(1) In the former organization, Supporting Staffs can freely help General Director in the both
fields, office work and site work, but in the latter organization, they are in a line of work, and the wide help for the general director isn't available. As a whole, the former style will allow the wider and the more free activity of staffs, such as Deputy Directors, Chief Engineer, etc.

(2) In the former organization, one section's work is clearly decided whether it is a site work or
a staff work. And the management of a section is much easier.

(3) For the management of all the organization, the simpler, the better.

13.2.3 Over share of the Tashkent Workshop to the individual and also to the social structure, concerning housing policies, public welfare, education, etc.

In the organization tree of the Tashkent Workshop, you have the Social Development Complex. In this organization, there are Kindergartens, Pioneer Centers, Housing Maintenance Department. It is important to have such organizations for the smooth management of the Tashkent Workshop, but they don't increase the productivity of the Tashkent Workshop. In the developed countries, some of those responsibilities belong to the state, or the local government, or to the individual. Circumstances around workers and workshops are very different between nations. But if you find the possibility of decreasing the over share of the the Tashkent Workshop, the productivity and the profitability of it will be increased. Such over share is not only limited to the man power itself, but also the money expenditure (pensions, life-insurance, etc.).

13.2.4 Excess of workers of the Tashkent Workshop

The workers are too many in the the Tashkent Workshop. the Tashkent Workshop has approximately 2,000 workers, and the overhaul number of DL is approximately 150. From the commonsense of Japanese workshop engineers, the workers' number is too large and the overhaul number is too small. It is difficult to compare the two precisely, because of the difference of boundary conditions, but the difference, at least, might be more than twice as much.

Now, the salary level of Uzbekistan is far below than that of Japan, then the personnel expenditure's pressure to the total cost isn't so high now (10 to 13 %), but when the life level comes higher, this will be the tremendous pressure to the cost up.(In Japan the personnel expenditure ratio comes to 50 to 60 %. So the cost pressure of personnel expenditure to the total is 4 or 5 times, comparing with that of Uzbekistan). Then early checking for the manpower is most important. At the same time how to find out the job of surplus manpower is the back side of the coin (If we don't have any accommodation for the surplus manpower, there is no solution).

13.2.5 To raise up the worker's productivity

There are several methods to promote the productivity of a workshop. And some of them are explained below.

(1) To study the past of the Tashkent Workshop

In the early stage of 1990s, the Tashkent Workshop worked out more than 300 DL overhauls a year. This figure is twice as much as the present work of the Tashkent Workshop. And the workers at that time were less than the twice. This means even in the present condition, the Tashkent Workshop has a possibility to improve the productivity, if you study the past deeply and apply the its condition.

(2) To introduce the more effective equipment or facilities, if possible to introduce the state of the art.

To introduce the modernized equipment and facilities, it raises up the productivity of workers physically. In this sense, replacement of DL with EL & EC is one of the productivity raising up, both indirectly and directly. Indirect effect is the decreasing the work volume of the Tashkent Workshop (the physical work volume of a EL is smaller than that of a DL, and a overhaul cycle of a EL is longer than a DL). And the direct effect is that by introducing the newer and modernized equipment and facilities for the EL & EC overhaul, the productivity of the Tashkent Workshop will be increased.

This method needs much funds, so it is very important to study the effectiveness of investment and to evaluate it correctly.

(3) To level up the ability of each worker of the Tashkent Workshop incessantly

Ceaseless improvement of workers ability is essential for the productivity up of the Tashkent Workshop. And this is done through the continuous reeducation and retraining of workers.

As stated in the former section, every worker has 10 % of retraining or reeducation in the whole working time. This must be used for the maintenance and improvement of skill of workers.

(4) Encouragement of workers' proposals for raising up the productivity

Workers on the sites have proposal for the improvement of the site, improvement of working methods, etc. Executives of the workshop shall study intently and deeply such proposals, and if they are effective enough, they shall be adopted with some incentives.

(5) Excess of staff members

As suggested in the former section, the Tashkent Workshop has the administration of two stories, the first, at the level of General Director and the second, at the level of each Complex. It is too bold to say that the Production Complex is the main part then the other complex or sections are the staff part. But actually, the main income is from it, then actually the other parts is a kind of the staff part (or subsidiary part) of the Production Complex. The workers ratio of the Production Complex to the whole the Tashkent Workshop is,

Production Complex (1596)/ Tashkent Workshop (2197) =0.726 =73 %

If you say that the other complex isn't the subsidiary part (or the staff part) of the Production Complex, then the Production Complex itself has the staff parts (they are the parts of the Chief Engineer and the Deputy Chief Engineer). In the Production Complex,

the main part (shops part = the part of Deputy Director, Manufacturing) ratio to the whole Production Complex is,

Workers of Dep. Director (Manufacturing) (1225)/ Production Complex (1596)
= 0.768 = 77 %

In the workshops of Japan, the average ratio of shop workers to the whole workshop is 10 to 15 %. To compare the figures directly is too bold, because the circumstance and the conditions are very different. But the following shall be said.;

The staff part is very important, but it is scarce this part will increase the productivity directly, and as mentioned above, the staff ratio is a little bit too high. There might be some room to check the ratio.

