SL. NO. 9 of 1994

NOTE ON REVISED ESTIMATE (MAJOR) OF SRISAILAM RIGHT BRANCH CANAL PROJECT OF ANDHRA PRADESH FOR CONSIDERATION OF THE ADVISORY COMMITTEE ON IRRIGATION, FLOOD CONTROL AND MULTIPURPOSE PROJECTS.

	P.C. approved during 1981	Revised Estimate
Estimated cost (Rs. in crores)	220.22	1185.58 (1993-94 SOR)
G.C.A. (ha)	97386	97386
C.C.A. (ha)	76890	76890
Annual Irrigation (ha)	76890 (100%)	100870 (131%)
	Kharif 52.63%	Kharif 40%
	Rabi 47.37%	Rabi 51%
		Two seasonal 40%

INTRODUCTION:

The Srisailam Right Branch Canal project envisages diversion of 19 TMC of Krishna water from the Srisailam Reservoir to irrigate 76,890 ha. in the chronically drought prone areas of Kurnool and Cuddapah districts of Rayalaseema region of A.P.

HISTORY OF CLEARANCE OF THE PROJECT:

Srisailam Right Bank Canal Project was cleared by Planning Commission, during May 1981 for an estimated cost of Rs.220.22 crores. The main components of the scheme as approved by the Planning Commission are:

(i) An approach channel 3.4 km long from Srisailam Resevoir to carry a maximum discharge of 315.73 cumecs upto the head regulator.

(ii) Head regulator comprising 4 vents of size 10mx8.57m for a design discharge of 315.73 cumecs.

(iii) 16.34 km long main canal to carry a discharge of 63.71 cumecs at MDDL condition in the Srisailam Reservoir and a discharge of 315.73 cumecs under flood flow conditions (This was proposed to serve as carrier of 15 TMC of water for Madras Water Supply).

(iv) A cross regulator at tail end of the main canal.

(v) Right Branch Canal 112.73 kms. long with a maximum capacity of 140.45 cumecs. The length of canal from Gorakallu Reservoir to OWK Reservoir also includes a 1.56 km

long tunnel.

vi) By pass channel on the down stream side of Gorakallu dam to facilitate drawal of water for Kharif irrigation required from Srisailam Reservoir without having to route through Gorakallu Reservoir.

(vii) Gorakallu balancing reservoir with FRL at 261 m, and Gross and live storages of 369.82 M cum (13.06 TMC) and 303.81 M cum (10.73 TMC) respectively.

(viii)OWK balancing Reservoir with FRL at 227.4 m, Gross and live storages of 137.88 Mcum (4.86 TMC) & 78.52 Mcum (2.77 TMC) respectively.

A revised estimate of Rs.386.05 crores of SRBC Project was discussed in 33rd meeting of TAC held on 21-3-86. The cost estimate of the project excluded the cost of the first four components of the approved estimate. These components from approch channel to cross regulator were considered to be charged to Madras Water Supply Scheme as per an agreement concluded between Govt of A.P. and Tamil Nadu. However in the TAC meeting it was decided that the economic viability of the project should be reassessed taking into account the allocable cost of common carrier canal and regulator (to be constructed for providing 19 TMC for this project and 15 TMC for Madras Water Supply Project).

The project was again considered in the TAC meeting (supplementary) held on 22-6-87 with revised B.C. Ratio calculations. After discussions the TAC observed that

(i) DOE & F clearance should be obtained;

(ii) Water availability should be kept the same as that approved by TAC in 1981 and

(iii) B.C. Ratio to be recalculated by taking into account the proportionate cost of remodelling of K.C. Canal system/ cost of Godavari diversion to Krishna.

REVISED ESTIMATE (Oct. 1993):

The Project report and revised estimate (Oct. 1993 prices) has been received from GOAP during December, 1993. The scope of the project i.e. the utilisation of 19 TMC of water remains the same except that the cropping pattern has been modified to achieve higher irrigation intensity.

PROJECT PROPOSALS:

The revised estimate now envisages the following component of works :

(i) S.R.B.C. Canal - takes off from Banakacherla Cross regulator drawing the required supply through head sluice and runs for a length of 198 kms.

(ii) Gorakallu By Pass Canal - runs parallel to Gorakallu Dam, connecting upstream and down stream sides of Right Branch Canal to facililtate drawal of Kharif irrigation requirement from Srisailam Reservoir and without having to deplete Gorakallu Reservoir.

(iii) Gorakallu Balancing Reservoir (Srinarasimharaya Sagar) - proposed from km 50.22km to 53.40 km of SRBC to store water during floods, with gross storage of 369.82 M cum and live capacity as 303.81 M cum.

(iv) OWK Balancing Reservoir - to be formed from km 113.545 to km 116 on SRBC, with gross storage of 137.876 Mcum and live storage of 78.523 Mcum. OWK Balancing Reservoir will be formed by joining two existing tanks namely Paleru Tank and Themmaraju Tank by a Saddle Dam without interferring with the existing irrigation of 668 ha under these two tanks. The balancing reservoir will be filled up by SRBC during floods.

(v) Net work of Major and Minor distributaries and field channels taking off from main canal.

The index map and salient features of the project are enclosed at Annex-I and II.

