

## IV.2 Determination of Dam Section

### Stability Analysis

Typical section of the dam is determined hereunder for non-overflow portion. The following conditions have to be satisfied for the safety of the dam.

- i) Tension stress does not occur on the upstream slope of the dam body. To satisfy this condition, the resultant force of external force with dead load of the dam body has to fall within the middle third of the dam basement.
- ii) Safety factor for shearing friction has to be above 4.0.

The following procedures were applied to determine an economically optimum section of the dam.

- i) Determination of the critical condition of the water level.
- ii) Assumption of the upstream side slope gradient.
- iii) Determination of the downstream side slope gradient to satisfy the middle third condition.
- iv) Selection of a little steeper downstream slope and determination of the shape of fillet to satisfy the middle third condition and Henny's safety factor by comparing combinations of the fillet location and the fillet slope gradient.
- v) Selection of the most economical section and check for each load condition.

### Design Conditions

The conditions which are employed for stability analysis and the determined diversions are as follows:

Normal High Water Level	EL.1,360.0m
Surcharge Water Level	EL.1,362.4m
Design Flood Water Level	EL.1,363.5m
Bedrock elevation	EL.1,295.0m
Crest level elevation	EL.1,365.0m
Crest width	5.0m
Design Seismic Coefficient	0.10
Earthquake wave height	0.40m
Wind wave height	1.50m

Design Sedimentation Level	EL.1,334.0
Sediment pressure coefficient	0.5
Upstream slope gradient	1:0.00
Downstream slope gradient	1:0.76
Fillet elevation	EL.1,325.0
Fillet slope gradient	1:0.3
Unit weight	
Concrete	2.35
Water	1.00
Sediment	1.00
Shear strength of the bedrock	$\tau = 150\text{t/m}^2$

Calculation results showed that the critical case is the Normal High Water Level case; Henny's safety factor is 4.10. The results are shown as follows:

Vertical Force			Horizontal Force		
Load	V (t)	M (t·m)	Load	H (t)	M (t·m)
Dead Load	4,768	76,997	Inertia Force	476	11,034
Water Weight	467	-2,304	Water Pressure	2,237	49,903
Sedimentation Weight	216	-1,174	Static Water Pressure	246	6,407
Uplift	-1,104	-11,173	Sedimentation Pressure	380	4,943
Total	4,347	62,346		3,339	72,287

Total moment M (t.m)	134,633
Henny's shear friction	4.09 > 4.0
Distance from the basement center to a point of action of the resultant force	8.87m
1/6 of basement length	10.37m
Vertical stress at both ends	$\sigma_{\text{up}} = 15.37\text{t/m}^2$ $\sigma_{\text{down}} = 124.05\text{t/m}^2$

### IV.3 Temporary Diversion Tunnel

Alignment and dimension of temporary diversion tunnel was determined, considering the following conditions.

- i) A landslide zone is located on the left bank at the dam site.
- ii) 70m downstream from the stilling basin, a fault is located which forms a waterfall. Talus deposits (boulders, etc.) are distributed on the left bank slope at the dam site.

On the basis of the above considerations, the tunnel is to be constructed on the left bank with intake 120m upstream of the dam axis and outlet 400m downstream of said axis. The tunnel is to be a standard horseshoe type with diameter of 7.2m. Bottom of the intake opening is to be 1.0m above the present riverbed (EL.1,302.4). Tunnel length is to be 395m with a gradient of 1/30.

With emphasis on safety during the dam construction period, tunnel discharge capacity is to be equivalent to flood discharge with a return period of 20 years (840m<sup>3</sup>/s).

For the standard horseshoe type tunnel capable of discharging design flow at 85% of tunnel height by uniform flow, required area and hydraulic features will be as follows:

assume A: flow area (m<sup>2</sup>)  
r<sub>0</sub>: radius of tunnel (m)  
R: wetted perimeter (m)  
Q: Design flow (m<sup>3</sup>/s)  
I: gradient  
here,  $A/r_0^2 = 3.0217947$   
 $AR^{2/3} / r_0^{3/8} = 2.1766$

$$Q = \frac{1}{n} AR^{2/3} I^{1/2}$$

$$AR^{2/3} = \frac{nQ}{I^{1/2}} = 2.1766 r_0^{8/3}$$

where,  $Q = 840 \text{ m}^3/\text{s}$        $I = 1/30$   
 $\frac{0.014 \cdot 840}{(1/30)^{1/2}} = 29.593 = r_0^{8/3}$   
 $r_0 = 3.561$   
then  $r_0 = 3.6$

#### IV.4 Spillway Type Determination

The spillway is designated to protect the dam and reservoir by releasing design flood discharge. Accordingly, the spillway must have sufficient discharge capacity, functional stability and reliable prevention of unexpected rises in reservoir level.

A gated spillway functions as a spillway when the gate is open. By adjusting the gate, the function of the spillway is controlled. There are several limitations with this type of spillway as follows:

- i) During a power failure, the gate cannot be raised.
- ii) Where flood concentration time is short, due to the small catchment area there is a danger that operation of the gate may be too slow.
- iii) There is also a danger that the discharge capacity of the spillway may be insufficient, especially in the case of a dam in the upper stream when water level in the reservoir rises extremely rapidly due to the sensitivity of the response to rainfall, and thus the necessary time for gate operation cannot be guaranteed.
- iv) A further disadvantage is an idle drop in the reservoir level due to pre-discharge prior to flood.
- v) An emergency gate is required for operation and maintenance.

Recently, overflow type concrete dams without a gate are being adopted in numerous cases as discharge facilities for design flood. The advantages of this type are:

- i) No gate operator is required;
- ii) A power source is not required;
- iii) Sufficient discharge capacity can be obtained;
- iv) Unexpected rise in the reservoir water level is avoided;
- v) Dam height is smaller due to the smaller overflow width; and,
- vi) Energy dissipation of the flood discharge is comparatively easy by side training wall.

The free overflow type is therefore usually adopted for a dam in remote area with relatively small catchment area.

A dam with a free-overflow type spillway, however, requires a relatively larger dam height compared to the gated spillway since the overflow depth is shallower in the case of the free-overflow type. In this connection a study has been conducted as presented below comparing decrease in dam construction cost versus an additional radial gate cost.

#### Dimension for Free-overflow Type

The design flood discharge is to be the probable maximum flood (PMF) anticipated at the site (peak value 2,527m<sup>3</sup>/s).

In view of the topography at the dam site, crest length is to be 180m. As a result of reservoir flood routing calculations carried out in view of maximizing reservoir effectivity, design flood can be reduced from 2,527m<sup>3</sup>/s to 2,465m<sup>3</sup>/s utilizing a surcharge capacity of 10,300,000m<sup>3</sup>.

Crest elevation:	EL.1,360.0m
Crest length:	180.0m
Overflow depth:	3.5m
Overflow discharge	2,465m <sup>3</sup> /s
Design flood level:	EL.1,363.5
Surcharge capacity:	10,300,000m <sup>3</sup>
Additional height (wave height):	1.5m
Non-overflow portion crest level elevation:	EL.1,365.0m

Spillway is to consist of 15 spans, each 12m wide and 3.5m high. Downstream portion consists of lateral walls affixed to the dam body to steadily narrow water flow in the direction downstream.

#### Dimensions for Gate Type

Gate type and dimensions will be as follows:

Type: Electric powered wire rope type radial  
Design overflow depth: 10.0m

Size: 10.0m wide by 9.0 high

No.of gates: 4

Capacity: 2,527m<sup>3</sup>/s

Crest elevation: EL.1,350.0m

Normal High Water Level (= Design Flood Level): EL.1,360.0m

Material quantity: 240ton (each 60ton)

Since the design flood level equals the normal high water level, the crest level elevation of the non-overflow portion of the dam body is determined by adding the wind wave height, earthquake wave height and surplus height for inadequate gate operation to the normal high water level of EL.1,360.0m

Accordingly,

Normal High Water Level: EL.1,360.0m

Wind wave height (hw): 1.5m (See 5.2.6)

Earthquake wave height (he): 0.4m (See 5.2.6)

Surplus height for inadequate gate operation: 0.5m

Adding these values,

Non-overflow portion crest level elevation: 1,362.4m

#### Cost Balance

Reduction in the costs of dam concrete, crest bridge, etc. and additional cost for radial gates are as follows;

##### Cost Reduction

Dam concrete	12,500m <sup>3</sup>	Rs42.5 million
Crest bridge	600m <sup>2</sup>	0.5
Compensation for flooding	0.2km <sup>2</sup>	2.0

Total

##### Cost Increase

Radial gates and installation	240ton	Rs60.0million
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#### Conclusion

As presented above, the cost for free-overflow type is lower than that for gated spillway type by 15 million. Accordingly, the free-overflow type is selected for cost effectiveness as well as other factors.

#### IV.5 Calculation for Stilling Basin

Dimensions of the stilling basin were determined based on the basis of the criteria set out below. In calculations, transition portion to the basin was neglected. The design discharge is the maximum spillway release of the PMF hydrograph at  $2,460\text{m}^3/\text{s}$ . The width of the basin was set at 40m in consideration of the downstream river width and dam joint.

##### Wall height at stilling basin

Flow velocity:  $V_1 = 0.95(2gH)^{1/2} = 33.86\text{m/s}$

Water depth:  $h_1 = Q/(B \cdot V) = 1.816\text{m}$

Fluid number:  $F_1 = V_1/(gh_1)^{1/2} = 8.03\text{m}$

Hydraulic jump depth:

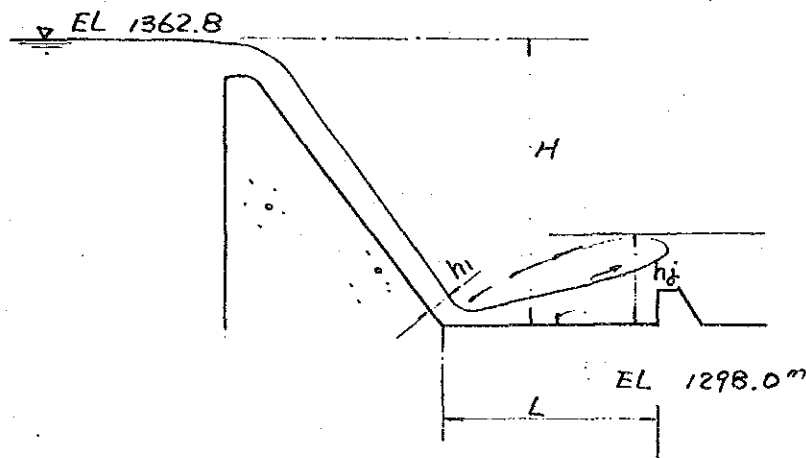
$$h_j = \frac{1}{2} h_1 ((1 + 8F_1^2)^{1/2} - 1) = 19.73\text{m}$$

Counting on 70% surplus, the wall height was determined at 14m.

##### Stilling basin length

Flow in the stilling basin will be compulsorily jumped; the length was determined at 4 times of the jump height, applying a 70% reduction factor.

$$L = 4 \times h_j \times 0.7 = 45.7 \quad \therefore L = 50\text{m}$$





#### IV.6 Calculation for Release Valve

Calculation to determine the area for release valve is as follows:

$$Q = C \times A \times (2gH_0)^{1/2}$$

where, Q : Discharge (m<sup>3</sup>/s)

K : Discharge coefficient at full valve opening (0.85)

g : gravity acceleration (9.8m/s<sup>2</sup>)

H<sub>0</sub> : effective head

A : flow area of valve

D : Diameter of valve

if, C=0.85 then

$$Q = 2.95 D^2 (H_0)^{1/2}$$

Considering that tailrace outlet center is EL.1,308m, and Standard Water Level is EL.1,351m.

$$H_0 = (1351 - 1308) \times 0.9 = 38.7$$

If Q is 40m<sup>3</sup>/s

$$D = 1,476$$

then diameter is determined at 1,500mm.

#### IV.7 Alternative Rockfill Type Dam

Drawings for the alternative rockfill dam for the proposed Caledonia dam are presented in FIG.IV.7-1 and IV.7-2.



**FIGURES**

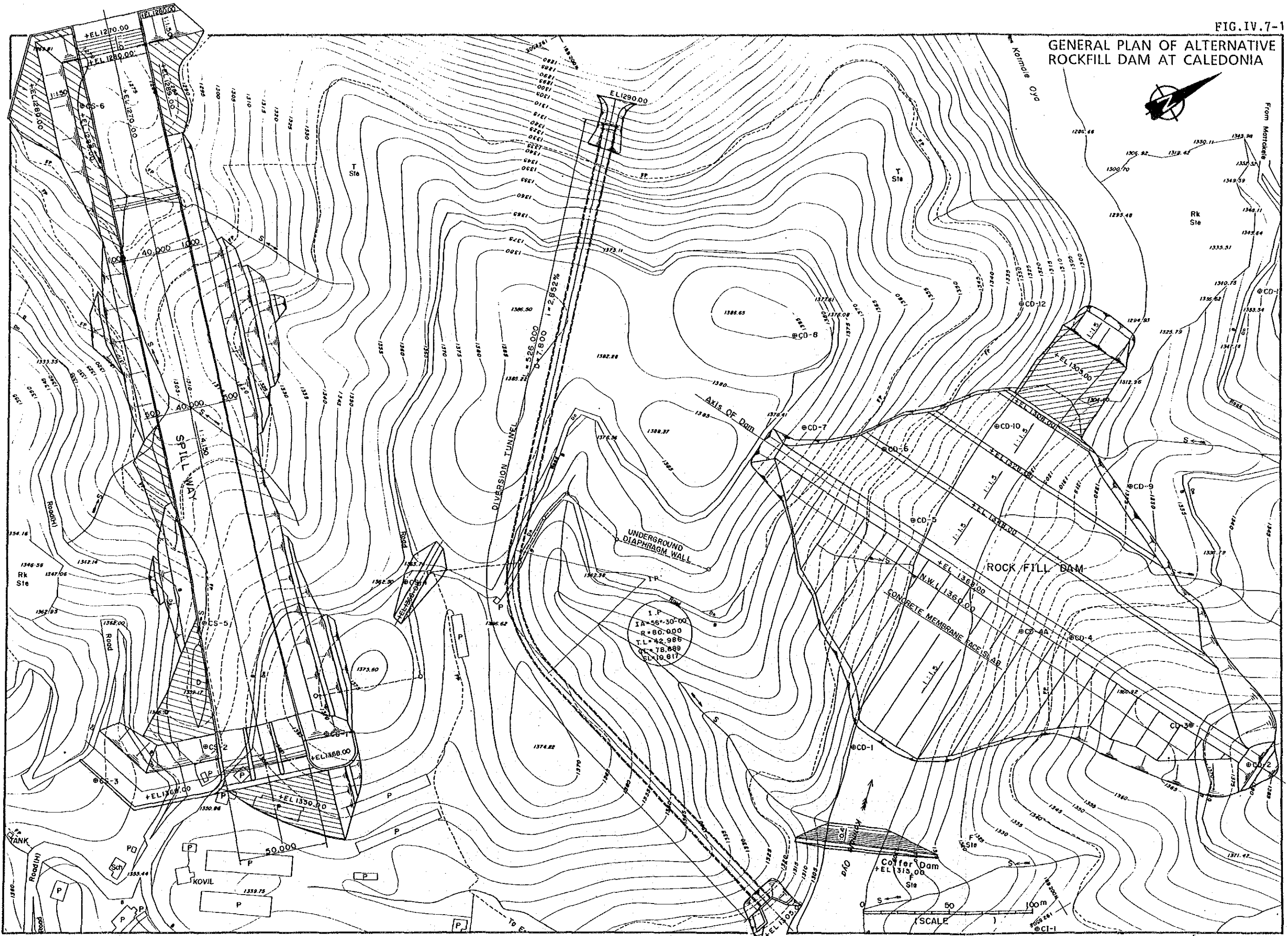


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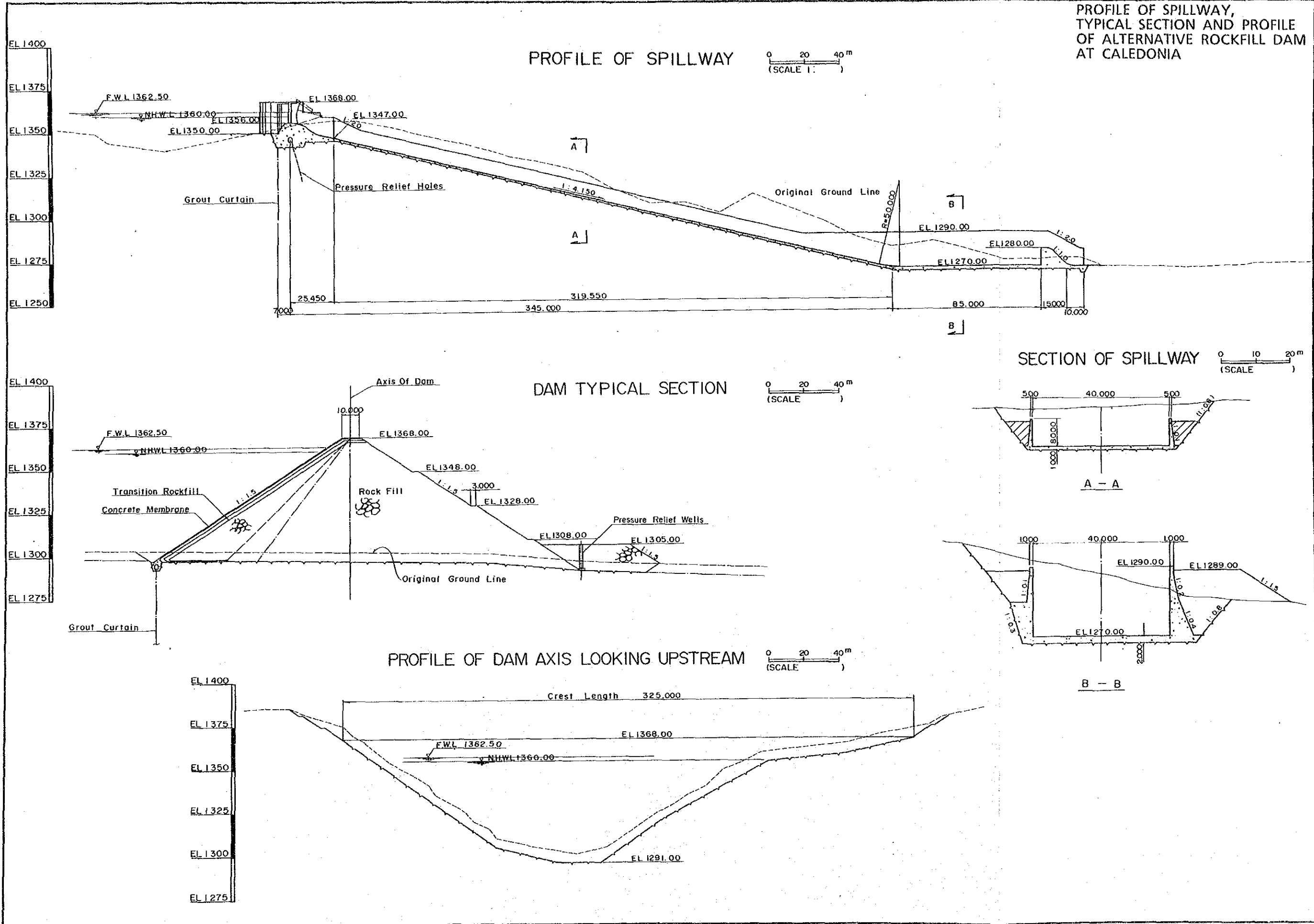


GENERAL PLAN OF ALTERNATIVE ROCKFILL DAM AT CALEDONIA



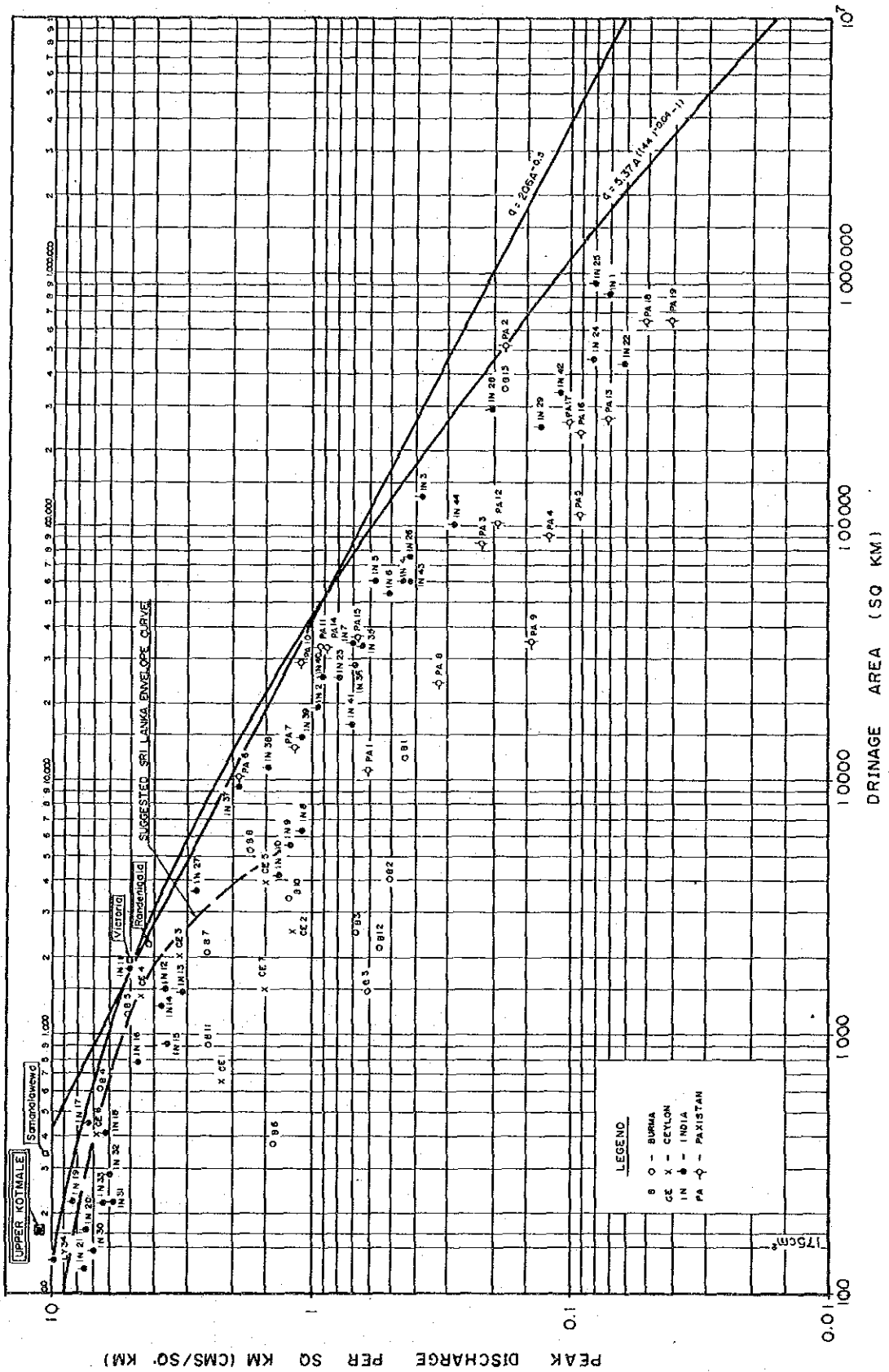


PROFILE OF SPILLWAY,  
TYPICAL SECTION AND PROFILE  
OF ALTERNATIVE ROCKFILL DAM  
AT CALEDONIA





ENVELOPE CURVE FOR PEAK DISCHARGE - DRAINAGE AREA



Source: Vol. III Kotmale General Review



**APPENDIX V**  
**IMPLEMENTATION PROCEDURE**  
**AND COST ESTIMATES**



APPENDIX V IMPLEMENTATION SCHEDULE AND COST ESTIMATES

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## APPENDIX V

### IMPLEMENTATION SCHEDULE AND COST ESTIMATES

#### V.1 Transportation in Sri Lanka

##### V.1.1 Airlines

Katunayake is the sole international airport in Sri Lanka. Domestic flights connect Ratmalana to Trincomalee, Batticaloa and Jaffna. Air transport to the Project site can be performed only by helicopter.