13.2.6 Recommendation of self-supporting basis for the independent businesses

In order to make clear the ratio of productivity or profit, it is recommended to have a self-supporting basis on every business. the Tashkent Workshop has several sections which are rather independent in their businesses. transportation, construction, such business are rather independent or comparatively easy to be separated. Therefore, assuming they are independent, and you apply self-supporting basis to them and evaluate them like a company. Actually there may be many hindrances for the independent calculation, but such effort increases the independent spirit and also their productivity and profitability.

13.2.7 To have some storage of spare parts and consuming goods for the EL & EC repair

In the modernized workshops or factories, one of the most important items which maintain the high productivity is the correct and quick delivery of parts which are assembled in the factory and consumed goods which the assembly line needs. The most famous of this system is called Kanban Houshiki (Japanese) which doesn't allow any storage at any assembly line.

All the parts and goods must be delivered on time at the assembly line, and the assembly line doesn't have any stock yard. In the early stage of the Tashkent Workshop, this idealized assembly line will be too early to be realized, so some storage of parts and goods shall be indispensable to the smooth flow of the work.

Too much storage of parts and goods makes the money (capital) flow slow, and decreases the productivity, and also needs a larger stock yard. But some extent of stock of spare parts and goods must be essential for the first stage of raising up the Tashkent Workshop productivity.

CHAPTER 14 ASSESSMENT AND RECOMMENDATIONS ON THE CONSTRUCTION PROJECT OF ELECTRIC LOCOMOTIVE REPAIR WORKSHOP IN UZBKISTAN

14.1 FINANCIAL AND ECONOMIC ANALYSIS

14.1.1 Claimable costs and benefits

(1) One of the difficulties faced in assessing this project is that it stands alone, and is not being appraised as part of the wider project which includes electrification and the procurement of electric locomotives. Whilst this makes the identification of relevant costs reasonably straightforward, the isolating of relevant benefits becomes extremely difficult - particularly if they are also being claimed for the other facets of the wider project. There is a danger, therefore, that benefits may be claimed twice. It is important, therefore, to give detailed consideration to precisely which costs and benefits will be incurred as a direct result of the construction of the workshop, when compared to 'doing nothing' (the 'without' case).

(2) As far as costs are concerned, the potentially relevant items are:

1) The construction costs of the workshop itself, which should include labour, materials and professional fees.

2) The fitting-out costs of the workshop, again including labour, materials and professional fees, but also an initial pool of spare parts.

3) The cost of employing additional staff. In practice, the Tashkent Workshop is in the process of reducing staff and the work of maintaining electric locomotives will be undertaken by existing employees, suitably re-trained. However, this situation still represents a theoretical cost: had the new workshop not been built, the staff reductions would, at least initially, have been greater. But there is also a corresponding benefit inasmuch as the maintenance of electric locomotives requires less labour input than the maintenance of diesel locomotives. There is therefore a productivity gain to be captured to offset the initial diminished decrease in payroll, at the point when any increase in the electric fleet results in a reduction in the diesel fleet.

4) The cost of training or re-training staff. However, provision is already made for training in employees' conditions, representing an allowance of up to 10% of an individual's working hours. It is intended that all necessary training for maintaining electric locomotives will be undertaken as part of this allowance. Therefore there will be no additional cost (except the theoretical, and unquantifiable, opportunity cost of other training forgone).

5) Incremental running costs, such as maintenance, heating, lighting, power, water, waste disposal etc. As with staffing, the new workload will bring with it additional running costs in the short term, until the point is reached where the increase in electric

locomotives results in a decrease in the number of diesel locomotives. At that point, there are then savings to be captured in the running costs of maintaining the diesel fleet, but these, of course, are not benefits to be claimed by this workshop project.

6) Opportunity costs. In allocating space within the Tashkent Workshop for the maintenance of electric locomotives, one needs to ask whether that space could have been put to a better and more productive use. Although the workshop is located in the heart of a major capital city, there is, at present, no pressure on space in Tashkent to push up land values. Given also that the workshop appears to have the firm support and backing of the city authorities, it is not believed that there exist any significant opportunity costs to be charged to the project.

