

MINUTES OF STEERING COMMITTEE MEETING
TRACECA ROADS MAINTENANCE PROJECT MODULES A AND B
ALMATY, 16TH AND 17TH FEBRUARY 1998

Steering Committee Members:

Mr T Mirzoev	-	Tajikistan Director, Tajikgiprotransstroy
Mr T Mirzaev	-	Uzbekistan Senior specialist, Uzzollokha
Mr J Gonchigzeveg	-	Mongolia Deputy director, Dept of Roads
Mr P Karchikian	-	Armenia Asst Deputy Director General, Road Directorate
Mr B Goncharov	-	Kazakhstan Director, Enginirringautodar
Mr K Fataliev	-	Azerbaijan Head of Administrative Department, Azeravtoyol
Mr A Sukhamberdiev	-	Turkmenistan Deputy Chairman Turkmenautoellari
*Mr T Shilakadze	-	Georgia Member of the Board, State Department of Motor Roads
*Mr R Rakhmatullin	-	Kyrgyz Republic Deputy Director General, DGRMBOR by Mr R Ishenaliev (Kyrgyzdortransproect) for some sessions

Other Representatives Present

Mr M Sims	-	TRACECA Co-ordinator
Mr P Melissen	-	TRACECA Monitoring Team
Mr V Stoyak	-	TRACECA National Monitor
Ms.B Kadyrova	-	Kyrgyz TACIS Monitoring Programme

Consultants Staff

Mr B Karell	-	TRACECA TNREG 9601 Project Director
Mr M Taylor	-	Module A Team Leader
Mr T Raukola	-	Module B Team Leader
Mr J Saunbury	-	Director, Roughton International
Mr E Bishop	-	Module A Materials Engineer
Mr H Jorgensen	-	Module A Bitumen Expert
Mr J Reeves	-	Module A and B Transport Economist
Mr J Luomaoja	-	Module B Assistant

*Unable to attend

Session 1 – 10.00 – 16.2.98

Opening of Meeting

Mr B Karell (Project Director): Welcomed Steering Committee Members (delegates), then introduced the consultant's team and the TRACECA representatives. The delegates introduced themselves. Described the practical arrangements for the Meeting. Thanked Mr Goncharov for his assistance with the organisation of the Meeting.

Presented an outlined of all 5 TRACECA Modules. Emphasised that the purpose Meeting was to steer the consultancy activities for the remaining period of Modules A and B

Opening Words by the Host Organisation

Mr Boris Goncharov (Kazakstan): Welcomed all those attending the meeting to Kazakstan and to the meeting on behalf of the Kazakstan Road Authority.

TRACECA Programme Overview

Mr M Sims (TRACECA Co-ordinator): Presented overview of TRACECA programme, including a summary of its origin and components. Also gave an outline of the involvement of the World Bank and ADB in developing project with recipient governments. Said that their input was welcomed into future TRACECA activities.

Over-view of Module A Draft Report

Mr Taylor (Module A Team Leader): Introduced himself as the originally nominated Team Leader, and explained that he had only just taken over from Tony Murphy who had carried out the role in Phase I. He hoped to visit all countries in next few months.

He apologised for Russian version of the report being issued in two stages as a result of more work being done on bitumen than originally planned. The complete English version was only now being tabled. These problems would be sorted out in the Final version of the report.

Phase I studies had covered a large number of topics relevant to the 9 TRACECA states and had involved travelling to each country for a short visit, as a result conclusions have necessarily tended to be quite generalised. This Meeting should aim to help make Phase II more targeted on addressing each country's own problems.

The contents of the report were then briefly outlined section by section with key issues identified.

Discussion

Mr Sims (TRACECA Co-ordinator): Implementation of changes and improvements to the existing situation is not expected to be easy. The Module A report and recommendations are intended to give delegates ammunition to help them carry out appropriate changes.

Mr Mirzoev (Tajikistan): It is important that Delegates should make comments on what should happen in Phase II.

Mr Gonchigzeveg (Mongolia): The map of Mongolia showing the 10 year road construction programme needs to be updated in final report. He will provide the necessary map and route upgrading information.

Module A needs to interface with ADB standard projects.

MATERIALS AND STANDARDS PRESENTATION (Session 2, 1200 hrs 16/02/98)

i) Availability of Natural Road Building Materials

Mr Bishop (Materials/Standards Specialist): Presented a review the availability and quality of road construction materials (sand, gravel and hard rock) in the TRACECA States.

Very good records of construction materials have been found to be available in each country. The Ministries of Geology have huge amounts of data including evaluation of resource size, type of material, potential uses etc. The operators of material source include the Road Authorities and the Ministry of Construction materials. These operators/owners typically hold records relating to rate of production and remaining reserves.

In view of this local availability of data relating to construction materials and the typical abundance of these resources, it was determined (soon after inception of the current study) that the recipients would gain no great benefit from an in depth and time consuming review of all natural material sources. In essence the Consultant would be returning to the recipients data which is already easily accessible to them. The project objective was therefore limited to an overview of the situation in each country, taking into account likely 10 year demand. This overview has identified and considered concerns relating to materials usage (such as deficiencies and use alternative materials) and appropriate processing.

Rocks of many types and almost all ages found in the region. However, alluvial deposits are very widely used as raw material for road building. Much more widely used than in Europe. It is not usual to use river gravels in the upper pavement layers in Europe because of the variability of the deposits in terms of particle strength, fines content etc (quarried hard rock is primarily used in Europe). As a result of the variability of alluvial deposits there is a greater need for good quality control in the pit in terms of material selection and monitoring of processed aggregate quality. The problem is typically processing not the material itself. For example, the consultant has observed rounded (uncrushed) gravel used in the bituminous surfacing and granular base of roads in some parts of the TRACECA region.

There is a deficiency of construction materials in some parts of the TRACECA region, in particular in the desert areas. The use of stabilisation and alternative pavement construction needs to receive greater consideration in some circumstances. Options include use of cement, lime, bitumen and synthetic stabilisers to bind pavement materials such as desert sand.

ii) Materials Supply Industry

Construction materials supply in the FSU was generally organised on the basis of large centralised extraction and processing plants.

It has been concluded that the cost of material haulage was not adequately accounted for when costing materials supply.

Economic difficulties have led to severe deterioration of extraction and processing equipment (excavators, screening plant, crushers and asphalt plant).

Priority actions to improve materials management have been reported. In particular there is a need to:

- identify material sources which will best serve the identified 10 year construction programmes
- upgrade screening, crushing and asphalt production plant (considered further under the Plant Presentation)
- Where existing sources are not economically located, materials investigations to be carried out during design to identify suitable pits/quarries close to the alignment
- Quality control testing infrastructure to be refurbished

A greater use of road transport compared with rail is anticipated. Introduction of mobile items of heavy plant recommended to enable smaller sources of material to be processed on a project specific basis.

