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*CN 2976-AL*

**Report No. 7027-AL**

**STAFF APPRAISAL REPORT**

**DEMOCRATIC AND POPULAR REPUBLIC OF ALGERIA**

**SECOND RAILWAY PROJECT**

**May 26, 1988**

Infrastructure Operations Division  
Europe, Middle East and North Africa Country Department II

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CURRENCY EQUIVALENTS

(December 1987)

Currency Unit	=	Algerian Dinar (DA)
US\$1	=	DA 5.00
DA 1	=	US\$0.20

FISCAL YEAR

January 1 - December 31

WEIGHTS AND MEASURES

<u>Metric System</u>		<u>British/US System</u>
1 meter (m)	=	3.28 feet (ft)
1 kilometer (km)	=	0.62 miles (mi)
1 sq. kilometer (km <sup>2</sup> )	=	0.386 sq. miles (mi <sup>2</sup> )
1 metric ton (ton)	=	2,205 pounds (lb)

PRINCIPAL ABBREVIATIONS

BAD	-	Banque Algérienne de Développement
BNA	-	Banque Nationale d'Algérie
CALTRAM	-	Compagnie Algéro-Libyenne de Transports Maritimes
DIE	-	Directions de l'Infrastructure et de l'Équipement (Wilaya)
ENESA	-	Entreprise Nationale d'Aéronautique
ER	-	Economic Rate of Return
ERENAV	-	Entreprise Nationale de Construction Navale
GTT	-	Gross trailed tons
INFRAFER	-	Entreprise Nationale de Réalisation d'Infrastructures Ferroviaires
MOC	-	Ministry of Commerce
MOF	-	Ministry of Finance
MOI	-	Ministry of Interior
MOT	-	Ministry of Transport
MPW	-	Ministry of Public Works
SNTF	-	Société Nationale des Transports Ferroviaires
SNTM/CNAN	-	Société Nationale des Transports Maritimes
SNTM/HYPROC	-	Société Nationale des Transports Maritimes (Pétrole et gaz)
SNTR	-	Société Nationale des Transports Routiers
SNTV	-	Société Nationale des Transports de Voyageurs

## ALGERIA

## STAFF APPRAISAL REPORT

## SECOND RAILWAY PROJECT

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This report is based on the findings of missions to Algeria in June and October 1987 composed of Roy Knighton (Senior Transport Economist), Mohindra Bery and Jean Claude Gross (Consultant Railway Engineers), Jean de Gryse (Consultant Financial Analyst) and Jean Pierre Noël (Consultant Transport Economist).

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IBRD 19945 - Algeria - Second Railway Project

ALGERIA

STAFF APPRAISAL REPORT

SECOND RAILWAY PROJECT

Loan and Project Summary

BORROWER: Société Nationale des Transports Ferroviaires (SNTF)

GUARANTOR: Democratic and Popular Republic of Algeria

AMOUNT: US\$143 million

TERMS: Repayable in 15 years including five years of grace at the standard variable interest rate.

Project Objectives: The proposed project forms part of a broader more comprehensive approach to Bank lending in the transport sector. Among the major policy objectives to be pursued under the proposed project is the need to rationalize the railway investment program and to give adequate priority to rehabilitation of the network. Secondly, high priority is being given to the financial restructuring of the railway and the need to implement a new railway convention (contract plan) which sets out the objectives and actions agreed between the Government and the railway, particularly in relation to pricing, compensation, responsibilities for investment, and depreciation charges for railway infrastructure. Specific project objectives are: (a) rehabilitation of key sections of the main railway to meet demand at reasonable efficiency; (b) improvement of investment planning; (c) financial viability of the railway; and (d) improvement of managerial, organizational and operational staff capabilities.

Project Description: The proposed project would include financing of the following high priority components: (a) about 60% of the Government's three-year program (mid-1988 to mid-1991) for track rehabilitation and renewal covering 370 km of main line track; (b) support for a program of modernization of signalling and telecommunications including the installation of interlocking systems on selected sections of the main line; (c) provision of equipment to establish a capacity for mechanized track maintenance; and (d) technical assistance and training to support routine track maintenance activities, for the establishment of

a cost-accounting system and for improving the planning, management and operation of the railway system. The total cost of the project with contingencies is estimated at US\$431 million with a foreign exchange cost of US\$190 million. The Bank loan of US\$143 million would cover about one-third of total project costs and 75% of the foreign exchange cost. The balance of the foreign exchange cost - US\$47 million - is currently being sought from the Japan Ex-Im Bank under a joint co-financing arrangement. Local costs in the amount of US\$241 million would be financed from the investment budget.

Benefits and Risks: Support in restructuring the railway financially, institutionally and operationally, constitutes adequate justification for the proposed project. Bank involvement will help lower the burden on the Government's budget by increasing operational efficiency, improving the railway's finances and restructuring the railway investment program. Economic benefits from the track rehabilitation and renewal programs accrue in the form of substantial savings in deferred maintenance costs which would otherwise be necessary to keep the lines open to traffic, as well as in savings in train operating costs and a reduction in derailments. The modernization of signalling and telecommunications will also contribute to increased efficiency and improved safety as well as capacity benefits on suburban lines near Algiers. The main risk is that the railway is slow to implement the rehabilitation and institutional strengthening programs. However, given that the project finances the highest priority items of the investment program and that the project action plan would closely monitor investment allocation, the risks are manageable. In addition, a financial restructuring of the railway has recently been implemented and a related railway convention will be signed shortly. Confirmation to this effect has been received from the Government. Financial objectives are included as covenants in the loan agreement and specific financial targets and the terms of the railway convention are included in the Project Action Plan.

Estimated Costs: 1/

	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
	US\$ million		
Track Rehabilitation	59.4	44.9	104.3
Track Renewal	135.9	54.4	190.3
Signalling/Telecommunications	11.9	23.6	35.5
Track Maintenance Equipment	5.2	33.6	38.8
Phosphate Terminals	1.0	2.0	3.0
Technical Assistance and Training	6.9	15.4	22.3
Sub-total	220.3	173.9	394.2
Physical Contingencies	9.6	7.4	17.0
Price Contingencies	11.1	8.7	19.8
Total	241.0	190.0	431.0

Financing Plan:

	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
	US\$ million		
World Bank	-	143.0	143.0
Japan Ex-Im Bank	-	47.0	47.0
Government	241.0	-	241.0
Total	241.0	190.0	431.0

Estimated Disbursements: 2/

	<u>IBRD FY</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>
Annual		46.0	50.0	25.0	13.0	9.0
Cumulative		46.0	96.0	121.0	134.0	143.0

Economic Rate of Return: Track and Signalling/Telecommunications programs:  
22%

1/ Includes taxes and duties of about 15%

2/ Disbursements of Bank Loan covering 75% of foreign exchange cost.

## I. THE TRANSPORT SECTOR 1/

### A. The Transport System

1.01 For its domestic transport needs, Algeria relies on all modes of transport including road, rail, coastal shipping, gas and oil pipelines and aviation. Shipping and aviation dominate international traffic while pipelines move natural gas across the Mediterranean to Italy. With the importance of import traffic, the main transport flows are organized around the country's principal ports with little long distance movement within the country. However, an increasing emphasis on the development of local production and import substitution, particularly of basic commodities, will cause a shift in the pattern of transport flows and the railway is expected to continue to play an important role in supporting the development of the economy. As such, the railway will meet an increasing inter-regional demand for bulk traffic generated by the movement of commodities such as steel products, fertilizers and cereals.

1.02 The transport network is extensive and includes 44,000 km of primary (national) and secondary (regional) roads, of which about 80% are paved, 33,000 km of local (community) roads, 3,700 km of railways, 5,000 km of oil and gas pipelines, six main ports, and an extensive domestic air service. Road transport carries by far the largest share of total domestic traffic excluding crude oil. Over 25 billion ton-km per year or about 90% of total freight traffic and about 13 billion passenger-km or 90% of total passenger traffic are carried by road transport. While road traffic has increased at about 10% per year over the past decade, the growth of rail traffic has been more modest. Port traffic consists mainly of hydrocarbon exports amounting to some 57 million tons in 1986 as well as major import volumes of general cargo and bulk traffic (mainly cereals and cement) estimated in 1986 at 10 million tons and 6 million tons, respectively. Exports other than hydrocarbons, amounted to less than 2 million tons in 1986.

1.03 The 3,700 km railway network is operated by the Société Nationale des Transports Ferroviaires (SNTF), a public agency under control of the Ministry of Transport. The railway is handicapped by an old network with poor design characteristics and the existence of two gauges, but it plays an important role in bulk freight traffic. Phosphate and iron ore traffic in the eastern part of the country constitute almost one-third of total freight ton-km, while passenger traffic is concentrated mainly around large urban areas, particularly Algiers. In 1986, rail traffic amounted to 2.9 billion ton-km of freight with an average haul of 235 km. Of the 12.4 million tons of originating traffic, 5.6 million tons consisted of minerals, mainly iron ore, phosphates and coal. Passenger traffic in 1986 amounted to 2 billion passenger-km with an average haul of only 40 km. However, suburban traffic accounts for about half of the total passenger-km carried. Rail traffic has increased steadily over the past 20 years at about 3 percent for passengers and 6 per cent for freight.

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1/ This chapter is drawn largely from a Transport Sector Strategy Paper which was issued in Green Cover in October 1987 (Report No. 6727-AL).



## B. Transport Organization

1.04 In broad terms, the transport sector is administered by the Ministry of Public Works (MPW) for matters related to infrastructure, apart from the railways, and by the Ministry of Transport (MOT) for matters related to transport operations. Transport tariff regulations require the agreement of the Ministry of Commerce (MOC) jointly with MOT, while fiscal policy and the provision of recurrent budgets involve the Ministry of Finance (MOF). Because increased responsibilities have been given recently to local government authorities through the Government's decentralization policy (Wilaya, communes), the Ministry of Interior (MOI), which supervises local authorities, is also involved in the administration of the transport sector. In addition to its responsibility in pricing policy, MOC also plays a role in the distribution of various basic commodities including related storage facilities and means of transport. However, the present organization is likely to undergo substantial changes which have been recently announced by Government. Although there are some uncertainties at this time, the main trend is to lessen control of Government and grant more autonomy to the public enterprises which would be more accountable for their financial performance (paras. 1.06 and 3.16).

1.05 Some of the main issues in the transport sector stem from poor coordination among the various agencies involved in planning of transport facilities (para. 1.13). Regional planning considerations and the strategy for industrial development have had major implications for the construction of new railway and port infrastructure. In many instances, investments in transport have gone ahead without a clear decision as to whether related development in other sectors would proceed. Clearly, a streamlining of overall transport sector planning and a strengthening of the planning capabilities of the modal agencies deserve high priority. The preparation of a proposed National Transport Study and the creation of a transport planning coordination unit under MOT would be a logical starting point to improve the planning process (para. 1.15).

1.06 Both MPW and MOT are responsible for overall supervision of various public agencies and enterprises in the transport sector. MPW currently supervises (a) 13 enterprises involved in road and airfield construction, (b) three enterprises specialized in civil works in the maritime and port sectors, (c) six enterprises specialized in structures, (d) five public agencies (laboratories) devoted to geotechnical studies and one to maritime studies, and (e) four public firms responsible for preparing engineering studies. MOT is responsible for the public road carriers (five regional companies for passenger traffic created from former SNTV, SNTR for freight) operating on intercity routes, SNTF for the railways, the national airline Air Algérie, the aeronautical agency ENESA, ten port enterprises, three shipping companies, (SNTM/CNAN, SNTM/HYPROC, CALTRAM) and a newly created shipyard enterprise (ERENAV). All the agencies or firms are publicly owned, the private sector accounting for a small share of the road transport and the road construction industries. Here again, some changes are expected in line with the granting of more autonomy to public enterprises.

1.07 Both MPW and MOT are organized into functional and subsectoral departments. In addition to the central organization in Algiers, both Ministries act at the regional level through the decentralized Government services in the wilayas. Specific technical services dealing with basic infrastructure and transport are located within the same regional directorates (DIE) under the authority of the wali.

### C. Transport Investments

#### Recent Investments

1.08 Until the mid-1970s, very little had been done to improve the transport system in Algeria. However, rapidly increasing traffic during the 1970s, combined with the progressive aging of facilities, led to major investments in the sector during the 1975-79 and 1980-84 Development Plans. Total investments in the transport sector during 1980-84 amounted to DA 30 billion (US\$6.5 billion) compared with a planned amount of DA 39 billion (US\$8.5 billion). However, during implementation of the 1980-84 plan, there was a major shift in emphasis with road infrastructure accounting for over 50% of the investments, almost twice the level initially planned. In contrast, investment in railways were only one-third of the original planned level with much of the investment going into the construction of new lines connected with industrial development schemes and the Government's regional development effort.

1.09 Despite increased efforts, there has been a lag in meeting the needs for rehabilitation and modernization of the existing infrastructure. Pavement rehabilitation accounted for about 40% of total highway investment during 1980-85, for improving about 6,000 km of roads. This represents annually only 3% of the total paved road network rather than 7 to 10% which would correspond to a normal design life of 10 to 15 years for pavement structures. A similar critical backlog has accumulated with track renewal on the railways, only one fourth of the requirements having been met during the last 30 years. A stepped-up program of track renewal was initiated under the 1975-79 plan period with Bank assistance under the First Railway Project. However, instead of pursuing this program, the Government embarked on extensions of the railway network for which the economic justification has not been demonstrated. Similarly, in the port subsector, the rehabilitation and modernization of existing port facilities have been neglected while priority has been given mainly to secondary ports or to the development of new sites.

#### Investments under 1985-89 Plan

1.10 Total public investment originally planned for the transport sector (Table 1.1) during the current plan period 1985-89, was expected to reach DA 54 billion (US\$11.7 billion) of which 76% would be allocated to land transport, 15% to the maritime subsector, and 9% to civil aviation. This overall distribution would have been fairly close to actual expenditures during the previous plan period, although within land transport, the railways were to absorb 55% of total investment as compared with only 31% under the previous plan. This planned increase in railway investments was

related to a major extension of the rail network, a proposal which is inconsistent with the relative role of the rail subsector. In fact, actual investments during the first two years of the plan period show railway investments substantially below the objectives, while expenditures on road infrastructure have far exceeded expectations. Moreover, during 1986 there was a need to adjust public investment levels as a result of the major fall in oil revenues.

Table 1.1: Public Investment under the Five Year Plan 1985-89<sup>1/</sup>  
(DA million)

	<u>Original Plan</u>	<u>Actual 1985-86</u>	<u>Proposed Bank Core Program</u>
<b>1. Road Subsector</b>			
<b>1.1 Highways</b>			
National Roads	8,000	5,000	10,000
Wilaya Roads	2,000	1,500	3,300
Local Roads	<u>7,300</u>	<u>2,500</u>	<u>4,000</u>
	17,300	9,000	17,300
<b>1.2 Road Transport</b>			
SNTR	2,360	710	1,600
SNTV	<u>2,900</u>	<u>540</u>	<u>2,020</u>
	5,260	1,250	3,620
	<u>22,560</u>	<u>10,250</u>	<u>20,920</u>
<b>2. Rail Subsector</b>			
2.1 Infrastructure	15,150	4,330	11,360
2.2 Rolling Stock	<u>3,100</u>	<u>1,210</u>	<u>2,075</u>
	18,250	5,540	13,435
<b>3. Maritime Subsector</b>			
3.1 Ports	5,960	1,650	4,540
3.2 Shipping	<u>2,260</u>	<u>110</u>	<u>920</u>
	8,220	1,760	5,460
<b>4. Air Subsector</b>			
4.1 Airports	2,100	830	1,880
4.2 Air Carrier	<u>2,870</u>	<u>450</u>	<u>2,310</u>
	4,970	1,280	4,190
 <u>Grand Total</u>	 <u>54,000</u>	 <u>18,830</u>	 <u>44,665</u>

<sup>1/</sup> Urban transport and the Algiers metro have been excluded.

1.11 In order to assist the Government, a Bank plan review mission identified a core investment program for the transport sector. For the sector as a whole, investment is expected to be reduced by about 20% together with a reallocation of funds between various transport subsectors. A five-year core program has been identified for the transport sector as a whole, which would amount to about DA 44 billion (US\$9.5 billion). Road infrastructure would account for just over 40% of the total and railways about 25%. The major emphasis of this core program would be on rehabilitation of existing infrastructure, particularly for the railways, and on a modernization program for the existing ports. The main cuts in the program would be in new rail infrastructure, including the Algiers metro, in the construction of local roads and in renewal of trucking capacity. The construction of new railway lines would be limited to ongoing projects, but these projects would be implemented at a slower rate than originally planned (para. 2.22). Similarly, the construction schedule for the new Djen Djen port in the eastern part of the country, which began in 1985, is likely to be revised in line with lower port traffic prospects over the next five years.

#### D. Sector Issues

1.12 There are a number of issues which the government must address in the transport sector. These issues can be grouped in four main areas:

- (a) institutional coordination and overall planning;
- (b) sector management and operational efficiency;
- (c) transport investment planning; and
- (d) pricing and fiscal policy.

1.13 Greater coordination among the various agencies dealing with the sector is needed. For roads, coordination is required between the Ministry of Public Works (MPW) and the regional authorities (Wilayas) under the Ministry of Interior (MOI), to ensure more balanced investment allocation between various classes of roads. For ports, coordination is required between MPW and the Ministry of Transport (MOT) to promote modernization and rehabilitation rather than new construction. In addition, regional planning considerations and the strategy for industrial development have major implications for the construction of new railway lines and port facilities. This problem has been one of the most serious affecting the transport sector in recent years and has diverted attention away from the critical need to rehabilitate the existing transport infrastructure. Attention to the coordination issue is already being addressed by the Fifth Highway Project which is improving coordination in road rehabilitation and maintenance planning.

1.14 Improved management is needed to increase the operational efficiency and financial viability of major transport enterprises in all modes. In the road subsector the issues are: the utilization of the large own-account truck fleet, the high accident rate, truck overloading, and the

need to improve the information system particularly with regard to vehicle registration. In the rail subsector the issues are: the long turnaround time of wagons (12 days for an average distance of 235 km), the lack of demand for long-distance passenger traffic, and the shortage of capacity to carry out more substantial rail renewal programs. For ports, the development of container traffic should speed up throughputs and reduce transport costs provided technical and institutional constraints can be eliminated.

1.15 With increased resource constraints there is a need to apply sound economic criteria in the selection of transport investments. As mentioned above, the focus should be on modernization and rehabilitation rather than new construction. This is particularly true for the railways where the existing east-west trunk line should play a more important role in the distribution of local production gradually substituting for imports. The Government is now embarking on a National Transport Study, with financial assistance under the Fifth Highway Project, which should help define the future role of the various modes and establish investment priorities in the sector. The study would also be an opportunity to strengthen the capability of the Ministry of Transport to undertake such planning tasks and would provide training for its staff. The study would be managed by a proposed transport planning coordination unit under MOT whose role would be to upgrade overall transport sector planning.

1.16 Fiscal revenues from road users exceed actual expenditures on construction and maintenance but heavy vehicles do not cover their share of infrastructure costs. For ports and railways, less than full recovery of operating and infrastructure costs is achieved. The most critical situation is that of the railways where deficits have been mounting even without any attempt to recover infrastructure costs. If allowance were made for infrastructure depreciation, the 1985 operating deficit would be DA 1 billion (US\$210 million). A major financial restructuring combined with a clearly established relationship between Government and the railway in relation to level of service, pricing, compensations, responsibilities for investment and depreciation is provided for under the proposed project.

1.17 The recent decline in hydrocarbon revenues has brought a sense of urgency in dealing with many of the problems in the transport sector. The issues mentioned above have been discussed with the Government as part of an ongoing program of economic and sector work which includes an economy-wide review of the 1985-89 Development Plan and a Green Cover Transport Sector Strategy Paper issued in October 1987. The proposed project would be part of this overall effort to improve the institutional framework and would support the urgent rehabilitation of the key sections of the railway network and help the railway achieve financial viability.

#### E. Previous Bank Projects

1.18 In the transport sector, Algeria has received eight loans from the Bank, for a total amount of US\$615 million, to finance five projects for roads, two for ports and one for railways. Annex 9 provides a summary of the content and implementation experiences of these projects. The First, Second and Third Highway Projects (Loans 912-AL, 1407-AL and 1683-AL) have

been completed and fully disbursed. The implementation of the Fourth Highway Project (Loan 1892-AL), approved in 1980, is about two years behind schedule because of delays in bidding and evaluating alternative bids for construction of a major component. The Fifth Highway Project (Loan 2808), which was recently made effective, will provide support for a two-year program of road rehabilitation and contracted maintenance, technical assistance and training in road rehabilitation and maintenance planning, and in transport operations and studies in the transport sector including preparation work and design studies for railway and port projects. The highway projects were all characterized by delays due in a large part to lengthy civil works contracting and approval procedures and late start up of studies. The Project Completion Reports (and the Project Performance Audit-Report No. 2552, on Loan 912-AL) all concluded, however, that project objectives in each case were met, although several times project components had to be revised to keep pace with administrative and organizational changes taking place in Algeria.

1.19 The First Railway Project (Loan 996-AL), which was designed to support the railway's modernization program within the 1974-77 Development Plan, was mainly completed on schedule. However, the closing date was extended to permit completion of several important studies. The Project Completion Report indicated that, although the project largely met its objectives, the disagreement between the Bank and the Government on track doubling between Constantine and Randame Jamel led to a deterioration in the dialogue between the railway and the Bank. In addition, a cost accounting study included under the project was never completed and a cost accounting system has yet to be implemented in the railway.

1.20 The Bank participated in financing a major port at Bethioua (Loan 995-AL), designed for the export of liquefied natural gas. The implementation of an envisaged Second Port Project at Jijel (Loan 1427-AL) evaluated in 1976 did not materialize because of the postponement of an associated new steel complex. The loan was then cancelled in 1980.

## II. THE RAILWAY

### A. General

2.01 The difficult topography of the Algerian coast, the relatively large number of ports and the very similar patterns of agricultural production between the eastern, central and western subregions have limited the volume of east-west transport flows, both for freight and passenger traffic. Commodity flows are related mainly to imports and exports which move within well defined port hinterlands. However, some changes in these patterns are now taking place with the development of local industrial capacity, particularly in import substitution. Many bulk commodities such as steel products and fertilizers originate mainly from the eastern part of the country and therefore increasing east-west flows of basic industrial commodities are to be expected in the future. The railway is expected to play an increasingly important role in these commodity flows.

## B. Traffic

2.02 Total passenger traffic in 1986 was about 51 million passengers and two billion passenger-km representing about 13% of the total traffic carried by common carriers (Table 1). However, half of the two billion passenger-kms are related to suburban commuters, in the vicinity of Algiers, Oran, Constantine and Annaba. This suburban traffic has been growing at an annual rate of about 13% during 1980-85. By comparison, the trends for main line traffic have been rather erratic. Although the total number of passengers carried in 1986 increased by 7%, there was a recent change in the statistical definition of suburban and long distance traffic and hence the current trends are not clear. However, except for the Constantine - Annaba line, passenger traffic on the main routes has shown modest increases of about 3% per year during the period 1980-86. On the other hand, the average haul for long-distance passenger traffic is not more than 70 to 80 km which raises a question concerning the role of rail transport in the interurban passenger transport market. For the main routes overall passenger traffic is expected to continue to grow at a modest rate of about 2.5% per year in the medium term, particularly following renewal of many of the critical sections of the network.

2.03 Originating freight traffic lifted in 1986 was 12.4 million tonnes, generating a total of 2.9 billion ton-km, equivalent to an average haul distance of 235 km. Nearly 90% of the tonnage and of the ton-km was accounted for by eight commodities: iron ore, phosphates, coal and coke, steel products, refined oil, cereals, fertilizers, and cement (Tables 2 and 3). Mineral traffic - iron ore, coal and phosphates - which moves over less than 10% of the network, added up to 5.6 million tons (45%) and 900 million ton-km (30%). In the 1980-86 period, mineral traffic has remained more or less at the same level of around 5 to 6 million tons and 0.8 to 1.0 billion ton-km. However, non-mineral traffic has increased at over 5% per year during the same period.

2.04 Mineral traffic is not likely to grow in the next three to four years but could increase in the longer term with the development of local industry. Although iron ore exports have recently ceased, all domestic resources are now being processed at the El Hadjar steel works near Annaba. For locally produced steel products there is expected to be some growth resulting from traffic generated by import substitution activities. Overall, non-mineral freight traffic lifted by the railway, particularly oil products, cereals and fertilizers, is expected to grow at a modest 2.5% per year until the early 1990s. By then, with a possible recovery in oil prices and the completion of much of the track rehabilitation and renewal program, freight traffic growth could increase to about 5% in the longer term.

## C. Railway Property

### The Network

2.05 The total network route kilometrage is about 3,700 km-- 2,584 km of standard gauge and 1,116 km narrow gauge (1.05m). About 290 km (11%) of

the standard gauge network in the vicinity of Algiers, Oran, Constantine and Ech Chleff are doubled, principally for suburban traffic. The 1,700 km main standard gauge route (Grande Rocade) runs east to west between the Tunisian and Moroccan borders, parallel to the coast, through Annaba, Constantine, Algiers, Oran and Tlemcen. Spurs off the main line connect the ports of Oran, Arzew, Mostaganem, Bejaia and Skikda and the inland towns of Guelma, Tizi Ouzou and Ain Temouchent. The 398 km eastern mineral line, which carries over one-third of SNTF's heavy bulk traffic, runs due south from the eastern port and industrial area of Annaba and the adjacent steel plant of El Hadjar, to Tebessa and the iron ore mines of Ouenza and El Kouif and the phosphate mines of Djebel Onk. About 290 km of the mineral line are electrified (3,000 Volts DC). Four branch lines penetrate the southern regions of the country: the 410 km standard gauge line from El Gourzi to Touggourt, the railhead for the oil and gas fields of Hassi Messaoud and three narrow gauge branches: Blida-Djelfa; Relizane-Tiaret, Mohammedia-Bechar.

2.06 The terrain traversed by the east-west main line and the northern reaches of the branch lines is mountainous: the alignment has sharp curves and steep grades. Minimum curvatures and ruling grades are 200 m and 15 per thousand on the standard gauge and 100 m and 25 per thousand on the narrow gauge. On the eastern mineral line, however, loaded traffic runs down these grades except at a hump near Souk Ahras. Of the 293 km of double tracked main line, two sections, totalling 131 km, have recently been completed or are nearing completion: El Harrach-Thenia (35 km) and Ramdane Jamel-El Gourzi (96 km), the former for Algiers suburban traffic and the latter for augmenting main line capacity mainly to serve a new port being built at Djen Djen. Two extensions of the network are under construction. A 137 km new line connecting Ramdane Jamel to the port of Djen Djen, and a 150 km line from Ain Touta to M'Sila on the Haut Plateau, the site of a new agricultural and industrial resettlement area. In view of the current shortage of funds, the scope of these two projects has been revised. The double tracking of a 50 km section of the line from Djen Djen to El Milia has now been abandoned and only 15 km of the Haut Plateau line will be completed up to the Ain Touta cement plant (para. 2.22).

#### Traction and Rolling Stock

2.07 The traction and rolling stock fleet comprises 164 main line standard gauge locomotives (25 electric, and 139 diesel), five dual-gauge and 31 narrow-gauge main line locomotives, 24 diesel-hydraulic shunters and 30 autorails (2 car units), 628 coaches (41 narrow gauge), 13,005 wagons of which 3,519 are dual gauge. Axle loads are 20 tons on the standard gauge (22.5 tons on the mineral line) and 12 tons on the narrow gauge. Details of traction and rolling stock are in Tables 4 and 5.

2.08 The main line locomotive fleet, relatively young in age (94% of the stock is around 15 years old), is practically standardized on the GM series, a feature that has simplified immensely the maintenance and spare parts procurement and holding (para. 2.18). In contrast, the East German electric locomotives on heavy mineral duties on the eastern electrified lines, originally built in the early 1970s, have not rendered effective



service since their inception because of poorly designed auxiliaries which are incapable of being rectified. Owing to frequent breakdown attributable to gross overcrowding, the two coach diesel rail car units, originally acquired for Algiers' suburban services, have been redeployed to branch line and short range local passenger services, where their performance has improved. Following the recently carried out overhaul of the power units and refitting of the transmission on these rail cars further improvements are expected.

2.09 With the acquisition of 400 coaches (not yet fully delivered) and the retirement of 47 second-hand units, bought a few years ago, the share of overage coach stock is below 15%. Similarly, about 15% (1500 in number) of the wagons are overaged, particularly the general purpose covered and open stock, the majority of which are obsolete two-axle units. Dual-gauge stock is, in fact, all new, having been completely replaced in the last three years. On completion of current deliveries of 1,200 wagons against orders placed during 1982-85, the requirement for new wagons in the next three years will fall off sharply. It may revive thereafter but not to past levels of annual demand. All wagons are manufactured in the country in a state enterprise factory (SONAM) near Annaba, which has an annual capacity of 800 wagons of all types. The factory will consequently have to endeavor to diversify further its production in other areas of fabrication such as overhead and portal cranes, heavy steel structures (columns, trusses, bridge girders, silo frames) and other "jobbing" work.

#### Signalling and Telecommunications

2.10 Except for the recently doubled section between Ramdane Jamel and El Gourzi (96 km) and the ongoing doubling between El Harrach and Thenia (35 km), where color-light signalling and automatic block have been provided, the signalling on the main routes of the Grande Rocade and the electrified portion of the Annaba-Tebessa mineral line is electro-mechanical, the mechanical semaphore having been partly replaced by color light indications. The telecommunications for train operations, owned and maintained by the railway, are by open wire land lines (telephone/telegraph circuits) along the track. Cables have been foreseen wherever the line is doubled and in the remodelled Annaba Port/Steel Plant complex zone. There are three different types of block working (Table 6) graded according to the density of trains on the respective sections of the network. Generally, however, for all its other telecommunication needs, local and long distance, the railway is dependent on the Post and Telegraph services like any other subscriber.

#### Track

2.11 There are several different rail profiles of section varying from 46-54 kg/m on the standard gauge (mainly 46 kg/m) and 25-40 kg/m on the narrow gauge. Sleepers are a mix of steel, concrete and timber. The formation in many stretches needs repairs. Ballast is deficient and availability, within easy reach of the alignment, is generally of limestone of an "acceptable" hardness, although below the requirement of good mechanized maintenance practices. Less than 1,000 km of track have been renewed in the last 30 years and a serious backlog has accumulated. This

will have to be eliminated progressively in order not to interfere unduly with train movements, particularly on the intensely used portions of the mainline.

2.12 The railway owns five mechanized ballast quarries and six concrete sleeper plants. The combined production of these units is about 27 percent and 23 percent short of the total annual routine maintenance and program renewal demands of ballast (under one million cubic meters) and sleepers (under half million numbers) respectively. This shortage is expected to be recouped by take-over of more contractor-delivered plants. The service stock of nearly 1,000 wagons (ballast hoppers, rail flat cars, opens and covered) is old but adequate for civil works transport needs for the next five years.

### Tunnels and Bridges

2.13 Tunnels and bridges are, in general, in reasonably good condition. Five tunnels need rehabilitation. Two of these, located on the Algiers-Constantine main route, are important: the daylighting of the 75 m long tunnel at km 113 and the 2,258 m long El Achir Tunnel built in 1884. Repairs to this latter tunnel are being carried out by a local contractor and a proposal is also under study for its eventual replacement on a new alignment. Rehabilitation of some bridges on the mineral lines and the Algiers-Thenia-Constantine, Algiers-Tizi Ouzou, Algiers-Oran routes for which studies have been completed will be undertaken in the near future. Severe speed restrictions have been imposed on 32 bridges and culverts on the narrow gauge network which are below strength for the current axle load of 12 tons. A resume of the tunnel and bridge rehabilitation needs is in Annex 2.

### Stations, Loops, Yards and Sidings

2.14 The railway has 400 stations. On an aggregate of nearly 1,000 km of low train density sections of the standard gauge<sup>1/</sup> and on all the three narrow gauge branch lines, excepting a few key stations, most of the crossing stations are unmanned and train passing is arranged between the locomotive crew, equipped with portable hook-on telephones and the train controller. Crossing loops over the standard gauge system are generally suitable for train lengths up to about 900 tons (shortest length 250 meters). On the mineral line, the loops are of 500 m clear length permitting up to 94 wagons (short length stock) for mineral trains of 2,000-2,100 gross tons trailing.

2.15 The system is distinguished by an absence of marshalling yards, excepting for a low-hump one near Algiers (Caroubier) and the exchange yards at Annaba for the iron ore and phosphate traffic, which have been rationalized and expanded in the remodelling scheme, completed in 1986. Traffic is generally carried in siding-to-siding block trains and there are 161 user sidings and holding lines at the 79 stations serving them.

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<sup>1/</sup> These sections are mostly in the Western sector of the railway, plus the Touggourt and Tebessa-Djebel Onk branches in the East.

#### D. Maintenance of Plant and Equipment

##### Track and Track Equipment

2.16 Maintenance is manual, organized in gangs of 20 men, each with a beat of 28 km on the average. The manpower is 1.0 man/km. Mobility is by truck. Increasing difficulty is being experienced in recruiting track gang labor as the working conditions are deemed tougher than most other occupations. Normal maintenance is hampered by fast aging track and the paucity of ballast. Maintenance ballast replenishment will have to be augmented considerably to achieve rapid extension of mechanized maintenance, which is more efficient and, in fact, inescapable because of the irreplaceable diminishing manual gang labor. Station and yard lines are reasonably well maintained despite the lack of ballast, worn-out materials and restricted availability of maintenance time. Points and crossings, however, need greater attention on shunting and side tracks. Workshops for maintenance of track machines, vehicles and trollies and power tools are planned to be established at three centres in the course of the next two to three years. An increased capacity for routine track maintenance by mechanization and the requisite personnel training would be supported by the proposed project (para. 3.09).

##### Signalling and Telecommunications

2.17 Incidence of electro-mechanical signal failures is not high. Rectification is, however, dilatory because of delays in communication of defects and low mobility of repair staff. Open wire communication circuit failures tend to be high at times: this is due to insufficient attempts to improve what is deemed to be an obsolescent system eventually due for replacement. This is an erroneous attitude as circuit reliability can be considerably enhanced with least-cost minor improvements in fixtures and maintenance practices. Here again, low mobility hampers rapid restoration.

##### Traction and Rolling Stock

2.18 There are six depots and two workshops for locomotive maintenance, two workshops for wagons and one for carriage upkeep (Table 7). Main line diesel locomotives are well maintained and maintenance schedules in depots are fairly closely observed. Shunting locomotive availability is lower, firstly because of their dispersed deployment on the system and secondly because their release from traffic duties for maintenance is not very strictly observed and conversely the pressure for their return is greater. Electric locomotive maintenance has been a problem because of the poorly designed auxiliaries. Unit exchange methods are current in all workshops for bogies and other major sub-assemblies (traction motors, generators, engines). The workshop capacities, inclusive of accident repairs, are just about enough for the present fleet. Addition of shunters to the fleet may not present serious capacity problems, but capacity would need to be augmented within the next five years for main line locomotive additions.

2.19 Wagon maintenance is adequate but has, so far, not been up to the same standard as locomotives primarily because of shortage of capacity in

the lineside depots and workshops (see Table 7). However, a five-year program of improving the lineside facilities and extending the workshops was initiated two years ago and on its completion in the next three years, wagon availability is expected to improve perceptibly to 97 percent. To unify deployment, control of all privately owned wagons has been taken over by SNTF. Coach upkeep is satisfactory and with a younger fleet is expected to be better in the future.

#### E. Investment Program

2.20 In common with the rest of the economy, the SNTF prepares a five-year outline investment plan, followed by annual plans for each plan period. Within the framework of the five-year plan, commitments on specific projects and investment outlays are not entered into until successive annual plans are firmed up and approved by the Government.

2.21 Given current resource constraints, railway investments during the 1985-89 period are expected to average about DA 2.6 billion (US\$550 million) annually, equivalent to about DA 13 billion (US\$2.8 million) over the five-year period. This level of investment corresponds to the core program recommended by the Bank Plan Review Mission and would represent a reduction of about 28% over the initial plan target for the railway subsector of DA 18 billion (US\$3.9 million). Details of the railway investment program are given in Annex 2 while Table 2.1 summarizes the core program for the 1985-89 plan:

Table 2.1: Railway Investments 1985-89 Core Program  
(DA million)

	<u>Actual</u> 1985-86	<u>Planned</u> 1987-89	<u>Total</u> 1985-89	<u>%</u>
New lines	1,820	2,400	4,220	31
Modernization	1,389	1,522	2,911	21
Track Rehabilitation/Renewal	336	2,264	2,600	19
Track Maintenance Equipment	200	100	300	2
Track Material	49	18	67	1
Signalling/Telecommunications	-	200	200	1
Workshops	199	300	499	4
Rolling Stock	1,206	774	1,800	15
Locomotives	-	276	276	2
Other (tools, studies)	<u>340</u>	<u>225</u>	<u>565</u>	<u>4</u>
Total	5,539	8,079	13,438	100

2.22 In the core program, expenditures on new lines will be limited to certain ongoing projects, including early completion of the Beni Saf-Ain Temouchent line (25 km). However, the major ongoing project is the Ramdane Jamel - Jijel line (137 km), connecting the rail network to the port of Djen Djen, which is currently under construction, and to a planned steel works at El Milia. The scope of this project has now been reduced to exclude proposed double tracking between Djen Djen and El Milia (50 km)

while implementation of the project as a whole will be delayed. The revised program also reflects a recent decision to defer completion of the Ain Touta - M'Sila line (150 km) on the Hauts Plateaux; only the first 15 km section leading to the Ain Touta cement plant is now scheduled for completion during the current plan. The resources from these two projects are now being transferred to the track renewal program. Substantial cuts are also being made in the acquisition of traction and rolling stock. As such, during the remainder of the plan (1987-89), the highest priority is being given to track rehabilitation and renewal and ongoing modernization programs. As a whole, these programs will account for about one-half of the remaining investments under the plan. During project implementation, the Government will provide the Bank with details of the annual railway investment budgets, beginning in 1988 (para. 3.23).

#### F. Organization and Management

2.23 Established as a state enterprise, SNTF functions under the supervision of the Ministry of Transport. Government bears the capital and maintenance expenditure on the track and its related infrastructure formation, culverts, bridges, tunnels and road crossings. Equity is contributed by the State. The system of control and organization is identical to that of most other state enterprises in the Government-run economy of Algeria. The workers' unions are influential and participate actively in decision formulation and regulations affecting wages and salaries, working and housing conditions, job classifications, promotion and reward systems. In freight transport, the major users of the railways are almost exclusively other parastatals,<sup>1/</sup> Central Government organizations or local provincial and district agencies. Bulk traffic is preferentially allocated to rail. However, enterprises are increasingly allowed greater freedom and flexibility in modal allocation of inward or outward transport demands.