(3) As stated above, the identification of relevant benefits arising from this particular project is complex and not straightforward. The issue merits discussion; the potential savings are:

1) Savings in maintenance costs. Without the new facility, the fleet of electric locomotives and multiple units would be sent abroad for overhaul where high prices in hard currency are charged. The creation of a domestic maintenance facility, where costs will be lower, will result in claimable savings.

2) Savings in locomotive numbers. The time taken to send electric locomotives and multiple units abroad for overhaul would make the fleet even larger than it otherwise needed to be - a proportion of it would always be in transit to and from the foreign workshops. The construction of a domestic overhaul facility will therefore abolish the transit time, and lead to a saving in the number of locomotives required. The problem, however, is which locomotives will be saved. If, for example, it has already been decided to procure, say, 100 new electric locomotives, then the construction of the new workshop may result in the reduction of the procurement order to, say, 90 locomotives. On the other hand, it may be decided to continue the purchase of 100 electric locomotives, and to pension off, say, 15 diesel locomotives instead[1].

3) In theory, the improvement in locomotive maintenance which the new workshop should ring about will translate into higher availability and reliability figures. This, in turn, should lead to increased revenues from both freight and passenger businesses. However, it is almost impossible to quantify the likely effect accurately (on data presently available) and therefore no attempt has been made to do so. The effect could, however, be a revenue gain of 1%-2%, which as a proportion of projected 1996 revenues would be between 140 million and 280 million Soms per annum.

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[1] These figures are purely imaginary, and serve only to illustrate the point.

14.1.2 Project variables

(1) The project life has been taken to be 30 years from 1997, over which period the scheme is evaluated.

(2) The currency in which the assessment is made is US dollars. The exchange rates used are $1 = 120 Yen, and (in an effort to reflect shadow pricing) $1 = 100 Som.

(3) The appropriate discount rate is a matter for debate. It is not an easy matter to determine UTJ's real cost of capital, when the capital markets in Uzbekistan are only just beginning to emerge, and when nominal interest rates are afflicted by comparatively high rates of inflation. A figure of 12% has therefore been chosen for the discount rate; this is higher than one would expect for a public utility in a more developed country, and reflects the somewhat higher risk attached to investment in Uzbekistan.

(4) In this particular case, economic and financial costs are not dissimilar, the project team being advised that goods imported by UTJ and paid for in hard currency are not subject to import tax. Staff costs are expressed excluding income tax at a rate of 37%, which would need to be added back to arrive at the net financial cost to UTJ.

14.1.3 Derivation of costs

(1) The breakdown in construction costs is shown in Appendix Table 14.1-1. Costs were obtained for two methods of lifting, one by jack and the other by crane. Subsequent investigation, however, has revealed that the crane method cannot be adopted. Both these and facilities costs should be tested by full, open competitive tendering at the appropriate stage.

(2) Facilities costs are detailed in Appendix Table 14.1-2. Again, two methods of lifting were considered, but only the jack method has been progressed further. In addition, the costs of full replacement of ageing equipment were isolated in order to provide two sub-options - the one providing for full replacement of equipment, the other not.

(3) Professional fees have been added at a rate of 10% of the total construction and facilities costs.

(4) An element of contingency has been incorporated, calculated at 5% of the total of construction costs, facilities costs, and professional fees.

(5) On the grounds that all avoidable costs should properly be charged to the project[2], an

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[2] An avoidable cost is defined, in this instance, as one which would not be incurred if the project did not go ahead. In the case of the new workshop it is quite clear that it could not perform its function without a pool of spare parts for the existing electric locomotive and multiple-unit fleet. The parts are therefore a sine qua non of the project, and their cost must, in consequence, be charged to it.

input for the purchase of initial spare parts has been made. Normally, the cost of locomotive spares is budgeted at around 10% of the procurement cost of a new locomotive or multiple unit. In this case, however, it ought to be possible to obtain spares second-hand - as a result of which a figure of 3% of average procurement cost for the existing fleet has been used. The calculation is as follows:

Number of Electric Locomotives	81
Proportion of 1-Section Electric Locos:	34/81 (42%)
Proportion of Multi-Section Electric Locos:	47/81 (58%)
Cost of New 1-Section Electric Locomotive:	$2.4m
Cost of New Multi-Section Electric Locomotive:	$3.3m
Average Cost of New Electric Locomotive:	$2.9m (2.4 x 42% + 3.3 x 58%)
Value of Existing Electric Locomotives if new:	$237 million (2.4 x 34 + 3.3 x 47)
Number of Electric Multiple Unit Coaches:	66
Average Cost of New EMU Coach:	$0.45 million
Value of Existing MU Fleet if new:	$30 million (0.45 x 66)
3% of New Value of EL/EMU Fleet:	$8 million (0.03 x 267)

However, the cost of spares has already been factored into the estimate of savings (see Clause 14.1.4) and therefore needs to be added back as a balancing benefit.