Construction Materials Discussion

Mr Karchikian (Armenia): Thinks it is acceptable for one third of particle faces in surfacing aggregate to be rounded. Discussion essentially agreed.

Also there are environmental issues. Armenia is trying to use more hard rock and less natural gravel.

Materials Industry – agrees that material processing plant was large and centralised with some uneconomic haul distances for processed aggregates . There is an economic case for a larger number of smaller materials production sources.

Mr Sims (TRACECA Co-ordinator): Will the Consultant be providing specifications for mobile materials processing plant?

Mr Taylor (Team Leader Module A): Equipment requirements per country have been estimated in a very simplistic way (which will be presented in the Plant Session). Outline plant specifications have been reported. It has been recommended that some plant is acquired by through ICB contracts and left with clients at the end of construction contracts. In this case the client will agree with the contractor details of the plant specification and supply.

Mr Karchikian (Armenia): Not useful to specify individual manufacturer. Some Soviet equipment was good for some rock types.

Mr Taylor (Team Leader Module A): Type of crusher needs to be matched to the deposit, this is a specialist task.

Mr Karchikian (Armenia): Has reviewed information on Russian crushers. Literature does not give enough information on particle shape produced.

Mr Mirzoev (Tajikistan): Would like a list of western plant manufacturers and suppliers including brochures and cost information. Consultant agreed to supply this to all participating countries.

Mr Fataliev (Azerbaijan): What are the advantages of mobile plant? How will we determine where to locate it?

Mr Taylor (Team Leader Mobile A): The main advantage of mobile plants is that they can be located close to both the material source and the construction site, preferably some distance along a road rehabilitation project. Will discuss further under the plant section.

Mr Sukhamberdiev (Turkmenistan): What about locations with poor materials? Can the consultant provide information on stabilisation of materials?

Mr Bishop (Materials/Standards Specialist): There are very good documents and specifications (both Soviet and Western) dealing with the stabilisation of pavement materials with cement, lime and bitumen. There are also a number of synthetic stabilisers (ligno-sulphates such as "Conaid" derived from the oil industry, liquid polymer stabilisers and polymer fibre stabilisers) which may have an application in the TRACECA region.

Research on the use and specification of ligno-sulphate and polymer stabilisers has not yet reached satisfactory conclusions. Part of the reason for this relates to the reluctance of stabiliser manufacturers to co-operate with independent research investigations. Often the composition of the stabiliser is considered a "secret formula"

The consultant's own experience has shown that the ligno-sulphate stabilisers, which work by preventing water absorption in treated clayey materials, have given disappointing results. However, some polymer stabilisers seem promising for use with sands and slightly clayey materials. Unfortunately we cannot provide satisfactory specifications for these materials yet.

At the present time stabilisation techniques should concentrate on the use of lime, cement and bitumen. One great advantage of these methods is that they do not require hard currency to obtain them.

Mr Karchikian (Armenia): Knows of a European polymer stabiliser but was unable to obtain information on its composition from the manufacturer.

Mr Gonchigzeveg (Mongolia): What current use is there of cement, lime and bitumen stabilisation? Mongolia is looking at the possible use of "Status" (Russian) or "Topseal" (US) for desert roads.

Mr Goncharov (Kazakstan): Kazakstan has considerable experience with stabilisers. Have carried out research on cement, bitumen, lime, bauxite waste and flyash in the 1970's and 1980's. Reports and National Specifications are available from Kazdornii. Noted as item for Phase 2 – distribution of Kazakstan data.

iii) Standards

Mr Bishop (Materials/Standards Specialist): Gave a presentation on Standards.

At present legislation in the TRACECA States requires road construction is carried out in accordance with SNiPs and GOSTs. Since the break-up of the Soviet Union the process of producing interstate standards has been established. Some GOST standards have been reviewed, amended and approved as Interstate Standards in recent years.

In practice new western type standards cannot be introduced until the countries have appropriate testing equipment and staff trained and experienced to use the equipment.

Often no direct comparisons are possible between Western standards and SNiPs/GOSTS, because test methods are different. Therefore it is not possible during such a short study to determine whether FSU standards are better or worse than Western standards.

The consultant has therefore concentrated on identifying aspects of the existing construction regulations that could be amended and updated in order to:

- Improve the performance and design life of roads (with limited increase in construction cost)
- Introduce greater flexibility into the design process and materials specification, when this will lead to cost savings without adversely affecting road quality
- Introduce new or replacement construction materials testing procedures, when implementation of such testing will significantly benefit materials selection and/or quality control

It is recommended that the strategy for improvement of road standards should be to build on existing regulations by initially introducing selected international test procedures and construction methods in areas identified as requiring priority attention.

a) Road Design Standards

Road categorisation is a key feature of the FSU design standard. Categories are defined in terms of both traffic use and road value/importance in the economy. These two aspects are not necessarily well correlated. Certain aspects of road design standards are therefore uneconomic and wasteful. There is therefore a pressing need to review the existing classification and geometric design standards.

It is to be expected that the ADB review of design standards will provide guidelines which may be widely applicable in the TRACECA States.

b) Pavement Design Standards

The Consultant has examined the in-depth review of FSU pavement design standards carried out as part of the World Bank funded Highway Rehabilitation and Maintenance Project (HRMP) for Russia. Shortcomings are listed in the report.

In essence the report concludes that pavement design standards are partly responsible for the poor in-service performance of roads in the FSU.

c) Subgrade and Embankment Construction Standards

An important aspect of the FSU standards that is at variance with western standards is that there are no subgrade soil strength limits defined. Specifications for soil moisture content and compaction exist but this is not linked to a strength characteristic such as California Bearing Ratio (CBR).

It is recommended that CBR testing is introduced into the pavement design and quality control processes.

There is also a need to improve procedures for the quality control of subgrade compaction and density. Greater emphasis needs to be placed on the determination of compacted density with the aid of suitable testing equipment ("sand replacement" insitu-density apparatus, nuclear density gauge etc).

d) Pavement Construction Standards

Poor compaction control is believed to have significantly contributed to the poor performance of some pavements. Target densities need to be introduced and checked using improved techniques and test equipment (pavement coring machines, nuclear density gauges and "sand replacement" apparatus).

There is evidence that sand sub-base layers (pavement foundation layers) which conform to SNiP standards are not providing adequate strength and support to the overlying layers. The introduction of CBR strength limits on sub-base and granular base materials is recommended to assist in countering this problem (and others).

e) Bituminous Pavement Materials Specifications

With respect to asphalt specifications the following main observations and conclusions have been drawn:

- Some areas of the TRACECA States experience extremes of climate, in such circumstances bituminous mix requirements become critical and a balance of engineering properties may become difficult to obtain.