WATER AVAILABILTY:

The total water requirement of the project has been kept as 19 TMC as contemplated in the original project report. While clearing the project during 1981, Planning Commission stressed for 9 TMC as regenerated flows and the balance of 10 TMC to be met from the modernisation of KC Canal System and/or any other system or alternatively from the allocation to the AP of 45 TMC of Godavari Waters to be diverted to the Krishna Basin.

In the present proposal, GOAP have proposed 11 TMC of water as regeneration flow towards AP share from KWDT award and balance 8 TMC is proposed to be met as a result of Modernisation of K.C. canal system. GOAP vide their order G.O.Ms. No.154 (SRSP.II) dated 6.6.1994 have allocated the entire 11 TMC of regeneration flow towards AP share to Srisailam Right Branch Canal Project (Annex-III). As the target date of completion of the project is by 2000 and the AP share of 11 TMC would be available from 1998-99 (as per KWDT award) the present proposal may be considerd by TAC .

IRRIGATION PLANNING:

G.C.A.	97,386 ha
C.C.A.	76,890 ha

The project proposes to increase the irrigation intensity to 131% of CCA of 76890 ha in the drought prone area of Kurnool and Cuddapah districts. Irrigation pattern proposed to be adopted for the project is based on the availability of 19 TMC of Water and is approved by the Agriculture Deptt, Ministry of Agriculture. Existing and proposed cropping pattern is enclosed at Annex-IV. The system is designed for an overall efficiency of 56% and the success rate of irrigation is 83%. Though achieving overall efficiency of 56% may be difficult in practice, considering that lining of canals upto 1 cumec is proposed, this is considered acceptable for planning purpose. However, this may be reviewed based on actual operation by project engineers, restricting the utilisation to 19 TMC only.

INTERSTATE ...

This has been justified through a system simulation study for 75 years, in which the reservoir inflows have been corrected by deducting upstream uses which inter alia cater to the allocations made by KWDT to upper states as also by adding both the regeneration as allocated by KWDT and the expected saving due to modernisation of KC canal ... 1976 ... No.1), would be obtained ... due to relocalisation and modernisation of the existing K.C. Canal System . With this it may be considered that no inter-state aspect is involved.

GROUND WATER ASPECT:

Central Ground Water Board had cleared the project from ground water angle in August 87 (Annex-V (a) and observed that ground water development through open wells and bore wells take place in order to operationalise conjunctive use of water resources effectively and to avoid water logging problems. The ground water development should be under taken in organised manner to counter rising water levels in the area.

A provision of Rs 416 lacs has been proposed in the project estimate, for the following works:

(i) Studies for ground water monitoring.
(ii) Subsidy for farmers for open wells and cost of bore wells.

As per the latest study based on the estimates by AP Ground Water Department, the total draft and balance potential in the command are 1656 ham (0.5849 TMC) and 5203 ham (1.84 TMC) respectively. The extra wells needed for development of 5203 ha m (1.84 TMC) in the post-project stage is 3060 . A note on ground water status is enclosed at Annex-V (b).

The total ground water resources would be available for utilisation for irrigation, domestic and industrial uses.

It is recommended that, comprehensive planning of the ground water may be carried out with the help of conjunctive use division of Central Ground Water Board and the same may be implemented in a phased manner.

PROVISION FOR DRINKING WATER :

The total drinking water requirement is stated to be 961 ham (0.339 TMC) which is proposed to be met from utilisation of ground water. The detailed planning for drinking water needs to be carried out.

DRAINAGE ASPECT:

The command area of SRBC Project lies on the left side of the main canal and extends upto River Kundu. The area is well drained through natural streams spread over the command. It is also crossed by Jurreru and Paleru rivers which after traversing the command area laterally join and as such no drainage problems are anticipated.

FOREST CLEARANCE:

The SRBC Project involves acquisition of 1060.88 ha of forest land. Forest clearance is received for 177.47 ha. The balance forest land required for diversion is 883.42 ha. The proposals for acquisition of this balance area of 883.42 ha of forest land have been submitted by GOAP to MOEF on 5.5.94.

ENVIRONMENTAL CLEARANCE:

The GOAP has now submitted in May 1994, the Environmental Impact Assessment Study including environmental management plan and environmental monitoring programme. The clearance from MOEF is awaited.

SUBMERGENCE AND RESETTLEMENT AND REHABILITATION:

Two balancing reservoirs viz., Gorakallu Balancing Reservoir (Sri Narasimharaya Sagar) and Owk Balancing Reservoir, involve submergence of 1231 ha culturable land. Two villages consisting of 550 families are stated to be coming under submergence as per Annex-VI. Detailed R&R Plan of SRBC Project is stated to have been submitted to the Ministry of Welfare by GOAP in April,1994 and the necessary clearance is awaited.

STATUS OF PROJECT:

An expenditure of about Rs 205.00 crores is stated to have been incurred on the project upto 10/93. The works in

the main canal portion from Km 0/0 to Km 141 and part of distribution system have been taken up for construction and are in various stages of execution. Canal beyond Km 141 and other components of works like Gorakallu Dam and Bypass canal, Owk complex, and balance distribution system are to be taken up. The project completion is planned by the end of year 2000.

WORLD BANK FUNDING:

The SRBC Project is a component of IInd AP Composite Irrigation Project for which an agreement with World Bank was signed on 28-5-86 for US $ 140 million IDA credit and US $ 131 million IBRD loan. The validity of this agreement expires by the end of June 94. The state Govt. has proposed to include all the balance works of SRBC and SRSP stage-I in the AP III Irrigation Project for assistance from the World Bank.