(6) One effect of the project will be to increase the number of staff over that which would be necessary if the project were not to take place. Details are given in Appendix Table 14.1-4. Currently some 11 direct employees are required for each DL/DS overhaul, and it has been assumed that this number will decrease to 9 employees for each EL/EMU overhaul. However, the projected increase in the locomotive fleet will lead to a net increase in employees, unless a lower fleet size is planned in which case there will be a reduction in employees. The costs in Table 14.1-4 have been expressed both inclusive and exclusive of income tax liability. As with the cost of spares, a balancing item is needed to take account of labour costs included in savings calculations.

(7) Incremental maintenance costs for the new facility have been assessed at 5% of procurement cost. The study team has been advised that because items of machinery do not receive intensive use in the workshop environment, and provided that proper maintenance is regularly carried out, the asset life will be coterminous with the project life at 30 years; therefore neither replacement costs, nor residual value, has been added into the final calculation.

(8) An assessment of incremental running costs (gas, water, electricity etc.) has been made based on the total energy costs for the entire workshop, excluding the costs of diesel fuel.

The incremental costs are assumed at 5% of the total; details are given in Appendix Table 14.1-3.

14.1.4 Derivation of benefits

(1) The principal benefit lies in the saving in maintenance costs from undertaking overhauls within Uzbekistan rather than sending stock to Russia/Ukraine. Moreover, this saving is one of hard currency. For each electric locomotive maintained domestically, a saving of $60,000 per section for a KP1 is assumed, and $64,000 per section for a KP2. The respective figures for an Electric Multiple Unit (per two-car set) are $41,000 and $42,000. The components of these savings are understood to be labour, materials and an element of profit. Appendix Table 14.1-5 has full details.

(2) The second major benefit lies in the reduced number of locomotives which will need to be procured. At present, sending each electric locomotive and multiple unit abroad for overhaul would take up no fewer than 44 days in transit time alone, which means that in the absence of the new workshop the fleet would be larger than it would otherwise need to be. There are therefore savings to be captured, amounting to around 12 locomotives and 2 MUs.

The cost of a new locomotive section has been averaged on the basis of 70% of a twin-section loco ($3.3 million halved) plus 30% of a single-section loco ($2.4 million), totalling $1.9 million. The calculation is given in Appendix Table 14.1-6. There are also likely to be savings in movement costs to and from the foreign workshops, although no assessment of these has been made.

(3) As explained above, no other benefits have been claimed for the project, even though one might expect improved reliability and availability to translate into additional revenues. At 1% of projected 1996 revenues (14.3 billion Sums - see Table 6.2-1), this would result in a present value of $7.1 million over the project life.

14.1.5 Evaluation of options

(1) Two primary options have been chosen for examination:

1) Case 1
Construction of a new workshop, together with full replacement of aged machines and overhaul cost given by UTJ.

2) Case 1a
As Case 1, but with a lower locomotive fleet.

3) Case 2
As Case 1, but with partial replacement of the aged machines, and overhaul cost in UTJ is 80% of that in foreign country.

(2) For each primary option, a sub-option has also been examined (Cases 1a and 2a) in which a lower locomotive fleet, consisting of only 400 electric locomotive sections, has

been assumed. Although the cost of procuring new locomotives cannot be considered as directly relevant to the evaluation of this project, it is important to bear it in mind as part of the wider electrification scheme. Whilst a higher fleet of locomotives obviously and inevitably adds more weight to the benefits side of the scale for the new workshop project, it also adds to the costs side of the scale for the electrification project. In the high locomotive fleet scenario, the cost of additional electric locomotive and multiple-unit procurement would, at current prices, amount to some $973 million, compared to a total of $560 million for a more modest fleet.

(3) The results of each evaluation are tabulated in Appendix Tables 14.1-8 (Case 1), 14.1-8a (Case 1a), and 14.1-9 (Case 2) and 14.1-8a (Case 2a).

(4) Table 14.1-8 indicates that full replacement of equipment, with a large locomotive fleet (Case 1), produces a Net Present Value (NPV) of -$3.3 million after 30 years. The EIRR is 10.3%, and by adding back the tax effect the FIRR is 9.7% (FNPV being -$4.4 million). Benefits-to-costs ratio is 0.94.