According to local transport company estimate (March 1986), land transport from Katunayake international airport to the Project site would cost US\$148 per load.

##### V.1.2 Ports

Ports where international cargo may be off-loaded in Sri Lanka are Colombo, Trincomalee, and Galle. Of these, Colombo by far handles the largest amount of cargo.

Colombo port is situated at north latitude 6°57' and east longitude 79°51'. Combined departures and arrivals total around 100 vessels per week. The port has three quays with dock side berths. Port water area is at present approximately 245ha. Capacities of freight off-load facilities are indicated below.

#### Queen Elizabeth Quay

Off-loading facilities:

<u>Berth</u>	<u>Berth Length (m)</u>	<u>Depth (m)</u>	<u>Crane</u>
QeQ4	150	11.0	30t x 1 unit
QeQ5	275	12.0	35.5t x 2 units



Off-loading Equipment

Hitachi mobile crane	35t x 4 units
Forklift truck	42t x 4 units
Forklift truck	40t x 1 units
Forklift truck	25t x 11 units
Forklift truck	15t x 3 units
Forklift truck	2.4t x 13 units
Prime mover	12 units
Trailer	30 units

New Container Terminal

Off-loading facilities:

<u>Berth</u>	<u>Berth length (m)</u>	<u>Depth (m)</u>	<u>Crane</u>
No.1	300	12	35.5t x 1 unit
No.2	332	13	35.5t x 2 units

Off-loading Equipment

Mobile crane	35t x 10 units
Prime mover	21 units
Trailer	49 units
Forklift	11 units

Freight tonnages handled at the ports of Colombo, Trincomallee and Galle are presented in the following table.

TABLE V.1-1 TOTAL NO. OF SHIPS ARRIVED AND THEIR G.R.T. & N.R.T. 1975-1984 PORTS OF COLOMBO, TRINCOMALEE & GALLE

Year	Colombo			Trincomalee			Galle			Total		
	No. of ships	G.R.T. ('000)	N.R.T. ('000)	No. of ships	G.R.T. ('000)	N.R.T. ('000)	No. of ships	G.R.T. ('000)	N.R.T. ('000)	No. of ships	G.R.T. ('000)	N.R.T. ('000)
1975	1,577	12,997	7,735	93	N.A.	N.A.	21	N.A.	N.A.	1,691	N.A.	N.A.
1976	1,668	13,580	8,164	72	N.A.	N.A.	17	N.A.	N.A.	1,757	N.A.	N.A.
1977	1,658	13,596	7,977	63	N.A.	N.A.	28	N.A.	N.A.	1,749	N.A.	N.A.
1978	1,699	14,053	8,364	73	N.A.	N.A.	21	N.A.	N.A.	1,793	N.A.	N.A.
1979	1,808	16,098	9,710	53	N.A.	N.A.	17	N.A.	N.A.	1,958	N.A.	N.A.
1980	2,055	17,954	10,804	48	N.A.	N.A.	20	N.A.	N.A.	2,123	N.A.	N.A.
1981	1,898	17,039	10,361	186	1,291	869	31	34	19	2,115	18,364	11,249
1982	1,890	17,966	10,961	125	1,824	1,164	12	27	14	2,027	19,817	12,139
1983	1,934	18,810	11,471	143	1,889	1,218	16	69	43	2,093	20,768	12,732
1984	2,052	19,421	11,723	191	1,540	1,049	31	30	18	2,274	20,991	12,790
Average per year	1,832	16,151	9,727	105	1,636	1,075	21	40	23.5	1,958	19,985	12,227

\* Exclusive of Sailing crafts, naval Vessels, Fishing Trawlers, Yachts & Dredgers etc.,  
 G.R.T.: Gross Registered Tonnage  
 N.R.T.: Net Registered Tonnage

### 1.3 Roads

Road construction, repair and maintenance are under the jurisdiction of the Ministry of Highways. At present, the ministry is carrying out principally road repair and maintenance projects. Of these, the 14km of road repair between Avissawella~Hatton~and Nuwara Eliya bears relevance to the Project. The ministry does not, however, subsidize access road construction required for the implementation of large-scale development projects.

#### Access road

For access to the Caledonia dam and power station sites and the Talawakelle dam site from Colombo, a route along highway A7 to Talawakelle via Ginigathena and Hatton is considered. Highway A7 was successfully utilized for transport of equipment and material for the Maskeliya Oya Project. Between Hatton and Talawakelle, the route intersects the railway at 3 locations. Of these, the brick culvert at Rosita is not considered capable of accomodating heavy equipment under present conditons. Reduction of the curve ratio at both ends of the tunnel by increasing road width would be necessary. Other points requiring increase of road width are at 5.1km (4.0m) and 28.6km (4.1m) points from Talawakelle.

Access to Talawakelle power station would be by highway A1 via Colombo~Kandy~Kotmale, and then by peripheral road along the left bank of Kotmale reservoir. This route consists of 10m wide paved road (the peripheral road is under construction) suitable for transport of heavy equipment.

#### Transport costs

Refer to V.2.3 (Page V-14).

#### 1.4 Railroads

Until 1980, rail transport was the monopoly of the Sri Lanka Railways established in 1864. However, in June 1980 private rail freight companies were authorized by the Government. For transport of construction equipment and materials, it would be possible to use the Sri Lanka Railways station at Talawakelle.

Data utilized for study of rail transport was almost entirely from 1983 (one portion from 1984) and was obtained from: Sri Lanka Railways, "Facts and Figures 1976 to 1983".

Basic data indicating facilities and operation status of the Sri Lanka Railways as of 1983 is presented in attached TABLE V.1-2.

#### Rail lines

The Sri Lanka Railways at present operates a total of 1,453km of rail lines. Of this, 1,394km is wide gauge (1,676mm) and 59km is narrow gauge (762mm).

Nine rail lines radiate from Colombo. These lines are as indicated in attached TABLE V.1-3.

#### Fares

Passenger and freight fares are as indicated below. However, 40% discount is available under authorization of the Sri Lanka Railways Co., and unlimited discount is possible when authorized by the Minister of Transport.

#### (1) Passenger fares:

1st class	50¢/km
2nd class	32¢/km
3rd class	13¢/km
Deisel delux	45¢/km
Air conditioned	60¢/km

However, third class fares for the sectors from Colombo Fort to Lumivila, Mirigama, Maggoda and Waga, rewspectively, are 14¢/km. Also, an additional seat charge is made depending on the passenger compartment.

(2) Freight charges:

Freight is divided into 8 classifications, the fares for which depend on whether freight moves through highland or lowland. The division for highland and lowland is made at Rambukkana. Fares are as follows:

Unit: RS./t·km

Class	Highland	Lowland
1	53	34
2	66	49
3	80	59
4	86	64
5	1.02	77
6	1.22	86
7	1.65	1.11
8	2.22	1.67

As of September 1, 1983, special discounts have been granted the limited number of quasi-government and private companies engaged in the production and supply of fuel, fertilizefr, primaflour, sugar, rice, cement, and quicklime.

Performance

(1) Passenger transport:

Passenger transport accounts for 62% of overall fare income. Performance in 1983 was 2.447.2 million passenger·kilometers. Figures for passenger transport from 1975 to 1983 are as follows:

	Passenger number ( '000,000)	Passenger-kilometers ( '000,000)
1975	69	2,864
1976	71	3,004
1977	65	2,792
1978	79	3,708
1979	89	4,072
1980	85	3,799
1981	70	2,985
1982	71	3,121
1983	61	2,447

(2) Freight transport:

Freight transport accounts for 28% of overall fare income. Performance in 1984 was 262.6 ton-kilometers. Figures for freight transport from 1975 to 1983 are as follows:

	Transported tonnage ( '000,000)	Ton-kilometers ( "000,000)
1976	1.5	277.5
1977	1.4	155.3
1978	1.8	280.6
1979	1.8	279.7
1980	1.6	206.3
1981	1.6	218.8
1982	1.5	216.8
1983	1.6	223.8
1984	1.6	262.6

### Rail use for the Project

There is the possibility for rail use in the transport of cement to the Project sites during Project construction. Supply points for cement are located at Colombo and Trincomalee. The nearest station to Project sites is at Talawakelle. Distances between Talawakelle station and Colombo and Trincomalee are 187km and 330km, respectively.

Construction cost for access rail line from existing line to a project site is around Rs.1 million / mile (in flat terrain).

TABLE V.1-2

Code	Line	Originating and Destinating Station and Distance
01	<u>Broad Gauge</u> Main Line	Colombo Fort to Badulla (291 kilometers)
02	Matalo Line	Peradeniya Junction to matalo (34 kilometers)
03	Puttalam Line	Ragama to Periyangavillu (144 kilometers)
04	Northern Line	Polgahawela to Kankesanturai (340 kilometers)
05	Talaimannar Line	Madeawachchiya to Talaimannar Pier (106 kilometers)
06	Batticaloa Line	Maho to Batticaloa (212 kilometers)
07	Trincomalco Line	Gal Oya Junction to Trincomalee (71 kilometers)
08	Coast Line	Maradana to Matara (161 kilometers)
09	<u>Narrow Gauge</u> Kelani Valley Line	Colombo Fort to Avissawella (59 kilometers)



TABLE V.1-3

Principal Statistics	1983
(1) <u>Route Length</u> (km)	
Broad Gauge	1,394
Narrow Gauge	59
(2) <u>Track Length</u> (km)	
Broad Gauge	1,868
narrow Gauge	76
(3) <u>Railway Stations</u> (Nos.)	
Rassenger and Freight	129
Passenger only	35
Freight only	04
(4) <u>Railway Sub Stations</u> (Nos.)	115
(5) <u>Rolling Stock</u> (Nos.)	
Locomotives - Diesel Electric	78
Diesel Hydraulic	87
Diesel Power Coaches	50
Hitachi Airconditioned	02
Diesel Mechanical	02
Steam	19
Passenger Coaches	1,420
Freight Wagons	3,402
(6) <u>Railway Traffic Volume</u> (million)	
Passengers carried	61.4
Tonnes carried	1.6
Passenger Kilometers	2,447.2
Tonnes Kilometers	223.8
(7) <u>Revenue and Expenditure</u> (Rs. million)	
Operating Revenue	434.6
Operating Expenses	887.2
(8) <u>Operating Ratio</u>	204

## V.2 Base Costs

Base costs are derived from data collected during field survey. On-site price is calculated as that price resulting from the sum of relevant taxes, duties and transport costs added to i) the exfactory price of equipment and materials procured locally, and ii) CIF Colombo price in the case of material and equipment from off-shore. Site cost is subsequently calculated by adding overhead, loss, etc. to the aforescribed on-site price.

### V.2.1 Labour

With the exception of highly skilled labour (including foreman) and security personnel, local labour will be procured through a labour supplier. Employee insurance such as EPF, ETF, etc. (15% of total wages) will be paid by the labour supplier on behalf of the contractor; however, the cost for such employee insurance will be included in the labour supplier contract price. Furthermore, the contractor will incorporate into the contract price 3% of the total labour supplier contract amount as BTT.

Labourer camp(s) are to be constructed by the contractor at his expense. The camp(s) will be operated, however, by the labour supplier, who will collect the necessary operating expenses from the labourers. Deployment of labourers to their designated work stations will be the responsibility of the labour supplier.

Standard number of working days per year is to be 270 (22.5 per month).

Daily wages per labourer are as set out below.

TABLE V.2-1 DAILY WAGES BY LABOUR CATEGORIES

No.	Breakdown	Foreman	Heavy Machinery Operator	Driver	Form Carpenter	Concrete Mechanic	Worker	Note
1.	Base Pay (8 hrs.)	120	120	90	70	60	40	
2.	Overtime (2 hrs.)	45	45	34	26	23	15	Base pay $\times 1.5 \times 2$ hrs.
3.	Work on Holidays	25	25	19	14	12	8	$(1. + 2.) \times 1.5 \times 27$ days/270 days
	$\Sigma 1. \sim 3.$	190	190	143	110	95	63	
4.	Bonus (1 month/year)	7	7	6	4	4	2	$(1. + 2.) \div 22.5$
5.	Paid Holidays (including Sick Leave)	17	17	13	10	9	6	$(1. + 2.) \times 28$ days/270 days
	$\Sigma 1. \sim 5.$	214	214	162	124	108	71	
6.	Severance Pay	7	7	6	4	4	2	$(1. + 2.) \div 22.5$
7.	EPF (15%)	32	32	24	19	16	11	$(\Sigma 1. \sim 2.) \times 15\%$
8.	ETF "	30	30	30	15	15	15	Meals, etc.
9.	Living Allowance	283	283	212	162	143	99	
	$\Sigma 1. \sim 9.$	-	-	-	5	4	3	$(\Sigma 1. \sim 9.) \times 3\%$
10.	BTT (3%)	283	283	212	167	147	102	
	Site Cost ( $\Sigma 1. \sim 10.$ )							

Over the past years, there has been a demand for numerous Sri Lankan skilled labourers overseas, particularly in the Middle East. As evidenced by this fact, both the quantity and quality of skilled labour in the country is generally good. However, there is a tendency for quality of labour to be skewed into certain professions, i.e. there are numerous qualified machinery operators (drivers, heavy machinery operators, etc.), while skilled form carpenters and welders, for example, are less available.

On large scale development projects in the country, contractors have employed some skilled labour from abroad (various industrialized countries, Singapore, Malaysia, Indonesia, etc.) to work alongside and train local workers. Although the wages for such foreign labour vary greatly depending on nationality and occupation, for the purposes of discussion here, the average wage (including overhead) of US\$2,000/month, roughly Rs1,900/day, is adopted.

#### V.2.2 Port Charges

At Colombo port, the contractor must pay port charges as well as customs duties for imported equipment and machinery. Said port charges consist principally of landing charges and handling charges.

Landing charges include wharfage, rent and dues, heavy lift charges, etc., and although some difference occurs depending on the length of time that a vessel is moored, such charges generally run about US\$3.65 per m<sup>3</sup> or ton (whichever figure is larger). Handling charges comprise documentation, preparation charges, etc., and are generally US\$2.42 per m<sup>3</sup> or ton. As almost all items to be imported for the Project are heavy equipment or materials, the port charge to be adopted for the purposes of this report is US\$6.07/ton or about Rs.173/ton.

#### V.2.3 Transport

Although a portion will be transported by the contractor himself to the site, most equipment and materials will be moved by local transport companies. According to quotations from such transport companies, the transport cost to site for cement in 50kg bags and in bulk trailers is US\$11.95/ton (Rs.340/ton) and US\$17.95/ton (Rs.512/ton), respectively, and

that for other materials (such as re-bar, steel pipe, heavy equipment, etc. is US\$19.08/ton (Rs.544/ton).

#### V.2.4 Construction Equipment

In principal, the contractor is to pay the relevant duties and charges on construction equipment brought into the country, and these payments are to be included in the contract price. Said amounts are calculated as follows:

##### i) Customs

Duties on construction equipment are set out in chapter 86 of the official Gazette. According to the Gazette, a 10% duty is levied on machinery for lifting, handling, loading, unloading, etc, a 5% duty is levied on machinery for excavating, levelling, tamping, boring, etc. and a 15% duty is levied on transport equipment, etc. For the purposes of this report, the average duty for all three types of equipment is calculated at 10%.

##### ii) BTT

For almost all equipment and materials brought from abroad, BTT is levied on the CIF price with duties. Although BTT differs somewhat depending on the items, the average according to the Customs Office runs about 10% for construction related material and equipment, and this figure has been adopted for the purposes of this report,

##### iii) Port Charges

Port charges have been discussed above. As it is impossible at this stage to accurately estimate total weight of materials and equipment to be brought from abroad, port charges are assumed here at 2% of CIF.

##### iv) Transport Cost

It is assumed that almost all construction machinery will be transported by the contractor himself to the site, and such transport cost will not be considered here (fuel and personnel costs are calculated separately).

##### v) Operating Costs and Overhead

Operating costs (including repair and maintenance costs) and overhead for construction machinery brought to the site is calculated at 12% of CIF.

#### Total

Site cost, based on the above, is computed as follows for construction machinery:

CIF (100%) + Customs (10%) + BTT (11%) + Port charges (2%) +  
Operating costs and overhead (12%) = 135%

#### V.2.5 Fuel

Fuel to be used during Project construction will consist almost entirely of diesel oil for machinery and power generation, and some lubricants. These are to be purchased from the Ceylon Petroleum Corporation (CPC). As of 1986, the price for diesel oil at Colombo is Rs.8.13/l. CPC will provide for transport to the site by tank lorry. The cost for such transport is \$4/l for every 20 miles, or \$20/l to the Project site (about 140km). The on-site price for diesel oil is accordingly Rs.8.33/l. Considering lubricant consumption during construction overheads and loss, an additional 20% is calculated for a site cost for fuel of Rs.10.00/l.

#### V.2.6 Cement

At present, both domestically produced and imported cement (from Indonesia, Kenya, USSR, etc.) are available in Sri Lanka. On large-scale projects, the practice has been to use cement imported from Kenya and Indonesia. According to estimate quotations by the Mahaweli Marin Cement Corporation (a joint venture between the Mahaweli Development Authority and the multi-national company Marin Cement), the CIF Colombo price for bulk import of cement is US\$50/ton (Rs.1,425/ton). With the addition of customs duties (Rs.625/ton, or 40% of CIF) and handling charges (US\$6.50/ton=Rs.185/ton), the price at Colombo is Rs.2,235/ton (as of 1986, cement is exempt from BTT). Inclusion of the previously discussed transport cost to site of Rs.512/ton yields an on-site price of Rs.2,747/ton. Site cost is subsequently computed at Rs.3,160/ton, or a 15% increase over the on-site price, taking into consideration site

storage (storage facility costs are under temporary facilities cost) and losses (excluding physical contingency) occurring during transport and storage, as well as overhead.

#### V.2.7 Reinforcing Bar

Re-bar is manufactured in Sri Lanka by the Ceylon Steel Corporation. However, from the standpoint of quality and available amounts, the practice on large-scale development projects has also been to bring in re-bar from abroad. This is likewise the premise for the subject Project. In the cases where re-bar has been imported from Japan, price has ranged from ¥35,000/ton (Rs.6,170/ton) to ¥70,000/ton (Rs.12,350/ton). This price range is the result of type (flat steel, bar steel, form steel, etc.) and quantity imported. Taking into consideration world prices at the end of 1986, the average CIF price for re-bar is set at Rs.8,800/ton for the purposes of this report.

According to chapter 73 of the Gazette, import duties on flat and bar steel are 35%, while that on form steel is 5%. If relative quantities for flatbar steel and form steel are assumed at 80% and 20%, respectively, the import duty rate based on the weighted average is 29%, or Rs.2,552/ton. Addition of BTT of Rs.1,135/ton ( $[(\text{CIF} + \text{import duty}) \times 10\%]$ ), port charge of Rs.175/ton, and transport cost of Rs.544/ton yields an on site price of Rs.13,206/ton. If transport and administrative loss, and overhead are calculated at 15%, site cost for rebar is Rs.15,200/ton.

#### V.2.8 Other Material and Equipment

Electrical facilities, pressure pipe, transmission line, etc. are included under this category. This equipment is to be procured by the Ceylon Electricity Board, which will pay 5% import duties (Gazette, chapter 84), 10% BTT, port charges (2% of CIF), and transport cost (Rs.544/ton; 2.5% of CIF). On the basis of the foregoing, on-site price is estimated at 120% of CIF. As loss and overhead are assumed at zero, this is adopted as the on-site cost as well.

Electricity utility fees and Concession fees for aggregate production miscellaneous costs are computed on the basis of on-site costs.

### Others

This cost item consists of power utility costs, concession right fees for aggregate production, miscellaneous expenditures, etc. These items are estimated on the basis of costs on site.

### V.3 Breakdown of Camp Cost

The headquarter camp site which is to be located at Talawakelle is composed of site office, staff houses and dormitories, guest house, club house and welfare facilities, etc. Access road, power distribution, water supply and sewerage system will also be required. Costs are estimated as follows:

TABLE V.3-1 BREAKDOWN OF CAMP COST

	Floor area	Units	Unit Cost		Total Rs. 103
			Construc- tion Cost Rs. 103	Finishing Cost Rs. 103	
House Type A (4 Beds)	230m <sup>2</sup>	3	810	300	3,330
B (3 Beds)	145m <sup>2</sup>	45	510	250	34,200
C (2 Beds)	105m <sup>2</sup>	65	350	100	29,250
Dormitory Type A (8 rooms)	370m <sup>2</sup>	3	1,200	300	4,500
B (8 rooms)	300m <sup>2</sup>	3	1,000	200	3,600
C (8 rooms)	215m <sup>2</sup>	2	800	180	2,880
Guest House, Club House and Welfare Facilities					74,000
Access Road	2.5km	3	Rs. 7,000,000		17,500
Site Preparation		3	Rs. 750,000		2,250
Power Distribution		3	Rs. 1,200,000		3,600
Water Sewer Distribution		3	Rs. 6,000,000		18,000
Site Preparation/ Levelling					6,890
Total					200,000



#### V.4. Engineering and Administrative Services for Project Implementation

##### V.4.1 Objective

Engineering services for the project implementation are broadly divided into two stages, namely;

- Detailed design stage
- Construction supervision stage

In accordance with the targetted date for operation commencement and also considering the construction schedule, consulting services for detailed design and preparation of tender documents are scheduled to commence in January 1988.

The objectives of engineering services are to assist the project executing agency to conduct detailed field investigations and detailed design, to prepare bills of quantity and tender documents and to select contractors. During the construction stage, the consultants will supervise construction works as representatives of the project executing agency.

##### V.4.2 Terms of Reference

The following work will be included in the consulting services for this project.

