191 | 177 | 167 | 159 | 153 | 148 | 143 | 141 | 140 |
| Electrification & power supply | 231 | 269 | 188 | 138 | 108 | 89 | 78 | 71 | 66 | 64 | 64 | 64 |
| Divisions Management | <u>126</u> | <u>139</u> | <u>136</u> | <u>134</u> | <u>132</u> | <u>131</u> | <u>130</u> | <u>129</u> | <u>128</u> | <u>128</u> | <u>128</u> | <u>128</u> |
| Total | 4,796 | 5,030 | 4,933 | 4,909 | 4,921 | 4,902 | 4,898 | 4,909 | 4,923 | 4,935 | 4,951 | 4,969 |
| Change from prior year | | 4.9 | -1.9 | -0.5 | 0. | -0.4 | -0.1 | 0. | 0.3 | 0.2 | 0.3 | 0.4 |
| Depreciation by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 112 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 |
| Locomotive | 770 | 906 | 22,227 | 18,061 | 13,375 | 12,786 | 11,811 | 11,429 | 11,040 | 11,073 | 11,117 | 11,078 |
| Wagons & Coaches | 2,181 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 |
| Track | 1,038 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 |
| Civil construction | 70 | 83 | 54 | 35 | 23 | 15 | 10 | 6 | 4 | 3 | 2 | 1 |
| Signalling & Communications | 214 | 250 | 225 | 205 | 191 | 179 | 171 | 165 | 159 | 154 | 152 | 151 |
| Electrification & power supply | 191 | 221 | 155 | 114 | 89 | 74 | 64 | 59 | 55 | 53 | 53 | 52 |

| | Projected | | | | | | | | | | | | |
|------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | Actual | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Divisions Management | | <u>405</u> | <u>446</u> | <u>439</u> | <u>432</u> | <u>426</u> | <u>420</u> | <u>417</u> | <u>415</u> | <u>412</u> | <u>412</u> | <u>412</u> | <u>412</u> |
| Total | 4,981 | 15,849 | 37,042 | 32,790 | 28,045 | 27,416 | 26,416 | 26,015 | 25,613 | 25,638 | 25,677 | 25,636 | 25,636 |
| Change from prior year | | 218.2% | 133.7% | -11.5% | -14.5% | -2.2% | -3.6% | -1.5% | -1.5% | 0.1% | 0.2% | -0.2% | -0.2% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)
OPTIMISTIC SCENARIO

| | Actual | Projected | | | | | | | | | | |
|---|--------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> |
| Other Expenses by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 509 | 575 | 579 | 586 | 595 | 597 | 599 | 602 | 604 | 606 | 607 | 609 |
| Locomotive | 2,070 | 2,349 | 2,248 | 2,052 | 1,859 | 1,794 | 1,694 | 1,660 | 1,624 | 1,629 | 1,636 | 1,634 |
| Wagons & Coaches | 2,722 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 |
| Track | 1,593 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 |
| Civil construction | 305 | 361 | 234 | 152 | 99 | 64 | 42 | 27 | 18 | 11 | 7 | 5 |
| Signalling & Communications | 227 | 265 | 238 | 218 | 202 | 190 | 181 | 174 | 169 | 164 | 161 | 160 |
| Electrification & power supply | 170 | 198 | 138 | 102 | 79 | 66 | 57 | 52 | 49 | 47 | 47 | 47 |
| Divisions Management | 1,196 | 1,317 | 1,296 | 1,276 | 1,258 | 1,241 | 1,232 | 1,224 | 1,217 | 1,215 | 1,215 | 1,215 |
| Total | 8,792 | 10,165 | 9,835 | 9,487 | 9,192 | 9,052 | 8,907 | 8,841 | 8,781 | 8,773 | 8,774 | 8,769 |
| Change from prior year | | 15.6% | -3.2% | -3.5% | -3.1% | -1.5% | -1.6% | -0.7% | -0.7% | -0.1% | 0.0% | -0.1% |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
RAILWAY TOTAL

| | Actual | Projected | | | | | | | | | | |
|---------------------------------------|----------------|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> |
| | | Tonne Kilometres by Commodity (Millions Tonne Kilometres) | | | | | | | | | | |
| Coal & Coke | 41,795 | 29,121 | 29,340 | 29,633 | 29,929 | 30,139 | 30,365 | 30,669 | 30,975 | 31,208 | 31,442 | 31,677 |
| Oil & Oil Products | 15,242 | 19,296 | 20,261 | 20,869 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 |
| Ores | 13,051 | 13,051 | 13,149 | 13,346 | 13,546 | 13,573 | 13,607 | 13,675 | 13,744 | 13,778 | 13,813 | 13,847 |
| Building Materials | 5,043 | 4,034 | 3,833 | 3,833 | 3,909 | 3,988 | 4,087 | 4,292 | 4,335 | 4,345 | 4,356 | 4,367 |
| Grain | 7,856 | 7,856 | 7,876 | 7,915 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 |
| Other | 5,416 | 5,560 | 5,643 | 5,926 | 6,222 | 6,315 | 6,410 | 6,506 | 6,604 | 6,653 | 6,703 | 6,753 |
| Transit Traffic | 24,286 | 24,286 | 24,650 | 25,883 | 27,177 | 27,585 | 27,998 | 28,418 | 28,845 | 29,061 | 29,279 | 29,499 |
| Total | 112,689 | 103,205 | 104,752 | 107,405 | 110,651 | 111,467 | 112,335 | 113,427 | 114,369 | 114,912 | 115,460 | 116,011 |
| Diesel - Tonne Kilometres | 57,204 | 56,630 | 57,675 | 59,440 | 61,669 | 62,161 | 62,680 | 63,310 | 63,826 | 64,098 | 64,373 | 64,649 |
| Electric - Tonne Kilometres | 55,486 | 46,575 | 47,077 | 47,965 | 48,982 | 49,306 | 49,655 | 50,117 | 50,543 | 50,814 | 51,087 | 51,362 |
| Change from prior year | -9.5% | -8.4% | 1.5% | 2.5% | 3.0% | 0.7% | 0.8% | 1.0% | 0.8% | 0.5% | 0.5% | 0.5% |
| Tonnes Transported (Millions) | 192.59 | 170.16 | 172.29 | 176.27 | 181.10 | 182.47 | 183.94 | 185.86 | 187.46 | 188.40 | 189.35 | 190.31 |

Actual **Projected**

| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
|---|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Tonne Kilometres by Commodity (Millions Tonne Kilometres) | | | | | | | | | | | | |
| Average Length of Haul (Km's) | 585 | 607 | 608 | 609 | 611 | 611 | 611 | 610 | 610 | 610 | 610 | 610 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 11.5% | 31.0% | 9.6% | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 42.7% | 54.9% | 9.6% | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.4776 | 0.7398 | 0.8108 | 0.8101 | 0.8097 | 0.8095 | 0.8094 | 0.8093 | 0.8091 | 0.8091 | 0.8090 | 0.8090 |
| % collected in cash | 50.1% | 40.6% | 49.7% | 62.4% | 72.9% | 77.4% | 81.0% | 83.0% | 83.0% | 83.0% | 82.9% | 82.9% |
| % collected in barter | 41.1% | 52.6% | 46.0% | 35.2% | 25.3% | 20.8% | 17.3% | 15.2% | 15.2% | 15.3% | 15.3% | 15.3% |
| <i>Barter conversion cost</i> | 0.0% | 6.1% | 5.0% | 4.4% | 2.7% | 2.3% | 2.4% | 2.5% | 2.5% | 2.5% | 2.4% | 2.4% |
| % bad debt | 8.7% | 6.8% | 4.3% | 2.4% | 1.9% | 1.8% | 1.8% | 1.8% | 1.8% | 1.8% | 1.7% | 1.7% |
| Cash (000,000) | 26,981 | 31,012 | 42,210 | 54,280 | 65,268 | 69,861 | 73,640 | 76,234 | 76,826 | 77,150 | 77,477 | 77,806 |
| Barter (000,000) | 22,144 | 40,176 | 39,103 | 30,669 | 22,655 | 18,791 | 15,687 | 13,950 | 14,090 | 14,194 | 14,298 | 14,404 |
| <i>Barter conversion cost (000,000)</i> | 0 | 2,431 | 1,936 | 1,336 | 611 | 435 | 374 | 342 | 346 | 348 | 350 | 353 |
| Bad debt (000,000) | 4,700 | 5,168 | 3,622 | 2,063 | 1,669 | 1,583 | 1,593 | 1,611 | 1,621 | 1,627 | 1,633 | 1,640 |
| Total revenue (000,000) | 53,824 | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,920 | 91,794 | 92,537 | 92,971 | 93,408 | 93,849 |
| Total revenue collected (000,000) | 49,125 | 71,188 | 81,313 | 84,949 | 87,923 | 88,651 | 89,327 | 90,184 | 90,916 | 91,344 | 91,775 | 92,209 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Coal & Coke

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | -30.3% | 0.8% | 1.0% | 1.0% | 0.7% | 0.8% | 1.0% | 1.0% | 0.8% | 0.8% | 0.8% |
| Tonne-km (000,000) | 41,795 | 29,121 | 29,340 | 29,633 | 29,929 | 30,139 | 30,365 | 30,669 | 30,975 | 31,208 | 31,442 | 31,677 |
| Diesel (25%) | 10,449 | 7,280 | 7,335 | 7,408 | 7,482 | 7,535 | 7,591 | 7,667 | 7,744 | 7,802 | 7,860 | 7,919 |
| Electric (75%) | 31,346 | 21,841 | 22,005 | 22,225 | 22,447 | 22,604 | 22,774 | 23,001 | 23,231 | 23,406 | 23,581 | 23,758 |
| Tonnes (000,000) | 86.00 | 59.92 | 60.37 | 60.98 | 61.59 | 62.02 | 62.48 | 63.11 | 63.74 | 64.22 | 64.70 | 65.18 |
| Ave haul | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 69.2% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 100.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.390 | 0.781 | 0.878 | 0.878 | 0.878 | 0.878 | 0.878 | 0.878 | 0.878 | 0.878 | 0.878 | 0.878 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 20.0% | 15.0% | 21.0% | 32.0% | 38.0% | 43.0% | 48.0% | 48.0% | 48.0% | 48.0% | 48.0% | 48.0% |
| % collected in barter | 75.0% | 80.0% | 75.0% | 65.0% | 60.0% | 55.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |

| | Projected | | | | | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Barter conversion cost | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| % bad debt | 5.0% | 5.0% | 4.0% | 3.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Cash (000,000) | 3,265 | 3,412 | 5,410 | 8,326 | 9,986 | 11,380 | 12,798 | 12,926 | 13,055 | 13,153 | 13,252 | 13,351 |
| Barter (000,000) | 12,244 | 18,200 | 19,322 | 16,913 | 15,768 | 14,555 | 13,331 | 13,465 | 13,599 | 13,701 | 13,804 | 13,907 |
| Barter conversion cost (000,000) | | 364 | 386 | 338 | 315 | 291 | 267 | 269 | 272 | 274 | 276 | 278 |
| Bad debt (000,000) | 816 | 1,137 | 1,030 | 781 | 526 | 529 | 533 | 539 | 544 | 548 | 552 | 556 |
| Total revenue (000,000) | 16,325 | 22,749 | 25,762 | 26,020 | 26,280 | 26,464 | 26,662 | 26,929 | 27,198 | 27,402 | 27,608 | 27,815 |
| Total revenue collected (000,000) | 15,509 | 21,612 | 24,732 | 25,239 | 25,754 | 25,935 | 26,129 | 26,390 | 26,654 | 26,854 | 27,056 | 27,259 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS

Oil

| | Projected | | | | | | | | | | | |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 26.6% | 5.0% | 3.0% | 5.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Tonne-km (000,000) | 15,242 | 19,296 | 20,261 | 20,869 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 | 21,912 |
| Diesel (80%) | 12,194 | 15,437 | 16,209 | 16,695 | 17,530 | 17,530 | 17,530 | 17,530 | 17,530 | 17,530 | 17,530 | 17,530 |
| Tonnes (000,000) | 19.87 | 25.16 | 26.41 | 27.21 | 28.57 | 28.57 | 28.57 | 28.57 | 28.57 | 28.57 | 28.57 | 28.57 |
| Ave haul | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.548 | 0.767 | 0.862 | 0.862 | 0.862 | 0.862 | 0.862 | 0.862 | 0.862 | 0.862 | 0.862 | 0.862 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 22.5% | 19.5% | 26.5% | 48.5% | 68.5% | 79.0% | 89.0% | 99.0% | 99.0% | 99.0% | 99.0% | 99.0% |
| % collected in barter | 70.0% | 75.0% | 70.0% | 50.0% | 30.0% | 20.0% | 10.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |

| | Projected | | | | | | | | | | | |
|--|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| % bad debt | 7.5% | 5.5% | 3.5% | 1.5% | 1.5% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| Cash (000,000) | 1,880 | 2,887 | 4,631 | 8,730 | 12,946 | 14,930 | 16,820 | 18,710 | 18,710 | 18,710 | 18,710 | 18,710 |
| Barter (000,000) | 5,848 | 11,105 | 12,233 | 9,000 | 5,670 | 3,780 | 1,890 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | 117 | 222 | 245 | 180 | 113 | 76 | 38 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 627 | 814 | 612 | 270 | 283 | 189 | 189 | 189 | 189 | 189 | 189 | 189 |
| Total revenue collected (000,000) | 7,728 | 13,992 | 16,863 | 17,729 | 18,616 | 18,710 | 18,710 | 18,710 | 18,710 | 18,710 | 18,710 | 18,710 |

**KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS**

Ore

| | Projected | | | | | | | | | | | |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 0.0% | 0.8% | 1.5% | 1.5% | 0.2% | 0.3% | 0.5% | 0.5% | 0.3% | 0.3% | 0.3% |
| Tonne-km (000,000) | 13,051 | 13,051 | 13,149 | 13,346 | 13,546 | 13,573 | 13,607 | 13,675 | 13,744 | 13,778 | 13,813 | 13,847 |
| Diesel (20%) | 2,610 | 2,610 | 2,630 | 2,669 | 2,709 | 2,715 | 2,721 | 2,735 | 2,749 | 2,756 | 2,763 | 2,769 |
| Electric (80%) | 10,441 | 10,441 | 10,519 | 10,677 | 10,837 | 10,859 | 10,886 | 10,940 | 10,995 | 11,022 | 11,050 | 11,078 |
| Tonnes (000,000) | 23.91 | 23.91 | 24.09 | 24.45 | 24.82 | 24.87 | 24.93 | 25.05 | 25.18 | 25.24 | 25.31 | 25.37 |
| Ave haul | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.433 | 0.606 | 0.681 | 0.681 | 0.681 | 0.681 | 0.681 | 0.681 | 0.681 | 0.681 | 0.681 | 0.681 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 50.0% | 30.0% | 70.0% | 85.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% |
| % collected in barter | 25.0% | 50.0% | 20.0% | 10.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |

| | Actual | Projected | | | | | | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| % bad debt | 25.0% | 20.0% | 10.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| Cash (000,000) | 2,827 | 2,375 | 6,276 | 7,735 | 8,775 | 8,792 | 8,814 | 8,858 | 8,902 | 8,925 | 8,947 | 8,969 |
| Barter (000,000) | 1,414 | 3,958 | 1,793 | 910 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | | 594 | 269 | 136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 1,414 | 1,583 | 897 | 455 | 462 | 463 | 464 | 466 | 469 | 470 | 471 | 472 |
| Total revenue (000,000) | 5,655 | 7,917 | 8,965 | 9,100 | 9,236 | 9,255 | 9,278 | 9,324 | 9,371 | 9,394 | 9,418 | 9,442 |
| Total revenue collected (000,000) | 4,241 | 6,334 | 8,069 | 8,645 | 8,775 | 8,792 | 8,814 | 8,858 | 8,902 | 8,925 | 8,947 | 8,969 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Building Materials

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | -20.0% | -5.0% | 0.0% | 2.0% | 2.0% | 2.5% | 5.0% | 1.0% | 0.3% | 0.3% | 0.3% |
| Tonne-km(000,000) | 5,043 | 4,034 | 3,833 | 3,833 | 3,909 | 3,988 | 4,087 | 4,292 | 4,335 | 4,345 | 4,356 | 4,367 |
| Diesel(75%) | 3,782 | 3,026 | 2,875 | 2,875 | 2,932 | 2,991 | 3,065 | 3,219 | 3,251 | 3,259 | 3,267 | 3,275 |
| Electric(25%) | 1,261 | 1,009 | 958 | 958 | 977 | 997 | 1,022 | 1,073 | 1,084 | 1,086 | 1,089 | 1,092 |
| Tonnes(000,000) | 10.65 | 8.52 | 8.09 | 8.09 | 8.25 | 8.42 | 8.63 | 9.06 | 9.15 | 9.17 | 9.20 | 9.22 |
| Avehaul | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 |
| Revenue per tonne-km | | | | | | | | | | | | |
| %real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.551 | 0.773 | 0.868 | 0.868 | 0.868 | 0.868 | 0.868 | 0.868 | 0.868 | 0.868 | 0.868 | 0.868 |
| Revenue | | | | | | | | | | | | |
| %collected in cash | 10.0% | 20.0% | 40.0% | 60.0% | 75.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% |
| %collected in barter | 50.0% | 50.0% | 40.0% | 30.0% | 20.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% |
| Barter conversion cost | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |
| %bad debt | 40.0% | 30.0% | 20.0% | 10.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |

| | Actual | Projected | | | | | | | | | | |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Cash(000,000) | 278 | 623 | 1,331 | 1,997 | 2,546 | 2,943 | 3,017 | 3,168 | 3,199 | 3,207 | 3,215 | 3,223 |
| Barter(000,000) | 1,391 | 1,558 | 1,331 | 998 | 679 | 346 | 355 | 373 | 376 | 377 | 378 | 379 |
| Barterconversioncost(000,000) | | 234 | 200 | 150 | 102 | 52 | 53 | 56 | 56 | 57 | 57 | 57 |
| Baddebt(000,000) | 1,113 | 935 | 666 | 333 | 170 | 173 | 177 | 186 | 188 | 189 | 189 | 190 |
| Total revenue(000,000) | 2,783 | 3,117 | 3,328 | 3,328 | 3,395 | 3,462 | 3,549 | 3,727 | 3,764 | 3,773 | 3,783 | 3,792 |
| Total revenue collected(000,000) | 1,670 | 2,182 | 2,662 | 2,995 | 3,225 | 3,289 | 3,372 | 3,540 | 3,576 | 3,585 | 3,593 | 3,602 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Grain

| | Actual | | | | | | | Projected | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--|--|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> | | |
| Tonne-km | | | | | | | | | | | | | | |
| Change from prior year | | 0.0% | 0.3% | 0.5% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | |
| Tonne-km (000,000) | 7,856 | 7,856 | 7,876 | 7,915 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | | |
| Diesel (75%) | 5,892 | 5,892 | 5,907 | 5,936 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | | |
| Electric (25%) | 1,964 | 1,964 | 1,969 | 1,979 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | | |
| Tonnes (000,000) | 9.82 | 9.82 | 9.84 | 9.89 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | | |
| Ave haul | 800.271 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | 800.27 | | |
| Revenue per tonne-km | | | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | |
| Revenue per tonne-km | 0.556 | 0.779 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | 0.875 | | |
| Revenue | | | | | | | | | | | | | | |
| % collected in cash | 65.0% | 20.0% | 45.0% | 67.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | | |
| % collected in barter | 20.0% | 70.0% | 50.0% | 30.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | |
| Barter conversion cost | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | | |
| % bad debt | 15.0% | 10.0% | 5.0% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | | |

| | Projected | | | | | | | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Cash (000,000) | 2,841 | 1,224 | 3,103 | 4,678 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 |
| Barter (000,000) | 874 | 4,284 | 3,448 | 2,079 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | 175 | 857 | 690 | 416 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 656 | 612 | 345 | 173 | 174 | 174 | 174 | 174 | 174 | 174 | 174 | 174 |
| Total revenue (000,000) | 4,371 | 6,120 | 6,896 | 6,930 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 |
| Total revenue collected (000,000) | 3,716 | 5,508 | 6,551 | 6,757 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 |

**KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS**

Other

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 2.7% | 1.5% | 5.0% | 5.0% | 1.5% | 1.5% | 1.5% | 1.5% | 0.8% | 0.8% | 0.8% |
| Tonne-km (000,000) | 5,416 | 5,560 | 5,643 | 5,926 | 6,222 | 6,315 | 6,410 | 6,506 | 6,604 | 6,653 | 6,703 | 6,753 |
| Diesel (75%) | 4,062 | 4,170 | 4,233 | 4,444 | 4,666 | 4,736 | 4,807 | 4,880 | 4,953 | 4,990 | 5,027 | 5,065 |
| Electric (25%) | 1,354 | 1,390 | 1,411 | 1,481 | 1,555 | 1,579 | 1,602 | 1,627 | 1,651 | 1,663 | 1,676 | 1,688 |
| Tonnes (000,000) | 18.84 | 19.34 | 19.63 | 20.61 | 21.64 | 21.97 | 22.30 | 22.63 | 22.97 | 23.14 | 23.32 | 23.49 |
| Ave. haul | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 46.2% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 87.1% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.5500 | 0.7700 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 85.0% | 73.0% | 78.5% | 84.0% | 89.0% | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% |
| % collected in barter | 12.5% | 25.0% | 20.0% | 15.0% | 10.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Barter conversion cost | 20.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |

| | Projected | | | | | | | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| % bad debt | 2.5% | 2.0% | 1.5% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| Cash (000,000) | 2,532 | 3,125 | 3,834 | 4,308 | 4,793 | 5,302 | 5,381 | 5,462 | 5,544 | 5,586 | 5,627 | 5,670 |
| Barter (000,000) | 372 | 1,070 | 977 | 769 | 538 | 109 | 111 | 113 | 114 | 115 | 116 | 117 |
| Barter conversion cost (000,000) | 74 | 161 | 147 | 115 | 81 | 16 | 17 | 17 | 17 | 17 | 17 | 18 |
| Bad debt (000,000) | 74 | 86 | 73 | 51 | 54 | 55 | 55 | 56 | 57 | 58 | 58 | 58 |
| Total revenue (000,000) | 2,979 | 4,281 | 4,884 | 5,129 | 5,385 | 5,466 | 5,548 | 5,631 | 5,715 | 5,758 | 5,801 | 5,845 |
| Total revenue collected (000,000) | 2,904 | 4,196 | 4,811 | 5,077 | 5,331 | 5,411 | 5,492 | 5,575 | 5,658 | 5,701 | 5,743 | 5,787 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Transit Traffic

| | Projected | | | | | | | | | | | |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 0.0% | 1.5% | 5.0% | 5.0% | 1.5% | 1.5% | 1.5% | 1.5% | 0.8% | 0.8% | 0.8% |
| Tonne-km (000,000) | 24,286 | 24,286 | 24,650 | 25,883 | 27,177 | 27,585 | 27,998 | 28,418 | 28,845 | 29,061 | 29,279 | 29,499 |
| Diesel (75%) | 18,215 | 18,215 | 18,488 | 19,412 | 20,383 | 20,688 | 20,999 | 21,314 | 21,633 | 21,796 | 21,959 | 22,124 |
| Electric (25%) | 6,072 | 6,072 | 6,163 | 6,471 | 6,794 | 6,896 | 7,000 | 7,105 | 7,211 | 7,265 | 7,320 | 7,375 |
| Tonnes (000,000) | 23.50 | 23.50 | 23.85 | 25.05 | 26.30 | 26.69 | 27.09 | 27.50 | 27.91 | 28.12 | 28.33 | 28.54 |
| Ave, haul | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 46.2% | 10.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 87.1% | 30.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.55 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| % collected in barter | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