#### Organization

2.24 The Chief Executive of SNTF is the Director General who is appointed by Government. The line organization is territorially divided into four Regional operational Divisions - Algiers, Constantine, Souk Ahras and Oran - and six locomotive/rolling stock maintenance workshop units. At the Algiers headquarters of the SNTF, there are eleven departments, each headed by a Director, reporting directly to the Director General. The four Regional Divisions (see Chart 1) and the six Maintenance Workshops Units are directly under the Director General, although the latter units are administered, in practice, by the Directorate of Traction and Rolling Stock. In addition to the eleven Directorates, three service departments are attached to the Director General - the Computer Wing, the Social and Cultural Services and the Inspector General. The latter is basically a Safety Inspector performing a technical audit function to ensure

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<sup>1/</sup> Such as FERPHOS (Iron ore/phosphate mining), SIDER-HADJAR (Steel Mill) METANOF (Zinc, Sulfuric acid), NAFTAL (Petroleum Products), ENA Sucre, ENA Sel, ONAB (Cattle Fodder), ONAPASA (Fertilizer shipments to local agencies for distribution).

application and observance of safety regulations and standards in operations and maintenance of Rolling Stock and Infrastructure. In addition to the six mechanical workshop units, there were, until early 1986, three field track works units, one each located at Sidi Mabrouk, Oran and Khemis, again in principle reporting directly to the Director General. The track units have since been detached from the SNTF and become a part of a new parastatal INFRAFER (Entreprise Nationale de Réalisation d'Infrastructures Ferroviaires), specifically organized to execute track renewal works as an implementing agency for the railways (para. 5.08). A similar proposal is being actively explored towards abolishing the existing Directorate of Projects and substituting it, possibly in 1988, by another independent parastatal for carrying out, on contract, infrastructure feasibility, design and specification studies, project engineering and management (para. 5.10). Assistance would be provided in these areas under the proposed project (para. 3.12).

2.25 The Deputy Director General (Chart 1) assists the Director General on task-to-task assignments with no defined organizational responsibility or authority. The organizational pattern adopted is more or less common to all parastatals and reflects the Government's precepts of decentralization of authority and decision-making overseen by a central paramount entity. On the whole, SNTF's organization functions satisfactorily. Inter-directorate and inter-regional coordination could, however, be more efficiently managed, if the very wide span of control of the Director General is reduced. A new Director General was nominated early in 1988 and he is now increasingly delegating responsibility for day-to-day operations to the various directorates. In addition, the proposed project would support a first phase in the implementation of a management information system which should help to improve railway operations.

### Management

2.26 Procurement and stocking of all capital stores is managed by the User Directorates, of which Traction and Rolling Stock and Infrastructure are the most important. The Stores Directorate's responsibilities are confined to the procurement and management of only the spares and other maintenance needs of traction, rolling stock and their workshops: the system is computerized and functions efficiently. Responding to budgetary constraints, maintenance inventories have been reduced from 33 to 19-1/2 months holding and are to be brought down to 18 months, the minimum safe level (see Table 8 for annual purchase value changes). Schemes are under study for Stores Directorate to take over all stores management on the railway.

2.27 The computer services, centralized at the SNTF Headquarters, cover: payrolls and personnel statistics on retirements, medical benefits, stores accounting/recoupment/procurement and inventory control, traffic and general accounting and operational statistics. There is a long-term scheme (estimated cost DA12 million or US\$ 2.5 million) for expanding activities (with supplementary mini/micro computers) into real time applications in wagon control, transport plan follow-up systems, traffic costing, commercial freight accounting, cash flow and credit data processing and analysis, workshop costing, and passenger ticketing, particularly

suburban. Meanwhile, two pilot projects are to be set up in the next two years, one at the regional Headquarters, Algiers, for passenger ticketing and statistics and operation information systems and the other at the diesel workshops of Hamma (Algiers) for workshop costing, locomotive maintenance scheduling and provisioning and production planning. Assistance for this program will be provided under the proposed project as part of the training program (para. 3.12).

2.28 In general, the Directorates of Traction and Rolling Stock and of Stores Procurement and Supplies are efficient and effective in their functioning. With the shedding of track renewal works to INFRAFER, the Civil Engineering Directorate is now better placed to handle ordinary track and civil works maintenance: some cadre strengthening and in-house expertise will, however, be required to build up an organization effective enough to cope with the technology of modern mechanized track maintenance and the upkeep of track machines and equipment. The proposed project would provide both equipment and training to strengthen routine track maintenance (para. 3.09). In addition, the Planning Directorate's shortcomings in the areas of investment analysis, coordination of the planning effort and performance monitoring should be remedied by a closer integration of its functions and responsibilities in the management system at the corporate level. Improvements in investment planning and project preparation would also be addressed under the proposed project (para. 3.12).

2.29 Finally, budgetary control, traffic costing and cost analysis in general, are practiced at present in a very crude and diffused way, devoid of any critical analysis and test. This situation is partly, but not entirely, due to the absence of a cost accounting system, for which support would be provided under the project (paras. 3.12 and 5.06).

#### G. Human Resources Planning, Development and Utilization

2.30 With a staff strength of about 18,000, the productivity level is 257,000 traffic units per employee. Identified weaknesses in human resource inputs are mainly: over-bureaucratized personnel management lacking dynamism; deficiencies in the training system along with mediocre training management; and too many professionals and middle level technicians nearing retirement. The present staff distribution and training system are summarized in Annex 3.

2.31 Training is only up to the foreman levels and spans just the three operational departments - Operations, Infrastructure and Traction and Rolling Stock maintenance. SNTF's 14 institutionalized centers turn over annually 2,800 staff - half on first recruitment and the rest on refresher grade promotion short-time courses. Personnel of non-operational departments train on-the-job without systematic refresher exposure, a deficiency which is to be addressed in the proposed project. The formal training capacity is adequate for the next five years: some teaching aids and equipment need supplementing or replacing for which provision has also been made in the project. The most critical deficiency, however, is in professional cadre training. Technical assistance and equipment are being provided in the Bank's Fifth Highway Project to support a Railway Technical

Institute at Rouiba, where the buildings and hostels are available. This effort will be supplemented under the proposed project, which will allow further training fellowships in planning, economic and investment analysis, management, and finance and accounting (para. 3.11).

#### H. Operations

2.32 The SNTF operates daily, on the average, 204 passenger trains (166 suburban and 38 mainline/local) and 95 freight trains (65 unit block trains and 30 ordinary marshalled block trains). The total of nearly 300 trains per day is anticipated to clear in 1987 about 5.4 billion units of traffic, comprising 2.15 billion passenger-km (half generated by suburban traffic) equivalent in number to 51 million passengers, and 3.25 billion net ton-km of freight (or 13.2 million tons originating equivalent), one-third of which will be minerals (Table 9).

2.33 Practically, all freight is planned annually and moves in block trains of two kinds (Annex 4): the point-to-point unit block trains of dedicated wagons (oil tanks, mineral hoppers, fertilizers, bulk cement) and ordinary block trains, composed of all general goods wagons and a mix of general and dedicated stock. The latter formations increase wagon turnround as does, more significantly, the loading/unloading delays at terminals in both cases. The overall average 13-day wagon turnround (Table 10) is too high for a 235 km average haul and is to be reduced to 9 days in the project period (Annex 1, Table 3). Mineral traffic wagon turnround, where loading/discharge is mechanized, is efficient at 1.6 and 3.5 days (iron ore/phosphate). SNTF still carries some LCL traffic, which besides raising wagon turnround, ties up other resources disproportionately (Table 11). Already diminishing, this traffic needs to be shed quickly. Efforts to improve wagon turnaround will also include provision of additional sidings, greater use of shunting locomotives, and a sharpening of financial incentives to reduce wagon retention by users. In passenger operations, suburban occupation ratios of 80% are reasonable, but the local and mainline occupation ratios of 60% are low.

2.34 Some principal operating performance indices are in Table 12. Utilization of main line diesel locomotives is generally satisfactory. The kilometrage between on-the-road failures of 25-33,000 km is, however, low and a doubling of this figure could be equivalent to the addition of another two to three locomotives to fleet availability. SNTF has made a detailed analysis of the problem and is initiating multiple measures, including better trouble-shooting training of drivers, for reversing the adverse trend of the last two years. For reasons already mentioned, electric locomotive performance will remain poor until the 24 units of East German origin are replaced or substituted by diesels. A technical and economic study of the advantages of continuing with electric traction, together with the modernization of the eastern mineral line will be undertaken by SNTF in 1988. This will involve assessing the economics of extensions of the electrified line at the Annaba end and eventual replacement of the electric locomotives, compared to switching over to complete diesel traction, gradually phasing out the electric locomotives and building up diesel maintenance capacity at Souk Ahras.



2.35 The 1987 line capacity availability, utilization and train working methods are shown in Table 6. The two sections likely to experience capacity constraints are the Ramdane Jamel-Skikda and Annaba-Bouchehouf sections, where utilization is above 80 percent. Planned upgrading of the block system and communication improvement on the Constantine - Annaba route and parts of the Annaba-Tebessa line will be an appropriate insurance against incipient congestion conditions developing in the next few years. The project provides for these improvements. In short, the railway has sufficient resources of line capacity to cope with the projected growth of freight traffic. As for rolling stock and traction, turnaround improvements, coupled with the additional shunting locomotives, will generate enough wagon capacity, while the addition of some mainline locomotives will eliminate the current and anticipated marginal shortages of motive power.

2.36 The incidence of derailments (and collisions) is high, namely 50 per million train kilometers in 1984 and 60 in 1985. Two-thirds of the accidents are in station yards and sidings. SNTF needs to intensify staff training and responsibility-fixing for breach of safety procedures to cut the number of derailments by at least half in the next few years.

#### I. Uneconomic Lines

2.37 The principal network of the SNTF, the 2,584 km standard gauge system, has on average a combined passenger and freight traffic density of 3 million gross tons per kilometer of route (1986 level). On the 2,228 km of main lines, the traffic density varies from 8.44 to 0.99. The highest density is on the mineral line (Annaba - O. Keberit) and the lowest on the Biskra-Touggourt half of the 418 km El Gourzi - Touggourt branch, serving the southern oil field (Table 13). The Grande Rocade density levels are 4.84 on the Algiers - Constantine route and 3.91 on the Algiers - Oran Line. The remaining 316 km of the standard gauge make up what are essentially ancillary lines of the main system, which although having a low density of 0.39, are important as feeder or bridging links.

2.38 The three narrow gauge branch lines totalling 1,116 km - Blida-Djelfa (279 km), Relizane-Tiaret (166 km), Mohammadia-Bechar (671 km) - have an average density of 0.6 million gross tons per route kilometer (0.54 freight 0.06 passenger). Most freight tonnage moves inwards from the standard gauge: little or none originates on these lines either terminating on them or transiting to standard gauge destinations. The inward narrow gauge freight moves in dual-gauge wagons, bogies being changed at the junction stations; because of the lighter narrow-gauge axle loads (12 tons versus 20 tons) these wagons are loaded below maximum capacity, resulting in underutilization of available payloads over the standard gauge portion of the transit. In 1982 the narrow gauge lines were closed to passenger traffic owing to deteriorated track and poor bridge conditions: this traffic was revived in 1986 after the minimum necessary repairs were done. Long-term restoration of these lines to appropriate standard, for free circulation of traffic would require substantial investments in track repairs and renewals and bridge repairs and strengthening. The SNTF has, in the past, also contemplated raising axle-load standards to 18 tons, if not 20, to equalize system wagon

payloads. Neither the prevailing traffic levels nor the growth prospects warrant large scale investments. Conversion to standard gauge is even less viable, particularly, as the northern sections of these lines are located in areas of difficult terrain. The problem of these lines is to be addressed in the National Transport Study and pending the results of this study no investments will be made on them (para. 1.15). In addition, traffic on the El Gourzi-Touggourt standard gauge line is apparently also declining (Table 13), oil field activities having been reduced in recent years. Investments on this branch may need to be limited to maintaining prevailing standards of safety in operations.

#### J. Costs and Tariffs

2.39. Traffic costing is rudimentary and would be improved under the proposed project. Available data indicate that rates and fares are unrelated to costs and the occasional tariff increases<sup>1/</sup> effected in the last seven years have not matched increasing costs. Cost allocations have been made by the Bank on a replacement value depreciation basis for the 1986 notional income accounts. The method makes provision for (i) the impact of the latest tariff increases (August 1986) over the full fiscal year; and (ii) depreciation based on replacement cost of all investments (cost to community). However, depreciation on new lines (which will gradually come into operations from 1987 on) has been reduced to a token allocation commensurable with the light traffic expected. Also, depreciation on infrastructure in operation has been assessed on its marginal cost estimated at 30%. Details of calculations made are in Annex 7.

2.40 The results of the cost allocations show a low average cost recovery factor of 0.56, with passengers at 0.71 and iron ore and phosphates at 0.31 and 0.25, respectively. The latter two commodities would require tariff increases of 224% and 294% and other categories of between 42% to 95% to reach a 100% operating ratio (Annex 7, Table 1). Major tariff adjustments for phosphates would, however, be conditioned by world market prices and barter arrangements. Short haul movements of nearly 2 million tons over average distances of 10 km (brouettage) between the ports and steel and chemical plants, is grossly underpriced. Global tariff increases are incorporated in the financial forecast discussed in Chapter V (paras. 5.27-5.30). All tariff matters, including the adequacy or otherwise of distance tapers are to be reviewed in the cost accounting study (para. 5.06).

#### K. Accounts and Audit

2.41 SNTF's Financial Department comprises seven Divisions, including cash management, investment financing, general accounting, debt management, budget, cost accounting, and internal audit. Particular attention would be paid under the the project to strengthening the two latter divisions (paras. 2.44 and 2.45).

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1/ Tariff increases: 1979 general goods 23%; 1983 passengers 35%; 1986 iron ore 30%; phosphate 50%; general goods 40%; passengers - intercity 22%; suburban new tariff structure.

2.42 Double-entry accounts are only partly kept in accordance with the Plan Comptable National (Ord. 75 - 35 of April 29, 1975) which is compulsory. Income accounts and balance sheet are submitted to Government (Ministries of Transport and Finance) and to the Cour des Comptes by no later than three months after the close of the fiscal (calendar) year; this timing is generally adhered to. Centralization of accounts is still largely done manually and more recourse to data processing is desirable. The latter will be investigated by the costing consultants (para. 5.06).

2.43 The Cost Accounting Division presently manned by seven staff acts on an ad-hoc basis aiming at limited specific objectives; no comprehensive cost system has been developed. Substituting for the lack of cost data, the commercial division of the Operations Department is compiling information to assess average costs per gross trailed ton-km (GTTK) for freight and passengers, the findings of which have been used to support the tariff increases requested - and partly obtained - in 1986.

2.44 A system identifying the variable and fixed costs per line and per commodity and service is indispensable to SNTF's management, particularly as a new railway convention - providing a cost-based subsidization mechanism - has been agreed (para. 5.05). Therefore, a comprehensive costing study, providing for about 100 man-months over an 18-month period, should be given urgent priority. Financing for such a study is incorporated in the proposed loan (paras. 3.12 and 5.06).

2.45 The Internal Audit Division is staffed by one person who carries out specific field inspections. Recruitment of competent staff - although authorized by SNTF's budget--does not seem feasible, and the recently announced policy by Government to appoint one internal auditor per 1,000 employees in each public enterprise may well be difficult to implement. Urgent strengthening of the Division is needed given that:

- (a) the a priori control carried out in the past by the "Contrôleur Financier" from the Ministry of Finance has been discontinued for SNTF; and
- (b) no formal approval of SNTF's financial statements is forthcoming from Government although Ordinance No. 75-76 dated November 21, 1975, provides for issuance of an annual joint quitus by the Ministries of Finance and Transport.

The proposed costing study would provide for the setting up of internal control systems and audit.

2.46 External audit is in its infancy although the concept thereof is progressively better understood. Sporadic investigations are conducted by the "Inspection Générale des Finances", as well as by the "Cour des Comptes", aiming at specific objectives. A more comprehensive approach has been initiated in the "Loi des Finances" 1985 which provides for the appointment of "Commissaires aux Comptes" for each public enterprise. So far no "Commissaire aux Comptes" has been assigned to SNTF. A "Statut des Commissaires aux Comptes" is under preparation which will provide for

stringent professional qualifications and specific audit procedures. During loan negotiations, agreement has been reached on a satisfactory scope of external audit, in line with the Bank's guidelines, as from FY 1988.

### III. THE PROJECT

#### A. Background

3.01 In order to establish a routine track renewal program and to meet a backlog of track renewal works, a program was initiated under the First Railway Project (Loan 936-AL) during the mid-1970s. However, the momentum of this program was not maintained. During the period 1980-85, the railway has only been able to accomplish an average of about 20 km of track renewal per year. This has been increased to 80 km in 1986, with an expected level of 120 km in 1987. In comparison, the objectives of the current 1985-89 plan call for renewal of about 700 km of main line track. In order to meet the backlog, SNTF wishes to step up the rate of track renewal to about 200 km per year. Concomitant with the implementation of the track renewal program, SNTF plans to establish a force account capacity for mechanized track maintenance. The current plan also calls for modernization of signalling and telecommunications but only a small part of this program has been implemented. The Algerian authorities have requested that the Bank support these priority programs with a proposed Second Railway Project.

#### B. Project Objectives

3.02 The proposed project forms part of a broader more comprehensive approach to Bank lending in the transport sector which includes addressing such key issues as investment planning, pricing and fiscal policy and improvements in operational efficiency. The overall objectives of this approach are mainly institutional, particularly the need to upgrade the efficiency of the transport system, to improve the planning and management of investments and to train staff.

3.03 Among the major policy objectives which are pursued under the proposed project is the need to rationalize the railway investment program and to ensure that priority be given to rehabilitation of the network. Secondly, high priority is given to the financial restructuring of the railway and the need to implement a new railway convention which sets out the relationship between the Government and the railway, particularly in regard to pricing, compensation, responsibilities for investment, and depreciation charges for railway infrastructure. Finally, the project would help in achieving improvements in managerial, organizational and operational staff capabilities. The proposed project will assist the railway and the Government in these matters through the preparation and implementation of sound, well-tailored programs for investments, and through action plans to improve operational efficiency, accounting, tariffs and staff training. As such, the project will support the efforts of the railway to establish adequate interregional bulk traffic services over its

core network and to develop suburban traffic in the Algiers area. As improvements in railway operations can only be achieved over a relatively long period, the project should set the trend for a longer-term cooperation with the Bank.

### C. Project Description

3.04 The proposed project will cover a three-year program (mid-1988 - mid-1991) of high priority investment items as follows:

- (a) a program of main line track rehabilitation and renewal covering about 88 km of complete rehabilitation and 283 km of renewal;
- (b) support for a program of modernization of signalling and telecommunications including inter alia the upgrading of block systems on two selected sections of the main network;
- (c) support for developing a force account capacity for mechanized track maintenance, including provision of equipment;
- (d) provision of specialized unloading equipment for phosphates on the eastern mineral line;
- (e) technical assistance for the establishment of a cost-accounting system and for improving all aspects of the planning, management and operation of the railway system; and
- (f) training of SNTF personnel including providing support for the newly created Rouiba Railway Training Institute.

3.05 During negotiations, the project objectives and description were confirmed.

#### Track Rehabilitation and Renewal

3.06 Poor track conditions have seriously aggravated railway operations and have become a major safety problem. Line capacity has been reduced and there has been a significant increase in operating and maintenance costs. About two-thirds of the standard gauge lines, or an equivalent of about 2,000 km, are in poor condition and need replacement of rails while many sections also require rehabilitation of substructure. Without track rehabilitation and renewal, the track conditions would deteriorate even further resulting in an increased safety problem, higher costs and a greater loss of capacity.

3.07 INFRAFER is now operating three track renewal units which provide a capacity of about 120 km of track renewal each year. Given the size of the Algerian rail network, the current capacity of INFRAFER corresponds to the needs of a routine program of track renewal, assuming no major backlog of renewal and rehabilitation works. However, the railway needs to step up

its track rehabilitation and renewal program to about 200 km per year over the next five to ten years in order to meet the backlog in track works which has accumulated over the last decade. Support from foreign contractors will be required for this program, particularly for the more technically complex works (para. 3.25). Priority will be given to the rehabilitation of the most heavily trafficked sections between Algiers, Constantine and Annaba and to the eastern mineral line. Work has just started on a high priority 80 km section between Thenia and El Asnam with a joint venture between INFRAFER and local contractor Genisider. The proposed Bank project would pursue the program on the Algiers-Constantine line with track renewal undertaken by INFRAFER on about 88 km between Beni Mansour and Setif and a further 104 km between Setif and El Gourzi. International contractors will be required for the more complex works on rehabilitation of the 88 km line between Randame Jamel and Annaba and for renewal of track on about 91 km of the eastern mineral line between El Hadjar and Souk Ahras. The sections included under the proposed project, totalling about 370 km, would represent about 60% of the total track rehabilitation and renewal effort during the three-year period of implementation.

#### Signalling and Telecommunications

3.08 Obsolete signalling and telecommunications systems are found throughout the railway network. Priority is being given to modernization of the northern main line between Oran, Algiers, Constantine and Annaba, including the replacement of mechanical signalling by electric color-light signals and the improvement of 60 level crossings. An automatic line block system will be installed on the Algiers-El Harrach suburban line and a single line tokenless manual block system on the Ramdane Jamel - Annaba line. In addition, a total of 11 turnout control boxes would also be built at stations on these same lines. All this equipment will increase safety, enable higher operating speeds and generally increase the maximum possible charted trains. In particular, the investments on the Algiers-El Harrach suburban link will enable the railway to increase its share of suburban traffic which will lead to lower economic costs. Other priority investments covered under the proposed project include the modernization of telephone equipment for some 29 stations on the Thenia-El Gourzi section of the Algiers-Constantine main line and for seven stations on the Randame Jamel-Annaba line. The project would also provide for equipment for a signalling and telecommunications maintenance workshop. The signalling and telecommunications component included under the project would account for about 40% of the total signalling and telecommunications program approved by the Government and 70% of high priority investments in this program. The remainder of the high priority program includes the rehabilitation of cables over about 1,000 km of which 900 km would be open wire (Annex 1, Table 1). These cabling works are scheduled to begin during 1988. During negotiations, a core program for signalling and telecommunications was discussed and confirmed.

### Track Maintenance Equipment

3.09 As the track rehabilitation and renewal program is implemented, it must be followed by an improved program of mechanized track maintenance. Although the railway acquired a substantial amount of heavy equipment in 1985, this has been transferred to INFRAFER to cope with the track renewal program. Additional equipment will therefore be procured with a view to establishing an adequate capacity for routine maintenance. Given that SNTF is already hiring four heavy tamping machines from INFRAFER, the additional equipment to be procured under the project would consist of four light tamping machines, to be used on spot improvement works and for tamping points, rolling stock - about 70 units - dedicated to gang transport and to routine track jobs, eight shunters for ballast trains, various tools and machinery specific to routine track works, a unit for recycling deteriorated metallic sleepers, and various handling equipment assigned to track material storage pools (Annex 1, Table 2). Further details of routine track maintenance equipment are given in Annex 5. During negotiations the list of equipment was discussed and confirmed.

### Phosphate Unloading Equipment

3.10 Before track renewal works can be undertaken on the eastern mineral line, it is necessary to solve a problem of the track ballast which is being weakened by a leakage of phosphate fines from the hopper wagons currently in use. SNTF plans to introduce 280 high-sided open wagons to replace the existing hopper wagons. However, the use of the new wagons requires the provision of two specialized unloading facilities for the phosphate traffic. The unloading equipment would be financed under the proposed project.

### Technical Assistance and Training

3.11 A comprehensive program of technical assistance and training in the transport sector has been initiated under the Fifth Highway Project. For SNTF, the Fifth Highway Project provides technical assistance for training (168 man-months), along with equipment supplies, for setting up and operating an initial phase of a three year instructional program in a new superior Railway Technical Institute at Rouiba, where the infrastructure is already available. The Fifth Highway Project also provides for preparation of bid documents for track renewals on the eastern mineral line. The proposed project will continue to support SNTF's institutional development, including human resources and training needs, by financing a further tranche of the training program and the supply of teaching aids and equipment.

3.12 The project provides for 710 man-months of consultant services and 110 man-months of overseas training of SNTF staff. The consultant services are divided into two categories as under:

	<u>man-months</u>
<b>A. <u>Institutional Development</u></b>	<b><u>242</u></b>
a. Cost accounting study/implementation	100
b. Planning/economic analysis/engineering/ centralized wagon control	62
c. Personnel Administration/Training Management improvement	40
d. Computer applications (Pilot scheme for MIS improvement, ticketing)	20
e. Miscellaneous	20
<b>B. <u>Training</u></b>	<b><u>360</u></b>
SNTF Training Centers: Rouiba	160
Apprentices, skills for workers and technicians	180
Other	20
Foreign Study Tours	110

3.13 Financing for about US\$3.3 million will be provided for training support materials and equipment and about US\$4.3 million for computer and office support equipment. Terms of reference for the cost accounting study are included as Annex 8 (para. 5.06). Outline terms of reference for the study of a centralized wagon control system are in the Project File. Detailed terms of reference for the training program will be prepared in collaboration with the Bank. Further details of the training program are given in Annex 3.

#### D. Cost Estimates and Financing

3.14 Cost estimates for all components included in the project are based on late 1987 prices. The total costs include taxes and duties. Estimated costs for track rehabilitation and track renewal are based on a recent round (1986) of international bidding for the 88 km Annaba - Ramdane Jamel section, which was cancelled due to financial constraints, and on the recent costs of procurement of track materials. Details of track renewal unit costs and the estimated foreign component are given in Annex 6, Table 1. For signalling and telecommunication and related equipment, the costs are based on SNTF's estimates derived from prevailing market prices and associated domestic costs. Track maintenance equipment costs are also based on existing international price conditions. The cost of consulting services is based on average man-month costs for foreign consultants (comprising individual rate, international travel and local allowances) which are consistent with currently applied rates for Algeria for similar services. A 10% physical contingency has been applied to track rehabilitation and track renewal costs.



**Table 3.1: Project Cost Estimates /1**

	DA million			US\$ million			Foreign Exchange % Total
	Local	Direct Foreign	Total	Local	Foreign	Total	
<b>Track Rehabilitation</b>							
Annaba-Ramdane Jamel (88 km)	297.0	224.5	521.5	59.4	44.9	104.3	43%
<b>Track Renewal</b>							
(i) Awards through ICB							
El Hadjar-Boucheouf (45 km)	88.0	72.0	160.0	17.6	14.4	32.0	45%
Boucheouf-Souk Ahras (46 km)	91.5	75.0	166.5	18.3	15.0	33.3	45%
(ii) Awards to INFRAFER							
Beni Mansour-Setif (88 km)	229.5	57.5	287.0	45.9	11.5/2	57.4	20%
Setif-El Gourzi (104 km)	270.5	67.5	338.0	54.1	13.5/2	67.6	20%
Subtotal	679.5	272.0	951.5	135.9	54.4	190.3	29%
<b>Signalling and Telecommunications</b>							
(i) Telephone Modernization							
Thenia-El Gourzi (29 stations)	13.0	30.0	43.0	2.6	6.0	8.6	70%
Annaba-Ramdane Jamel (7 stations)	3.5	8.0	11.5	0.7	1.6	2.3	70%
(ii) Block Installations							
Single-line manual block (Annaba-Ramdane Jamel)	1.5	4.0	5.5	0.3	0.8	1.1	73%
Automatic line block (Algiers-El Harrach)	5.0	12.0	17.0	1.0	2.4	3.4	71%
(iii) Switch control boxes							
Annaba-Ramdane Jamel (7)	10.0	19.0	29.0	2.0	3.8	5.8	66%
Algiers-El Harrach (4)	5.0	9.0	14.0	1.0	1.8	2.8	64%
(iv) Level-crossing automatic barriers:	9.0	21.0	30.0	1.8	4.2	6.0	70%
(v) Light signals:	6.5	12.0	18.5	1.3	2.4	3.7	65%
(vi) Maintenance laboratory:	6.0	3.0	9.0	1.2	0.6	1.8	33%
Subtotal	59.5	118.0	177.5	11.9	23.6	35.5	66%
<b>Equipment for Routine Track Maintenance</b>							
(i) Light tamping machines (4)	2.0	14.5	16.5	0.4	2.9	3.3	88%
(ii) Rolling stock for gang transport and track works	17.0	126.0	143.0	3.4	25.2	28.6	88%
(iii) Tools and machinery	3.0	12.5	15.5	0.6	2.5	3.1	81%
(iv) Metallic sleepers recycling unit	1.0	3.0	4.0	0.2	0.6	0.8	75%
(v) Handling equipment	3.0	12.0	15.0	0.6	2.4	3.0	80%
Subtotal	26.0	168.0	194.0	5.2	33.6	38.8	87%
<b>Annaba Phosphate Terminals</b>							
Unloading equipment	5.0	10.0	15.0	1.0	2.0	3.0	67%
<b>Technical Assistance/Training</b>							
(i) Institutional development	3.5	14.5	18.0	0.7	2.9	3.6	80%
(ii) Training	5.5	21.5	27.0	1.1	4.3	5.4	80%
(iii) Overseas Study Tours	0.0	3.0	3.0	0.0	0.6	0.6	100%
(iv) Training materials	11.0	16.5	27.5	2.2	3.3	5.5	60%
(v) Support equipment	14.5	21.5	36.0	2.9	4.3	7.2	60%
Subtotal	34.5	77.0	111.5	6.9	15.4	22.3	69%
TOTAL BASE COST	1,101.5	869.5	1,971.0	220.3	173.9	394.2	44%
Physical Contingencies /3	47.6	37.2	84.8	9.6	7.4	17.0	44%
Price Contingencies/4	179.1	139.0	318.1	11.1	8.7	19.8	44%
TOTAL COST	1,328.2	1,045.7	2,373.9	241.0	190.0	431.0	44%

1/ Base costs are late 1987; some figures may not add up precisely due to rounding.

2/ Direct foreign exchange cost of track materials; details of track materials are given in Table 14.

3/ 10% on civil works contracts only.

4/ Applied to base cost and physical contingencies using the following inflation rates (%):

	1988	1989	1990	1991
Local	11.0	10.0	10.0	10.0
Foreign	3.0	3.0	3.0	4.0

Project implementation from mid-1988 to mid-1991.

3.15 The proposed loan would finance a part of the estimated foreign exchange costs of contracts, satisfactory to the Bank, for (a) track rehabilitation and track renewal; (b) track materials for track renewal work which would be performed by INFRAFER (paras. 3.18 and 3.25); (c) supply and installation of signalling and telecommunications equipment (except provision of installed communication cables and the installation of level crossing equipment for which nominated contractors would be employed); (d) supply of equipment for routine track maintenance; (e) supply of phosphate unloading equipment; and (f) consultants' services for technical assistance and training, including related training materials and equipment.

3.16 The total cost of the project, including physical and price contingencies, is estimated at DA 2.4 billion, equivalent to US\$431 million, with a foreign exchange cost of US\$190 million (Table 3.1). As such, the project would account for close to 30% of total railway investments expected during the three-year implementation period from mid 1988 to mid 1991. The cost of negotiated contracts for track renewal and level crossing works has been excluded from total project costs in order to establish the size of the Bank loan (paras. 3.18, 3.19 and 3.25). A proposed Bank loan of US\$143 million would meet about 75% of the foreign exchange cost of the project. A joint co-financing arrangement has been confirmed by the Japan Ex-Im Bank in the amount of US\$47 million, representing the balance of the foreign exchange cost.

3.17 The largest part - about 85% - of the proposed project is for track and related investments, which are being financed by unreimbursable contributions from Government to SNTF (concours définitifs). Likewise, the training component of the proposed project is the financial responsibility of Government, leaving only the study and technical assistance project component to be financed by SNTF. However, the new policy presently being formulated by Government calling for larger autonomy for public enterprises will ultimately require the latter to finance directly their debt service regardless of the ultimate usage of borrowed funds. In view of the new policy, the proposed loan would be made to SNTF with Government reimbursing 85% of the actual debt service on the Bank loan. During negotiations, the project cost estimates were discussed and confirmed. The terms and conditions of reimbursement by the Government to SNTF of its share of debt service on the loan (para. 5.11) are covered in the Project Action Plan (para. 3.23).

#### E. Implementation and Action Plan

##### Implementation

3.18 Track rehabilitation of 88 km and track renewals of 91 km are to be executed by contractors. Bids for the 88 km Annaba-Ramdane Jamel section for which bidding documents are complete, are scheduled to be invited in January 1988 and contracts would be awarded in early 1988 and would be eligible for retroactive financing (paras. 3.26 and 3.29). Bid documents for track renewal on Beni Mansour - Setif and Setif - El Gourzi sections, totalling 192 km, to be performed by INFRAFER, will be limited to

procurement of track materials (para. 3.25). The estimated quantities of track materials are shown in Table 14. Advertising for track materials is expected in the first half of 1988 with contract award by the time of loan effectiveness. For the 91 km of track renewal on the El Hadjar-Boucheouf and Boucheouf-Souk Ahras sections, the site survey, execution plan and bid documents are currently being prepared. Financing of consultant services for this purpose are provided under the ongoing Fifth Highway Project. As the preparatory work will take about one year, the contract will be awarded in early 1989. Implementation schedules for the track and other work is shown in Chart 2.

3.19 Bid documentation for the supply and installation of signalling and telecommunications equipment will be completed in early 1988. Installation of this equipment would start during the latter part of 1988 and the first quarter of 1989. Laboratory, level crossing and color-light signal equipment orders are scheduled to be finalized in 1988 and deliveries completed by mid 1989. SASIF, a joint venture of Siemens with local enterprise, is to undertake the installation of level crossing equipment. The telephone equipment for stations can only be installed after the communications cables have been laid between Algiers-Constantine and Skikda-Ramdane-Jamel-Annaba. The cables are locally manufactured and are to be installed by a local enterprise. Cable deliveries and laying will begin during 1988: placing orders for telephone equipment in mid-1989, with deliveries specified for completion in early 1990, will leave just enough time to install and test the equipment within the manufacturer's guarantee periods.

3.20 Track maintenance equipment supply, deliveries and commissioning would be phased in such a way as to enable the Infrastructure Directorate of the SNTF to mobilize and train the operational personnel and set up the appropriate normal mechanized maintenance organization in each of the four regions. The phasing in of new equipment is also tailored to suit the successive take-over by the regional organizations of the completed track rehabilitation and renewal sections, scheduled to occur in the period late 1989 to end-1991.

3.21 The main components of technical assistance are the cost accounting study and the organization of training for the technical and management cadres at the Rouiba school and foreign study tours training of selected SNTF staff. SNTF will be responsible for recruiting consultants for the cost accounting study and for procuring training materials and equipment. Instructor selection for the Rouiba center and candidate selections for foreign study tours are planned to commence before mid-1988 and training continued through 1991.

#### Action Plan

3.22 The Action Plan shown in Annex 1 constitutes a comprehensive record of project objectives and activities, including what action has already been taken, as well as timing and responsibilities relating to various steps and action to be taken during project implementation. The Action Plan provides for:

- (a) broad agreement on the overall scope and priorities of the railway investment program through 1990 and presentation of the annual program to the Bank;
- (b) arrangements for improvements in the organization and in the operational efficiency of the railway;
- (c) various actions related to improvement in the railway's financial performance including specific financial targets for 1991;
- (d) administrative, project preparation and procurement arrangements for the project; and
- (e) provision for training with particular reference to planning and project preparation, equipment maintenance and track maintenance.

3.23 One of the key items of the Action Plan is the overall scope and content of the railway investment program through 1990, including the balance of allocations between new investments and rehabilitation and maintenance of the existing railway system. During loan negotiations, assurances were obtained that the Government would allocate sufficient resources for the rehabilitation and renewal of about 200 km of track annually. Assurances were also obtained that the Government would present the draft annual railway sector investment budgets to the Bank, beginning in 1988. The Project Action Plan also summarizes the key features of the Railway Convention and defines the terms of reimbursement by Government to SNTF of infrastructure investments partly financed by foreign loans (paras. 5.05 and 5.11).

3.24 At negotiations, the content of the Project Action Plan and the schedule of project implementation were discussed and confirmed. Assurances were also obtained that the project would be implemented in line with the provisions of the Action Plan and that the plan will be updated annually in agreement with the Bank.

#### F. Procurement

3.25 Although SNTF wishes to make maximum use of local capacity to execute the track renewal program, it realizes that in order to catch up with much of the backlog and to achieve an implementation rate of about 200 km per year, there will be a need to rely on foreign contractors for about half of the program, who would be engaged through international competitive bidding (ICB). The other half of the track program under the proposed project would be undertaken through negotiated contracts with INFRAFER, the Bank financing track materials only.

3.26 Given the proposed joint co-financing arrangement with the Japan Ex-Im Bank, all procurement procedures would be handled by the Bank. Procurement will be in accordance with ICB procedures for civil works totalling US\$195 million including contingencies. These works would be

organized in two contract packages of sufficient size to attract competent foreign contractors. Track materials totalling US\$26 million including contingencies and equipment totalling US\$78 million including contingencies would be grouped into about 20 contract packages and procured through ICB in accordance with Bank guidelines. For procurement of goods through ICB, local suppliers would be allowed a margin of preference equal to the existing rate of customs duty applicable on non-exempt imports or 15% of the cost-insurance-freight (CIF) price, whichever is lower. Nabla elastic track fastenings (SNTF standards), which are a propriety item, will be procured through direct purchase (about US\$5.5 million). Training materials, training aids, computer and operational support equipment, totalling about US\$13 million would be procured through limited international bidding, except for contracts estimated to cost less than US\$150,000 which would be procured by international shopping; for such items SNTF would obtain written price quotations from at least three qualified suppliers. About 600 man-months of consultants services for training and studies would be procured in accordance with the Bank's Guidelines for the use of consultants. The procurement categories and respective amounts, inclusive of physical and price contingencies, are shown in Table 3.2.

Table 3.2: Procurement Analysis

<u>Project Elements</u>	-----ICB-----			Not Applicable	<u>Total</u>
	<u>Works</u>	<u>Materials Equipment</u>	<u>Other</u>		
			US\$ million /1		
1. Track Rehabilitation	119.7				119.7
	(51.6)				(51.0)
2. Track Renewal (ICB)	75.0	25.8	5.5 /2	100.9 /3	207.2
	(34.0)	(21.6)	(4.6)		(60.2)
3. Signalling/Telecommunications		34.6		2.5 /3	37.1
		(24.7)			(24.7)
4. Track Maintenance Equipment		40.6			40.6
		(35.2)			(35.2)
5. Phosphate Terminals		3.1			3.1
		(2.1)			(2.1)
6. Training Material/Equipment			13.3 /4		13.3
			(8.0)		(8.0)
7. Training/Technical Assistance			9.4 /5		9.4
			(7.6)		(7.6)
8. Foreign Study Tours			0.6		0.6
			(0.6)		(0.6)
	<u>194.7</u>	<u>104.1</u>	<u>28.8</u>	<u>103.4</u>	<u>431.0</u>
	(85.6)	(83.6)	(20.8)		(190.0)

- /1 Costs include estimated contingencies
- /2 Direct purchase of track fastenings
- /3 Implementation costs of negotiated contracts not financed by Bank (reserved procurement)
- /4 Limited international bidding or international shopping
- /5 Employment of consultants

Note: Figures in parentheses indicate amounts to be financed jointly by Bank/Japan Ex-Im Bank.