COST ESTIMATE :

The 1981 SRBC Project estimate is revised adopting the SOR of 1993-94. In the revised estimate, cost of the project has been worked out excluding the components being used to serve the Madras City Water Supply. As per the decision of Govt of Andhra Pradesh (vide G.O. No.195, dated 3--3-84 of Irrigation Deptt) the cost of common works upto and including Banakacherla Cross Regulator is charged to Madras Water Supply Scheme. However the apportioned cost of common works is taken into consideration for calculating the B.C. Ratio. The cost of the SRBC Scheme has been finalised to Rs.1185.58 cr., which includes the ongoing works as per the agreement rates and the works which are not yet taken up are worked out at SOR 1993-94. The cost abstracts are enclosed at Annex-VII and VII(a).

ECONOMIC EVALUATION:

The Benefit Cost Ratio of the project at 10% rate of interest works out to 1.08 (Annex-VIII). Since the project area is in drought prone area, B.C. Ratio is acceptable.

The internal rate of return works out to 13.39% (Annex-IX).

The financial rate of return works out to 0.0096% (Annex-X) at the end of 10 years after completion.

PLAN PROVISION:

SRBC Project is included in the VIII Plan of State with outlays of Rs 440 crores. Budget provision for the year 1994-95 for this project is Rs.199.40 crores as intimated by the State Govt. An expenditure of Rs 205 crores is stated to have been incurred on the project till 10/93.

PENDING ISSUES:

i) Comprehensive planning for Ground water development needs to be carried out including for drinking water supply.

ii) Clearance on environmental and forest diversion aspects from MOEF.

iii) Clearance by Ministry of Welfare regarding R&R Plans.

RECOMMENDATION:

In the revised estimate the design parameters have not been examined. Central Design Organisation of A.P. and the project authorities have to look after these aspects. The Dam Safety Panel of SRBC Project is reviewing the progress made in the implementation of the recommendations made for Gorakallu Dam and Owk Balancing reservoirs.

The revised project estimate is recommended for Rs.1185.58 Crores and is put up for consideration of the Technical Advisory Committee.

SRISAILAM RIGHT BRANCH CANAL PROJECT

ANDHRA PRADESH

REVISED CHECK-LIST

Estimated Cost Rs.1185.58 Crores

C.C.A. 76890 ha

1.	a) Name of Project and State (Attach an Index Plan)	SRISAILAM RIGHT BRANCH CANAL (S.R.B.C.) ANDHRA PRADESH Index Plan attached at Annex-I
	b) Is the project included in the plan and what is the allocation for it ?	Yes. VIII Plan Outlay Rs.44000 lakhs.
2.	a) Total estimated cost of the project including credit/debits from connected projects and foreign exchange component	Rs. 1185.58 crores No Foreign Exchange Component is involved.
	b) Yearly optimum phasing of expenditure and foreign exchange (subject to reasonable equipment, personnel and finance being available).	

Year	Exp.(in lakhs)
upto 1992-1993	Rs. 16997.04
1993-1994	Rs. 14055.00
1994-1995	Rs. 19940.00
1995-1996	Rs. 25900.00
1996-1997	Rs. 17500.00
1997-1998	Rs. 13000.00
1998-1999	Rs. 7400.00
1999-2000	Rs. 3765.96

3.	Salient Features of the work (location, length, height, type of dam gross and live storages length of canals, G.R.L., M.W.L., whether any lift involved)	Salient Features attached vide Annexure-II.
4.	Command Area (G.C.A.,C.C.A. & I.C.A. in ha)	G.C.A. 97386 ha C.C.A. 76890 ha ANNUAL IRRG.100800 ha (131% of CCA)

5. Has any curtailment or enhancement of the scheme been considered for advantages or economy and whether the scheme proposed will undergo any change on that account ?	NO

INTER STATE ASPECTS

a) Are there any interests or issues involved such as upstream and downstream utilisation, submergence, etc?	NO
b) If so, has the concurrence of the other concerned states been obtained for implementation of the scheme with regard to questions such as sharing of project, water cost benefits, etc?	Does not arise.
7. Are there any special features peculiar to project in regard to planning and design?	NO.

COST ESTIMATE AND FOREIGN EXCHANGE

1. Attach an abstract of cost	: Vide Annex-VII.
2. Does the cost include necessary provision of drainage? If so what is the amount provided?	: Yes. A sum of Rs.88.58 lakhs has been provided for drainage.
3. Has the specific concurrence of State Finance Department been obtained for taking up the project?	: Yes. Specific concurrence of the State Finance Department to the revised cost has been obtained.