| | Projected | | | | | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| % bad debt | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Cash (000,000) | 13,357 | 17,364 | 17,625 | 18,506 | 19,432 | 19,723 | 20,019 | 20,319 | 20,624 | 20,779 | 20,934 | 21,091 |
| Barter (000,000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total revenue (000,000) | 13,357 | 17,364 | 17,625 | 18,506 | 19,432 | 19,723 | 20,019 | 20,319 | 20,624 | 20,779 | 20,934 | 21,091 |
| Total revenue collected (000,000) | 13,357 | 17,364 | 17,625 | 18,506 | 19,432 | 19,723 | 20,019 | 20,319 | 20,624 | 20,779 | 20,934 | 21,091 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
RAILWAY TOTAL

| | Actual | Projected | | | | | | | | | | | | | | | |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|--|--|--|
| | | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | | | | |
| Passenger-km (000,000) | | | | | | | | | | | | | | | | | |
| Regional | 8,838 | 7,777 | 7,840 | 8,028 | 8,277 | 8,277 | 8,277 | 8,343 | 8,385 | 8,427 | 8,469 | 8,511 | 8,554 | | | | |
| International | 4,926 | 4,335 | 4,370 | 4,474 | 4,613 | 4,613 | 4,650 | 4,673 | 4,697 | 4,720 | 4,744 | 4,767 | 4,767 | | | | |
| Commuter | 435 | 383 | 386 | 395 | 407 | 407 | 411 | 413 | 415 | 417 | 419 | 419 | 421 | | | | |
| Total | 14,199 | 12,495 | 12,595 | 12,897 | 13,297 | 13,297 | 13,404 | 13,471 | 13,538 | 13,606 | 13,674 | 13,674 | 13,742 | | | | |
| Change from prior year | | -12.0% | 0.8% | 2.4% | 3.1% | 0.0% | 0.8% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% | | | | |
| Revenue per passenger-km | | | | | | | | | | | | | | | | | |
| % real change from prior year | | -3.9% | 6.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | | | |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | | | |
| Nominal % change from prior year | | 13.6% | 6.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | | | | |
| Revenue per passenger-km | 0.572 | 0.650 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | 0.694 | | | | |
| Revenue (000,000) | | | | | | | | | | | | | | | | | |
| Regional | 5,061 | 5,098 | 5,668 | 5,804 | 5,984 | 5,984 | 6,032 | 6,062 | 6,093 | 6,123 | 6,154 | 6,184 | | | | | |
| International | 2,821 | 2,794 | 2,817 | 2,884 | 2,974 | 2,974 | 2,997 | 3,012 | 3,027 | 3,043 | 3,058 | 3,073 | | | | | |
| Commuter | 249 | 234 | 261 | 267 | 275 | 275 | 277 | 279 | 280 | 282 | 283 | 284 | | | | | |
| Passenger service subsidies | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |

| | Actual | Projected | | | | | | | | | | |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Total | 8,130 | 8,127 | 8,746 | 8,955 | 9,233 | 9,233 | 9,307 | 9,353 | 9,400 | 9,447 | 9,494 | 9,542 |
| Change from prior year | | | | | | | | | | | | |
| Luggage revenue (000,000) | 197 | 199 | 221 | 226 | 233 | 233 | 235 | 236 | 238 | 239 | 240 | 241 |
| Mail revenue (000,000) | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Total Revenue | 8,339 | 8,338 | 8,979 | 9,194 | 9,478 | 9,478 | 9,554 | 9,602 | 9,650 | 9,698 | 9,746 | 9,795 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
REGIONAL SERVICES

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km | | | | | | | | | | | | |
| Change from prior year | 0.0% | -12.0% | 0.8% | 2.4% | 3.1% | 0.0% | 0.8% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% |
| Pass-km (000,000) | 8,838 | 7,777 | 7,840 | 8,028 | 8,277 | 8,277 | 8,343 | 8,385 | 8,427 | 8,469 | 8,511 | 8,554 |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | -11.9% | -3.1% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 12.7% | 14.5% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.572 | 0.655 | 0.723 | 0.723 | 0.723 | 0.723 | 0.723 | 0.723 | 0.723 | 0.723 | 0.723 | 0.723 |
| Revenue | 5,061 | 5,098 | 5,668 | 5,804 | 5,984 | 5,984 | 6,032 | 6,062 | 6,093 | 6,123 | 6,154 | 6,184 |

KAZAKHSTAN RAILWAYS

OPTIMISTIC SCENARIO

PASSENGER TRAFFIC & REVENUE FORECASTS

INTERNATIONAL SERVICES

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km | | | | | | | | | | | | |
| Change from prior year | 0.0% | -12.0% | 0.8% | 2.4% | 3.1% | 0.0% | 0.8% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% |
| Pass-km (000,000) | 4,926 | 4,335 | 4,370 | 4,474 | 4,613 | 4,613 | 4,650 | 4,673 | 4,697 | 4,720 | 4,744 | 4,767 |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | -11.9% | -4.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 12.7% | 12.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.5726 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 |
| Revenue | 2,821 | 2,794 | 2,817 | 2,884 | 2,974 | 2,974 | 2,997 | 3,012 | 3,027 | 3,043 | 3,058 | 3,073 |

KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
COMMUTER SERVICES

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km | | | | | | | | | | | | |
| Change from prior year | 0.0% | -12.0% | 0.8% | 2.4% | 3.1% | 0.0% | 0.8% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% |
| Pass-km (000,000) | 435 | 383 | 386 | 395 | 407 | 407 | 411 | 413 | 415 | 417 | 419 | 421 |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | -11.9% | -9.5% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 12.7% | 7.0% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.572 | 0.612 | 0.675 | 0.675 | 0.675 | 0.675 | 0.675 | 0.675 | 0.675 | 0.675 | 0.675 | 0.675 |
| Revenue | 249 | 234 | 261 | 267 | 275 | 275 | 277 | 279 | 280 | 282 | 283 | 284 |

**KAZAKHSTAN RAILWAYS
OPTIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
LUGGAGE & MAIL**

| | Projected | | | | | | | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Luggage | | | | | | | | | | | | |
| Percent of regional services revenue | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% |
| Revenue | 197 | 199 | 221 | 226 | 233 | 233 | 235 | 236 | 238 | 239 | 240 | 241 |
| Mail | | | | | | | | | | | | |
| % real change from prior year | | | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | | | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |

**KAZAKHSTAN
RAILWAYS**

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
OPERATING STATISTICS**

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|--|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Key Assumptions | | | | | | | | | | | | |
| Inflation rate [relates current to previous year's expenses] | | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Key Operating Statistics | | | | | | | | | | | | |
| Freight tonnes (000) | 192,586 | 170,164 | 172,292 | 176,273 | 181,104 | 182,468 | 183,471 | 181,291 | 181,645 | 181,505 | 181,373 | 181,251 |
| Freight tkm (000,000) | 112,689 | 103,205 | 104,752 | 107,405 | 110,651 | 111,467 | 112,109 | 110,405 | 110,742 | 110,757 | 110,778 | 110,804 |
| Ave. length of haul | 585 | 607 | 608 | 609 | 611 | 611 | 611 | 609 | 610 | 610 | 611 | 611 |
| Passenger km (000,000) | 14,199 | 12,495 | 11,500 | 10,500 | 9,500 | 8,500 | 8,075 | 7,671 | 7,288 | 6,923 | 6,578 | 6,248 |
| Locomotive km (000) | 168,109 | 161,187 | 150,572 | 139,638 | 132,522 | 126,377 | 120,940 | 119,645 | 119,934 | 119,983 | 120,036 | 120,093 |
| Train km (000) | 134,179 | 128,915 | 120,440 | 113,284 | 109,796 | 106,894 | 104,317 | 103,288 | 103,520 | 103,562 | 103,606 | 103,653 |
| Wagon km (000,000) | 4,611 | 4,195 | 4,245 | 4,344 | 4,469 | 4,503 | 4,531 | 4,469 | 4,482 | 4,481 | 4,481 | 4,482 |
| Employment - core activity | 146,143 | 135,275 | 110,738 | 95,357 | 85,123 | 77,928 | 72,670 | 69,108 | 67,296 | 66,061 | 65,430 | 65,094 |
| Percentage change | | -7.4% | -18.1% | -13.9% | -10.7% | -8.5% | -6.7% | -4.9% | -2.6% | -1.8% | -1.0% | -0.5% |

KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
CASH FLOW STATEMENT 1997 - 2007
(All Data is in Millions of Tenge)

| | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| RECEIPTS | | | | | | | | | | | |
| Freight Business | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,722 | 89,174 | 89,386 | 89,357 | 89,332 | 89,311 |
| Demurrage & Wagon Hire | 2,251 | 2,285 | 2,343 | 2,413 | 2,431 | 2,445 | 2,408 | 2,415 | 2,416 | 2,416 | 2,417 |
| Passenger Business | 8,338 | 8,236 | 7,539 | 6,841 | 6,143 | 5,827 | 5,525 | 5,249 | 4,986 | 4,738 | 4,500 |
| Other Transport Revenue | 786 | 746 | 694 | 642 | 538 | 466 | 466 | 466 | 466 | 466 | 466 |
| Auxiliary Activities Income | 2,370 | 2,370 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sales of Non Transport Goods & Services | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |
| Gains or Loss Foreign Currency Transactions | 3,447 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Income | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| Operating Subsidy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decrease in Accounts Receivable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Capital Grant - Repayment of Loans | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Grants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loans received - Japanese | 4,567 | 2,964 | 1,979 | 2,055 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loans received - German | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loans received - EBRD | 0 | 728 | 3,638 | 1,346 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 98,335 | 102,451 | 103,391 | 103,078 | 99,534 | 99,647 | 97,760 | 97,703 | 97,411 | 97,139 | 96,881 |
| PAYMENTS | | | | | | | | | | | |
| Operating Expenses | 79,553 | 75,042 | 69,611 | 67,914 | 66,790 | 65,410 | 63,934 | 63,157 | 62,610 | 62,207 | 61,865 |
| Increase in Inventory | 1,000 | 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Increase in Accounts Receivable | 3,000 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Decrease in Accounts Payable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Repayment Short Term Loans | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Capital Investment | 4,601 | 3,691 | 5,617 | 3,401 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interest - Loans | 235 | 379 | 703 | 848 | 833 | 764 | 701 | 620 | 539 | 458 | 375 |
| Loan Repayments - Japanese | 0 | 0 | 0 | 0 | 0 | 389 | 778 | 778 | 778 | 778 | 778 |
| Loan Repayments - German | 27 | 27 | 27 | 27 | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loan Repayments - EBRD | 0 | 0 | 0 | 0 | 650 | 698 | 751 | 808 | 868 | 933 | 1,003 |
| Interest - Bank Borrowings | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Profit Tax Paid | 2,886 | 4,244 | 4,427 | 3,980 | 3,201 | 3,295 | 3,450 | 3,709 | 3,847 | 3,892 | 3,932 |
| Total | 91,316 | 84,385 | 80,886 | 76,670 | 71,998 | 71,057 | 70,014 | 69,571 | 69,143 | 68,768 | 68,453 |
| Cash Increase / (Decrease) | 7,018 | 18,066 | 22,505 | 26,406 | 27,538 | 28,590 | 27,746 | 28,132 | 28,269 | 28,371 | 28,428 |
| Balance Previous Year | 841 | 7,859 | 25,925 | 48,430 | 74,838 | 102,374 | 130,964 | 158,710 | 186,841 | 215,110 | 243,481 |
| Cash at Year End | 7,859 | 25,925 | 48,430 | 74,836 | 102,374 | 130,964 | 158,710 | 186,841 | 215,110 | 243,481 | 271,909 |
| Annual Interest Rate | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Debt Service Coverage (Times) (Available Cash/Interest Payments) | 30.4 | 56.2 | 59.0 | 59.6 | 62.4 | 67.0 | 66.2 | 71.5 | 76.9 | 82.6 | 89.5 |

KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
BALANCE SHEET 1996 - 2007
(All Data is in Millions of Tenge)

| | Estimated 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Fixed Assets | | | | | | | | | | | | |
| Gross Fixed Assets & Capital WIP | 208,526 | 213,127 | 216,819 | 222,436 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 | 225,836 |
| Less: Historical Cost Depreciation | 78,469 | 84,725 | 91,119 | 97,823 | 104,296 | 111,071 | 117,846 | 124,621 | 131,397 | 138,172 | 144,947 | 151,722 |
| Net Fixed Assets | 130,057 | 128,403 | 125,700 | 124,812 | 121,540 | 114,765 | 107,990 | 101,215 | 94,440 | 87,665 | 80,889 | 74,114 |
| Financial Long Term Assets | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 | 242 |
| Total Fixed Assets | 130,299 | 128,645 | 125,942 | 125,054 | 121,782 | 115,007 | 108,232 | 101,457 | 94,682 | 87,907 | 81,131 | 74,356 |
| Current Assets | | | | | | | | | | | | |
| Cash | 841 | 7,859 | 25,925 | 48,430 | 74,836 | 102,374 | 130,964 | 158,710 | 186,841 | 215,110 | 243,481 | 271,909 |
| Accounts Receivable | 30,043 | 33,043 | 33,543 | 34,043 | 34,543 | 35,043 | 35,543 | 36,043 | 36,543 | 37,043 | 37,543 | 38,043 |
| Inventory | 14,829 | 15,829 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 | 16,329 |
| Total Current Assets | 45,713 | 56,731 | 75,797 | 98,802 | 125,708 | 153,746 | 182,836 | 211,082 | 239,713 | 268,482 | 297,353 | 326,281 |
| Current Liabilities | | | | | | | | | | | | |
| Accounts Payable & Accruals | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 | 36,669 |
| Bank Borrowings | - | - | - | - | - | - | - | - | - | - | - | - |
| Short Term Loans | 13 | - | - | - | - | - | - | - | - | - | - | - |
| Tax payable | 6,044 | 6,415 | 6,744 | 6,695 | 6,562 | 6,347 | 6,450 | 6,467 | 6,548 | 6,567 | 6,575 | 6,586 |
| Total Current Liabilities | 42,726 | 43,084 | 43,413 | 43,364 | 43,231 | 43,016 | 43,119 | 43,136 | 43,217 | 43,236 | 43,244 | 43,255 |
| Net Current Assets / (Liabilities) | 2,987 | 13,647 | 32,384 | 55,438 | 82,477 | 110,730 | 139,717 | 167,945 | 196,496 | 225,246 | 254,109 | 283,026 |
| Long Term Loans | 297 | 4,871 | 8,535 | 14,124 | 17,498 | 16,827 | 15,740 | 14,211 | 12,625 | 10,979 | 9,268 | 7,487 |
| Net Assets | 132,989 | 137,421 | 149,791 | 166,368 | 186,761 | 208,909 | 232,209 | 255,191 | 278,553 | 302,173 | 325,972 | 349,895 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
BALANCE SHEET 1996 - 2007
(All Data is in Millions of Tenge)**

| | Estimated 1996 Millions | Forecast 1997 Millions | Forecast 1998 Millions | Forecast 1999 Millions | Forecast 2000 Millions | Forecast 2001 Millions | Forecast 2002 Millions | Forecast 2003 Millions | Forecast 2004 Millions | Forecast 2005 Millions | Forecast 2006 Millions | Forecast 2007 Millions |
|---------------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Capital & Reserves | | | | | | | | | | | | |
| Share Capital | 671 | 671 | 671 | 671 | 671 | 671 | 671 | 671 | 671 | 671 | 671 | 671 |
| Reserves & Special Funds | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 | 139,966 |
| Replacement Cost Depreciation Reserve | 0.0 | 5,744 | 14,350 | 25,846 | 41,673 | 61,148 | 80,781 | 99,870 | 118,543 | 137,224 | 155,929 | 174,576 |
| Grants | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Profit Retained - Year | 0 | -1,312 | 3,764 | 5,082 | 4,566 | 2,674 | 3,666 | 3,893 | 4,689 | 4,939 | 5,094 | 5,276 |
| Profit Retained - Previous | -7,648 | -7,648 | -8,960 | -5,196 | -114 | 4,451 | 7,125 | 10,791 | 14,684 | 19,373 | 24,312 | 29,406 |
| Total Capital & Reserves | 132,989 | 137,421 | 149,791 | 166,368 | 186,761 | 208,909 | 232,209 | 255,191 | 278,553 | 302,173 | 325,972 | 349,895 |
| | 0.00000 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Current Assets / Current Liabilities | 107.0% | 131.7% | 174.6% | 227.8% | 290.8% | 357.4% | 424.0% | 489.3% | 554.7% | 621.0% | 687.6% | 754.3% |
| Quick Assets / Current Liabilities | 72.3% | 94.9% | 137.0% | 190.2% | 253.0% | 319.5% | 386.2% | 451.5% | 516.9% | 583.2% | 649.8% | 716.6% |
| Long Term Debt / Equity Ratio | 0.2% | 3.5% | 5.7% | 8.5% | 9.4% | 8.1% | 6.8% | 5.6% | 4.5% | 3.6% | 2.8% | 2.1% |
| Profit Before Tax / Net Fixed Assets | -0.9% | 1.5% | 6.6% | 7.6% | 6.9% | 4.9% | 6.5% | 7.3% | 9.0% | 10.0% | 11.1% | 12.4% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)
PESSIMISTIC SCENARIO

| Summary by Expense Type | Projected | | | | | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Salary | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Social Insurance | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 |
| Materials | 10,535 | 12,259 | 12,069 | 12,106 | 12,754 | 13,671 | 13,577 | 13,470 | 13,417 | 13,405 | 13,399 | 13,387 |
| Fuel | 5,795 | 6,693 | 6,618 | 6,368 | 6,118 | 5,604 | 5,164 | 4,692 | 4,350 | 4,043 | 3,770 | 3,525 |
| Power | 4,796 | 5,030 | 4,915 | 4,868 | 4,857 | 4,821 | 4,797 | 4,739 | 4,716 | 4,695 | 4,678 | 4,662 |
| Depreciation | 4,981 | 15,849 | 37,042 | 32,790 | 28,045 | 27,416 | 26,408 | 25,864 | 25,448 | 25,456 | 25,480 | 25,422 |
| Other | 8,792 | 10,165 | 9,828 | 9,473 | 9,172 | 8,927 | 8,878 | 8,789 | 8,714 | 8,700 | 8,693 | 8,682 |
| Total | 52,970 | 69,125 | 87,078 | 80,543 | 74,739 | 73,257 | 70,737 | 68,896 | 67,705 | 67,159 | 66,778 | 66,379 |
| Change from prior year | | 30.5% | 26.0% | -7.5% | -7.2% | -2.0% | -3.4% | -2.6% | -1.7% | -0.8% | -0.6% | -0.6% |
| Summary by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 3,722 | 4,012 | 3,803 | 3,634 | 3,534 | 3,460 | 3,434 | 3,421 | 3,421 | 3,420 | 3,419 | 3,418 |
| Locomotive | 18,524 | 20,069 | 40,704 | 35,821 | 30,608 | 29,453 | 27,666 | 26,325 | 25,469 | 25,137 | 24,851 | 24,473 |
| Wagons | 10,348 | 12,918 | 12,611 | 12,514 | 12,973 | 13,505 | 13,357 | 13,193 | 13,130 | 13,114 | 13,114 | 13,114 |
| Track | 11,657 | 22,746 | 22,415 | 22,111 | 21,831 | 21,519 | 21,237 | 21,111 | 20,990 | 20,876 | 20,818 | 20,818 |
| Civil construction | 919 | 1,081 | 666 | 415 | 260 | 164 | 104 | 66 | 42 | 27 | 18 | 11 |
| Signalling & Communications | 2,497 | 2,841 | 2,016 | 1,569 | 1,307 | 1,138 | 1,027 | 950 | 891 | 843 | 820 | 808 |
| Electrification & power supply | 1,379 | 1,601 | 1,112 | 829 | 665 | 568 | 511 | 476 | 453 | 444 | 441 | 439 |
| Divisions Management | 3,924 | 3,858 | 3,750 | 3,651 | 3,561 | 3,451 | 3,401 | 3,353 | 3,308 | 3,299 | 3,299 | 3,299 |
| Total | 52,970 | 69,125 | 87,078 | 80,543 | 74,739 | 73,257 | 70,737 | 68,896 | 67,705 | 67,159 | 66,778 | 66,379 |
| Change from prior year | | 30.5% | 26.0% | -7.5% | -7.2% | -2.0% | -3.4% | -2.6% | -1.7% | -0.8% | -0.6% | -0.6% |
| Salary by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 1,855 | 1,974 | 1,812 | 1,678 | 1,594 | 1,537 | 1,517 | 1,513 | 1,513 | 1,513 | 1,513 | 1,513 |
| Locomotive | 3,586 | 3,632 | 3,184 | 2,805 | 2,563 | 2,340 | 2,172 | 2,020 | 1,995 | 1,971 | 1,948 | 1,910 |
| Wagons & Coaches | 2,357 | 2,647 | 2,430 | 2,354 | 2,281 | 2,167 | 2,059 | 1,956 | 1,910 | 1,899 | 1,899 | 1,899 |
| Track | 2,630 | 3,109 | 2,854 | 2,620 | 2,405 | 2,165 | 1,948 | 1,851 | 1,758 | 1,670 | 1,625 | 1,625 |
| Civil construction | 169 | 199 | 102 | 52 | 26 | 13 | 7 | 3 | 2 | 1 | 0 | 0 |
| Signalling & Communications | 1,228 | 1,401 | 874 | 564 | 409 | 314 | 255 | 216 | 187 | 165 | 155 | 150 |
| Electrification & power supply | 407 | 469 | 274 | 173 | 121 | 91 | 75 | 65 | 59 | 57 | 56 | 56 |
| Divisions Management | 1,484 | 1,274 | 1,218 | 1,167 | 1,122 | 1,059 | 1,032 | 1,005 | 980 | 975 | 975 | 975 |
| Total | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Change from prior year | | 7.2% | -13.5% | -10.3% | -7.8% | -7.9% | -6.4% | -4.8% | -2.6% | -1.8% | -1.0% | -0.5% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)
PESSIMISTIC SCENARIO