3.27 All contracts for civil works, and those for materials and equipment in excess of US\$500,000 each would be subject to prior review. This would cover more than 90% of estimated total contract values. Other Bank-financed contracts would be subject to post-award review. These procedures are compatible with the Bank's objectives of ensuring economy, efficiency and overall project soundness.

#### G. Disbursements

3.28 On the assumption that the Bank loan would finance 75% of the total foreign exchange cost, disbursements of the Bank loan would be made on the following basis:

- (a) civil works: 32% of total costs for track rehabilitation and 34% of total costs for track renewal let under ICB;
- (b) 75% of foreign expenditures for track materials;
- (c) 75% of foreign expenditures for signalling and telecommunications equipment;
- (d) 75% of foreign expenditures for track maintenance equipment;
- (e) 75% of foreign expenditures on phosphate unloading equipment;
- (f) 75% of foreign expenditures for training materials and office support equipment;
- (g) 75% of total expenditures on consultants services for technical assistance and training; and
- (h) 75% of the cost of foreign study tours.

3.29 Disbursements would be made against Statement of Expenditure (SOE) for eligible expenditures under contracts valued at US\$250,000 equivalent or less. Supporting documentation for these would be retained by the Borrower and made available for review by the Bank during supervision. The annual audits of the projects accounts would include a separate opinion on the disbursements made under the SOE procedure. This investigation would be part of a general external audit (para. 2.46). All other disbursements would be made against normal documentation submitted to the Bank. Agreement was reached during negotiations, on satisfactory procedures for disbursements under SOE.

3.30 In order to expedite project execution, a Special Account would be opened at a commercial Bank acceptable to the Bank with an authorized allocation of US\$15 million (four-month average of eligible expenditures). The documentation for replenishment requests would follow the same procedures as in para. 3.29. In addition, monthly bank statements of the Special Account would accompany replenishment requests. Agreement was reached during negotiations, on the establishment and operation of the Special Account which would also be audited annually as part of the general external audit (para. 2.46).

3.31 The closing date of the Bank loan would be December 31, 1992. The disbursement schedule shown in Table 14 has been developed from the implementation schedule shown in Chart 2 and assumes the project would be effective by September 1988, and would be completed by December 31, 1991. Disbursements under the First Railway Project took six years, although 85% of the loan was disbursed after four years. Disbursements under the three highway projects in Algeria have averaged about six years but two of them have included complex new construction components which ran into delays and required design changes. As the civil works under the project will be undertaken under traffic, they will by necessity have to be completed according to a tight schedule. On this basis, it is expected that disbursements would take place over a five year period.

#### H. Environmental Impact

3.32 Civil works under the project would be undertaken essentially along existing alignments and there would be no adverse environmental impact. As a result of the proposed investments, the increased efficiency in railway operations will cause some reduction in fossil fuel use along the routes included under the project.

### IV. ECONOMIC EVALUATION

#### A. General

4.01 Because of an inadequate track maintenance strategy during the last two decades the condition of railway network in Algeria has deteriorated, accumulating a serious backlog of track renewal and rehabilitation. The SNTF and the Government are now aware of the need to redress this situation, and the railway has embarked on a substantial program of track rehabilitation and modernization. Over 50% of railway investments during the period 1988-90 will be allocated to rehabilitation and modernization of the existing infrastructure, the share allocated to the completion of ongoing investments in new lines gradually declining during this period (para. 2.22). The proposed project focuses priority on those most heavily trafficked sections of the network, namely on the northern trunk line between Algiers, Constantine and Annaba, and on the mineral line between Annaba and Souk Ahras.

4.02 The proposed track rehabilitation and renewal programs will enable the railway to continue carrying essential bulk traffic over two of its most important routes at reasonable economic costs. In the absence of such programs, the condition of the track would continue to deteriorate, inducing even much higher operating costs. Ultimately the rail service might be disrupted leading to additional costs to the economy. The proposed improvements in track and in signalling and telecommunications facilities along these key routes will provide substantial savings in deferred track repairs, which would otherwise be necessary to keep the lines open to traffic, as well as in equipment operating and maintenance costs. The proposed project also aims at establishing a force account capacity for

mechanized routine track maintenance within SNTF in order to ensure a standard lifetime of the track. This improved maintenance program will also generate savings in operating and maintenance costs. These savings would ultimately be passed on to rail users through slower increases in rail tariffs, thereby lowering the cost of goods and products. The programs will also contribute towards savings in foreign exchange through increases in efficiency in the use of resources, both in railway equipment and in consumable items, as well as ensure continued foreign exchange earnings from the export of phosphates. As such, these investments will enable the railway to continue to play a key role in the development of the economy in the coming years.

**B. Traffic Growth**

4.03 Over the period 1967-86, the total traffic of gross trailed ton-km has increased at about 5% per year for the whole network (3,700 km), respectively at 3% for passenger traffic and 6% for freight. About 90% of the total traffic is concentrated on a core network of about 2,200 km of standard gauge lines. Traffic growth on this core network over the past twenty years has been slightly higher than for the network as a whole. Although since 1980 overall traffic growth has fallen somewhat to about 2.6% per year, all track works to be financed under the proposed project are located on sections of the core network where, with the exception of the eastern mineral line, traffic growth has generally been above average.

Table 4.1: Rail Traffic Growth (% per year)

<u>Line</u>	<u>1967 - 86</u>			<u>1980 - 86</u>		
	<u>Passenger</u>	<u>Freight</u>	<u>Total</u>	<u>Passenger</u>	<u>Freight</u>	<u>Total</u>
Algiers-Constantine	3.4	8.4	6.3	2.5	5.4	4.4
Annaba-Ramdane, Jamel	- 1.6	11.4	8.5	- 5.6	4.0	3.1
Annaba-0. Keberit	4.9	3.4	3.5	5.9	0.3	0.6

4.04 Traffic forecasts for the different sections under the proposed project have been based on simplified growth patterns with conservative assumptions on future growth. Apart from the eastern mineral line, freight traffic growth is expected to increase at about 2.5% per year through 1991, the proposed track renewal program precluding any additional growth. Beyond 1991, once the track works have been completed, freight traffic growth on the main network is expected to increase to about 5% per year. Forecasts for the mineral line are based on no increase in traffic up to 1991 followed by a 2.5% per year increase in the longer term. For passenger traffic, the average increase is expected to be about 2.5% per year, except on the section Ramdane Jamel - Annaba where traffic is expected to remain stagnant up to 1991, followed by a 2.5% per year increase once track improvements have been completed.



### C. Track Rehabilitation and Renewal

4.05 The economic effects of track rehabilitation and renewal are similar, the differences consisting only in the degree of improvement. Track renewal normally includes replacement of rails, track fastenings and sleepers, with only minor work on the substructure. Track rehabilitation normally involves removal and reconstruction of the substructure and ballast as well as the provision of new track materials. Minor changes in alignment can also be included in track rehabilitation. The main benefits of track improvements are:

- (a) reductions in track maintenance costs;
- (b) reductions in train operating costs through higher operating speeds;
- (c) decrease of wear and hence of maintenance costs of locomotives and rolling stock; and
- (d) increased safety through fewer derailments.

4.06 Reductions in track maintenance costs constitute by far the most important benefits of track rehabilitation and renewal. Such costs would increase substantially in the future in order to keep lines open to traffic, this being the only reasonable scenario compared to the alternative of line closure and diversion of traffic to road transport.

### D. Signalling and Telecommunications

4.07 Investments in signalling and telecommunications are necessary because existing equipment is obsolete and inadequate for the efficient operation of the railway. The principal effects of modernizing signalling are:

- (a) increased safety which is reflected in a decrease in accident costs;
- (b) reduced block times through increased speeds which follow from more rapid execution of signalling actions thereby increasing utilization of traction and rolling stock; and
- (c) savings in staff costs resulting from the introduction of automatic signalling functions and the introduction of automatic level crossing gates.

4.08 While the effects of modern signalling can be quantified, the benefits associated with telecommunications investments are difficult to estimate on a line-by-line basis. Clearly these investments increase staff productivity and raise the general efficiency of railway operations.

### E. Economic Return

4.09 Annex 6 describes the assumptions used in the economic analysis of the track rehabilitation/renewal components and the signalling and telecommunications improvements under the proposed project. An economic evaluation has been undertaken for each of the five track rehabilitation and renewal sub-projects which together account for over 75% of total project costs. Track rehabilitation and renewal will be of special significance for the main line linking Algiers, Constantine and Annaba, the proposed project providing for 88 km of rehabilitation and 192 km of renewal along this route. This is in addition to ongoing rehabilitation works covering 80 km between Thenia and El Esmam (para. 3.07).

4.10 The proposed investments in signalling and telecommunications are concentrated mainly on two key lines, namely Annaba - Ramdane Jamel and Algiers - El Harrach, these investments accounting for about 4% of project costs and about 45% of signalling and telecommunications investments under the project. Signalling and telecommunications improvements on the Annaba - Ramdane Jamel line would involve upgrading to a single line, tokenless block system, including the provision of telephone equipment in seven stations as well as seven turnout control boxes. Signalling on the Algiers - El Harrach suburban line will involve installation of an automatic line block system and four turnout control boxes thereby increasing capacity and safety for commuter traffic. Other signalling and telecommunications investments under the project include the upgrading of 60 level crossings and the provision of electric signals throughout the northern main line as well as station telephone equipment at 29 stations between Algiers and Constantine. As the effects of these other investments are so diffused throughout the system, no attempt has been made to estimate individual ERs for these investments. Similarly, the benefits of improved routine track maintenance, which will be built up gradually following the rehabilitation and renewal program and the introduction of new track maintenance equipment, have not been estimated.

4.11 Table 4.2 summarizes the results of the economic evaluation for the various project components, based on the most probable estimates of costs of construction, equipment, operation and maintenance. The estimated ERs on the track rehabilitation and renewal program range from 18% to 27% with an overall average of about 22%. The ERs are somewhat higher for track renewal as opposed to track rehabilitation in view of the lower unit investment costs. Because of the absence of origin-destination traffic data which would be necessary to assess the costs of a road transport alternative, a detailed evaluation for the signalling and telecommunications improvements on the Annaba - Ramdane Jamel and Algiers - El Harrach lines was not possible. However, these investments are estimated to yield ERs of at least 15%, as are the more diffused investments in station telephone equipment and level crossing improvements (Annex 6). Investments in track maintenance machines which will enable the railway to gradually develop a routine track maintenance program should have an ER of at least 30%. Based on these assumptions, the overall ER for the project would be about 22%. All investments would yield acceptable first year benefits (FYB)

Table 4.2: Economic Returns (ERs)

<u>Project Component</u>	<u>Proportion of Total Investment /1</u>	<u>ER</u>	<u>Sensitivity Analysis /2</u>
<u>A. Track Rehabilitation</u>			
Annaba-Ramdane Jamel (88 km)	28	18	14
<u>B. Track Renewal</u>			
(i) Beni Mansour-Setif (88 km)	16	24	18
(ii) Setif-El Gourzi (104 km)	18	22	16
(iii) El Hadjar-Boucheougouf (45 km)	9	22	18
(iv) Boucheougouf-Souk Ahras (46 km)	9	27	22
<u>C. Signalling and Telecommunications</u>	10	15 /3	12 /3
<u>D. Track Maintenance Equipment</u>	10	30 /3	20 /3
<u>Total</u>	100	22	

1/ Excluding studies and training.

2/ Assumes 10% increase in costs combined with 10% decrease in benefits.

3/ Estimates only (see Annex 6).

in excess of 10%. Even with a 10% reduction in project benefits combined with a 10% increase in costs, all project components continue to show acceptable ERs. As a whole, the results of the evaluation can be considered conservative in view of the broad, systemwide effects of the proposed project and the increased comfort and convenience for passengers on the improved facilities.

#### F. Project Risk

4.12 The proposed project supports high priority components of the 1985-89 railway investment plan. In addition, all project components involve proven technology and their economic justification has been clearly demonstrated. The main area of risk relates to possible delays in implementing track works, although this problem will be mitigated through the use of experienced international contractors on the more difficult sections of track. A second area of risk involves possible shortfalls in financial resources for the project. However, the project includes the highest priority components of the investment program. In addition, close monitoring of overall investment allocations under the provisions of the Project Action Plan should provide a safeguard against a shortage of funds.

4.13 Finally, a sensitivity analysis has been conducted to test the effects on the viability of project components of a substantial change in the dinar exchange rate. After estimating the share of foreign exchange

expenditures in project costs and project benefits, these were then converted into border prices assuming a devaluation of the dinar of 100%. Although this change affects costs and benefits in a similar manner, the slightly higher foreign exchange component of project cost tends to give marginally lower ERs. However, all project components continue to show acceptable ERs under this assumption ranging from 14% to about 22%.

## V. FINANCIAL EVALUATION

### A. Relationship between State and SNTF and Institutional Matters

#### Introduction

5.01 Until January 1, 1977 the institutional relationship between the State and SNTF and their respective financial responsibilities were written into a Railway Convention dating from June 30, 1959. However, the provisions of the 1959 Convention have not always been adhered to; Government compensation was not or was only partly granted and, consequently, the financial situation of SNTF deteriorated steadily until drastic corrective action became necessary. In December 1978, the Government agreed to a series of financial measures (known as Restructuration Financière) which included inter alia: (a) consolidation and refinancing of existing debt on concessionary terms; (b) cancellation of overdue interest; and (c) granting of additional working capital. However, the 1959 Convention was not replaced and, since 1978, the respective financial responsibilities of State and SNTF have been unclear, resulting in erratic contributions of Government totally unrelated to SNTF's requirements.

5.02 Since abrogation of the convention, Government contributions comprise an annual flat compensation for below-cost passenger tariffs of DA 3.5 million and a subsidy (subvention d' équilibre) to cover the cost of vocational training (a policy applicable to all public enterprises), and interest charges on external lending for purchase of rolling stock (perpetuating a measure taken as part of the 1978 restructuration financière). The compensation paid for low tariffs is grossly inadequate and was discontinued in 1982 but resumed with retroactive effect in 1986. In addition, since 1983, the subsidy also includes track maintenance costs and this has tripled the annual amount of the Government contribution. These contributions compensate only in part SNTF's operating deficits which had to be financed by a substantial Bank overdraft. On the other hand, Government contributions to capital expenditure have remained in line with the provisions of the 1959 Convention. The State finances the construction and renewal of track, and SNTF finances rolling stock and other equipment through borrowing from Banque Algérienne de Développement (BAD) for long term, and from Banque Nationale d'Algérie (BNA) for medium term. Self-financing of capital expenditure has recently been authorized, but it has obviously not been available to SNTF.

### Financial Restructuring

5.03 Below-cost tariffs, inadequate Government compensation, and increasing working expenses have deeply deteriorated SNTF's earnings position. This situation, together with the unsatisfactory collection of receivables and a growing debt service, made it necessary to undergo a second financial restructuring. Various proposals were submitted by SNTF to Government since 1985. A final set of measures were approved by the Council of Ministers in November 1987 and these measures were implemented early in 1988 as part of the 1988 "Loi des Finances". These measures provided for:

- (a) Government contribution of DA 1,000 million to SNTF's equity;
- (b) consolidation by Government of principal due by SNTF to BAD and Treasury on December 31, 1986, and not paid, in the amount of about DA 460 million;
- (c) loan from Treasury of DA 650 million; and
- (d) a global tariff increase of 20%.

5.04 The financial restructuring also provides for compensation by Government of SNTF's operating deficits (including interest charges) in 1987 and 1988. These measures have greatly assisted in re-establishing SNTF's creditworthiness and were considered a prerequisite for Bank lending.

### Railway Convention

5.05 Experience has proved that financial restructuring measures have only short-lived curative effects unless they are taken in conjunction with well defined policies which state anew the respective responsibilities - for operations and investment - of State and SNTF. Therefore, concurrently with the second financial restructuring, a new Railway Convention has been drawn up which provides for Government compensation to cover uneconomic lines and services, below-cost tariffs, fare reductions imposed by Government, purchase of rolling stock imposed by Government but not warranted by operations, and level-crossing costs. The convention also provides for unreimbursable financing by State of infrastructure investments, including maintenance costs. The railway convention was approved by the Council of Ministers in November 1987 and will be signed shortly. Confirmation to this effect has been received from the Government. In addition, the main features of the railway convention are included as part of the Project Action Plan (para. 3.23).

5.06 The new railway convention can be operative only if reliable cost accounting is available to substantiate SNTF's claims for compensation. The proposed project makes provision for the services of costing consultants which are to develop such pricing tool. Draft terms of reference have been prepared and are shown in Annex 8. During negotiations, the terms of reference and implementation arrangements for the study were discussed and confirmed. Assurances were also obtained that SNTF

would employ cost accounting consultants by December 1, 1988 and that the proposed cost accounting system would be presented to the Bank for review and comment by December 1, 1989.

5.07 A complete costing system cannot be operative before FY 1990; until such time compensation due to SNTF will have to be assessed on the basis of data available. During this unavoidable intermediate period, close monitoring by the Bank will be needed to ensure to the extent possible adequate compensation to SNTF.

#### Other Institutional Matters

5.08 The acknowledged policy of Government is to separate institutionally railway operations from railway investment and renewal works and, eventually later on, from railway project preparation. Therefore, by Decree No. 86.162 dated August 5, 1986, the public enterprise INFRAFER was created to carry out track and related works, including renewals and major maintenance. It started operations on January 1, 1987; about 950 staff from SNTF's track department were transferred to INFRAFER with no change in statute or pay. Currently, INFRAFER acts as SNTF's force account track unit, with track materials provided by SNTF. However, if INFRAFER is to be dealt with as a contractor in competition with domestic and foreign construction companies, it will need the appropriate technical and financial means to carry out track works. This will involve transfer from SNTF of necessary track construction and maintenance equipment, and related inventories, and adequate working capital.

5.09 In the past SNTF has been the institutional channel of studies and other activities related to the future metro of Algiers. Since January 1, 1985, these operations have been passed on to the newly created Entreprise du métro d'Alger. However, SNTF is still carrying in its books studies amounting to about DA 375 million and some related operating expenses. These entries should be eliminated from the balance sheet; provision to that effect is in the Action Plan (Annex 1).

5.10 The present investment financing system calls for SNTF to finance studies out of its own resources; they are ultimately repaid by unreimbursable State contributions to investment (Concours Définitifs). Actually SNTF pre-finances these studies through Bank overdraft with ensuing interest charges which are not reimbursed by Government. This practice will be discontinued soon with the setting up of a railway project preparation enterprise distinct from SNTF; the decree establishing the new enterprise is under preparation.

5.11 SNTF is fully servicing Bank Loan No. 996-AL (First Railway Project) dated June 10, 1974, and the Government is reimbursing to SNTF its share (about 70%) corresponding to the track portion of the project. During loan negotiations, arrangements were agreed upon for easy identification of the track and training portion of the proposed project in the "Proceeds of the Loan" which are to be reimbursed in a timely manner by Government to SNTF. Provision to this effect is included in the Project Action Plan (para. 3.23).

B. Past Financial Performance

Income Accounts

5.12 SNTF's income accounts over the period 1979-86 are shown in Annex 7, Table 2. A summary follows:

Table 5.1: SNTF Income Accounts 1979-86

	(DA million)								Rate-growth 1979/86
	1979	1980	1981	1982	1983	1984	1985	1986	
Revenue	818	917	928	867	1090	1081	1172	1286	57%
Working Expenses	720	835	888	964	1103	1150	1265	1463	103%
Depreciation	98	113	134	142	186	203	214	269	175%
Operating Expenses	818	948	1022	1106	1289	1353	1479	1732	112%
Net Operating Loss	--	31	94	239	199	272	307	446	
Interest	92	68	64	85	81	114	178	186	
Net Loss After Interest	92	99	158	324	280	386	485	632	
Net Non-operating									
Revenue/Loss	4	11	6	(32)	21	(39)	(34)	(167)	
Net Deficit	88	88	152	356	259	425	519	799	
	==	==	==	==	==	==	==	==	

5.13 Revenue accrues from suburban and long-distance passenger traffic (about 25% of total traffic revenue), the annual State contribution of DA 3.5 million to partly compensate for below-cost fares imposed by Government (until 1981 and again in 1986), from freight traffic in FCL (about 50% of total traffic revenue), small revenue from baggages, parcels, mail, storage, etc., as well as operating subsidies from Government covering vocational training, interest charges on foreign lending, and, since 1983, track maintenance expenses. Staff costs represent an unusually high 70-75% of working expenses. Over the period considered, staff costs have increased substantially but this is essentially due to incorporation into staff of about 4,500 hourly workers in 1981. Staff numbers were reduced substantially in 1987 following transfers to INFRAFER (para. 5.08). However, staff costs increased as a result of the new personnel statute and job classification (Statut Général des Travailleurs - SGT) applied by mid-1986 with retroactive effect to January 1, 1985. So far staff numbers and productivity and cost per employee have fluctuated approximately as follows:

Table 5.2: Staff Number Productivity 1979-86

	1979	1980	1981	1982	1983	1984	1985	1986
Average Staff	12,998	13,288	18,368	19,503	19,503	19,200	19,480	19,150
Traffic Units (Million)	4,387	4,547	4,859	4,529	4,475	4,466	5,049	4,926
Productivity per Employee (TU 000)	--	--	265	233	229	232	260	257
Average Cost per Employee (DA 000)	40	45	34	38	42	45	47	55

5.14 Considering the substantial portion of FCL traffic carried productivity per employee should be higher. The objective written into the Action Plan is a productivity per capita of 330,000 traffic units by 1990 which would be in line with comparable railways (Annex 1, Table 3).

5.15 Materials, fuel, and other (frais divers de gestion) working expenses are relatively small when compared with payroll (+ 20%); this is one of the few headings where SNTF can most freely act, and the low level of such expenses reflects SNTF's tight financial position. Taxes are high and comprise TUGPS (Taxe Unique Globale sur les Prestations de Service), a 6% levy (increased to 8% in 1984) on gross traffic revenue, TAIC (Taxe sur les activités industrielles et commerciales), a 2.5% levy, also on gross traffic revenue, a tax of 6% on salaries and 3% on compulsory contributions to social works, and a tax on turnover and miscellaneous. Total taxation now stands at about 14% of gross revenue (excluding subsidy). Financial charges concern interest on internal and external lending and on the ever-growing bank overdraft (reaching by end 1986 DA 1.75 billion).

5.16 As a result of increasing working expenses and inadequate tariffs, the working ratio deteriorated from 88 in 1979 to 114 in 1986; however, the deterioration would have been worse had it not been partly offset during 1983-86 by the granting of larger operating subsidies. Without such subsidies the working ratio would have increased from 100 in 1979 to 138 in 1986. The operating ratio - not too meaningful because of the prevailing depreciation policy - deteriorated from 100 in 1979 to 135 in 1986; without subsidies, the operating ratio would have increased from 113 in 1979 to 163 in 1986.

5.17 Depreciation is based on historical cost. It comprises two chapters; one concerns rolling stock and other equipment which is being depreciated at 4% p.a. based on a plausible average economic life of 25 years; the other chapter concerns infrastructure (track and related investments); overhead costs estimated at 3% of such investments carried out during the FY are charged to depreciation (the latter allocation is made only once). Both allocations fall substantially short of depreciation based on replacement value.

5.18 Ordinance No. 75.35 dated April 29, 1975, establishing the "Plan Comptable National" states that investments are to be accounted for at historical cost, with depreciation calculated accordingly. The Government acknowledges that a realistic pricing policy requires costs to include a depreciation allowance based on replacement cost and is preparing appropriate legislation which will embody such change. During negotiations, the Government issued a Letter of Intent confirming above measures and stating that the financial objectives for SNTF as detailed in paras. 5.29 and 5.30 would be assessed taking into account depreciation on all investments, whether financed by state or SNTF, at replacement cost.

5.19 Operating deficits - which are not compensated by subsidies - are accrued (about DA 2.8 billion by end 1986) and charged to equity. The high net non-operating loss shown in 1986 (DA 167 million) represents essentially the effect of S.G.T. retroactively throughout FY 1985 (para. 5.13).



5.20 The earnings position of SNTF has continued to deteriorate rapidly due to inadequate and delayed tariff adjustments coupled with increasing operating expenses and financial charges. Corrective action is now taken through implementation of the recently approved second financial restructuring, Government compensation as defined in the draft Railway Convention, and substantial tariff increases (paras. 5.03 to 5.05).

Balance Sheet

5.21 SNTF's balance sheet over the period 1979-86 is given in Annex 7, Table 3. A summary follows:

Table 5.3: SNTF - Balance Sheet 1979-86

	(DA million)							
	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Current Assets	1000	1164	1322	1510	1688	1783	1893	2022
Net Fixed Assets	<u>3874</u>	<u>3985</u>	<u>4347</u>	<u>5320</u>	<u>7221</u>	<u>9196</u>	<u>11183</u>	<u>14221</u>
TOTAL ASSETS	<u>4874</u>	<u>5149</u>	<u>5669</u>	<u>6830</u>	<u>8909</u>	<u>10979</u>	<u>13076</u>	<u>16243</u>
	====	====	====	====	====	=====	=====	=====
Current Liabilities	597	666	851	1573	1801	2235	2828	3609
Long Term Debt	2473	2648	2855	3061	3442	3742	3887	4455
Equity and Reserves	<u>1804</u>	<u>1835</u>	<u>1963</u>	<u>2196</u>	<u>3666</u>	<u>5002</u>	<u>6361</u>	<u>8179</u>
TOTAL LIABILITIES	<u>4874</u>	<u>5149</u>	<u>5669</u>	<u>6830</u>	<u>8909</u>	<u>10979</u>	<u>13076</u>	<u>16243</u>
	====	====	====	====	====	=====	=====	=====

5.22 The main feature in the balance sheet is the substantial increase in fixed assets, more particularly, for track and related investments; this heading more than quadrupled between 1981 and 1986, and reflects the heavy investments made, at Government cost, in the doubling of existing lines and construction of new lines. As mentioned earlier fixed assets are registered at historical cost and they are substantially undervalued. An estimate of the replacement value amounts to about DA 45 billion (US\$9.6 billion), about three times the book value. The balance sheet does not distinguish between fixed assets in use and work-in-progress; it was agreed during negotiations that this shortfall would be corrected as from 1988 on to allow better assessment of depreciation requirements.

5.23 A major weakness is the high level of receivables, particularly from commercial debtors, which, by end 1986, equalled - in the books - the traffic revenue of that year. However, the situation, although serious, is less drastic than suggested by the accounts. A review at December 31, 1986, revealed the following position:

DA million

- Receivables from commercial debtors	1167.0
- Receipts from commercial debtors which cannot be identified against specific services rendered <sup>1/</sup>	<u>717.3</u>
- Net receivables from commercial debtors	449.7

Action has now been taken to accelerate reconciliation of payments received against services rendered through itemization lists attached to payment orders to banks. Nevertheless net receivables still represent about eight months of freight revenue as compared with a theoretical grace period of 30 days. The reasons for this unsatisfactory record are manifold, namely SNTF cannot in practice refuse its services to delinquent payers, many institutional changes involving redistribution of responsibilities among railway users occurred recently with ensuing delays in payment, and penalties for overdue payments are not strictly applied. In addition, decentralization of receivables recovery to SNTF's regional units initially delayed payments, and there is an overall lack of monitoring. Various measures have now been taken by SNTF to reduce progressively outstanding receivables from commercial debtors to the equivalent of three months of freight revenue, hence improving its current position. This objective, to be achieved by the end of FY90, is included in the Loan Documents.

5.24 Inventories are kept at the level of about two years of operational needs (Table 8); faster turnover, more selective purchases, and elimination of dead stock could reduce the level of inventories to the equivalent of 18 months of operational needs; this objective is also written into the Action Plan (Annex 1). Current liabilities are high but they comprise the suspense accounts dealt with in para. 5.23. The larger part (60%) of the net<sup>2/</sup> current liabilities is Bank overdraft which stood, at December 31, 1986, at DA 1,750 million, exceeding by far the present annual traffic revenue. The annual increases in equity reflect essentially the large investments financed by Government; operating deficits are balanced through reduction of equity.

5.25 The current ratio deteriorated from a safe 1.68 in 1979 to 0.56 in 1986; likewise, the liquid ratio decreased from 1.24 to 0.43. Although these ratios must be interpreted with caution because of the accounting practice described in para. 5.23 they are an indication of SNTF's unfavorable cash position. The debt/equity ratio remained at a satisfactory level throughout the period considered.

5.26 SNTF keeps annual "Comptes d'établissement" which show, on one side, capital investments and increases in inventories, and on the other side, the sources of financing. A summary of SNTF's investment financing

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1/ Balanced by suspense accounts on liabilities side.

2/ Excluding suspense accounts.

over the period 1979-86 is given in Annex 7, Table 4. It shows that since the first financial restructuring of 1978, all infrastructure investments have been financed by unreimbursable State contributions (concoirs definitifs), no external borrowing has been obtained, and BAD and BNA have been the sole providers of long-term financing as well as bridging credits (Crédits-Relais) to refinance repayment of external debt.

C. Forecast Financial Performance

5.27 A financial forecast has been prepared in constant terms for the period 1987-1991. This forecast takes into account the measures of financial restructuring (para. 5.03) as from 1988, as well as adoption of the pricing, compensation, investment financing and depreciation policies which are provided for in the Railway Convention (para. 5.05) and the Government's Letter of Intent (para. 5.18).

5.28 SNTF's forecast income accounts for 1987-1991 are in Annex 7, Table 5, together with the basic assumptions used. The forecast income account is summarized below:

Table 5.4: Forecast Income Accounts  
(DA billion)

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Revenue	1.5	1.8	2.0	2.2	2.4
Working Expenses	1.6	1.5	1.5	1.6	1.6
Depreciation	<u>0.3</u>	<u>0.3</u>	<u>0.3</u>	<u>0.5</u>	<u>0.5</u>
Operating Expenses	<u>1.9</u>	<u>1.8</u>	<u>1.8</u>	<u>2.1</u>	<u>2.1</u>
Net Operating Revenue	(0.4)	-	0.2	0.1	0.3
Interest	<u>0.3</u>	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>
Revenue After Interest	(0.7)	(0.2)	-	(0.1)	0.1

5.29 The main features of the forecast income accounts are substantial and progressive tariff increases amounting by 1991 to 60% of the present rates and fares and a State operating subsidy covering track maintenance costs. The accounts also assume: (a) reduction of staff by attrition and by transfer to INFRAFER; (b) depreciation, based as of 1990, on the replacement cost of all investments, whether financed by State or SNTF (Annex 7, Table 6); and (c) subsidization of the operating deficits and interest charges in 1987 and 1988, as part of the financial restructuring. Under the combined effects of these factors the financial performance of SNTF improves progressively, as indicated by the ratios below:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Working ratio	109	82	76	69	64
Operating ratio	128	98	91	94	87
Working ratio (excluding operating subsidy)	130	101	92	82	75
Operating ratio (excluding operating subsidy)	153	121	110	111	102

5.30 The forecasts show that, by 1991, the cost coverage factor by users will be about one with working and operating ratios (excluding the State operating subsidy for track) of 3:4 and 1:1 respectively (para. 5.35).

5.31 Details of the sources and application of funds are given in Annex 7, Table 7. A summary of the cash flow follows:

**Table 5.5: Cash Flow**  
(DA million)

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>Total</u>	<u>%</u>
<b>Sources:</b>							
Internally generated cash	(129)	318	479	672	832	2171	11%
Government - investments	2300	2300	2320	2300	2300	11520)	71%
- restruc. fin.	694	1847	-	-	-	2541)	
Bank overdraft	1700	-	-	-	-	1700)	16%
Long-term borrowing	300	300	265	300	315	1480)	
Other	92	165	85	133	15	490	2%
<b>Total</b>	<u>4957</u>	<u>4930</u>	<u>3149</u>	<u>3405</u>	<u>3462</u>	<u>19903</u>	<u>100%</u>
<b>Application:</b>							
Investments	2600	2600	2585	2600	2615	13000	67%
Debt service	527	513	517	626	616	2799	14%
Net current assets shortfall	1586	-	-	-	-	1586)	17%
Bank overdraft repayment	-	1700	-	-	-	1700)	
Other	174	41	26	39	78	358	2%
<b>Total</b>	<u>4887</u>	<u>4854</u>	<u>3128</u>	<u>3265</u>	<u>3309</u>	<u>19442</u>	<u>100%</u>
<b>Balance</b>	70	76	21	140	153	461	

5.32 The forecast shows the importance of the Government contributions (71%) as compared with a modest 11% of internally generated cash. On the application side the largest share is, as expected, for investments (67%). The cash flow shows an accrued balance of about DA 460 million, a safety feature which could eventually be used by SNTF to self-finance part of its rolling stock program.

5.33 SNTF's balance sheet for 1986, as presented and after corrections, together with the forecast balance sheets 1987-1991 are in Annex 7, Table 8. A summary follows:

**Table 5.6: Forecast Balance Sheet: 1987-96**  
(DA billion)

	-----1986-----		Forecast				
	<u>As presented</u>	<u>Corrected</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
<b>Assets</b>							
Current Assets	2.0	1.3	1.5	1.3	1.2	1.2	1.2
Net Fixed Assets	<u>14.2</u>	<u>44.8</u>	<u>47.1</u>	<u>49.5</u>	<u>51.8</u>	<u>53.8</u>	<u>55.9</u>
Total Assets	16.2	46.1	48.6	50.8	53.0	55.0	57.1
<b>Liabilities</b>							
Current Liabilities	3.6	2.9	1.3	1.1	1.1	0.9	0.8
Long-term Debt	4.4	4.4	6.2	5.2	5.2	5.1	5.0
Equity	<u>8.2</u>	<u>38.8</u>	<u>41.1</u>	<u>44.5</u>	<u>46.7</u>	<u>49.0</u>	<u>51.3</u>
Total Liabilities	16.2	46.1	48.6	50.8	53.0	55.0	57.1

5.34 The 1986 balance sheet has been corrected by elimination of the unidentified commercial receipts (DA 717 million) from the assets and liabilities suspense accounts (see para. 5.23), and by revaluation of fixed assets as per Annex 7, Table 6. The 1987-91 forecast balance sheets take into account the results of the corresponding income accounts and cash flow. The current ratio improves substantially to 1.56 in 1991 as a result of better operating performance and of the measures associated with the financial restructuring; the liquid ratio remains somewhat marginal until 1990, then corrects itself above 1.0 in 1991. The debt/equity ratio - about 10/90 - reflects the investment policy by which the largest share of investments - infrastructure - is being financed by non-reimbursable Government contributions (concours définitifs) which are balanced by equity increases.

5.35 Subject to implementation of the policies written into the railway convention and under the assumptions made in paras. 5.27 and 5.33, SNTF's financial performance is expected to improve progressively and substantially, culminating, in 1991, in achieving working and operating ratios (excluding subsidy for track costs) of 3:4 and 1:1 respectively. However, this objective is subject to re-evaluation if so warranted by inflation and/or the findings and outcome of the National Transport Study financed under Bank loan No. 2808-AL dated June 24, 1987, particularly with respect to road user charges (para. 1.15). During loan negotiations, assurances were obtained that SNTF would reach financial equilibrium from FY 1991, and that the Government would take all measures required to that effect. Specific financial targets are included in the Project Action Plan (para. 3.22).

#### D. Sensitivity

5.36 The sensitivity analysis shows the following results in 1991 when varying revenue from users and investment costs by 10% and 20%, and combining the effects of both parameters.

	<u>Objectives</u>	Revenue From Users		Investment Costs		-----Combined-----			
		-10%	-20%	-	-	-10%	-20%	-10%	-20%
		-	-	+10%	+20%	+10%	+10%	+20%	+20%
Working Ratio	75	83	94	75	75	83	94	83	94
Operating Ratio	100	113	127	102	103	114	128	114	128

5.37 The financial objectives of 3:4 and 1:1 are obviously more sensitive to tariff adjustments than to investments costs.

## VI. RECOMMENDATIONS

6.01 During loan negotiations, assurances were obtained from SNTF on the following points of particular significance:

- (a) an external audit of SNTF accounts would be undertaken through the Commissaire aux Comptes (para. 2.46);
- (b) the project would be implemented in line with the Action Plan, including updating the plan annually in agreement with the Bank (para. 3.24);
- (c) cost accounting consultants would be employed by December 1, 1988 and the proposed cost accounting system be provided to the Bank for review and comment by December 1, 1989 (para. 5.06); and
- (d) financial equilibrium would be reached beginning in 1991 (para. 5.35).

6.02 During negotiations, confirmation was obtained from SNTF on the content of the Project Action Plan. In particular, the Action Plan summarizes the provisions of the Railway Convention, specifies the financial targets to be reached in 1991, and defines the terms of reimbursement by Government to SNTF of infrastructure investments financed partly by foreign loans.

6.03 Assurances were obtained from the Government that it will:

- (a) allocate sufficient resources for the rehabilitation and renewal of about 200 km of track annually (para. 3.23);
- (b) present the draft annual railway sector investment budgets to the Bank, beginning in 1988 (para. 3.23); and
- (c) take all the measures required for SNTF to reach financial equilibrium beginning in 1991 (para. 5.35).