###### Detailed Design Stage

(1) Conduct of field investigations including the following:

- Aerophoto mapping
- Topographical survey and mapping
- Seismic prospecting survey
- Core drilling
- Trench pit observation and tunneling
- Various laboratory testing including rock test & jack test
- Socioeconomical investigations
- review of basic design
- various analysis, calculations, hydraulic model tests

- (2) Drawing up of detailed design
- (3) Preparation of contract documents including the following:
  - Tender documents
  - Technical specifications
  - Bill of quantity
  - Design drawings

Construction Supervision Stage

- (4) Suggestion of the proper construction supervision to maintain the original implementation schedule
- (5) Assistance in reviewing the design drawings, procurement procedures, documentation and implementation schedule, and the issue of final major working civil drawings and the approval of electrical and mechanical drawings and minor civil drawings prepared by contractors.
- (6) Coordination of applications for loan procurement
- (7) Assistance in the preparation of applications for the reimbursement of loans made upon the accomplishment of identified work
- (8) Assistance in the evaluation and analysis of tenders received, and the provision of contracts
- (9) Assistance in monitoring the performance and progress of works by contractors and sub-contractors as per the contracts
- (10) Preparation of monthly and quarterly progress reports covering up-to-date information on work accomplished along with charts showing the physical progress and future work programs
- (11) Preparation of a training program for transfer of knowledge regarding supervision of the construction works as well as for operation and maintenance after completion

### V.4.3 Staffing

#### Detailed Design Stage

Proposed organization and number of staff for engineering services during the detailed design stage are presented as follows;

	Class and numbers for foreign and local							
	A		B		C		D	
	F	L	F	L	F	L	F	L
Project Manager	1	-	-	-	-	-	-	-
Assistant Project Manager	1	-	-	-	-	-	-	-
-Economy	-	-	1	-	-	2	-	-
-Peripheral development	-	-	-	1	-	1	-	-
-Environment	-	-	1	-	-	1	-	-
Deputy Project Manager (Administration )	-	1	-	-	-	-	-	-
-General affairs	-	-	-	1	-	1	-	1
-Accounting	-	-	1	-	-	1	-	-
-Contract and quantity survey	-	-	1	-	-	1	-	-
Deputy Project Manager (Civil)	1	-	-	-	-	-	-	-
-Dam	-	-	1	1	-	2	-	-
-Tunnel	-	-	-	-	1	2	-	-
-Powerhouse	-	-	-	-	1	2	-	-
-General Civil Structures	-	-	-	-	-	1	-	2
Deputy Project Manager (Investigation)	-	1	-	-	-	-	-	-
-Aerophoto Mapping	-	-	-	-	1	2	-	4
-Topographical Survey	-	-	-	-	1	2	-	4
-Geological Survey	-	-	1	-	-	-	-	-
-Seismic Prospecting	-	-	-	-	1	2	-	4
-Drilling	-	-	-	-	-	2	-	-
-Laboratory Testing	-	-	-	-	-	1	-	-
-Hydrology and Model Testing	-	-	1	-	1	1	1	-
-Drawing	-	-	1	-	-	1	6	2
Deputy Project Manager (Electro-mechanics)	1	-	-	-	-	-	-	-
-Generator(Mechanical)	-	-	1	-	-	-	-	-
-Generator(Electrical)	-	-	1	-	1	1	-	-
-Turbine	-	-	1	-	-	1	-	-
-Switchyard	-	-	-	-	1	-	-	1
-Transmission	-	-	1	-	-	1	-	-
-Instrumentation	-	-	1	-	-	1	-	-
-Other mechanical works	-	-	-	-	-	1	-	1
<b>Total</b>	<b>4</b>	<b>2</b>	<b>10</b>	<b>3</b>	<b>9</b>	<b>30</b>	<b>7</b>	<b>19</b>

Construction Spervision Stage

	Caledonia Div.			Talawakella Div.			Material/ Quantity
	Dam	Tunnel	P.House	Dam	Tunnel	P.House	
Senior Engineer	1	1	1	1	1	1	1
Assistant Engineer	3	4	2	2	4	2	2
Technical Assistant/ Junior Engineer	6	8	4	4	8	4	4
Checkers	6	8	4	4	8	4	4
Secretary	1	1	1	1	1	1	1
Clerk	2	2	2	2	2	2	2
Typist	1	1	1	1	1	1	1
Office Aid	2	2	2	2	2	2	2
Driver	3	4	2	3	4	2	2
Total	25	31	19	19	31	19	19
General Manger	1						
Deputy	1						
Foreign Senior Engineer	6						
Total staff	171						

V.5 Breakdown of Work Quantities

Breakdown of work quantities is presented hereafter:

TABLE V.5-1 Work Quantities for Caledonia Dam

TABLE V.5-2 Work Quantities for Talawakelle Intake Dam

TABLE V.5-3 Work Quantities for Caledonia Power Stations

TABLE V.5-4 Work Quantities for Talawakelle Power Stations

TABLE V.5-1 WORK QUANTITIES FOR CALEDONIA DAM

Item	Unit	Diversion works	Dam Body	Foundation Treatment	Saddle Dam	Total
Civil Works						
Excavation (Soil)	m <sup>3</sup>	400	14,400		3,400	18,200
Excavation (Rock)	m <sup>3</sup>	1,000	81,600		3,300	85,900
Tunnel Excavation	m <sup>3</sup>	21,400				21,400
Concrete	m <sup>3</sup>	3,600	250,000			253,600
Tunnel Concrete	m <sup>2</sup>	3,900				3,900
Grouting	m	200				200
Mortar	m <sup>3</sup>	700				700
Anchor Bolt	m	750				750
Rebar	t	100	750			850
Plug Concrete	m <sup>3</sup>	1,900				1,900
Finishing Excavation	m <sup>3</sup>		6,000			6,000
Rock Cleaning	m <sup>2</sup>		11,900			11,900
Boring (Consoli.)	m			6,800		6,800
Grouting (Consoli.)	t			140		140
Boring (Curtain)	m			8,700	200	8,900
Grouting (Curtain)	t			220	4	224
Seepage Prevention Concrete	m <sup>3</sup>			400		400
Diaphragm Wall	m <sup>2</sup>			8,600	7,100	15,700
Rock Embankment	m <sup>3</sup>				54,500	54,500
Filter Embankment	m <sup>3</sup>				5,500	5,500
Blanket Grouting	m				8,500	8,500
Concrete Forms	m <sup>2</sup>	9,200	36,100			45,300
Equipment & Facilities						
Crest Bridge			800			800
Gate	t		32			32
Bottom Outlet	t		39			39
Valves	L.S.		1			1 D=1,500mm
Plug Gate	L.S.		1			1
Measuring Instruments	L.S.		1			1
Other Works						
Soil Depositing	L.S.		1			1
Environment Developmt.	L.S.		1			1

TABLE V.5-2 WORK QUANTITIES FOR TALAWAKELLE INTAKE DAM

Item	Unit	Quantity
Civil works		
River Closure Concrete	m <sup>3</sup>	6,200
Excavation (Soil)	m <sup>3</sup>	500
Excavation (Rock)	m <sup>3</sup>	10,000
Slab Concrete	m <sup>3</sup>	5,000
Pier Concrete	m <sup>3</sup>	5,000
Non-overflow Portion Concrete	m <sup>3</sup>	7,000
Concrete Block	m <sup>3</sup>	550
Backfill	m <sup>3</sup>	2,300
Rebar	t	400
Boring	m	1,200
Grouting	t	30
Equipment & Facilities		
Gates	t	250
Operations Bridge	m <sup>2</sup>	140
Other Works		
Existing Bridge Rehabilitation		1
River Bank Protection Works	m <sup>2</sup>	7,000

TABLE V.5-3 WORK QUANTITIES FOR CALEDONIA POWER STATION

Item	Intake	Headrace Tunnel	Surge Tank	Penstock	Power-house	Tailrace	Outlet	Switch-yard	Trans-Diversion	Total
Civil Works										
Open Excavation	10,300		3,200				5,000	10,000	9,200	37,700
Tunnel Excavation	1,500	54,400	12,700	5,300	58,400	37,300	900		25,800	196,300
Open Excavation	1,600		100				500	2,500	11,400	16,100
Tunnel Concrete	1,200	15,400	3,500		17,000	10,800	500		4,900	53,300
Plug Concrete		100	200	2,900		100			100	3,400
Shotcrete				300	2,000					2,300
Forms	3,700	36,600	2,300	300	16,100	26,000	1,600	12,500	12,300	111,400
Rebar	60	220	140		650	210	20	130	20	1,450
Low Pressure Grouting	100	3,000				2,100	100			5,300
High Pressure Grouting	100	3,000				2,100	100			5,300
Drainage Facilities										1
Rock Bolt					1,000					1,000
PC Anchor					900					900
Gate									40	40
Screen	49								17	66
Elevator										1
Operation House										1
Hydromechanical Equipment										
Gate	36									36
Penstock	15			300		12				327
Electrical facilities										
Generator and Transformer										1
Transmission Line										1

TABLE V.5-4 WORK QUANTITIES FOR TALAWAKELLE POWER STATION

Item	Intake	Headrace Tunnel	Surge Tank	Penstock	Power-house	Tailrace	Outlet	Switch-yard	Trans-Diversion	Total
Civil Works	23,200		5,400				18,500	18,000	15,500	80,600
Open Excavation										
Tunnel Excavation	1,300	282,400	26,300	21,300	84,800	14,700	2,600		64,300	497,700
Open Excavation	4,900		100				300	4,000	11,000	20,300
Tunnel Concrete	600	75,300	6,800	100	24,100	4,400	1,200		12,400	124,900
Plug Concrete		200	200	9,000		100			200	9,700
Shotcrete				1,300	700					2,000
Forms	6,100	180,700	5,000	400	26,400	7,800	1,600	20,000	21,300	269,300
Rebar	150	1,490	270	10	990	90	40	200	120	3,360
Low Pressure Grouting	100	13,100				400				13,600
High Pressure Grouting	100	13,100				400				13,600
Drainage Facilities										1
Rock Bolt					1,200					1,200
PC Anchor					2,000					1,200
Gate									50	50
Screen	108								23	131
Elevator										1
operation House										1
Hydromechanical Equipment										
Gate	28		28			140				196
Penstock	24			1,880		19				1,923
Electrical Facilities										
Generator and Transformer										1
Transmission Line										1



**APPENDIX VI**

**PROJECT EVALUATION**



APPENDIX VI PROJECT EVALUATION

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APPENDIX VI  
PROJECT EVALUATION

VI.1 Conversion Factors of Major Inputs

Each CF for major inputs into the Project has been obtained as follows.

Port Charges

During the Project implementation period, various imported materials and equipment will be input; and port charges in Colombo Port are added on to CIF prices of those imported items. As mentioned previously (V.2.2 of APPENDIX V), these port charges consist of landing charges by the Port Authority and handling charges by clearing agents. These charges are paid for services which arise within a limited locale, i.e. within Colombo Port; and in that sense, they do not occur across borders. From the stand point of proper economic analysis, therefore, port charges should be broken down into such constituent factors as depreciation cost of unloaded machinery, fuel cost, wages and salaries, over-head of the agents, etc., and each CF should be obtained to get accounting prices for port charges. CF for port charges can be obtained by calculating weighted average of their accounting prices and by dividing them by market prices.

The share of the port charges in total project costs is, however, very small (less than 1 percent) and precise economic costing does not have much effect on total economic costs. For these reasons, it is assumed for the sake of simplification that these port charges reflect real values, or in other words, charges are economic prices in themselves. Since accounting prices are obtained by multiplying economic prices by SCF, the CF for port charges in this Report is the same as SCF or 0.90.

Transportation Costs

Project sites are located approximately 150km from Colombo. Almost all materials and equipment for Project construction will be transported either from Colombo Port or from within the City itself, and the costs of transportation are added to prices inside Colombo city. These transportation costs are paid for services which occur within Sri Lanka and are set at relatively higher prices due to the lack of international

competition and higher costs for transport vehicles. Thus costs of transportation should also be converted into economic costs by estimating their accounting prices.

According to the transportation companies in Sri Lanka, charges for transportation consist of 1) depreciation of vehicles and costs for spares and parts (30%), 2) fuel costs (25%), 3) labour costs (12.5%), and overhead which includes administrative costs, salaries, profits, etc. (32.5%).

15% of import duty is levied on CIF prices of imported transportation vehicles. To this total; another 10% of Business Turnover Tax (BTT) is also taxed. Providing port charges are 1% of CIF prices, Colombo prices are 1.275 times CIF prices [ $\therefore (1 + 0.15) \times 1.1 + 0.01 = 1.275$ ]. The CF for transportation vehicles, therefore, is obtained by subtracting transfer payments (duties and BTT) and dividing CIF prices including port charge accounting prices ( $0.01 \times 0.9 = 0.009$ ) by market prices, which yields 0.79 [ $\therefore (1 + 0.009) \div 1.275 \doteq 0.79$ ].

With regard to fuel cost, as described later, CF in Colombo is 0.77. And as for wages, providing a heavy duty vehicle driver (skilled labour) and one unskilled labour are involved in transportation, CF will become 0.75 [ $\therefore (0.90 + 0.60) \div 2 = 0.75$ , See Wages below]. Furthermore, assuming overhead reflects opportunity costs or economic prices, the CF for overhead is the same as SCF. Thus overall CF for transportation costs is obtained by calculating the weighted average of components, which yields 0.82 [ $\therefore (0.79 \times 0.30) + (0.77 \times 0.25) + (0.75 \times 0.125) + (0.90 \times 0.325) \doteq 0.82$ ].

### Wages

In economic analysis, wages based on minimum wage policy (particularly in the case of unskilled labour) in countries with significant numbers of unemployed and underemployed are not considered as reflecting the true value of labour in that country. The reason for this is that in a completely competitive labour market, wages correspond to the values of marginal products of workers, while in a society where labour supply greatly exceeds demand, minimum wages set by government policy are higher than such values of marginal products. Viewed from the standpoint of the true cost to the country as a whole, labour costs or wages can be regarded as the opportunity cost of labour input into the Project, in

other words the loss in marginal products which would otherwise be realized if said labour were not employed on the Project and remained in their respective production activities.

In the case of the subject Project, labour input will most likely consist of farmers in the vicinity to be employed by the contractor. Consequently, economic price of wages is the value of marginal products of said farmers to be hired.

Due to the physical constraints (civil disturbances in the vicinity of the Project site) and time constraints, the Team was not able to undertake detailed survey of the farmer population in the vicinity of Project site. For this reason, in this Report the value 0.60 CF for unskilled labour wages, which has been prepared by the Department of National Planning of the Treasury, is adopted.

There is no problem as to quality of skilled labour as over the years numerous Sri Lankan skilled workers have been working in many Middle Eastern countries. At present, although considerable numbers of them have returned from the Middle East due to the recession prevailing in that area, there is relatively stable demand for skilled labour for building construction in Colombo as well as projects related to the ongoing Accelerated Programme of Mahaweli Development. As a result, wages for skilled labour are seen as competitive and as reflecting economic price, and the CF for said skilled labour wage is determined as the multiplied product of economic price which equals 1.0, and SCF which is 0.90. A certain number of foreign skilled workers are also anticipated to be employed in construction of the Project. However, as these workers will be paid in hard currency, the CF for their wages is 1.0.

#### Construction Machinery

Construction under the Project will require inputs of heavy equipment such as cable cranes, dump trucks, etc. This equipment will be principally brought in from abroad by the contractors for the Projects, and financial cost will be computed in terms of depreciation, costs at the Project site. If these costs are assumed as reflecting the real costs for construction machinery itself, CF is the ratio between i) CIF plus accounting prices for various associated costs, and ii) the site cost.

Even in the case of projects implemented under international cooperation, CEB has the responsibility of paying customs duties and BTT

on construction equipment and materials brought in from abroad. The average customs duties on construction machinery is 10% of CIF and the average BTT is also 10% of CIF prices plus import duties (which means 11% of CIF). In addition, assuming 2% of CIF as port charges and 12% as overhead, the site cost of construction machinery increases 35% more as compared to CIF price. As the contractor himself in principle is responsible for transportation of materials and equipment, transportation cost is ignored here. Accounting prices for construction machinery are obtained by subtracting transfer payments (taxes) from site costs, and by converting port charges and overheads into accounting prices and by adding those accounting prices to CIF prices. Accordingly, the CF for construction machinery is:  $[1.00 + (0.2 + 0.12) \times 0.9] \div 1.35 \div 0.83$ .

#### Fuel

Fuel costs comprise the cost for diesel oil required for construction machinery including diesel power generator. The Ceylon Petroleum Corporation (CPC) purchases its crude oil principally on the Saudi Arabia, Iran and UAE spot markets. Following importation, said crude is refined domestically into various petroleum products. In 1985 and 1986, CPC imported 1,657 million tons and 1,639 million tons at costs of Rs9,513 millions and Rs.7,262 millions, respectively. While the average price of imported crude oil was US\$28.5/bbl in 1985, it came down drastically to US\$13.0/bbl in 1986. (However the price of oil shifted again to an upward trend, and at the spot market in February 1987 it cost US\$18.0/BBL).

The refining capacity of CPC with regard to some products exceeds domestic demand, and it accordingly exports naphtha, furnace oil, gasoline (super), gas oil, kerosene, etc. to Singapore, Maldives, Japan and Malaysia. The export of oil products has grown to be one of the biggest foreign exchanges earners in Sri Lanka. Diesel oil for machinery and vehicles was once exported, but at present CPC has been importing approximately 130 million tons every year due to the rapid growth of domestic demand. In 1986, CPC imported diesel fuel equivalent to a volume of 131.6 million tons, and value of Rs.526.9 millions. If relative weight for diesel oil is assumed at 0.83, then the volume imported amounted to 158.6 million liters and CIF Colombo price was Rs.3.32/l.

Import duties on crude-oil and crude-oil products have been lifted sharply in recent years amounting to 45% in March 1986. CPC, therefore, has been paying Rs.1.50/ℓ as import duties. In addition to customs duties, port charges and CPC overhead, which amount to Rs.3.31/ℓ, are also added, and final contract price for diesel fuel in Colombo is Rs.8.13/ℓ. The CF for diesel oil in Colombo, assuming that port charges and overhead reflect economic prices, is :  $[Rs.3.32/ℓ + (Rs.3.31/ℓ \times 0.90)] \div Rs.8.13/ℓ \doteq 0.77$ . The on-site price of diesel fuel has been obtained by adding Rs.0.20/ℓ of transportation charges by CPC to the Colombo contract price. The on-site cost, on the other hand, includes necessary lubricants and overheads incurred to and at the project site, which amount to as much as 120% of on-site price. It is assumed, for simplification, that the CF for on site cost of diesel fuel is the same as that for on-site price. If the CF for transportation costs is as discussed earlier 0.82, the CF for on site cost is :  $[Rs.3.32/ℓ + (Rs.3.131/ℓ \times 0.90) + (Rs.0.20/ℓ \times 0.82)] \div (Rs.8.13/ℓ + Rs.0.20/ℓ) \doteq 0.77$ , which is the same as that at Colombo.

#### Cement

Cement is produced domestically by the parastatal Sri Lanka Cement Corporation; however, the product is of irregular quality. In fact, the Mahaweli Authority has opted not to utilize domestically produced cement on its Accelerated Programme for Mahaweli development, and instead has established the Mahaweli Marine Cement Company in joint venture with the multinational Marine Cement Company located in Switzerland, for importation of cement from Indonesia, Kenya, etc.

The average CIF Colombo price for cement is quoted at US\$ 50/ton (Rs.1,425/ton). With the addition of 40% import duties (Rs.625/ton) and US\$6.50/MT (Rs.185/ton) of handling charges by Mahaweli Marine Cement, the contract price in Colombo is Rs.2,235/ton (BTT has been abolished in place of lifting customs duties from 25% to 40%). The on-site cost of cement rises to Rs.3,159/ton taking into consideration transportation costs (Rs.512/ton), overhead, etc (Rs.412/ton).

The CF for cement is computed by taking the sum of the CIF Colombo price (excluding duties as transfer payments), and accounting prices for transportation costs, etc., and dividing this total by the on-site cost:



$[Rs.1,425/ton + (Rs.185/ton + Rs.412/ton) \times 0.90 + Rs.512/ton \times 0.82] \div Rs.3,159/ton \doteq 0.75.$

### Steel

As described in APPENDIX-IV (Cost Estimates), many types of imported steel reinforcing bars will be utilized on the Project. At the end of 1986, the average CIF price for steel is estimated at Rs.8,800/ton, the weighted average of customs duties is 29% on CIF price or Rs.2,552/ton. With the addition of BTT (Rs.1,135/ton), port charges (Rs.175/ton), transportation costs (Rs.544/ton) and overheads, etc. (Rs.1,994/ton), the on-site cost rises to Rs.15,200/ton. As a result, the CF for steel is computed as:  $[Rs.8,800/ton + (Rs.175/ton + Rs.1,994/ton) \times 0.90 + Rs.544/ton \times 0.82] \div Rs.15,200 \doteq 0.74.$

### Facilities and Equipment

On facilities and equipment ordered and handled by CEB, 5% of import duties and 10% of BTT are to be levied. In financial cost estimates, on-site cost for this category was derived from the addition of port charges (2% of CEF price), and transportation cost (2.5% of CIF price) to CIF Colombo price and required taxes. Provided CIF price is equal to 100%, on-site cost becomes 120% [ $100 + 5 + (100 + 5) \times 0.10 + 2 + 2.5 = 120$ ]. The CF for facilities and equipment is thus calculated as:  $[100 + (2 \times 0.90) + (2.5 \times 0.82)] \div 120 \doteq 0.87.$

### Others

Included under this category are electricity charges during construction, the right to exploit aggregate quarries, and other non-traded goods and services. However, since the portion that this category occupies in total project cost is minimal, and numerous items are included, component items are assumed as reflecting economic prices and thus viewed the same as SCF.

### Compensation

The dam, reservoir, power station, access road, transmission, etc. facilities under the Project and resettlement areas will occupy total areas of 1,162ha. Of this area compensatory payment is to be made for the acquisition of 870ha. of tea estates, 85ha. of cultivated and residential land, as well as for the dwellings and public facilities on these lands. In addition to compensation, the Project must bear the costs of land

aquisition and development of resettlement areas. The financial cost of this compensation is calculated at Rs.460.0 million based on government valuations (See 7.3 of Chapter 7 in Main Report).

In economic analysis, government appraised prices (and even market prices) are not considered as reflecting the true value of land. Instead said valuation prices should be evaluated on the basis of opportunity cost. Opportunity cost represents the economic value of the land in terms of value of what it would produce in the future if the Project were not implemented. Economic value is not recognized either in rivers and wastelands for which no compensation is to be paid even in financial costs estimates. The economic cost for existing roads is considered as canceled out by that of the new roads to be constructed under the Project which will actually be of better quality.

According to data from the Ministry of State Plantation, JEDB and the Ceylon Tea Board, the average production (made tea) of estates in the vicinity of the Project site is 1,173 kg/ha. The 1985 (due to the data availability following analysis is done using 1985 data) market price in Colombo averaged Rs.25.15/kg, which means an average income of Rs.29,500 per hectare. Furthermore, the total of fixed (overall estate operating and maintenance) and variable (fertilizer, tea picking labor, power rates, transport to Colombo, etc.) costs required to produce the above mentioned 1,173 kg/ha. is Rs.27,400. Accordingly, average net income is Rs.2,100/ha.

As this net income has been computed in terms of market prices, gross income must be expressed in terms of FOB Colombo prices for the purposes of economic analysis because tea is a major export good for Sri Lanka, and expenditures must likewise be converted into accounting prices. According to the Fourth Tree Corps Project appraisal report submitted in February 1985 by World Bank staff, the 1985 FOB Colombo price for tea was estimated at Rs.60.41/kg. On the basis of this, final gross income is Rs.70,860/ha. In economic analysis, gross expenditure would be calculated by totaling the accounting prices for each constituent element comprising said expenditure. However, due to time and informational constraints, a conversion factor of 0.80 was adopted. (The reason for not using the SCF was that tea picking wages account for nearly 25% of expenditure, and each estate is using a large volume of fertilizers whose materials are imported.) Expenditure based on accounting prices is Rs.21,920/ha. To

this economic cost must also be added the various expenses incurred in moving the tea to Colombo port. The above mentioned appraisal report cites these costs in economic terms at Rs.3.82/kg which amounts to about Rs.4,480/ha. (assuming an average production of 1,173 kg of made tea per hectare).

Based on the above, the economic net income per hectare for tea at 1985 fixed prices is:  $[70,860 - (21,920 + 4,480)] = \text{Rs.}44,460$ . In 1986 world market price of tea fell, with accordant deterioration of FOB Colombo price for Sri Lankan tea. The adoption of a relatively high FOB price in 1985 means that economic cost of land for tea is estimated higher than actuality, or the analysis was performed from the safe side.