| Employment by Operating Unit | Actual | | | | | | | | | | Projected | | | | | | | | | | | | | |
|---|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Employment by Operating Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 23,547 | 21,192 | 19,073 | 17,312 | 16,127 | 15,555 | 15,350 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 | 15,310 |
| Locomotive | 32,883 | 28,181 | 24,220 | 20,925 | 18,744 | 17,116 | 15,884 | 14,769 | 14,585 | 14,411 | 14,245 | 13,985 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 | 14,245 |
| Wagons & Coaches | 27,142 | 25,785 | 23,206 | 22,046 | 20,944 | 19,897 | 18,902 | 17,957 | 17,534 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 | 17,430 |
| Track | 26,385 | 26,385 | 23,747 | 21,372 | 19,235 | 17,311 | 15,580 | 14,801 | 14,061 | 13,358 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 | 13,000 |
| Civil construction | 12,518 | 12,518 | 6,259 | 3,130 | 1,565 | 782 | 391 | 196 | 98 | 49 | 24 | 12 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Signalling & Communications | 11,190 | 10,803 | 6,402 | 4,180 | 2,970 | 2,278 | 1,852 | 1,568 | 1,362 | 1,201 | 1,127 | 1,088 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,127 | 1,088 |
| Electrification & power supply | 5,411 | 5,276 | 3,020 | 1,873 | 1,281 | 968 | 795 | 693 | 627 | 602 | 594 | 589 | 594 | 594 | 594 | 594 | 594 | 594 | 594 | 594 | 594 | 594 | 594 | 589 |
| Divisions Management | 7,087 | 5,134 | 4,811 | 4,520 | 4,258 | 4,022 | 3,916 | 3,815 | 3,719 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 | 3,700 |
| Total | 146,143 | 135,275 | 110,738 | 95,357 | 85,123 | 77,928 | 72,670 | 69,108 | 67,296 | 66,061 | 65,430 | 65,094 | 65,430 | 65,430 | 65,430 | 65,430 | 65,430 | 65,430 | 65,430 | 65,430 | 65,430 | 65,430 | 65,094 | |
| Change from prior year | | -7.4% | -18.1% | -13.9% | -10.7% | -8.5% | -6.7% | -4.9% | -2.6% | -1.8% | -1.0% | -0.5% | -1.0% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.5% |
| Social Insurance by Operating Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 611 | 592 | 544 | 503 | 478 | 461 | 455 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 | 454 |
| Locomotive | 1,152 | 1,090 | 955 | 842 | 769 | 702 | 652 | 606 | 598 | 591 | 584 | 570 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 570 |
| Wagons & Coaches | 844 | 933 | 856 | 786 | 722 | 649 | 584 | 555 | 527 | 501 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 | 488 |
| Civil construction | 55 | 60 | 30 | 16 | 8 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Signalling & Communications | 399 | 420 | 254 | 169 | 123 | 94 | 76 | 65 | 56 | 50 | 47 | 45 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 45 | |
| Electrification & power supply | 128 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 |
| Divisions Management | 441 | 382 | 365 | 350 | 336 | 318 | 309 | 301 | 294 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 | 292 |
| Total | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 | 2,587 | 2,587 | 2,587 | 2,587 | 2,587 | 2,587 | 2,587 | 2,587 | 2,587 | 2,587 | 2,573 | |
| Change from prior year | | 1.6% | -12.1% | -9.3% | -7.2% | -7.4% | -6.0% | -4.5% | -2.4% | -1.7% | -0.9% | -0.5% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.9% | -0.5% |
| Materials by Operation Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 206 | 238 | 238 | 239 | 240 | 240 | 240 | 239 | 239 | 239 | 239 | 238 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 238 |
| Locomotive | 2,424 | 2,768 | 2,744 | 2,879 | 3,032 | 3,304 | 3,235 | 3,167 | 3,127 | 3,126 | 3,125 | 3,117 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,117 | |
| Wagons & Coaches | 1,876 | 2,150 | 2,158 | 2,175 | 2,744 | 3,439 | 3,446 | 3,430 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | 3,434 | |
| Track | 5,244 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | 6,199 | |
| Civil construction | 178 | 210 | 137 | 89 | 58 | 38 | 24 | 16 | 10 | 7 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | |
| Signalling & Communications | 197 | 231 | 207 | 189 | 176 | 166 | 158 | 152 | 147 | 142 | 140 | 139 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 139 | |
| Electrification & power supply | 213 | 248 | 173 | 127 | 99 | 82 | 72 | 65 | 61 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | |
| Divisions Management | 196 | 216 | 213 | 209 | 206 | 203 | 202 | 201 | 200 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | |
| Total | 10,535 | 12,259 | 12,069 | 12,106 | 12,754 | 13,671 | 13,577 | 13,470 | 13,417 | 13,405 | 13,399 | 13,387 | 13,399 | 13,399 | 13,399 | 13,399 | 13,399 | 13,399 | 13,399 | 13,399 | 13,399 | 13,387 | | |
| Change from prior year | | 16.4% | -1.6% | 0.3% | 5.4% | 7.2% | -0.7% | -0.8% | -0.4% | -0.1% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)
PESSIMISTIC SCENARIO

| | Projected | | | | | | | | | | | |
|---|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Fuel by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 85 | 99 | 99 | 99 | 100 | 100 | 100 | 99 | 99 | 99 | 99 | 99 |
| Locomotive | 4,866 | 5,639 | 5,652 | 5,454 | 5,242 | 4,757 | 4,339 | 3,885 | 3,553 | 3,251 | 2,979 | 2,735 |
| Wagons & Coaches | 343 | 393 | 370 | 359 | 348 | 337 | 327 | 317 | 313 | 312 | 312 | 312 |
| Track | 225 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 |
| Civil construction | 109 | 129 | 84 | 55 | 35 | 23 | 15 | 10 | 6 | 4 | 3 | 2 |
| Signalling & Communications | 34 | 40 | 35 | 32 | 30 | 28 | 27 | 26 | 25 | 24 | 24 | 24 |
| Electrification & power supply | 38 | 44 | 31 | 23 | 18 | 15 | 13 | 12 | 11 | 11 | 10 | 10 |
| Divisions Management | 76 | 84 | 82 | 81 | 80 | 79 | 78 | 78 | 77 | 77 | 77 | 77 |
| Total | 5,795 | 6,693 | 6,618 | 6,368 | 6,118 | 5,604 | 5,164 | 4,692 | 4,350 | 4,043 | 3,770 | 3,525 |
| Change from prior year | | 15.5% | -1.1% | -3.8% | -3.9% | -8.4% | -7.9% | -9.1% | -7.3% | -7.1% | -6.8% | -6.5% |
| Power Supply by Operation Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 344 | 403 | 403 | 403 | 404 | 404 | 404 | 404 | 404 | 403 | 403 | 403 |
| Locomotive | 3,636 | 3,685 | 3,698 | 3,735 | 3,780 | 3,783 | 3,785 | 3,748 | 3,738 | 3,724 | 3,710 | 3,697 |
| Wagons & Coaches | 145 | 167 | 157 | 152 | 147 | 143 | 139 | 135 | 133 | 132 | 132 | 132 |
| Track | 83 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| Civil construction | 32 | 38 | 25 | 16 | 11 | 7 | 4 | 3 | 2 | 1 | 1 | 1 |
| Signalling & Communications | 198 | 233 | 209 | 191 | 177 | 167 | 159 | 153 | 148 | 143 | 141 | 140 |
| Electrification & power supply | 231 | 269 | 188 | 138 | 108 | 89 | 78 | 71 | 66 | 64 | 64 | 64 |
| Divisions Management | 128 | 139 | 136 | 134 | 132 | 131 | 130 | 129 | 128 | 128 | 128 | 128 |
| Total | 4,796 | 5,030 | 4,915 | 4,868 | 4,857 | 4,821 | 4,797 | 4,739 | 4,716 | 4,695 | 4,678 | 4,662 |
| Change from prior year | | 4.9% | -2.3% | -0.9% | -0.2% | -0.7% | -0.5% | -1.2% | -0.5% | -0.5% | -0.4% | -0.3% |
| Depreciation by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 112 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 |
| Locomotive | 770 | 906 | 22,227 | 18,061 | 13,375 | 12,786 | 11,804 | 11,278 | 10,876 | 10,893 | 10,920 | 10,864 |
| Wagons & Coaches | 2,181 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 | 3,551 |
| Track | 1,038 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 | 10,259 |
| Civil construction | 70 | 83 | 54 | 35 | 23 | 15 | 10 | 6 | 4 | 3 | 2 | 1 |
| Signalling & Communications | 214 | 250 | 225 | 205 | 191 | 179 | 171 | 165 | 159 | 154 | 152 | 151 |
| Electrification & power supply | 191 | 221 | 155 | 114 | 89 | 74 | 64 | 59 | 55 | 53 | 53 | 52 |
| Divisions Management | 405 | 446 | 439 | 432 | 428 | 420 | 417 | 415 | 412 | 412 | 412 | 412 |
| Total | 4,981 | 15,849 | 37,042 | 32,790 | 28,045 | 27,416 | 26,408 | 25,864 | 25,448 | 25,456 | 25,480 | 25,422 |
| Change from prior year | | 218.2% | 133.7% | -11.5% | -14.5% | -2.2% | -3.7% | -2.1% | -1.6% | 0.0% | 0.1% | -0.2% |

KTZ Railroad Operating Expenses Summary (in Million of Tenge)
PESSIMISTIC SCENARIO

| | Projected | | | | | | | | | | | |
|---|----------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Actual 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Other Expenses by Operating Unit | | | | | | | | | | | | |
| Passenger, Freight & Commercial Service | 509 | 575 | 576 | 580 | 586 | 585 | 586 | 581 | 580 | 580 | 579 | 578 |
| Locomotive | 2,070 | 2,349 | 2,244 | 2,044 | 1,848 | 1,781 | 1,679 | 1,621 | 1,581 | 1,582 | 1,583 | 1,577 |
| Wagons & Coaches | 2,722 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 | 3,217 |
| Track | 1,593 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 | 1,883 |
| Civil construction | 305 | 361 | 234 | 152 | 99 | 64 | 42 | 27 | 18 | 11 | 7 | 5 |
| Signalling & Communications | 227 | 265 | 238 | 218 | 202 | 190 | 181 | 174 | 169 | 164 | 161 | 160 |
| Electrification & power supply | 170 | 198 | 138 | 102 | 79 | 66 | 57 | 52 | 49 | 47 | 47 | 47 |
| Divisions Management | 1,196 | 1,317 | 1,296 | 1,276 | 1,258 | 1,241 | 1,232 | 1,224 | 1,217 | 1,215 | 1,215 | 1,215 |
| Total | 8,792 | 10,165 | 9,828 | 9,473 | 9,172 | 9,027 | 8,878 | 8,780 | 8,714 | 8,700 | 8,693 | 8,682 |
| Change from prior year | | 15.6% | -3.3% | -3.6% | -3.2% | -1.6% | -1.7% | -1.1% | -0.8% | -0.2% | -0.1% | -0.1% |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
RAILWAY TOTAL**

| | Projected | | | | | | | | | | | |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Tonne Kilometres by Commodity (Millions Tonne Kilometres) | | | | | | | | | | | | |
| Coal & Coke | 41,795 | 29,121 | 29,340 | 29,633 | 29,929 | 30,139 | 30,139 | 29,837 | 29,539 | 29,244 | 28,951 | 28,662 |
| Oil & Oil Products | 15,242 | 19,286 | 20,261 | 20,869 | 21,912 | 21,912 | 21,912 | 19,721 | 19,721 | 19,721 | 19,721 | 19,721 |
| Ores | 13,051 | 13,051 | 13,149 | 13,346 | 13,546 | 13,573 | 13,607 | 13,675 | 13,744 | 13,778 | 13,813 | 13,847 |
| Building Materials | 5,043 | 4,034 | 3,833 | 3,833 | 3,909 | 3,988 | 4,087 | 4,292 | 4,335 | 4,345 | 4,356 | 4,367 |
| Grain | 7,856 | 7,856 | 7,876 | 7,915 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 |
| Other | 5,416 | 5,560 | 5,643 | 5,926 | 6,222 | 6,315 | 6,410 | 6,506 | 6,604 | 6,653 | 6,703 | 6,753 |
| Transit Traffic | 24,286 | 24,286 | 24,650 | 25,863 | 27,177 | 27,585 | 27,998 | 28,418 | 28,845 | 29,061 | 29,279 | 29,499 |
| Total | 112,689 | 103,205 | 104,752 | 107,405 | 110,651 | 111,467 | 112,109 | 110,405 | 110,742 | 110,757 | 110,778 | 110,804 |
| Diesel | 57,204 | 56,630 | 57,675 | 59,440 | 61,669 | 62,161 | 62,624 | 61,350 | 61,714 | 61,854 | 61,997 | 62,142 |
| Electric | 55,486 | 46,575 | 47,077 | 47,965 | 48,982 | 49,306 | 49,485 | 49,055 | 49,028 | 48,903 | 48,781 | 48,662 |
| Change from prior year | -9.5% | -8.4% | 1.5% | 2.5% | 3.0% | 0.7% | 0.6% | -1.5% | 0.3% | 0.0% | 0.0% | 0.0% |
| Tonnes Transported (Millions) | 192.59 | 170.16 | 172.29 | 176.27 | 181.10 | 182.47 | 183.47 | 181.29 | 181.65 | 181.50 | 181.37 | 181.25 |
| Average Length of Haul (Km's) | 585 | 607 | 608 | 609 | 611 | 611 | 611 | 609 | 610 | 610 | 611 | 611 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 11.5% | 31.0% | 9.6% | -0.1% | -0.1% | 0.0% | 0.0% | -0.2% | -0.1% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 42.7% | 54.9% | 9.6% | -0.1% | -0.1% | 0.0% | 0.0% | -0.2% | -0.1% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.4776 | 0.7398 | 0.8108 | 0.8101 | 0.8097 | 0.8095 | 0.8092 | 0.8077 | 0.8072 | 0.8068 | 0.8064 | 0.8060 |
| % collected in cash | 50.1% | 40.6% | 49.7% | 62.4% | 72.9% | 77.4% | 81.1% | 83.0% | 83.2% | 83.3% | 83.5% | 83.6% |
| % collected in barter | 41.1% | 52.6% | 46.0% | 35.2% | 25.3% | 20.8% | 17.2% | 15.2% | 15.1% | 14.9% | 14.8% | 14.6% |
| Barter conversion cost | 0.0% | 6.1% | 5.0% | 4.4% | 2.7% | 2.3% | 2.4% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% |
| % bad debt | 8.7% | 6.8% | 4.3% | 2.4% | 1.9% | 1.8% | 1.8% | 1.8% | 1.8% | 1.8% | 1.8% | 1.8% |
| Cash (000,000) | 26,981 | 31,012 | 42,210 | 54,280 | 65,268 | 69,861 | 73,545 | 74,012 | 74,349 | 74,451 | 74,556 | 74,664 |
| Barter (000,000) | 22,144 | 40,176 | 39,103 | 30,669 | 22,655 | 18,791 | 15,588 | 13,585 | 13,459 | 13,331 | 13,205 | 13,080 |
| Barter conversion cost (000,000) | 0 | 2,431 | 1,936 | 1,336 | 617 | 435 | 372 | 335 | 333 | 331 | 328 | 326 |
| Bad debt (000,000) | 4,700 | 5,168 | 3,622 | 2,063 | 1,669 | 1,583 | 1,589 | 1,577 | 1,577 | 1,574 | 1,571 | 1,568 |
| Total revenue (000,000) | 53,824 | 76,355 | 84,936 | 87,012 | 89,592 | 90,234 | 90,722 | 89,174 | 89,386 | 89,357 | 89,332 | 89,311 |
| Total revenue collected (000,000) | 49,125 | 71,188 | 81,313 | 84,949 | 87,923 | 88,651 | 89,132 | 87,597 | 87,809 | 87,783 | 87,761 | 87,743 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Coal & Coke**