6.04 With the agreements reached on the above, the project would be suitable for a Bank loan of US\$143 million to SNTF.

ALGERIA

STAFF APPRAISAL REPORT

SECOND RAILWAY PROJECT

Action Plan

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**

**Action Plan**

<u>ACTIVITY</u>	<u>PRESENT POSITION</u>	<u>ACTION TO BE TAKEN</u>	<u>RESPONSIBILITY/ TIMING</u>
<b>A. INVESTMENTS/PLANNING</b> <b>1. 1985-89 Investment Program</b>	<ul style="list-style-type: none"> <li>. Priority given to rehabilitation of existing network (about 200 km per year).</li> <li>. Defer new investments on new railway routes.</li> </ul>	<ul style="list-style-type: none"> <li>. Continue to give priority to rehabilitation and modernization of existing network. Budgetary allocations of at least DA 900 million annually to rehabilitation/modernization program.</li> </ul>	<p>MT/SNTF/MP 1987-1990</p>
	<ul style="list-style-type: none"> <li>. Slow down ongoing investments on new lines and transfer resources and materials to track renewal program:               <ul style="list-style-type: none"> <li>- Ain Touta-M'Sila line (150 Km) will be completed only first 15 Km to Ain Touta cement plant.</li> <li>- Defer construction of double track between El Milia and Jijel on Randane Jamel - Jijel line (135 Km).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>. Continuous monitoring of ongoing programs in terms of costs and implementation schedules.</li> </ul>	<p>SNTF/MT/MP 1987-1990</p>
	<ul style="list-style-type: none"> <li>. The core program of railway investments during 1987-89 will amount to about DA 7.7 billion representing about a 30% reduction over initial program. Over 50% of investments will be allocated to rehabilitation and modernization.</li> </ul>	<ul style="list-style-type: none"> <li>. Preparation of technical and economic feasibility studies to be prepared for important components of investment plan.</li> <li>. Draft annual budget for railway investment to be submitted to Bank during project implementation.               <ul style="list-style-type: none"> <li>1988 Budget                   <ul style="list-style-type: none"> <li>- Final version</li> </ul> </li> <li>1989 Budget                   <ul style="list-style-type: none"> <li>- Draft program</li> <li>- Final version</li> </ul> </li> <li>1990 Budget                   <ul style="list-style-type: none"> <li>- Draft program</li> <li>- Final version</li> </ul> </li> </ul> </li> </ul>	<p>SNTF/MT 1988-1990</p> <p>6/88</p> <p>12/88</p> <p>3/89</p> <p>12/89</p> <p>3/90</p>



<u>ACTIVITY</u>	<u>PRESENT POSITION</u>	<u>ACTION TO BE TAKEN</u>	<u>RESPONSIBILITY/ TIMING</u>
2. Strengthen Planning Capabilities.	. Creation of local capacity for track renewal works (INFRAFER).	. Capacity of INFRAFER should not exceed three units equivalent to about 120 Km per year.	MT/SNCF 1989-90
		. Start up of rehabilitation between Thenia and El Esnam (80 km)	SMTF 1988
	. Start up of National Transport Study by MT (financing under Fifth Highway Project).	. Assistance to strengthen planning capacity within SMTF to be provided under project.	SMTF 1988
		. Preparation of 1990-94 Plan in close collaboration with National Transport Study.	SMTF/MT/MP 1988-90
	. Priority given to programming and planning of track renewal works and to preparation of routine maintenance programs. Need to prepare technical and economic feasibility studies and project designs.	. Assistance and training for preparation of feasibility studies and design work.	SMTF/MT 1988-90
	. Need for possible replacement of electric traction and modernization of eastern mineral line identified.	. Comparative study of continued use of electric traction versus diesel replacement.	SMTF 1988
<b>B. <u>PROJECT IMPLEMENTATION</u></b>			
1. Project scope and content.	. Agreement on following composition:		
	- Rehabilitation of 88 km of track by international tender between Ramdane Jame1 and Annaba.	. Complete preparation of operational plans for track rehabilitation/renewal program including cost estimates and implementation schedule for 1988-90	SMTF 7/88
	- Renewal of 91 km of track on eastern mineral line (El Hadjar-Bouchegouf-Souk Aharas by international tender.		
	- Renewal of 192 km of track on Alger-Constantine line (Beni Mansour-Setif-El Gourzi) by INFRAFER/local firms.		

**ACTIVITY****PRESENT POSITION****ACTION TO BE TAKEN****RESPONSIBILITY/  
TIMING**

	<ul style="list-style-type: none"> <li>- Modernization of signalling on Algiers - El Harrach and Ramdane Jamel - Annaba, improvement of level crossings and installation of electric signals (Annex 1, Table 1).</li> <li>- Installation of telephones in stations on Ramdane Jamel - Annaba and Thenia - El Gourzi lines (Annex 1, Table 1).</li> <li>- Track maintenance equipment. (Annex 1, Table 2).</li> <li>- Two unloaders for phosphate traffic.</li> <li>- Technical assistance and a second phase of training.</li> </ul>	<ul style="list-style-type: none"> <li>. Complete preparation of operations and implementation plan for signalling and telecommunications.</li> </ul>	<p>SNTF 5/88</p>
	<ul style="list-style-type: none"> <li>. Project will be implemented over three-year period mid 1988-mid 1991 and will represent about 60% of track rehabilitation/renewal program and close to 30% of total investment in railway subsector.</li> </ul>		
2. Preparation of studies and designs.	<ul style="list-style-type: none"> <li>. Feasibility studies completed for track rehabilitation/renewal and under preparation for signalling and telecommunications components. ERS for track rehabilitation/renewal in range 18% to 27%.</li> <li>. Detailed designs available for 88 km of track rehabilitation and 192 km of track renewal.</li> <li>. Agreement to proceed with bidding on Ramdane Jamel - Annaba (88 Km) for retroactive financing.</li> </ul>	<ul style="list-style-type: none"> <li>. Training needs to take into account results of first phase under Fifth Highway Project.</li> <li>. Call for bids in mid-1988 after agreement with Bank on bidding documents.</li> </ul>	<p>SNTF/MT 1988-1989</p> <p>SNTF/Bank 7/88</p>

**ACTIVITY****PRESENT POSITION****ACTION TO BE TAKEN****RESPONSIBILITY/  
TIMING**

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>. Funds available under Fifth Highway Project (about DA 11 million) for preparation of designs and bidding documents for track renewal program. Studies will include:           <ul style="list-style-type: none"> <li>- El Hadjar - Souk Ahras 91 km.</li> <li>- Bidding documents for track materials to be procured under project.</li> </ul> </li> <li>. Technical documents for signalling and telecommunications program prepared by consultants.</li> <li>. Agreement on list of track maintenance equipment.</li> </ul> | <ul style="list-style-type: none"> <li>. Terms of reference to be prepared.</li> <li>. Complete preparation of design for El Hadjar - Souk Ahras after approval of draft contract by Bank.</li> <li>. Call for bids on El Hadjar - Souk Ahras</li> <li>. Complete bidding documents for Bank approval for procurement of track materials for track renewal program and for equipment</li> <li>. Initiate international competitive bidding for track materials</li> <li>. Bank review and call for bids after Bank approval.</li> <li>. Preparation of technical specifications and bidding documents.</li> <li>. Bank review and call for bids after Bank approval.</li> </ul> | <ul style="list-style-type: none"> <li>SNTF<br/>12/87</li> <li>SNTF/Bank<br/>12/88</li> <li>SNTF<br/>2/89</li> <li>SNTF<br/>6/88</li> <li>SNTF<br/>7/88</li> <li>SNTF<br/>7/88</li> <li>SNTF<br/>7/88</li> <li>SNTF/Bank<br/>9/88</li> </ul> |
| <b>C. <u>PRODUCTIVITY/OPERATIONS</u></b>   |   |  |
| <ul style="list-style-type: none"> <li>1. <b>Operational Performance.</b> <ul style="list-style-type: none"> <li>. Emphasize marketing activities in order to increase traffic and make effective use of newly acquired capacity.</li> <li>. Need to emphasize bulk commodity movements.</li> <li>. Need to improve productivity.</li> <li>. Action plan prepared to limit:               <ul style="list-style-type: none"> <li>a) main line diesel locomotive breakdown</li> <li>b) accidents in stations.</li> </ul> </li> </ul> </li> </ul>                        | <ul style="list-style-type: none"> <li>. Improve quality of service by increasing efficiency. Rationalize services by concentrating on bulk traffic. Early retirement of old wagons.</li> <li>. Increase use of block trains and increase weight of trains.</li> <li>. Reach objectives shown in Annex 1, Table 3.</li> <li>. Establish position of senior foreman in each region to monitor performance of mechanics and help in diagnosis and repair of faults of locomotives in service; intensive training of maintenance personnel in depots.</li> </ul>   | <ul style="list-style-type: none"> <li>1988-1990</li> <li>SNTF<br/>1988-1990</li> <li>SNTF<br/>1988-1989</li> </ul>  |

**ACTIVITY****PRESENT POSITION****ACTION TO BE TAKEN****RESPONSIBILITY/  
TIMING**

- |   |   |                           |
|---|---|---------------------------|
| <ul style="list-style-type: none"> <li>. Based on current delivery of 1,200 wagons under 1985-89 Plan there will be no additional needs before 1991 for renewal or increase in capacity.</li> </ul> | <ul style="list-style-type: none"> <li>. Reduce turnaround time to 10 days enabling earlier retirement of old wagons. Target to be achieved through improving handling activities, including provision of sidings and adequate storage, introducing new shunting locomotives, improving yard operations and sharpening of financial incentives to improve wagon loading/unloading.</li> </ul>               | <p>SNTF<br/>1988-1990</p> |
| <ul style="list-style-type: none"> <li>. Based on 400 passenger cars for which delivery will be completed in 1987, there will be no additional needs before 1991.</li> </ul>                        | <ul style="list-style-type: none"> <li>. Study to be undertaken for establishment of centralized wagon control system.</li> </ul>   | <p>SNTF<br/>1988-89</p>   |
| <ul style="list-style-type: none"> <li>. Improve staff productivity.</li> </ul>   | <ul style="list-style-type: none"> <li>. Increase load factors for suburban and main line trains. Give priority to development of suburban services.</li> </ul>   | <p>SMTF<br/>1988 - 90</p> |
| <ul style="list-style-type: none"> <li>. Need to examine viability of specific lines and operations and to eliminate uneconomic services.</li> </ul>  | <ul style="list-style-type: none"> <li>. Reach objective of 330,000 traffic units per employee in 1990. Program to reduce staff together with program of training and replacement of staff leaving on retirement.</li> </ul>  | <p>SNTF<br/>1988 - 90</p> |
| <ul style="list-style-type: none"> <li>. Procurement of 20 shunting locos and 20 main line locos under 1985-89 Plan.</li> </ul>   | <ul style="list-style-type: none"> <li>. National Transport Study will analyze low traffic lines.</li> </ul>  | <p>SNTF<br/>1988 - 90</p> |
| <ul style="list-style-type: none"> <li>. Procurement of 20 shunting locos and 20 main line locos under 1985-89 Plan.</li> </ul>   | <ul style="list-style-type: none"> <li>. Progressively eliminate less-than-car load traffic (less than 10,000 tons/year).</li> </ul>  | <p>SNTF<br/>1988</p>      |
| <ul style="list-style-type: none"> <li>. Need to solve ballast pollution problem on mineral line before track renewal.</li> </ul>   | <ul style="list-style-type: none"> <li>. Procurement of 20 shunting locos is justified and should be finalized. Annex 1, Table 4 provides a tentative justification for 20 main line locomotives based on demand for different services -suburban main line passenger, unit train and standard trains. Growth of passenger and freight traffic is unlikely to exceed 2.5% per year through 1990.</li> </ul> | <p>SNTF<br/>1988</p>      |
|   | <ul style="list-style-type: none"> <li>. Replacement of hopper wagons by 280 open wagons. Unloaders to be provided under project.</li> </ul>  | <p>SNTF<br/>1988</p>      |

<u>ACTIVITY</u>	<u>PRESENT POSITION</u>	<u>ACTION TO BE TAKEN</u>	<u>RESPONSIBILITY/ TIMING</u>
2. Reorganization.	. Need to strengthen senior management in SNTF. The scope of the Director General's control is too broad with 12 directorates, 4 regional units and 3 workshops. New Director General now increasing delegating authority for day-to-day operations.	. Gradual introduction of management information system in various directorates and units.	SNTF 1988-1989
	. Need to strengthen planning and project preparation for track renewal works.	. Redirect resources of Projects directorate towards preparation of modernization project in Infrastructure directorate.	SNTF 1988-89
D. <u>INSTITUTIONAL</u>			
1. Railway Convention	. In the past, the respective financial responsibilities of State and SNTF were not clearly defined and Government contributions were unrelated to operating deficits.  . New railway convention was approved by Council of Ministers in November 1987. Government has issued confirmation that the Convention will be signed shortly.	. Implementation of the new Railway Convention defining:  1. Compensation due to SNTF as a result of constraints imposed by Government regarding: - operations on uneconomic lines and services - below cost tariffs - fare reduction for certain passengers - purchase of rolling stock not warranted by foreseeable traffic - level crossing costs.  2. Contributions by State of acquisitions, construction, and maintenance of infrastructure, and related investments.  . Although the convention does not specify the cost components to be taken into account, it is agreed that these include: - working expenses - depreciation of fixed assets at replacement cost	MT/SNTF 1988-1990

<u>ACTIVITY</u>	<u>PRESENT POSITION</u>	<u>ACTION TO BE TAKEN</u>	<u>RESPONSIBILITY/ TIMING</u>
		<ul style="list-style-type: none"> <li>In reciprocity to the self-imposed obligations by Government a Plan of Action will be prepared annually listing the operational and financial objectives to be achieved by SNTF.</li> </ul>	SNTF/MT as from FY88
E. <u>FINANCIAL</u>			
1. "Restructuration Financière".	<ul style="list-style-type: none"> <li>The recent financial situation of SNTF required a major contribution from Government to improve its cash position and important tariff adjustments to enhance its operating results.</li> <li>Financial restructuring package approved by Council of Ministers in November 1987.</li> <li>Following measures implemented as part of 1988 Loi des Finances:               <ul style="list-style-type: none"> <li>non-reimbursable cash contribution by Government of DA 1 billion;</li> <li>consolidation by Government of principal due to BAD &amp; Treasury on Dec. 31, 1986, and unpaid for an amount of about DA 460 million.</li> <li>loan by Treasury of DA 650 million.</li> <li>Government to cover SNTF's operating deficits in 1987 and 1988.</li> <li>global tariff increase of 20% in May 1988.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Government to cover SNTF's operating deficits in 1987 and 1988.</li> </ul>	MT 1988-1989
2. Cost Accounting.	<ul style="list-style-type: none"> <li>There is no comprehensive cost accounting.</li> </ul>	<ul style="list-style-type: none"> <li>The compensation mechanisms to be written into the Railway Convention required detailed cost accounting which should be fully operational by no later than January 1990; it will be organized with the assistance of consultants to be appointed by not later than October 1, 1988.</li> </ul>	SNTF as from FY90  SNTF 10/88
3. Revaluation of Fixed Assets.	<ul style="list-style-type: none"> <li>The itemization of fixed assets is incompleting.</li> </ul>	<ul style="list-style-type: none"> <li>Completion of itemization, with valuation at               <ul style="list-style-type: none"> <li>historical cost</li> <li>replacement cost</li> </ul> </li> </ul>	SNTF  12/88 12/89

<u>ACTIVITY</u>	<u>PRESENT POSITION</u>	<u>ACTION TO BE TAKEN</u>	<u>RESPONSIBILITY/ TIMING</u>
4. Receivables	. Commercial receivables are too high.	. Faster collection of receivables is needed to improve SNTF's cash position; by end of the FY commercial receivables should not exceed: 5 months of annual freight traffic revenue 3 months of annual freight traffic revenue.	SNTF  FY 89 FY 90
5. Inventories	. They are too high.	. Closer supervision of the level of inventories is needed so as to reduce them to 18 months of the needs of consumable materials.	SNTF as from FY 89
6. Presentation of Balance Sheet	. Analysis of the balance sheet would be facilitated by various measures.	- Segregation of fixed assets in operation and work-in-progress. - Elimination from SNTF's balance sheet of assets related to "Metro d'Alger and transfer thereof. - Same for INFRAFER assets.	SNTF 12/88 " "
7. Previous financing of infrastructure investment.	. There is contradiction between Government's policy of investment financing and service by SNTF of Bank Loan No. 996-AL dated June 10, 1974.	. About 70% of the Bank Loan was for infrastructure; this portion of the debt service should be reimbursed by Government to SNTF.	MT/MF 12/88 and annually thereafter.
8. External Audit	. Controls carried out by the Ministry at-charge and other authorities do not meet satisfactory auditing standard.	. Appointment of "Commissaires aux Comptes" to SNTF to carry out annual external audit as required from borrowers by the Bank.	MT/MF 12/88
9. Financial Objectives	. With the recent clarification of pricing policy and definition of the respective financial responsibilities of State and SNTF, the railway can now formulate clear financial objectives.	. The financial objectives are: - a working ratio (excluding subsidy for track maintenance, level crossing and training costs) of 3:4; - an operational ratio (excluding subsidy for track maintenance, level crossing and training costs) of 1:1. Framework for tariff increases (in real terms): May 1988 - 20% (para E.1) Jan. 1989 - 10% Jan. 1990 - 10% Jan. 1991 - 10%	SNTF/MT as from FY91

**ACTIVITY****PRESENT POSITION****ACTION TO BE TAKEN****RESPONSIBILITY/  
TIMING****F. TRAINING****1. Development of Human Resources.**

. Priority given to training. Training program for transport sector including SNTF, is included under Fifth Highway Project (approx. DA 23 million). Selection of consultants for first phase of railway training program underway.

. Start up of training program under Fifth Highway Project. Selection of training specialists and consultants for:  
 - 5 man-months to complete preparation of training program.  
 - 100 man months of training specialists for Rouiba Training Center.

SNTF/MT  
7/88

. January 1987 Study established training needs as follows:  
 - improve operations  
 - improve equipment maintenance  
 - replace staff leaving on retirement  
 - increase training coverage (only 3%)  
 - train staff for Rouiba Training Center.

. Preparation of 30 man-months of foreign study tours for SNTF.

SNTF/MT  
7/88

. Training needs 1987-1990	
operations	404
infrastructure	400
equipment	<u>444</u>
Total	1,248

. Complete preparation of terms of reference for second tranche of training program giving priority to:  
 - investment planning and preparation of studies  
 - equipment maintenance  
 - track maintenance  
 - management

SNTF/Bank  
10/88

. Need for training staff	
operations	10
infrastructure	10
equipment	<u>10</u>
Total	30

. Program includes:  
 - institutional development - about 240 man-months of which 100 man-months for cost accounting.  
 - training - about 360 man-months of training specialists and 110 man-months of foreign study tours.

. Retraining program over 8 months	
operations	86
infrastructure	120
equipment	300
data processing	<u>12</u>
Total	518

. Define needs for logistical support for technical assistance/training effort to be financed under project (administrative staff, vehicles, teaching materials, etc. for the Rouiba Center).

SNTF/MT/Bank  
10/88



ALGERIA  
STAFF APPRAISAL REPORT  
SECOND RAILWAY PROJECT

Signalling and Telecommunications:  
First Tranche Program 1/  
(DA million without taxes)

A.	<u>Telecommunications</u>	<u>Core program</u>			<u>Second priority</u>		
		<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
(1)	<u>Cables</u>						
	<u>Post-mounted</u>						
	Thenia - El Gourzi (373 km)	20	2	22			
	Annaba - Ramdane Jame1 (96 km)	6	1	7			
	El Gourzi - Touggourt (418 km)				26	4	30
	<u>Underground</u>						
	El Gourzi - Ramdane Jame1 (105 km)	36	6	42			
(ii)	<u>Telephones</u>						
	<u>Stations</u>						
	Thenia - El Gourzi (29)	8	30	38			
	Annaba - Ramdane Jame1 (7)	2	8	10			
	El Gourzi - Touggourt (25)				5	25	30
	<u>Regional Control Centers (4)</u>						
	Algiers, Constantine, Batna, Biskra	1	6	7			
	<u>Algiers - El Harrach Section</u>	2	4	6			
(iii)	<u>Ground/train radio</u>						
	Annaba - Ramdane Jame1				3	5	8
	Skikda - Constantine - El Gourzi				5	7	12
	El Gourzi - Touggourt				9	24	33
	200 locomotives				0.5	5.5	6
(iv)	<u>Clocks and PA Systems</u>						
	Thenia - El Gourzi				0.5	3.5	4
	Annaba - Ramdane Jame1				0.1	0.9	1
	El Gourzi - Touggourt				0.5	4.5	5
	El Gourzi - Ramdane Jame1				0.3	2.7	3
	Sub-total	75	57	132	50	82	132
B.	<u>Safety Equipment</u>						
(i)	<u>Block system</u>						
	<u>Single line tokenless block</u> on Annaba - R. Jame1	1	4	5			
	<u>Color-light automatic block</u> on Algiers - El Harrach	4	12	16			
	<u>Centralized Traffic Control (CTC)</u>				3	5	8
	Annaba - Ramdane Jame1 - Skikda						
(ii)	<u>Turnout Control Boxes</u>						
	Annaba - Ramdane Jame1 - Skikda (7)	7	18	25			
	Alger - El Harrach (4)	3	9	12			
(iii)	<u>Level Crossings</u>						
	Automatic barriers (60)	4	21	25			
(iv)	<u>Color-light signals</u>	4	12	16			
	Sub-total	23	76	99	3	5	8
C.	<u>Other Facilities</u>						
(i)	<u>Maintenance center</u>	5	3	8			
	Building and equipment						
(ii)	<u>Other support buildings</u>				16	-	16
(iii)	<u>Vehicles and tools</u>	1	4	5			
	Sub-total	7	13	16	16	-	16
	Grand Total	124	140	244	69	87	156

Note: 1/ Approved by Government in November 1985; this First Tranche has been estimated by SNTF at DA 400 million without taxes. Fiscal taxes are estimated at DA 60 million or 15%.

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**Track Routine Maintenance Equipment**

		<u>Cost (DA million)</u>		
		<u>Foreign</u>	<u>Local</u>	<u>Total</u>
(i)	<u>Track Tamping Machines</u>			
	4 light track tamping machines	2.0	14.4	16.4
(ii)	<u>Rail mounted Equipment and Maintenance Trolleys</u>			
	20 units (208 HP) with crane	3.9	28.6	32.5
	20 units (208 HP) with backhoe	3.3	24.2	27.5
	20 units (170 HP) for gang only	2.7	19.8	22.5
	1 trolley for structures inspection	0.2	1.7	1.9
	2 tower wagons for catenary maintenance	0.5	3.3	3.8
	1 trolley for track ride control	0.3	2.3	2.6
	<u>Weed-killing machine</u>			
	1 high output unit	0.4	2.8	3.2
	<u>Bush Clearing Machine</u>			
	4 units	1.6	11.9	13.5
	<u>Locomotive for Engineering Trains</u>			
	8 units (800 HP)	<u>4.2</u>	<u>30.9</u>	<u>35.0</u>
	Sub-total	17.1	125.4	142.5
(iii)	<u>Tools and Machinery</u>	3.2	12.6	15.8
(iv)	<u>Steel Sleeper Reconditioning Plant</u>	0.8	3.2	4.0
(v)	<u>Handling equipment</u>			
	2 gantries (10 tons)	1.2	4.6	5.8
	3 road crane trucks	0.7	3.0	3.7
	14 fork lift trucks (6-8 tons)	<u>1.2</u>	<u>4.6</u>	<u>5.8</u>
		<u>3.1</u>	<u>12.2</u>	<u>15.3</u>
	Total	26.2	167.8	194.0
	(at 1987 current prices)			

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**Performance Objectives**  
**1987 - 1990**

		-----Actuals-----			-----Objectives-----			
		1984	1985	1986	1987	1988	1989	1990
<b>Locomotive Main Line</b>								
<b>Diesel/Passenger &amp; Freight</b>	Availability %	91	91	90.5	90	90	90	90
	Utilization km/day	294	290	291	295	297	296	300
	Reliability km/failure	33,009	34,251	25,913	30,000	45,000	50,000	52,000
<b>Electric/Freight Mineral Line</b>	Availability %	80	77	75.6	75	75	75	75
	Utilization km/day	112	120	120	120	120	120	120
	Reliability km/failure	3,684	3,582	3,507	3,500	3,500	3,500	3,500
<b>Shunters</b>	Availability %	66	76.3	74.5	75	76	77	77
	Productivity Wagons/Loco. day	20	20	20	20	22	24	25
<b>Railcars</b>	Availability %	87	85	88	88	88	88	88
	Utilization km/day	215	300	311	350	350	350	350
	Reliability km/failure	38,325	23,523	24,940	40,000	40,000	40,000	40,000
<b>Narrow Gauge Main Line Locomotives</b>								
	Availability %	92	93	94	95	96	97	97
	Average Load per Loaded Wagon	41	41	42	42	42.5	43	43
	Turnround	12	13	13	13	12	10	9
	Wagon km/wagon day	37	- to be determined -					
<b>Coaches</b>								
	Availability %	85	87	89	90	92	92	92
	Occupation ratio %							
	Suburban			80	80	80	80	85
	Mainline			60	62	65	68	70
	Overall			65	66	67	69	71
<b>Accidents</b>								
	Derailments, Collisions per million train kilometer (of which online)	50 (13)	60 (24)	n.a.	45 (12)	40 (10)	25 (6)	20 (5)
<b>Staff Productivity</b>								
	Traffic Units per employee (000)	232	260	257	290	305	315	330

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SECOND RAILWAY PROJECT

Locomotive Haulage Statistics (1985). Deployment and Requirement

1. Engine Kilometers by Duties

	<u>Trains</u> km	<u>Assisting Train Shunting Light Running</u> km	<u>Shunting</u> km	<u>Total</u> km	<u>%</u>
<b>Standard Gauge</b>					
Electric Traction	959,883	174,693	49,783	1,184,359	8
Diesel Traction	<u>11,543,824</u>	<u>1,309,937</u>	<u>920,048</u>	<u>13,773,809</u>	92
	12,503,707	1,484,600	969,831	14,957,158	100
Ratio percent	84	10	6	100	
<b>Narrow Gauge</b>					
Diesel Traction	1,355,401	1,019,954	203,066	2,576,42	
Ratio percent	53	39	8	100	

2. Gross Ton Kilometers Hauled by Series of Locomotives (millions)

	<u>Engine Series</u>	<u>HP</u>	<u>Nos</u>	<u>Availa- bility %</u>	<u>No. Availa- ble</u>	<u>Pass.</u>	<u>Frgt.</u>	<u>Other</u>	<u>Total</u>	<u>GTKM per Available Loco.</u>
<b>Standard Gauge</b>										
<b>Diesel</b>										
a.	GM	3300	93	88.4	82	846.5	4345.5	39.9	5231.9	63.80
b.	GM	2500	24	96.0	23	834.2	197.7	3.3	1035.2	45.00
c.	GE	2000	25	91.5	23	14.6	223.7	20.8	259.1	11.22
d.	GM	1100	5	93	4.7	-	1.6	-	1.6	0.34
					<b>Sub-total</b>	1695.3	4768.5	64.0	6527.8	38.69
Ratio percent						26	73	1	100	
<b>Standard Gauge Electric</b>										
e.	LEW	3000	25	80	20	0.1	1055.9	1.6	1057.6	52.88
Total Standard Gauge						1695.4	5824.4	65.6	7584.4	
<b>Narrow Gauge</b>										
f.	GM	1100	25			-	664.3	0.1	664.4	28.6

3. Average Train Load (trailing tons)

	<u>Traction</u>	<u>Pass.</u>	<u>Frgt.</u>
<b>Standard Gauge</b>			
	Diesel	253	800
	Electric	283	1187
	Average	254	884
<b>Narrow Gauge Diesel</b>			
		-	490

4. Main Line Locomotive Distribution by Services

Diesel Passenger	$\frac{1696 \times 10^6}{254 \times 106 \times 10^3}$	= 63 at 85% availability	=	74
Diesel Freight	$\frac{4768 \times 10^6}{800 \times 106 \times 10^3}$	= 56 at 85% availability	=	66
Electric Freight	$\frac{1055 \times 10^6}{1187 \times 54.75 \times 10^3}$	= 16 at 65% availability	=	25
Locomotives in pusher/departmental service				<u>7</u>
Total	Standard Gauge			172
Narrow Gauge	Passenger			8
	Freight			<u>25</u>
Total Fleet				205

5. Locomotives Allocated for Commercial Transport of Construction Materials

<u>Region</u>	<u>No. of Locomotives</u>	<u>HP</u>	<u>Daily Period</u>	<u>Work/Contractor</u>
Constantine	1	3300	0600-1400	Departmental service
	1	3300	0700-1600	M'Sila Construction
	1	3300	0400-1600	Ain Yagoud (Renewal)
	1	3300	0600-1500	Pafra (RVB)
	1	3300	0700-1500	(Doubling) COGEFAR
	<u>1</u>	3300	0400-2000	Telergam (RVB) INFRAFER
	6			
Oran	1	3300	0600-1400	Pk 397-415 (Renewal)
	1	3300	0600-1400	Sidi Ali, Bayoub (Ballast)
	<u>1</u>	2000	0600-1500	E1 Amria (RVB)
	3			
Algiers	1	3300	0800-2130	E1 Achir Tunnel EMROS
	1	3300	0800-1730	(RVB) - INFRAFER
	<u>1</u>	3300	1100-1600	Doubling GEA
	3			
Souk Ahras	<u>1</u>	3300	0800-1600	Ain Afra (RVB)
	1			
Total Locomotives	<u>13</u>	=	113 hours daily	= 7 locomotives (effective)

6. Distribution of Shunting Locomotives

HP	Year	No.	Region			
			Soukh Ahras	Constantine	Algiers	Oran
2000	1977/78	25	8	10	-	7
1100	1977	5	-	-	3	2
650	1971	9	-	5	-	4
650	1972	9	-	-	8	1
650	1976	6	-	-	4	2
Total		54	8	15	15	16

7. Tentative Estimate of Main Locomotive Requirements 1990 Standard Gauge

a. Replacement		2
b. Freight services (3% growth)		2
	$\frac{3150 \times 10^6 \text{ (ntkm)} \times 2 \times 0.03}{63.8 \times 10^6 \times 0.85}$	
c. Departmental services (additional)		4
d. Passenger services		4
Suburban: 40 additional		
Coaches @ 10 coaches/loco. average on line		
e. Main Line		8
New services 1-Algiers/Oran	1 Nos	
1 - Oran Magnia	2 -	
1 - Constantine Touggourt	2 -	
1 - Algiers-Bejia	1 -	
2 - Algiers-Annaba	2 -	
Total		20

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SECOND RAILWAY PROJECT

Railway Investment Program 1985-89

1. The core railway investment program during the 1985-89 plan is expected to amount to just over DA 13 billion (US\$2.7 billion), representing about a 28% reduction over the initial plan target. Emphasis is now being given to track rehabilitation and renewal as well as the completion of ongoing modernization projects, these investments accounting for over 50% of the expected expenditures during the three-year period 1987-89. Details of the investment program including actual expenditures for 1985 and 1986 are shown in Table 1 of this Annex. The following summarizes the content of the investment program.

New lines

2. About DA 2.4 billion (US\$510 million), or about 30% of the remaining program, is expected to be allocated to the ongoing construction of new lines. This program includes the completion of the Saida spur (25 km) and the Beni Saf - Ain Temouchent line (25 km). However, construction of the two major ongoing new projects, the Ramdane Jamel - Jijel line (137 km) and the Ain Touta - M'Sila line (150 km) on the Hauts Plateaux, will be implemented at a slower rate and the scope of the projects modified in order to provide the necessary resources for a stepped-up track rehabilitation and renewal program. A proposed double tracking of part of the Ramdane Jamel - Jijel line between Jijel and El Milia (50 km) has now been deferred. In addition, only the first 15 km of the Ain Touta - M'Sila line will be completed at this stage, linking the main rail network with the new Ain Touta cement plant.

Modernization

3. Doubling track between Ramdane Jamel and El Gourzi (125 km) and between El Harrach and Thenia (35 km) as well as modernization of lines in the Annaba - El Hadjar area have now been opened for traffic or are on the verge of completion. The amounts allocated in the plan, namely about DA 1.5 billion (US\$320 million), represent final settlement payments.

Track Rehabilitation and Renewal

4. New project outlays are focussed primarily on infrastructure rehabilitation repairs and renewal which will absorb about DA 2.3 billion (US\$490 million) during the three-year period 1987-89. Track rehabilitation, involving the replacement of track and ballast on an improved substructure, will cover 168 km on the main line, namely between Ramdane

Jamel and Annaba (88 km) and between Thenia and El-Esnam (80 km) on the Algiers-Constantine line. The main part of the track renewal program covers about 280 km, namely about 90 km between El Hadjar and Souk Ahras on the mineral line and about 190 km between Beni Mansour, Setif and El Gourzi on the Algiers - Constantine route.

### Signalling

5. Signalling improvements will, in principle, upgrade the signalling and train movement systems to modern standards of safety and reliability. The projects included are: tokenless block between Annaba-Ramdane Djamel (DA 5 million); double line automatic block El Harrach-Algiers (DA 16 million); Turnout control boxes at stations on sections Annaba-Ramdane Djamel-Skikda and El Harrach-Algiers (DA 37 million); level crossings with automatic barriers and warning devices (DA 25 million); and replacement of semaphores by color light signals (DA 16 million). These proposals which are acceptable, along with another DA 3 million for structural works, total DA 102 million (US\$22 million). In addition, centralized traffic control (CTC) has been considered for Annaba-Ramdane Jamel, with the control centre at Constantine at a cost of DA 8 million (US\$1.7 million). However, in view of the fact that considerable relief in both line capacity and station operations will be afforded by the installation, already proposed, of cabin-operated signals and tokenless block working, the present and future anticipated traffic density does not warrant the adoption of CTC on the Annaba - Ramdane Jamel section.

### Telecommunications.

6. The objective is to install dependable communications both for train operations, operational control, data transmission and administration. Open wire land lines are proposed to be replaced by cable over the entire 564 km of the Grande Rocade between Thenia-El Gourzi-Ramdane Jamel-Annaba. The cable will be post-supported throughout except between El Gourzi and Ramdane Jamel where it will be laid underground. The project cost is estimated at DA 71 million (US\$15 million). All the 37 stations on this route will also be equipped with modern telephone equipment at a cost of DA 48 million (US\$10 million). Similarly modern train control equipment is to be installed at Constantine, Algiers, Batna and Biskra and line equipment on the Algiers-El Harrach double line at a total cost of DA 13 million (US\$2.8 million). Miscellaneous equipment for time synchronization on the main cabled route will require DA 13 million (US\$2.8 million). Along with the essential buildings and civil works of DA 7 million (US\$1.5 million), the cost of these proposals aggregate DA 145 million (US\$31 million). In addition, the SNTF has proposals for cabling and telephone equipment on the secondary El Gourzi - Touggourt branch line and ground train radio, covering the routes Skikda - Constantine - El Gourzi-Touggourt and Ramdane Jamel - Annaba, with equipment for 200 locomotives. The investments are premature and will not be implemented in the near future.



### Tunnels and Bridges

7. Tunnel and bridge repairs are currently underway but progress has fallen behind schedule. Repair work is currently underway on two tunnels on the Algiers - Constantine route, namely at El Achir (2,260 meters at km 220.220) and the daylighting of a 75 meters tunnel at km 113. The total cost is estimated at DA 53 million (US\$11.3 million). A feasibility study for a new 5,000 meter tunnel at El Achir, together with track realignment, is currently underway. Other tunnels requiring rehabilitation as well as the planned program of bridge repair is shown in Table 2 of this Annex.

### Track Maintenance Equipment

8. Although SNTF recently acquired a substantial amount of track maintenance equipment, this has now been transferred to INFRAFER for the track renewal program. Additional equipment will now be procured with a view to establishing a capacity for routine track maintenance. This will include four light track tamping machines, some 70 items of rail-mounted equipment, eight shunting locomotives as well as small machinery and power tools. Details are given in Annex 5.

### Workshops/Tools

9. In the past wagon maintenance has not been equal to the standards of locomotive maintenance because of lack of capacity in the workshop and line installations. Workshop space has been cramped and mere replacement of old by modern machines has not contributed effectively to either better quality or quantity of overhaul output. Similarly, lineside maintenance and inspection depots have lacked both adequate handling and lifting equipment and siding tracks for scheduled maintenance of rolling stock. Moreover a part of the basic facilities has been tied up in repair to accident damage wagons. Two schemes to remedy this situation are currently underway:

10. Scheme (a) launched in 1983, was a seven-year master plan for the remodelling and extension of the major workshops at Hussein Dey, Sidi Bel Abbes and Mohammadia, and the major line depots of Mohammadia, Blida, Agha and Oran. Included also was some equipment for the Annaba wagon shop and the Constantine bogie shop. Originally estimated at DA 638 million (US\$136 million), the final cost is likely to be DA 780 million (US\$166 million) inclusive of taxes. Project cost distribution percentage-wise is roughly workshop structure, trackage, lighting, electricity, compressed air and equipment - 50%; Machine Tools and associated equipment 15%; Erection and installation 20%; Detailed Engineering 15%.

11. Scheme (b) concerns mainly the lineside maintenance points where primary level schedule inspection and attention is given to wagons. These points also handle minor repairs to accident damaged wagons or render them fit to run to depots or workshops. The total cost is estimated at DA 86 million (US\$18.3 million).

### Rolling Stock

12. Wagon orders were placed in three tranches between 1982-85: 1,500 (DA 450 million - all replacement): 1,900 (DA 700 million including take over 528 user wagons): 1,200 (DA 556 million including 700 for replacement). 400 coaches (100 suburban, 250 mainline, 50 miscellaneous) were ordered in France in 1985. All rolling stock is currently under final delivery and no further procurement will be made at least for the next four or five years.

### Locomotives

13. SNTF is currently marginally short of main line locomotives and does need more shunters, particularly for its siding-connected services<sup>1/</sup>. SNTF does not maintain statistics of average numbers of locomotives deployed on passenger and freight services, but a rough estimate shows that of the fleet of 205 locomotives in 1986, the allocation to services was roughly: 123 on freight duty and 82 on passenger trains, of which 26 were exclusively dedicated to suburban services. The freight duty locomotives include 7-2000/1100 HP units used in pusher services and for ballast and engineering trains. In the current year the latter demands are not being met adequately. Against INFRAFER's requirement of six locomotives (low horsepower shunters), only three have been provided on an average in the first half of 1987. The transport of ballast and relaying materials (rails, sleeper plant or main stockyards to works site subdepots, for INFRAFER or works contractors (doubling, relaying) is effected as normal commercial service by allocating main line locomotives daily for specified periods. So far SNTF has coped with such demands without substantial transit delays, but the delay factor will worsen if motive power availability is not enhanced.

14. The investment program has a provision for acquisition in the next three years of 20 shunters. The shunters are fully justified for normal commercial duties as well as the ancillary requirements of the works program. The proposal is to acquire 650 HP units, ten for standard gauge and ten for dual-gauge. It is considered, however, that half the total number (10 units) should be of a higher horsepower in the 1500-2000 range. The distribution of motive power on shunting duties is shown in Annex 1, Table 4.

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1/ A September 1985 analysis for 1990 traffic level of 16.5 million tons originating (75 trains/daily equivalent) and 234 passenger trains both ways daily, places the mainline locomotive requirements at 65 in addition to a 1990 existing fleet of 145 locomotives (116 available daily in use). A similar analysis set the shunter requirement at 50 units.