The economic value of lost tea production per annum resulting from Project implementation would be:  $\text{Rs.}44,460/\text{ha.} \times 870\text{ha.} \div \text{Rs.}38.7$  millions. In cash flow analysis, such lost income should be calculated for each year of the Project life. However, as this amount is very small in comparison with overall Project costs, annual economic value foregone is discounted each year with 10% discount rate, and summed up in present values in the first year of construction start-up, of the fourth year of project life, which is considered to be the proxy of opportunity cost of land.

Accordingly, the economic cost of compensation for tea plantation land:

$$\text{Rs.}38.7 \text{ m.} \times \left[ \sum_{t=1}^{59} \frac{1}{(1+0.10)^t} - \sum_{t=1}^4 \frac{1}{(1+0.10)^t} \right] = \text{Rs.}38.7 \text{ m.} \times (9.964 - 3.170) = \text{Rs.}262.9\text{m.}$$

Cultivated land with residence plots is concentrated on fertile bank of rivers and the demand for such is relatively large. Therefore, the Government valuation prices are assumed to reflect economic prices of cultivated land. In addition, the compensation for residence and moving allowance for residents and estate labour set by the Government are also assumed for simplification purposes as economic prices. These financial costs can be converted into economic costs through application of SCF:  $(\text{Rs.}13 \text{ million} + \text{Rs.}210 \text{ million} + \text{Rs.}24 \text{ million} + \text{Rs.}8 \text{ million}) \times 0.90 = \text{Rs.}229.5 \text{ million}$ .

This item of expenditures also includes the construction cost of twin cottages for estate labours who will be transferred to other estates

which are short of labour and the development cost for infrastructure in the resettled area where those engaged in cultivation of vegetables and crops will be transferred. The Department of National Planning calculates the CF for such construction cost as 0.78, and in this analysis, the same value of 0.78 is adopted for infrastructure development cost: (Rs.95 millions + Rs.24 millions)  $\times$  0.78  $\doteq$  Rs.92.8 millions.

Consequently, total economic costs for compensation amount to: (Rs.262.9 million + Rs.229.5 millions + Rs.92.8 millions) = Rs.585.2 million.

#### Engineering and Administration

Engineering and administrative costs include the consultant's fee and various administrative expenses which CEB must bear in the course of Project implementation. Foreign portion and local portion ratios are assumed here at 70% and 30%, respectively, for the first two years when detailed designing will be carried out. In the following years when tender document preparation and construction supervision are performed, the ratio is assumed at 50% each. Local portion is converted to economic costs through application of SCF. Overall CF is 0.97 for the first two years and 0.95 for the following years.

#### Operation and Maintenance; Replacement

In financial cost estimates, operation and maintenance costs were calculated from unit cost of RS.4.5/month/kW which CEB applies on its hydropower projects. Conversion factor for this O/M cost is determined at 0.86, the overall averaged CF for the Project.

As discussed in Chapter 7, the facility and equipment are assumed to be maintained in good operating condition by repairs which are borne under operation and maintenance costs. Thus, replacement cost is not included under the Project.

## VI.2 EIRR Calculation Sheet for Sensitivity Analysis

### Calculation of Oil and Thermal as Alternatives

- CASE 200 EIRR based on oil thermal as the alternative  
CASE 300 EIRR based on coal thermal as the alternative

### Sensitivity Analysis for Base Case (Diesel as the alternative)

- CASE 101 One year delay of realization of Project benefits due to construction delays (however, costs are as for the base case):
- CASE 102 Two year delay of realization of Project benefits for the same reason as i) above
- CASE 103 10% cost over-run for initial construction cost
- CASE 104 20% cost over-run for initial construction cost
- CASE 105 A relative 10% rise in fuel costs (price of residual oil) in comparison with other general costs (10% price contingency)
- CASE 106 20% relative rise in fuel costs under the same conditions as v) above
- CASE 107 Raising of Kotmale dam 10 years after operation commencement of this Project
- CASE 108 Raising of Kotymale dam 15 years after operation commencement of this Project
- CASE 109 i), iii) and v) above occur together
- CASE 110 ii), iv) and vi) above occur together
- CASE 111 In addition to x) above, 30% rise in economic fuel costs by taking into consideration accounting prices of services involved in import of fuel

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 200

HILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS		TOTAL COSTS	INVESTMENT AND REPLACEMENT	ALTERNATIVE FUEL COST	BENEFITS OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00X)	NET PRESENT VALUE	DISCOUNT FACTOR (27.44X)	NET PRESENT VALUE
			OPERATION AND MAINTENANCE	TOTAL COSTS										
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70	
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	0.909	-155.18	0.785	-133.95	
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	0.00	-20.90	0.826	-17.27	0.616	-12.87	
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.483	-521.86	
5	1992	357.43	0.00	357.43	0.00	0.00	0.00	0.00	-357.43	0.683	-244.11	0.379	-135.52	
6	1993	965.40	0.00	965.40	1775.00	0.00	0.00	1775.00	809.60	0.621	502.70	0.298	240.89	
7	1994	1027.20	0.00	1027.20	2663.00	0.00	0.00	2663.00	1535.80	0.564	923.37	0.233	381.94	
8	1995	2843.20	0.00	2843.20	3551.00	0.00	0.00	3551.00	707.80	0.513	363.21	0.183	129.68	
9	1996	1828.00	0.00	1828.00	888.00	0.00	0.00	888.00	-940.00	0.467	-438.52	0.144	-135.15	
10	1997	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.424	287.07	0.113	76.37	
11	1998	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.386	260.97	0.089	59.93	
12	1999	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.350	237.25	0.069	47.03	
13	2000	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.319	215.68	0.055	36.90	
14	2001	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.290	196.07	0.043	28.86	
15	2002	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.263	178.25	0.034	22.72	
16	2003	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.239	162.04	0.026	17.83	
17	2004	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.218	147.31	0.021	13.99	
18	2005	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.198	133.92	0.016	10.98	
19	2006	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.180	121.75	0.013	8.62	
20	2007	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.164	110.68	0.010	6.76	
21	2008	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.149	100.62	0.008	5.31	
22	2009	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.135	91.47	0.006	4.16	
23	2010	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.123	83.15	0.005	3.27	
24	2011	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.112	75.59	0.004	2.56	
25	2012	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.102	68.72	0.003	2.01	
26	2013	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.092	62.48	0.002	1.58	
27	2014	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.084	56.80	0.002	1.24	
28	2015	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.076	51.63	0.001	0.97	
29	2016	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.069	46.94	0.001	0.76	
30	2017	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.063	42.67	0.001	0.60	
31	2018	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.057	38.79	0.001	0.47	
32	2019	0.00	11.50	11.50	888.00	661.70	26.70	1576.40	1564.90	0.052	35.53	0.001	0.85	
33	2020	0.00	11.50	11.50	2663.00	661.70	26.70	3351.40	3339.90	0.047	32.81	0.000	1.43	
34	2021	0.00	11.50	11.50	3551.00	661.70	26.70	4239.40	4227.90	0.043	30.24	0.000	1.42	
35	2022	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.039	27.50	0.000	0.18	
36	2023	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.036	24.99	0.000	0.14	
37	2024	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.032	21.90	0.000	0.11	
38	2025	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.029	19.91	0.000	0.09	
39	2026	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.027	18.10	0.000	0.07	
40	2027	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.024	16.45	0.000	0.05	
41	2028	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.022	14.96	0.000	0.04	
42	2029	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.020	13.60	0.000	0.03	
43	2030	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.018	12.36	0.000	0.03	
44	2031	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.017	11.24	0.000	0.02	
45	2032	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.015	10.22	0.000	0.02	
46	2033	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.014	9.29	0.000	0.01	
47	2034	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.012	8.44	0.000	0.01	
48	2035	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.011	7.67	0.000	0.01	
49	2036	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.010	6.98	0.000	0.01	
50	2037	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.009	6.34	0.000	0.00	
51	2038	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.009	5.77	0.000	0.00	
52	2039	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.008	5.24	0.000	0.00	
53	2040	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.007	4.77	0.000	0.00	
54	2041	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.006	4.33	0.000	0.00	
55	2042	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.006	3.94	0.000	0.00	
56	2043	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.005	3.58	0.000	0.00	
57	2044	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.005	3.25	0.000	0.00	
58	2045	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.004	2.96	0.000	0.00	
59	2046	0.00	11.50	11.50	0.00	661.70	26.70	661.70	676.90	0.004	2.69	0.000	0.00	
*TOTAL*		8463.50	575.00	9038.50	15979.00	33085.00	1335.00	50399.00	41360.50		3408.26		0.01	

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 300

MILLION RS

NO.	YEAR	COSTS			ALTERNATIVE BENEFITS.			TOTAL BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (37.41%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	FUEL COST	OPERATION AND MAINTENANCE					
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	-170.70	0.909	-155.18	0.728	-124.22
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	-20.90	0.826	-17.27	0.530	-11.07
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.385	-416.23
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	-357.40	0.683	-244.11	0.280	-100.24
6	1993	965.40	0.00	965.40	2242.00	0.00	2242.00	1276.60	0.621	792.67	0.204	260.56
7	1994	1027.20	0.00	1027.20	3363.00	0.00	3363.00	2335.80	0.564	1318.50	0.149	346.94
8	1995	2843.20	0.00	2843.20	4484.00	0.00	4484.00	1640.80	0.513	841.99	0.108	177.35
9	1996	1828.00	0.00	1828.00	1120.00	0.00	1120.00	-708.00	0.467	-330.29	0.079	-55.69
10	1997	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.424	187.58	0.057	25.32
11	1998	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.386	170.53	0.042	18.43
12	1999	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.350	155.02	0.030	13.41
13	2000	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.319	140.93	0.022	9.76
14	2001	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.290	128.12	0.016	7.10
15	2002	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.263	116.47	0.012	5.17
16	2003	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.239	105.88	0.009	3.76
17	2004	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.218	96.26	0.006	2.74
18	2005	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.198	87.51	0.005	1.99
19	2006	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.180	79.55	0.003	1.45
20	2007	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.164	72.32	0.002	1.05
21	2008	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.149	65.75	0.002	0.77
22	2009	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.135	59.77	0.001	0.56
23	2010	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.123	54.33	0.001	0.41
24	2011	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.112	49.40	0.001	0.30
25	2012	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.102	44.90	0.000	0.22
26	2013	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.092	40.82	0.000	0.16
27	2014	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.084	37.11	0.000	0.11
28	2015	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.076	33.74	0.000	0.08
29	2016	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.069	30.67	0.000	0.06
30	2017	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.063	27.88	0.000	0.04
31	2018	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.057	25.35	0.000	0.03
32	2019	0.00	11.50	11.50	1120.00	405.10	48.70	1578.80	0.052	81.39	0.000	0.08
33	2020	0.00	11.50	11.50	3363.00	405.10	48.70	3816.80	0.047	180.23	0.000	0.15
34	2021	0.00	11.50	11.50	4484.00	405.10	48.70	4937.80	0.043	212.11	0.000	0.14
35	2022	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.039	17.31	0.000	0.01
36	2023	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.036	15.74	0.000	0.01
37	2024	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.032	14.31	0.000	0.00
38	2025	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.029	13.01	0.000	0.00
39	2026	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.027	11.82	0.000	0.00
40	2027	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.024	10.75	0.000	0.00
41	2028	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.022	9.77	0.000	0.00
42	2029	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.020	8.88	0.000	0.00
43	2030	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.018	8.08	0.000	0.00
44	2031	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.017	7.34	0.000	0.00
45	2032	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.015	6.67	0.000	0.00
46	2033	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.014	6.07	0.000	0.00
47	2034	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.012	5.52	0.000	0.00
48	2035	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.011	5.01	0.000	0.00
49	2036	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.010	4.56	0.000	0.00
50	2037	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.009	4.14	0.000	0.00
51	2038	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.009	3.77	0.000	0.00
52	2039	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.008	3.43	0.000	0.00
53	2040	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.007	3.11	0.000	0.00
54	2041	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.006	2.83	0.000	0.00
55	2042	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.006	2.57	0.000	0.00
56	2043	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.005	2.34	0.000	0.00
57	2044	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.005	2.13	0.000	0.00
58	2045	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.004	1.93	0.000	0.00
59	2046	0.00	11.50	11.50	0.00	405.10	48.70	453.80	0.004	1.76	0.000	0.00
*TOTAL*		8463.50	575.00	9038.50	20176.00	20255.00	2435.00	42866.00	33827.50	3680.67		0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 101

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	ALTERNATIVE		TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (10.59%)	NET PRESENT VALUE	
					INVESTMENT AND REPLACEMENT	FUEL COST							
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70	
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	-170.70	0.909	-155.18	0.904	-154.36	
3	1990	30.93	0.00	20.99	0.00	0.00	0.00	-20.90	0.826	-17.27	0.818	-17.09	
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.739	-798.60	
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	-357.40	0.683	-244.11	0.669	-238.98	
6	1993	965.40	0.00	965.40	0.00	0.00	0.00	-965.40	0.621	-599.44	0.605	-583.74	
7	1994	1027.20	0.00	1027.20	0.00	0.00	0.00	-1027.20	0.564	-579.83	0.547	-561.66	
8	1995	2843.20	0.00	2843.20	1260.00	0.00	1260.00	-1583.20	0.513	-812.43	0.494	-782.81	
9	1996	1828.00	0.00	1828.00	1681.00	0.00	1681.00	-147.00	0.467	-68.58	0.447	-65.73	
10	1997	0.00	11.50	11.50	1260.00	0.00	1260.00	1248.50	0.424	529.49	0.404	504.79	
11	1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.385	267.30	0.366	253.48
12	1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.350	243.00	0.331	229.22
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.299	207.28
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.270	187.44
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.244	169.50
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.221	153.27
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.200	138.60
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.181	125.33
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.163	113.34
20	2007	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.164	113.36	0.148	102.40
21	2008	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.149	103.06	0.134	92.68
22	2009	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.135	93.69	0.121	83.81
23	2010	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.123	86.17	0.109	75.78
24	2011	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.112	77.43	0.099	68.53
25	2012	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.102	70.39	0.089	61.97
26	2013	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.092	63.99	0.081	56.04
27	2014	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.084	58.17	0.073	50.67
28	2015	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.076	181.11	0.066	156.93
29	2016	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.069	164.64	0.060	141.91
30	2017	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.063	43.71	0.054	37.47
31	2018	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.057	39.73	0.049	33.88
32	2019	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.052	36.12	0.044	30.64
33	2020	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.047	32.84	0.040	27.71
34	2021	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.043	29.85	0.036	25.06
35	2022	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.039	27.14	0.033	22.66
36	2023	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.036	24.67	0.030	20.49
37	2024	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.032	22.43	0.027	18.63
38	2025	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.029	20.39	0.024	16.75
39	2026	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.027	18.54	0.022	15.15
40	2027	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.024	16.85	0.020	13.70
41	2028	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.022	15.32	0.018	12.39
42	2029	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.020	13.93	0.016	11.20
43	2030	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.018	12.66	0.015	10.13
44	2031	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.017	11.51	0.013	9.16
45	2032	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.015	10.46	0.012	8.28
46	2033	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.014	9.51	0.011	7.49
47	2034	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.012	8.65	0.010	6.77
48	2035	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.011	26.92	0.009	20.98
49	2036	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.010	24.47	0.008	18.97
50	2037	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	5.50	0.007	5.01
51	2038	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	5.91	0.007	4.53
52	2039	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.008	5.37	0.006	4.10
53	2040	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.007	4.88	0.005	3.70
54	2041	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.44	0.005	3.35
55	2042	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.03	0.004	3.03
56	2043	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.67	0.004	2.74
57	2044	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.33	0.004	2.49
58	2045	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	3.03	0.003	2.24
59	2046	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	2.76	0.003	2.03
*TOTAL*		8463.50	575.00	9038.50	10925.00	32722.20	1813.00	45460.20	36421.70		264.42		-0.00



ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 102

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	ALTERNATIVE FUEL COST	BENEFITS OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (9.62%)	NET PRESENT VALUE
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	0.909	-155.18	0.912	-155.72
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	0.00	-20.90	0.826	-17.27	0.832	-17.39
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.759	-819.81
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	0.00	-357.40	0.683	-244.11	0.692	-247.48
6	1993	965.40	0.00	965.40	0.00	0.00	0.00	0.00	-965.40	0.621	-599.44	0.632	-609.80
7	1994	1027.20	0.00	1027.20	0.00	0.00	0.00	0.00	-1027.20	0.564	-579.83	0.576	-591.87
8	1995	2843.20	0.00	2843.20	0.00	0.00	0.00	0.00	-2843.20	0.513	-1459.01	0.526	-1494.44
9	1996	1828.00	0.00	1828.00	1260.00	0.00	0.00	1260.00	-568.00	0.467	-264.98	0.479	-272.34
10	1997	0.00	11.50	11.50	1681.00	0.00	0.00	1681.00	1669.50	0.424	708.03	0.437	730.21
11	1998	0.00	11.50	11.50	1260.00	0.00	0.00	1260.00	1248.50	0.386	481.35	0.399	498.13
12	1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.360	243.00	0.364	252.33
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.332	230.18
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.303	209.97
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.276	191.54
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.252	174.73
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.230	159.39
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.210	145.40
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.191	132.63
20	2007	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.164	113.36	0.175	120.99
21	2008	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.149	103.06	0.159	110.37
22	2009	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.135	93.69	0.145	100.68
23	2010	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.123	85.17	0.132	91.84
24	2011	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.112	77.43	0.121	83.78
25	2012	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.102	70.39	0.110	76.42
26	2013	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.092	63.99	0.101	69.71
27	2014	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.084	58.17	0.092	63.59
28	2015	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.076	181.11	0.084	198.67
29	2016	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.069	164.64	0.076	181.22
30	2017	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.063	43.71	0.070	48.27
31	2018	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.057	39.73	0.064	44.03
32	2019	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.052	36.12	0.058	40.17
33	2020	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.047	32.84	0.053	36.64
34	2021	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.043	29.85	0.048	33.43
35	2022	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.039	27.14	0.044	30.49
36	2023	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.036	24.67	0.040	27.81
37	2024	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.032	22.43	0.037	25.37
38	2025	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.029	20.39	0.033	23.15
39	2026	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.027	18.54	0.030	21.11
40	2027	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.024	16.85	0.028	19.26
41	2028	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.022	15.32	0.025	17.57
42	2029	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.020	13.93	0.023	16.03
43	2030	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.018	12.66	0.021	14.62
44	2031	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.017	11.51	0.019	13.34
45	2032	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.015	10.46	0.018	12.17
46	2033	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.014	9.51	0.016	11.10
47	2034	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.012	8.65	0.015	10.12
48	2035	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.011	26.92	0.013	21.63
49	2036	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.010	24.47	0.012	20.85
50	2037	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	6.50	0.011	7.68
51	2038	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	5.91	0.010	7.01
52	2039	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.008	5.37	0.009	6.39
53	2040	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.007	4.88	0.008	5.83
54	2041	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.44	0.008	5.32
55	2042	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	4.03	0.007	4.85
56	2043	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.67	0.006	4.43
57	2044	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.33	0.006	4.04
58	2045	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	3.03	0.005	3.68
59	2046	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	2.76	0.005	3.36
*TOTAL*		8463.50	575.00	9038.50	10925.00	32054.40	1776.00	44755.40	35716.90		-185.96		0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 103

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	ALTERNATIVE		TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00X)	NET PRESENT VALUE	DISCOUNT FACTOR (10.61X)	NET PRESENT VALUE
					INVESTMENT AND REPLACEMENT	FUEL COST						
1	1988	187.80	0.00	187.80	0.00	0.00	0.00	-187.80	1.000	-187.80	1.000	-187.80
2	1989	187.80	0.00	187.80	0.00	0.00	0.00	-187.80	0.909	-170.73	0.904	-169.79
3	1990	23.00	0.00	23.00	0.00	0.00	0.00	-23.00	0.826	-19.01	0.817	-18.80
4	1991	1188.00	0.00	1188.00	0.00	0.00	0.00	-1188.00	0.751	-892.56	0.739	-877.91
5	1992	393.10	0.00	393.10	0.00	0.00	0.00	-393.10	0.683	-268.49	0.668	-262.63
6	1993	1061.90	0.00	1061.90	0.00	0.00	0.00	-1061.90	0.621	-659.36	0.604	-641.41
7	1994	1129.90	0.00	1129.90	1260.00	0.00	1260.00	130.10	0.564	73.44	0.546	71.05
8	1995	3127.50	0.00	3127.50	1681.00	0.00	1681.00	-1446.50	0.513	-742.28	0.494	-714.16
9	1996	2010.80	0.00	2010.80	1260.00	0.00	1260.00	-750.80	0.467	-350.25	0.446	-335.13
10	1997	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.424	294.03	0.404	279.78
11	1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.386	267.30	0.365	252.95
12	1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.350	243.00	0.330	228.69
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.319	220.91	0.298	206.76
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.290	200.82	0.270	186.92
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.263	182.57	0.244	169.00
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.239	165.97	0.220	152.79
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.218	150.88	0.199	138.13
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.198	137.17	0.180	124.88
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.180	124.70	0.163	112.91
20	2007	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.164	113.36	0.147	102.08
21	2008	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.149	103.05	0.133	92.29
22	2009	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.135	93.69	0.120	83.44
23	2010	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.123	85.17	0.109	75.43
24	2011	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.112	77.43	0.098	68.20
25	2012	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.102	70.39	0.089	61.66
26	2013	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.092	63.99	0.080	55.74
27	2014	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.084	58.17	0.073	50.40
28	2015	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	0.076	181.11	0.066	156.04
29	2016	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	0.069	164.64	0.059	141.07
30	2017	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.063	43.71	0.054	37.24
31	2018	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.057	39.73	0.049	33.67
32	2019	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.052	36.12	0.044	30.44
33	2020	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.047	32.84	0.040	27.52
34	2021	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.043	29.85	0.036	24.88
35	2022	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.039	27.14	0.032	22.50
36	2023	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.036	24.67	0.029	20.34
37	2024	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.032	22.43	0.027	18.39
38	2025	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.029	20.39	0.024	16.62
39	2026	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.027	18.54	0.022	15.03
40	2027	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.024	16.85	0.020	13.59
41	2028	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.022	15.32	0.018	12.28
42	2029	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.020	13.93	0.016	11.11
43	2030	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.018	12.66	0.014	10.04
44	2031	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.017	11.51	0.013	9.08
45	2032	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.015	10.46	0.012	8.21
46	2033	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.014	9.51	0.011	7.42
47	2034	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.012	8.65	0.010	6.71
48	2035	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	0.011	26.92	0.009	20.77
49	2036	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	0.010	24.47	0.008	18.78
50	2037	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.009	6.50	0.007	4.96
51	2038	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.009	5.91	0.006	4.48
52	2039	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.008	5.37	0.006	4.05
53	2040	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.007	4.88	0.005	3.66
54	2041	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.006	4.44	0.005	3.31
55	2042	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.005	4.03	0.004	2.99
56	2043	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.005	3.67	0.004	2.71
57	2044	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.005	3.33	0.004	2.45
58	2045	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.004	3.03	0.003	2.21
59	2046	0.00	11.50	11.50	0.00	667.80	37.00	704.80	0.004	2.76	0.003	2.00
*TOTAL*		9309.80	575.00	9884.80	10925.00	33390.00	1850.00	46165.00	36280.20	270.87		-0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 104