| | Projected | | | | | | | | | | | |
|-----------------------------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Actual 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | -30.3% | 0.8% | 1.0% | 1.0% | 0.7% | 0.0% | -1.0% | -1.0% | -1.0% | -1.0% | -1.0% |
| Tonne-km (000,000) | 41,795 | 29,121 | 29,340 | 29,633 | 29,929 | 30,139 | 30,139 | 29,837 | 29,539 | 29,244 | 28,951 | 28,662 |
| Diesel (25%) | 10,449 | 7,280 | 7,335 | 7,408 | 7,482 | 7,535 | 7,535 | 7,459 | 7,385 | 7,311 | 7,238 | 7,165 |
| Electric (75%) | 31,346 | 21,841 | 22,005 | 22,225 | 22,447 | 22,604 | 22,604 | 22,378 | 22,154 | 21,933 | 21,713 | 21,496 |
| Tonnes (000,000) | 86.00 | 59.92 | 60.37 | 60.98 | 61.59 | 62.02 | 62.02 | 61.40 | 60.78 | 60.17 | 59.57 | 58.98 |
| Ave haul | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 69.2% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 100.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.3906 | 0.7812 | 0.8781 | 0.8781 | 0.8781 | 0.8781 | 0.8781 | 0.8781 | 0.8781 | 0.8781 | 0.8781 | 0.8781 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 20.0% | 15.0% | 21.0% | 32.0% | 38.0% | 43.0% | 48.0% | 48.0% | 48.0% | 48.0% | 48.0% | 48.0% |
| % collected in barter | 75.0% | 80.0% | 75.0% | 65.0% | 60.0% | 55.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Barter conversion cost | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| % bad debt | 5.0% | 5.0% | 4.0% | 3.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Cash (000,000) | 3,265 | 3,412 | 5,410 | 8,326 | 9,986 | 11,380 | 12,703 | 12,576 | 12,450 | 12,325 | 12,202 | 12,080 |
| Barter (000,000) | 12,244 | 18,200 | 19,322 | 16,913 | 15,768 | 14,555 | 13,232 | 13,100 | 12,969 | 12,839 | 12,711 | 12,583 |
| Barter conversion cost (000,000) | | 364 | 386 | 338 | 315 | 291 | 265 | 262 | 259 | 257 | 254 | 252 |
| Bad debt (000,000) | 816 | 1,137 | 1,030 | 781 | 526 | 529 | 529 | 524 | 519 | 514 | 508 | 503 |
| Total revenue (000,000) | 16,325 | 22,749 | 25,762 | 26,020 | 26,280 | 26,464 | 26,464 | 26,199 | 25,937 | 25,678 | 25,421 | 25,167 |
| Total revenue collected (000,000) | 15,509 | 21,612 | 24,732 | 25,239 | 25,754 | 25,935 | 25,935 | 25,675 | 25,419 | 25,164 | 24,913 | 24,664 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Oil**

| | Projected | | | | | | | | | | | |
|-----------------------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | | | | | | | | | | | |
| Tonne-km (000,000) | 15,242 | 19,296 | 20,261 | 20,869 | 21,912 | 21,912 | 21,912 | 19,721 | 19,721 | 19,721 | 19,721 | 19,721 |
| Diesel (80%) | 12,194 | 15,437 | 16,209 | 16,695 | 17,530 | 17,530 | 17,530 | 15,777 | 15,777 | 15,777 | 15,777 | 15,777 |
| Electric (20%) | 3,048 | 3,859 | 4,052 | 4,174 | 4,382 | 4,382 | 4,382 | 3,944 | 3,944 | 3,944 | 3,944 | 3,944 |
| Tonnes (000,000) | 19.87 | 25.16 | 26.41 | 27.21 | 28.57 | 28.57 | 28.57 | 25.71 | 25.71 | 25.71 | 25.71 | 25.71 |
| Ave haul | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 | 767 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.5481 | 0.7673 | 0.8625 | 0.8625 | 0.8625 | 0.8625 | 0.8625 | 0.8625 | 0.8625 | 0.8625 | 0.8625 | 0.8625 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 22.5% | 19.5% | 26.5% | 48.5% | 68.5% | 79.0% | 89.0% | 99.0% | 99.0% | 99.0% | 99.0% | 99.0% |
| % collected in barter | 70.0% | 75.0% | 70.0% | 50.0% | 30.0% | 20.0% | 10.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| % bad debt | 7.5% | 5.5% | 3.5% | 1.5% | 1.5% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| Cash (000,000) | 1,880 | 2,887 | 4,631 | 8,730 | 12,946 | 14,930 | 16,820 | 16,839 | 16,839 | 16,839 | 16,839 | 16,839 |
| Barter (000,000) | 5,848 | 11,105 | 12,233 | 9,000 | 5,670 | 3,780 | 1,890 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | 117 | 222 | 245 | 180 | 113 | 76 | 38 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 627 | 814 | 612 | 270 | 283 | 189 | 189 | 170 | 170 | 170 | 170 | 170 |
| Total revenue (000,000) | 8,354 | 14,807 | 17,475 | 17,999 | 18,899 | 18,899 | 18,899 | 17,009 | 17,009 | 17,009 | 17,009 | 17,009 |
| Total revenue collected (000,000) | 7,728 | 13,992 | 16,863 | 17,729 | 18,616 | 18,710 | 18,710 | 16,839 | 16,839 | 16,839 | 16,839 | 16,839 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Ore**

| | Projected | | | | | | | | | | | |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | | | | | | | | | | | |
| Tonne-km (000,000) | 13,051 | 13,051 | 13,149 | 13,346 | 13,546 | 13,573 | 13,607 | 13,675 | 13,744 | 13,778 | 13,813 | 13,847 |
| Diesel (20%) | 2,610 | 2,610 | 2,630 | 2,669 | 2,709 | 2,715 | 2,721 | 2,735 | 2,749 | 2,756 | 2,763 | 2,769 |
| Electric (80%) | 10,441 | 10,441 | 10,519 | 10,677 | 10,837 | 10,859 | 10,886 | 10,940 | 10,995 | 11,022 | 11,050 | 11,078 |
| Tonnes (000,000) | 23.91 | 23.91 | 24.09 | 24.45 | 24.82 | 24.87 | 24.93 | 25.05 | 25.18 | 25.24 | 25.31 | 25.37 |
| Ave haul | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 | 546 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.4333 | 0.6066 | 0.6818 | 0.6818 | 0.6818 | 0.6818 | 0.6818 | 0.6818 | 0.6818 | 0.6818 | 0.6818 | 0.6818 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 50.0% | 30.0% | 70.0% | 85.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% | 95.0% |
| % collected in barter | 25.0% | 50.0% | 20.0% | 10.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |
| % bad debt | 25.0% | 20.0% | 10.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| Cash (000,000) | 2,827 | 2,375 | 6,276 | 7,735 | 8,775 | 8,792 | 8,814 | 8,858 | 8,902 | 8,925 | 8,947 | 8,969 |
| Barter (000,000) | 1,414 | 3,958 | 1,793 | 910 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | | 594 | 269 | 136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 1,414 | 1,583 | 897 | 455 | 462 | 463 | 464 | 466 | 469 | 470 | 471 | 472 |
| Total revenue (000,000) | 5,655 | 7,917 | 8,965 | 9,100 | 9,236 | 9,255 | 9,278 | 9,324 | 9,371 | 9,394 | 9,418 | 9,442 |
| Total revenue collected (000,000) | 4,241 | 6,334 | 8,069 | 8,645 | 8,775 | 8,792 | 8,814 | 8,858 | 8,902 | 8,925 | 8,947 | 8,969 |

KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Building Materials

| | Actual <u>1996</u> | Projected | | | | | | | | | | | | | | | |
|-----------------------------------|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------|--------|--------|--------|--------|
| | | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> | | | | | |
| Tonne-km | | | | | | | | | | | | | | | | | |
| Change from prior year | | -20.0% | -5.0% | 0.0% | 2.0% | 2.0% | 2.5% | 5.0% | 1.0% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% |
| Tonne-km (000,000) | 5,043 | 4,034 | 3,833 | 3,833 | 3,909 | 3,988 | 4,087 | 4,292 | 4,335 | 4,345 | 4,356 | 4,367 | 4,367 | 4,367 | 4,367 | 4,367 | 4,367 |
| Diesel (75%) | 3,782 | 3,026 | 2,875 | 2,875 | 2,932 | 2,991 | 3,065 | 3,219 | 3,251 | 3,259 | 3,267 | 3,275 | 3,275 | 3,275 | 3,275 | 3,275 | 3,275 |
| Electric (25%) | 1,261 | 1,009 | 958 | 958 | 977 | 997 | 1,022 | 1,073 | 1,084 | 1,086 | 1,089 | 1,092 | 1,092 | 1,092 | 1,092 | 1,092 | 1,092 |
| Tonnes (000,000) | 10.65 | 8.52 | 8.09 | 8.09 | 8.25 | 8.42 | 8.63 | 9.06 | 9.15 | 9.17 | 9.20 | 9.22 | 9.22 | 9.22 | 9.22 | 9.22 | 9.22 |
| Ave haul | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 | 474 |
| Revenue per tonne-km | | | | | | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.5518 | 0.773 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 | 0.8683 |
| Revenue | | | | | | | | | | | | | | | | | |
| % collected in cash | 10.0% | 20.0% | 40.0% | 60.0% | 75.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% | 85.0% |
| % collected in barter | 50.0% | 50.0% | 40.0% | 30.0% | 20.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% |
| Barter conversion cost | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |
| % bad debt | 40.0% | 30.0% | 20.0% | 10.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| Cash (000,000) | 278 | 623 | 1,331 | 1,997 | 2,546 | 2,943 | 3,017 | 3,168 | 3,199 | 3,207 | 3,215 | 3,223 | 3,223 | 3,223 | 3,223 | 3,223 | 3,223 |
| Barter (000,000) | 1,391 | 1,558 | 1,331 | 998 | 679 | 346 | 355 | 373 | 376 | 377 | 378 | 379 | 379 | 379 | 379 | 379 | 379 |
| Barter conversion cost (000,000) | | 234 | 200 | 150 | 102 | 52 | 53 | 56 | 56 | 57 | 57 | 57 | 57 | 57 | 57 | 57 | 57 |
| Bad debt (000,000) | 1,113 | 935 | 666 | 333 | 170 | 173 | 177 | 186 | 188 | 189 | 189 | 190 | 190 | 190 | 190 | 190 | 190 |
| Total revenue (000,000) | 2,783 | 3,117 | 3,328 | 3,328 | 3,395 | 3,462 | 3,549 | 3,727 | 3,764 | 3,773 | 3,783 | 3,792 | 3,792 | 3,792 | 3,792 | 3,792 | 3,792 |
| Total revenue collected (000,000) | 1,670 | 2,182 | 2,662 | 2,995 | 3,225 | 3,289 | 3,372 | 3,540 | 3,576 | 3,585 | 3,593 | 3,602 | 3,602 | 3,602 | 3,602 | 3,602 | 3,602 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Grain**