15. SNTF also proposes to procure 20 main line locomotives. A tentative justification and deployment has been prepared but this requires review and elaboration with regard to the current situation,<sup>1/</sup> and a lower traffic growth forecast for 1990. A tentative estimate of requirements and deployment is in Annex 1, Table 4. Introduction of any new main line passenger services on the Grande Rocade would appear to be a dubious proposition, particularly on the Algiers - Constantine - Annaba route, until the track rehabilitation works are completed. Moreover, there appears to be scope for improving the occupation ratio of the present main line passenger services which is stated to be 60%. Locomotive requirements would not be more than 12 if no new main line passenger services are introduced and 17 if only the new services on the Algiers - Annaba route are eliminated.

### Studies

16. A feasibility and engineering study is currently being undertaken for the eventual replacement of the El Achir tunnel, along with the easing of present severe gradients and curves. Other studies include the relocation of the present railway station in Algiers and a modernization study of the eastern mineral line. The Fifth Highway Project is also providing funding for track rehabilitation and renewal studies. The proposed project will include studies for cost accounting and tariffs and for the establishment of a centralized wagon control system.

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<sup>1/</sup> One diesel locomotive and one electric locomotive, damaged beyond repair in a collision, were scrapped in 1987. (In all 5 locomotives were damaged in accidents in 1986). 2 railcar units and 7 narrow gauge locomotives - 6 mainline (1973) and one shunter (1951) - were also retired in 1987.

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**Core Railway Investment Program: 1985-89**

	<u>Expenditures</u>		
	<u>Actual</u> <u>1985 - 86</u>	<u>Planned</u> <u>1987 - 89</u>	<u>Total</u> <u>1985 - 89</u>
	-----DA million-----		
<b>A. <u>New Lines</u></b>			
Ain Touta - M'Sila (150 km)	229	300	529
Beni Saf - Ain Temouchent (25 km)	144	500	644
Ramdane Jamel - Jijel (137 km)	1,365	1,600	2,965
Saida spur (25 km)	82	-	82
Sub-total	1,820	2,400	4,220
<b>B. <u>Modernization</u></b>			
Ramdane Jamel - El Gourzi (125 km) line doubling	456	-	456
El Harrach - Thenia (35 km) line doubling	685	695	1,380
Annaba - El Hadjar	174	545	719
Bridges and tunnels	74	282	356
Sub-total	1,389	1,522	2,911
<b>C. <u>Track Rehabilitation/Renewals</u></b>			
Renewal 2nd program (261 km)	336	764	1,100
Renewal 3rd program (358 km)	-	1,200	1,200
Renewal 4th program (100 km)	-	300	300
Sub-total	336	2,264	2,600
<b>D. <u>Other</u></b>			
Signalling/Telecommunications	-	200	200
Track Maintenance Equipment	200	100	300
Track Material	49	18	67
Workshops	199	300	499
Rolling Stock			
Passenger coaches	669	464	953
Freight cars	537	310	847
Locomotives	-	276	276
Tools	207	125	332
Studies	133	100	233
Sub-total	1,994	1,893	3,887
<b>Total</b>	<b>5,539</b>	<b>8,079</b>	<b>13,438</b>
	=====	=====	=====

Source: SNTF and mission estimates

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SECOND RAILWAY PROJECT

Tunnel and Bridge Rehabilitation Program

A. Tunnel Rehabilitation Program

a) Ongoing work

The El Achir 2,260 meter tunnel at Km 220.220 on the Algiers - Constantine line and the daylighting of a 75 m. tunnel at Km 113 on the same are currently being repaired at a cost of about DA 53 million.

b) Other tunnels requiring rehabilitation:

- the Naciria 72 meter long tunnel at km 28.010 on Thenia-Tizi Ouzou line, estimated to cost DA 12 million;
- the Baazir 437.5 meter long tunnel on the Blida-Djelfa narrow gauge line (estimated cost DA 54 million);
- the Ouled Dhia 97 meter long tunnel on the Annaba-Ghardimaou (Tunisian border) section (cost DA 22 million);
- another 26 tunnels have been surveyed by ENROS and the cost of rehabilitation estimated at DA 60 million, inclusive of detail studies, drainage and conservation works.

B. Bridges

Some bridges on the mineral lines, the Grande Rocade and the Thenia-Tizi Ouzou lines, for which studies have been completed, require heavy repairs or rebuilding. The total costs have been estimated at around DA 150 million as follows:

<u>Line</u>	<u>Bridge Rehabilitation</u>		<u>Estimated Cost</u>		<u>Contractors</u>
	<u>No.</u>	<u>Total Length(m)</u>	<u>DA</u>	<u>US\$</u>	
Algier-Constantine	26	590	100.0	19.6	SAPTA
Annaba-R. Jamel	3	88	5.0	1.0	SAPTA
B. Mansoor-Bejaia	2	40	-	-	INFRAFER
Annaba-S. Ahras - Ghardimaou	8	105	4.0	0.8	-
Algiers-Oran	10	100	24.5	4.8	INFRAFER SONATRAM
Senia - Ain Temouchent	5	100	12.0	2.4	SEROR
Blida-Djelfa	1	15	3.0	0.6	INFRAFER
<b>Total</b>	<b>49</b>	<b>1,038</b>	<b>148.5</b>	<b>29.2</b>	

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SECOND RAILWAY PROJECT

Human Resources Planning & Development

I. Personnel Management

1. The Director of Human Resources manages personnel which is organized under him in four functional departments -- Personnel Management, Payroll/Remuneration, Recruitment/Promotion and Rules and Regulations. The Medical Department is also an adjunct of this Directorate. The Budget and Budgetary Control is, however, handled by the Directorate of Administration, a dichotomy not conducive to efficiency. Moreover, the departments within the Directorates function disparately; in consequence the subunits also work in such narrow compartments that coordination for decision-making requires top level intervention even in minor matters. Manpower planning and control is not practiced in a continuous, meaningful fashion and as a result it is prone to ad hoc decision-making not always in the long term interest of the organization. However, in this regard, the parastatals in general are subordinate to Government policy decisions and regulations which do limit their scope for manoeuvre. Government decrees on award of permanent status to seasonal permanent way labor is a case in point. Nevertheless, in the changing conditions of manpower and technology the railways face, a more dynamic system needs to be developed in the management, training and deployment of staff. The new Government policy which now emphasizes autonomy of the public enterprises should help to improve this situation.

2. Certain characteristics of the SNTF workforce which have an impact on future personnel planning and organization need to be highlighted (Annex 3, Tables 1-3):

- (a) The percentage of professionals (managers, engineers, technicians) is as low as 3.9% versus a norm of around 7%. Unless this is strengthened with suitably qualified and experienced staff, efficiency is bound to suffer.
- (b) A large percentage of professionals and middle-level technicians are nearing retirement (55) age, 23% being more than 50 years old. Replacements need to be planned from now on, particularly as the chances of filling the gap by promotion of senior and experienced staff in the grades below are ruled out because here again the age groups are in the higher bracket.

- (c) A sizeable number of professional staff lack higher educational qualifications due to the earlier policy of encouraging promotion from the ranks. One consequence of this has been that graduates, recruited after direct entry was permitted, have faced serious problems of integration. Recruitment needs to be weighted in favor of graduates, on the one hand, and, on the other, the selection system and higher professional training of prospective promoters needs to be redefined.

3. The training function is organized in a separate Directorate but it lacks a systematically evolved policy, planning and evaluation, purposefully oriented to the railways' long term needs. A study is in hand to merge this Directorate with Personnel Administration and a reorganisation expected to take place early in the project period.

## II. Training

4. SNTF's in-house training system, organized at 14 different centers spread over the railway (Annex 3, Table 3), covers only the rank and file staff and the supervisory/foremen levels of, basically, the three principal operational departments - Operations, Civil Engineering and Traction and Rolling Stock Maintenance. Training of long duration (2-3 years) is imparted on initial recruitment followed, at appropriate intervals during the service, by short refresher courses (three to six weeks) for grade promotion trade tests or examinations. Upward mobility is built into the promotional structure, including induction of foremen into the higher professional cadres, where direct recruitment, now usually of University graduates, is a comparatively recent innovation. Initial recruitment training is a sandwich of "on-the-job" practical associative work and theoretical classroom instruction. For departments, other than the three principal operational ones, the recruit receives only "on the job" task exposure under the intermittent guidance of a training assistant. In the last five years or so, training center throughputs have averaged annually: 1,443 personnel (248 foremen) through long duration courses (initial recruitment and professional upgrading); and 1,350 personnel (409 foremen) through short duration refresher and promotional test courses. These capacities are considered adequate for the next five years or more. The centers would need, however, some replacement and improved teaching aids and materials for which a provision of US\$3 million in foreign exchange has been made in the project. The "on-the-job" system of training, applicable to many categories in operations and commercial working and departments other than the three operational ones, requires to be reviewed towards planning an improved system. Owing to the changing technology and competitive environment of the railway enterprise, an expert review of the courses and curricula appears necessary.

5. For the professional cadre (managers, engineers, technicians) training in the Railway industry as such is not systematically organized -

a lacuna proposed to be remedied by the setting up of a Superior Railway Technical Institute at Rouiba. At present, on recruitment the graduates move through various facets of their assigned departments' activities for 29 months before placement in a working post. To the maximum extent feasible, a course of reasonable duration on overseas railway is also sandwiched in this period. Subsequently, during the service career, the professional is from time to time put through proficiency seminars and workshops of Algeria's national institutes or organized "in house" by the SNTF. Annually, about 70 professionals participate in these sessions. These exposures, which are considered important for grade promotion tests, are supplemented, but on a very limited scale, by training in overseas railway establishments as well as in specialised equipment suppliers work. In the last five years, the numbers trained overseas have averaged about 30 staff annually.

6. The Railway Technical Institute is proposed to be organized in the project period for the initial recruitment and subsequent career development stages of the professional cadre. The objective is to establish systematic training in Railway Technology, namely in Operations, Civil Engineering & Signalling and Telecommunications and in Traction and Rolling Stock Maintenance. The scheme provides for (a) equipping the building, already available in Rouiba, with working models, modern teaching aids and didactic material (cost approximately US\$ 2 million) and (b) 168 man-months of expatriate technical assistance for training of (i) a faculty of 60 instructors, (ii) throughput of 1,736 professionals (716 operations, 600 infrastructure, 420 traction and rolling stock) in the 1988-91 period. Additionally, the technical assistance will draw up a detailed plan for initial training and the subsequent training requirements of 1990/2000 and 2000/2010 along with an action plan for institutionalizing the Professional Cadre Training System of SNTF. The scheme is expected to cost a total of US\$4 million and funding is provided from the Fifth Highway Project.

7. The proposed Project provides 710 man-months of consultancy services and 110 man-months of overseas training of SNTF personnel: the total cost, including a supply of teaching aids and equipment, is estimated at US\$15 million, of which the foreign exchange content is US\$12 million as indicated in Annex 3, Table 4. Terms of Reference for the technical assistance, consultancy services and the criteria for selection of SNTF staff for overseas training will be agreed with the Bank. A resume of the technical assistance and training component is given below:

8. Cost Accounting Study/Implementation. This is a scheme to study and install a modern accounting system which will enable SNTF to cost and analyse its product more meaningfully for tariff fixation, accurate valuation of Government imposed services for compensation claims and generally for management accounting.

9. Planning. The objective is to strengthen and develop competence in project evaluation and investment analysis so as to provide management



with more refined and informed data for decision-making as well as long term planning of SNTF's development in a growing competitive environment. The experts provided will also assist the National Transport Study of the Ministry of Transport. The Directorate of Projects, a Civil Engineering function, is proposed to be reorganized into a parastatal similar to INFRAFER and its scope expanded to cover railway engineering in general. This unit will provide/develop specifications and standards for adoption by SNTF, engineer and manage projects and carry out surveys and designs as required. The staff for this unit will have to be carefully selected and trained and an extensive documentation service built up to assist the unit to fulfill its role effectively. Provision is also made for a preliminary study for a centralized wagon control system.

10. Personnel Administration/Training Management. To review and strengthen the organization of these functions and devise procedures and methods of handling the Directorates' business more efficiently, particularly in the areas of manpower planning, training and redeployment.

11. Computers. To assist in the setting up of the pilot schemes for workshop production planning and costing and the passenger ticket system in the Algiers region.

12. SNTF Training Centers. Though capacity and facilities are deemed to be adequate for the present, the consultancy services will be utilized to review the system of training, suggest improvements and help provide better teaching aids and equipment (for which a separate provision has been made) as also revise curricula and identify new training areas, especially concerning staff of departments who are at present trained on the job on recruitment.

13. Miscellaneous. This provision has been retained to provide, among other items, training for track maintenance staff in the upkeep and operation of trackwork machines and workshop organization skills and management. The exact requirements will be identified after the quantum of training that equipment suppliers can offer is precisely known. Other contingencies in the training program will also be taken care of by this reserve .

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Staff Strength and Distribution - January 1, 1987

Table 1: Distribution of Main Staff Functions

<u>Function</u>	<u>Subgroup No.</u>	<u>Group Total No.</u>
<u>Operations</u>		
Movements & Commercial	4,108	5,332
Locomotive Drivers and Depot Maintenance	1,224	
<u>Motive Power &amp; Rolling Stocks Maintenance</u>		4,489
Repair & Maintenance	4,301	
Stores and procurement	188	
<u>Infrastructure Maintenance</u>		6,236
Maintenance & Renewals	5,780	
Projects	456	
<u>General Administration</u>		2,181
Headquarters	944	
Regions	1,237	
	Grand Total	18,238

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Table 2. Personnel Distribution by Age

Age	Managerial & Professional	Supervisors & Foremen	Skilled/Unskilled Labor	Total
55 years & +	42	427	1118	1587
50 to 54 years	97	829	1229	2155
45 to 49 years	142	1006	1350	2498
40 to 44 years	98	775	1200	2073
35 to 39 years	87	872	2216	3175
30 to 34 years	112	986	2714	3812
25 to 29 years	33	646	2405	3084
20 to 24 years	—	113	648	761
Total	611	5,654	12,880	19,145

Source: SNTF

Table 3. SNTF Existing Training Centres

Centre	Location	Category	----- Course ----- Type	----- Duration -----	Staff Grade
1. Locomotives	Algiers Oran Mohammedia Souk Ahras	Drivers	Initial Refresher	6 months 1 week	Recruitment 2 years service
2. Centre	Bouzarra	Foremen	Train Con- trollers Traction/ Rolling Stock Civil Engineering	10 weeks 4-6 months N.A.	Recruitment
3. Apprentice	Algiers Oran Sidi Mabrouk	Workers	Diesel Loco./Mechan.	3 years	Recruitment (unskilled)
4. Apprentice (superior)	Algiers	Workers	Diesel/Loco/ Mechan.	9 months	Best apprentices after 3 year course above
5. Center (special skills)	Mohammedia	Workers	Welding, smith, foundry	18 months	Recruitment apprentice, trained workers
6. Center (professional)	Oran	Staff	Train Contr. Traffic Account- ing, claims Shunting Civil Eng. Maintenance	2-6 weeks " 3 weeks 2 weeks	Recruitment (previous experience)
	Mohammedia	Staff	Train Contr. Traffic Account- ing, claims	2-6 weeks 6 weeks	Refresher
	Blida	Staff	-ditto-	3-6 weeks	-ditto-
	Beni Mansoor	Foremen Train Crews	Shunting	3-6 weeks	-ditto-

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Table 4. Technical Assistance, Consultancy Services and Overseas Training

	Man/ Months	Local -----	Foreign Exchange US\$ million	Total -----
<b>1. Institutional Development</b>				
(a) Cost Accounting Study/Implementation	100			
(b) Planning/Economic Analysis/Engineering/ Centralized Wagon Control	62			
(c) Personnel Administration/Training Management	40			
(d) Computers (Pilot scheme for MIS improvement and ticketing)	20			
(e) Miscellaneous	<u>20</u>			
Subtotal	242	0.7	2.9	3.6
<b>2. Training</b>				
SNTF Training Centres:				
Rouiba	160			
Apprentices, skills for workers/technicians	180			
Other	<u>20</u>			
Subtotal	360	1.1	4.3	5.4
<b>3. Foreign Study Tours</b>	110	--	0.6	0.6
<b>4. Instructional equipment and materials:</b>				
Rouiba Center		1.0	1.5	2.5
SNTF Centers		1.2	1.8	3.0
<b>5. Computer and Office Support Equipment</b>		<u>2.9</u>	<u>4.3</u>	<u>7.2</u>
<b>Total</b>		6.9	15.4	22.3

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Railway Operations

I. Traffic

1. Ninety-five percent of freight traffic is planned, commodity movement volumes being agreed annually between the users (other parastatals, local bodies organized for distribution of farm inputs and essential goods) and SNTF. The 1987 Transport Plan (see Table 9) is for a lift of 13.2 million tons or 3.3 billion net ton-kilometers equivalent to an average haul of 250 km. Steel plant traffic - raw materials (iron ore, coal, limestone/dolomite) and finished products - accounts for 6.9 million tons (1.28 billion ton kilometers) or 52 percent of total rail tonnage or 39 percent of the ton-kilometers. The next large volume bulk commodity is phosphates with a share of 1.2 million tons (412 million net ton km) or 16 and 13 percent of tons and ton-kilometers respectively. The bulk of this traffic (68 percent of tonnage and 55 percent ton-km) moves over the Eastern Mineral line and the route Annaba-Algiers or roughly 1,000 kilometers of the network. About 558,000 tons of finished steel products (plates, coils, rounds, billets, ingots) is short-haul (19 km) from the plant to the port of Annaba for shipment by coastal vessels of up 12,000 tons to the port of Algiers from where the products are road delivered to factories and local consumers. The coastal movement is an artificially induced transport calculated to develop coastal shipping. Costwise once on to wagons at the steel plant it would be far more economical to transit through the "brouettage" tonnage to Algiers for local distribution as SNTF not only has the capacity to do so but all the consignees are siding connected.

2. LCL traffic consolidated in full wagon load has dwindled from 41,000 tons in 1983 to a provision of 11,000 tons in the 1987 transport plan<sup>1/</sup>. Evidently SNTF has a public service obligation to carry this type of "smalls." In August 1986 in an effort to cut costs, SNTF contracted out the handling and consolidation of this traffic to freight forwarders, leasing them warehouse space in the origin-destination terminals wherever available. During the period August-December 1986 about 2,700 tons<sup>2/</sup> were shipped over distances averaging 100-1,000 km (see

1/ This tonnage is included in 468,600 tons of General Good in full wagon loads.

2/ January-July 1986 figures were not readily available. The data in Table 12 has been derived from computer coded data adopted after August 1986.

Table 11). An occasional full wagon consignment has been as low as one or two tons . Transit times notwithstanding, the low tariffs and the liberal minimum wagon load tonnage of 5 tons prescribed makes this class of rail movement a highly attractive proposition compared to road transport particularly for high volume low unit weight consignments. In relation to the very low overall and individual annual tonnages lifted and its wide dispersal, this traffic ties up a totally disproportionate quantum of the railways' resources and is obviously highly costly to operate. It should be phased out as rapidly as possible and the simplest means of doing so would be to raise the minimum weight conditions for LCL full wagon loads first to 10 and subsequently to 15 tons.

## II. Wagon turnaround

3. For an average haul of 250 km, the wagon turnaround of 13 days is high (see Table 10). Iron ore and phosphates wagons have a turnaround of 1.6 and 3.4 days for average hauls of 181 and 344 kilometers respectively. Petroleum product stock turnaround averages 6 days for an average lead of 227 km, about the same as raw sugar for a shorter haul of 185 km. The "other" traffic category - a mixed bag of commodities which includes cement, fertilizers, flour, steel products (excluding coils) and general goods - is, however, the main contributor to excessive turnaround. In this category the turnaround ranges between 28 and 22 days; the latter figure excludes the wagons "stabled in good order" due to seasonal fluctuations or variations in ship arrivals at ports for imported goods, of about 16-18 percent over the year. In the general category of goods and in some bulk commodities like gypsum, fertilizers and salt, unloading delays are excessive because of lack of appropriate handling and conveying facilities at the user's terminals, possibly also inadequate storage. Increased demurrage charges do not appear to have been a deterrent to excessive terminal detention of wagons. In the view of the Ministry of Transport, which has apparently not been able to assist SNTF significantly in reducing terminal detentions, the problem lies more in the poor management by parastatals and local bodies of their transport and handling activities than in lack of means of handling local transport or storage capacity. While undoubtedly the major part of detention is attributable to the users, there appears to be some scope for improving terminal operations by providing additional sidings, introducing additional shunting locomotives, and eliminating marshalling on the main line track.

4. No statistics are maintained of the time taken from the arrival of a wagon at the main station yard and its placement/withdrawal in/from the user's siding. The efficiency of such operations depends on how effectively shunting locomotives are deployed and controlled and if their number is adequate for the totality of the service zones. About 50 wagon weighbridges are planned to be installed in the 1987-88 period at major loading stations to avoid overloading of wagons and disputes over tons

actually loaded. If the shunting movements are not more effectively organized and controlled on the commissioning of this facility, the wagon turnround is likely to increase further. In regard to "en route" shunting by freight train engines, rationalization of procedures and reduction in the number of stations where such shunting has to be done can contribute to better utilization of wagons. In addition, SNTF will undertake a study to set up a centralized wagon control system in order to improve efficiency in handling freight traffic. Wagon turnround on SNTF does need to be improved as a reduction from 13 to 9 days would generate enough capacity for an additional 2-3 million tons annually of freight. Even if this additional capacity is not required in the next two to three years, the effort is worthwhile as the surplus wagons can either be "stabled in good order" or the pace of selective retirement of overaged stock could be accelerated.

### III. Eastern Mineral Line Traction

5. Electric locomotive performance will remain poor until the 24 units of East German origin are replaced or substituted by diesels. Most of the overhead catenary structures - presently in fairly sound condition - dates from the mid-1930s when the line was electrified. The equipment of seven substations, purchased several years ago at relatively low prices, is now in the course of replacement. Operations on this route are not entirely by electric traction: at the Annaba end, diesel traction takes over to serve the steel plant and port/industrial area as in the remodelling and expansion scheme the tracks in the new complex - aggregating about 40 km - have not been electrified: electrification today would be an expensive proposition. At the mining end, iron ore trains from the mines to Tebessa, the last point electrified, are diesel-hauled - a distance of 25 km: likewise diesels are used over the 25 km stretch between Oued Keberit and Ouenza. Frequent changes of traction are not conducive to efficient operations and with a set of inherently low-performance electric locomotives, the overall cost of operations would appear to be high. SNTF will conduct a technical and economic study of the comparative advantages of continuing with electric traction - with the necessary extensions of the electrified line and eventual replacement of the electric locomotives - versus switching over to diesel traction, gradually phasing out the electric locomotives and building up diesel maintenance capacity at Souk Ahras.

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Routine Track Maintenance Equipment

I. Introduction

1. All the equipment which was devoted to mechanized track maintenance has been transferred from SNTF to INFRAFER in early 1987, to handle the increasing demand for periodic track overhaul. Most of the equipment dates from 1985 and is in good condition. The track overhaul works are being contracted by SNTF either to INFRAFER or through international tenders, the necessary equipment being provided by the contractors. For routine track maintenance works, SNTF still depends on its own force account capacity of essentially manual labor. However, the aging manpower and the difficulty in recruiting new workers have required SNTF to develop new mechanized capacities to handle routine maintenance. For this purpose, SNTF hires four heavy tamping machines from INFRAFER on a permanent basis. To complete the necessary capacity for maintenance work, SNTF has planned to purchase additional equipment as follows:

- (a) light tamping machines (third level) which would be used inter-alia on turnouts;
- (b) gauge and material trollies devoted mainly to track and ancillary works and also for gang transport (labor force, materials, small equipment);
- (c) additional locomotives for engineering trains;
- (d) power tools and light equipment for track work;
- (e) a plant for reconditioning steel sleepers;
- (f) equipment for handling track materials (rails, sleepers, etc.) in storeyards.

2. The Bank mission reviewed the SNTF Track Maintenance Department proposals for procurement of additional equipment under the project. Adjustments were agreed upon as follows:



- (a) In view of low traffic densities, deletion of all items dealing with narrow gauge lines;
- (b) reduction of rail cars and trollies purchases from about 120 to 70 units but with increased power (about 200 HP compared to 100 HP initially proposed). Moreover, about two thirds of the rail trollies which were originally designed for transport purposes only are now proposed with additional equipment (cranes, backhoes) to provide a direct input to works; and
- (c) reduction of the total number of crane and fork lift trucks to be assigned to regional workshops and track material storage pools but with the addition of two gantries (10 tons each).

II. List of Equipment and Costs

3. The following provides details of maintenance equipment and costs.

(i) Tamping machines

Four light tamping machines (third level) with a CIF price estimate to DA 3.3 million per unit, or an equivalent of DA 3.7 million per unit including local taxes. The total cost including an additional provision of 10% for spare parts has been estimated to DA 16.4 million, of which DA 14.4 million is direct foreign exchange.

(ii) Transport and track maintenance rolling stock

	<u>CIF unit prices</u> <u>(DA million)</u>
<u>rail trollies</u>	
20 units (208 HP) with crane	1.3
20 units (208 HP) with backhoe	1.1
20 units (170 HP) for gang transport	0.9
1 unit for bridges inspection	1.5
2 units for catenary maintenance	1.5
1 unit for ride index inspection	2.1
 <u>weed killing unit</u>	
1 unit with intensive output	2.6
 <u>bush clearance units</u>	
4 units	2.7
 <u>locomotives</u>	
8 units (800 HP)	3.5

CIF prices have been estimated at 88% of final costs which include local taxes. The total cost includes 10% additional cost for spare parts has been estimated to DA 142.5 million, of which DA 125.4 million is direct foreign exchange.

(iii) Tools/machinery for track works

	<u>CIF unit prices</u> <u>('000 DA)</u>
183 rail sawing machines	7.6
179 rail drills	7.4
201 regular sleeper-screw drivers	9.0
63 spike and bolt drivers	12.0
24 wooden sleeper borers	7.0
20 rail loaders	30.0
4 rail layers	120.0
4 sleeper replacers	575.0
4 LWR stress release equipment	270.0
12 Thermit welding equipment	40.0
8 rail grinding equipment	30.0
2 switcher layers	1,000.0

CIF prices are estimated at 80% of final costs including local taxes. The total cost has been therefore estimated to DA 15.8 million, of which DA 12.6 million for direct foreign exchange.

(iv) Plant for reconditioning sleepers

The total cost is estimated to DA 4.0 million, of which DA 3.2 million for the direct foreign exchange.

(v) Handling equipment

	<u>CIF unit prices</u> <u>(DA million)</u>
2 gantries (10 tons)	2.1
3 road crane trucks	0.9
14 fork lift trucks (6/8 tons)	0.3

CIF prices are estimated at 80% of final costs including local taxes. With an additional provision of 10% for spare parts, the total cost is estimated to DA 15.3 million of which DA 12.2 million for direct foreign exchange.

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Economic Evaluation

I. Introduction

1. This annex provides the basic data and assumptions used in the economic evaluation of the track rehabilitation and renewal subprojects, as well as details of the block system component. Background data have been prepared by SNTF railway staff in collaboration with Bank missions. Working papers are included in the Project File (Documents C2 and C3).

II. Track Rehabilitation Program

General

2. A distinction should be made first between track overhaul and complete track rehabilitation. The latter applies only to those sections of the network where substructure (platform, drainage) needs first to be rehabilitated prior to track overhaul. Detailed technical design studies have been prepared for such sections by consultants. Cost estimates for the Ramdane Jamel - Annaba section (88 km) are derived from a first round of bidding undertaken in 1986 which was subsequently cancelled. For track overhaul, the current program has been prepared by the SNTF Track Department.

Traffic Growth.

3. The proposed project is oriented towards those sections of the core network (2,200 km of standard gauge lines) which were the most heavily trafficked in 1986.

	<u>Gross traileed tons per km (GTT per km)</u> <u>(million)</u>
Ramdane Jamel - Annaba	3.62
Beni Mansour - Setif - El Gourzi	4.16
El Hadjar - Bouchegouf - Souk Ahra:	7.93

4. For the relevant section of the network, the forecast cumulative traffic over the thirty year period 1991-2020 will range from 265 to 350 million gross-trailed tons, depending on the sections. Apart from the eastern mineral line, freight traffic growth is expected to increase at about 2.5% per year through 1991, the proposed track renewal program

precluding any additional growth. Beyond 1991, once the track works have been completed, freight traffic growth on the main network is expected to increase to about 5% per year. Forecasts for the mineral line are based on no increase in traffic up to 1991 followed by a 2.5% per year increase in the longer term. For passenger traffic, the average increase is expected to be about 2.5% per year except on the section Ramdane Jamel - Annaba where traffic is expected to remain stagnant up to 1991 followed by a 2.5% per year increase once track improvements have been completed.

### Project Costs

5. For flat tangent subsections, the renewed track is designed to last at least 30 years which has been considered as a standard lifetime for rails, sleepers and ballast. However, along sections with severe curvature (radius smaller than 1,000 m.), increased wear will reduce rail life to 15 years. It is also assumed that about 20% of sleepers are replaced, and about 30% of ballast replenished from years 15 to 20. A residual value is considered for UIC 54B rail only. Based on fully mechanized track works, about 40% of total cost relates to track materials and 60% to labor. A detailed breakdown of the track overhaul unit cost is given in Annex 6, Table 1. A typical economic net-of-tax cost for track renewal is estimated at DA 2.88 million per km in 1987 prices. Additional substructure works on Ramdane Jamel - Annaba have been estimated at DA 1.85 million per km.

### Project Benefits

6. Savings in expenditures on major spot repairs, as well as a part of recurrent costs related to track material replacement constitute the major benefits of the track renewal program. Additional savings are expected from reductions in (a) routine track maintenance costs, (b) on-line train running times, (c) derailments, and (d) rolling stock maintenance.

7. Deferred Track Maintenance. For the without project scenario, it is assumed that in order to maintain track in serviceable condition, a stepped-up maintenance effort would be necessary beyond that normally required for routine maintenance tasks. Without such deferred maintenance, the condition of the track would continue to deteriorate with demand ultimately being diverted to road transport or economic activity being disrupted. The rate of stepped-up maintenance has been assumed to build up gradually, in line with a growing need for spot repair, such that after a ten-year period the total of maintenance expenditures would be equivalent to full track overhaul. This spot improvement work is assumed to apply first to subsections with severe curvature where existing conditions are presumably at their worst. All such spot repairs are carried out with labor intensive methods and as a result, the lifetime of track items is reduced since the quality of work is inferior to that achieved using mechanized forces. The basic assumptions used are as follows: (i) rail

life is reduced by one-third; (ii) only 70% of sleepers would reach a 30-year life; (iii) the ballast replenishment would increase from 30% to 45%. Maintenance costs using labor intensive methods are estimated to be about 2.7 times higher than with mechanized forces with a breakdown of 20% for track materials and 80% for labor costs. On the section between Ramdane Jamel and Annaba which requires rehabilitation of the substructure, it is assumed that only 25% of this work would be achieved in the without project scenario. In addition, the work on the substructure would also be undertaken using labor intensive methods.

8. Routine Track Maintenance Costs. Following track rehabilitation and renewal, labor intensive maintenance can be replaced by a more efficient system of mechanized routine maintenance. The savings from this change in maintenance practices are estimated at about DA 30,000 per km.

9. Operating Cost Savings. On the basis of technical and operating data which have been reviewed with railway technical staff, on-line travel delays due to track conditions have been identified for each of the project sections. The estimated annual cumulative train-hour savings are assumed to be converted into capital and maintenance cost savings for rolling stock, as well as into crew and energy cost savings.

10. Improvement in the track conditions under the project are expected to provide the following time savings per train:

	<u>Time savings (minutes)</u>	
	<u>Passenger</u>	<u>Freight</u>
Ramdane Jamel - Annaba	68	42
Beni Mansour - Setif	15	5
Setif - El Gourzi	12	2
El Hadjar - Bouchegouf	7	3
Bouchegouf - Souk Ahras	10	20

11. The average operating cost savings per train-hour (at 1987 prices) have been estimated as follows on standard gauge lines:

<u>Type of train</u>	<u>DA/train-hour</u>
<u>Passenger</u> (320 GTT)	1,840
<u>Freight</u>	
Mineral line (1250 GTT)	1,095
Other lines (860 GTT)	1,020

12. Typical standard trains have been defined separately for passenger and freight traffic and for freight traffic on the mineral line. Total traffic on each section has been converted into standard train travel movements. Annual traffic recorded in 1986 expressed as standard equivalent trains are as follows:

	<u>Passenger</u>	<u>Freight</u>
Ramdane Jamel - Annaba	784	3916
Beni Mansour - Setif	3,305	3,606
Setif - El Gourzi	2,734	3,821
El Hadjar - Souk Aharas	1,565	5,944

13. Accidents. In 1986, derailments which have been recorded on the main lines between stations, are the following:

Ramdane Jamel - Annaba	10
Beni Mansour - Setif	2
Setif - El Gourzi	3
El Hadjar - Bouchegouf	2
Bouchegouf - Souk Ahras	8

14. On average, about 50% of derailments are caused by the existing poor track conditions. The economic cost of each derailment comprises the cost of disrupted services and necessary repairs to the track and rolling stock. These costs depend on the level of traffic on each section. (Further details are given in the Project File). Finally some additional maintenance savings on rolling stock are expected following the upgrading of the track profile. However, most of those savings may be offset by increased maintenance because of increases in operating speeds.

### Results

15. Annex 6, Tables 2 to 6 show the quantities of replaced track materials in the with and without project scenarios for the five sections under consideration. Annex 6, Tables 7 to 11 show the track rehabilitation or track renewal investment costs allocated between materials and labor, and Annex 6, Tables 12 to 16 show the streams of costs and benefits taking into consideration both investment costs and operating savings. The ERs and Benefit/Cost ratios at a 10% discount rate are estimated as follows:

<u>Sections</u>	<u>ER</u>	<u>B/C</u>
Ramdane Jamel - Annaba	18	1.5
Beni Mansour - Setif	24	1.8
Setif - El Gourzi	22	1.6
El Hadjar - Bouchegouf	22	1.8
Bouchegouf - Souk Ahras	27	2.2

16. Two types of sensitivity analysis have been carried out: (i) a 10% increase in investment costs combined with a 10% decrease in benefits, and (ii) a 100% devaluation of the dinar. Revised ERs range in both cases from about 14% for Ramdane Jamel - Annaba, to 22% for Bouchegouf - Souk Ahras. Details of the sensitivity tests are shown in the Project File.

### III. Signalling and Telecommunication

17. A number of subcomponents included under the proposed signalling and telecommunication program, such as level crossing equipment and replacement of obsolete signals, are primarily designed to meet safety objectives. As these investments are concentrated on the East-West trunk line and particularly on those sections scheduled for track rehabilitation and renewal, they have been included as integral part of the project. However, as their effects are diffused, no attempt has been made to quantify the benefits from these investments.

18. A more detailed assessment has been made for block installations which are planned for Ramdane Jamel - Annaba (single line manual block) and Algiers - El Harrach (automatic line block). These block system improvements will provide travel time savings, relief of bottlenecks and safety benefits.

19. For the Ramdane Jamel - Annaba section, the installation of a single line block system will increase the traffic saturation level from about 22 to 35 trains per day. However, as the existing traffic is only 13 trains per day on average, and given current traffic growth prospects, it is unlikely that any saturation would occur before year 2000. The main benefits would therefore accrue from travel time savings and relief of congestion.

20. The proposed block system investment on Ramdane Jamel - Annaba is broken down as follows:

<u>Item</u>	<u>Economic Cost</u> <u>(DA million of tax)</u>
Block system	5.0
Point control cabins (7)	25.4
Telephone (7 stations)	<u>10.0</u>
	40.4

21. Turnout control boxes and modernization of the existing telephone equipment are considered necessary to take full advantage of the block system. The average travel time saving has been estimated at 5 minutes through each station. With 1991 being taken as first year of operation, time savings over a 20-year period would be sufficient to provide an ER in excess of 15%. However, by the year 2000 capacity constraints would be

felt in the without project scenario and potential demand would be diverted to road transport implying additional benefits in the form of transport cost savings.

22. For the section Algiers - El Harrach, the proposed investment would consist of the following:

<u>Item</u>	<u>Economic Cost</u> <u>(DA million net of tax)</u>
Automatic line block	15.0
Turnout control boxes (4)	<u>12.0</u>
	27.0

23. On this section, main line trains currently do not stop at the four intermediate stations. and therefore do not incur any travel time losses. For suburban trains, the expected travel time savings will be marginal with the introduction of the block system. The major benefits are expected from increased capacity which would be raised from 153 to 242 trains per day. The saturation level is already achieved during about nine peak hours per day with an average of about eight trains per hour. Any incremental suburban travel demand will require additional services or would be diverted to a road transport alternative (busses, taxis, or even private cars). For suburban traffic, long term marginal costs, including provision for the development of infrastructure, are lower for rail transport compared to road transport. In addition, for the rail alternative, the impact on the urban environment will be attenuated and energy consumption will be lower. However, detailed assessment of the benefits of the block system are not possible given the lack of detailed information on urban traffic patterns.



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**Track Overhaul Investment Costs per Average km 1/  
(1987 prices)**

	<u>Units</u>	<u>Quantity per km</u>	<u>Unit prices (DA)</u>	<u>Cost/km '000 DA</u>	<u>Direct Foreign Exchange Foreign Contractor</u> Cost/km	<u>INFRAFER</u>
<b>1. Material</b>						
rail UIC 54 B	t	110.2	3,250	358	358	358
sleepers (1700/km)						
wooden (15%)	pcs	255	170	43	43	43
concrete (85%)	pcs	1,445	225	325	105	75
fastenings 2/	t	11.5	10,000	115	115	115
fish plates ties 3/	pcs	28	250	7	7	7
welding portions supply 4/	pcs	83	145	12	12	12
switches	pcs	0.2	200,000	40	40	40
ballast	m3	2,000	140	280	100	180
				1,180	780	650
<b>2. Works</b>				1,600	800	-
<b>3. Site preparation</b>				100	40	10
			<b>Economic Cost</b>	2,880	1,620	650
			<b>Taxes</b>			
			Foreign Contractor (25%)	720		
			Local Contractor (13%)	370		
			<b>Total Cost</b>			
			Foreign Contractor	3,600		
			Local Contractor	3,250		

- Notes:** 1/ The breakdown refers mainly to the section Bent Mansour - Setif - El Gourzi where the geometrics would permit the average following conditions:  
50% of the track equipped with long welded rail (LWR) layed on concrete sleepers  
50% of the track equipped with bars of 36 m., of which 30% layed on wooden sleepers, and  
70% layed on concrete sleepers.
- 2/ The average weight of fastenings per sleeper unit is of 14 kg on wooden, and 5.5 kg on concrete.
- 3/ Only 50% of the track is equipped with bars, and therefore needs ties (2 x 500): 36 = 28 ties/km.
- 4/ Bars of 36 m. are obtained from bars of 18 m. which require 55 welded joints per km. In addition, 50% of the track is layed with long welded rails which need 28 supplementary welded joints per km.