C. WATER UTILISATION

1. Drainage aspects	: The command area is covered by a good network of natural drainage. For a portion of command not covered by natural drainage, a provision is made in the estimate.
2. Soil conservation in the command and catchment area	State C.A.D. Department is being entrusted with these items of works for rapid development of command.
3. Measures against salinity	
4. Colonisation Plan (If necessary)	

5. Expected irrigation (cropped area in ha) power and other benefits. : Annual Irrigation - 100800 ha

6. Cost per hectare of annual irrigation : Rs. 1.176 lakhs

7. B.C.Ratio with 10% rate of interest on capital outlay. : 1.08

8. Financial Return

a) Anticipated Financial Return

i) At the end of 5 yrs of completion -

ii) At the end of 10 yrs after completion 0.0092

iii) On full development of irrigation 0.0092

b) Anticipated Internal Rate of Return 13.39

c) If the project is unproductive, what are the special grounds for undertaking Question does not arise

PART-II

DESCRIPTIVE REPORT AND COMMENTS
WATER RESOURCES ENGINEERING AND OTHER TECHNICAL ASPECTS

1. Assumption and Data (give broad details of Hydrology, Yields, Utilisation etc.) This Project is planned to utilise 19TMC of water. Out of this 11 TMC will be available as regenerated flow and the balance 8 TMC will be met from the savings to be affected by modernisation of K.C.Canal system.

2. Salient features of ph ysical programme and its phasing :

Year	%
1996-97	57%
1997-98	84%
1998-99	97%
1999-2000	100%

3. Does the project envisages inter-linking with other project now or at a future date? NO.

4. Is the project self contained or does it envisage further stages of development? If the latter, describe their scope and relationship to the present project. The Project is self-contained.

5. Is there any ayacut development plan ?	This aspect will be taken up by State C.A.D. Deptt.,Govt.of Andhra Pradesh.
6. Are any Minor Irrigation Project proposed in the Ayacut ?	Nil
7. Measures for construction of field channels and water courses.	Provision for construction of field channels, water courses upto 5-8 ha block is made in the project estimate.

D. BENEFITS

1. Are the command area and annual irrigation estimates reliable ?	Yes.
2. What are the existing and proposed cropping pattern ?	Vide Annex - IV.
3. What is the net additional agricultural produce expected ?	Net additional Agricultural produce worth of Rs. 15638 lakhs per year is expected.
4. Are the cropping pattern and the estimates of benefits sound and reasonable ?	Yes.
5. What is the benefit cost ratio @ 10% rate of interest ?	1.08

6. What is the phasing of expected benefits Rs

Year	Benefits (ha)
1996-97	41,148
1997-98	67,073
1998-99	75,073
1999-2000	76,890

E. REVENUE

1. What are the rate of betterment levy proposed, the period for recovery, year of the commencement and estimated yield ?	Rs. 742.00 per ha 1999-2000 570.52 lakhs.
2. Are any charges proposed for irrigation facilities as distinct from water charges ?	Only betterment levy
3. Give the scale of water rates for various crops.	Kharif(I.D.) Rs.98.80 per ha Rabi (I.D.) -do- Two Seasonal Rs.296.48 per ha
4. How doe the rate of betterment levy and water charges compare with those obtained in other projects in the Region? Has the concurrence of State Revenue Department been obtained for these rates ?	The rates are common to other commands also. Yes.
5. Give the phasing of Revenue	

Year	Ravenue(Rs.in lakhs)
1997-98	156.76
1998-99	83.67
1999-2000	96.53
2000-2001	98.87
2001-onwards	98.87