- High temperatures reduce the stiffness of mixes making them prone to deformation and also cause the bitumen to harden rapidly reducing its durability. The requirements for improved durability which involve increased bitumen content conflict with the requirement for higher stiffness. As a result the tolerances on mix specifications need to be very narrow and a high level of quality control is essential.
- Procedures for quality control of asphalt compaction need to be improved.
- Bitumen used in road surfacing work should be selected for low temperature sensitivity and good resistance to hardening. Use of high paraffin wax bitumens may result in severe deformation in high temperature conditions.
- The GOST asphalt standard attempts to cover all aspects of asphalt specification for the huge diversity of climatic zones, topographical conditions and traffic loadings that exist in the FSU. As a result the design choices available to the pavement engineer for his particular situation are limited.
- The existing asphalt specifications therefore require considerable revision to take account of recent relevant advances in asphalt technology. It is recommended that the improved specifications should relate to more carefully defined climatic conditions/zones.
- The introduction of Marshall testing for mix design and quality control is considered an urgent and essential requirement

Standards Discussion

Mr Karchikian (Armenia): Recent pavement investigations in Armenia have found a lack of gravel under some roads, even though 20 – 25 cm of gravel specified. There are three possible reasons why the gravel was mixed into the subgrade:

- Very soft (undetected) subgrade
- Poorly compacted subgrade
- Water saturated subgrade

Mr Goncharov (Kazakstan): Road design standards are currently being reviewed by the Interstate Standards Committee and this review is due to be completed this year

Mr Gonchigzeveg (Mongolia): Mongolia is moving over to AASHTO (Western) standards. Need training for laboratory staff as part of the World Bank project. Materials testing laboratories have been provided. The Consultant and World Bank have insisted on AASHTO.

Mr Karchikian (Armenia): SNiP revisions have not been enforced. The Interstate Standards Committee are doing the revisions. It is taking time, but progress is being made. Armenia wants to continue to collaborate with the CIS and Russia. However, Armenia supports Module A. There is a need to more clearly define standards, for example Russian 60/90 penetration bitumen is different from Iranian 60/90 bitumen. Armenia's laboratory does not investigate chemical differences. Armenia can not introduce western standards on CBR, density and Marshall testing at present, even though we have the testing equipment for some off the tests

Unfortunately there was no further time at the end of this session to continue the Standards discussion. It was therefore decided to programme further discussion time on Standards following the Quality Control Presentation and as a part of the final Summary Session.

WINTER MAINTENANCE STANDARDS (Session 3, 1500hrs 16/02/98)

Mr Raukola (Module B Team Leader): Gave a presentation reviewing the working document issued to the delegates on Winter Maintenance Standards and assessment of "Level of Service".

The document contents were shown on an overhead projector and briefly outlined:

1. Levels of service analysis
2. Standards – The importance of feed back from the delegates was stressed
3. Model Maintenance Base (Station) and Pilot Section – approximately 100 km to form pilot section with Maintenance Base Station and appropriate staffing
4. Road Weather Information systems (RWIS)
5. Regional Winter Road
6. Quality Control

The Kazakstan system for Winter Maintenance has been described but other systems in the FSU are similar. Kazakstan selected 10,000 km of road out of 17,500 km. Their Winter Maintenance system (WMS) includes all the necessary elements but needs to be more detailed for adequate quality control monitoring.

Priorities were identified within the 10,000 km of road:

- Shymkent to Uralsk to Border
- Kzyl-Orda to Akmola to Border
- Other WMS roads

Table 1 presents ADT and Winter Maintenance classes. Also identifies priority order for treatment.

Table 2.7.2 which identifies "Level of Service " (LOS) ratings was presented and reviewed:

- 1 Slipperiness
- 2 Snow condition
- 3 Evenness

Rating are from 1 (poor) to -5 (excellent). 1 is not acceptable, 5 is not required (summer condition). The various rating systems were described.

Table 2.7.3 which shows target LOS for the various road classes and allowed response time was reviewed.

Map of Kazakstan showing the distribution of WRM classes was shown. It was concluded that they have a good relationship to each other when viewed as a graphical (histogram) presentation. The more Class I roads the more expense.

The RMS model for Armenia was compared with Kazakstan. Similar with respect to traffic levels. Table 2.7.2 was the same and Table 2.7.3 was similar except response times have been modified. The Armenia map shows a star of Class I roads leading into Yerevan. Few Class IV roads due to high traffic levels.

Same approach applied to Azerbaijan. Target LOS slightly different.

Georgia have a similar Winter Maintenance but system, but this is not detailed enough for quality control. Better descriptions required. The approach would be similar to previous by FINNROAD.

Mongolia has very low traffic volumes. No information at present for Tajikistan and Uzbekistan therefore no analysis.

The Turkmenistan classification and LOS analysis was presented for this hot country.

Winter Maintenance Discussion

Mr Karchikian (Armenia): Seems to be a good system. Method of treatment must be related to the financial resources available. Improvement or deterioration is dependant on funding.

Funding catered for by prioritisation of maintenance activities and roads. Trail section will be a good starting point but a 100 km pilot section will need IFI funding.

To make standards more differentiated clearing could be applied to side roads and shoulders if money available.

Mr Raukola (Module B Team Leader): Justification for LOS is on an economic basis. Initially it may not take account of whether LOS can be afforded. Planning system is designed to determine whether a particular road is treated or not. Road classification assists allocation of resources. Other pressures may apply to various roads, but classification assists planning of activities.

Mr Mirzaev (Uzbekistan): From an economic and political point of view Uzbekistan must focus on interstate main roads – mountain roads. More funds must be allocated to these roads.

Mr Karchikian (Armenia): Armenia is short of money therefore we are very particular about prioritisation. We are operating a detailed system of prioritisation at present. In order to make the system effective it must be based on financial considerations.

Mr Saunbury (Consultants): We cannot solve funding problems therefore give us guidance on what is needed from us during the next part of the study

Mr Karchikian (Armenia): Suggest you question all participants about the level of funding required to implement this type of Winter Maintenance Standard.

Mr Karell (Project Director): The Winter Maintenance System may be put in place before adequate funding is available. Then it can be used to justify increased funding and will be operational when additional funding is received.

Mr Fataliev (Azerbaijan): Our problem is identical to the other countries – there is not enough funding. Nevertheless, some money is allocated. Azerbaijan focuses on international roads: Baku- Astara-Iran and the Northern road to Georgia. Money is primarily distributed among these roads.

Our snow equipment is obsolete and we require a new fleet of graders and bulldozers.

Weather conditions in Azerbaijan may include 2 days of snow followed by a warm wind and thaw. Hence we have a problem with snow and water. We try to approach international standards but at present we apply FSU Standards.

Mr Karell (Project Director): Module C restructuring includes for 40 Million US \$ to be raised through the Road Fund. At present Road Authority only gets 20% of scheduled revenue. In 1996 the Road Fund was established but the Government withdrew the fund for other use.

Mr Fataliev (Azerbaijan): I Attended a Ministers meeting before coming and it was indicated that the Road Fund would be returned to the Road Authority within 3 months.