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**Beni Mansour-Setif (88.4 km)**

**Track Material Replacement**

	<u>With the Project</u>				<u>Without the Project</u>			
	<u>Track Materials</u>			<u>Recycled Rail (km)</u>	<u>Track Materials</u>			<u>Recycled Rail (km)</u>
<u>New Rail (km)</u>	<u>Sleepers (no.)</u>	<u>Ballast (m3)</u>	<u>New Rail (km)</u>		<u>Sleepers (no.)</u>	<u>Ballast (m3)</u>		
1988								
1989	39.9	67,830	79,800	4.4	7,514	8,840		
1990	48.5	82,450	97,000	5.3	9,017	10,608		
1991				6.2	10,520	12,376		
1992				7.1	12,022	14,144		
1993				8.0	13,525	15,912		
1994				8.8	15,028	17,680		
1995				9.7	16,531	19,448		
1996				10.6	18,034	21,216		
1997				12.4	21,039	24,752		
1998				15.9	27,050	31,824		
1999				4.4			4.4	
2000				5.3			5.3	
2001				6.2			6.2	
2002				7.1			7.1	
2003				7.3			7.3	
2004	13.7	2,261	3,990	13.7	376	663		
2005	16.7	5,009	8,840	16.7	827	1,459		
2006		5,009	8,840		1,353	2,387		
2007		5,009	8,840		1,954	3,448		
2008		5,009	8,840		2,630	4,641		
2009		5,009	8,840	4.4	3,381	5,967	4.4	
2010		2,748	4,850	5.3	3,832	6,763	5.3	
2011				6.2	4,283	7,558	6.2	
2012				7.1	4,809	8,486	7.1	
2013				8.0	5,560	9,812	8.0	
2014				8.8	4,884	8,619	8.8	
2015				9.7	4,133	7,293	9.7	
2016				10.6	3,306	5,834	10.6	
2017				12.4	2,404	4,243	12.4	
2018								
2019								
2020								







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Annaba-R. Jame1 (87.8 km)

Economic Cost of Track Overhaul  
(DA million)

	With the Project							Without the Project						
	Track Materials				Recycled Rail	Sub-structure	Economic Cost	Track Materials				Recycled Rail	Sub-structure	Economic Cost
	New Rail	Sleepers	Ballast	Labor				New Rail	Sleepers	Ballast	Labor			
1988	5.47	6.38	3.69	22.38	1.43	24.24	60.74	1.84	2.13	1.23	20.78	0.79	5.41	30.60
1989	22.02	25.52	14.75	89.70		97.50	249.49	2.21	2.55	1.48	24.97	0.64	6.52	37.09
1990	9.19	10.63	6.15	37.40		40.70	104.07	2.55	2.98	1.72	28.99	7.50	43.74	
1991								2.92	3.40	1.97	33.18		8.61	50.08
1992								3.30	3.83	2.21	37.37		9.72	56.43
1993								3.68	4.25	2.46	41.56		10.82	62.77
1994								4.05	4.68	2.70	45.75		11.93	69.11
1995								4.39	5.10	2.95	49.77		12.92	75.13
1996								5.14	5.96	3.44	58.14		15.13	87.81
1997								6.60	7.66	4.43	74.73		19.43	112.85
1998								1.84			7.35	0.79		8.40
1999								2.21			8.86	0.95		10.12
2000								2.55			10.19	1.09		11.65
2001								0.50			2.01	0.21		2.29
2002														
2003	1.06	0.21	0.19	2.10	0.45		3.11		0.11	0.09	0.79			0.99
2004	4.26	1.06	0.92	9.00	1.83		13.42		0.23	0.20	1.75			2.18
2005	1.78	1.42	1.23	6.38	0.76		10.04		0.38	0.33	2.86			3.57
2006		1.42	1.23	3.81			6.46		0.55	0.48	4.13			5.16
2007		1.42	1.23	3.81			6.46		0.74	0.65	5.56			6.95
2008		1.42	1.23	3.81			6.46	1.84	0.96	0.83	14.50	0.79		17.34
2009		1.21	1.04	3.24			5.49	2.21	1.08	0.94	16.96	0.95		20.25
2010		0.35	0.31	0.95			1.61	2.55	1.21	1.05	19.25	1.09		22.97
2011								2.92	1.36	1.18	21.86	1.25		26.08
2012								3.30	1.57	1.36	24.96	1.41		29.78
2013								3.68	1.38	1.20	25.03	1.58		29.71
2014								4.05	1.17	1.01	24.95	1.74		29.45
2015								4.39	0.94	0.81	24.54	1.88		28.79
2016								5.14	0.68	0.55	25.49	2.20		29.66
2017								6.60	0.38	0.29	29.12	2.83		33.57
2018														
2019														
2020														

Unit costs: New Rail DA/km 417,815  
Sleepers DA/unit 285  
Ballast DA/m3 140  
Value of recycled rail: DA/km 179,000

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**Beni Mansour-Setif (88.4 km)**

**Economic Cost of Track Overhaul**  
**(DA million)**

	With the Project						Without the Project					
	Track Materials			Labor	Recycled Rail	Economic Cost	Track Materials			Labor	Recycled Rail	Economic Cost
	New Rail	Sleepers	Ballast				New Rail	Sleepers	Ballast			
1988												
1989	16.67	19.33	11.17	67.93		115.11	1.84	2.14	1.24	20.87		26.09
1990	20.26	23.50	13.58	82.57		139.92	2.21	2.57	1.49	25.08		31.35
1991							2.59	3.00	1.73	29.29		36.61
1992							2.97	3.43	1.98	33.49		41.86
1993							3.34	3.85	2.23	37.70		47.12
1994							3.68	4.28	2.48	41.74		52.17
1995							4.05	4.71	2.72	45.95		57.43
1996							4.43	5.14	2.97	50.16		62.69
1997							5.18	6.00	3.47	58.57		73.21
1998							6.64	7.71	4.46	75.23		94.04
1999							1.84			7.35	0.79	8.48
2000							2.21			8.86	0.95	10.12
2001							2.59			10.36	1.11	11.84
2002							2.97			11.87	1.27	13.56
2003							3.05			12.20	1.31	13.94
2004	5.72	0.64	0.56	9.97	2.45	14.45		0.11	0.09	0.80		1.00
2005	6.98	1.43	1.24	13.89	2.99	20.54		0.24	0.20	1.76		2.20
2006		1.43	1.24	3.84		6.50		0.39	0.33	2.88		3.60
2007		1.43	1.24	3.84		6.50		0.56	0.48	4.16		5.20
2008		1.43	1.24	3.84		6.50		0.75	0.65	5.60		7.00
2009		1.43	1.24	3.84		6.50	1.84	0.96	0.84	14.55	0.79	17.40
2010		0.78	0.68	2.11		3.57	2.21	1.09	0.95	17.01	0.95	20.32
2011							2.59	1.22	1.06	19.48	1.11	23.24
2012							2.97	1.37	1.19	22.10	1.27	26.35
2013							3.34	1.58	1.37	25.20	1.43	30.07
2014							3.68	1.39	1.21	25.10	1.58	29.80
2015							4.05	1.18	1.02	25.01	1.74	29.52
2016							4.43	0.94	0.82	24.75	1.90	29.04
2017							5.18	0.69	0.59	25.84	2.22	30.08
2018												
2019												
2020												

Unit costs: New Rail DA/km 417,815  
Sleepers DA/unit 285  
Ballast DA/m3 140  
Value of recycled rail: DA/km 179,000



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Setif-El Gourzi (103.3 km)

Economic Cost of Track Overhaul  
(DA million)

	<u>With the Project</u>					<u>Without the Project</u>					
	<u>Track Materials</u>			<u>Labor</u>	<u>Recycled Rail</u>	<u>Economic Cost</u>	<u>Track Materials</u>			<u>Recycled Rail</u>	<u>Economic Cost</u>
<u>New Rail</u>	<u>Sleepers</u>	<u>Ballast</u>	<u>New Rail</u>				<u>Sleepers</u>	<u>Ballast</u>	<u>Labor</u>		
1988											
1989	21.68	25.15	14.53	88.36		149.72	2.17	2.52	1.45	24.58	30.72
1990	21.73	25.19	14.56	88.53		150.01	2.59	3.02	1.75	29.43	36.78
1991							3.05	3.52	2.04	34.44	43.05
1992							3.47	4.03	2.33	39.29	49.11
1993							3.93	4.53	2.62	44.31	55.38
1994							4.35	5.03	2.91	49.15	61.44
1995							4.76	5.54	3.20	54.00	67.50
1996							5.22	6.04	3.49	59.02	73.77
1997							6.06	7.05	4.07	68.71	85.89
1998							7.81	9.06	5.24	88.44	110.55
1999							2.17			8.69	9.93
2000							2.59			10.36	11.84
2001							3.05			12.20	13.94
2002							3.47			13.87	15.86
2003							3.93			15.71	17.95
2004	15.58	0.84	0.73	24.69	6.68	35.77	0.38	0.13	0.11	2.44	2.89
2005		1.68	1.45	4.51		7.64		0.28	0.24	2.07	2.58
2006		1.68	1.45	4.51		7.64		0.45	0.39	3.38	4.23
2007		1.68	1.45	4.51		7.64		0.65	0.57	4.89	6.11
2008		1.68	1.45	4.51		7.64		0.88	0.76	6.58	8.22
2009		1.68	1.45	4.51		7.64	2.17	1.13	0.98	17.15	20.50
2010		0.84	0.73	2.26		3.83	2.59	1.28	1.11	19.95	23.82
2011							3.05	1.43	1.24	22.91	27.34
2012							3.47	1.61	1.40	25.90	30.89
2013							3.93	1.86	1.61	29.62	35.34
2014							4.35	1.64	1.42	29.60	35.14
2015							4.76	1.38	1.20	29.39	34.70
2016							5.22	1.11	0.96	29.16	34.21
2017							6.06	0.81	0.70	30.25	35.21
2018											
2019											
2020											

Unit costs: New Rail DA/km 417,815  
Sleepers DA/unit 285  
Ballast DA/m3 140  
Value of recycled rail: DA/km 179,000

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El Hadjar-Boucheouf (44.5 km)

Economic Cost of Track Overhaul  
(DA million)

	With the Project						Without the Project					
	Track Materials			Labor	Recycled Rail	Economic Cost	Track Materials			Labor	Recycled Rail	Economic Cost
	New Rail	Sleepers	Ballast				New Rail	Sleepers	Ballast			
1988												
1989												
1990	18.59	21.56	12.46	75.76	7.97	120.41	0.92	1.08	0.62	10.48	0.39	12.71
1991							1.13	1.29	0.75	12.68	0.48	15.36
1992							1.30	1.51	0.87	14.71	0.55	17.83
1993							1.50	1.72	1.00	16.90	0.64	20.48
1994							1.67	1.94	1.12	18.93	0.72	22.95
1995							1.88	2.16	1.25	21.13	0.81	25.61
1996							2.05	2.37	1.37	23.16	0.88	28.07
1997							2.21	2.59	1.50	25.19	0.95	30.54
1998							2.59	3.02	1.74	29.41	1.11	35.66
1999							3.34	3.88	2.24	37.86	1.43	45.90
2000							0.92			3.68	0.39	4.20
2001							1.13			4.51	0.48	5.16
2002							1.30			5.18	0.55	5.92
2003							1.50			6.02	0.64	6.88
2004							1.67			6.69	0.72	7.64
2005	11.78	0.72	0.62	18.90	5.05	26.98	1.88	0.05	0.05	7.92	0.81	9.10
2006		0.72	0.62	1.93		3.27	2.05	0.12	0.10	9.07	0.88	10.47
2007		0.72	0.62	1.93		3.27	1.34	0.19	0.17	6.80	0.57	7.92
2008		0.72	0.62	1.93		3.27	0.00	0.28	0.24	2.09	0.00	2.62
2009		0.72	0.62	1.93		3.27	0.00	0.38	0.33	2.82	0.00	3.52
2010		0.72	0.62	1.93		3.27	0.92	0.49	0.42	7.30	0.39	8.73
2011							1.13	0.55	0.48	8.62	0.48	10.29
2012							1.30	0.61	0.53	9.77	0.55	11.66
2013							1.50	0.69	0.60	11.17	0.64	13.32
2014							1.67	0.80	0.69	12.64	0.72	15.09
2015							1.88	0.70	0.61	12.75	0.81	15.14
2016							2.05	0.59	0.51	12.62	0.88	14.89
2017							2.21	0.47	0.41	12.40	0.95	14.55
2018												
2019												
2020												

Unit costs: New Rail      DA/km 417,815  
                  Sleepers      DA/unit 285  
                  Ballast      DA/m3 140  
 Value of recycled rail: DA/km 179,000

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Boucheouf-Souk Ahras (46.0 km)

Economic Cost of Track Overhaul  
(DA million)

	With the Project						Without the Project					
	Track Materials			Labor	Recycled Rail	Economic Cost	Track Materials			Labor	Recycled Rail	Economic Cost
	New Rail	Sleepers	Ballast				New Rail	Sleepers	Ballast			
1988												
1989												
1990	19.22	22.29	12.88	78.32	8.23	124.47	0.96	1.11	0.64	10.88	0.41	13.18
1991							1.17	1.34	0.77	13.12	0.50	15.90
1992							1.34	1.56	0.90	15.19	0.57	18.42
1993							1.55	1.78	1.03	17.44	0.66	21.13
1994							1.71	2.01	1.16	19.51	0.73	23.66
1995							1.92	2.23	1.29	21.75	0.82	26.37
1996							2.13	2.45	1.42	24.00	0.91	29.08
1997							2.30	2.67	1.55	26.07	0.98	31.61
1998							2.67	3.12	1.80	30.39	1.15	36.84
1999							3.47	4.01	2.32	39.19	1.49	47.50
2000							0.96			3.84	0.41	4.39
2001							1.17			4.68	0.50	5.35
2002							1.34			5.35	0.57	6.11
2003							1.55			6.18	0.66	7.07
2004							1.71			6.85	0.73	7.83
2005	15.88	0.74	0.64	24.86	6.80	35.32	1.92	0.06	0.05	8.10	0.82	9.31
2006		0.74	0.64	2.00		3.38	2.13	0.12	0.11	9.44	0.91	10.89
2007		0.74	0.64	2.00		3.38	2.30	0.20	0.17	10.69	0.98	12.38
2008		0.74	0.64	2.00		3.38	2.67	0.29	0.25	12.86	1.15	14.93
2009		0.74	0.64	2.00		3.38		0.39	0.34	2.91	0.00	3.64
2010		0.74	0.64	2.00		3.38	0.96	0.50	0.43	7.59	0.41	9.07
2011							1.17	0.57	0.49	8.92	0.50	10.65
2012							1.34	0.64	0.55	10.09	0.57	12.04
2013							1.55	0.71	0.62	11.51	0.66	13.73
2014							1.71	0.82	0.71	13.01	0.73	15.53
2015							1.92	0.72	0.63	13.10	0.82	15.55
2016							2.13	0.61	0.53	13.10	0.91	15.46
2017							2.30	0.49	0.43	12.85	0.98	15.08
2018												
2019												
2020												

Unit costs: New Rail DA/km 417,815  
Sleepers DA/unit 285  
Ballast DA/m3 140  
Value of recycled rail: DA/km 179,000

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Annaba-R. Jamal (87.8 km)

Base Cost Analysis  
(DA million)

	Benefits					Rolling Stock Maintenance	Net Costs
	Project Investment Cost	Deferred Maintenance	Routine Maintenance	Time Savings	Avoided Derailments		
1988	60.74	30.60					(30.14)
1989	249.49	37.09					(212.40)
1990	104.07	43.74					(60.33)
1991		50.08	2.63	5.03	3.53	0.03	61.30
1992		56.43	2.63	5.25	3.87	0.03	68.21
1993		62.77	2.63	5.46	4.24	0.03	75.13
1994		69.11	2.63	5.69	4.65	0.04	82.12
1995		75.13	2.63	5.93	5.09	0.04	88.82
1996		87.81	2.63	6.18	5.58	0.04	102.24
1997		112.85	2.63	6.45	6.12	0.04	128.09
1998		8.40	2.63	6.72	6.71	0.04	24.50
1999		10.12	2.63	7.01	7.35	0.04	27.15
2000		11.65	2.63	7.31	8.06	0.05	29.70
2001		2.29	2.63	7.62	8.83	0.05	21.42
2002			2.63	7.96	9.68	0.05	20.32
2003	3.11	0.99	2.63	8.30	10.60	0.05	19.47
2004	13.42	2.18	2.63	8.65	11.62	0.06	11.73
2005	10.04	3.57	2.63	9.03	12.74	0.06	17.99
2006	6.46	5.16	2.63	9.43	13.96	0.06	24.78
2007	6.46	6.95	2.63	9.84	15.30	0.06	28.32
2008	6.46	17.34	2.63	10.27	16.77	0.07	40.62
2009	5.49	20.25	2.63	10.72	18.38	0.07	46.56
2010	1.61	22.97	2.63	11.19	20.15	0.07	55.39
2011		26.08	2.63	11.69	22.08	0.08	62.56
2012		29.78	2.63	12.21	24.20	0.08	68.90
2013		29.71	2.63	12.75	26.52	0.09	71.70
2014		29.45	2.63	13.31	29.07	0.09	74.55
2015		28.79	2.63	13.91	31.86	0.09	77.26
2016		29.66	2.63	14.53	34.92	0.10	81.84
2017		33.57	2.63	15.19	38.27	0.10	89.76
2018			2.63	15.86	41.94	0.11	60.54
2019			2.63	16.57	45.97	0.11	65.28
2020			2.63	17.33	50.38	0.12	70.46
<b>NPV</b>							
0%	467.35	944.53	78.90	297.39	538.44	1.95	1,393.85
10%	383.32	422.29	20.49	58.08	75.51	0.37	193.41
<b>ERR</b>	18.2%						

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**

**Beni Mansour-Setif (88.4 km)**

**Base Cost Analysis**  
(DA million)

	<b>Benefits</b>						
	<b>Project Investment Cost</b>	<b>Deferred Maintenance</b>	<b>Routine Maintenance</b>	<b>Time Savings</b>	<b>Avoided Derailments</b>	<b>Rolling Stock Maintenance</b>	<b>Net Costs</b>
1988							
1989	115.11	26.09					(89.02)
1990	139.92	31.35					(108.57)
1991		36.61	2.65	3.90	0.95	0.04	44.15
1992		41.86	2.65	4.03	1.03	0.05	49.62
1993		47.12	2.65	4.17	1.11	0.05	55.10
1994		52.17	2.65	4.31	1.20	0.05	60.38
1995		57.43	2.65	4.45	1.29	0.05	65.37
1996		62.69	2.65	4.60	1.40	0.05	71.39
1997		73.21	2.65	4.76	1.51	0.06	82.19
1998		94.04	2.65	4.91	1.63	0.06	103.29
1999		8.40	2.65	5.08	1.76	0.06	17.95
2000		10.12	2.65	5.25	1.90	0.06	19.98
2001		11.84	2.65	5.44	2.05	0.06	22.04
2002		13.56	2.65	5.62	2.22	0.07	24.12
2003		13.94	2.65	5.82	2.39	0.07	24.87
2004	14.45	1.00	2.65	6.03	2.58	0.07	(2.12)
2005	20.54	2.20	2.65	6.24	2.79	0.08	(6.58)
2006	6.50	3.60	2.65	6.45	3.01	0.08	9.29
2007	6.50	5.20	2.65	6.67	3.25	0.08	11.35
2008	6.50	7.00	2.65	6.91	3.52	0.08	13.65
2009	6.50	17.40	2.65	7.16	3.80	0.09	24.60
2010	3.57	20.32	2.65	7.42	4.10	0.09	31.01
2011		23.24	2.65	7.68	4.43	0.09	38.09
2012		26.35	2.65	7.96	4.78	0.10	41.84
2013		30.07	2.65	8.24	5.16	0.10	46.22
2014		29.80	2.65	8.54	5.58	0.11	46.68
2015		29.52	2.65	8.85	6.02	0.11	47.15
2016		29.04	2.65	9.18	6.51	0.11	47.49
2017		30.08	2.65	9.51	7.03	0.12	49.39
2018			2.65	9.87	7.59	0.12	20.23
2019			2.65	10.23	8.20	0.13	21.21
2020			2.65	10.61	8.85	0.13	22.24
<b>NPV</b>							
<b>0%</b>	319.59	835.28	79.50	199.89	107.64	2.42	905.14
<b>10%</b>	255.26	364.88	22.71	45.44	18.29	0.54	196.66
<b>ERR</b>	23.5%						

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**

Setif-E1 Gourzi (103.3 km)

Base Cost Analysis  
(DA million)

	<u>Benefits</u>						<u>Net Costs</u>
	<u>Project Investment Cost</u>	<u>Deferred Maintenance</u>	<u>Routine Maintenance</u>	<u>Time Savings</u>	<u>Avoided Derailments</u>	<u>Rolling Stock Maintenance</u>	
1988							
1989	149.72	30.72					(119.00)
1990	150.01	36.78					(113.23)
1991		43.05	3.12	1.30	0.85	0.05	48.37
1992		49.11	3.12	1.34	0.92	0.05	54.54
1993		55.38	3.12	1.37	1.00	0.05	60.92
1994		61.44	3.12	1.41	1.08	0.06	67.11
1995		67.50	3.12	1.45	1.17	0.06	73.30
1996		73.77	3.12	1.49	1.27	0.06	79.71
1997		85.89	3.12	1.53	1.38	0.06	91.98
1998		110.55	3.12	1.57	1.49	0.07	116.80
1999		9.93	3.12	1.62	1.62	0.07	16.36
2000		11.84	3.12	1.66	1.76	0.07	18.45
2001		13.94	3.12	1.72	1.90	0.07	20.75
2002		15.85	3.12	1.76	2.06	0.08	22.87
2003		17.95	3.12	1.81	2.24	0.08	25.20
2004	35.17	2.89	3.12	1.87	2.43	0.08	(24.77)
2005	7.64	4.23	3.12	1.98	2.85	0.09	4.63
2007	7.64	6.11	3.12	2.03	3.09	0.10	6.80
2008	7.64	8.22	3.12	2.09	3.35	0.10	9.24
2009	7.64	20.50	3.12	2.16	3.63	0.10	21.87
2010	3.83	23.82	3.12	2.22	3.94	0.11	29.39
2011		27.34	3.12	2.29	4.27	0.11	37.13
2012		30.89	3.12	2.35	4.62	0.12	41.10
2013		35.34	3.12	2.42	5.01	0.12	46.01
2014		35.14	3.12	2.49	5.43	0.13	46.31
2015		34.70	3.12	2.57	5.89	0.13	46.41
2016		34.21	3.12	2.64	6.38	0.14	46.49
2017		35.21	3.12	2.72	6.92	0.14	48.11
2018			3.12	2.81	7.50	0.15	13.58
2019			3.12	2.89	8.13	0.15	14.29
2020			3.12	2.98	8.82	0.16	15.08

**NPV**

0%	376.95	984.93	93.60	60.46	103.63	2.85	868.52
10%	301.97	429.68	26.74	14.30	17.17	0.62	186.54

**ERR**

21.5%

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**SECOND RAILWAY PROJECT**

El Hadjar-Boucheoug (44.5 km)

Base Cost Analysis  
(DA million)

	<u>Benefits</u>						
	<u>Project Investment Cost</u>	<u>Deferred Maintenance</u>	<u>Routine Maintenance</u>	<u>Time Savings</u>	<u>Avoided Derailments</u>	<u>Rolling Stock Maintenance</u>	<u>Net Costs</u>
1988							
1989							
1990	120.41	12.71					(107.70)
1991		15.36	1.34	0.69	1.67	0.03	19.09
1992		17.83	1.34	0.71	1.76	0.03	21.67
1993		20.48	1.34	0.73	1.84	0.03	24.42
1994		22.95	1.34	0.75	1.94	0.03	27.01
1995		25.61	1.34	0.76	2.04	0.03	29.78
1996		28.07	1.34	0.78	2.14	0.03	32.36
1997		30.54	1.34	0.80	2.25	0.03	34.96
1998		35.66	1.34	0.82	2.37	0.03	40.22
1999		45.90	1.34	0.84	2.49	0.03	50.60
2000		4.20	1.34	0.87	2.61	0.03	9.05
2001		5.16	1.34	0.89	2.75	0.03	10.17
2002		5.92	1.34	0.91	2.89	0.03	11.09
2003		6.88	1.34	0.93	3.03	0.03	12.21
2004		7.64	1.34	0.96	3.19	0.03	13.16
2005	26.98	9.10	1.34	0.98	3.35	0.04	(12.17)
2006	3.27	10.47	1.34	1.00	3.52	0.04	13.09
2007	3.27	7.92	1.34	1.03	3.70	0.04	10.76
2008	3.27	2.62	1.34	1.05	3.89	0.04	5.66
2009	3.27	3.52	1.34	1.08	4.09	0.04	6.80
2010	3.27	8.73	1.34	1.11	4.30	0.04	12.25
2011		10.29	1.34	1.14	4.52	0.04	17.33
2012		11.66	1.34	1.16	4.75	0.04	18.95
2013		13.32	1.34	1.19	4.99	0.04	20.88
2014		15.09	1.34	1.22	5.24	0.04	22.93
2015		15.14	1.34	1.25	5.51	0.05	23.29
2016		14.89	1.34	1.28	5.79	0.05	23.35
2017		14.55	1.34	1.32	6.09	0.05	23.35
2018			1.34	1.35	6.40	0.05	9.14
2019			1.34	1.38	6.72	0.05	9.49
2020			1.34	1.42	7.07	0.05	9.88
<b>NPV</b>							
0%	163.75	422.19	40.20	30.40	112.90	1.12	443.05
10%	129.84	183.27	12.63	8.12	25.40	0.31	99.90
<b>ERR</b>	22.4%						

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**SECOND RAILWAY PROJECT**

**Boucheouf-Souk Ahras (46.0 km)**

**Base Cost Analysis**  
**(DA million)**

	<u>Benefits</u>					<u>Rolling Stock Maintenance</u>	<u>Net Costs</u>
	<u>Project Investment Cost</u>	<u>Deferred Maintenance</u>	<u>Routine Maintenance</u>	<u>Time Savings</u>	<u>Avoided Derailments</u>		
1988							
1989							
1990	124.47	13.18					(111.28)
1991		15.90	1.38	2.56	4.45	0.03	24.32
1992		18.42	1.38	2.63	4.69	0.03	27.15
1993		21.13	1.38	2.69	4.91	0.03	30.14
1994		23.66	1.38	2.76	5.17	0.03	33.00
1995		26.37	1.38	2.83	5.44	0.03	36.05
1996		29.08	1.38	2.90	5.71	0.03	39.10
1997		31.61	1.38	2.97	6.00	0.03	41.99
1998		36.84	1.38	3.05	6.37	0.04	47.68
1999		47.50	1.38	3.12	6.64	0.04	58.68
2000		4.39	1.38	3.20	6.96	0.04	15.97
2001		5.35	1.38	3.28	7.33	0.04	17.38
2002		6.11	1.38	3.36	7.71	0.04	18.60
2003		7.07	1.38	3.45	8.08	0.04	20.02
2004		7.83	1.38	3.53	8.51	0.04	21.29
2005	35.32	9.31	1.38	3.62	8.93	0.04	(12.04)
2006	3.38	10.89	1.38	3.71	9.39	0.04	22.02
2007	3.38	12.38	1.38	3.81	9.87	0.04	24.09
2008	3.38	14.93	1.38	3.90	10.37	0.05	27.25
2009	3.38	3.64	1.38	4.00	10.91	0.05	16.60
2010	3.38	9.07	1.38	4.10	11.47	0.05	22.69
2011		10.65	1.38	4.20	12.05	0.05	28.33
2012		12.04	1.38	4.31	12.67	0.05	30.45
2013		13.73	1.38	4.41	13.31	0.05	32.88
2014		15.53	1.38	4.52	13.97	0.05	35.45
2015		15.55	1.38	4.64	14.69	0.05	36.31
2016		15.46	1.38	4.75	15.44	0.06	37.09
2017		15.08	1.38	4.87	16.24	0.06	37.63
2018			1.38	4.99	17.07	0.06	23.50
2019			1.38	5.12	17.92	0.06	24.48
2020			1.38	5.25	18.85	0.06	25.54
<b>NPV</b>							
0%	176.71	452.71	41.40	112.53	301.12	1.31	732.36
10%	136.00	192.45	13.01	30.06	67.76	0.35	167.64
<b>ERR</b>	27.4%						



ALGERIA

STAFF APPRAISAL REPORT

SECOND RAILWAY PROJECT

Financial Details

ALGERIA  
STAFF APPRAISAL REPORT  
SECOND RAILWAY PROJECT  
SNTF Revenue/Cost Comparisons 1986

Basis: (i) Notional income accounts 1986;  
(ii) Impact of latest tariff increase 1986 for full year;  
(iii) Depreciation based on replacement cost of all investments (cost to community).

Note: Depreciation on new lines (which will gradually come into operation from 1987 on) has been reduced to a token allocation commensurate with the light traffic expected. Also the depreciation on infrastructure in operation has been assessed on its marginal cost estimated at 30%.

	DA per Traffic Unit		Cost	Tariff
	<u>Revenue</u>	<u>Cost</u>	<u>Recovery</u>	<u>Increase</u>
			<u>Factor</u>	<u>required (%)</u> <sup>1/</sup>
Iron Ore	0.117	0.379	0.31	224
Phosphate	0.090	0.355	0.25	294
Other	0.317	0.550	0.58	74
Subtotal Freight	0.254	0.496	0.51	95
Passengers	0.163	0.231	0.71	42
Total	0.217	0.388	0.56	79

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<sup>1/</sup> To reach a 100 percent operating ratio or zero net return.

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**  
**SMTF - INCOME ACCOUNTS 1979 - 1986**

	1979	1980	1981	1982	1983	DA Million 1984	1985	1986
<b>REVENUE</b>								
<b>TRAFFIC</b>								
1. Pass - Suburban	15.3	26.0	22.0	20.0	NA	NA	NA	NA
- Long Distance	129.2	194.8	208.2	162.3	NA	NA	NA	NA
- S/TOTAL	194.5	220.8	230.2	189.3	257.9	236.4	265.1	305.9
State Contribution	1.5	1.5	1.5	---	---	---	---	12.8
- S/TOTAL PASS	196.0	224.3	233.7	189.3	257.9	236.4	265.1	317.9
2. Freight - FCL	443.0	487.4	506.9	491.1	471.2	510.3	552.4	636.8
3. Baggages	0.8	0.8	0.7	0.6	0.6	0.5	0.6	0.5
Parcels	9.6	12.1	13.1	12.4	12.3	13.7	15.0	14.0
Mail	1.3	1.2	1.2	1.2	2.2	2.2	2.8	2.5
- S/TOTAL LCL	11.7	14.1	15.0	14.2	15.8	16.9	18.4	17.0
4. Storage, etc.	39.3	52.2	49.1	51.2	56.8	52.5	56.1	51.3
- S/TOTAL TRAFFIC	692.0	778.5	804.7	745.8	791.7	816.1	892.0	1023.0
OTHER REVENUE	31.2	33.9	35.5	41.1	40.6	31.4	42.1	37.0
STATE OPERATING SUBSIDY	95.5	104.6	87.9	88.3	252.4	212.5	238.8	226.1
TOTAL REVENUE	818.7	917.0	928.1	867.2	1089.7	1081.0	1172.1	1286.1
<b>WORKING EXPENSES</b>								
1. Staff	522.9	593.5	623.2	738.5	822.1	855.3	917.6	1060.0
2. Materials, fuel, Etc.	91.0	128.8	144.8	97.4	155.8	147.8	192.4	204.6
3. Other	13.0	15.3	17.0	19.0	14.4	12.4	15.0	30.2
4. Tax on - Traffic	52.3	49.9	52.0	55.3	46.8	71.5	74.7	109.7
- Staff	20.1	25.3	26.4	31.0	39.7	38.7	39.4	54.5
- Other	28.8	21.8	23.4	22.8	24.5	24.6	26.2	3.9
S/TOTAL TAX	93.0	97.0	101.8	108.3	110.2	134.8	148.3	168.1
TOTAL WORKING EXPENSES	719.0	834.6	807.6	964.0	1102.5	1150.3	1265.3	1462.9
DEPRECIATION	98.9	112.8	134.2	142.1	186.2	202.9	219.3	268.9
TOTAL OPERATING EXPENSES	818.3	947.4	1021.8	1106.1	1288.7	1353.2	1479.6	1731.8
NET OPERATING REVENUE	0.4	(30.4)	(93.7)	(238.9)	(199.0)	(272.2)	(307.5)	(445.7)
<b>FINANCIAL CHARGES:</b>								
Interest Ext. Debt	72.3	47.4	42.0	53.0	40.2	34.2	28.2	27.8
Interest Int. Debt	0.6	5.0	10.3	14.2	12.6	28.7	54.2	47.4
Other Financial Charges	19.2	15.4	11.2	18.8	22.2	58.6	25.2	118.5
TOTAL FINANCIAL CHARGES	92.1	67.8	63.5	85.4	80.5	113.8	172.6	185.2
Net Loss After Interest	(91.7)	(98.2)	(157.2)	(324.3)	(279.5)	(385.7)	(488.1)	(631.4)
Net Non-Operating Income/Loss	3.8	18.8	5.9	(31.9)	28.4	(39.5)	(33.6)	(187.5)
Net Deficit	(87.9)	(87.4)	(151.3)	(356.2)	(251.1)	(425.2)	(518.7)	(798.9)
<b>WORKING RATIO</b>								
WORKING RATIO (EXCLUDING SUBSIDY)	100	103	106	123	132	136	135	138
OPERATING RATIO	100	103	110	128	118	125	126	135
OPERATING RATIO (EXCLUDING SUBSIDY)	113	117	121	141	155	160	158	163

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**SMTF - BALANCE SHEET 1979 - 1986**

	DA Million							
	1 9 7 9	1 9 8 0	1 9 8 1	1 9 8 2	1 9 8 3	1 9 8 4	1 9 8 5	1 9 8 6
<b>ASSETS</b>								
CURRENT ASSETS								
CASH - BANKS	95.7	116.3	92.6	166.6	208.4	161.3	13.7	53.9
RECEIVABLES - COMMERCIAL	469.9	650.3	778.2	912.2	826.6	849.2	1137.9	1210.6
- OTHER	13.8	4.6	8.8	10.7	10.0	12.5	11.1	115.6
- SUSPENSE	150.0	131.4	132.2	95.9	181.2	245.0	213.9	186.1
- S/TOTAL	643.7	786.3	919.2	968.8	1017.8	1106.7	1362.9	1512.3
INVENTORIES	260.5	261.3	302.7	374.8	461.3	515.1	516.1	456.3
TOTAL CURRENT ASSETS	999.9	1163.9	1321.5	1510.2	1687.5	1783.1	1892.7	2022.5
FIXED ASSETS								
TRACK - RELATED INVESTMENTS	1964.9	2090.7	2373.5	3015.6	4518.0	6262.6	8023.4	10229.6
LESS ACCRUED DEPRECIATION	152.6	156.9	165.8	186.4	236.8	294.8	351.8	423.6
- S/TOTAL	1812.3	1933.8	2207.7	2829.2	4281.2	5967.8	7671.6	9806.0
ROLLING STOCK, ETC.	2385.9	2408.2	2552.3	2919.9	3248.2	3411.6	3678.7	4634.7
LESS ACCRUED DEPRECIATION	419.2	475.5	554.6	639.1	743.6	819.1	927.9	1091.0
- S/TOTAL	1966.7	1932.7	1997.7	2280.8	2504.6	2601.5	2751.7	3543.7
OTHER FIXED ASSETS	94.9	118.0	141.3	206.7	413.1	623.2	757.2	868.2
TOTAL NET FIXED ASSETS	3873.9	3984.5	4346.7	5316.7	7218.9	9192.5	11100.5	14217.9
INVESTMENTS	0.5	0.5	0.7	2.9	3.0	3.1	3.1	3.1
TOTAL ASSETS	4874.3	5148.9	5668.9	6829.8	8909.4	10978.7	13076.3	16243.5
<b>LIABILITIES</b>								
CURRENT LIABILITIES								
CREDITORS	218.4	377.6	424.7	982.9	1143.1	1519.0	1705.1	2861.7
SUSPENSE	378.3	288.4	426.1	590.3	657.4	715.6	1123.1	747.2
TOTAL CURRENT LIABILITIES	596.7	666.0	850.8	1573.2	1800.5	2234.6	2828.2	3608.9
PROVISIONS	2.0	12.0	22.0	2.0	2.0	2.0	2.0	2.0
LONG TERM DEBT, INTERNAL	1668.7	1954.1	2283.0	2528.1	3004.4	3257.6	3456.3	4326.1
LONG TERM DEBT, EXTERNAL	809.1	694.0	571.8	532.6	437.3	484.2	438.2	128.5
TOTAL LONG TERM DEBT	2477.8	2648.1	2854.8	3060.7	3441.7	3741.8	3894.5	4454.6
EQUITY AND RESERVES	1802.8	1822.8	1941.3	2193.9	3665.2	5000.3	6352.6	8178.0
TOTAL LIABILITIES	4874.3	5148.9	5668.9	6829.8	8909.4	10978.7	13076.3	16243.5
<b>RATIOS</b>								
CURRENT RATIO	1.68	1.75	1.55	0.96	0.94	0.80	0.70	0.56
LIQUID RATIO	1.24	1.36	1.19	0.72	0.68	0.57	0.49	0.43
DEBT/EQUITY RATIO	51/49	51/49	50/50	49/51	48/52	43/57	38/62	35/66

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**  
**SNTF - Investment Financing 1979 - 1985**  
**(DA Million)**

	Accrued									Accrued	Long-Term Debt
	<u>12/31/78</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>12/31/86</u>	<u>12/31/86</u>
Unreimbursable State Contribution to Investment	45.9	43.6	107.5	269.8	608.7	1735.4	1760.1	1824.3	2612.2	9007.5	
Long-Term Borrowing:											
IBRD 996-AL	196.0									196.0	128.5
Other External Credits	<u>950.9</u>									<u>950.9</u>	<u>724.1</u>
Subtotal External	1146.9									1146.9	852.6
B.A.D.	1267.4	108.1	80.4	204.1	280.7	334.4	334.5	72.4	79.5	2761.5	2608.6
Banque Nationale d'Algérie - BNA	5.6							133.9	25.8	165.3	159.8
Treasury	37.6									37.6	-
Treasury (Inventories Financing)	251.1									251.1	158.8
Bridging Credits	-	<u>98.6</u>	<u>220.0</u>	<u>150.8</u>	-	<u>155.7</u>	<u>68.9</u>	<u>33.3</u>	<u>52.2</u>	<u>779.5</u>	<u>674.8</u>
Subtotal Internal	<u>1561.7</u>	206.7	300.4	354.9	280.7	450.1	403.4	239.6	157.5	3995.0	<u>3602.0</u>
Total Long-Term Borrowing	<u>2708.6</u>										4454.6
Self-Financing	<u>11.7</u>									<u>11.7</u>	
TOTAL SOURCES	2766.2	250.3	407.9	624.7	889.4	2225.5	2163.5	2063.9	2769.7	14161.1	
Infrastructure	588.8	66.2	122.6	282.8	642.1	1502.4	1684.1	1636.9	2206.3	8732.2	
Rolling Stock, Equipment	1865.1	34.7	62.6	165.4	392.8	349.1	351.1	422.1	648.8	4291.7	
Studies	68.7	23.6	23.1	23.2	65.5	226.4	190.1	133.9	111.0	865.5	
Inventories	<u>217.6</u>	<u>42.9</u>	<u>0.8</u>	<u>48.4</u>	<u>65.1</u>	<u>86.4</u>	<u>53.8</u>	<u>1.6</u>	<u>(60.0)</u>	<u>456.1</u>	
TOTAL APPLICATIONS	2740.2	167.4	209.1	519.8	1165.5	2164.3	2279.1	2193.9	2906.1	14345.5	
BALANCE	26.0	82.9	198.8	104.9	(276.1)	61.2	(161.6)	(130.0)	(136.4)		

ALGERIA  
STAFF APPRAISAL REPORT  
SECOND RAILWAY PROJECT

SNTF - FORECAST INCOME ACCOUNTS 1987-1991  
(DA MILLION)

Revenue	1987	1988	1989	1990	1991
Traffic Revenue					
Iron Ore	71	73	74	75	76
Phosphate	37	37	37	37	37
Freight	637	669	682	707	729
Passengers	341	350	359	367	377
Subtotal	1,086	1,128	1,151	1,185	1,219
Tariff Increases in					
1988		20%	226	230	244
1989		10%		138	146
1990		10%		156	161
1991		10%			177
Baggage, Parcels, Mail	17	16	15	14	13
Storage, etc.	56	62	68	75	82
Subtotal Traffic Revenue	1,159	1,432	1,602	1,810	2,041
Other Revenue	40	40	40	40	40
State Operating Subsidy for Track Maintenance	235	337	340	342	345
Total Revenue	1,434	1,809	1,982	2,192	2,426
Working Expenses					
Staff	1,076	1,049	1,033	1,016	1,018
Job Classification (SGT)	90				
Materials, etc.	205	211	216	221	227
Other	30	30	30	30	30
Tax	162	200	224	253	286
Total Working Expenses	1,563	1,491	1,503	1,520	1,561
Depreciation					
On Gross Fixed Assets (12/31/86)					
Infrastructure				198	198
New Lines				1	2
Rolling Stock, etc.	195	195	195	253	253
Subtotal	195	195	195	452	453
On New Investments					
Infrastructure	69	69	69	33	42
New Lines				1	2
Rolling Stock, etc.	12	25	36	49	62
Subtotal	81	94	105	83	106
Total Depreciation	276	289	300	535	559
Operating Expenses	1,839	1,780	1,803	2,055	2,120
Net Operating Revenue/Loss	(405)	29	179	137	306
Interest On:					
Debt at December 31, 1986	133	174	147	145	120
New Borrowing	156	52	75	96	120
Total Interest	289	226	222	241	240
Revenue/Loss After Interest	(694)	(197)	(43)	(104)	66
Corporate Tax					(33)
State Subsidy as per					
Restructuration Financiere	(694)	(197)			
Working Ratio	109	82	76	69	64
Operating Ratio	128	98	91	94	87
Working Ratio (excl. oper. sub.)	130	101	92	82	75
Operating Ratio (excl. oper. sub.)	153	121	110	111	102

ALGERIA

Staff Appraisal Report

Second Railway Project

Assumptions used to forecast SNTF's Income Accounts 1987-1991

A. Revenue

1. Traffic and revenue for 1987 have been calculated as follows:

	<u>Ton-km or pass-km (Million)</u>		<u>Receipt per ton-km or pass-km (DA)</u>	<u>Annual Revenue (DA Million)</u>
Iron Ore	610	x	0.117	71
Phosphate	410	x	0.090	37
Other Freight	<u>2010</u>	x	0.317	<u>637</u>
S/Total	3030			745
Passenger	<u>2090</u>	x	0.163	<u>341</u>
Total	5120			1086

2. Passenger and freight traffic has been increased by 2.5% over the period 1987-91.

3. Tariff increases for freight and passengers globally applied, are provided for as follows:

- 20% as from 1/1/88
- 10% as from 1/1/89
- 10% as from 1/1/90
- 10% as from 1/1/91

4. Revenue from baggages, parcels and mail is expected to decrease by about 5% p.a.

5. Revenue from storage and from penalties for undue retention of freight cars is to increase by about 10% p.a.

6. Other revenue (rentals, etc.) remains, as in the past, at about DA 40 million annually.

7. The State operating subsidy is expected to remain in 1987 at its level of 1983-86. Provision is made for a DA 100 million increase as from 1988 so as to cover annual actual track maintenance expenses (about DA 300 million).