(5) Table 14.1-8a tabulates the same scenario with a smaller locomotive fleet (Case 1a). In this instance, the NPV worsens to -$16.4 million, with EIRR at 3.2% and FIRR at 2.6% (FNPV marginally worse at -$17.2 million). Benefits-to-costs ratio is 0.71.

(6) Table 14.1-9 evaluates Case 2 (partial equipment replacement with a large locomotive fleet and overhaul cost in Uzbekistan is 80% of that in foreign country) . The NPV is +2.8 million (FNPV + $1.7million) with EIRR at 17.1% and FIRR at 15.0%. Benefits-to-costs ratio is 1.08.

(7) A summary of results is given in Appendix Tables 14.1-10 and 14.1-11.

14.1.6 Sensitivity analysis

The NPVs for each case were recalculated assuming a) a 10% increase in total costs, b) a 10% decrease in total benefits, and c) a combination of a) and b). The results are presented in Appendix Tables 14.1-10, and 14.1-11.

14.1.7 Conclusion

(1) Evaluation of options, Case 1 and Case 2, is shown in the following table.

Unit (%)

		EIRR	FIRR
Case 1	Base case	10.3	9.7
	C+10% B-10%	5.6	4.9
Case 2	Base case	17.1	15.6
	C+10% B-10%	7.1	5.5

Note: C; Cost B; Benefit

1) Case 2 shows high EIRR figure of 17.1%, higher than the opportunity cost of capital (12%). However sensitivity analysis reveals that a change of cost and benefit flow i.e. increase in cost by 10% and decrease of benefit turn the figure of FIRR far below the opportunity cost. This calls attention of the policy makers when the project would be implemented

2) Case 1 is judged by its lower EIRR than the opportunity cost of capital, and thus is excluded from the policy alternative.

Case 2 is desirable, because it is empirically judged that the KP cost in Uzbekisatn will be 80 % of the entrusted KP cost in foreign country

(2) Conclusion

The electric locomotive repair workshop construction plan designed on condition of partial replacement of aged machines is feasible, because EIRR,FIRR and sensitivity analysis of Case 2 are robust and Case 2 is considered as reasonable case.

14.2 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

14.2.1 Objective of EIA study

Since the first system of environmental impact assessment (EIA) was established in the USA in 1970, EIA systems have been set up worldwide and become a powerful environmental safeguard in the project planning process. If significant negative impacts are predicted by the study, the change or modification of project can be considered.

14.2.2 Environmental impact assessment in Uzbekistan

(1) Action requiring an environmental assessment

Uzbekistan Government has an environmental impact assessment system. Uzbekistan has implemented a formal Environmental Assessment Process that relies on the laws relating to Nature Protection (1992), Protection of the Atmosphere (1981), Water Use (1993) and so on. Under these laws, the permission for the following activities must be obtained:

- Emission of pollutants into the air (maximum permissible emission);
- Discharge of pollutants into the water (maximum permissible discharge);
- Water use (norms and conditions of water and water allotment)
- Disposal of solid wastes;
- Use of biological resources
- Extraction of useful mineral resources for geological studies and other purposes.

During the design of new construction, reconstruction, retooling, or expansion of an active enterprise, an EIA procedure must be carried out if the original construction was carried out without an EIA, or if design decisions are different from those made under an earlier EIA.

The permissions for any of these activities are given by local bodies of the State Committee for Nature Protection (Goskomriroda). Before a final economic decision about a proposed project can be granted, environmental information on the project must be provided.

(2) Procedure

1) Preparation of a Draft EIA Report

According to the required procedure for preparing an EIA, a draft document must be assembled by the initiator, called the investor, of the proposed project or economic activity. This document must include an ecological assessment and a review and description of the project.

The draft document must:

- give a description of environmental features, air condition, surface and groundwater, soil, geology, flora and fauna, and so forth;
- present analyses and assessments of real alternatives to the proposed activity;
- describe the principal options considered relative to engineering and technology;
- describe the basic characteristics of the use of natural resources and pollution generation;
- give expert assessment and a forecast of environmental changes that will from the proposed project;
- propose measures to prevent or mitigate the possibility of adverse environmental impacts.

The draft EIA is prepared during the project development process and given by the investor to the local governmental and nature protection bodies. The goal is to identify all possible environmental and other consequences of implementation of the project, and to discuss all realistic alternatives to the project.

2) Public input

The EIA procedure requires that the draft report and supporting material must be presented before the public, and opinion from citizens must be received. This may be done as follows:

- publication of information describing the proposed project in newspapers;
- radio or television announcements;
- informational newsletters, flyers, or bulletins;
- public opinion polling;
- public hearings; and
-workshops.

A formal public hearing is carried out if required.

3) Application for land

On the basis of EIA materials and findings by Goskompriroda, the investor must prepare an application for a plot of land on which the project will be conducted.