Mr Mirzoev (Tajikistan): We also suffer from a shortage of money. We receive only 10% of our requirement for road maintenance. Interstate roads are the problem those above 3000m may be closed for up to 6 months. The proposed Module B standards seem good. The objective is to ensure minimum road closures. The main obstacle to compliance with the standards is that IFI funding is required or we have no potential to improve the situation.

Mr Sukhamberdiev (Turkmenistan): The situation in Turkmenistan is relatively easy. The Ministry of Mineral Resources ensures that roads are kept open. Their method of dealing with slipperiness is to apply sand. We have no deep snow problems but some ice. Due to shortage of money we pray for more sun.

Mr Mirzaev (Uzbekistan): Our problem is similar to the other counties therefore there is no sense in repeating what has been said. We should make a mutual decision since the problems are shared everywhere.

Mr Gonchigzeveg (Mongolia): We have a sharply continental climate in November temperatures of -7 deg C are experienced becoming -30 deg C in January. The system of salting is no good in our conditions, only mechanical cleaning. We do not even receive 10% of the money we require for winter maintenance.

Mr Raukola (Module B Team Leader): Salt may not be effective but sand would be useful.

Offering a good level of service provides savings for society by: reducing accidents; vehicle operating costs; transport savings for industry; and paving repair costs.

Mr Saunbury (Consultants): Could the delegates review the priority maps and respond individually tomorrow.

Mr Karchikian (Armenia): New winter maintenance standards should be introduced gradually, not all at once. As the money flow increases we can improve the situation experienced in previous years.

Mr Goncharov (Kazakstan): We are well acquainted with Module B and like the approach for optimum selection of Winter Maintenance activities and priority budgeting. We would like to prove that inadequate winter maintenance funding is a big mistake (increasing accidents and road closures) and should be corrected. In our scheme of State Road Maintenance ("Scheme 5") we award money from the budget and the maximum is 60 US\$/day/km We can prove with examples that lack of winter maintenance is a mistake.

BITUMEN AND REFINERIES PRESENTATION (Session 4 1700 hrs 16/02/98)

i) Introduction

Mr Jorgensen (Bitumen Specialist): identified the key issues addressed during the bitumen studies as follows:

- Availability of bitumen for construction of roads in the TRACECA States
- Importance of the distribution system
- Recommended amendments to the standards and specifications

Overall conclusions summarised as:

- Enough raw materials in area
- Enough refinery capacity to produce bitumen for estimated demand
- It is necessary to select appropriate crude oils or apply appropriate processing to ensure production of quality bitumen
- Proposals for refinery plant improvements presented where necessary
- Recommendations made for laboratory testings procedures to be introduced to supplement existing tests
- Storage of bitumen is a serious problem
- The examination of bitumen samples from refineries and bitumen plants has been started. Results obtained so far have been reported
- Results received to date have enabled broad conclusions to be drawn.

ii) Production Facilities

Condition and status of bitumen production facilities in Tajikistan, Azerbaijan, Turkmenistan Uzbekistan, Kazakstan and Kyrgyzstan reviewed (summary of information contained in the Draft Report)

iii) Standards

The existing GOST Standards are largely sufficient but the introduction of selected western test methods is recommended. Also, production of only two grades of bitumen at the refineries is recommended (others to be prepared by blending the 2 proposed grades).

Additional test required for:

- Viscosity testing
- Determination of Ageing Properties
- Composition

Report outlines minimum bitumen testing required for quality control.

iii) Laboratory Facilities and quality Control

Review of labs presented. Generally lack sufficient testing equipment to enable adequate QC of bitumen. In particular require viscosity test equipment (use roto-viscometers for rapid determinations supplemented by capillary viscometers for greater accuracy). Rolling Thin Film Oven Test (RTFOT) to be introduced.

Laboratory deficiencies to be addressed by establishment of suitably equipped labs. Cost estimate US \$ 150,000 minimum for bitumen lab and US\$ 200,000 - 250,000 for combined bitumen and asphalt laboratory depending on development/research requirements.

iv) Sample Examination

Summary of test result presented in main report in the form of Heukelom Diagrams. All test data to be summarised in an Appendix to the Final report. Four or five samples still to be tested.

Some of the Heukelom diagrams reported show a drop in viscosity at around the "Ring and Ball" temperature. This is a critical temperature at which the road must perform well during hot weather. Such a drop in viscosity indicates the occurrence of a paraffin wax problem.

High paraffin wax contents and associated bitumen viscosity problems have been identified in samples obtained from Baku Refinery and Turkmenbashi Refinery. The same problem may possibly be found at other refineries in the area.

Heukelom diagrams showing normal bitumen properties also presented in report. The use of additives to improve bitumen performance is illustrated in diagrams of European bitumens with and without additives.

v) Bitumen Supply and Distribution

Recommend as few grades as possible to be produced at the refineries

In order to overcome bitumen distribution problems the following is required:

- Increased storage capacity at the refineries
- Regional storage and distribution centres

This will help to ensure both the quality and availability of bitumen in the region.

An intermediate solution to the improved distribution of bitumen could involve the introduction of drum supply as outlined in the report.

Bitumen Discussion

Mr Mirzoev (Tajikistan): Reported that the situation in his country investigated with Mr Jorgensen. Planned refinery rehabilitation not completed. Delegate considers there is a big requirement for Mr Chapman (Refinery Specialist) to visit Tajikistan and to advise on refinery rehabilitation during Phase 2

Mr Jorgensen (Bitumen Specialist): Additional information concerning the refinery in Tajikistan, that was requested, has not been received. Existing proposals for development and future plans are needed.

Mr Mirzoev (Tajikistan): The additional data that was requested was dispatched. It is not known why it was not received, but a new data package will be prepared and sent to Mr Jorgensen.

Mr Fataliev (Azerbaijan): Two refineries for crude oil in Azerbaijan. A special American oxidising device will be operational from May 1988. Production will be: 200,000 t/year road bitumen and 50,000 t/year of roofing bitumen.

Azerbaijan only requires 10-12,000 t/year. The oxidising system is supposed to produce 60/90 bitumen.

There is up to 25% paraffin wax in the bitumen. Will the oxidising device reduce this paraffin wax?

Mr Jorgensen (Bitumen Specialist):

- a) Introduction of 50/70 grade bitumen as the hardest grade is OK

- b) The paraffin problem will not be solved by the new oxidising (blowing) plant. Baku refinery needs to either select low paraffin crudes for bitumen production or install a Propane De-Asphalting (PDA) Plant. Such plants are usually used for lubrication oil production

The use of stabilising additives may be considered in Azerbaijan to improve bitumen characteristics. Additives should result in improved aggregate adhesion but may not fully overcome problems associated with high wax content.

It is recommended that the additives are tried anyway.

Mr Jorgensen (Bitumen Specialist): What are the Delegates comments regarding the proposals for improved bitumen distribution?

Better storage facilities are recommended. For instance, Turkmenbashi bitumen must go straight from the refinery for distribution – there is no possibility for storage or mixing of bitumen products.