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	ALTERNATIVE FUEL COST	BENEFITS OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00X)	NET PRESENT VALUE	DISCOUNT FACTOR (9.55X)	NET PRESENT VALUE
1	1988	204.80	0.00	204.80	0.00	0.00	0.00	0.00	-204.80	1.000	-204.80	1.000	-204.80
2	1989	204.80	0.00	204.80	0.00	0.00	0.00	0.00	-204.80	0.909	-185.18	0.913	-185.94
3	1990	25.10	0.00	25.10	0.00	0.00	0.00	0.00	-25.10	0.826	-20.74	0.833	-20.91
4	1991	1296.00	0.00	1296.00	0.00	0.00	0.00	0.00	-1296.00	0.751	-973.70	0.761	-985.62
5	1992	428.90	0.00	428.90	0.00	0.00	0.00	0.00	-428.90	0.683	-292.94	0.694	-297.74
6	1993	1158.50	0.00	1158.50	0.00	0.00	0.00	0.00	-1158.50	0.621	-719.34	0.634	-734.07
7	1994	1232.60	0.00	1232.60	1260.00	0.00	0.00	1260.00	27.40	0.564	15.47	0.578	15.85
8	1995	3411.80	0.00	3411.80	1681.00	0.00	0.00	1681.00	-1730.80	0.513	-888.17	0.528	-913.75
9	1996	2193.60	0.00	2193.60	1260.00	0.00	0.00	1260.00	-933.60	0.467	-435.63	0.482	-449.89
10	1997	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.424	294.03	0.440	304.96
11	1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.386	267.30	0.401	278.36
12	1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.350	243.00	0.366	254.08
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.335	231.92
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.305	211.70
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.279	193.23
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.254	176.38
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.232	161.00
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.212	146.96
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.193	134.14
20	2007	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.164	113.36	0.177	122.44
21	2008	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.149	103.06	0.161	111.76
22	2009	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.135	93.69	0.147	102.01
23	2010	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.123	85.17	0.134	93.12
24	2011	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.112	77.43	0.123	85.00
25	2012	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.102	70.39	0.112	77.58
26	2013	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.092	63.99	0.102	70.82
27	2014	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.084	58.17	0.093	64.64
28	2015	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.076	181.11	0.085	202.06
29	2016	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.069	164.84	0.078	184.44
30	2017	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.063	43.71	0.071	49.16
31	2018	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.057	39.73	0.065	44.87
32	2019	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.052	36.12	0.059	40.96
33	2020	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.047	32.84	0.054	37.39
34	2021	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.043	29.85	0.049	34.13
35	2022	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.039	27.14	0.045	31.15
36	2023	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.036	24.67	0.041	28.43
37	2024	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.032	22.43	0.037	25.95
38	2025	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.029	20.39	0.034	23.69
39	2026	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.027	18.54	0.031	21.62
40	2027	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.024	16.85	0.028	19.74
41	2028	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.022	15.32	0.026	18.02
42	2029	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.020	13.93	0.024	16.44
43	2030	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.018	12.66	0.022	15.01
44	2031	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.017	11.51	0.020	13.70
45	2032	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.015	10.46	0.018	12.51
46	2033	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.014	9.51	0.016	11.42
47	2034	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.012	8.65	0.015	10.42
48	2035	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.011	26.92	0.014	32.57
49	2036	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.010	24.47	0.013	29.73
50	2037	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	6.50	0.011	7.92
51	2038	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	5.91	0.010	7.23
52	2039	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.008	5.37	0.010	6.60
53	2040	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.007	4.88	0.009	6.03
54	2041	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.44	0.008	5.50
55	2042	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.03	0.007	5.02
56	2043	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.67	0.007	4.58
57	2044	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.33	0.006	4.18
58	2045	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	3.03	0.006	3.82
59	2046	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	2.76	0.005	3.49
*TOTAL*		10156.10	575.00	10731.10	10925.00	33390.00	1850.00	46165.00	35433.90		-218.03		-0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 105

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	ALTERNATIVE BENEFITS		TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (12.62%)	NET PRESENT VALUE
					INVESTMENT AND REPLACEMENT	FUEL COST						
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	-170.70	0.909	-155.18	0.888	-151.57
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	-20.90	0.825	-17.27	0.788	-16.48
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.700	-755.07
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	-357.40	0.683	-244.11	0.622	-222.16
6	1993	965.40	0.00	965.40	0.00	0.00	0.00	-965.40	0.621	-599.44	0.552	-532.85
7	1994	1027.20	0.00	1027.20	1260.00	0.00	1260.00	232.80	0.564	131.41	0.490	114.09
8	1995	2843.20	0.00	2843.20	1681.00	0.00	1681.00	-1162.20	0.513	-596.39	0.435	-505.75
9	1996	1828.00	0.00	1828.00	1260.00	0.00	1260.00	-568.00	0.467	-264.98	0.386	-219.47
10	1997	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.424	322.36	0.343	260.79
11	1998	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.388	293.05	0.305	231.86
12	1999	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.350	266.41	0.271	205.61
13	2000	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.319	242.19	0.240	182.57
14	2001	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.290	220.17	0.213	161.11
15	2002	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.263	200.16	0.189	143.94
16	2003	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.239	181.96	0.168	127.81
17	2004	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.218	165.42	0.149	113.48
18	2005	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.198	150.38	0.133	100.77
19	2006	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.180	136.71	0.118	89.47
20	2007	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.164	124.28	0.105	79.45
21	2008	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.149	112.98	0.093	70.54
22	2009	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.135	102.71	0.082	62.64
23	2010	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.123	93.38	0.073	55.62
24	2011	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.112	84.89	0.065	49.38
25	2012	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.102	77.17	0.058	43.85
26	2013	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.092	70.15	0.051	38.94
27	2014	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.084	63.78	0.045	34.57
28	2015	0.00	11.50	11.50	1681.00	734.60	37.00	2452.60	0.076	186.20	0.040	98.59
29	2016	0.00	11.50	11.50	1681.00	734.60	37.00	2452.60	0.069	169.27	0.035	87.54
30	2017	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.063	147.92	0.032	74.20
31	2018	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.057	132.56	0.028	67.49
32	2019	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.052	118.00	0.025	61.08
33	2020	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.047	104.10	0.022	55.64
34	2021	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.043	90.73	0.020	50.94
35	2022	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.039	77.75	0.018	46.85
36	2023	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.036	65.10	0.016	43.16
37	2024	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.032	52.75	0.014	40.00
38	2025	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.029	40.70	0.012	37.36
39	2026	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.027	28.92	0.011	35.16
40	2027	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.024	17.47	0.010	33.47
41	2028	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.022	16.79	0.009	32.25
42	2029	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.020	15.27	0.008	31.47
43	2030	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.018	13.88	0.007	31.16
44	2031	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.017	12.62	0.006	30.38
45	2032	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.015	11.47	0.005	29.61
46	2033	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.014	10.43	0.004	28.88
47	2034	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.012	9.48	0.004	28.19
48	2035	0.00	11.50	11.50	1681.00	734.60	37.00	2452.60	0.011	27.58	0.004	27.44
49	2036	0.00	11.50	11.50	1681.00	734.60	37.00	2452.60	0.010	25.16	0.003	26.64
50	2037	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.009	22.92	0.003	25.84
51	2038	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.008	20.82	0.002	25.04
52	2039	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.007	18.85	0.002	24.24
53	2040	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.006	17.00	0.002	23.44
54	2041	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.006	15.27	0.002	22.64
55	2042	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.005	13.66	0.001	21.84
56	2043	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.005	12.16	0.001	21.04
57	2044	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.004	10.76	0.001	20.24
58	2045	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.004	9.46	0.001	19.44
59	2046	0.00	11.50	11.50	0.00	734.60	37.00	771.60	0.004	8.26	0.001	18.64
*TOTAL*		8463.50	875.00	9038.50	10925.00	36730.00	1850.00	49505.00	40466.50	1068.81		0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 186

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	FUEL COST	BENEFITS OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (13.32%)	NET PRESENT VALUE
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	0.909	-155.18	0.882	-150.64
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	0.00	-20.90	0.826	-17.27	0.779	-15.28
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.687	-742.23
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	0.00	-357.40	0.683	-244.11	0.606	-216.76
6	1993	965.40	0.00	965.40	0.00	0.00	0.00	0.00	-965.40	0.621	-599.44	0.535	-516.70
7	1994	1027.20	0.00	1027.20	1260.00	0.00	0.00	1260.00	232.80	0.564	131.41	0.472	109.96
8	1995	2843.20	0.00	2843.20	1681.00	0.00	0.00	1681.00	-1162.20	0.513	-596.39	0.417	-484.42
9	1996	1828.00	0.00	1828.00	1260.00	0.00	0.00	1260.00	-568.00	0.467	-264.98	0.358	-208.93
10	1997	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.424	350.69	0.325	268.41
11	1998	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.385	318.81	0.286	236.87
12	1999	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.350	289.82	0.253	209.03
13	2000	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.319	263.48	0.223	184.47
14	2001	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.290	239.52	0.197	162.79
15	2002	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.263	217.75	0.174	143.66
16	2003	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.239	197.95	0.153	126.78
17	2004	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.218	179.96	0.135	111.88
18	2005	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.198	163.60	0.119	98.73
19	2006	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.180	148.73	0.105	87.13
20	2007	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.164	135.21	0.093	76.89
21	2008	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.149	122.91	0.082	67.85
22	2009	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.135	111.74	0.072	59.88
23	2010	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.123	101.58	0.064	52.84
24	2011	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.112	92.35	0.056	46.63
25	2012	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.102	83.95	0.050	41.15
26	2013	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.092	76.32	0.044	36.32
27	2014	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.084	69.38	0.039	32.05
28	2015	0.00	11.50	11.50	1681.00	801.40	37.00	2519.40	2507.90	0.076	191.30	0.034	85.77
29	2016	0.00	11.50	11.50	1681.00	801.40	37.00	2519.40	2507.90	0.069	173.91	0.030	75.89
30	2017	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.063	52.13	0.027	22.02
31	2018	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.057	47.39	0.024	19.44
32	2019	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.052	43.08	0.021	17.15
33	2020	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.047	39.16	0.018	15.14
34	2021	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.043	35.60	0.016	13.36
35	2022	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.039	32.37	0.014	11.79
36	2023	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.036	29.42	0.013	10.40
37	2024	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.032	26.75	0.011	9.18
38	2025	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.029	24.32	0.010	8.10
39	2026	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.027	22.11	0.009	7.15
40	2027	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.024	20.10	0.008	6.31
41	2028	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.022	18.27	0.007	5.57
42	2029	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.020	16.61	0.006	4.91
43	2030	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.018	15.10	0.005	4.34
44	2031	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.017	13.73	0.005	3.83
45	2032	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.015	12.48	0.004	3.38
46	2033	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.014	11.34	0.004	2.98
47	2034	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.012	10.31	0.003	2.63
48	2035	0.00	11.50	11.50	1681.00	801.40	37.00	2519.40	2507.90	0.011	28.44	0.003	7.04
49	2036	0.00	11.50	11.50	1681.00	801.40	37.00	2519.40	2507.90	0.010	25.85	0.002	6.21
50	2037	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.009	7.75	0.002	1.81
51	2038	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.009	7.04	0.002	1.59
52	2039	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.008	6.40	0.002	1.41
53	2040	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.007	5.82	0.002	1.24
54	2041	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.006	5.29	0.001	1.10
55	2042	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.006	4.81	0.001	0.97
56	2043	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.005	4.37	0.001	0.85
57	2044	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.005	3.98	0.001	0.75
58	2045	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.004	3.61	0.001	0.66
59	2046	0.00	11.50	11.50	0.00	801.40	37.00	838.40	826.90	0.004	3.29	0.001	0.59
*TOTAL*		8463.50	575.00	9038.50	10925.00	40070.00	1850.00	52845.00	43806.50		1377.78		-0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 107

MILLION \$

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	FUEL COST	ALTERNATIVE OPERATION AND MAINTENANCE	BENEFITS TOTAL	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (11.76%)	NET PRESENT VALUE
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	0.00	-170.70	0.909	-155.18	0.895	-152.74
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	0.00	-20.90	0.826	-17.27	0.801	-16.73
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.716	-773.67
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	0.00	-357.40	0.683	-244.11	0.641	-229.09
6	1993	965.40	0.00	965.40	0.00	0.00	0.00	0.00	-965.40	0.621	-599.44	0.574	-553.68
7	1994	1027.20	0.00	1027.20	1260.00	0.00	0.00	1260.00	132.80	0.564	131.41	0.513	119.47
8	1995	2843.20	0.00	2843.20	1581.00	0.00	0.00	1581.00	-1182.20	0.513	-595.39	0.459	-553.65
9	1996	1828.00	0.00	1828.00	1260.00	0.00	0.00	1260.00	-568.00	0.467	-264.98	0.411	-233.36
10	1997	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.424	294.03	0.368	254.87
11	1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.385	267.30	0.329	228.05
12	1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.350	243.00	0.294	204.05
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.263	182.58
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.236	163.37
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.211	146.17
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.189	130.79
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.169	117.03
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.151	104.71
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.135	93.69
20	2007	0.00	11.50	11.50	-122.00	647.90	35.90	683.80	560.30	0.164	89.98	0.121	66.54
21	2008	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.149	99.93	0.108	72.74
22	2009	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.135	90.85	0.097	65.09
23	2010	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.123	82.59	0.087	58.24
24	2011	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.112	75.08	0.078	52.11
25	2012	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.102	68.26	0.069	46.62
26	2013	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.092	62.08	0.062	41.72
27	2014	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.084	56.41	0.056	37.33
28	2015	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.076	178.65	0.050	114.41
29	2016	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.069	159.69	0.044	102.37
30	2017	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.063	42.38	0.040	26.74
31	2018	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.057	38.53	0.036	23.93
32	2019	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.052	35.03	0.032	21.41
33	2020	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.047	31.84	0.028	19.16
34	2021	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.043	28.95	0.025	17.14
35	2022	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.039	26.32	0.023	15.34
36	2023	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.036	23.92	0.020	13.72
37	2024	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.032	21.75	0.018	12.28
38	2025	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.029	19.77	0.016	10.99
39	2026	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.027	17.97	0.015	9.83
40	2027	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.024	16.34	0.013	8.80
41	2028	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.022	14.85	0.012	7.87
42	2029	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.020	13.50	0.010	7.04
43	2030	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.018	12.28	0.009	6.30
44	2031	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.017	11.16	0.008	5.64
45	2032	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.015	10.15	0.008	5.04
46	2033	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.014	9.22	0.007	4.51
47	2034	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.012	8.38	0.006	4.04
48	2035	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.011	26.11	0.005	12.38
49	2036	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.010	23.74	0.005	11.08
50	2037	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.009	6.30	0.004	2.89
51	2038	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.009	5.73	0.004	2.59
52	2039	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.008	5.21	0.003	2.32
53	2040	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.007	4.73	0.003	2.07
54	2041	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.006	4.30	0.003	1.85
55	2042	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.005	3.91	0.002	1.66
56	2043	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.005	3.56	0.002	1.48
57	2044	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.004	3.20	0.002	1.33
58	2045	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.004	2.94	0.002	1.19
59	2046	0.00	11.50	11.50	0.00	647.90	35.90	683.80	572.30	0.004	2.67	0.002	1.06
*TOTAL*		8463.50	575.00	9038.50	10601.40	32594.00	1806.00	45001.40	38962.90		694.52		0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 108

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS		TOTAL COSTS	ALTERNATIVE INVESTMENT AND REPLACEMENT		FUEL COST	OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (11.81%)	NET PRESENT VALUE
			OPERATION AND MAINTENANCE	TOTAL COSTS		INVESTMENT AND REPLACEMENT	FUEL COST								
1	1988	170.70	0.00	170.70	0.00	0.00	0.00	0.00	0.00	-170.70	1.000	-170.70	1.000	-170.70	
2	1989	170.70	0.00	170.70	0.00	0.00	0.00	0.00	0.00	-170.70	0.909	-155.18	0.894	-152.66	
3	1990	20.90	0.00	20.90	0.00	0.00	0.00	0.00	0.00	-20.90	0.826	-17.27	0.800	-15.72	
4	1991	1080.00	0.00	1080.00	0.00	0.00	0.00	0.00	0.00	-1080.00	0.751	-811.42	0.715	-772.57	
5	1992	357.40	0.00	357.40	0.00	0.00	0.00	0.00	0.00	-357.40	0.683	-244.11	0.640	-228.65	
6	1993	955.40	0.00	955.40	0.00	0.00	0.00	0.00	0.00	-955.40	0.621	-599.44	0.572	-552.37	
7	1994	1027.20	0.00	1027.20	1260.00	0.00	0.00	0.00	1260.00	232.80	0.564	131.41	0.512	119.13	
8	1995	2843.20	0.00	2843.20	1581.00	0.00	0.00	0.00	1581.00	-1162.20	0.513	-596.39	0.458	-531.87	
9	1996	1828.00	0.00	1828.00	1260.00	0.00	0.00	0.00	1260.00	-568.00	0.467	-264.98	0.409	-232.48	
10	1997	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.424	294.03	0.366	253.78		
11	1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.385	267.30	0.327	226.97		
12	1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.350	243.00	0.293	202.99		
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.262	181.54		
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.234	162.36		
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.209	145.20		
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.187	129.86		
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.168	116.14		
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.150	103.87		
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.134	92.89		
20	2007	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.164	113.36	0.120	83.08		
21	2008	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.149	103.06	0.107	74.30		
22	2009	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.135	93.69	0.096	66.45		
23	2010	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.123	85.17	0.085	59.43		
24	2011	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.112	77.43	0.077	53.15		
25	2012	0.00	11.50	11.50	-122.00	647.90	35.90	561.80	550.30	0.102	55.87	0.069	37.73		
26	2013	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.092	62.05	0.061	41.22		
27	2014	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.084	56.41	0.055	36.87		
28	2015	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.076	175.56	0.049	112.95		
29	2016	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.069	159.69	0.044	101.01		
30	2017	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.063	42.38	0.039	26.37		
31	2018	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.057	38.53	0.035	23.59		
32	2019	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.052	35.03	0.031	21.10		
33	2020	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.047	31.84	0.028	18.87		
34	2021	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.043	28.95	0.025	16.87		
35	2022	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.039	26.32	0.022	15.09		
36	2023	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.036	23.92	0.020	13.50		
37	2024	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.032	21.75	0.018	12.07		
38	2025	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.029	19.77	0.016	10.79		
39	2026	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.027	17.97	0.014	9.65		
40	2027	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.024	16.34	0.013	8.63		
41	2028	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.022	14.85	0.011	7.72		
42	2029	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.020	13.50	0.010	6.91		
43	2030	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.018	12.28	0.009	6.18		
44	2031	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.017	11.16	0.008	5.52		
45	2032	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.015	10.15	0.007	4.94		
46	2033	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.014	9.22	0.007	4.42		
47	2034	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.012	8.38	0.006	3.95		
48	2035	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.011	26.11	0.005	12.10		
49	2036	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.010	23.74	0.005	10.83		
50	2037	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.009	6.30	0.004	2.83		
51	2038	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.009	5.73	0.004	2.53		
52	2039	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.008	5.21	0.003	2.26		
53	2040	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.007	4.73	0.003	2.02		
54	2041	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.006	4.30	0.003	1.81		
55	2042	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.006	3.91	0.002	1.62		
56	2043	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.005	3.56	0.002	1.45		
57	2044	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.005	3.23	0.002	1.29		
58	2045	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.004	2.94	0.002	1.16		
59	2046	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.004	2.67	0.002	1.03		
*TOTAL*		8463.50	575.00	9038.50	10601.40	32693.50	1811.50	45106.40	36067.90			716.40		0.00	

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 109

MILLION RS

NO. YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	ALTERNATIVE FUEL COST	BENEFITS OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (9.55%)	NET PRESENT VALUE
1 1988	187.80	0.00	187.80	0.00	0.00	0.00	0.00	-187.80	1.000	-187.80	1.000	-187.80
2 1989	187.80	0.00	187.80	0.00	0.00	0.00	0.00	-187.80	0.909	-170.73	0.913	-171.43
3 1990	23.00	0.00	23.00	0.00	0.00	0.00	0.00	-23.00	0.826	-19.01	0.833	-19.17
4 1991	1188.00	0.00	1188.00	0.00	0.00	0.00	0.00	-1188.00	0.751	-892.56	0.761	-903.67
5 1992	393.10	0.00	393.10	0.00	0.00	0.00	0.00	-393.10	0.683	-268.49	0.694	-272.96
6 1993	1061.90	0.00	1061.90	0.00	0.00	0.00	0.00	-1061.90	0.621	-659.36	0.634	-673.09
7 1994	1129.90	0.00	1129.90	0.00	0.00	0.00	0.00	-1129.90	0.564	-637.80	0.579	-653.77
8 1995	3127.50	0.00	3127.50	1260.00	0.00	0.00	1260.00	-1867.50	0.513	-958.32	0.528	-986.38
9 1996	2010.80	0.00	2010.80	1681.00	0.00	0.00	1681.00	-329.80	0.467	-153.85	0.482	-159.01
10 1997	0.00	11.50	11.50	1260.00	0.00	0.00	1260.00	1248.50	0.424	529.49	0.440	549.50
11 1998	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.386	267.30	0.402	278.55
12 1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.350	243.00	0.367	254.27
13 2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.335	232.11
14 2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.308	211.88
15 2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.279	193.41
16 2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.255	175.56
17 2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.232	161.17
18 2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.212	147.12
19 2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.194	134.30
20 2007	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.164	113.36	0.177	122.60
21 2008	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.149	103.06	0.161	111.91
22 2009	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.135	93.69	0.147	102.16
23 2010	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.123	85.17	0.135	93.25
24 2011	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.112	77.43	0.123	85.13
25 2012	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.102	70.39	0.112	77.71
26 2013	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.092	63.99	0.102	70.93
27 2014	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.084	58.17	0.093	64.75
28 2015	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.076	181.11	0.085	202.43
29 2016	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.069	164.64	0.078	184.79
30 2017	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.063	43.71	0.071	49.26
31 2018	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.057	39.73	0.065	44.96
32 2019	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.052	36.12	0.059	41.04
33 2020	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.047	32.84	0.054	37.47
34 2021	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.043	29.85	0.049	34.20
35 2022	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.039	27.14	0.045	31.22
36 2023	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.036	24.67	0.041	28.50
37 2024	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.032	22.43	0.038	25.02
38 2025	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.029	20.39	0.034	23.75
39 2026	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.027	18.54	0.031	21.68
40 2027	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.024	16.85	0.029	19.79
41 2028	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.022	15.32	0.026	18.06
42 2029	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.020	13.93	0.024	16.49
43 2030	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.018	12.66	0.022	15.05
44 2031	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.017	11.51	0.020	13.74
45 2032	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.015	10.46	0.018	12.54
46 2033	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.014	9.51	0.017	11.45
47 2034	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.012	8.65	0.015	10.45
48 2035	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.011	26.92	0.014	32.68
49 2036	0.00	11.50	11.50	1681.00	667.80	37.00	2385.80	2374.30	0.010	24.47	0.013	29.83
50 2037	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	6.50	0.011	7.95
51 2038	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.009	5.91	0.010	7.26
52 2039	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.008	5.37	0.010	6.63
53 2040	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.007	4.88	0.009	6.05
54 2041	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.44	0.008	5.52
55 2042	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.006	4.03	0.007	5.04
56 2043	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.67	0.007	4.60
57 2044	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.005	3.33	0.006	4.20
58 2045	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	3.03	0.006	3.83
59 2046	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.004	2.76	0.005	3.50
*TOTAL*	9309.80	575.00	9884.80	10925.00	32722.20	1813.00	45460.20	35575.40		-224.55		-0.01



ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 110

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	INVESTMENT AND REPLACEMENT	ALTERNATIVE FUEL COST	BENEFITS OPERATION AND MAINTENANCE	TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00X)	NET PRESENT VALUE	DISCOUNT FACTOR (7.85X)	NET PRESENT VALUE
1	1988	204.80	0.00	204.80	0.00	0.00	0.00	0.00	-204.80	1.000	-204.80	1.000	-204.80
2	1989	204.80	0.00	204.80	0.00	0.00	0.00	0.00	-204.80	0.909	-185.18	0.927	-189.87
3	1990	25.10	0.00	25.10	0.00	0.00	0.00	0.00	-25.10	0.826	-20.74	0.860	-21.57
4	1991	1296.00	0.00	1296.00	0.00	0.00	0.00	0.00	-1296.00	0.751	-973.70	0.797	-1032.73
5	1992	428.90	0.00	428.90	0.00	0.00	0.00	0.00	-428.90	0.683	-292.94	0.739	-316.86
6	1993	1158.50	0.00	1158.50	0.00	0.00	0.00	0.00	-1158.50	0.621	-719.34	0.685	-793.48
7	1994	1232.60	0.00	1232.60	0.00	0.00	0.00	0.00	-1232.60	0.564	-695.77	0.635	-782.69
8	1995	3411.80	0.00	3411.80	0.00	0.00	0.00	0.00	-3411.80	0.513	-1750.79	0.589	-2008.52
9	1996	2193.60	0.00	2193.60	1260.00	0.00	0.00	1260.00	-933.60	0.467	-435.53	0.546	-509.54
10	1997	0.00	11.50	11.50	1681.00	0.00	0.00	1681.00	1669.50	0.424	708.03	0.506	844.76
11	1998	0.00	11.50	11.50	1260.00	0.00	0.00	1260.00	1248.50	0.386	481.35	0.469	585.69
12	1999	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.350	243.00	0.435	301.53
13	2000	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.319	220.91	0.403	279.55
14	2001	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.290	200.82	0.374	259.17
15	2002	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.263	182.57	0.347	240.28
16	2003	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.239	165.97	0.321	222.76
17	2004	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.218	150.88	0.298	206.52
18	2005	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.198	137.17	0.276	191.47
19	2006	0.00	11.50	11.50	0.00	667.80	37.00	704.80	693.30	0.180	124.70	0.255	177.51
20	2007	0.00	11.50	11.50	-122.00	647.90	35.90	561.80	550.30	0.164	89.98	0.237	130.62
21	2008	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.149	99.93	0.220	147.95
22	2009	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.135	90.85	0.204	137.17
23	2010	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.123	82.89	0.189	127.17
24	2011	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.112	75.08	0.175	117.90
25	2012	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.102	68.26	0.163	109.30
26	2013	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.092	62.05	0.151	101.33
27	2014	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.084	56.41	0.140	93.95
28	2015	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.076	175.66	0.130	298.35
29	2016	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.069	159.69	0.120	276.60
30	2017	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.063	42.38	0.111	74.86
31	2018	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.057	38.53	0.103	69.41
32	2019	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.052	35.03	0.096	64.35
33	2020	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.047	31.84	0.089	59.65
34	2021	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.043	28.95	0.082	55.31
35	2022	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.039	26.32	0.076	51.27
36	2023	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.036	23.92	0.071	47.54
37	2024	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.032	21.75	0.066	44.07
38	2025	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.029	19.77	0.061	40.86
39	2026	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.027	17.97	0.056	37.88
40	2027	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.024	16.34	0.052	35.12
41	2028	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.022	14.85	0.048	32.56
42	2029	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.020	13.50	0.045	30.19
43	2030	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.018	12.28	0.042	27.96
44	2031	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.017	11.16	0.039	25.94
45	2032	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.015	10.15	0.036	24.05
46	2033	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.014	9.22	0.033	22.30
47	2034	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.012	8.38	0.031	20.67
48	2035	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.011	26.11	0.029	65.66
49	2036	0.00	11.50	11.50	1630.60	647.90	35.90	2314.40	2302.90	0.010	23.74	0.026	60.87
50	2037	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.009	6.30	0.025	16.47
51	2038	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.009	5.73	0.023	15.27
52	2039	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.008	5.21	0.021	14.16
53	2040	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.007	4.73	0.020	13.13
54	2041	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.006	4.30	0.018	12.17
55	2042	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.006	3.91	0.017	11.28
56	2043	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.005	3.56	0.016	10.46
57	2044	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.005	3.23	0.014	9.70
58	2045	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.004	2.94	0.013	8.99
59	2046	0.00	11.50	11.50	0.00	647.90	35.90	683.80	672.30	0.004	2.67	0.012	8.34
*TOTAL*		10156.10	575.00	10731.10	10601.40	31258.40	1732.00	43591.80	32860.70		-1229.14		-0.00

ECONOMIC INTERNAL RATE OF RETURN BASED UPON ALTERNATIVE FACILITY

CASE - 111

MILLION RS

NO.	YEAR	INVESTMENT AND REPLACEMENT	COSTS OPERATION AND MAINTENANCE	TOTAL COSTS	ALTERNATIVE		TOTAL BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (9.22%)	NET PRESENT VALUE
					INVESTMENT AND REPLACEMENT	FUEL COST						
1	1988	204.80	0.00	204.80	0.00	0.00	0.00	-204.80	1.000	-204.80	1.000	-204.80
2	1989	204.80	0.00	204.80	0.00	0.00	0.00	-204.80	0.909	-186.18	0.916	-187.51
3	1990	25.10	0.00	25.10	0.00	0.00	0.00	-25.10	0.826	-20.74	0.838	-21.04
4	1991	1296.00	0.00	1296.00	0.00	0.00	0.00	-1296.00	0.751	-973.70	0.768	-994.69
5	1992	428.90	0.00	428.90	0.00	0.00	0.00	-428.90	0.683	-292.94	0.703	-301.39
6	1993	1158.50	0.00	1158.50	0.00	0.00	0.00	-1158.50	0.621	-719.34	0.643	-745.36
7	1994	1232.60	0.00	1232.60	0.00	0.00	0.00	-1232.60	0.564	-695.77	0.589	-726.09
8	1995	3411.80	0.00	3411.80	0.00	0.00	0.00	-3411.80	0.513	-1750.79	0.539	-1840.11
9	1996	2193.60	0.00	2193.60	1260.00	0.00	1260.00	-933.60	0.467	-435.53	0.494	-461.02
10	1997	0.00	11.50	11.50	1681.00	0.00	1681.00	1669.50	0.424	708.03	0.452	754.81
11	1998	0.00	11.50	11.50	1260.00	0.00	1260.00	1248.50	0.386	481.35	0.414	516.81
12	1999	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.350	313.20	0.379	338.67
13	2000	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.319	284.73	0.347	310.08
14	2001	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.290	258.84	0.318	283.90
15	2002	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.263	235.31	0.291	259.94
16	2003	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.239	213.92	0.256	237.99
17	2004	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.218	194.47	0.244	217.90
18	2005	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.198	176.79	0.223	199.50
19	2006	0.00	11.50	11.50	0.00	868.10	905.10	893.60	0.180	160.72	0.204	181.86
20	2007	0.00	11.50	11.50	-122.00	842.10	36.90	756.00	0.164	121.73	0.187	139.33
21	2008	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.149	128.80	0.171	148.48
22	2009	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.135	117.09	0.157	135.94
23	2010	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.123	106.45	0.144	124.46
24	2011	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.112	96.77	0.132	113.96
25	2012	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.102	87.97	0.120	104.34
26	2013	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.092	79.97	0.110	95.53
27	2014	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.084	72.70	0.101	87.46
28	2015	0.00	11.50	11.50	1630.60	842.10	35.90	2508.60	0.076	190.47	0.092	230.77
29	2016	0.00	11.50	11.50	1630.60	842.10	35.90	2508.60	0.069	173.16	0.085	211.29
30	2017	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.063	54.62	0.077	67.13
31	2018	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.057	49.66	0.071	61.46
32	2019	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.052	45.14	0.065	56.27
33	2020	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.047	41.04	0.059	51.62
34	2021	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.043	37.31	0.054	47.17
35	2022	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.039	33.92	0.050	43.19
36	2023	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.036	30.83	0.046	39.54
37	2024	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.032	28.03	0.042	36.20
38	2025	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.029	25.48	0.038	33.15
39	2026	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.027	23.17	0.035	30.35
40	2027	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.024	21.06	0.032	27.79
41	2028	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.022	19.15	0.029	25.44
42	2029	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.020	17.40	0.027	23.29
43	2030	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.018	15.82	0.025	21.33
44	2031	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.017	14.38	0.023	19.53
45	2032	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.015	13.08	0.021	17.88
46	2033	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.014	11.89	0.019	16.37
47	2034	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.012	10.81	0.017	14.99
48	2035	0.00	11.50	11.50	1630.60	842.10	35.90	2508.60	0.011	28.31	0.016	39.54
49	2036	0.00	11.50	11.50	1630.60	842.10	35.90	2508.60	0.010	25.74	0.014	36.20
50	2037	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.009	6.12	0.013	11.50
51	2038	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.009	7.38	0.012	10.53
52	2039	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.008	6.71	0.011	9.64
53	2040	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.007	6.10	0.010	8.83
54	2041	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.006	5.55	0.009	8.08
55	2042	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.006	5.04	0.009	7.40
56	2043	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.005	4.58	0.008	6.78
57	2044	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.005	4.17	0.007	6.20
58	2045	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.004	3.79	0.007	5.68
59	2046	0.00	11.50	11.50	0.00	842.10	35.90	878.00	0.004	3.44	0.006	5.20
*TOTAL*		10156.10	578.00	10731.10	10601.40	40628.80	1732.00	52962.20	42231.10	-475.59		0.00

### VI.3 FIRR Calculation Sheet for Sensitivity Analysis

- CASE 501 Realization of Project benefits is delayed one year due to construction delays (however, the disbursement schedule is the same as for base case)
- CASE 502 Realization of Project benefits is delayed two years due to construction delays (however, disbursement is the same as for base case)
- CASE 503 10% cost over-run for initial construction cost
- CASE 504 20% cost over-run for initial construction cost
- CASE 505 Reduction of system loss is not 10%, but 15%
- CASE 506 Kotmale dam is raised after 10 years of operation of the Project
- CASE 507 Kotmale dam is raised after 15 years of operation of the Project
- CASE 508 i) and iii) occur together
- CASE 509 ii) and iv) occur together
- CASE 510 3% deduction of Business Turnover Tax from revenues

FINANCIAL EVALUATION

CASE - 501

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR ( 8.41%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	176.00	0.00	176.00	0.00	-176.00	1.000	-176.00	1.000	-176.00
2	1989	176.00	0.00	176.00	0.00	-176.00	0.909	-160.00	0.922	-162.34
3	1990	22.00	0.00	22.00	0.00	-22.00	0.826	-18.18	0.851	-18.72
4	1991	1014.40	0.00	1014.40	0.00	-1014.40	0.751	-762.13	0.785	-796.11
5	1992	421.00	0.00	421.00	0.00	-421.00	0.683	-287.55	0.724	-304.77
6	1993	1139.80	0.00	1139.80	0.00	-1139.80	0.621	-707.73	0.668	-761.09
7	1994	1248.90	0.00	1248.90	0.00	-1248.90	0.564	-704.97	0.616	-769.24
8	1995	3407.80	0.00	3407.80	0.00	-3407.80	0.513	-1748.74	0.568	-1936.10
9	1996	2194.10	0.00	2194.10	0.00	-2194.10	0.467	-1023.56	0.524	-1149.82
10	1997	0.00	13.40	13.40	0.00	-13.40	0.424	-5.68	0.483	-6.48
11	1998	0.00	13.40	13.40	1092.20	1078.80	0.386	415.92	0.446	481.02
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.411	443.69
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.379	409.26
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.350	377.51
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.323	348.22
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.298	321.20
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.275	295.27
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.253	273.28
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.234	252.08
20	2007	0.00	13.40	13.40	1092.20	1078.80	0.164	176.39	0.216	232.52
21	2008	0.00	13.40	13.40	1092.20	1078.80	0.149	160.36	0.199	214.48
22	2009	0.00	13.40	13.40	1092.20	1078.80	0.135	145.78	0.183	197.83
23	2010	0.00	13.40	13.40	1092.20	1078.80	0.123	132.53	0.169	182.48
24	2011	0.00	13.40	13.40	1092.20	1078.80	0.112	120.48	0.156	168.32
25	2012	0.00	13.40	13.40	1092.20	1078.80	0.102	109.53	0.144	155.26
26	2013	0.00	13.40	13.40	1092.20	1078.80	0.092	99.57	0.133	143.22
27	2014	0.00	13.40	13.40	1092.20	1078.80	0.084	90.52	0.122	132.10
28	2015	0.00	13.40	13.40	1092.20	1078.80	0.076	82.29	0.113	121.85
29	2016	0.00	13.40	13.40	1092.20	1078.80	0.069	74.81	0.104	112.40
30	2017	0.00	13.40	13.40	1092.20	1078.80	0.063	68.01	0.096	103.68
31	2018	0.00	13.40	13.40	1092.20	1078.80	0.057	61.82	0.089	95.63
32	2019	0.00	13.40	13.40	1092.20	1078.80	0.052	56.20	0.082	88.21
33	2020	0.00	13.40	13.40	1092.20	1078.80	0.047	51.09	0.075	81.37
34	2021	0.00	13.40	13.40	1092.20	1078.80	0.043	46.45	0.070	75.05
35	2022	0.00	13.40	13.40	1092.20	1078.80	0.039	42.23	0.064	69.23
36	2023	0.00	13.40	13.40	1092.20	1078.80	0.036	38.39	0.059	63.86
37	2024	0.00	13.40	13.40	1092.20	1078.80	0.032	34.90	0.055	58.90
38	2025	0.00	13.40	13.40	1092.20	1078.80	0.029	31.73	0.050	54.33
39	2026	0.00	13.40	13.40	1092.20	1078.80	0.027	28.84	0.046	50.12
40	2027	0.00	13.40	13.40	1092.20	1078.80	0.024	26.22	0.043	46.23
41	2028	0.00	13.40	13.40	1092.20	1078.80	0.022	23.84	0.040	42.64
42	2029	0.00	13.40	13.40	1092.20	1078.80	0.020	21.67	0.036	39.33
43	2030	0.00	13.40	13.40	1092.20	1078.80	0.018	19.70	0.034	36.28
44	2031	0.00	13.40	13.40	1092.20	1078.80	0.017	17.91	0.031	33.46
45	2032	0.00	13.40	13.40	1092.20	1078.80	0.015	16.28	0.029	30.87
46	2033	0.00	13.40	13.40	1092.20	1078.80	0.014	14.80	0.026	28.47
47	2034	0.00	13.40	13.40	1092.20	1078.80	0.012	13.45	0.024	26.26
48	2035	0.00	13.40	13.40	1092.20	1078.80	0.011	12.23	0.022	24.23
49	2036	0.00	13.40	13.40	1092.20	1078.80	0.010	11.12	0.021	22.35
50	2037	0.00	13.40	13.40	1092.20	1078.80	0.009	10.11	0.019	20.61
51	2038	0.00	13.40	13.40	1092.20	1078.80	0.009	9.19	0.018	19.01
52	2039	0.00	13.40	13.40	1092.20	1078.80	0.008	8.35	0.016	17.54
53	2040	0.00	13.40	13.40	1092.20	1078.80	0.007	7.59	0.015	16.18
54	2041	0.00	13.40	13.40	1092.20	1078.80	0.006	6.90	0.014	14.92
55	2042	0.00	13.40	13.40	1092.20	1078.80	0.006	6.28	0.013	13.76
56	2043	0.00	13.40	13.40	1092.20	1078.80	0.005	5.71	0.012	12.70
57	2044	0.00	13.40	13.40	1092.20	1078.80	0.005	5.19	0.011	11.71
58	2045	0.00	13.40	13.40	1092.20	1078.80	0.004	4.72	0.010	10.80
59	2046	0.00	13.40	13.40	1092.20	1078.80	0.004	4.29	0.009	9.96
*TOTAL*		9800.00	670.00	10470.00	53517.80	43047.80		-1062.26		-0.00

FINANCIAL EVALUATION

CASE - 502

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (7.86%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	176.00	0.00	176.00	0.00	-176.00	1.000	-176.00	1.000	-176.00
2	1989	176.00	0.00	176.00	0.00	-176.00	0.909	-160.00	0.927	-163.17
3	1990	22.00	0.00	22.00	0.00	-22.00	0.826	-18.18	0.860	-18.91
4	1991	1014.40	0.00	1014.40	0.00	-1014.40	0.751	-762.13	0.797	-808.38
5	1992	421.00	0.00	421.00	0.00	-421.00	0.683	-287.55	0.739	-311.04
6	1993	1139.80	0.00	1139.80	0.00	-1139.80	0.621	-707.73	0.685	-780.74
7	1994	1248.90	0.00	1248.90	0.00	-1248.90	0.564	-704.97	0.635	-793.12
8	1995	3407.80	0.00	3407.80	0.00	-3407.80	0.513	-1748.74	0.589	-2006.41
9	1996	2194.10	0.00	2194.10	0.00	-2194.10	0.467	-1023.56	0.546	-1197.67
10	1997	0.00	13.40	13.40	0.00	-13.40	0.424	-5.68	0.506	-6.78
11	1998	0.00	13.40	13.40	0.00	-13.40	0.386	-5.17	0.469	-6.29
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.435	469.28
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.403	435.07
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.374	403.36
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.347	373.97
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.321	346.71
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.298	321.44
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.276	298.02
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.256	276.30
20	2007	0.00	13.40	13.40	1092.20	1078.80	0.164	176.39	0.237	256.16
21	2008	0.00	13.40	13.40	1092.20	1078.80	0.149	160.36	0.220	237.49
22	2009	0.00	13.40	13.40	1092.20	1078.80	0.135	145.78	0.204	220.18
23	2010	0.00	13.40	13.40	1092.20	1078.80	0.123	132.53	0.189	204.13
24	2011	0.00	13.40	13.40	1092.20	1078.80	0.112	120.48	0.175	189.26
25	2012	0.00	13.40	13.40	1092.20	1078.80	0.102	109.53	0.163	175.46
26	2013	0.00	13.40	13.40	1092.20	1078.80	0.092	99.57	0.151	162.67
27	2014	0.00	13.40	13.40	1092.20	1078.80	0.084	90.52	0.140	150.82
28	2015	0.00	13.40	13.40	1092.20	1078.80	0.076	82.29	0.130	139.83
29	2016	0.00	13.40	13.40	1092.20	1078.80	0.069	74.81	0.120	129.64
30	2017	0.00	13.40	13.40	1092.20	1078.80	0.063	68.01	0.111	120.19
31	2018	0.00	13.40	13.40	1092.20	1078.80	0.057	61.82	0.103	111.43
32	2019	0.00	13.40	13.40	1092.20	1078.80	0.052	56.20	0.096	103.31
33	2020	0.00	13.40	13.40	1092.20	1078.80	0.047	51.09	0.089	95.78
34	2021	0.00	13.40	13.40	1092.20	1078.80	0.043	46.45	0.082	88.80
35	2022	0.00	13.40	13.40	1092.20	1078.80	0.039	42.23	0.076	82.33
36	2023	0.00	13.40	13.40	1092.20	1078.80	0.036	38.39	0.071	76.33
37	2024	0.00	13.40	13.40	1092.20	1078.80	0.032	34.90	0.066	70.76
38	2025	0.00	13.40	13.40	1092.20	1078.80	0.029	31.73	0.061	65.61
39	2026	0.00	13.40	13.40	1092.20	1078.80	0.027	28.84	0.056	60.82
40	2027	0.00	13.40	13.40	1092.20	1078.80	0.024	26.22	0.052	56.39
41	2028	0.00	13.40	13.40	1092.20	1078.80	0.022	23.84	0.048	52.28
42	2029	0.00	13.40	13.40	1092.20	1078.80	0.020	21.67	0.045	48.47
43	2030	0.00	13.40	13.40	1092.20	1078.80	0.018	19.70	0.042	44.94
44	2031	0.00	13.40	13.40	1092.20	1078.80	0.017	17.91	0.039	41.66
45	2032	0.00	13.40	13.40	1092.20	1078.80	0.015	16.28	0.036	38.63
46	2033	0.00	13.40	13.40	1092.20	1078.80	0.014	14.80	0.033	35.81
47	2034	0.00	13.40	13.40	1092.20	1078.80	0.012	13.45	0.031	33.20
48	2035	0.00	13.40	13.40	1092.20	1078.80	0.011	12.23	0.029	30.78
49	2036	0.00	13.40	13.40	1092.20	1078.80	0.010	11.12	0.026	28.54
50	2037	0.00	13.40	13.40	1092.20	1078.80	0.009	10.11	0.025	26.46
51	2038	0.00	13.40	13.40	1092.20	1078.80	0.009	9.19	0.023	24.53
52	2039	0.00	13.40	13.40	1092.20	1078.80	0.008	8.35	0.021	22.74
53	2040	0.00	13.40	13.40	1092.20	1078.80	0.007	7.59	0.020	21.08
54	2041	0.00	13.40	13.40	1092.20	1078.80	0.006	6.90	0.018	19.55
55	2042	0.00	13.40	13.40	1092.20	1078.80	0.006	6.28	0.017	18.12
56	2043	0.00	13.40	13.40	1092.20	1078.80	0.005	5.71	0.016	16.80
57	2044	0.00	13.40	13.40	1092.20	1078.80	0.005	5.19	0.014	15.58
58	2045	0.00	13.40	13.40	1092.20	1078.80	0.004	4.72	0.013	14.44
59	2046	0.00	13.40	13.40	1092.20	1078.80	0.004	4.29	0.012	13.39
*TOTAL*		9800.00	670.00	10470.00	52425.60	41955.60		-1483.35		0.00