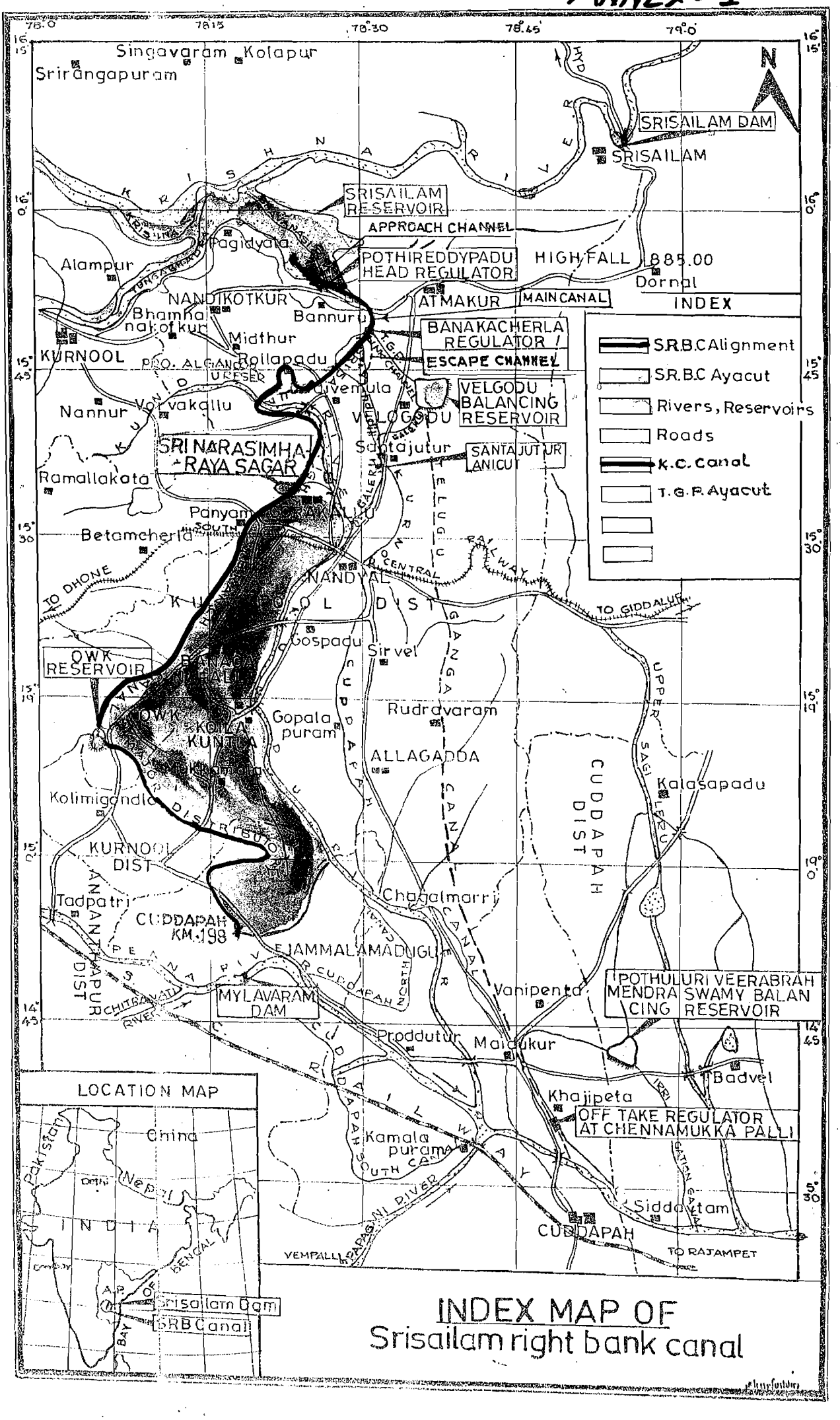
F. OUTSTANDING COMMENTS

Give outstanding comments of CWC, Ministry of Water Resources, Ministry of Agriculture etc, if any.	i) Comrehensive planning for Ground development needs to be carried out including for drinking water supply. ii) Clearance on environmental and forest diversion aspects from MOEF. iii) Clearance by Ministry of Welfare regarding R&R Plans.

PART-III
REVISION OF PROJECT FEATURES & COSTS
(Required only in cases of Revision)

(i) History of the Project	:	The project was cleared by P.C. in May 1981 to utilise 19 TMC of Krishna Waters from Srisailam Reservoir.
(ii)Nature of change in the Project	:	Revised estimate is formulated with the same utilisation of water. 11 TMC from regenerated flow and 8 TMC from savings Modernisation of KC canal system. Cropping intensity is enhanced from 100% to [illegible]

ANNEX - I



INDEX MAP OF
Srisailam right bank canal

ANNEXURE-II

SRISAILAM RIGHT BRANCH CANAL PROJECT - ANDHRA PRADESH

SALIENT FEATURES

I. RIGHT BRANCH CANAL	ORIGINAL	REVISED
1) From Banakacharla Cross Regulator to Gorakallu Balancing Reservoir KM 0.0 to KM 50.22		
a) Length (KM)	50.22	56.77
b) Bed Width (M)	5.49	5.49
c) Bed Level at start (M)	+ 253.90	+ 253.90
d) Bed Level at end (M)	+ 249.63	+ 249.29
e) F.S.L. at start at MDDL condition (M)	+ 257.86	+ 257.86
f) F.S.L. at start under flood-flow condition (M)	+ 265.79	+ 265.78
g) F.S.L. at end of MDDL condition (M)	+ 253.59	+ 253.25
h) F.S.L. at end at flood-flow condition (M)	+ 261.52	+ 261.18
i) Bed slope	1/15000	1/15000
j) Rugosity co-efficient :		
-for lined portion	0.018	0.018
-for unlined portion	0.035	0.035
k) Discharge for MDDL Condition in Srisailam Reservoir (Cumec)	21.23	21.23
l) Discharge under flood-flow	140.45	140.45
2) Bye pass Canal on the rear slope of Gorakallu Dam		
a) Total length (KM)	3.23	3.307
i) Open excavation KM	0.38	1.00
ii) RCC trough including transition (KM)	2.23	2.307
iii) Chute Section	0.55	60 m (aqueduct)
iv) Energy dissipation	0.07	-
b) Section :		
i) Open excavation	7.5mx3.66m	3.56mx3.75m
ii) RCC trough	6.5mx3.75m	Pressure Pipe
c) Bed Slppe :		
i) Open excavation	1/2100	1/562
ii) RCC trough	1/688	Pressure Pipe

	ORIGINAL	REVISED
d) Velocity :		
i) Open excavation	2.036m/sec	-
ii) RCC trough	3.00 m/sec	-
e) Discharge (Cumecs)	67.96	67.96

3) Right Branch Canal from Gorakallu Balancing Reservoir to Owk Balancing Reservoir from KM 53.40 to KM 112.73 (50.22 KM to 53.40 KM is the bund length of the Gorakallu Balancing Reservoir).