4) Presentation

The basic findings regarding the proposed implementation of the project are described in an explanatory note, called the "Application about Ecological Consequences (AEC)". All materials prepared during the conduct of the EIA are then compiled into final file,

including:

- the draft EIA and results of its consideration by the local government and Goskompriroda;
- the final EIA report;
- a description of outcome of the public hearing stage;
- the characteristics of measures and arrangements about prevention of the possible negative consequences; and
- AEC.

(3) Environmental passport

In addition to EIAs (which must be prepared prior to construction), a special document known as an "environmental passport" is needed for the operation of enterprises. Environmental passports are basically permitting documents, and include detailed information, production methodologies, inputs used, wastes produced, and the technologies used to control them. Permissible limits for emissions, discharges, and solid wastes are defined. Passports must be updated every five years, or whenever and alteration is made that would affect the quantities of waste/pollutants produced as planned.

14.2.3 EIA on construction of electric locomotive repair workshop

(1) Introduction

The JICA Study Team will provide result of EIA study. When EIA study is carried out, we need detail information on location and lay out of sites, contents of project, project activities and others.

1) Objectives
The construction of electric locomotive repair workshop where the overhaul of electric locomotives and electric railcars of UTJ can be carried out.

2) Study area
Tashkent Workshop and its neighboring areas.

3) Project components:
- repair of buildings or construction of buildings; and
- installation of new machines, equipment and tools.

(2) Project activity

1) Construction phase
- employment of labor;
- mobilization of heavy equipment and construction materials;
- operation of heavy equipment such as truck, back hoe, compressor and others;
- demolition of existing structures;
- construction and improvement of structures;
- installation of new machines

2) Operation and maintenance phase

- operation and maintenance of machines and equipment;
- maintenance of building.

(3) Sources of environmental impact

1) Construction phase
- increasing employment opportunity;
- increasing traffic volume around the access road by transporting of heavy equipment and construction materials;
- generating noise by operation of heavy equipment and transportation of construction materials; and
- generating construction waste.

2) Operation and maintenance phase
- generating noise from operation of new machines and equipment;
- changing the consumption of water;
- changing the production of wastewater;
- changing the production of air pollutants;
- changing the production of wastes.

(4) Environmental impact prediction and its mitigation

1) Air quality

(a) Construction phase

Dust will be generated by demolition of existing structure, especially on windy days. Therefore, it is necessary to consider the wind direction and velocity in this demolition process to minimize the dust' influence to residents around the workshop.

(b) Operation and maintenance phase

For new facilities to be constructed, some measures for air pollution will be done. Dusts which occur from exhaust gas in a new air blowing room will be eliminated with a baghouse filter. And paint-aerosols and evaporated solvents which are produced in the process of painting in a new painting room will be eliminated with a wet air scrubbers. Therefore the production of air pollutants will not be changed after the construction of new facilities.

But at present, principal source of air contaminants are the foundry factory and its relation facilities. The main contaminants from them are dust and carbon monoxide,(Appendix 5-2,and Appendix 14.2-1) and the concentration of dust sometimes passes the maximum permissible concentration on the border of Tashkent Workshop. Some measures should be taken by UTJ to reduce the dust contamination. The following consideration is necessary:
- improving the process;
- exhaust gas purification; and
- translocation of these factories.

2) Water consumption

(a) Construction phase

The groundwater may be slightly influenced by digging soil, which depends on the position of water table (below 5m from the ground).

(b) Operation and maintenance phase

The present water consumption is 80 % of the maximum permissible consumption. After the project of the electric locomotive repair workshop's construction, the water consumption won't surpass this maximum permissible consumption, because of less water consumption of repairing a electric locomotive than that for a diesel locomotive and because of the reuse of wastewater treated with a new wastewater treatment facility which is under construction now.

Since the consumption of groundwater will decrease, there will not be problems relating to land subsidence and hydrological situation.

3) Wastewater

(a) Construction phase

Raw sewage to be produced during the construction of this project will be sent into the municipal sewerage system.

(b) Operation and maintenance phase

Wastewater which is produced in the Tashkent Workshop is sent into the municipal sewage system. Except the wastewater which will be produced from the wet scrubber in the new painting room, there is few factors in changing the wastewater quality. Depending on the property of solvents to be used in painting room, some part of solvents will enter into the wastewater after the treatment with the Workshop's wastewater treatment facility. The present wastewater treatment facility of the Workshop does not function well to remove the oil product from the wastewater.