| | Projected | | | | | | | | | | | |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 0.0% | 0.3% | 0.5% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Tonne-km (000,000) | 7,856 | 7,856 | 7,876 | 7,915 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 | 7,955 |
| Diesel (75%) | 5,892 | 5,892 | 5,907 | 5,936 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 | 5,966 |
| Electric (25%) | 1,964 | 1,964 | 1,969 | 1,979 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 | 1,989 |
| Tonnes (000,000) | 9.82 | 9.82 | 9.84 | 9.89 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 | 9.94 |
| Ave haul | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 | 800.3 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 1.6% | 18.4% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 30.0% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.5564 | 0.7790 | 0.8756 | 0.8756 | 0.8756 | 0.8756 | 0.8756 | 0.8756 | 0.8756 | 0.8756 | 0.8756 | 0.8756 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 65.0% | 20.0% | 45.0% | 67.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% | 97.5% |
| % collected in barter | 20.0% | 70.0% | 50.0% | 30.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% |
| % bad debt | 15.0% | 10.0% | 5.0% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% |
| Cash (000,000) | 2,841 | 1,224 | 3,103 | 4,678 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 |
| Barter (000,000) | 874 | 4,284 | 3,448 | 2,079 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | 175 | 857 | 690 | 416 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 656 | 612 | 345 | 173 | 174 | 174 | 174 | 174 | 174 | 174 | 174 | 174 |
| Total revenue (000,000) | 4,371 | 6,120 | 6,896 | 6,930 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 | 6,965 |
| Total revenue collected (000,000) | 3,716 | 5,508 | 6,551 | 6,757 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 | 6,791 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Other**

| | Projected | | | | | | | | | | | |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 2.7% | 1.5% | 5.0% | 5.0% | 1.5% | 1.5% | 1.5% | 1.5% | 0.8% | 0.8% | 0.8% |
| Tonne-km (000,000) | 5,416 | 5,560 | 5,643 | 5,926 | 6,222 | 6,315 | 6,410 | 6,506 | 6,604 | 6,653 | 6,703 | 6,753 |
| Diesel (75%) | 4,062 | 4,170 | 4,233 | 4,444 | 4,666 | 4,736 | 4,807 | 4,880 | 4,953 | 4,990 | 5,027 | 5,065 |
| Electric (25%) | 1,354 | 1,390 | 1,411 | 1,481 | 1,555 | 1,579 | 1,602 | 1,627 | 1,651 | 1,663 | 1,676 | 1,688 |
| Tonnes (000,000) | 18.84 | 19.34 | 19.63 | 20.61 | 21.64 | 21.97 | 22.30 | 22.63 | 22.97 | 23.14 | 23.32 | 23.49 |
| Ave. haul | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 | 287 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 46.2% | 18.4% | 12.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 87.1% | 40.0% | 12.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.5500 | 0.7700 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 | 0.8655 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 85.0% | 73.0% | 78.5% | 84.0% | 89.0% | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% |
| % collected in barter | 12.5% | 25.0% | 20.0% | 15.0% | 10.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Barter conversion cost | 20.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |
| % bad debt | 2.5% | 2.0% | 1.5% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| Cash (000,000) | 2,532 | 3,125 | 3,834 | 4,308 | 4,793 | 5,302 | 5,381 | 5,462 | 5,544 | 5,586 | 5,627 | 5,670 |
| Barter (000,000) | 372 | 1,070 | 977 | 769 | 538 | 109 | 111 | 113 | 114 | 115 | 116 | 117 |
| Barter conversion cost (000,000) | 74 | 161 | 147 | 115 | 81 | 16 | 17 | 17 | 17 | 17 | 17 | 18 |
| Bad debt (000,000) | 74 | 86 | 73 | 51 | 54 | 55 | 55 | 56 | 57 | 58 | 58 | 58 |
| Total revenue (000,000) | 2,979 | 4,281 | 4,884 | 5,129 | 5,385 | 5,466 | 5,548 | 5,631 | 5,715 | 5,758 | 5,801 | 5,845 |
| Total revenue collected (000,000) | 2,904 | 4,196 | 4,811 | 5,077 | 5,331 | 5,411 | 5,492 | 5,575 | 5,658 | 5,701 | 5,743 | 5,787 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
FREIGHT TRAFFIC & REVENUE FORECASTS
Transit Traffic**

| | Projected | | | | | | | | | | | |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Tonne-km | | | | | | | | | | | | |
| Change from prior year | | 0.0% | 1.5% | 5.0% | 5.0% | 1.5% | 1.5% | 1.5% | 1.5% | 0.8% | 0.8% | 0.8% |
| Tonne-km (000,000) | 24,286 | 24,286 | 24,650 | 25,883 | 27,177 | 27,585 | 27,998 | 28,418 | 28,845 | 29,061 | 29,279 | 29,499 |
| Diesel (75%) | 18,215 | 18,215 | 18,488 | 19,412 | 20,383 | 20,688 | 20,999 | 21,314 | 21,633 | 21,796 | 21,959 | 22,124 |
| Electric (25%) | 6,072 | 6,072 | 6,163 | 6,471 | 6,794 | 6,896 | 7,000 | 7,105 | 7,211 | 7,265 | 7,320 | 7,375 |
| Tonnes (000,000) | 23.50 | 23.50 | 23.85 | 25.05 | 26.30 | 26.69 | 27.09 | 27.50 | 27.91 | 28.12 | 28.33 | 28.54 |
| Ave. haul | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 | 1,033 |
| Revenue per tonne-km | | | | | | | | | | | | |
| % real change from prior year | 46.2% | 10.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 87.1% | 30.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per tonne-km | 0.55 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 |
| Revenue | | | | | | | | | | | | |
| % collected in cash | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| % collected in barter | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Barter conversion cost | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| % bad debt | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Cash (000,000) | 13,357 | 17,364 | 17,625 | 18,506 | 19,432 | 19,723 | 20,019 | 20,319 | 20,624 | 20,779 | 20,934 | 21,091 |
| Barter (000,000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barter conversion cost (000,000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bad debt (000,000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total revenue (000,000) | 13,357 | 17,364 | 17,625 | 18,506 | 19,432 | 19,723 | 20,019 | 20,319 | 20,624 | 20,779 | 20,934 | 21,091 |
| Total revenue collected (000,000) | 13,357 | 17,364 | 17,625 | 18,506 | 19,432 | 19,723 | 20,019 | 20,319 | 20,624 | 20,779 | 20,934 | 21,091 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
RAILWAY TOTAL**

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km (000,000) | | | | | | | | | | | | |
| Regional | 8,838 | 7,777 | 7,500 | 7,000 | 6,500 | 6,000 | 5,600 | 5,208 | 4,938 | 4,680 | 4,436 | 4,203 |
| International | 4,926 | 4,335 | 3,614 | 3,105 | 2,593 | 2,093 | 2,064 | 2,050 | 1,937 | 1,830 | 1,729 | 1,632 |
| Commuter | 435 | 383 | 386 | 395 | 407 | 407 | 411 | 413 | 413 | 413 | 413 | 413 |
| Total | 14,199 | 12,495 | 11,500 | 10,500 | 9,500 | 8,500 | 8,075 | 7,671 | 7,288 | 6,923 | 6,578 | 6,248 |
| Change from prior year | -12.0% | -8.0% | -8.7% | -9.5% | -10.5% | -5.0% | -5.0% | -5.0% | -5.0% | -5.0% | -5.0% | -5.0% |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | | | | | | | | | | | | |
| Inflation | 28.0% | -3.9% | 7.1% | 0.2% | 0.2% | 0.3% | -0.1% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.5726 | 0.6504 | 0.6968 | 0.6980 | 0.6996 | 0.7014 | 0.7006 | 0.6995 | 0.6995 | 0.6995 | 0.6994 | 0.6994 |
| Revenue (000,000) | | | | | | | | | | | | |
| Regional | 5,061 | 5,098 | 5,423 | 5,061 | 4,700 | 4,338 | 4,049 | 3,765 | 3,570 | 3,384 | 3,207 | 3,039 |
| International | 2,821 | 2,794 | 2,330 | 2,001 | 1,671 | 1,349 | 1,330 | 1,321 | 1,249 | 1,180 | 1,115 | 1,052 |
| Commuter | 249 | 235 | 261 | 267 | 275 | 275 | 278 | 279 | 279 | 279 | 279 | 279 |
| Passenger service subsidies | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 8,130 | 8,127 | 8,013 | 7,329 | 6,646 | 5,962 | 5,657 | 5,366 | 5,098 | 4,842 | 4,601 | 4,370 |
| Change from prior year | | | | | | | | | | | | |
| Luggage revenue (000,000) | 197 | 199 | 211 | 197 | 183 | 169 | 158 | 147 | 139 | 132 | 125 | 119 |
| Mail revenue (000,000) | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Total Revenue | 8,339 | 8,338 | 8,236 | 7,539 | 6,841 | 6,143 | 5,827 | 5,525 | 5,249 | 4,986 | 4,738 | 4,500 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
REGIONAL SERVICES**

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km | | | | | | | | | | | | |
| Change from prior year | 0.0% | -12.0% | -3.6% | -6.7% | -7.1% | -7.7% | -6.7% | -7.0% | -5.2% | -5.2% | -5.2% | -5.3% |
| Pass-km (000,000) | 8,838 | 7,777 | 7,500 | 7,000 | 6,500 | 6,000 | 5,600 | 5,208 | 4,938 | 4,680 | 4,436 | 4,203 |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | -11.9% | -3.1% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 12.7% | 14.5% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.5726 | 0.6555 | 0.7230 | 0.7230 | 0.7230 | 0.7230 | 0.7230 | 0.7230 | 0.7230 | 0.7230 | 0.7230 | 0.7230 |
| Revenue | 5,061 | 5,098 | 5,423 | 5,061 | 4,700 | 4,338 | 4,049 | 3,765 | 3,570 | 3,384 | 3,207 | 3,039 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
INTERNATIONAL SERVICES**

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km | | | | | | | | | | | | |
| Change from prior year | 0.0% | -12.0% | -16.6% | -14.1% | -16.5% | -19.3% | -1.4% | -0.7% | -5.5% | -5.5% | -5.5% | -5.6% |
| Pass-km (000,000) | 4,926 | 4,335 | 3,614 | 3,105 | 2,593 | 2,093 | 2,064 | 2,050 | 1,937 | 1,830 | 1,729 | 1,632 |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | -11.9% | -4.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 12.7% | 12.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.5726 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 | 0.6446 |
| Revenue | 2,821 | 2,794 | 2,330 | 2,001 | 1,671 | 1,349 | 1,330 | 1,321 | 1,249 | 1,180 | 1,115 | 1,052 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
COMMUTER SERVICES**

| | Projected | | | | | | | | | | | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Passenger-km | | | | | | | | | | | | |
| Change from prior year | 0.0% | -12.0% | 0.8% | 2.3% | 3.0% | 0.0% | 1.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| Pass-km (000,000) | 435 | 383 | 386 | 395 | 407 | 407 | 411 | 413 | 413 | 413 | 413 | 413 |
| Revenue per passenger-km | | | | | | | | | | | | |
| % real change from prior year | -11.9% | -9.5% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | 12.7% | 7.0% | 10.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue per passenger-km | 0.5726 | 0.6125 | 0.6756 | 0.6756 | 0.6756 | 0.6756 | 0.6756 | 0.6756 | 0.6756 | 0.6756 | 0.6756 | 0.6756 |
| Revenue | 249 | 235 | 261 | 267 | 275 | 275 | 278 | 279 | 279 | 279 | 279 | 279 |