Details	ORIGINAL			REVISED			
	Reach I KM 53.4 to KM 74.80	Reach II KM 74.80 to KM 91.6	Reach III KM 91.60 to KM 112.73	Reach I 53.355 to KM 74.144	Reach II KM 74.144 to KM 82.00	Reach III KM 82.00 toKM 112.73	Reach IV KM 116 toKM 198
a) Length KM	21.40	16.80	21.13	20.79	7.85	30.73	82.00
b) Bed Width(m)	13.80	10.40	7.50	16.90 to 11.00	14.10 to 9.40	9.40 to 7.50	7.60 to 6.00
c) Bed level at start(m)	231.63	229.32	227.49	231.63	229.53	228.83	216.50
d) Bed level at end(m)	229.32	227.49	223.48	229.53	228.83	226.27	209.66
e) FSL at start(m)	235.29	232.92	231.15	235.29	233.18	232.49	219.50
f) FSL at end(m)	232.98	232.15	227.98	233.18	232.49	229.93	212.66
g) Bed slope	1/12000	1/12000 (1/10000 for flume)	1/12000	1/12000	1/12000	1/12000	1/12000
h) Discharge (Cumecs)	67.96	53.80	41.63	67.96	55.69	41.82	28.66

II. GORAKALLU BALANCING RESERVOIR

DETAILS	APPROVED	REVISED
a) Location	Near Gorakallu village,Nandyal Taluk,Kurnool District.	Near Gorakallu village,Nandyal Taluk,Kurnool District
b) Self Catchment area (Sq.Km)	77.70	77.70
c) Yield from self-catchment(M.Cum)	4.22	4.22
d) Storage capacity		
i)Gross storage @ FRL(M.Cum)	369.82	369.82
ii)Live storage @ FRL (M.Cum)	303.81	303.81
e) FRL (m)	261.00	261.00
f) TBL (m)	266.60	266.60
g) Minimum draw down level (m)	235.29	235.29
h) Water spread @ FRL (M.Sq.m.)	15.64	15.64
i) Extent of land affected (ha)	659.00	659.00
j) Total length of dam (m)	3472	4472
k) Discharge for which spillway is designed (Cumecs)	809.85	805.85
l) No. and size of spillway gates	7 Nos.of size 9mx3.6m each	7 Nos.of size 9mx3.6m each
m) Crest level of spillway (m)	257.40	257.40

III. OWK BALANCING RESERVOIR

	DETAILS	APPROVED	REVISED
a)	Location	Near Owk village, Banaganapally Taluk,Kurnool District.	Near Owk Village Banaganapally Taluk, Kurnool District.
b)	Self catchment Area (Sq.Km)	246.04	246.04
c)	Yield from self catchment (M.Cum)	7.33	7.33
d)	Storage capacity		
	i) Gross Storage @ FRL (M.Cum)	137.88	137.88
	ii) Live Storage @ FRL (M.Cum)	78.52	78.52
e)	F.R.L. (m)	227.40	227.00
f)	T.B.L. (m)	231.65	231.65
g)	Minimum draw down level (m)	219.46	219.46
h)	Water spread @ FRL (M.Sq.M)	12.14	12.14
i)	Extent of land affected (ha)	988	1477
j)	Length of Earthern dam		
	i) Paleru Dam (m)	965	1471
	ii) Saddle Dam (m)	1320	1167
	iii) Thimmaraju Dam (m)	736	1278
		3021	3916
k)	Discharge for which spillway is designed (Cumecs)	1284.72	1284.72
l)	No. & size of spillway Gates	5 Nos.of size 12.2mx5.2m each	100m Chute spillway (design under finalisation)
m)	Crest level of spillway (m)	222.15	

IV. AYACUT	APPROVED	REVISED
i) Existing Ayacut		
a) Rainfed and Dry (ha)	76890	76890
b) Precarious wet (ha) (Paddy under tanks)	-	688
ii) Proposed Ayacut		
a) Irrigated (ha)	76890	76890
b) Stabilization of existing Wet Paddy (ha)	-	688
iii) Proposed Cropping Pattern		
KHARIF (ha)	40468	30800
RABI (ha)	36422	39270
TWO SEASONAL (ha)	-	30730
	76890	100800
Intensity of Irrigation (%)	100	131
Perinnial Fruit Crops (ha) (Inter Crop)	-	4000

V. FINANCIAL ASPECTS		
Estimated Cost (Rs. in Crores)	222.22	1185.58
B.C.Ratio	1.62	1.08
Financial Return at the end of 10 years after completion	0.0038	0.0092
Internal Rate of Return	—	13.39

GOVERNMENT OF ANDHRA PRADESH
A B S T R A C T.

ANNEX-III

SECOND A.P.IRRIGATION PROJECT - Srisailam Right Branch Canal- Allotment of water allocations to Srisailam Right Branch Canal- ORDERS ISSUED.

-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-

Irrigation and C.A.D.(Projects Wing)Department..

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G.O.Ms.No.154 (SRSP.II) Dated 6--6--1994.

Read the following:-

1. From the Govt. of India, Planning Commission, New Delhi, Letter No.2.(205)/81-I&CAD. Dt.16-5-1981.

2. From the Engineer-in-Chief, Hyderabad Lr.No.SR/DDK/5842/79 dated 15-4-1994.

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O R D E R.

While accepting the Srisailam Right Branch Canal Scheme at an estimated cost of Rs.220.22 crores, the Planning Commission, Govt. of India, has observed, among others, that the total water requirement for the Project has been estimated to be 19 TMC. Of this, 9 TMC. will be available as regeneration flow (return flow) . The balance requirement is to be met from the savings to be effected by Modernisation of the K.C. Canal system or any other system or alternatively from the allocations to Andhra Pradesh of 45 TMC. from the Godavari waters to be diverted to the Krishna Basin. As such, the availability of balance flows over and above the regeneration water (return flows) would depend on modernisation of K.C. Canal and/or any other canal system in the Krishna basin in Andhra Pradesh or the completion of the Godavari Diversion Link. The Planning Commission,has, therefore, observed that the State Govt. should ensure the simultaneous compl etion of these works for the supply of balance water of 10 TMC. required for the Project.