Therefore, a new wastewater treatment facility is under construction to satisfy the maximum permissible concentration of pollutants toward the discharge into the municipal sewage system and to reuse the wastewater treated in this facility. After operating the new wastewater treatment facility, the quality of wastewater will be improved and the quantity of wastewater will be reduced. This facility is necessary for the Workshop to environmentally function well.

Furthermore, it is necessary to rethinking the process of production in order to reduce the water consumption and the produced wastewater, for example the process of the plating factory.

4) Water Quality

(a) Construction phase

The water quality of groundwater may be slightly influenced by digging soil, which depends on the position of water table.

(b) Operation and maintenance phase

At present, the concentration of oil products in the treated wastewater, which is sent into the municipal sewage system, surpasses the maximum permissible concentration toward the discharge into the municipal sewage system. This surpass of oil product in the wastewater may reduce the capacity of the municipal sewage system, and may indirectly contaminate the surface water system. Also from the viewpoint of water quality, the new wastewater treatment facility is necessary to protect the surface water.

5) Wastes

(a) Construction phase

Changing machines and equipment and demolition of building will generate wastes. Recyclable materials such as metal, glass, and so on should be separated from wastes in

order to reduce the quantity of solid wastes. Furthermore, wastes as accumulated sand on floor and ditches, and as surface soil should be paid attention because these solid may contain oil and metals. Therefore, disposal of the above mentioned wastes should be handled carefully. The remainder of wastes should be sent into the municipal final disposal place.

(b) Operation and maintenance phase

The quality and the quantity of solid waste will not be changed before and after this project. The Tashkent Workshop separates and recycles many materials such as metals, glass, oil products and so on, but it is necessary to further reduce the quantity of wastes at present.

Biowaste (separately collected kitchen waste and green matter) and yard wastes are separated from other wastes and should be sent to some institution to treat with the biological treatments such as composting and anaerobic processes. And it is necessary to use a high temperature furnace with which the reduction of paper, cloth, domestic wastes and sludge which are completely separated from chlorinated organic compounds not to produce dioxins.

6) Noise

(a) Construction phase

Noise will be generated by the following activities:

- demolition of existing structures (in Appendix 14.2-2);
- operation of heavy equipment (in Appendix 14.2-2); and
- traffic noise of trucks which will send the wastes into the municipal final disposal place (in Appendix 14.2-3).

It is necessary to communicate with neighbors on construction and traffic noise. But there are not sensible institutions like schools or hospitals in the affected area (Fig. 1 of Appendix 14.2-3).

(b) Operation and maintenance phase

It may be expected that the noise level will not change after the construction in comparison with the present state.

7) Traffic

(a) Construction phase

The following traffic will be carried out between inside and outside of the Workshop during construction phase:

a) from outside of the workshop into the inside:
- construction heavy equipment
- construction materials
- installed new machines and equipment

b) from the workshop to the outside
- construction waste
- no-used machines and equipment
- construction heavy equipment

There are pedestrians near the entrance into the main road. It is necessary to protect the pedestrians from the construction traffic.

(b) Operation and maintenance phase

It may be expected that the traffic will not change after the construction in comparison with the present state.

8) Economic activity

(a) Construction phase

Provided that construction materials can be bought in Tashkent, it can contribute to local economy.

(b) Operation and maintenance phase

It may be expected that economic activity will show a little increase after the construction in comparison with the present state.

9) Employment

(a) Construction phase

Construction of building will require workers. Therefore, employment will increase during the construction.

(b) Operation and maintenance phase

It may be expected that employment opportunity will slightly increase.

10) Fauna and Flora

(a) Construction phase

There is not a direct influence on fauna (in Appendix 14.2-4) and flora.

(b) Operation and maintenance phase

There is not a direct influence on fauna and flora. At present, the treated wastewater, in which the concentration of oil products surpasses the maximum permissible concentration toward the discharge into the municipal sewage facility, may reduce the capacity of the municipal sewage system and may indirectly contaminate the surface water system of Syr Darya water basin, and affect the ecosystem in this water basin.

11) Other social environmental factors

Since the construction will be done within the Tashkent Workshop, there will not be problems relating to resettlement, split of communities, cultural property and water right and rights of common.

12) Other natural environmental factors

There will not be a direct influence on topography, geology, soil erosion, meteorology, and landscape.

13) Offensive odor

There will not be a problem on offensive odor.

(5) Environmental consideration

1) The construction of electric locomotive repair workshop in the Tashkent Workshop will not induce the great deterioration of environmental condition, and the electrification of UTJ will reduce the air and water pollution.

2) The Tashkent Workshop should finish to construct the wastewater treatment facility which is under construction in order to reduce the input of oil product and other pollutants with the discharge of treated wastewater into the municipal sewage system. The neutralization of acid and alkali enhances the salinization of surface water, a

measure should be considered in order to reduce the discharge of neutral salts through wastewater.