Mr Melissen (TRACECA Monitoring Group): What would be the additional cost of storage

Mr Jorgensen (Bitumen Specialist): Better storage facilities should not increase cost. Improved storage facilities it will result in energy cost savings and costs associated with road deterioration associated with use of poor quality bitumen will be reduced.

Existing methods of bitumen handling is effecting the end quality of bitumen very much.

Mr Karchikian (Armenia): Funding required to solve distribution problems, it is economically interesting.

Mr Saunbury (Consultants): Summary of conclusions agreed as follows:

- a) Wax Removal
 - PDA plant essential or selection of low wax content raw material (crude oil).
- b) Additives:
 - Questions remain concerning the effectiveness and economics of additive use
 - Additives introduced in the asphalt plant before laying
 - Should improve deformation resistance and adhesion of bitumen to aggregate
 - Additives may double the cost of bitumen and lead to a 30% increase in asphalt production costs.

Mr Sukhamberdiev (Turkmenistan): What is an appropriate specification for wax content? No limit is defined in the FSU standards and specifications.

Mr Jorgensen/Taylor Reply: Unacceptably high wax content will be reflected in the failure of the bitumen to comply with the recommended high temperature viscosity specification. There is a German DIN laboratory test method for quantifying the amount of paraffin wax in bitumen samples (this testing should be undertaken by the refinery to investigate the characteristics of raw materials and processed bitumens).

ROAD CONSTRUCTION AND MAINTENANCE PLANT (SESSION 5, 09.30 HRS 17/02/98)

Mr Taylor (Module A Team Leader): Gave the presentation on plant

i) Plant Inventories

During the study it was only possible to review a small sample of plant holdings in each country. We therefore had to rely on the lists provided by the Road Authorities. These lists were typically very extensive and included a large proportion of broken equipment. It is our belief that some large items of plant, such as asphalt plants, have been stripped of usable/movable items (ie electric motors, wiring etc).

It seems that the plant inventory data supplied is frequently incomplete, out of date and probably misleading with respect to the reported condition of the equipment stocks. It is therefore recommended that plant inventories are up-dated by each Road Authority.

During this session we would welcome feed-back from the delegates on the availability of spares and the status of the original suppliers.

ii) Plant Requirements and Supply Strategy

Plant requirements have been considered in terms of:

- Requirements for Road Maintenance
- Requirements for Road Rehabilitation

The Terms of Reference places emphasis on bituminous pavement equipment (ie we do not consider requirements for concrete mixers)

Requirements have been referenced to needs in relation to the assumed 10 year programmes for maintenance and rehabilitation.

It has been recommended that major contracts for road rehabilitation include for supply of new plant (rock crushers, asphalt batch plants etc) for hand over to the Government upon completion of the project. There are advantages and disadvantages associated with this proposal, such as:

- There is a risk that the plant will not be well maintained during the construction project
- Local staff will be comprehensively trained in use of the equipment

The only alternative is outright procurement of the equipment

Existing plant should be repaired as far as possible to service road maintenance needs in the short to medium term.

General recommendations in relation to equipment purchases and brief specifications are included in the report. It has been concluded that there is a case for buying portable rather than fixed plant in many instances.

iii) Emulsion Plant

It is recommended that establishment of bitumen emulsion plants is given serious consideration. Emulsions have several advantages: use in wet; use in cold; store cold mix for extended periods. Would welcome comments on this from Armenia, since this country has recently acquired an emulsion plant.

iv) Plant Pools (State Plant Hire Enterprises)

Plant pools are seen as a way of tackling the problem of encouraging the development of contracting enterprises. They are also a good repository for plant donated by IFI's. Donors are typically less willing to provide plant directly to private enterprises.

Armenia and Mongolia both have operational plant pools. In the following discussion it would be interesting to hear their comments relating to plant pools.

Mr Karchikian (Armenia): Plant in Armenia typically belongs to individual enterprises with no exchange of plant between enterprises. Each item has its owner/host.

The plant pool mainly contained FSU equipment and the World bank programme to date has been primarily achieved with old FSU equipment.

Some problems have been achieved with obtaining spares. Like the idea of foreign contractors bringing new equipment for large projects and handing it over to the Government at the end of the construction.

Difficult to understand Table 5.4.1 in the report.

Mr Taylor (Module A Team Leader): Explained that Table 5.4.1 is a very simplistic estimate of minimum plant requirements for pavement construction expected during the next 10 years.

It was determined that an error in the Russian report was causing confusion. Other aspects of the Table were found to be unclear. Mr Taylor stated that the Table would be improved in the Final report.

Mr Karchikian (Armenia): Armenia had ten times as many asphalt plants than were actually needed during FSU times. 100 asphalt plants were used by the Road Authority to 10-15% of their capacity. There were in total about 200 asphalt plants including those in other Ministries (ie Ministry of Agriculture). Naturally soon after independence all plants belonging to other Ministries stopped working.

Money received from the World Bank was used to refurbish asphalt plants not used for 4-5 years. Some equipment was missing, but not as bad as you suggests (ie wiring removed). All plant restored was achieved using own resources. Mostly German asphalt plants were restored. 60 asphalt plants were returned to working condition. 60 is quite enough. However, we do need pavement laying and compaction plant. We had a shortage of automatic weighing/dosing equipment. We had no laboratories at plants and no scales to weigh output. The same problem even existed in FSU times. Now all asphalt plants have a laboratory with daily testing of asphalt.

Mr Mirzaev (Uzbekistan): We have a Technology Centre involved in the rehabilitation of asphalt plants. At present all plants are in working order. We have a problem in the mountains where there is a need for new asphalt plants for mountain road rehabilitation. The Technology Centre deals the acquisition of new plants. The Road Fund is to supply the necessary money to buy two new asphalt plants.

Mr Goncharov (Kazakstan): We have had a major reorganisation in the road sector. Construction enterprises have all been privatised. All works connected with maintenance are carried out by sub-contractors – considers this wrong.

Large amounts of equipment has been sitting idle for the last 5 years and much of it is now obsolete. When the road fund is available we will acquire replacement equipment. We also have loans from the World Bank and ADB earmarked for purchase of plant. Then we may create pools for leasing equipment to contractors. Contractors may buy plant.

Mr Gonchigzeveg (Mongolia): Construction enterprises have been privatised and own their own equipment. Maintenance organisations have not been privatised. We plan, with the ADB, to create a plant pool to lease equipment to sub-contractors

Mr Fataliev (Azerbaijan): About 40% of plant is in working condition, 60% needs rehabilitation. We have no new roads planned only rehabilitation. Plant pool seems a good idea They should be located in each of 9 regions.

Mr Taylor (Module A Team Leader): Does money generated by the plant pools go into a plant pool fund?

Mr Fataliev (Azerbaijan): No into the Road Ministry, which allocates funds to each pool.