2. As per the recommendation of the Pl-anning Comm-ission, only 9 TMC. of regenerated flow (return flow) is to be considered for Srisailam Right Branch Canal taking the Andhra Pradesh's share as on 1983-84. However KWDT.award provides for 11 TMC. of regenerated flow towards A.P.Share by 1998--99. The relevant operating portion of KWDT.award provides for the following:

> "According to the KWDT.award and its further report at the end of 1998-99 full utilisation of water for irrigation in Krishna River Basin from the Projects using more than 3 TMC. are made, the return flow that would be made available to the A.P.State towards its share is 11 T.M.C."

3. In these circumstances, the Government consider that the entire 11 TMC. of regeneration flow towards A.P.Share can be made available for the Srisailam Right Branch Canal Project.

(PTO)

4. After careful examination of all these foregoing facts, duly considering the time frame for development of irrigation under Srisailam Right Branch Canal allocations made by the KWDT. to the A.P.State, Government hereby allocate the Andhra Pradesh Share of 11 TMC. of regeneration flow (return flows) to the Srisailam Right Branch Canal Project.

5. The balance requirement of 8 TMC. to Srisailam Right Branch Canal is proposed to be made available by modernisation of K.C. Canal system or any other system.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

M.C. MAHAPATRA,
Secretary to Government(Irrgn).

To
The Secretary to the Government of India,
Ministry of Water Resources
Shrama Sakti Bhavan,Rafi-Marg,
NEW DELHI-110 001. (with covering letter)

The Engineer-in-Chief, Errumanzil,Hyderabad.

The Chief Engineer(Projects) Srisailam Project,Hyderabad.

The Special Officer/Chief Engineer,Project Preparation & Monitoring,BRK.Bldgs.Hyderabad.

Copy to the Commissioner for Project Formulation and Ex-Officio Secretary to Govt. Irrgn.& CAD.Deptt.

/forwarded//by order//

P. Hanumanta Swamy
Section Officer.

ANNEXURE - IV

SRISAILAM RIGHT BRANCH CANAL PROJECT - ANDHRA PRADESH

Existing and Proposed Crop Pattern CCA-76890 Ha

Sl. No.	NAME OF CROP	PRE-PROJECT		P.C.ACCEPTED DURING 1981		POST PROJECT AS PER PRESENT REPORT	
		AREA ha	% C.C.A.	AREA ha	% C.C.A.	AREA ha	% C.C.A.
	KHARIF						
1.	JOWAR	25074	32.6	-	-	7700	10.0
2.	GROUNDNUT	4405	5.7	-	-	10300	13.4
3.	PADDY	3579	4.6	-	-	-	-
4.	COTTON	17387	22.6	20234	26.3	-	-
5.	CHILLIES	-	-	20234	26.3	-	-
6.	PULSES	-	-	-	-	6000	7.8
7.	SUNFLOWER	-	-	-	-	5900	7.6
8.	VEGETABLES & OTHERS	31155	40.5	-	-	900	1.2
	RABI						
9.	JOWAR	-	-	6070	7.9	-	-
10.	JOWAR SEED	-	-	-	-	202	-
11.	GROUNDNUT	-	-	8094	10.5	7466	9.7
12.	WHEAT	-	-	14164	18.5	-	-
13.	PULSES	-	-	8094	10.5	4141	5.4
14.	SUNFLOWER	-	-	-	-	9018	12.0
	SUNFLOWER SEED	-	-	-	-	403	
15.	TOBACCO	-	-	-	-	6000	7.9
16.	VEGETABLES & OTHERS	-	-	-	-	12000	16.0
	TWO SEASONAL						
17.	CHILLIES	-	-	-	-	7560	10.0
18.	COTTON	-	-	-	-	16732	22.0
	COTTON SEED	-	-	-	-	302	
19.	TURMERIC	-	-	-	-	3830	5.0
20.	SUGAR CANE	-	-	-	-	1520	2.0
21.	MULBERRY	-	-	-	-	706	1.0
22.	BETELVINE					80	-
	TOTAL :	81600	106.0	76890	100.0	100800	131.0
	PADDY STABILIZATION	668	0.9	-	-	668	-
	FRUIT CROPS	-	-	-	-	4000	-
		82268				105468	

ANNEXURE - V(A)

CENTRAL GROUND WATER BOARD

Subject:- Sri Sailam Right Branch Canal Project-Andhra Pradesh.

In the light of provision made for ground water monitoring and development in the project, the project can be cleared from ground water angle. It may however be ensured that the proposed ground water development through open wells and bore wells take place in order to operationalise conjunctive use of water resources effectively and to avoid water-logging problems. The ground water development should be undertaken in an organised manner to counter rising water levels in the area.

The data of monitoring of ground water development be made available to the Board on regular basis.

The lining of the canals be undertaken on selective basis based on the seepage studies in order to avoid infructuous expenditure on canal lining at places where in canal passes through hard massive rock formations.