**B. Working Expenses**

8. Staff productivity is expected to increase (see Plan of Action, Annex 1) and staff numbers to decrease as follows:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Traffic Units (TU) Million	5120	5285	5390	5530	5670
Staff Productivity (TU 000)	290	305	315	330	330
Staff Numbers at end of FY	17655	17328	17111	16758	17182

The payroll has been calculated on the basis of average numbers of staff as below:

	<u>1/1/87</u>	<u>1/1/88</u>	<u>1/1/89</u>	<u>1/1/90</u>	<u>1/1/91</u>
Actual number	19150				
<u>less</u> INFRAFER	<u>950</u>				
	18200	17328	17111	16758	17182
Average staff	17925	17492	17219	16934	16970
Cost per staff (DA 000)	60	60	60	60	60
Payroll (DA Million)	1076	1049	1033	1016	1018

9. The job classification provided for by the SGT has not yet been completed; the estimated additional cost is DA 90 million, to be paid in 1987.

10. Materials, fuels, etc. have been estimated at the present level of DA 40 million per billion TU, as follows:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
TU (Million)	5120	5285	5390	5530	5670
Materials, (DA Million)	205	211	216	221	227

11. "Other" working expenses are expected to remain at their present level of about DA 30 million.

12. The present level and structure of taxation is expected to remain unchanged over the period 1987-91; it amounts to 14% of gross traffic revenue.



C. Depreciation

13. The present depreciation system based on historical cost provides for:

(a) about 4% on rolling stock, etc.; and

(b) 3% on infrastructure investments made during the fiscal year, an allocation applied only once.

This system is expected to remain in use until FY1990, when the revaluation of fixed assets on a replacement cost basis will be completed. For the period 1987-89 calculations are as follows:

(DA Million)	<u>31/12/86</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
(a) Infrastructure (incl. new lines)				
Investments to be made at 3%		2300 69	2300 69	2320 69
(b) Rolling stock, etc.				
Book value	4635	4635	4935	5235
Investment to be made		<u>300</u>	<u>300</u>	<u>265</u>
Total at 4.2%	195	4935 207	5235 220	5500 231

14. For the period 1990-91 depreciation is calculated on replacement cost as explained hereafter:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
(a) <u>Existing gross fixed assets</u> <u>as of December 31, 1986</u>					
(i) Infrastructure in operation					
Replacement value at 2.17% x 30%				30430 198	30430 198
(ii) New lines					
A token allocation				1	2
(iii) Rolling stock, etc.					
Replacement value at 4.2%				6031 253	6031 253

ANNEX 7 - Table 5  
Page 5 of 5

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
<b>(b) <u>New investments</u></b>					
(i) Infrastructure in operation					
Investments to be made	1300	1300	1230	1300	1300
Accrued value at 2.17% x 30%				5130	6430
				33	42
(ii) New lines					
A token allocation				1	2
(iii) Rolling stock, etc.					
Investments to be made	300	300	265	300	315
Accrued value at 4.2%				1165	1480
				49	62

D. Interest

15. Interest charges on new borrowing have been calculated on the following assumptions:

- (a) Financing of rolling stock program 1987-1991 amounting to DA 1480 million thru borrowing at 8% p.a., over 18 years, including three years of grace;
- (b) Lending by Treasury of DA 650 million as of January 1, 1988 at 2 1/2% p.a., over 15 years, including three years of grace; (restructuration financière)
- (c) Bank overdraft, at 8% p.a.

On above assumptions the debt service of new borrowing would be as below (DA million):

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Principal					
Rolling Stock				55	55
Restructuration Fin.				50	51
Bank Overdraft		1700			
S/Total		1700		105	106
Interest					
Rolling Stock	12	36	59	81	106
Restructuration Fin.	8	16	16	15	14
Bank Overdraft	136				
S/Total	156	52	75	96	120
Debt Service	156	1752	75	201	226

**ALGERIA**

**STAFF APPRAISAL REPORT**

**SECOND RAILWAY PROJECT**

**SNTF - Evaluation of Fixed Assets in Use at Replacement Cost  
and Annual Depreciation Allowance**

-----US\$ million-----			
	<u>Value</u>	<u>Depreciation Rate</u>	<u>Annual Depreciation Allowance</u>
<b><u>Infrastructure</u></b>			
Track - 2694 km. St. G. at \$1,000,000/km	2694	2/3 at 1% 1/3 at 5%	18.0 44.9
- 1112 km. N.G. at \$700,000/km.	778	2.33%	18.1
- 200 km. doubling at \$700,000/km	<u>140</u>	2.33%	3.3
S/Total	3612		
- 25% of above for stations, sidings	903	2.33%	21.0
- tunnels and bridges	1000	1%	10.0
- electrification 298 km at \$600,000	179	2%	3.6
- other constructions	100	1%	1.0
- signalling and telecommunications	250	4%	10.0
- maintenance shops and depots	300	40% at 1% 60% at 5%	1.2 9.0
- service buildings and housing	<u>200</u>	1%	<u>2.0</u>
S/Total	83%	6544	aver. 2.17% 142.1
<b><u>Motive Power, Rolling Stock, Equipment</u></b>			
- 208 locomotives at \$1,100,000	229	4%	9.2
- 25 shunters at \$800,000	20	4%	0.8
- 665 coaches at \$400,000	266	4%	10.6
- 32 railcars at \$1,000,000	32	6.66%	2.1
- 13,000 cars at \$50,000	650	4%	26.0
- various equipment	<u>100</u>	5%	<u>5.0</u>
S/Total	17%	1292	aver. 4.14% <u>53.2</u>
Total	7841		195.8
	====		=====

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**

**SNTF - SOURCES AND APPLICATIONS OF FUNDS 1987-1991**  
(DA MILLION)

	1987	1988	1989	1990	1991	1987-91
<b>SOURCES OF FUNDS</b>						
Net Operating Revenue/Loss	(405)	29	179	137	273	212
Depreciation	276	289	300	535	559	1,959
Internally Generated Cash	(129)	318	479	672	832	2,171
Decrease in Receivables	46	50	25	118		239
Decrease in Inventories	46	41	45			132
Partial Reimbursement Debt Service (Loan 996-AL)						
Principal & Interest 1988/91		74	15	15	15	119
Government Investment Contributions	2,300	2,300	2,320	2,300	2,300	11,520
Borrowing	300	300	265	300	315	1,480
Restructuration Financiere:						
Treasury Lending		650				650
Deficit Subsidization	694	197				891
Government Special Contribution		1,000				1,000
Bank Overdraft	1,700					1,700
<b>TOTAL</b>	<b>4,957</b>	<b>4,930</b>	<b>3,149</b>	<b>3,405</b>	<b>3,462</b>	<b>19,903</b>
<b>APPLICATION OF FUNDS</b>						
Infrastructure	1,300	1,300	1,230	1,300	1,300	6,430
New Lines	1,000	1,000	1,090	1,000	1,000	5,090
Rolling Stock	300	300	265	300	315	1,480
Investment Program	2,600	2,600	2,585	2,600	2,615	13,000
Debt Service						
On Debt at 12/31/86						
Principal	238	287	295	280	270	1,370
Interest	133	174	147	145	120	719
On New Borrowing						
Principal				105	106	211
Interest	156	52	75	96	120	499
<b>Total Debt Service</b>	<b>527</b>	<b>513</b>	<b>517</b>	<b>626</b>	<b>616</b>	<b>2,799</b>
Net Current Assets Shortfall at 12/31/86	1,586					1,586
Increase in Receivables					35	35
Increase in Inventories				8	9	17
Increase in Working Capital Requirements	174	41	26	31	35	306
Reimbursement of Bank Overdraft		1,700				1,700
<b>TOTAL</b>	<b>4,887</b>	<b>4,854</b>	<b>3,128</b>	<b>3,265</b>	<b>3,309</b>	<b>19,442</b>
<b>BALANCE</b>						
	70	76	21	140	153	461

**Note:** Progressive reduction of commercial receivables, so as not to exceed 3/12th of the annual freight traffic revenue from 1990, on; progressive reduction of inventories so as not to exceed 18 months of annually consumed materials from 1989 on; reimbursement of Government to SNTF of 70% of the debt service of Bank Loan 996-AL and implementation of the financial measures under the "Restructuration Financiere". The cash flow also takes into consideration a substantial Bank overdraft in 1987, to be repaid in 1988, to bridge SNTF's cash squeeze until implementation of the financial restructuring in 1988. It is also assumed that Government contributes to infrastructure investments would continue and depreciation is based on the core investment program 1985-89 with amounts of same magnitude for 1990 and 1991. Cash and banks have been kept at 15% of traffic revenue.

## ALGERIA

## STAFF APPRAISAL REPORT

## SECOND RAILWAY PROJECT

SNTF - FORECAST BALANCE SHEET 1987-1991  
(DA MILLION)

	1986	1986	1987	1988	1989	1990	1991
	as pre- sented	correc- ted					
<b>ASSETS</b>							
Cash and Banks	54	54	298	215	240	272	306
Receivables							
Commercial	1,212	495	449	399	374	256	290
Other	300	300	300	300	300	300	300
Inventories	456	456	410	369	324	332	341
<b>TOTAL CURRENT ASSETS</b>	<b>2,022</b>	<b>1,305</b>	<b>1,457</b>	<b>1,283</b>	<b>1,283</b>	<b>1,159</b>	<b>1,237</b>
Infrastructure	1,223	30,430	31,730	33,030	34,260	35,560	36,860
less Depreciation	424	424	493	562	631	862	1,102
Subtotal	799	30,006	31,237	32,468	33,629	34,698	35,758
New Lines	9,007	9,007	10,007	11,007	12,097	13,097	14,097
less Depreciation			0	0	0	2	6
Subtotal	9,007	9,007	10,007	11,007	12,097	13,095	14,091
Rolling Stock, etc.	4,635	6,031	6,331	6,631	6,896	7,196	7,511
less Depreciation	1,091	1,091	1,298	1,518	1,749	2,051	2,366
Subtotal	3,544	4,940	5,033	5,113	5,147	5,145	5,145
Other Fixed Assets	868	868	868	868	868	868	868
<b>TOTAL NET FIXED ASSETS</b>	<b>14,218</b>	<b>44,821</b>	<b>47,145</b>	<b>49,456</b>	<b>51,741</b>	<b>53,806</b>	<b>55,862</b>
Investments	3	3	3	3	3	3	3
<b>TOTAL ASSETS</b>	<b>16,243</b>	<b>46,129</b>	<b>48,605</b>	<b>50,742</b>	<b>52,982</b>	<b>54,968</b>	<b>57,102</b>
<b>LIABILITIES</b>							
Current liabilities	3,608	2,891	1,305	1,105	1,084	943	790
Provisions	2	2	2	2	2	2	2
Long-Term Debt							
Debt existing on 12/31/86	4,455	4,455	4,217	3,930	3,635	3,355	3,085
New Debt			2,000	1,250	1,515	1,710	1,919
Subtotal	4,455	4,455	6,217	5,180	5,150	5,065	5,004
Equity, Reserves, Accrued Losses	8,178	38,781	41,081	44,455	46,747	48,957	51,305
<b>TOTAL LIABILITIES</b>	<b>16,243</b>	<b>46,129</b>	<b>48,605</b>	<b>50,742</b>	<b>52,982</b>	<b>54,968</b>	<b>57,102</b>
<b>CURRENT RATIO</b>	<b>0.56</b>	<b>0.45</b>	<b>1.12</b>	<b>1.16</b>	<b>1.14</b>	<b>1.23</b>	<b>1.56</b>
<b>LIQUID RATIO</b>	<b>0.43</b>	<b>0.29</b>	<b>0.80</b>	<b>0.83</b>	<b>0.84</b>	<b>0.88</b>	<b>1.13</b>
<b>DEBT/EQUITY RATIO</b>	<b>35/65</b>	<b>10/90</b>	<b>13/87</b>	<b>10/90</b>	<b>10/90</b>	<b>9/91</b>	<b>9/91</b>

ALGERIA

STAFF APPRAISAL REPORT

SECOND RAILWAY PROJECT

Cost Accounting - Terms of Reference

Background

1. The Algerian Railway (Société Nationale des Transports Ferroviaires - SNTF) is a semi-autonomous public enterprise under the authority of the Ministry of Transport. Until January 1, 1977, it carried out its function within the framework of a railway convention which provided inter-alia for government compensation for below cost services and subsidization of operating deficits. In line with the Government revised policies which called for revenue earning public enterprises to operate with less reliance on Government assistance the railway convention was abrogated and not replaced by any institutional instrument redefining the respective financial responsibilities of State and enterprise. Since then, Government contributions to SNTF's operations have been limited to some interest charges, vocational training costs and - since 1983 - the cost of track maintenance. On the capital side, infrastructure investments have been financed by unreimbursable Government contributions, while rolling stock, motive power, equipment, etc. have been financed by SNTF through medium-and long-term borrowing.

2. Low traffic, below-cost tariffs, inadequate government compensation, and increasing working expenses, particularly payroll, have over the years deeply deteriorated SNTF's earnings' position. The Government is presently considering two concomitant actions, namely:

- (a) a major financial restructuring of SNTF to consolidate past operating deficits, relieve debt service, and extend additional borrowing; and
- (b) a new railway convention which would define the respective responsibilities of State and enterprise with respect to investments and debt service resulting thereof, and state the principles of subsidization for:
  - (i) below-cost tariffs;
  - (ii) losses incurred on uneconomic lines and services;
  - (iii) vocational training and level-crossing costs.

It is also expected that depreciation based on replacement cost for all investments - regardless of their source of financing - will have to be dealt with as a cost component for the assessment of tariffs and compensation.

3. The new railway convention can be operative only if reliable cost accounting is available to substantiate SNTF's claims for compensation, and that the methodology used to determine the amount of claims is fully accepted by Government. The consulting services described in the following are to provide such pricing tool.

#### Objectives

4. The purpose of the consulting services is to assist SNTF in setting up a comprehensive cost accounting system, including an updating mechanism, which will permit Government and SNTF to determine the tariff adjustments needed - or alternatively the compensation required - at various traffic levels to achieve an agreed return on railway investments. The Cost Accounting System shall take into account the requirements of the Plan Comptable National which is not yet fully implemented by SNTF and, eventually, the Plan Comptable Analytique National presently under preparation.

5. It is ultimately expected that the outcome of this assignment in conjunction with the results of the National Transport Study to be undertaken as part of the Bank-financed Fifth Highway Project will provide the necessary data leading to the optimal distribution of traffic between road and rail and preventing any distortion of traffic.

#### Scope of Services

6. The consultants shall perform all investigation analyses, and other services herein described, as required to attain the "objectives" above. In the conduct of their work, the consultants shall collaborate closely with SNTF, which will assign counterpart staff to work with the consultants and will provide the "Data, Services and Facilities" described in chapter 5 hereafter. The consultants shall be solely responsible, however, for the analysis and interpretation of all data and services received, and for the findings and recommendations contained in their reports. The consultants shall also coordinate their work and collaborate closely with other consultants if any retained by SNTF for the improvement of planning, management and operations.

7. The cost accounting system to be developed will clearly identify and segregate all costs related to major commodities carried and services rendered by SNTF, namely:

- (a) passengers: long-distance and suburban traffic; the latter in the vicinity of Algiers, and eventually Oran and Constantine.
- (b) freight: iron ore, phosphate, steel products, refined oil, cereals, fertilizers, cement and sugar; including "brouettage".

Costs will also be defined separately for standard and narrow-gauge lines, and by main relations or routes.

8. Costs will take into account the implications of the recently-enacted Statut Général des Travailleurs - S.G.T., and its impact on SNTF's working expenses. Also, the effects of the attrition policy carried out by SNTF will be considered.

9. Costs will also be corrected to take into consideration the establishment of INFRAFER, and the progressive transfer to it of track construction, periodic maintenance activities, and track overhaul except for routine maintenance.

10. The long-term marginal costs of commodities and services will be calculated and compared to fully distributed costs; a broad assessment of variations of long-term marginal costs per given levels of traffic will be made, as part of an updating mechanism.

11. Notwithstanding the depreciation allocations referred to in para. 2, the Government may eventually decide that only part of the capital costs is to be recovered from revenue and that the other part of the investments serves general development purposes for which no immediate or direct return is due. To assist the Government in deciding the respective parts of capital costs earmarked for direct cost recovery the consultant will incorporate into costs three separate annual depreciation allowances based on estimated replacement value for:

- (a) existing infrastructure, including signalling and tele-communications on lines in full operation;
- (b) same, on lines recently doubled or built where traffic is expected to develop only progressively; for these lines depreciation will be calculated pro rata to annual traffic as compared to total accumulated traffic for the expected lifetime; and
- (c) motive power, rolling stock, equipment, etc.



12. The consultants will develop a tariff structure based on their cost findings which will allow for the following optional objectives:

- (a) recover the fully distributed cost of services rendered without cross-subsidization;
- (b) earn a return on all railway investments; and
- (c) provide cash resources to cover debt service.

Alternative tariff proposals will also be made to prevent dampening demand, taking into account the findings of the National Transport Study consultants, and other possible constraints.

13. In studying alternative tariff structures and levels the consultants will consider the possible advantages of modulating rates and fares with distance, thus introducing a taper discount system.

14. Concurrently with cost accounting the consultants will develop a system of internal audit ensuring on a continuing basis the correctness and validity of entries and procedures.

15. A substantial part of the consulting services is expected to be earmarked for training of SNTF's accounting and auditing staff, over a period of at least one accounting cycle, e.g. one fiscal year to which is added the time required for closing of account. The training program will take into account the need for extending EDP methods.

#### Time Schedule and Reporting Requirements

16. The consultants will mobilize their staff needed for the preparation of the conceptual report in Algiers within one month of the signing of the consulting services contract; other staff will be mobilized in Algiers within two month(s) after approval of the conceptual report.

17. In the conduct of their assignment, the consultants will prepare the following reports:

- (a) a conceptual report (Schéma Directeur) to be issued within three months of the signing of the Consulting Services contract which will detail the objectives to be achieved and their timing; the systems to be established; the organization within which such systems will be developed; the hardware and software needed; and the personnel and organizational constraints likely to be encountered and their effect on the timing of the consultants' assignment. Approval of such "Schéma Directeur" by SNTF and the Bank will be a

prerequisite for further action by the consultants. Unless otherwise agreed between the parties--SNTF and the Consultants--the consulting service contract will be terminated if, two months after issuance of the "Schéma-Directeur" Report, no agreement has been finalized with respect to the scope and limitations of the consulting services; (to be completed eventually with a compensation clause in case of termination)

- (b) progress reports at two months intervals after approval of the Conceptual Report covering; and
- (c) manuals covering appropriate accounting procedures.

ALGERIA  
STAFF APPRAISAL REPORT  
SECOND RAILWAY PROJECT

Transport Projects Previously Financed by the Bank

1. In the transport sector, Algeria has received eight loans from the Bank, for a total amount of US\$615 million, to finance five projects for roads, two for ports and one for railways. The First, Second and Third Highway Projects (Loans 912-AL, 1407-AL and 1683-AL) have been completed and fully disbursed. The implementation of the Fourth Highway Project (Loan 1892-AL), approved in 1980, is about two years behind schedule because of delays in bidding and evaluating alternative bids for construction of a major component. The Fifth Highway Project has recently been signed and contracts have recently been awarded for a first-year program of pavement strengthening and road maintenance.

2. The First Highway Project (Loan 912-AL), comprising improvements to 84 km of high priority road sections and a substantial program of highway pre-investment and maintenance studies, resulted in (a) a highway development plan based on an inventory of about 7,000 km of principal roads; (b) detailed engineering for about 400 km of road rehabilitation; and (c) a comprehensive study of road maintenance requirements (operational, management and institutional). The project on the whole went well and served as the basis for the Second Highway Project (Loan 1407-AL), under which organizational change, separating housing and urbanization activity from highway infrastructure at the regional level, and reforms of the maintenance organization were implemented. In support of this institutional change, the training of operators and mechanics was started while engineers and equipment managers were sent abroad for maintenance related training. The Ministry of Public Works (MPW) also gained experience in International Competitive Bidding and in contract supervision and management of a major road project. However, delays in bidding, rebidding, awarding contracts and obtaining approvals delayed project completion three years.

3. The Third Highway Project (Loan 1683-AL) supported (a) a two-year tranche (1980-81) of a five-year maintenance program, with purchase of equipment and continued training; (b) a two-year tranche of a paved road strengthening program, which had been prepared by technical assistance under the Second Highway Project; (c) technical assistance to MPW in the preparation of feasibility studies for the development program; and (d) another major north-south road improvement project. Progress was made in developing and equipping a force account maintenance work force (which

continued under the next highway project) against a background of increasing decentralization and proliferation of regional authorities. Both pavement strengthening and major road improvement were delayed in starting by lengthy contract bidding and approval procedures as well as by a major earthquake, which diverted resources from project contracts to reconstruction. In the end, inadequate management of one local contractor also contributed to the delay in completion which totalled three years.

4. The Fourth Highway Project (Loan 1892-AL) is ongoing. It comprised (a) continued support for the next two-year tranche of maintenance (1982-83); (b) a second two-year tranche of pavement strengthening; (c) improvement of a critical section of another major north-south road; and (d) technical assistance for construction supervision, maintenance training, assistance to the road construction industry and rural road studies. Delays have again stemmed from lengthy bidding and contract award procedures and substantial construction quantity increases. In addition, recent developments have markedly changed the nature of the maintenance organization, the force account equipment pools having been reorganized into autonomous enterprises responsible for road maintenance. The project civil works are expected to be completed by the end of 1988, two years late.

5. The recently signed Fifth Highway Project (Loan 2808-AL) is designed to address a number of high priority matters in the highway sector. The pricing objectives of the project are to: (a) reduce the backlog of pavement strengthening works; (b) rationalize planning and control of this work; (c) improve planning and operational efficiency in road maintenance; and (d) strengthen personnel management and training functions in MPW, MOT and various transport enterprises. The project will support (a) a two-year program (1987-88) of road rehabilitation and contracted maintenance; (b) technical assistance and training to improve the collection and use of road network data, planning and optimization of pavement strengthening and road maintenance programs, as well as training programs for transport enterprises and (c) to improve policy formulation and project preparation in the transport sector.

6. The Railway Project (Loan 996-AL), designed to support the railway's modernization program within the 1974-77 Development Plan, consisted mainly of renewal of motive power, rolling stock, rehabilitation of track and technical assistance. Execution of the physical project components, including procurement was completed on schedule. Several important studies, however, were not completed at the scheduled closing date which was, in consequence, extended. Disagreement between the Bank and the railways concerning the upgrading to double track standard the Ramdane-Jamal Constantine line, with doubtful justification, led to cessation of Bank lending to the railway.

7. The Bank participated in financing a major port at Bethouia (Loan 995-AL), designed for the export of Liquefied Natural Gas. The implementation of an envisaged Second Port Project at Jijel (Loan 1427-AL) evaluated in 1976 did not materialize because of the postponement of the restoration of an associated new steel complex. The loan was then cancelled in 1980.

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List of Project File Documents

**A. Selected Reports and Studies Related to the Sector**

- A.1 Transport Sector Memorandum (White Cover), April 1982
- A.2 Transport Sector Strategy Paper (Green Cover), October 8, 1987
- A.3 Algeria: 1985-89 Development Plan and the medium- and long-term projects (Grey Cover), September 30, 1987

**B. Selected Reports and Studies Related to the Project**

- B.1 Comparaison des Améliorations Possibles sur la Ligne Minière, SNCFA, Juillet 1974
- B.2 Les Transports Ferroviaires dans la Région Algérienne, SNTF, Mai 1976
- B.3 Line-by-Line Distances between Stations, SNTF, July 1979
- B.4 Computer Listings for Origin, Destination, Passenger and Freight Traffic, SNTF 1986
- B.5 A Votre Service, SNTF
- B.6 Etude du Coût de Transports Marchandises, SNTF, 1985
- B.7 Track Longitudinal Profiles: - Annaba-Ghardimaou  
- Alger-Constantine  
- Annaba-Ramdane Jamel
- B.8 Opération de Réhabilitation et Modernisation; sous-Détails des Coûts d'Investissements et Plans d'Opérations, SNTF, 1987.
- B.9 Termes de Référence de la Mise en Place d'une Gestion Centralisée du Trafic Marchandises, SNTF, Janvier 1988.
- B.10 Gestion Centralisée du Trafic Marchandises; Note Méthodologique; SNTF, Janvier 1988.

**C. Selected Working Papers**

- C.1 SNTF Investment Program: 1985-89, April 1987
- C.2 Analysis of Rail Traffic Data, Jean-Pierre Noel (Consultant), April 1987
- C.3 Economic Evaluation and Sensitivity Analysis, Jean-Pierre Noel (Consultant), November 1987
- C.4 Financial Evaluation, Jean de Gryse (Consultant), July 14, 1987.

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**Rail Passenger Traffic**

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u> <sup>1/</sup>
<b><u>Passengers (million)</u></b>								
Suburb	8.5	13.6	11.6	10.6	17.2	16.9	25.4	37.7
Main Lines	<u>14.4</u>	<u>16.4</u>	<u>18.0</u>	<u>17.2</u>	<u>16.8</u>	<u>18.9</u>	<u>22.3</u>	<u>13.2</u>
Total	22.9	30.0	29.6	27.8	34.0	35.8	47.7	50.9
<b><u>PK (million)</u></b>								
Suburb	175	263	231	216	333	333	486	1010
Main Lines	<u>1704</u>	<u>1807</u>	<u>1925</u>	<u>1558</u>	<u>1471</u>	<u>1502</u>	<u>1515</u>	<u>1030</u>
Total	1879	2070	2156	1774	1804	1835	2011	2040
<b><u>Average Distance (km)</u></b>								
Suburb	20.6	19.3	19.9	20.4	19.4	19.7	19.1	26.8
Main Lines	118.6	110.2	106.9	90.6	87.6	79.5	68.4	78.0
Total	82.1	69.0	72.8	63.8	53.1	51.3	42.2	40.1

<sup>1/</sup> Change in definition of suburban and main line passenger traffic.

Source: SNTF

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**Rail Freight Traffic (FCL)**

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<b><u>Tons ('000)</u></b>								
Iron Ore	3,273	3,479	3,188	3,594	3,551	3,229	3,436	3,105
Phosphate	1,125	1,082	927	999	915	927	1,272	1,146
Other	<u>4,653</u>	<u>5,769</u>	<u>6,578</u>	<u>6,612</u>	<u>6,774</u>	<u>7,311</u>	<u>7,880</u>	<u>8,134</u>
Total	9,051	10,330	10,693	11,205	11,240	11,467	12,588	12,385
<b><u>TK (million)</u></b>								
Iron Ore	535	565	526	582	561	509	540	469
Phosphate	382	369	317	339	309	316	435	393
Other	<u>1,545</u>	<u>1,508</u>	<u>1,821</u>	<u>1,808</u>	<u>1,756</u>	<u>1,806</u>	<u>2,073</u>	<u>2,054</u>
Total	2,462	2,442	2,664	2,729	2,626	2,631	3,048	2,916
<b><u>Average Distance (km)</u></b>								
Iron Ore	163	162	165	162	158	158	157	151
Phosphate	340	341	342	339	338	341	342	344
Other	332	261	277	273	259	247	263	252
Total	272	236	249	244	234	229	242	235

Source: SNTF



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**Rail Traffic (FCL) Broken Down by Commodity Types**

Item	<u>1984</u>		<u>1985</u>			Distance (km)	<u>1986</u>			Distance (km)
	Tons ('000)	TK(million)	Tons ('000)	TK (million)	TK (%)		Tons ('000)	TK (million)	TK (%)	
Iron Ore	3,229	509.3	3,436	539.7	17.7	157	3,105	469.0	16.1	151
Phosphate	927	315.8	1,272	434.8	14.3	342	1,146	393.0	13.5	344
Steel Products	1,595	546.4	1,620	601.0	19.7	371	1,587	621.0	21.3	370
Refined Oil	1,559	359.9	1,748	452.3	14.8	259	1,844	421.3	14.5	230
Cereals	836	209.3	993	249.7	8.2	252	1,197	316.0	10.8	250
Fertilizers	206	148.4	278	193.6	6.4	697	272	170.5	5.8	700
Cement	346	104.0	338	98.5	3.2	291	397	129.5	4.5	300
Sugar	<u>385</u>	<u>79.7</u>	<u>339</u>	<u>71.3</u>	<u>2.3</u>	<u>210</u>				
Sub-Total	9,083	2,272.8	10,023	2,640.9	86.7	263	9,548	2,520.3	86.5	264
Coal, Coke	1,216	24.7	1,363	27.7	0.9	20	1,352	29.8	1.0	22
Baryte	8	7.5	10	8.9	0.3	882)				
Flour, Semolina	104	39.3	51	20.3	0.7	398)				
Chemical	158	32.9	104	29.8	1.0	286)	1,059	333.6	11.4	315
Salt	77	28.5	74	33.1	1.1	448)				
Alfa	38	14.7	31	14.7	0.5	471)				
Other Cargo	625	185.1	772	244.9	8.0	317)				
Own Account	<u>158</u>	<u>25.6</u>	<u>160</u>	<u>27.3</u>	<u>0.9</u>	<u>171</u>	<u>326</u>	<u>32.2</u>	<u>1.1</u>	<u>100</u>
Sub-Total	2,384	385.3	2,565	406.7	13.3	159	2,737	395.6	13.5	145
Grand Total	11,467	2,658.1	12,588	3,047.6	100.0	242	12,385	2,915.9	100.0	235

Source: SNTF

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SECOND RAILWAY PROJECT

Locomotive Stock - 1987

<u>Type</u>	<u>HP</u>	<u>Make</u>	<u>Wheel Arrange- ment</u>	<u>Axle Load (Tonnes)</u>	<u>Year</u>	<u>Numbers</u>
<u>Diesels Main Line</u>						
<u>Standard Gauge</u>						
Diesel-Electric	3300	GM-USA	Co Co	20	1971	27
"	3300	GM-USA	"	20	1973	25
"	3300	GM-CANADA	"	20	1976	14 <sup>1/</sup>
"	3300	GM-CANADA	"	20	1982	25
"	2475	GM-CANADA	"	20	1976	24
"	1980	GE-USA	"	16	1978	25
					Sub-total	140
Electric						
3000 V DC	3000	LEW-GDR	Co Co	22	1972-73	24 <sup>2/</sup>
					TOTAL	164
<u>Dual Gauge (Standard/Narrow - 105 mm - bogies changeable)</u>						
Diesel-Electric	1100	GM-USA	Co Co	13	1977	5 <sup>3/</sup>
<u>Narrow (105 mm) Gauge</u>						
Diesel-Electric	920	Alsthom	Co Co	10	1958	2 <sup>4/</sup>
"	935	Alsthom	"	12	1961	4
"	1100	GM-USA	"	12	1977	25
					Sub-total	31
					Grand Total Main Line	200
<u>Shunting Locomotives</u>						
<u>Standard Gauge</u>						
Diesel-Hydraulic	650	LEW-DGR	4-Axle	15	1971/72	18
"					1972	6
					Total shunters	24
<u>Autorails (2 car units) Standard Gauge</u>						
Diesel Mech.	780	FIAT	8-Axle	10	1973	30 <sup>5/</sup>

<sup>1/</sup> 1 - 1976 vintage locomotive, accident damaged beyond repair scrapped in 1987.

<sup>2/</sup> 1 - Electric locomotive, damaged beyond repair in collision with 1) above, scrapped in 1987.

<sup>3/</sup> Classified as main line for narrow-gauge services. Used on standard gauge principally for heavy duty shunting or transfer services.

<sup>4/</sup> 6 - 1958 vintage locomotives scrapped in 1987. Also 1 narrow gauge locomotive.

<sup>5/</sup> Relegated from suburban to secondary local passenger services since 1985. Engines and transmission of all 30 units completely overhauled in last two years. 2 units, damaged in accidents, scrapped in early 1987.

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## STAFF APPRAISAL REPORT

## SECOND RAILWAY PROJECT

## Rolling Stock Ownership - December 31, 1986

## Wagon Stock

Category	Nos		Total Capacity (tonnes)			Average (tonnes)	
	SG	Dual	SG	Dual Gauge		Payload/wagon	
<b>General Stock</b>				SG	NG	SG	SG - NG
Covereds	2,624	770	96,047	45,815	19,943	37	60 - 26
Opens	1,626	681	44,536	37,863	18,250	27	56 - 27
Flats	<u>2,232</u>	<u>1,326</u>	<u>92,060</u>	<u>78,101</u>	<u>33,548</u>	<u>41</u>	<u>59 - 25</u>
Subtotal 1/	6,482	2 777	232,643	161,779	71,741	36	58 - 26
<b>Special Stock</b>							
Opens (dropside)	-	240	-	13,200	6,000	-	55 - 25
Tank Pol	460	433	23,368	14,246	11,994	51	33 - 28
General Hoppers (Cereals: tilt cover, gravity loading/unloading)	434	49	24,174	2,818	1,372	56	58 - 28
Iron Ore Hoppers (Central discharge)	602	-	36,120	-	-	60	- -
Phosphate Hoppers (Side discharge tilt-cover)	516	-	23,323	-	-	45	- -
Sugar Hoppers (Gravity Ldg/Unlg tilt-cover)	30	-	1,761	-	-	59	- -
Cement Bulk (Pneumatic discharge)	170	-	9,945	-	-	59	- -
Coke Fines Open Salt Hoppers (Side discharge tilt-cover-corten)	205	-	12,751	-	-	62	- -
Steel Coil Flats	285	-	16,587	-	-	58	- -
Limestone/Dolomite Hoppers	33	-	1,933	-	-	59	- -
Coal open (Side discharge auto-operated)	90	-	5,130	-	-	57	- -
Gypsum Hoppers (Side discharge tilt-cover)	79	-	4,527	-	-	57	- -
Sand Hoppers (Gravity L/UL)	<u>60</u>	<u>20</u>	<u>3,480</u>	<u>1,180</u>	<u>520</u>	<u>58</u>	<u>59 - 26</u>
Subtotal 2/	3,004	742	165,279	31,444	19,886	55	42 - 27
Grand Total	<u>9,486</u>	<u>3,519</u>					
Total SNTF stock	<u>13,005</u>						
Private stock	<u>181</u>	1/					
Total Wagon Stock	<u>13,186</u>						

## Service Wagons 1986

Brake Vans	173 Nos (100 pre 1959) standard gauge
Ballast Hoppers	750 Nos (700 standard gauge 1911-53/50 dual gauge 1983)
Tank	46 Nos (1939-1959) standard gauge
Miscellaneous	235 Nos (216 standard gauge 1880-1012 dual gauge 1944-63)
Total	1204

1/ This stock consisting of 64 fertilizer/phosphate hoppers, 28 sugar hoppers, 45 coke fines opens, 44 special flats are to be taken over shortly by the SNTF, leaving no wagons in private ownership thereafter.