FINANCIAL EVALUATION

CASE - 503

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR ( 8.32%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	193.60	0.00	193.60	0.00	-193.60	1.000	-193.60	1.000	-193.60
2	1989	193.60	0.00	193.60	0.00	-193.60	0.909	-176.00	0.923	-178.73
3	1990	24.20	0.00	24.20	0.00	-24.20	0.826	-20.00	0.852	-20.62
4	1991	1115.80	0.00	1115.80	0.00	-1115.80	0.751	-838.32	0.787	-877.90
5	1992	463.10	0.00	463.10	0.00	-463.10	0.683	-316.30	0.726	-336.37
6	1993	1253.80	0.00	1253.80	0.00	-1253.80	0.621	-778.51	0.671	-840.73
7	1994	1373.80	0.00	1373.80	0.00	-1373.80	0.564	-775.47	0.619	-850.43
8	1995	3748.60	0.00	3748.60	0.00	-3748.60	0.513	-1923.62	0.571	-2142.25
9	1996	2413.50	0.00	2413.50	0.00	-2413.50	0.467	-1125.92	0.528	-1273.31
10	1997	0.00	13.40	13.40	1092.20	1078.80	0.424	457.52	0.487	525.43
11	1998	0.00	13.40	13.40	1092.20	1078.80	0.386	415.92	0.450	485.07
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.415	447.80
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.383	413.40
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.354	381.64
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.327	352.33
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.302	325.26
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.278	300.27
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.257	277.21
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.237	255.91
20	2007	0.00	13.40	13.40	1092.20	1078.80	0.164	176.39	0.219	236.25
21	2008	0.00	13.40	13.40	1092.20	1078.80	0.149	160.36	0.202	218.10
22	2009	0.00	13.40	13.40	1092.20	1078.80	0.135	145.78	0.187	201.35
23	2010	0.00	13.40	13.40	1092.20	1078.80	0.123	132.53	0.172	185.88
24	2011	0.00	13.40	13.40	1092.20	1078.80	0.112	120.48	0.159	171.60
25	2012	0.00	13.40	13.40	1092.20	1078.80	0.102	109.53	0.147	158.42
26	2013	0.00	13.40	13.40	1092.20	1078.80	0.092	99.57	0.136	146.25
27	2014	0.00	13.40	13.40	1092.20	1078.80	0.084	90.52	0.125	135.01
28	2015	0.00	13.40	13.40	1092.20	1078.80	0.076	82.29	0.116	124.64
29	2016	0.00	13.40	13.40	1092.20	1078.80	0.069	74.81	0.107	115.07
30	2017	0.00	13.40	13.40	1092.20	1078.80	0.063	68.01	0.098	106.23
31	2018	0.00	13.40	13.40	1092.20	1078.80	0.057	61.82	0.091	98.07
32	2019	0.00	13.40	13.40	1092.20	1078.80	0.052	56.20	0.084	90.53
33	2020	0.00	13.40	13.40	1092.20	1078.80	0.047	51.09	0.077	83.58
34	2021	0.00	13.40	13.40	1092.20	1078.80	0.043	46.45	0.072	77.16
35	2022	0.00	13.40	13.40	1092.20	1078.80	0.039	42.23	0.066	71.23
36	2023	0.00	13.40	13.40	1092.20	1078.80	0.036	38.39	0.061	65.76
37	2024	0.00	13.40	13.40	1092.20	1078.80	0.032	34.90	0.056	60.71
38	2025	0.00	13.40	13.40	1092.20	1078.80	0.029	31.73	0.052	56.04
39	2026	0.00	13.40	13.40	1092.20	1078.80	0.027	28.84	0.048	51.74
40	2027	0.00	13.40	13.40	1092.20	1078.80	0.024	26.22	0.044	47.76
41	2028	0.00	13.40	13.40	1092.20	1078.80	0.022	23.84	0.041	44.09
42	2029	0.00	13.40	13.40	1092.20	1078.80	0.020	21.67	0.038	40.71
43	2030	0.00	13.40	13.40	1092.20	1078.80	0.018	19.70	0.035	37.58
44	2031	0.00	13.40	13.40	1092.20	1078.80	0.017	17.91	0.032	34.69
45	2032	0.00	13.40	13.40	1092.20	1078.80	0.015	16.28	0.030	32.03
46	2033	0.00	13.40	13.40	1092.20	1078.80	0.014	14.80	0.027	29.57
47	2034	0.00	13.40	13.40	1092.20	1078.80	0.012	13.45	0.025	27.30
48	2035	0.00	13.40	13.40	1092.20	1078.80	0.011	12.23	0.023	25.20
49	2036	0.00	13.40	13.40	1092.20	1078.80	0.010	11.12	0.022	23.26
50	2037	0.00	13.40	13.40	1092.20	1078.80	0.009	10.11	0.020	21.48
51	2038	0.00	13.40	13.40	1092.20	1078.80	0.009	9.19	0.018	19.83
52	2039	0.00	13.40	13.40	1092.20	1078.80	0.008	8.35	0.017	18.30
53	2040	0.00	13.40	13.40	1092.20	1078.80	0.007	7.59	0.016	16.90
54	2041	0.00	13.40	13.40	1092.20	1078.80	0.006	6.90	0.014	15.60
55	2042	0.00	13.40	13.40	1092.20	1078.80	0.006	6.28	0.013	14.40
56	2043	0.00	13.40	13.40	1092.20	1078.80	0.005	5.71	0.012	13.29
57	2044	0.00	13.40	13.40	1092.20	1078.80	0.005	5.19	0.011	12.27
58	2045	0.00	13.40	13.40	1092.20	1078.80	0.004	4.72	0.011	11.33
59	2046	0.00	13.40	13.40	1092.20	1078.80	0.004	4.29	0.010	10.46
*TOTAL*		10780.00	670.00	11460.00	54610.00	43160.00		-1157.94		-0.00

FINANCIAL EVALUATION  
CASE - 504

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (7.68%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	211.20	0.00	211.20	0.00	-211.20	1.000	-211.20	1.000	-211.20
2	1989	211.20	0.00	211.20	0.00	-211.20	0.909	-192.00	0.929	-196.14
3	1990	26.40	0.00	26.40	0.00	-26.40	0.826	-21.82	0.862	-22.77
4	1991	1217.30	0.00	1217.30	0.00	-1217.30	0.751	-914.58	0.801	-974.99
5	1992	505.20	0.00	505.20	0.00	-505.20	0.683	-345.06	0.744	-375.78
6	1993	1367.80	0.00	1367.80	0.00	-1367.80	0.621	-849.30	0.691	-944.84
7	1994	1498.70	0.00	1498.70	0.00	-1498.70	0.564	-845.98	0.642	-961.43
8	1995	4089.30	0.00	4089.30	0.00	-4089.30	0.513	-2098.46	0.596	-2436.25
9	1996	2632.90	0.00	2632.90	0.00	-2632.90	0.467	-1228.27	0.553	-1456.71
10	1997	0.00	13.40	13.40	1092.20	1078.80	0.424	457.52	0.514	554.30
11	1998	0.00	13.40	13.40	1092.20	1078.80	0.386	415.92	0.477	514.77
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.443	478.06
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.412	443.97
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.382	412.30
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.355	382.90
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.330	355.59
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.306	330.23
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.284	306.68
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.264	284.81
20	2007	0.00	13.40	13.40	1092.20	1078.80	0.164	176.39	0.245	264.50
21	2008	0.00	13.40	13.40	1092.20	1078.80	0.149	160.36	0.228	245.64
22	2009	0.00	13.40	13.40	1092.20	1078.80	0.135	145.78	0.211	228.12
23	2010	0.00	13.40	13.40	1092.20	1078.80	0.123	132.53	0.196	211.85
24	2011	0.00	13.40	13.40	1092.20	1078.80	0.112	120.48	0.182	196.74
25	2012	0.00	13.40	13.40	1092.20	1078.80	0.102	109.53	0.169	182.71
26	2013	0.00	13.40	13.40	1092.20	1078.80	0.092	99.57	0.157	169.68
27	2014	0.00	13.40	13.40	1092.20	1078.80	0.084	90.52	0.146	157.58
28	2015	0.00	13.40	13.40	1092.20	1078.80	0.076	82.29	0.136	146.34
29	2016	0.00	13.40	13.40	1092.20	1078.80	0.069	74.81	0.126	135.90
30	2017	0.00	13.40	13.40	1092.20	1078.80	0.063	68.01	0.117	126.21
31	2018	0.00	13.40	13.40	1092.20	1078.80	0.057	61.82	0.109	117.21
32	2019	0.00	13.40	13.40	1092.20	1078.80	0.052	56.20	0.101	108.85
33	2020	0.00	13.40	13.40	1092.20	1078.80	0.047	51.09	0.094	101.09
34	2021	0.00	13.40	13.40	1092.20	1078.80	0.043	46.45	0.087	93.88
35	2022	0.00	13.40	13.40	1092.20	1078.80	0.039	42.23	0.081	87.18
36	2023	0.00	13.40	13.40	1092.20	1078.80	0.036	38.39	0.075	80.97
37	2024	0.00	13.40	13.40	1092.20	1078.80	0.032	34.90	0.070	75.19
38	2025	0.00	13.40	13.40	1092.20	1078.80	0.029	31.73	0.065	69.83
39	2026	0.00	13.40	13.40	1092.20	1078.80	0.027	28.84	0.060	64.85
40	2027	0.00	13.40	13.40	1092.20	1078.80	0.024	26.22	0.056	60.22
41	2028	0.00	13.40	13.40	1092.20	1078.80	0.022	23.84	0.052	55.93
42	2029	0.00	13.40	13.40	1092.20	1078.80	0.020	21.67	0.048	51.94
43	2030	0.00	13.40	13.40	1092.20	1078.80	0.018	19.70	0.045	48.24
44	2031	0.00	13.40	13.40	1092.20	1078.80	0.017	17.91	0.042	44.80
45	2032	0.00	13.40	13.40	1092.20	1078.80	0.015	16.28	0.039	41.60
46	2033	0.00	13.40	13.40	1092.20	1078.80	0.014	14.80	0.036	38.63
47	2034	0.00	13.40	13.40	1092.20	1078.80	0.012	13.45	0.033	35.88
48	2035	0.00	13.40	13.40	1092.20	1078.80	0.011	12.23	0.031	33.32
49	2036	0.00	13.40	13.40	1092.20	1078.80	0.010	11.12	0.029	30.94
50	2037	0.00	13.40	13.40	1092.20	1078.80	0.009	10.11	0.027	28.74
51	2038	0.00	13.40	13.40	1092.20	1078.80	0.009	9.19	0.025	26.69
52	2039	0.00	13.40	13.40	1092.20	1078.80	0.008	8.35	0.023	24.78
53	2040	0.00	13.40	13.40	1092.20	1078.80	0.007	7.59	0.021	23.02
54	2041	0.00	13.40	13.40	1092.20	1078.80	0.006	6.90	0.020	21.38
55	2042	0.00	13.40	13.40	1092.20	1078.80	0.006	6.28	0.018	19.85
56	2043	0.00	13.40	13.40	1092.20	1078.80	0.005	5.71	0.017	18.44
57	2044	0.00	13.40	13.40	1092.20	1078.80	0.005	5.19	0.016	17.12
58	2045	0.00	13.40	13.40	1092.20	1078.80	0.004	4.72	0.015	15.90
59	2046	0.00	13.40	13.40	1092.20	1078.80	0.004	4.29	0.014	14.77
*TOTAL*		11760.00	670.00	12430.00	54610.00	42180.00		-1716.84		-0.00

FINANCIAL EVALUATION

CASE - 505

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR ( 8.61%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	176.00	0.00	176.00	0.00	-176.00	1.000	-176.00	1.000	-176.00
2	1989	176.00	0.00	176.00	0.00	-176.00	0.909	-160.00	0.921	-162.05
3	1990	22.00	0.00	22.00	0.00	-22.00	0.826	-18.18	0.848	-18.65
4	1991	1014.40	0.00	1014.40	0.00	-1014.40	0.751	-762.13	0.781	-791.83
5	1992	421.00	0.00	421.00	0.00	-421.00	0.683	-287.55	0.719	-302.58
6	1993	1139.80	0.00	1139.80	0.00	-1139.80	0.621	-707.73	0.662	-754.28
7	1994	1248.90	0.00	1248.90	0.00	-1248.90	0.564	-704.97	0.609	-760.98
8	1995	3407.80	0.00	3407.80	0.00	-3407.80	0.513	-1748.74	0.561	-1911.87
9	1996	2194.10	0.00	2194.10	0.00	-2194.10	0.467	-1023.56	0.517	-1133.40
10	1997	0.00	13.40	13.40	1031.50	1018.10	0.424	431.77	0.476	484.24
11	1998	0.00	13.40	13.40	1031.50	1018.10	0.386	392.52	0.438	445.86
12	1999	0.00	13.40	13.40	1031.50	1018.10	0.350	356.84	0.403	410.52
13	2000	0.00	13.40	13.40	1031.50	1018.10	0.319	324.40	0.371	377.99
14	2001	0.00	13.40	13.40	1031.50	1018.10	0.290	294.91	0.342	348.03
15	2002	0.00	13.40	13.40	1031.50	1018.10	0.263	268.10	0.315	320.45
16	2003	0.00	13.40	13.40	1031.50	1018.10	0.239	243.73	0.290	295.05
17	2004	0.00	13.40	13.40	1031.50	1018.10	0.218	221.57	0.267	271.67
18	2005	0.00	13.40	13.40	1031.50	1018.10	0.198	201.43	0.246	250.14
19	2006	0.00	13.40	13.40	1031.50	1018.10	0.180	183.11	0.226	230.32
20	2007	0.00	13.40	13.40	1031.50	1018.10	0.164	166.47	0.208	212.06
21	2008	0.00	13.40	13.40	1031.50	1018.10	0.149	151.33	0.192	195.26
22	2009	0.00	13.40	13.40	1031.50	1018.10	0.135	137.58	0.177	179.78
23	2010	0.00	13.40	13.40	1031.50	1018.10	0.123	125.07	0.163	165.53
24	2011	0.00	13.40	13.40	1031.50	1018.10	0.112	113.70	0.150	152.42
25	2012	0.00	13.40	13.40	1031.50	1018.10	0.102	103.36	0.138	140.34
26	2013	0.00	13.40	13.40	1031.50	1018.10	0.092	93.97	0.127	129.21
27	2014	0.00	13.40	13.40	1031.50	1018.10	0.084	85.42	0.117	118.97
28	2015	0.00	13.40	13.40	1031.50	1018.10	0.076	77.66	0.108	109.54
29	2016	0.00	13.40	13.40	1031.50	1018.10	0.069	70.60	0.099	100.86
30	2017	0.00	13.40	13.40	1031.50	1018.10	0.063	64.18	0.091	92.87
31	2018	0.00	13.40	13.40	1031.50	1018.10	0.057	58.35	0.084	85.51
32	2019	0.00	13.40	13.40	1031.50	1018.10	0.052	53.04	0.077	78.73
33	2020	0.00	13.40	13.40	1031.50	1018.10	0.047	48.22	0.071	72.49
34	2021	0.00	13.40	13.40	1031.50	1018.10	0.043	43.84	0.066	66.75
35	2022	0.00	13.40	13.40	1031.50	1018.10	0.039	39.85	0.060	61.46
36	2023	0.00	13.40	13.40	1031.50	1018.10	0.036	36.23	0.056	56.59
37	2024	0.00	13.40	13.40	1031.50	1018.10	0.032	32.93	0.051	52.10
38	2025	0.00	13.40	13.40	1031.50	1018.10	0.029	29.94	0.047	47.97
39	2026	0.00	13.40	13.40	1031.50	1018.10	0.027	27.22	0.043	44.17
40	2027	0.00	13.40	13.40	1031.50	1018.10	0.024	24.74	0.040	40.67
41	2028	0.00	13.40	13.40	1031.50	1018.10	0.022	22.49	0.037	37.45
42	2029	0.00	13.40	13.40	1031.50	1018.10	0.020	20.45	0.034	34.48
43	2030	0.00	13.40	13.40	1031.50	1018.10	0.018	18.59	0.031	31.75
44	2031	0.00	13.40	13.40	1031.50	1018.10	0.017	16.90	0.029	29.23
45	2032	0.00	13.40	13.40	1031.50	1018.10	0.015	15.36	0.026	26.91
46	2033	0.00	13.40	13.40	1031.50	1018.10	0.014	13.97	0.024	24.78
47	2034	0.00	13.40	13.40	1031.50	1018.10	0.012	12.70	0.022	22.82
48	2035	0.00	13.40	13.40	1031.50	1018.10	0.011	11.54	0.021	21.01
49	2036	0.00	13.40	13.40	1031.50	1018.10	0.010	10.49	0.019	19.34
50	2037	0.00	13.40	13.40	1031.50	1018.10	0.009	9.54	0.017	17.81
51	2038	0.00	13.40	13.40	1031.50	1018.10	0.009	8.67	0.016	16.40
52	2039	0.00	13.40	13.40	1031.50	1018.10	0.008	7.88	0.015	15.10
53	2040	0.00	13.40	13.40	1031.50	1018.10	0.007	7.17	0.014	13.90
54	2041	0.00	13.40	13.40	1031.50	1018.10	0.006	6.52	0.013	12.80
55	2042	0.00	13.40	13.40	1031.50	1018.10	0.006	5.92	0.012	11.79
56	2043	0.00	13.40	13.40	1031.50	1018.10	0.005	5.39	0.011	10.85
57	2044	0.00	13.40	13.40	1031.50	1018.10	0.005	4.90	0.010	9.99
58	2045	0.00	13.40	13.40	1031.50	1018.10	0.004	4.45	0.009	9.20
59	2046	0.00	13.40	13.40	1031.50	1018.10	0.004	4.05	0.008	8.47
*TOTAL*		9800.00	670.00	10470.00	51575.00	41105.00		-879.82		0.01



FINANCIAL EVALUATION  
CASE - 506

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR ( 8.96%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	176.00	0.00	176.00	0.00	-176.00	1.000	-176.00	1.000	-176.00
2	1989	176.00	0.00	176.00	0.00	-176.00	0.909	-160.00	0.918	-161.53
3	1990	22.00	0.00	22.00	0.00	-22.00	0.826	-18.18	0.842	-18.53
4	1991	1014.40	0.00	1014.40	0.00	-1014.40	0.751	-762.13	0.773	-784.14
5	1992	421.00	0.00	421.00	0.00	-421.00	0.683	-287.55	0.709	-298.67
6	1993	1139.80	0.00	1139.80	0.00	-1139.80	0.621	-707.73	0.651	-742.11
7	1994	1248.90	0.00	1248.90	0.00	-1248.90	0.564	-704.97	0.598	-746.27
8	1995	3407.80	0.00	3407.80	0.00	-3407.80	0.513	-1748.74	0.548	-1868.82
9	1996	2194.10	0.00	2194.10	0.00	-2194.10	0.467	-1023.56	0.503	-1104.27
10	1997	0.00	13.40	13.40	1092.20	1078.80	0.424	457.52	0.462	498.30
11	1998	0.00	13.40	13.40	1092.20	1078.80	0.386	415.92	0.424	457.32
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.389	419.71
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.357	385.19
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.328	353.51
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.301	324.44
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.276	297.75
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.253	273.26
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.232	250.79
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.213	230.16
20	2007	0.00	13.40	13.40	1059.40	1046.00	0.164	171.03	0.196	204.81
21	2008	0.00	13.40	13.40	1059.40	1046.00	0.149	155.48	0.180	187.97
22	2009	0.00	13.40	13.40	1059.40	1046.00	0.135	141.35	0.165	172.51
23	2010	0.00	13.40	13.40	1059.40	1046.00	0.123	128.50	0.151	158.32
24	2011	0.00	13.40	13.40	1059.40	1046.00	0.112	116.82	0.139	145.30
25	2012	0.00	13.40	13.40	1059.40	1046.00	0.102	106.20	0.127	133.35
26	2013	0.00	13.40	13.40	1059.40	1046.00	0.092	96.54	0.117	122.38
27	2014	0.00	13.40	13.40	1059.40	1046.00	0.084	87.77	0.107	112.32
28	2015	0.00	13.40	13.40	1059.40	1046.00	0.076	79.79	0.099	103.08
29	2016	0.00	13.40	13.40	1059.40	1046.00	0.069	72.53	0.090	94.60
30	2017	0.00	13.40	13.40	1059.40	1046.00	0.063	65.94	0.083	86.82
31	2018	0.00	13.40	13.40	1059.40	1046.00	0.057	59.94	0.076	79.68
32	2019	0.00	13.40	13.40	1059.40	1046.00	0.052	54.50	0.070	73.13
33	2020	0.00	13.40	13.40	1059.40	1046.00	0.047	49.54	0.064	67.11
34	2021	0.00	13.40	13.40	1059.40	1046.00	0.043	45.04	0.059	61.59
35	2022	0.00	13.40	13.40	1059.40	1046.00	0.039	40.94	0.054	56.53
36	2023	0.00	13.40	13.40	1059.40	1046.00	0.036	37.22	0.050	51.88
37	2024	0.00	13.40	13.40	1059.40	1046.00	0.032	33.84	0.046	47.61
38	2025	0.00	13.40	13.40	1059.40	1046.00	0.029	30.76	0.042	43.70
39	2026	0.00	13.40	13.40	1059.40	1046.00	0.027	27.96	0.038	40.10
40	2027	0.00	13.40	13.40	1059.40	1046.00	0.024	25.42	0.035	36.81
41	2028	0.00	13.40	13.40	1059.40	1046.00	0.022	23.11	0.032	33.78
42	2029	0.00	13.40	13.40	1059.40	1046.00	0.020	21.01	0.030	31.00
43	2030	0.00	13.40	13.40	1059.40	1046.00	0.018	19.10	0.027	28.45
44	2031	0.00	13.40	13.40	1059.40	1046.00	0.017	17.36	0.025	26.11
45	2032	0.00	13.40	13.40	1059.40	1046.00	0.015	15.79	0.023	23.96
46	2033	0.00	13.40	13.40	1059.40	1046.00	0.014	14.35	0.021	21.99
47	2034	0.00	13.40	13.40	1059.40	1046.00	0.012	13.05	0.019	20.18
48	2035	0.00	13.40	13.40	1059.40	1046.00	0.011	11.86	0.018	18.52
49	2036	0.00	13.40	13.40	1059.40	1046.00	0.010	10.78	0.016	17.00
50	2037	0.00	13.40	13.40	1059.40	1046.00	0.009	9.80	0.015	15.60
51	2038	0.00	13.40	13.40	1059.40	1046.00	0.009	8.91	0.014	14.32
52	2039	0.00	13.40	13.40	1059.40	1046.00	0.008	8.10	0.013	13.14
53	2040	0.00	13.40	13.40	1059.40	1046.00	0.007	7.36	0.012	12.06
54	2041	0.00	13.40	13.40	1059.40	1046.00	0.006	6.69	0.011	11.07
55	2042	0.00	13.40	13.40	1059.40	1046.00	0.006	6.09	0.010	10.16
56	2043	0.00	13.40	13.40	1059.40	1046.00	0.005	5.53	0.009	9.32
57	2044	0.00	13.40	13.40	1059.40	1046.00	0.005	5.03	0.008	8.56
58	2045	0.00	13.40	13.40	1059.40	1046.00	0.004	4.57	0.008	7.85
59	2046	0.00	13.40	13.40	1059.40	1046.00	0.004	4.16	0.007	7.21
*TOTAL*		9800.00	670.00	10470.00	53298.00	42828.00		-656.75		-0.00