**KAZAKHSTAN RAILWAYS
PESSIMISTIC SCENARIO
PASSENGER TRAFFIC & REVENUE FORECASTS
LUGGAGE & MAIL**

| | Projected | | | | | | | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | <u>1996</u> | <u>1997</u> | <u>1998</u> | <u>1999</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> |
| Luggage | | | | | | | | | | | | |
| Percent of regional services revenue | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% | 3.9% |
| Revenue | 197 | 199 | 211 | 197 | 183 | 169 | 158 | 147 | 139 | 132 | 125 | 119 |
| Mail | | | | | | | | | | | | |
| % real change from prior year | | | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Inflation | 28.0% | 18.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Nominal % change from prior year | | | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Revenue | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |

| | Actual 1996 | Forecast 1997 | Forecast 1999 | Forecast 2000 | Forecast 2000 | Forecast 2000 | Forecast 2000 | Forecast 2000 | Forecast 2000 | Forecast 2000 | Forecast 2000 | Forecast 2000 |
|---|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| Sales of Non Transport Goods & Services | 1,192 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |
| Gains or Loss Foreign Currency Transactions | 5,302 | 3,447 | - | - | - | - | - | - | - | - | - | - |
| Other Income | 18 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| Total Revenue | 73,426 | 93,733 | 98,759 | 97,774 | 99,675 | 99,534 | 99,647 | 97,760 | 97,703 | 97,411 | 97,139 | 96,881 |
| Operating Subsidy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Operating Revenue | 73,426 | 93,733 | 98,759 | 97,774 | 99,675 | 99,534 | 99,647 | 97,760 | 97,703 | 97,411 | 97,139 | 96,881 |
| Operating Expenses | | | | | | | | | | | | |
| Salary - per accounts | 13,717 | 14,706 | 12,720 | 11,413 | 10,521 | 9,687 | 9,065 | 8,629 | 8,404 | 8,251 | 8,172 | 8,127 |
| Social Insurance | 4,355 | 4,423 | 3,886 | 3,524 | 3,272 | 3,031 | 2,849 | 2,721 | 2,655 | 2,610 | 2,587 | 2,573 |
| Consumption Fund (Other Employee Benefits) | 3,121 | 2,728 | 2,233 | 1,923 | 1,717 | 1,571 | 1,465 | 1,394 | 1,357 | 1,332 | 1,319 | 1,313 |
| Materials | 10,535 | 12,259 | 12,069 | 12,106 | 12,754 | 13,671 | 13,577 | 13,470 | 13,417 | 13,405 | 13,399 | 13,387 |

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 199 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | | | |
|---|----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------|--------|--------|
| Fuel | 5,795 | 6,693 | 6,618 | 6,368 | 6,118 | 5,604 | 5,164 | 4,692 | 4,350 | 4,043 | 3,770 | 3,525 |
| Electrical power supply | 4,796 | 5,030 | 4,915 | 4,868 | 4,857 | 4,821 | 4,797 | 4,739 | 4,716 | 4,695 | 4,678 | 4,662 |
| Other operating expenses | 8,792 | 10,165 | 9,828 | 9,473 | 9,172 | 9,027 | 8,878 | 8,780 | 8,714 | 8,700 | 8,693 | 8,682 |
| Contract Costs - Civil Works | 0 | 0 | 0 | 126 | 280 | 377 | 437 | 474 | 498 | 513 | 523 | 529 |
| Contract Costs - Electrical Services | 0 | 0 | 0 | 0 | 135 | 232 | 289 | 324 | 348 | 357 | 360 | 362 |
| Insurance [reserve fund] | 78 | 84 | 83 | 84 | 85 | 84 | 84 | 82 | 82 | 81 | 81 | 81 |
| Taxes [other than income tax] | 355 | 2,100 | 2,101 | 2,107 | 2,114 | 2,114 | 2,114 | 2,107 | 2,107 | 2,106 | 2,105 | 2,104 |
| Transport service penalties | 422 | 457 | 464 | 476 | 490 | 494 | 496 | 489 | 490 | 490 | 491 | 491 |
| Bad Debt | 4,700 | 5,168 | 3,622 | 2,063 | 1,669 | 1,583 | 1,569 | 1,577 | 1,577 | 1,574 | 1,571 | 1,568 |
| Barter Conversion | 0 | 2,431 | 1,936 | 1,336 | 611 | 435 | 372 | 335 | 333 | 331 | 328 | 326 |
| Social Needs Expenditures | 5,050 | 2,414 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 | 1,693 |
| Value Added Tax (Net) Treated as a Cost | 0 | 10,897 | 12,874 | 12,052 | 12,426 | 12,367 | 12,541 | 12,326 | 12,415 | 12,430 | 12,438 | 12,444 |

| | Actual 1996 Millions | Forecast 1997 Millions | Forecast 199 Millions | Forecast 199 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | Forecast 200 Millions | |
|--|----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|---------------|
| Total Operating Expenses | 61,716 | 79,553 | 69,611 | 67,914 | 66,790 | 65,410 | 63,834 | 63,157 | 62,610 | 62,207 | 61,865 |
| Operating Profit Before Depreciation | 11,710 | 14,180 | 28,163 | 31,761 | 32,743 | 34,237 | 33,926 | 34,546 | 34,801 | 34,932 | 35,015 |
| Depreciation | 4,981 | 12,000 | 18,000 | 22,500 | 26,250 | 26,408 | 25,864 | 25,448 | 25,456 | 25,480 | 25,422 |
| Operating Profit after Depreciation | 6,729 | 2,180 | 10,163 | 9,261 | 6,493 | 7,828 | 8,062 | 9,098 | 9,345 | 9,452 | 9,594 |
| Interest - Japanese Loan | - | 231 | 382 | 443 | 441 | 427 | 419 | 393 | 368 | 343 | 318 |
| Interest - German Loan | - | 4 | 2 | 1 | 0 | - | - | - | - | - | - |
| Interest - EBRD Loan | - | - | 320 | 404 | 392 | 338 | 282 | 227 | 171 | 115 | 58 |
| Interest - Bank Borrowings | - | - | - | - | - | - | - | - | - | - | - |
| Extraordinary Items | 7,849 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Profit / (Loss) before tax | -1,120 | 1,945 | 9,459 | 8,413 | 5,660 | 7,064 | 7,361 | 8,478 | 8,806 | 8,994 | 9,218 |
| Income Tax | 1,774 | 3,257 | 4,378 | 3,847 | 2,986 | 3,398 | 3,467 | 3,789 | 3,867 | 3,900 | 3,942 |
| Profit Retained | -2,894 | -1,312 | 5,082 | 4,566 | 2,674 | 3,666 | 3,893 | 4,689 | 4,939 | 5,094 | 5,276 |

| | | | | | | | | | | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Operating Profit before Depreciation % | Actual | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast | Forecast |
| | 1996 | 1997 | 199 | 199 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions | Millions |
| | 15.9 | 15.1% | 24.0% | 28.8% | 31.9% | 32.9% | 34.4% | 34.7% | 35.4% | 35.7% | 36.0% | 36.1% |

1.1.1

1.1.2 TECHNICAL ASSISTANCE

BACKGROUND AND OBJECTIVES

It is recommended that there will be technical assistance to continue the momentum of this Restructuring Study. There are planned institutional improvements needed by the railway in its move from a traditional railway towards a modern efficient commercially driven organisation as it moves into the 21st century. There is also the likelihood of an associated investment programme funded by International Funding Institutions such as the EBRD.

There are two main areas where technical assistance is recommended. Firstly there is a need to support the implementation of restructuring. Restructuring is a major change and there can be many difficult steps. There is a requirement for support for railway management through this complex process. It is likely that the first element of assistance would be over 18 to 24 months.

Secondly, the implementation of investment programmes brings new demands to the region in terms of skills in developing international specifications and procurement procedures. The IFIs usually also require Business Plans as part of the conditionality of the loan finance. Thus there is need for support for implementation of the investment programme.

Thus it is proposed to have technical assistance with the following objectives:

(a) Institutional

To support the railway management in the following areas:

- changing the management structure towards that of a commercially driven and profit conscious company
- institutional, legal and corporate changes
- preparation of a rolling 5 year detailed Business Plan
- the introduction of modern accounting practices and costing procedures
- Human Resources development to support the major changes arising from the restructuring programme
- the identification of a MIS system suitable for the requirements of a modern railway.

(a) Implementation of Investment

-
- Support for establishment of a Project Implementation Unit (PIU) to implement the investment programme.

1.1.3 METHODOLOGY

1.1.3.1.1 Institutional

Consultants will be required to give support in the following areas:

Organisational Change

The consultants will advise the senior railway management on the management of change from the traditional organisation to the new management structure.

The consultants will prepare a Master Plan to cover the overall change process. This will include guidelines for individual change in each of the chosen organisational units. Advice will be given on the description and implementation of the detailed organisation structure down to operational levels.

The consultants will monitor progress for change in each organisational unit and report back to the railway management on progress. They will assist management in resolving difficulties that may arise and in advising on corrective action to maintain the momentum of change.

Human Resources

In tandem with the institutional and organisational changes, the consultants will help with initiatives in Human Resources development. The programme will include manpower planning and communications as well as any planned retrenchment and reorganisation.

The consultants will advise on requirements for training. It is likely that training will cover

- marketing skills
- management skills
- financial skills
- information technology

as well as Maintenance, Engineering and Operations.

Strategic and Corporate Planning

The consultants will assist senior management with the development and preparation of a long-term strategic view for the railway. They will help with establishing the business planning function

in the railway and will present a template for a detailed 5-year Business Plan, which is upgradeable. This will be done at an early stage to assist with compliance with IFI loan arrangements.

Introduction of Modern Financial Systems

The existing accounting systems of the railway need to be upgraded to provide the management with the information they need to perform their functions. This task will be carried out in conjunction with the introduction of modern MIS as the two areas are very closely linked.

Priority will be given to the improvement of the internal management accounting systems and the development of cost accounting techniques. Particular emphasis needs to be given to the creation of profit centres and the identification of revenues and costs associated with each.

Costing must be integrated with the new financial accounting system to ensure that the same source data is used in the preparation of all management information. The costing system must ultimately be integrated with the MIS system. There is need for development of a training programme to introduce a greater degree of awareness of the necessary modern financial analysis skills.

Introduction of Modern MIS

It is necessary to begin the task of putting in place the hardware and software infrastructure and support services needed to deliver the Information Technology improvements for the railway. The consultants will give assistance on this.

Performance Agreement/Legal Changes

The consultants will give advice on the composition of a Performance Agreement, which will determine the relationship of the railway with the Government in the context of the new role of the railway in a market economy.

Assistance will also be needed to support associated legal changes.

1.1.4 Operational Improvements

The consultants will give support for introduction of operational and technical improvements such as improved operational efficiency coupled with investment in infrastructure, rolling stock, signalling

It is likely that experts in the following areas would be required for this Technical Assistance

- Organisational
- Human Resources

-
- Finance
 - Business Planning
 - MIS
 - Operations
 - Legal

Assistance with implementation of the Investment Programme

The consultants will provide for the set-up of a Project Implementation Unit in the railway. Experts from the railway will primarily staff it.

The duties of the PIU would be to implement the investment programme.

The PIU would carry out its duties in all parts of the procurement cycle in accordance with the requirements of the IFIs: to establish (a) a system for preparation of specifications, (b) tender dossier, (c) contract documentation, the tendering procedures including shortlisting and prequalification (if appropriate), issue of tender documentation, receipt and evaluation of tenders, awarding of contract, monitoring of implementation, quality control.

The consultants will support the PIU in its activities throughout the procurement cycle. A training programme in relevant areas of procurement, project implementation and loan administration will be required.

Technical experts will also be required for preparation of the technical specifications.

Their disciplines will reflect the precise components of the investment programme but can include the following areas

- Infrastructure
- Rolling stock
- Signalling and communications
- Electrification