3) The Tashkent Workshop should reduce the emission of dusts from the present operating facilities, especially from the foundry factory and relating facilities. If it is difficult to reduce the emission of dusts, the translocation of these facilities should be considered.

4) It is recommended that the Tashkent Workshop do the minimization project on wastewater, wastes and air pollution and reduce the consumption of natural resources such as water, fuels, raw materials and so on.

14.3 EXECUTION PLAN OF THE PROJECT

Tentative process of executing the project after submitting Final Report will be assumed as shown in Fig. 11.2.4-1

14.4 FUND PLAN

According to UTJ's funding plan relating to the Project, about 125million US$ including project cost of EL repair workshop construction plan, rolling stock and spare parts procurement plan, etc. is estimated in total.

Construction cost for this Project estimated by JICA team is 3940 million yen or 33 million US$

(exchange rate :1 US$= 120 yen) in total, and 3295 million yen or 27 million US$ (exchange rate = the same) partially in foreign currency is within UTJ's estimation of 25~30 million US$.

14.5 OVERALL EVALUATION AND RECOMMENDATIONS

(1) It is desirable that construction of the electric locomotive repair workshop proceed in accordance with the contents of the Final Report.

1) Financial and economic analysis reveal that the project will be feasible.

2) Significant environmental deterioration will not be caused by construction of the electric locomotive repair workshop in Tashkent Workshop.

3) The construction cost estimated by the JICA team coincides approximately with the funds planned by UTJ.
There will be no special problem relating to the funding plan.

(2) It is necessary to procure sufficient spare parts for undertaking KP-1 and KP-2 of rolling stock, in order that daily operation of the workshop may proceed smoothly.

(3) It is recommended that the following items be examined for the improvement of

UTJ or workshop management and operation.

1) Transportation.
   (a) Public announcement or advertising of train operation time table.
   (b) Train speed-up.
   (c) Improvement of track for train speed-up and good riding quality

2) Rolling stock maintenance work
   (a) Repair work method for electric rotating machine,etc.
      a) For armature and stator, it is not desirable to disassemble them completely down to the coil in every KP-1 and KP-2.
      b) For the main transformer mounted on the car body, in the case of KP-2, inspect the insulation resistance of insulating oil.
      c) Check the surface condition of tap-changer contactors.
      d) Clean the cooling air passage of main rectifier, etc.

   (b) Cleaning of rolling stock and parts.

   (c) Keeping work sites orderly and clean.

   (d) Application of neutral detergent for cleaning.

   (e) Increase of electric power supply capacity with the electricity authority.

3) Replacement of life-expired machinery.

4) Environmental facilities.
   (a) Early completion of waste water treatment facilities in Tashkent Workshop.

   (b) Reduction of dust emission from the present operating facilities in Tashkent Workshop.

   (c) Establishment of minimization project on waste water, wastes and air pollution.

5) Management and operation.
   (a) As UTJ heads towards becoming a more commercially-driven business, operating in a market economy, there will be an increasing need to review the entire basis of its internal accounting system in order to ensure that costs and revenues are properly allocated to the appropriate business activities at the lowest practicable level.

   (b) UTJ must look very closely at which of its current activities it wishes to retain and which it would prefer to divest. Regardless of the nature of any privatization strategy (if indeed any), the company may well wish to review the scope of its future involvement even in activities such as track maintenance or rolling stock maintenance, particularly if investment funds are liable to be scarce.

   (c) Steps should be taken, with the help of the new ticketing system, to establish a comprehensive data-bank of origin and destination information (together with other market data such as journey purpose, age, socio-economic grouping etc.), in order that a much more detailed picture of passenger travel demand can be painted.

(d) The likely ending of cross-subsidies from the freight to the passenger business will pose particular challenges for management. It is recommended that a review of existing high-cost strategies in the passenger business is urgently undertaken- particularly, for example, a review of the policy of running many passenger trains overnight which is extremely expensive in both capital and operating cost.

(e) The emerging scale and costs of this project, as it develops, need to be monitored closely in conjunction with the development of parallel projects such as electrification and locomotive procurement.

(f) Increase of daily car-kilometer for effective rolling stock operation management.

(g) Improvement of productivity in relation to the number of workers engaged in repair work and its volume.

(h) To make the Tashkent Worksgop organization tree simpler, by eliminating its two-tier management structure and to utilize staff members more flexibly and widely by making a clear distinction between the staff part and the line (work site; shop) part

(i) Motivation for raising employees' working attitude.

(j) Steady execution of management cycle, such as plan, do monitor and adjust.

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