FINANCIAL EVALUATION

CASE - 507

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (9.00%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	176.00	0.00	176.00	0.00	-176.00	1.000	-176.00	1.000	-176.00
2	1989	176.00	0.00	176.00	0.00	-176.00	0.909	-160.00	0.917	-161.47
3	1990	22.00	0.00	22.00	0.00	-22.00	0.826	-18.18	0.842	-18.52
4	1991	1014.40	0.00	1014.40	0.00	-1014.40	0.751	-762.13	0.772	-783.34
5	1992	421.00	0.00	421.00	0.00	-421.00	0.683	-287.55	0.708	-298.27
6	1993	1139.80	0.00	1139.80	0.00	-1139.80	0.621	-707.73	0.650	-740.85
7	1994	1248.90	0.00	1248.90	0.00	-1248.90	0.564	-704.97	0.596	-744.75
8	1995	3407.80	0.00	3407.80	0.00	-3407.80	0.513	-1748.74	0.547	-1864.39
9	1996	2194.10	0.00	2194.10	0.00	-2194.10	0.467	-1023.56	0.502	-1101.29
10	1997	0.00	13.40	13.40	1092.20	1078.80	0.424	457.52	0.460	496.78
11	1998	0.00	13.40	13.40	1092.20	1078.80	0.386	415.92	0.422	455.77
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.388	418.14
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.356	383.63
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.326	351.96
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.299	322.90
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.275	296.24
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.252	271.79
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.231	249.35
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.212	228.77
20	2007	0.00	13.40	13.40	1092.20	1078.80	0.164	176.39	0.195	209.88
21	2008	0.00	13.40	13.40	1092.20	1078.80	0.149	160.36	0.178	192.55
22	2009	0.00	13.40	13.40	1092.20	1078.80	0.135	145.78	0.164	176.66
23	2010	0.00	13.40	13.40	1092.20	1078.80	0.123	132.53	0.150	162.07
24	2011	0.00	13.40	13.40	1092.20	1078.80	0.112	120.48	0.138	148.69
25	2012	0.00	13.40	13.40	1059.40	1046.00	0.102	106.20	0.126	132.27
26	2013	0.00	13.40	13.40	1059.40	1046.00	0.092	96.54	0.116	121.35
27	2014	0.00	13.40	13.40	1059.40	1046.00	0.084	87.77	0.106	111.33
28	2015	0.00	13.40	13.40	1059.40	1046.00	0.076	79.79	0.098	102.14
29	2016	0.00	13.40	13.40	1059.40	1046.00	0.069	72.53	0.090	93.71
30	2017	0.00	13.40	13.40	1059.40	1046.00	0.063	65.94	0.082	85.97
31	2018	0.00	13.40	13.40	1059.40	1046.00	0.057	59.94	0.075	78.88
32	2019	0.00	13.40	13.40	1059.40	1046.00	0.052	54.50	0.069	72.36
33	2020	0.00	13.40	13.40	1059.40	1046.00	0.047	49.54	0.063	66.39
34	2021	0.00	13.40	13.40	1059.40	1046.00	0.043	45.04	0.058	60.91
35	2022	0.00	13.40	13.40	1059.40	1046.00	0.039	40.94	0.053	55.88
36	2023	0.00	13.40	13.40	1059.40	1046.00	0.036	37.22	0.049	51.27
37	2024	0.00	13.40	13.40	1059.40	1046.00	0.032	33.84	0.045	47.04
38	2025	0.00	13.40	13.40	1059.40	1046.00	0.029	30.76	0.041	43.15
39	2026	0.00	13.40	13.40	1059.40	1046.00	0.027	27.96	0.038	39.59
40	2027	0.00	13.40	13.40	1059.40	1046.00	0.024	25.42	0.035	36.32
41	2028	0.00	13.40	13.40	1059.40	1046.00	0.022	23.11	0.032	33.32
42	2029	0.00	13.40	13.40	1059.40	1046.00	0.020	21.01	0.029	30.57
43	2030	0.00	13.40	13.40	1059.40	1046.00	0.018	19.10	0.027	28.05
44	2031	0.00	13.40	13.40	1059.40	1046.00	0.017	17.36	0.025	25.73
45	2032	0.00	13.40	13.40	1059.40	1046.00	0.015	15.79	0.023	23.61
46	2033	0.00	13.40	13.40	1059.40	1046.00	0.014	14.35	0.021	21.66
47	2034	0.00	13.40	13.40	1059.40	1046.00	0.012	13.05	0.019	19.87
48	2035	0.00	13.40	13.40	1059.40	1046.00	0.011	11.86	0.017	18.23
49	2036	0.00	13.40	13.40	1059.40	1046.00	0.010	10.78	0.016	16.73
50	2037	0.00	13.40	13.40	1059.40	1046.00	0.009	9.80	0.015	15.35
51	2038	0.00	13.40	13.40	1059.40	1046.00	0.009	8.91	0.013	14.08
52	2039	0.00	13.40	13.40	1059.40	1046.00	0.008	8.10	0.012	12.92
53	2040	0.00	13.40	13.40	1059.40	1046.00	0.007	7.36	0.011	11.85
54	2041	0.00	13.40	13.40	1059.40	1046.00	0.006	6.69	0.010	10.87
55	2042	0.00	13.40	13.40	1059.40	1046.00	0.006	6.09	0.010	9.97
56	2043	0.00	13.40	13.40	1059.40	1046.00	0.005	5.53	0.009	9.15
57	2044	0.00	13.40	13.40	1059.40	1046.00	0.005	5.03	0.008	8.40
58	2045	0.00	13.40	13.40	1059.40	1046.00	0.004	4.57	0.007	7.70
59	2046	0.00	13.40	13.40	1059.40	1046.00	0.004	4.16	0.007	7.07
*TOTAL*		9800.00	670.00	10470.00	53462.00	42992.00		-634.38		-0.00

FINANCIAL EVALUATION  
CASE - 508

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (7.75%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	193.60	0.00	193.60	0.00	-193.60	1.000	-193.60	1.000	-193.60
2	1989	193.60	0.00	193.60	0.00	-193.60	0.909	-176.00	0.928	-179.68
3	1990	24.20	0.00	24.20	0.00	-24.20	0.826	-20.00	0.861	-20.84
4	1991	1115.80	0.00	1115.80	0.00	-1115.80	0.751	-838.32	0.799	-891.99
5	1992	463.10	0.00	463.10	0.00	-463.10	0.683	-316.30	0.742	-343.59
6	1993	1253.80	0.00	1253.80	0.00	-1253.80	0.621	-778.51	0.689	-863.35
7	1994	1373.80	0.00	1373.80	0.00	-1373.80	0.564	-775.47	0.639	-877.95
8	1995	3748.60	0.00	3748.60	0.00	-3748.60	0.513	-1923.62	0.593	-2223.35
9	1996	2413.50	0.00	2413.50	0.00	-2413.50	0.467	-1125.92	0.550	-1328.55
10	1997	0.00	13.40	13.40	0.00	-13.40	0.424	-5.68	0.511	-6.85
11	1998	0.00	13.40	13.40	1092.20	1078.80	0.386	415.92	0.474	511.51
12	1999	0.00	13.40	13.40	1092.20	1078.80	0.350	378.11	0.440	474.73
13	2000	0.00	13.40	13.40	1092.20	1078.80	0.319	343.74	0.408	440.59
14	2001	0.00	13.40	13.40	1092.20	1078.80	0.290	312.49	0.379	408.91
15	2002	0.00	13.40	13.40	1092.20	1078.80	0.263	284.08	0.352	379.51
16	2003	0.00	13.40	13.40	1092.20	1078.80	0.239	258.26	0.326	352.22
17	2004	0.00	13.40	13.40	1092.20	1078.80	0.218	234.78	0.303	326.89
18	2005	0.00	13.40	13.40	1092.20	1078.80	0.198	213.44	0.281	303.38
19	2006	0.00	13.40	13.40	1092.20	1078.80	0.180	194.03	0.261	281.57
20	2007	0.00	13.40	13.40	1092.20	1078.80	0.164	176.39	0.242	261.32
21	2008	0.00	13.40	13.40	1092.20	1078.80	0.149	160.36	0.225	242.53
22	2009	0.00	13.40	13.40	1092.20	1078.80	0.135	145.78	0.209	225.09
23	2010	0.00	13.40	13.40	1092.20	1078.80	0.123	132.53	0.194	208.90
24	2011	0.00	13.40	13.40	1092.20	1078.80	0.112	120.48	0.180	193.88
25	2012	0.00	13.40	13.40	1092.20	1078.80	0.102	109.53	0.167	179.94
26	2013	0.00	13.40	13.40	1092.20	1078.80	0.092	99.57	0.155	167.00
27	2014	0.00	13.40	13.40	1092.20	1078.80	0.084	90.52	0.144	154.99
28	2015	0.00	13.40	13.40	1092.20	1078.80	0.076	82.29	0.133	143.85
29	2016	0.00	13.40	13.40	1092.20	1078.80	0.069	74.81	0.124	133.50
30	2017	0.00	13.40	13.40	1092.20	1078.80	0.063	68.01	0.115	123.90
31	2018	0.00	13.40	13.40	1092.20	1078.80	0.057	61.82	0.107	114.99
32	2019	0.00	13.40	13.40	1092.20	1078.80	0.052	56.20	0.099	106.73
33	2020	0.00	13.40	13.40	1092.20	1078.80	0.047	51.09	0.092	99.05
34	2021	0.00	13.40	13.40	1092.20	1078.80	0.043	46.45	0.085	91.93
35	2022	0.00	13.40	13.40	1092.20	1078.80	0.039	42.23	0.079	85.32
36	2023	0.00	13.40	13.40	1092.20	1078.80	0.036	38.39	0.073	79.18
37	2024	0.00	13.40	13.40	1092.20	1078.80	0.032	34.90	0.068	73.49
38	2025	0.00	13.40	13.40	1092.20	1078.80	0.029	31.73	0.063	68.20
39	2026	0.00	13.40	13.40	1092.20	1078.80	0.027	28.84	0.059	63.30
40	2027	0.00	13.40	13.40	1092.20	1078.80	0.024	26.22	0.054	58.75
41	2028	0.00	13.40	13.40	1092.20	1078.80	0.022	23.84	0.051	54.52
42	2029	0.00	13.40	13.40	1092.20	1078.80	0.020	21.67	0.047	50.60
43	2030	0.00	13.40	13.40	1092.20	1078.80	0.018	19.70	0.044	46.96
44	2031	0.00	13.40	13.40	1092.20	1078.80	0.017	17.91	0.040	43.59
45	2032	0.00	13.40	13.40	1092.20	1078.80	0.015	16.28	0.037	40.45
46	2033	0.00	13.40	13.40	1092.20	1078.80	0.014	14.80	0.035	37.54
47	2034	0.00	13.40	13.40	1092.20	1078.80	0.012	13.45	0.032	34.84
48	2035	0.00	13.40	13.40	1092.20	1078.80	0.011	12.23	0.030	32.34
49	2036	0.00	13.40	13.40	1092.20	1078.80	0.010	11.12	0.028	30.01
50	2037	0.00	13.40	13.40	1092.20	1078.80	0.009	10.11	0.026	27.86
51	2038	0.00	13.40	13.40	1092.20	1078.80	0.009	9.19	0.024	25.85
52	2039	0.00	13.40	13.40	1092.20	1078.80	0.008	8.35	0.022	23.99
53	2040	0.00	13.40	13.40	1092.20	1078.80	0.007	7.59	0.021	22.27
54	2041	0.00	13.40	13.40	1092.20	1078.80	0.006	6.90	0.019	20.67
55	2042	0.00	13.40	13.40	1092.20	1078.80	0.006	6.28	0.018	19.18
56	2043	0.00	13.40	13.40	1092.20	1078.80	0.005	5.71	0.017	17.80
57	2044	0.00	13.40	13.40	1092.20	1078.80	0.005	5.19	0.015	16.52
58	2045	0.00	13.40	13.40	1092.20	1078.80	0.004	4.72	0.014	15.33
59	2046	0.00	13.40	13.40	1092.20	1078.80	0.004	4.29	0.013	14.23
*TOTAL*		10780.00	670.00	11450.00	53517.80	42067.80		-1621.14		-0.01

FINANCIAL EVALUATION

CASE - 509

(UNIT - MILLION RS)

NO.	YEAR	COSTS			BENEFITS	BENEFITS -COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR (6.48%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE	TOTAL COSTS						
1	1988	211.20	0.00	211.20	0.00	-211.20	1.000	-211.20	1.000	-211.20
2	1989	211.20	0.00	211.20	0.00	-211.20	0.909	-192.00	0.939	-198.35
3	1990	26.40	0.00	26.40	0.00	-26.40	0.826	-21.82	0.882	-23.29
4	1991	1217.90	0.00	1217.90	0.00	-1217.30	0.751	-914.68	0.828	-1008.37
5	1992	505.20	0.00	505.20	0.00	-505.20	0.683	-345.06	0.778	-393.03
6	1993	1367.80	0.00	1367.80	0.00	-1367.80	0.621	-849.30	0.731	-999.37
7	1994	1498.70	0.00	1498.70	0.00	-1498.70	0.564	-845.98	0.686	-1028.40
8	1995	4089.30	0.00	4089.30	0.00	-4089.30	0.513	-2098.46	0.644	-2635.33
9	1996	2632.90	0.00	2632.90	0.00	-2632.90	0.467	-1228.27	0.605	-1593.54
10	1997	0.00	13.40	13.40	0.00	-13.40	0.424	-5.68	0.568	-7.62
11	1998	0.00	13.40	13.40	0.00	-13.40	0.386	-5.17	0.534	-7.15
12	1999	0.00	13.40	13.40	1031.50	1018.10	0.350	356.84	0.501	510.44
13	2000	0.00	13.40	13.40	1031.50	1018.10	0.319	324.40	0.471	479.38
14	2001	0.00	13.40	13.40	1031.50	1018.10	0.290	294.91	0.442	450.22
15	2002	0.00	13.40	13.40	1031.50	1018.10	0.263	268.10	0.415	422.83
16	2003	0.00	13.40	13.40	1031.50	1018.10	0.239	243.73	0.390	397.10
17	2004	0.00	13.40	13.40	1031.50	1018.10	0.218	221.57	0.366	372.95
18	2005	0.00	13.40	13.40	1031.50	1018.10	0.198	201.43	0.344	350.26
19	2006	0.00	13.40	13.40	1031.50	1018.10	0.180	183.11	0.323	328.95
20	2007	0.00	13.40	13.40	1059.40	1046.00	0.164	171.03	0.303	317.40
21	2008	0.00	13.40	13.40	1059.40	1046.00	0.149	155.48	0.285	298.09
22	2009	0.00	13.40	13.40	1059.40	1046.00	0.135	141.35	0.268	279.96
23	2010	0.00	13.40	13.40	1059.40	1046.00	0.123	128.50	0.251	262.93
24	2011	0.00	13.40	13.40	1059.40	1046.00	0.112	116.82	0.236	246.93
25	2012	0.00	13.40	13.40	1059.40	1046.00	0.102	106.20	0.222	231.91
26	2013	0.00	13.40	13.40	1059.40	1046.00	0.092	96.54	0.208	217.80
27	2014	0.00	13.40	13.40	1059.40	1046.00	0.084	87.77	0.196	204.56
28	2015	0.00	13.40	13.40	1059.40	1046.00	0.076	79.79	0.184	192.10
29	2016	0.00	13.40	13.40	1059.40	1046.00	0.069	72.53	0.172	180.42
30	2017	0.00	13.40	13.40	1059.40	1046.00	0.063	65.94	0.162	169.44
31	2018	0.00	13.40	13.40	1059.40	1046.00	0.057	59.94	0.152	159.13
32	2019	0.00	13.40	13.40	1059.40	1046.00	0.052	54.50	0.143	149.45
33	2020	0.00	13.40	13.40	1059.40	1046.00	0.047	49.54	0.134	140.36
34	2021	0.00	13.40	13.40	1059.40	1046.00	0.043	45.04	0.126	131.82
35	2022	0.00	13.40	13.40	1059.40	1046.00	0.039	40.94	0.118	123.80
36	2023	0.00	13.40	13.40	1059.40	1046.00	0.036	37.22	0.111	116.27
37	2024	0.00	13.40	13.40	1059.40	1046.00	0.032	33.84	0.104	109.20
38	2025	0.00	13.40	13.40	1059.40	1046.00	0.029	30.76	0.098	102.55
39	2026	0.00	13.40	13.40	1059.40	1046.00	0.027	27.96	0.092	96.31
40	2027	0.00	13.40	13.40	1059.40	1046.00	0.024	25.42	0.086	90.45
41	2028	0.00	13.40	13.40	1059.40	1046.00	0.022	23.11	0.081	84.95
42	2029	0.00	13.40	13.40	1059.40	1046.00	0.020	21.01	0.076	79.78
43	2030	0.00	13.40	13.40	1059.40	1046.00	0.018	19.10	0.072	74.93
44	2031	0.00	13.40	13.40	1059.40	1046.00	0.017	17.36	0.067	70.37
45	2032	0.00	13.40	13.40	1059.40	1046.00	0.015	15.79	0.063	66.09
46	2033	0.00	13.40	13.40	1059.40	1046.00	0.014	14.35	0.059	62.07
47	2034	0.00	13.40	13.40	1059.40	1046.00	0.012	13.05	0.056	58.29
48	2035	0.00	13.40	13.40	1059.40	1046.00	0.011	11.86	0.052	54.76
49	2036	0.00	13.40	13.40	1059.40	1046.00	0.010	10.78	0.049	51.42
50	2037	0.00	13.40	13.40	1059.40	1046.00	0.009	9.80	0.046	48.29
51	2038	0.00	13.40	13.40	1059.40	1046.00	0.009	8.91	0.043	45.35
52	2039	0.00	13.40	13.40	1059.40	1046.00	0.008	8.10	0.041	42.59
53	2040	0.00	13.40	13.40	1059.40	1046.00	0.007	7.36	0.038	40.00
54	2041	0.00	13.40	13.40	1059.40	1046.00	0.006	6.69	0.036	37.57
55	2042	0.00	13.40	13.40	1059.40	1046.00	0.006	6.09	0.034	35.28
56	2043	0.00	13.40	13.40	1059.40	1046.00	0.005	5.53	0.032	33.13
57	2044	0.00	13.40	13.40	1059.40	1046.00	0.005	5.03	0.030	31.12
58	2045	0.00	13.40	13.40	1059.40	1046.00	0.004	4.57	0.028	29.23
59	2046	0.00	13.40	13.40	1059.40	1046.00	0.004	4.16	0.026	27.45
*TOTAL*		11760.00	670.00	12430.00	50628.00	38198.00		-2783.67		-0.00

FINANCIAL EVALUATION

CASE - 510

(UNIT - MILLION RS)

NO.	YEAR	COSTS		TOTAL COSTS	BENEFITS	BENEFITS - COSTS	DISCOUNT FACTOR (10.00%)	NET PRESENT VALUE	DISCOUNT FACTOR ( 8.82%)	NET PRESENT VALUE
		INVESTMENT AND REPLACEMENT	OPERATION AND MAINTENANCE							
1	1988	176.00	0.00	176.00	0.00	-176.00	1.000	-176.00	1.000	-176.00
2	1989	176.00	0.00	176.00	0.00	-176.00	0.909	-160.00	0.919	-161.74
3	1990	22.00	0.00	22.00	0.00	-22.00	0.826	-18.18	0.844	-18.58
4	1991	1014.40	0.00	1014.40	0.00	-1014.40	0.751	-762.13	0.776	-787.24
5	1992	421.00	0.00	421.00	0.00	-421.00	0.683	-287.55	0.713	-300.25
6	1993	1139.80	0.00	1139.80	0.00	-1139.80	0.621	-707.73	0.655	-747.01
7	1994	1248.90	0.00	1248.90	0.00	-1248.90	0.564	-704.97	0.602	-752.18
8	1995	3407.80	0.00	3407.80	0.00	-3407.80	0.513	-1748.74	0.553	-1886.11
9	1996	2194.10	0.00	2194.10	0.00	-2194.10	0.467	-1023.56	0.509	-1115.96
10	1997	0.00	13.40	13.40	1059.40	1046.00	0.424	443.61	0.467	488.90
11	1998	0.00	13.40	13.40	1059.40	1046.00	0.386	403.28	0.430	449.29
12	1999	0.00	13.40	13.40	1059.40	1046.00	0.350	366.62	0.395	412.88
13	2000	0.00	13.40	13.40	1059.40	1046.00	0.319	333.29	0.363	379.42
14	2001	0.00	13.40	13.40	1059.40	1046.00	0.290	302.99	0.333	348.68
15	2002	0.00	13.40	13.40	1059.40	1046.00	0.263	275.44	0.306	320.42
16	2003	0.00	13.40	13.40	1059.40	1046.00	0.239	250.40	0.282	294.46
17	2004	0.00	13.40	13.40	1059.40	1046.00	0.218	227.64	0.259	270.59
18	2005	0.00	13.40	13.40	1059.40	1046.00	0.198	206.95	0.238	248.67
19	2006	0.00	13.40	13.40	1059.40	1046.00	0.180	188.13	0.218	228.52
20	2007	0.00	13.40	13.40	1059.40	1046.00	0.164	171.03	0.201	210.00
21	2008	0.00	13.40	13.40	1059.40	1046.00	0.149	155.48	0.184	192.98
22	2009	0.00	13.40	13.40	1059.40	1046.00	0.135	141.35	0.170	177.34
23	2010	0.00	13.40	13.40	1059.40	1046.00	0.123	128.50	0.156	162.97
24	2011	0.00	13.40	13.40	1059.40	1046.00	0.112	116.82	0.143	149.77
25	2012	0.00	13.40	13.40	1059.40	1046.00	0.102	106.20	0.132	137.63
26	2013	0.00	13.40	13.40	1059.40	1046.00	0.092	96.54	0.121	126.48
27	2014	0.00	13.40	13.40	1059.40	1046.00	0.084	87.77	0.111	116.23
28	2015	0.00	13.40	13.40	1059.40	1046.00	0.076	79.79	0.102	106.81
29	2016	0.00	13.40	13.40	1059.40	1046.00	0.069	72.53	0.094	98.15
30	2017	0.00	13.40	13.40	1059.40	1046.00	0.063	65.94	0.086	90.20
31	2018	0.00	13.40	13.40	1059.40	1046.00	0.057	59.94	0.079	82.89
32	2019	0.00	13.40	13.40	1059.40	1046.00	0.052	54.50	0.073	76.17
33	2020	0.00	13.40	13.40	1059.40	1046.00	0.047	49.54	0.067	70.00
34	2021	0.00	13.40	13.40	1059.40	1046.00	0.043	45.04	0.061	64.33
35	2022	0.00	13.40	13.40	1059.40	1046.00	0.039	40.94	0.057	59.12
36	2023	0.00	13.40	13.40	1059.40	1046.00	0.036	37.22	0.052	54.33
37	2024	0.00	13.40	13.40	1059.40	1046.00	0.032	33.84	0.048	49.92
38	2025	0.00	13.40	13.40	1059.40	1046.00	0.029	30.76	0.044	45.88
39	2026	0.00	13.40	13.40	1059.40	1046.00	0.027	27.96	0.040	42.16
40	2027	0.00	13.40	13.40	1059.40	1046.00	0.024	25.42	0.037	38.74
41	2028	0.00	13.40	13.40	1059.40	1046.00	0.022	23.11	0.034	35.60
42	2029	0.00	13.40	13.40	1059.40	1046.00	0.020	21.01	0.031	32.72
43	2030	0.00	13.40	13.40	1059.40	1046.00	0.018	19.10	0.029	30.07
44	2031	0.00	13.40	13.40	1059.40	1046.00	0.017	17.36	0.026	27.63
45	2032	0.00	13.40	13.40	1059.40	1046.00	0.015	15.79	0.024	25.39
46	2033	0.00	13.40	13.40	1059.40	1046.00	0.014	14.35	0.022	23.33
47	2034	0.00	13.40	13.40	1059.40	1046.00	0.012	13.05	0.021	21.44
48	2035	0.00	13.40	13.40	1059.40	1046.00	0.011	11.86	0.019	19.71
49	2036	0.00	13.40	13.40	1059.40	1046.00	0.010	10.78	0.017	18.11
50	2037	0.00	13.40	13.40	1059.40	1046.00	0.009	9.80	0.016	16.64
51	2038	0.00	13.40	13.40	1059.40	1046.00	0.009	8.91	0.015	15.29
52	2039	0.00	13.40	13.40	1059.40	1046.00	0.008	8.10	0.013	14.05
53	2040	0.00	13.40	13.40	1059.40	1046.00	0.007	7.36	0.012	12.91
54	2041	0.00	13.40	13.40	1059.40	1046.00	0.006	6.69	0.011	11.87
55	2042	0.00	13.40	13.40	1059.40	1046.00	0.006	6.09	0.010	10.91
56	2043	0.00	13.40	13.40	1059.40	1046.00	0.005	5.53	0.010	10.02
57	2044	0.00	13.40	13.40	1059.40	1046.00	0.005	5.03	0.009	9.21
58	2045	0.00	13.40	13.40	1059.40	1046.00	0.004	4.57	0.008	8.46
59	2046	0.00	13.40	13.40	1059.40	1046.00	0.004	4.16	0.007	7.78
*TOTAL*		9800.00	670.00	10470.00	52970.00	42500.00		-750.77		-0.00





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