Mr Taylor (Module A Team Leader): This system is common in other countries but is not a real plant pool. It is much more effective if the pool is financially independent (ie equipment replacement is funded through generated revenue). There are two potential problems with the Azerbaijan type of system:

- Government keeps too much money generated by the pools
- Because accounts are separate for income and expenses no one knows whether the plant pool is operating at a profit or loss.

QUALITY CONTROL PRESENTATION (SESSION 6, 11.30 hrs 17/02/98)

Mr Bishop (Material/Standards Specialist): Started by introducing the Quality Control (QC) section the report and highlighted the following observations:

- a) The most important observation made as a result of the team's inspection of roads and discussions with road engineers in the project countries was that the poor condition of the roads had resulted more from non adherence to construction standards and lack of construction QC than from the existence of poor Standards.
- b) The major cause of this lack of compliance with Standards under the present circumstances was the lack of trained staff and properly equipped laboratories and institutional organisation.
- c) The key to improving QC was to completely separate the Client and Contractor thereby removing serious conflicts of interest. Privatisation was a good start to achieving this.
- d) What is required to achieve an adequate materials testing/quality control infrastructure has been considered. Each country requires at least:
 - One Central Laboratory (to provide QC for the State) able to conduct a full range of tests required in the specifications
 - Several Regional Laboratories (to provide QC for the State) equipped to carry out all routine testing and sited so that they can effectively cover the whole country
 - Mobile/District Laboratories as necessary to cover major projects and areas not accessible to the Regional Laboratories.

In addition, construction enterprises and materials production enterprises should have their own laboratories to monitor the quality of their products and raw materials. There is also a need in each country to have a National Standards Laboratory to calibrate test equipment and audit the quality of testing being carried out in other testing laboratories. Finally Universities training civil engineers should have adequate laboratory facilities to carry out training in the standard test procedures.

- e) Whilst appreciating the problems involved we recommend most strongly that the poorly equipped countries press very hard to get supplies of testing equipment and training of technicians. Equipment without trained staff is of little use.

Quality Control Discussion

Mr Karchikian (Armenia): If labs were to be provided by Contractors and if Producers were also to have their own labs, was it necessary for the Client to have labs as well?

Mr Bishop/ Mr Taylor's Reply: In general yes it was. In a regime where quality was properly controlled producers (which could include contractors) require the capacity to test their products to ensure that they would not be rejected through lack of compliance with standards. The client needs lab facilities to satisfy himself that the goods being delivered (aggregate, asphalt, compacted earthworks etc) are up to specified standards.

On major contracts the Contractor sometimes shares a site laboratory with the Client (supervisor), this saves on equipment costs but it is still necessary for the Client to have his own testing staff and carry out testing either jointly or independently. If the Client does not maintain his own testing staff and facilities he is ultimately likely to find himself at the mercy of Contractors and Producers.

Mr Mirzaev (Uzbekistan): Uzbekistan has started converting to the use of Western Standards and test and intends to press on with this.

Mr Karell (Project Director): Commented that the world Bank projects in Armenia were being implemented entirely with Western Standards

Mr Goncharov (Kazakstan): Commented that ADB projects were under way with specifications based on AASHTO Standards and with AASHTO lab testing equipment. There was some correlation made between AASHTO and GOST norms, but technically work should be done following GOST. In future Kazakstan expected to follow the new GOST Standards developed for the CIS countries by the Inter State Standards Committee (ISSC), some new ones (including Western methods) were expected to be finished this year and some drafts had already been issued.

Mr Karchikian (Armenia): Noted that the new ISSC were expected to be close to Western Standards as far as materials were concerned

Mr Fataliev (Azerbaijan): Azerbaijan has sent representatives from its QC organisation to Germany and Finland where they were negotiating for the supply of new QC equipment. Primarily for the control of the quality of manufactured products. However, they also intended that future standards would be in compliance with conclusions of the ISSC.

Mr Taylor (Module A Team Leader): it seems essential that the Consultant commences liaison with the ISSC. The Project needs to review the ISSC Standards proposals in the areas of identified concern.

Mr Mirzoev (Tajikistan): The Tajikistan Representative who is also on the ISSC commented that he saw no reason at present for the project to receive copies of the draft standards. He would discuss the question of liaison with the project with the ISSC Director in Moscow next week.

Mr Goncharov (Kazakstan): Noted that ISSC was also considering road design standards. Possibly the Consultant should also discuss these with the ISSC.

Mr Bishop (Materials/Standards Specialist): Suggested that some states may be helped by getting a detailed independent assessment (by the consultant) of their existing laboratory testing facilities and their upgrading requirements. This would provide them an authoritative document that could be used as the basis for future requests for aid and technical assistance (training of laboratory technicians).

Details of the responses of the delegates are presented in the final section of these Minutes which summarise the Steering Committee's guidance on Phase II activities. It was determined that the countries of Armenia, Azerbaijan, Tajikistan, Turkmenistan, Kazakstan and Kyrgyz Republic would like their laboratory facilities fully assessed and upgrading requirements documented.

INVESTORS CONFERENCE (SESSION 7, 17.00 hrs, 17/02/98)

Mr Karell (Project Director): Gave a presentation on the Investors conference

The Investors Conference will be held in Almaty on 25 and 26 May 1998. The main objective of the conference is to:

- Link Western and local companies in the road sector
- Improve the private sector in TRACECA countries

European companies have been largely selected for invitation and must respond by the end of March.

We are still identifying local companies interested in attending and would welcome suggestions from the delegates (including address). Given that some countries have difficulty communicating with the Project Office in Bishkek, an alternative of sending E Mails or Faxes to Mr Karell's FINNROAD Office in Finland was suggested. The FINNROAD contacts are:

- E Mail tuula.syrjasalo@tieh.fi
- Fax 00 358 9 154 5692

There is no intention to involve the oil sector because the investments are so large. We are looking for:

- Quarrying equipment manufacturers/suppliers
- Asphalt plant manufacturers/suppliers
- Maintenance equipment manufacturers/suppliers
- Spare part manufacturers/suppliers
- Local contractor joint ventures

In general local companies lack equipment and management experience and will benefit from forming joint ventures.

Investors Conference Discussion:

Mr Karchikian (Armenia): Foreign contractor Joint Venture or Investor JV?

Mr Karell (Project Director): Contractor is an investor

Mr Gonchigzeveg (Mongolia): Will you invite Russian Manufacturers? Most existing equipment is of Russian manufacture.

Mr Karell (Project Director): We have not invited any Russian manufacturers to date, but as CIS members Russian companies are welcome to attend. Please recommend relevant companies.

Mr Goncharov (Kazakstan): We have three large road construction projects about to start and a large investment in the road sector in the next 10 years. Therefore there will be a demand for new products, so the time is right to develop local production facilities.

Mr Karell (Project Director): Contractor is an investor not be difficult to get foreign companies to invest locally in order to protect this 10 year potential market. Locally manufactured goods can get benefit in IFI procurement assessment procedures (and they should have cheaper supply costs).