2/ In the period 1970-1986, 9600 new wagons have been acquired. All the 3519 dual gauge wagons are new (replaced units), 4081 of the standard gauge or 53% is new replaced stock. Retirement of 4900 was planned in the period 1981-1990: during 1981-1986 4200 wagons have been replaced, 700 will be replaced by 1990, thus completing the program. Another 3400 wagons (flats open) are slated for renewal during 1990-1995. By 1990, about 70% of the fleet will be under 15 year of age and by 1995 if the fleet size remains the same and the program is realized, 70% of the stock will be under 15 year and 30% under 5 years of age.

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SECOND RAILWAY PROJECT

Passenger Stock - December 31, 1986

<u>Category</u>	<u>Nos</u>	<u>Total Capacity</u>				
		<u>1st class</u>		<u>2nd class</u>		
<u>Standard Gauge</u>		<u>Seats</u>	<u>Sleepers</u>	<u>Seats</u>	<u>Sleeper-</u>	<u>Standing</u>
					<u>ettes</u>	
<u>Passenger Coaches</u>						
<u>Main line</u>	37	3,922	320	-	-	-
	253	-	-	15,012	960	-
<u>Suburban</u>	12	336	-	-	-	-
	248	-	-	17,680	-	8,840
<u>Narrow Gauge</u>	41	-	-	2,050	-	-
<u>Other Vehicles</u>						
<u>Brake Vans</u>						
<u>Standard Gauge</u>	34	-	-	-	-	-
<u>Narrow Gauge</u>	9	-	-	-	-	-
<u>Reversible S.G.</u>	27	-	-	-	-	-
	620	3,758	320	34,630	960	8,840

## ALGERIA

## STAFF APPRAISAL REPORT

## SECOND RAILWAY PROJECT

Line Capacity Characteristics  
Trains Each Way Per Day in 1986

Sections	Km	Max Charted Trains	a c t u a l n u m b e r				Block System
			P	F	T	X	
<b>Standard Gauge</b>							
<b>Alger-Constantine line</b>							
Alger-Dar El Beida	19	DTrack	19	7	26	-	DLB
Dar El Beida-Thenia	35	24	10	7	17	71	CT
Thenia-Bouira	63	20	7	5	12	60	CT
Bouira-Beni Mansour	49	20	6	5	11	55	CT
B.Mansour-BBA	29	14	4	5	9	64	CT
BBA-Setif	70	15	5	5	10	67	CT
Setif-El Gourzi	128	14	4	5	9	64	CT
El Gourzi-Constantine	27	DTrack	6	5	11	-	DLB
Thenia-Tizi Ouzou	57	11	3	2	5	45	CT
B.Mansour-Bejaia	88	14	8	2	10	71	CT
<b>Constantine-Annaba line</b>							
Constantine R.Jamel	44	DTrack	5	9	14	-	DLB
R.Jamel-Skikda	19	17	5	9	14	82	BMV
R.Jamel-Annaba	96	13	1	6	7	54	CT
<b>Annaba-Djebel Onk line</b>							
Annaba-Bouchejoug	44	23	7	14	21	91	BMV
Bouchejoug-S.Ahras	52	18	2	11	13	72	BMV
S.Ahras-O.Keberit	56	18	1	11	12	67	BMV
O.Keberit-Tebessa	68	19	1	4	5	26	EPR
Tebessa-Djebel Onk	108	12	1	3	4	33	EPR
Tebessa-El Kouif	25	15	-	1	1	7	EPR
O.Keberit-Ouenza	24	23	-	10	10	43	EPR
Ain Chenia-B.Khadra	18	17	-	2	2	12	BP
Bouchejoug-Guelnia	33	12	2	1	3	25	CT
S.Ahras-Ghardimaou	53	15	3	1	4	27	CT
<b>El Gourzi-Touggourt line</b>							
El Gourzi-Baina	80	12	2	4	6	50	CT
Batna-Biskra	120	13	2	4	6	46	EPR
Biskra-Touggourt	216	11	1	2	3	27	EPR
<b>Alger-Oran line</b>							
Alger-El Afroun	68	DTrack	17	6	23	-	DLB
El Afroun-Khemis	51	18	6	5	11	61	CT
Khemis-O. Jdda	66	16	6	4	10	63	CT
O.Fodda-O.Sly	38	DTrack	6	4	10	-	DLB
O.Sly-Relizane	72	15	5	3	8	53	CT
Relizane-Mohammadia	50	18	7	4	11	61	CT
Mohamm-O.Tielat	50	16	7	3	10	63	CT
O.Tielat-Oran	26	DTrack	23	5	28	-	DLB
<b>Tielat-ZEB line</b>							
O.Tielat-S.B.Abbes	51	16	6	2	8	50	CT
S.B.Abbes-Tabia	23	16	4	2	6	38	CT
Tabia-Tlemcen	64	14	4	2	6	43	CT
Tlemcen-Z.E.Beghal	69	8	2	2	4	50	CT
Moham.-Mostaganem	45	12	4	1	5	42	EPR
Oran-Ain Temouchent	69	14	10	-	10	71	CT
Z.E.Beghal-Ghazaouet	-	14	-	2	2	14	EPR
Tabia-Crampel	76	3	-	1	1	33	BP
<b>Narrow Gauge</b>							
Blida-Medea	49	12	-	3	3	25	EPR
Medea-Boghari	75	16	-	2	2	13	EPR
Boghari-Djeifia	155	10	-	1	1	10	EPR
Mohammadia-Saida	120	14	1	3	4	29	EPR
Saida-Kraifallah	43	8	1	2	3	38	EPR
Kraifallah-Mecheria	138	14	1	2	3	21	EPR
Mecheria-Bechar	358	10	1	2	3	30	EPR
Relizane-Tiaret	121	5	-	1	1	20	CT
Tiaret-Mahdia	45	5	-	1	1	20	BP
Tizi-Mascara	12	6	-	-	-	-	BP

## ALGERIA

STAFF APPRAISAL REPORTSECOND RAILWAY PROJECTTraction and Rolling Stock  
Maintenance Installations and ProductionLOCOMOTIVESDepots

	DE	No. of Locomotives homed		Autorails
		Main Line Electric	Shunters DH	
<u>Standard Gauge</u>				
Algiers	39	--	15	16
Sidi-Mabrouk	48	--	4	6
S. Ahras	25	24 1/	1	--
Oran	36	--	4	10
<u>Narrow Gauge</u>				
Blida	9	--	--	--
Mohammadia	19 2/	--	--	--
Total	176	24	24	32

Workshops (Periodic Overhaul)

El Hamma (Algiers) All GM Units: Capacity 36 units/year.  
Sidi-Mabrouk (Constantine) GE Units, Shunters, Autorails and bogies of Electric Locomotives.

WAGONSWorkshops (Periodic Overhaul)

Annaba Covered, specials: capacity 3600 units/year 3/  
Mohammadia Opens.

Heavy Repair Centres

Sidi-Mabrouk (Constantine) Specials  
Hussein-Dey Flats  
Blida Dual Gauge, all types.

There are 25 "on line" wagon repair/recovery Depots, strategically dispersed over the system, and 47 Train Examination points located approximately at every 100 km along the line.

COACHESWorkshops

Sidi-Bel-Abbess All standard gauge vehicles including vans  
Mohammadia Used to handle narrow gauge vehicles which are now no longer in service

General During the last six years the equipment, especially machine tools and ground level lifting and handling gear, has been modernized in all workshops, and many of the lineside depots. The on-going program, started in 1982 is expected to be continued through the 1986-1990 interval, by the end of which most the plant and equipment will have been modernized.

- 1/ The Depot is equipped to overhaul Electric Locomotives, except the bogies and traction motors which are overhauled at Sidi-Mabrouk (Constantine).
- 2/ Alstom units are allocated here for running maintenance as well as overhaul.
- 3/ In addition, 30 accident-damaged wagons are repaired annually.

Workshop Maintenance Output 1986/Program 1987

1. Locomotives (Workshops)

Workshop	Type	General 1/ Overhaul	Intermediate Overhaul	Overhaul Bogies	Accident Repairs
Algiers (Hamma)	Diesel Electric (GM)	1986 21 (26) 2/ 1987 28	9 (15) 21	44 (52) 50	52 1/
Constantine	Diesel Electric (GE) Diesel Shunters Bogies Electric	1986 23 (22) 1987 12	3 (3) 15	12 (12) 12	31
Souk Ahras	Electric	1986 8 (6) 1987 6	9 (12) 12	-	98
Total	1986 Output 1987 Program	52 (54) 46	21 (30) 47	56 (64) 62	181
	1986 Program Achievement	96%	70%	84%	-

2. Wagons & Coaches (Workshops 1986 Output)  
Vehicle & Brake Gear

Workshop	Type	General 1/ Overhaul	Intermediate Overhaul	Periodic Preventive Maintenance	Bogies		Periodic Preventive Maintenance
					G Overhaul	I Overhaul	
Annaba	Wagons	120 (170) 2/	581 (600)	2182 (2250)	691 (200)	156 (200)	550 (600)
	Coaches	-	-	89 (100)	-	-	-
Sidi-Mabrouk	Wagons	-	40 (60)	1310 (1150)	-	-	-
	Coaches	-	-	57 (120)	-	-	-
Hussein Dey	Wagons	102 (100)	-	484 (300)	-	-	-
	Coaches	-	-	775 (850)	-	-	-
Mohamedia	Wagons	27 (132)	317 (240)	899 (696)	834 (720)	116 (360)	654 (600)
	Coaches	-	-	68	-	-	-
Sidi-Bel-Abbes	Coaches	37 (51)	106 (93)	219 (400)	-	-	-
<b>Total 1986</b>		<b>286 (453) 4/</b>	<b>1044 (993)</b>	<b>6083 (5866)</b>	<b>1525 (920)</b>	<b>272 (560)</b>	<b>1195 (1200)</b>
1986 Program Achievement		63%	105%	104%	165%	49%	99%

3. Wagons & Coaches (Regional Bad Order Maintenance Depot output 1986)

Region	Type	Washing Line Maintenance	Brake Gear Adjustment	Primary Maintenance
Algiers	Coaches	50 (204)	-	426 (500)
	Wagons	-	138 (400)	3551 (4000)
Oran	Coaches	192 (224)	-	467 (300)
	Wagons	-	180 (390)	2222 (2700)
Constantine	Coaches	64 (92)	-	67 (150)
	Wagons	-	514 (450)	4522 (3200)
Souk Ahras	Coaches	107 (102)	-	390 (350)
	Wagons	-	766 (546)	8250 (6500)
<b>Total 1986</b>	<b>Coaches</b>	<b>413 (622)</b>	<b>-</b>	<b>1350 (1300)</b>
	<b>Wagons</b>	<b>-</b>	<b>1598 (2176)</b>	<b>18,545 (16,400) 5/</b>
1986 Program Achievement	<b>Coaches</b>	66%	-	103%
	<b>Wagons</b>	-	73%	113%

- G/Overhaul I/Overhaul Bogies(2)
- 1/ Manhours required are GM/GE 5000/4500 8000/7500 1500
  - 2/ Bracket figures refer to 1986 program targets. The 1987 program targetted includes backlog carry-overs of 1986 program.
  - 3/ 3-severely damaged GM locomotives were repaired. The repair involved complete stripping, reassembly, cutting/rewelding chasis, rebuilding the cab and coachwork.
  - 4/ Includes accident repairs of 4 coaches and 233 wagons.
  - 5/ Includes accident rerailing, recovery and minor repairs and replacements.

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**  
**Maintenance Stores Procurement**  
**1985/86 and Forecast 1987**  
**Procurement (million DA)**

	-----Actual-----						-----Forecast-----		
	0	1985 I	T <sup>1/</sup>	0	1986 I	T	0	1987 I	T
<b>I. Raw Materials</b>	<b>4.85</b>	<b>0.66</b>	<b>5.51</b>	<b>15.51</b>	<b>0.27</b>	<b>15.42</b>	<b>17.8</b>	<b>0.5</b>	<b>18.3</b>
Lubricants	2.19	-	2.19	10.9	-	10.9	14.0	-	14.0
Timber	0.43	0.48	0.91	1.31	0.04	1.35	1.0	0.1	1.1
Iron & Steel	0.08	0.12	0.20	1.53	0.01	1.55	1.0	0.2	1.2
Miscellaneous	-	-	-	1.41	0.21	1.62	1.8	0.2	2.0
<b>II. Hardware</b>	<b>2.35</b>	<b>1.46</b>	<b>3.81</b>	<b>2.51</b>	<b>1.01</b>	<b>3.52</b>	<b>2.5</b>	<b>1.2</b>	<b>3.7</b>
Electric Cables	0.04	0.02	0.06	0.09	0.01	0.10	0.5	0.1	0.6
Paints	0.45	-	0.45	-	-	-	-	-	-
Nuts & Bolts	0.57	0.10	0.67	0.32	0.10	0.42	0.5	0.1	0.6
Apparatus Electric	1.29	1.34	2.63	2.10	0.90	3.00	1.5	1.0	2.5
<b>III. Tools/Air Conditioning</b>	<b>0.02</b>	<b>0.29</b>	<b>0.31</b>	<b>0.06</b>	<b>0.33</b>	<b>0.39</b>	<b>0.1</b>	<b>0.8</b>	<b>0.9</b>
Heating	-	0.08	0.08	-	0.26	0.26	-	0.4	0.4
Hard Tools/Tool Bits	0.02	0.21	0.23	0.06	0.07	0.13	0.1	0.4	0.5
<b>IV. Loco Spares</b>	<b>0.03</b>	<b>10.31</b>	<b>10.34</b>	<b>0.13</b>	<b>6.13</b>	<b>6.26</b>	<b>0.10</b>	<b>10.10</b>	<b>10.20</b>
GM	0.02	5.70	5.72	-	3.60	3.60	-	6.00	6.00
GE	-	0.70	0.70	-	0.32	0.32	-	0.50	0.50
Electric	-	1.62	1.62	-	0.97	0.97	-	1.00	1.00
Shunters	-	0.61	0.61	-	0.11	0.11	-	0.40	0.40
Autorails	-	0.33	0.33	-	0.37	0.37	-	1.00	1.00
Compressors/Brakes	0.01	0.93	0.94	-	0.16	0.16	-	0.70	0.70
Others	-	0.42	0.42	0.13	0.60	0.73	0.1	0.50	0.60
<b>V. Rolling Stock</b>	<b>22.6</b>	<b>9.1</b>	<b>31.7</b>	<b>9.22</b>	<b>12.01</b>	<b>21.23</b>	<b>10.1</b>	<b>18.6</b>	<b>28.7</b>
Wheels	-	3.0	3.0	-	8.50	8.50	-	10.0	10.0
Brake Blocks	22.1	0.4	22.5	7.10	-	7.10	8.0	4.5	12.5
Wagons/Coaches	0.5	5.3	5.8	2.11	3.51	5.62	2.0	4.0	6.0
Miscellaneous	-	0.4	0.4	0.01	-	0.01	0.1	0.1	0.2
<b>VI. Paper/Office Equipment</b>	<b>3.7</b>	<b>-</b>	<b>3.7</b>	<b>1.45</b>	<b>-</b>	<b>3.45</b>	<b>3.6</b>	<b>0.5</b>	<b>4.1</b>
<b>VII. Catenary/Substations</b>	<b>-</b>	<b>0.03</b>	<b>0.3</b>	<b>-</b>	<b>0.01</b>	<b>0.01</b>	<b>-</b>	<b>0.10</b>	<b>0.10</b>
<b>VIII. Vehicles</b>	<b>-</b>	<b>4.98</b>	<b>4.98</b>	<b>0.07</b>	<b>2.03</b>	<b>2.10</b>	<b>-</b>	<b>3.0</b>	<b>3.0</b>
<b>IX. Unforeseen</b>	<b>0.74</b>	<b>5.75</b>	<b>6.48</b>	<b>0.61</b>	<b>4.31</b>	<b>4.92</b>	<b>1.0</b>	<b>3.0</b>	<b>4.0</b>
Grand Total I - IX	34.29	32.58	66.87	31.20	26.10	57.30	35.2	37.8	73.0
	=====	=====	=====	=====	=====	=====	=====	=====	=====

Note on Lead Time for Procurement

1/ 0 = Domestic, I = Import, T = Total



## ALGERIA

## STAFF APPRAISAL REPORT

## SECOND RAILWAY PROJECT

## SNTF Annual Transport Plan - 1987 Forecast

Commodity	Tonnes (000)	Tonne-km (Million)	Average Lead (km)	Regional Distribution			
				Soukh Ahras	Constantine	Algiers	Oran
Iron Ore	3,575	647	181	647	-	-	-
Phosphate	1,200	413	344	413	-	-	-
Coal	1,505	32.6	21	29	1.8	1.5	0.3
Slag	120	7	62	5	2	-	-
Limestone/Dolomite	125	27	219	6	21	-	-
Iron and Steel	857	497	580	40	300	141	16
Steel Products	149	59	207	1	27	24	7
Brouettage 1/	588	11	20	11	-	-	-
Zinc	27	32	1,132	1	8	11	12
Sulphuric Acid	16	14	901	1	3	5	5
Petroleum Products	2,018	460	227	21	141	80	218
Lubricants	54	45	833	1	13	22	9
Cereals	1,220	280	230	3	95	112	70
Cement	420	124	300	-	53	38	33
Gypsum	50	8	151	-	8	-	-
Fertilizer	270	190	700	8	85	81	16
Salt	99	41	412	0.2	24	11.8	5
Sugar raw	159	29	185	7	-	9	13
Sugar crystallized	5	1	200	-	-	-	1
Flour, Semolina	65	34	520	-	18	15	1
Food Products	180	49	273	3	17	20	9
Timber	44	9	212	-	7	2	-
Alfa	30	9	300	-	-	2	7
Paper cartons	19	10	526	1	3	4	2
Fodder	32	6	190	-	3	2	1
General Goods	462	246	520	7	28	83	58
<b>Total</b>	<b>13,171</b>	<b>3,280</b>	<b>249</b>	<b>1,201</b>	<b>926</b>	<b>671</b>	<b>482</b>

1/ Steel and steel products shipped by coastal vessels to Algiers/Oran.

**ALGERIA**  
**STAFF APPRAISAL REPORT**  
**SECOND RAILWAY PROJECT**  
**Wagon Turnround**

<u>Wagon Type</u>	<u>Annual Wagon Days</u>	<u>Under Maintenance</u>	<u>Average Stabled</u>	<u>Average Available</u>	<u>Annual Loading Nos.</u>	<u>Turnround Days</u>	<u>Annual Tonnage Loaded</u>	<u>Average Wagon Load Tons</u>
Petroleum Products	321,480	22,567	-	298,913	49,117	6	1,866,636	38
Iron Ore	219,730	137,863	-	81,867	51,744	1.6 <sup>2</sup> / <sub>1</sub>	3,104,880	60
Phosphate	188,370	110,120	-	78,250	22,865	3.4 <sup>2</sup> / <sub>1</sub>	1,146,375	50
Cereals	176,295	9,263	-	167,032	23,733	7	1,095,478	46
Coke/Coal	63,875	6,935	7,000	49,940	27,358	0.5 <sup>1</sup> / <sub>2</sub>	1,351,897	50
Steel Coil	67,525	8,760	-	58,765	5,275	2.0	250,000	47
Sugar	21,170	2,773	4,040	14,357	2,768	5	148,913	47
Others	3,706,265	667,116	660,313	2,378,856	106,156	6.7 <sup>1</sup> / <sub>2</sub>	3,420,395	32
						28.6		
<b>Total</b>	<b>4,764,710</b>	<b>965,377</b>	<b>671,353</b>	<b>3,127,980</b>	<b>269,016</b>	<b>10.8<sup>1</sup>/<sub>2</sub></b>	<b>12,384,574</b>	<b>42</b>
						13.1		

Note: The bottom line (total) overall figures are more or less correct but the commodity data is not quite accurate. The SNTF conducted a census of wagons on April 2, 1987 with the twin objective of reconciling the turnround status and computerizing the reckoning. The results of the census and reconciliation will be known in late April 1987.

- 1/ Turnround excluding wagons stabled due to no traffic upper figure: lower figure = turnround inclusive of stabled wagons.
- 2/ The average availability for iron ore/phosphate show an immobilization percentage of 62/58 respectively, which is clearly too high. About 189 iron ore wagons (119 with troughs and 80 of Romanian origin) are of the phosphate wagons, 140 recently delivered by the Annaba factory have minor rivetting defects which are being rectified.

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STAFF APPRAISAL REPORT  
SECOND RAILWAY PROJECT

LCL Traffic, Grouped in Complete Wagon Loads by Forwarding Agents  
Loaded in Period Aug.- Dec. 1986

<u>Origin</u>	<u>Destination</u>	<u>Tonnes</u>	<u>Tonne km</u>	<u>Lead</u>	
<u>Agha</u>	Ech Chetiff	49.6	10,307	208	
	Djelfa (VE)	49.0	10,204	327	
	Bouira	16.0	1,952	122	
	BB Arredj	2.3	545	237	
	Setif	119.8	36,767	307	
	Tizi Ouzou	43.0	4,558	106	
	Bejaia	62.7	16,178	258	
	Oran	477.5	201,011	421	
	Relizane	37.0	10,923	295	
	Sidi Bel Abbes	9.4	4,185	445	
	Tlemcen	28.5	15,200	533	
	Mostaganem	12.4	4,818	389	
	Bechar (VE)	9.0	9,036	1004	
	Tiaret	106.0	30,056	284	
	Constantine	298.8	138,044	462	
	Batna	80.3	40,536	505	
	Touggourt	69.0	58,167	843	
	Skikda	20.0	10,960	548	
	Annaba	235.3	147,062	626	
	Tebessa	5.0	4,280	856	
	<u>Total A</u>	<u>1730.5</u>	<u>774,224</u>	<u>448</u>	
<u>Hussein Dey</u>	Oran	111.6	66,425	595	
	Constantine	54.6	24,942	457	
	Guelma	8.0	5,664	708	
	Annaba	10.0	4,200	420	
	<u>Total B</u>	<u>184.2</u>	<u>83,231</u>	<u>452</u>	
<u>Caroubier Tri</u>	Djelfa	<u>Total C</u>	<u>9.0</u>	<u>2,871</u>	<u>319</u>
<u>Ech Chetiff</u>	Medea	<u>Total D</u>	<u>1.0</u>	<u>208</u>	<u>208</u>

<u>Origin</u>	<u>Destination</u>	<u>Tonnes</u>	<u>Tonne km</u>	<u>Lead</u>	
<u>Oran</u>	Agha	114.3	98,199	422	
	Baba Ali	30.0	12,060	402	
	Sidi Bel Abbes	57.0	4,503	79	
	Tlemcen	59.5	9,875	166	
	Mostaganem	10.9	1,329	122	
	Bechar (VE)	148.3	109,297	737	
	Constantine	181.0	150,565	865	
	<u>Total E</u>	<u>601.0</u>	<u>341,748</u>	<u>569</u>	
<u>Relizane</u>	Oran	<u>Total F</u>	<u>3.0</u>	<u>378</u>	<u>126</u>
<u>Tlemcen</u>	Oran	<u>Total G</u>	<u>43.0</u>	<u>7,138</u>	<u>166</u>
<u>Bechar</u>	Oran	<u>Total H</u>	<u>25.1</u>	<u>18,498</u>	<u>737</u>
<u>Constantine</u>	Agha	4.0	1,848	462	
	Batna	16.5	1,930	117	
	Annaba	14.6	2,375	163	
	<u>Total K</u>	<u>35.1</u>	<u>6,153</u>	<u>192</u>	
<u>Batna</u>	Touggourt	<u>Total L</u>	<u>2.0</u>	<u>676</u>	<u>338</u>
<u>Annaba</u>	Agha	9.2	5,750	639	
	Guelma	7.6	666	88	
	Souk Ahras	48.3	5,166	107	
	<u>Total M</u>	<u>65.1</u>	<u>11,582</u>	<u>178</u>	
<u>Soukh Ahras</u>	Agha	2.7	1,958	725	
	Tebessa	2.5	307	123	
	<u>Total N</u>	<u>5.2</u>	<u>2,265</u>	<u>436</u>	
<u>Tebessa</u>	Annaba	<u>Total P</u>	<u>3.0</u>	<u>693</u>	<u>231</u>
<u>Grand Total A - P</u>		<u>2,707.2</u>	<u>1,249,665</u>	<u>462</u>	

**ALGERIA**

**STAFF APPRAISAL REPORT**

**SECOND RAILWAY PROJECT**

**Operational Performance Data  
(1986)**

<u>Locomotives</u>			<u>1984</u>	<u>1986</u>	
<u>Standard Gauge</u>					
Diesel main line	Availability	%	91	90.5	
Freight and Passenger services	Performance	km/day	294	291	
	Reliability	km/failure	33,009	25,913	
<u>Electric main line</u>					
Freight (mineral) services	Availability	%	80	75.6	
	Performance	km/day	112	150	
	Reliability	km/failure	3,684	2,507	
Shunting Locomotives	Availability	%	66	74.5	
<u>Autorails</u>					
	Availability	%	87	88	
	Performance	km/day	215	173	
	Reliability	km/failure	38,325	24,940	
<u>Narrow/Dual Gauge</u>					
1100 HP main line Freight service	Availability	%	79	88.4	
	Performance	km/day	280	311	
	Reliability	km/failure	17,406	18,370	
920/935 HP main line Freight service	Availability	%	69	84.4	
	Performance	km/day	7	39	
<u>Wagons</u>					
Railway all types	Availability	%	92	94	
Private	Availability	%	77	69	
Certain special types, as under, are prone to a higher incidence of service defects:					
Phosphate	SNTF	Availability	%	85	87
	Private	Availability	%	72	79
Limestone/Dolomite		Availability	%	57	55
Flats of particular types		Availability	%	67	67
Average Load per wagon		Tons	41	42	
Turnround		days	12	12	
<u>Coaches</u>	Availability	%	85	81	
<u>Accidents, Collisions &amp; Derailments per million trains kms</u>			50 1/	60	

1/ 1983 data. All collisions in yards. 67% derailments are in shunting, the balance 33% of trains.

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SECOND RAILWAY PROJECT

Gross Trained Traffic 1967 - 86

A. Traffic Density

	L(km)	(GTTkm/year)		(GTT/km.year)		Cumulated GTT/km From 1967 to 1986
		1967	1986	1967	1986	
<b>1. Standard Gauge Track</b>						
<b>a) Main Line</b>						
Annaba - O/ Keberit	163	715.5	1,376.5	4.39	8.44	137.6
Alger-Constantine	453	685.3	2,192.7	1.51	4.84	62.1
Constantine - Skikda	86	101.8	391.0	1.18	4.55	59.7
Annaba - R. Jamel	96	74.0	350.0	0.77	3.65	44.3
Alger - Oran	421	689.6	1,644.6	1.64	3.91	54.8
O. Keberit - D. Onk	243	171.3	511.3	0.70	2.10	30.8
El Gourzi - Biskra	201	124.2	400.6	0.62	1.99	29.9
B. Mansour - Bejaia	88	52.2	177.1	0.59	2.01	23.0
O. Tlelat - Beghal	208	140.5	312.2	0.68	1.50	19.6
Thenia - Tizi Ouzou	52	15.3	56.8	0.29	1.09	13.2
Biskra - Touggourt	217	74.1	215.2	0.34	0.99	18.6
Sub-total	2,228	2,843.8	7,628.0	1.28	3.42	48.2
<b>b) Other lines</b>	356	56.2	137.8	0.16	0.39	5.1
<b>2. Narrow Gauge Track</b>	<b>1,116</b>	<b>349.6</b>	<b>668.2</b>	<b>0.31</b>	<b>0.60</b>	<b>7.4</b>
<b>Total</b>	<b>3,700</b>	<b>3,249.6</b>	<b>8,434.0</b>	<b>0.88</b>	<b>2.28</b>	<b>31.8</b>

B. Average Annual Growth Rates of GTT Traffics  
(per cent/year)

	Long Term Trend (1967-86)			Medium Term Trend (1980-86)		
	Passenger	Freight	Total	Passenger	Freight	Total
<b>1. Standard Gauge Track</b>						
<b>a) Main Line</b>						
Annaba - O/ Keberit	4.9	3.4	3.5	5.9	0.3	0.6
Alger-Constantine	3.4	8.4	6.3	2.5	5.4	4.4
Constantine - Skikda	-2.4	10.1	7.3	-5.6	4.0	3.1
Annaba - R. Jamel	-1.6	11.5	8.5	-9.8	6.4	4.6
Alger - Oran	3.5	6.1	4.7	6.0	0.7	2.9
O. Keberit - D. Onk	5.2	6.0	5.9	10.8	1.3	1.6
El Gourzi - Biskra	-1.5	7.9	6.4	-0.6	-2.0	-1.9
B. Mansour - Bejaia	7.2	5.7	6.6	5.4	5.2	5.3
O. Tlelat - Beghal	2.8	5.8	4.3	0.9	6.5	3.8
Thenia - Tizi Ouzou	3.8	13.2	7.1	-5.0	27.2	5.5
Biskra - Touggourt	-	5.2	5.8	6.5	-7.4	-6.3
Sub-total	3.3	6.2	5.3	3.5	2.0	2.3
<b>b) Other lines</b>	7.0	3.5	4.8	4.2	4.5	4.4
<b>2. Narrow Gauge Track</b>	<b>-2.7</b>	<b>4.9</b>	<b>3.5</b>	<b>-0.3</b>	<b>7.1</b>	<b>6.2</b>
<b>Total</b>	<b>3.1</b>	<b>6.0</b>	<b>5.1</b>	<b>3.4</b>	<b>2.4</b>	<b>2.6</b>

Table 14

ALGERIA

STAFF APPRAISAL REPORT

SECOND RAILWAY PROJECT

Quantities of Track Materials to be Procured

	<u>Units</u>	<u>Quantity</u>	<u>Cost US\$ million</u>
Rails UIC 54 B	tons	21,160	13.8
Wooden sleepers	pcs	43,200	1.7
Metal bars for concrete sleepers	pcs	277,440	2.9
Fastenings	tons	2,208	4.4
Fish plates	pcs	5,780	0.3
Welding portions	pcs	15,940	0.5
Switches	pcs	40	<u>1.5</u>
		Total	25.1

Table 15

ALGERIA  
STAFF APPRAISAL REPORT  
SECOND RAILWAY PROJECT  
Disbursement Schedule

A. Bank Disbursements

	FY89	FY90	FY91	FY92	FY93
	-----US \$ million-----				
Annual	46.0	50.0	25.0	13.0	9.0
Cumulative	46.0	96.0	121.0	134.0	143.0

B. Co-Donor Disbursements

	FY89	FY90	FY91	FY92	FY93
	-----US \$ million-----				
Annual	15.0	18.0	8.0	4.0	2.0
Cumulative	15.0	33.0	41.0	45.0	47.0



ALGERIA

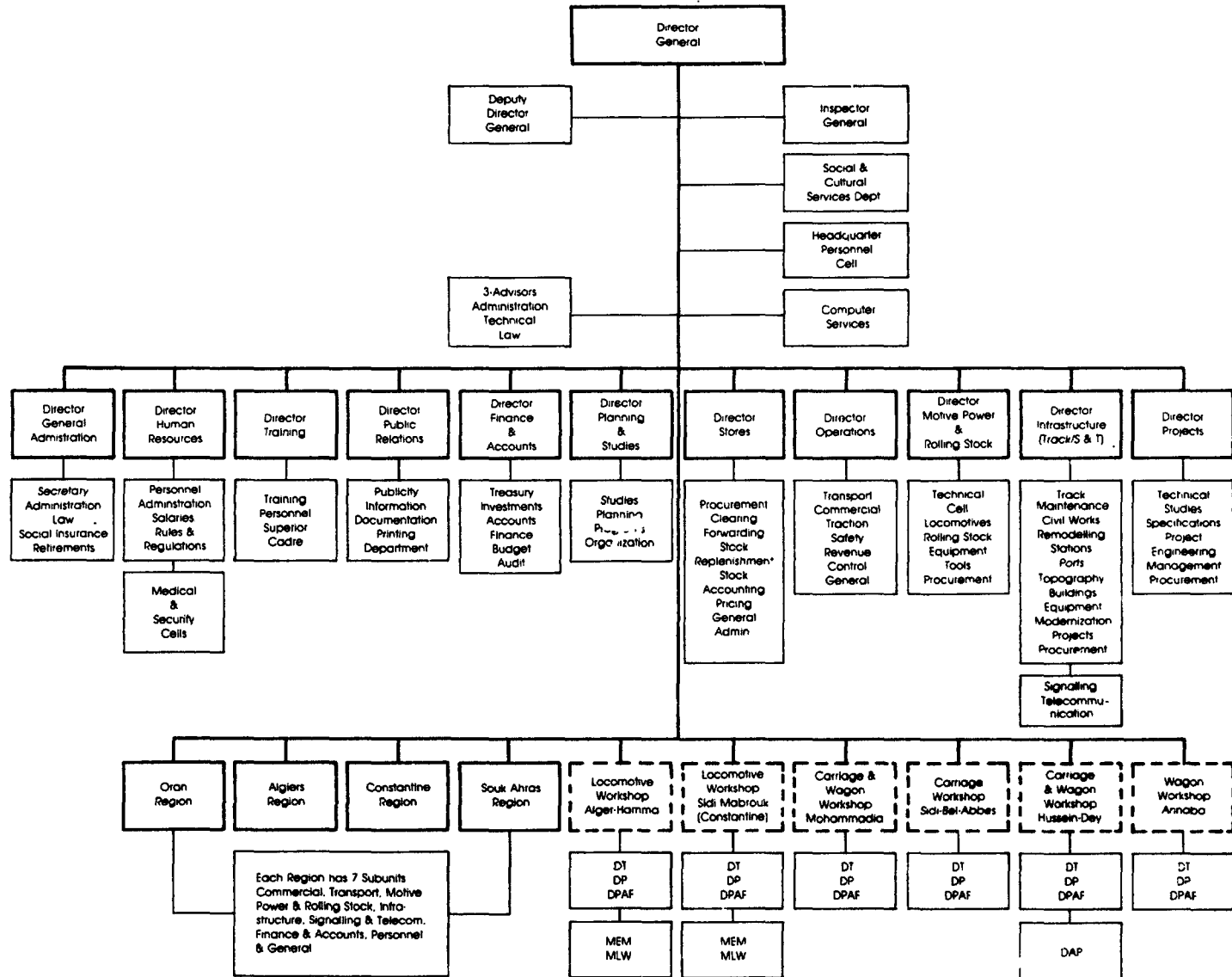
STAFF APPRAISAL REPORT

SECOND RAILWAY PROJECT

Project Implementation Schedule

PROJECT	1987	1988	1989	1990	1991
I. <u>Track Rehabilitation</u> <u>Annaba - Ramdane Djamel</u> Invite bids/award contract Mobilization of works Construction		XX XXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX			
II. <u>Track Renewal</u> a. <u>El Hadjar - Souk Ahras</u> Prepare project/Bid documents Invite bids/award contract Mobilization of works Construction		XXXXXXXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX XXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX		
b. <u>Beni Mansoor - Setif</u> Prepare materials list/Specifications Invite materials offers/place orders Delivery of materials Construction		XXXX XXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX		
III. <u>Signalling and Telecommunications</u> a. <u>Cabin Operated Points/Signals</u> <u>Algiers - El Harrach : Annaba -</u> <u>Ramdane Djamel :</u> Prepare project/Bid documents Invite bids/award contracts Works mobilization Installation		XXXX XXXXXXXXXX XXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXX XXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX		
b. <u>Tokenless Block (Annaba - Ramdane Djamel)</u> <u>CLS - Auto Block (Algiers - El Harrach)</u> Prepare project/Bid Documents Invite Bids/Award Contracts Works mobilization Installation		XXXXXXXXXX XXXXXXXXXXXX XXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXX XXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX		
c. <u>Laboratory</u> Prepare specs/Bid Documents Invite offers/place orders Complete building Deliveries Install equipment		XXXX XXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX		
d. <u>Level Crossing Equipment</u> Prepare specs/Bid Documents Invite offers/place orders Deliveries Install equipment		XXXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	
e. <u>Station Telephone Equipment</u> Prepare specs/Bid Documents Invite offers/place orders Deliveries Install equipment			XXXXXX XXXXXXXXXX XXXXXXXXXX	XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX
IV. <u>Wagon Tippler - Annaba</u> Prepare specs/Bid Documents Invite offers/place orders Deliveries Install equipment		XXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX		XXXX XXXXXXXXXXXXXXXXXXXX	
V. <u>Track Maintenance Equipment</u> Prepare specs/Bid Documents Invite offers/place orders Deliveries Commission		XXXXXX XXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX	
VI. <u>Technical Assistance</u> a. Organize school Short list consultants Invite bids/Select instructors Commence Training	XXX	XXX XXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX			
b. Select overseas trainees and institutions Proceed training		XXXXXX XXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXX XXXXXXXXXX	XXXXXXXXXX XXXXXXXXXX	XXXXXX XXXXXX
c. TOR studies/short list consultants Invite bids/Select consultants Inception Reports Final Reports		XXXXXXXXXX XXXXXXXXXXXX XXXXXX	XXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX		
d. <u>Staff Training Centres</u> Prepare TORs/Select consultants Consultants posted		XXXXXXXXXXXX XXXX	XXXX XXXXXXXXXX	XXXX XXXX	XX XX

**ALGERIA  
SECOND RAILWAY PROJECT  
Organisation Chart SNTF-1987**



Notes  
 DT Technical Division  
 DP Production Division  
 DPAF Personnel Administration & Finance Division  
 MEM Engine Overhaul Division  
 MLW Millwright Division  
 DAP Store Depot