May is considered a good "active" month for the conference. July would not be so good because of the European summer holiday season. We expect 20 – 30 companies to attend possibly 100 delegates. 10 companies have already been invited to attend. Eastern block countries could also be invited to attend, there are still powerful manufacturers in Eastern Europe.

Mr Mirzaev (Uzbekistan): Is the project supposed to encourage EU country participants not Russia.

Mr Karell (Project Director): The project is financed by the EU and the priority is to promote EU companies, but Russia is part of the TACIS programme therefore there is no conflict.

Mr Mirzoev (Tajikistan): Please give us information about the participants as soon as possible so that we can prepare for the conference.

Mr Karell (Project Director): Information about the participants will be sent as soon as possible. Even if invited companies can not attend, we can act as liaison joining companies with mutual interests.

STEERING COMMITTEE GUIDANCE ON PHASE II ACTIVITIES (SUMMARY SESSION)

The summary session was attended by all Steering Committee Members/Delegates (excepting from Georgia). The Kyrgyz republic was represented by Mr Rustan. Also in attendance were Mr M Sims TRACECA Co-ordinator and Mr P Melissen TRACECA Monitoring Group.

Mr Saunsbury opened the session on behalf of the consultants and emphasised that the purpose of the session was:

- to summarise discussions and decisions from the previous sessions
- for the Committee to "steer" the Consultant on the priority actions for Phase II of Modules A and B

The Steering Committee then discussed the topics sequentially:

1 Materials Supply Industry

Mr Bishop (Materials Specialist): Presented a summary of the main recommendations as follows:

- the decentralisation of the materials supply industry
- the replacement/upgrading of existing extraction and processing equipment
- the introduction of transportable/mobile processing plant
- the re-establishment of adequately equipped quality control laboratories at material sources

Mr Gonchigzeveg (Mongolia): Mongolia has a shortage of crushing and screening plant and equipment for pavement stabilisation and asphalt production.

Would like the Consultant to provide information on types of equipment available, details of manufacturers and costs. Also interested in mobile equipment and plant for pavement recycling. (including Wirtgen).

Mr Rustam (Kyrgyz Republic): Interested in equipment for recycling. Does not agree with the pessimistic attitude of consultants with respect to recycling pavement materials. In particular the recycling of existing surfacing materials for use in the lower layers of an upgraded road should be considered.

Mr Bishop (Materials Specialist) Reply: The prime objective of this project is to promote the construction of improved quality asphalt pavements. There are few instances where pavement recycling would be recommended because existing pavements may comprise poor quality bitumen, unsatisfactory crushed aggregates and variations in mix quality. It would typically be better to overlay existing surfacing (of suitable quality) rather than to rework it.

After further discussion it was agreed that recycling was not a priority for Phase II.

Mr Karchikian (Armenia): Armenia has good sand and gravel resources and could export processed aggregates to other countries.

Mr Mirzoev (Tajikistan): First phase activities have not been completed in Tajikistan due to the difficulties there. Completion of the Phase I tasks is requested

Mr Saunsbury (Consultants): Asked whether there were any additional requests for Phase II activities relating to the Materials Supply Industry

Conclusions: With respect to the materials supply industry Phase II should concentrate on provision of information and advice about crushing, screening and asphalt plant including manufacturers, types, performance and costs.

2 Standards

Mr Bishop (Materials Specialist): Explained that the key objectives with respect to Standards relate to the introduction of identified test procedures and specification limits which will significantly improve the quality of road design and construction in the TRACECA States. These primarily include:

- Improved *in situ* road material density testing procedures (sand replacement density testing, pavement coring, nuclear density meter testing)
- California Bearing Ration (CBR) Testing of subgrade and granular pavement materials for pavement design and construction quality control
- Marshall Testing for the design and quality control of bituminous pavement materials
- Wax content of bitumen testing
- High temperature viscosity testing of bitumen (to identify paraffin wax problems)
- Tests to determine the ageing properties of bitumen (Thin Film Oven Test –TFOT, Rolling Thin Film Oven Test – RTFOT and Tin Film accelerated Ageing Test - TFAAT)

The Steering Committee members were asked whether they supported the introduction of these new test procedures/specifications and whether they believed that they could be integrated into the existing FSU standards.

Mr Karchikian (Armenia): Suggested that a working group was required to develop standards. It was asked how long the Steering Committee would be in existence. The working group would identify standards to be adopted/promoted and the boring part of implementing their adoption would be the responsibility of the Interstate Standards Committee. Funds are needed to develop new standards. Armenia has an organisation to work on Standards, but it is not effective due to insufficient operating funds. Can TACIS fund the development of a new set of standards?

Mr Sims (TRACECA Co-ordinator): Recommended that the identified key test procedures and specifications are translated into Russian.

Specifications may then be modified as necessary to suit local conditions (climatic factors etc).

99% of the technical work will then have been done.

There is no need to unnecessarily "re-invent the wheel". These test procedures/standards have been extensively applied outside the FSU and proven to be appropriate.

Mr Karchikian (Armenia): Wheels do evolve. Standards revision is recommended to keep up with developments. Western technology has been innovative and is spreading into the CIS. Russian Specifications are also innovative and are being modernised.

Mr Saunbury (Consultants): The identified key tests will improve road construction. Time has shown that the selected tests are the most suitable for the purpose.

Mr Fataliev (Azerbaijan): Agrees with colleagues concerning Standards, but stated that emphasis should be placed on trying to help each other solve standards problems.

Mr Goncharov (Kazakstan): It is considered that Module A has touched on very important issues and problems that are holding back the development of road construction.

In Kazakstan the Programme for development of National Standards is in progress and 300 have already been changed. In this programme the best Standards from Russia and Europe are adopted and made suitable for local conditions. They aim to solve the problems relating to bitumen and aggregates. Road improvements are to be implemented with the help of institutional strengthening.

Kazakstan is therefore more interested in Module B (Winter Maintenance) than Module A, but will apply the recommendations derived from Module A.

Mr Mirzoev (Tajikistan): It would be useful if information on standards developed in other TRACECA States is distributed among all the participating states during Phase II of Module A.

Tajikistan delegate is a representative on the Interstate Standards Committee. He recommended Module A established liaison with the Interstate Committee. He would provide contact names and address in Moscow and inform them of our intention to make contact.

Mr Sukhamberdiev (Turkmenistan): It is important that national features, particularly climate and geographical influences are taken into account in the production of revised Standards.

Mr Mirzaev (Uzbekistan): Uzbekistan has started to develop National Standards and proposes to adopt western test procedures. A major investment in western test equipment has been made by Uzbekistan. It is recommended that Mr Sims proposal for introduction of new standards is followed.

The Uzbekistan delegate agreed that their Central Materials Laboratory in Tashkent could be used to demonstrate western test procedures such as CBR, Marshall testing etc.

Conclusions: The agreed activities with respect to Standards in Phase II of the project were summarised as comprising:

- Translate the identified key western test procedures and associated standards into Russian.
- Identify any modifications to the standards that may be necessary to make them suitable for local conditions (ie climatic considerations)
- Visit the participating states and promote the adoption of these standards/test procedures as Internal/National Standards. Ensuring that all necessary information required to assist in their introduction is provided.
- Distribute copies of important new standards developed in the participating states for review and possible adoption by the other states. This particularly applies to specifications developed for use of stabilised and alternative pavement materials.
- Establish contact with the CIS Inter Governmental Committee on Standards (MNTKC). Inform them of the conclusions and recommendations reached during Phase I of the Module A study and arrange for publication in their journal (Moscow Motor Roads Institute monthly journal –Mr B Karimov Tel 1550885)
- Liaise with the ADB Review of Road Design and Construction Standards Project.

The promotion of the selected test methods/standards for adoption as Inter Governmental Standards will remain the responsibility of the appropriate representatives of the participating countries.

3 Bitumen and Refineries

Mr Jorgensen (Bitumen Specialist): Summarised the main recommendations for discussion with the Steering Committee:

i) Bitumen Standards and Test Methods

It was confirmed that actions required with respect to bitumen standards and test procedures had been adequately covered in the previous discussion.

ii) Improved Bitumen Storage and Distribution

The delegates were asked their opinion with respect to the need for further action on the development and promotion of improved bitumen distribution systems. It was generally felt that the development of regional distribution centres and refinery storage improvements were matters for consideration by each government. No further information or work was required from the Consultant during Phase 2.

iii) Bitumen Additives

After some discussion on the possible benefits of using additives to improve the performance of poor quality bitumens, it was decided that the consultant should provide additional information relating to : when additives might be used; where they might be used; likely benefits; and estimated cost of use.

v) Refinery Visits

Mr Mirzoev (Tajikistan): requested the visit by the Refinery Specialist that was deferred in Phase I.

Conclusions: That the Phase II activities should consist of :

- Action on bitumen standards/test methods as already covered in Section 2
- Advise and information on bitumen additives
- Assessment of Tajikistan Refinery by Refinery Specialist.

4 Road Construction and Maintenance Plant

i) Existing Plant Inventories

Existing data collected from the Road Authorities by the Consultant is incomplete, out of date and probably misleading with respect to the reported condition of the plant stocks. It was recommended that the up-dating of plant inventories is carried out by each Road Authority. No further action was therefore required from the Consultant.

ii) Plant Suppliers

As discussed under Materials Supply Industry the Consultant is to distribute information concerning plant suppliers and their products.

iii) Plant Pools (State Plant Hire Enterprises)

There was some discussion relating to the definition of a plant pool. The Consultant reported that the term plant pool was being applied to enterprises that have their own trading accounts separate from Roads Department or Department of Finance Accounts (ie receipt of hire income

and payment of all costs including depreciation or renewal so that actual profit and loss can be properly monitored).

Mr Goncharov (Kazakstan): Reported that it was an interesting system but that some legal problems would have to be settled prior to the formation of plant pools in Kazakstan.

Mr Karchikian (Armenia): Stated that they had established a plant pool and that it was a good decision. They were interested in privatising it at some time in the future.

Mr Saunsbury (Consultants): Asked whether any documents were required from the consultant concerning the establishment and operation of plant pools.

Steering Committee Members: All reported that they required no further action from the Consultant with respect to plant pools.

Conclusions: The action required from the Consultant during Phase II relating to plant is the distribution of information on plant suppliers and their products

5 Quality Control

Mr Bishop (Materials and Standards Specialist): Reported that key issues in respect of quality control relate to introduction of new test procedures and specifications (considered above) and upgrading of testing laboratories.

During the quality control review delegates were asked whether they would like the Consultant to carry out an independent detailed assessment of materials testing laboratory upgrading requirements and associated cost. The responses obtained at that session are summarised below for completeness:

Mr Gonchigzeveg (Mongolia): Mongolia will be receiving equipment for the establishment of 5 laboratories (from an ADB funded project) and so does not require an assessment of equipment needs. However, a programme of training for laboratory staff is required.

Mr Karchikian (Armenia): Armenia would like all laboratory upgrading requirements to be assessed. He asked whether mobile laboratories might be considered for inclusion in the plant pool.

Mr Taylor (Module A Team Leader) Although no example of mobile labs being included in a plant pool was known, there is no reason why not.

Mr Mirzoev (Tajikistan): Would like details of equipment required for a comprehensive Central Laboratory

Mr Fataliev (Azerbaijan): Azerbaijan would like all laboratory upgrading requirements assessed.

Mr Goncharov (Kazakstan): Kazakstan has proposals to upgrade Kazdornii and 6 regional laboratories (to serve 14 Regions). Funding is being arranged. However any assistance would be welcome.

Mr Sukhambardiev (Turkmenistan): would like all laboratory upgrading requirements assessed.

Mr Mirzaev (Uzbekistan): Major laboratory upgrading programme in hand but would like a programme of training for laboratory staff.

Kyrgyz Republic: Delegate not present at the meeting, but subsequently confirmed that Kyrgyz republic would like all laboratory upgrading requirements assessed.

Conclusions: Consultant reported that it was beyond the scope of Module A to implement training programmes for laboratory staff, but that the country assessment reports would include recommendations with respect to staff training. Given that the Uzbekistan Delegate had agreed that their Central Laboratory in Tashkent could be used to demonstrate western test procedures (such as CBR, Marshall Testing etc) such an introduction is recommended.

Consultant's Phase II activities are summarised as follows:

- Visit Armenia, Azerbaijan, Tajikistan, Turkmenistan, Kazakstan and Kyrgyz Republic to prepare a detailed assessment of existing laboratory equipment and laboratory infrastructure, and prepare individual country reports defining upgrading requirements with cost estimates. The Consultant's assessments will be drafted in such a format so that they can be readily used by the Road Authorities to justify and quantify IFI funding for laboratory upgrading.
- Contact Steering Committee Member representing Georgia and determine whether a laboratory assessment and report is required
- Organise an introductory "workshop" in Tashkent on the identified key western testing methods. To include demonstration of equipment and testing procedures. Suggested length of workshop approximately 5 days.

6 Winter Maintenance

Delegates were asked to review the Winter Maintenance Documents distributed at the meeting and then pass their written comments on to Mr Raukola.

Ansgar Kauf (International Road Federation)

Mr Kauf introduced himself as a representative of the International Road Federation (IRF) and thanked the Meeting organisers for allowing him to attend some of the sessions.

He invited all delegates present to attend the IRF Silk Road Conference to be held in Ashgabad on 15-17 April 1998. Accommodation and subsistence expenses would be covered by the IRF

Closing of the Meeting

Mr Karell (Project Director): Closed the meeting by thanking everyone for their participation.