(B. P. C. SINHA)
CHIEF HYDROGEOLOGIST & MEMBER

Director PPC(North) C.W.C. R.K.Puram New Delhi.
CGWB U.O.No.14-5/CGWB/SRBC/87 dated. 27-8-87
4861

Copy to:- Chairman CGWB, alongwith the copy of C.G.W.B. comments and reply from state Govt.

(B. P. C. SINHA)
CHIEF HYDROGEOLOGIST & MEMBER

BRIEF NOTE ON GROUNDWATER POTENTIAL AVAILABILITY AND COST ESTIMATES FOR DEVELOPING THE GROUNDWATER POTENTIAL AVAILABLE IN SRISAILAM RIGHT BANK CANAL COMMAND.

...

The Srisailam Right Bank canal envisages provision of irrigation facilities for an extent of 76,900 ha. The area is underlain by a number of geological formations which have a wide range of hydrogeological and geohydrological characteristics. The chemical quality of groundwater also vary widely. The command is covered by a variety of soils and in some zones problem soils are encountered.

Srisailam Right Bank canal command forms part of a semi-arid tract and mean annual rainfall in the area is 620 mm. The monitoring of groundwater levels and chemical quality characterisation being carried out by the Ground Water Department since 1990 provided a preliminary idea of the groundwater regime prevailing. A preliminary study of the hydrogeological and geohydrological characteristics to facilitate delineation of the zones feasible for groundwater development and to carryout an assessment of the utilisable groundwater resources. An attempt has been made to predict the likely change in the groundwater regime in the post project situation, by a study of the groundwater buildup and changes in the groundwater quality characteristics in the command under a recently commissioned project in the region.

GEOHYDROGEOLOGICAL AND HYDROGEOLOGICAL CHARACTERISTS:

The hard rock formations comprising of Nandyal shales, Kolikunta limestones, Panyam quartzites, Auk shales, Narji limestones and Banaganapalli quartzites from the aquifers in the command area. The geological map of Srisailam Right Bank canal is shown in figure.1.

The weathered zones of Nandyal shales and Auk shales, jointed portions of Panyam quartzites and Banaganapalli quartzites from unconfined aquifers, feasible for groundwater development through dug wells.

...2.

The deeper aquifers formed through joints, fractures and solution openings in shales and limestones are under confined conditions and are feasible for construction of bore wells and dug-cum-borewells. The yield characteristics of various zones vary erratically and are generally governed by the structural conditions. There are a few zones of alluvium of limited thickness and lateral extension along River Jurreru.

Based on the yield potential of various zones, the command has been delineated into various zones as follows.

Extent (Ha)	Irrigation potential of each well (Ha) (I.D. each season)
8,267	0.5 to 1.0
16,370	1.0 to 2.0
5,350	2.0 to 4.0
7,900	More than 4.0
39,013	Less than 0.5 and non feasible area.

Soil characteristics:

The soil types encountered in the command are Red soils (Sandy loams to sandy clay loams) Brown soils (silty clay loams) and Black soils (clay loams to clays). 75% of command area is having Black soils.

The premonsoon groundwater levels in the command are generally in the range of 6 m to 9 m. bgl. The post monsoon depth to water level may vary from 3 m to 9 m. bgl. The depth to water levels of Srisailam Right Bank Canal command during 1993 and the depth to water levels of Srisailam Right Bank canal command during post monsoon 1993 are shown in plate 2 and 3. The low seasonal fluctuations, inspite of a low specific yield is attributable to poor recharge characteristics. A reconnoitary study conducted in the area indicates about 6780 ha. i.e. 7% of total gross command has problem soils

...3

A more detailed study is required to evolve a suitable strategy for averting further deterioration of chemical quality of groundwater and soils. The Groundwater specific electrical conductance range map and location of problem soil zones in Srisailam Right Bank Canal are shown in plate 4.

Groundwater Resource assessment:

The estimation of the groundwater resources available present extraction rates and the balance potential available after introduction of canal irrigation has been carried out duly following the procedure and norms stipulated by the Groundwater Estimation Committee 1984 constituted by the Government of India. The present pumpage rates from different types of wells have been worked out by actual field sampling. There are 450 dugwells, 482 dug-cum-bores and 504 bore wells are existing in the command. The unit draft of dugwell, dug-cum-bore well and bore wells in the command are varying from 0.4 - 2.8 Ha.m., 0.70 - 4.0 Ha.m. and 1.10 - 4.9 Ham. respectively, hence the average unit draft considering the different types of wells in the command is 1.7 Ham.

The estimation of recharge has to take into account of the infiltration characteristics of the soils and geohydrological characteristics of the formations. While estimating the recharge, the components like rainfall infiltration, recharge due to seepage from canals, return seepage from irrigation ~~field~~ fields depending upon the type of sources (surface water source/Groundwater source), seepage from tanks, influent seepage from the rivers etc., are to be taken into account. The rainfall recharge in hard rock areas are varying from 10 to 15 percent of normal rainfall, where as in limestones, quartzites and in shales it varies from 3 to 10 percent of normal rainfall only. The seepage from canals also varies from lined to unlined ones for unlined canals where some clay contents are there it varies from 15 to 20 hect/day/10^6 sq.m. of wetted area of canal, since the seepage from unlined canals is more, in the reaches where lining is provided the seepage from such reaches has to take only 20 percent of the above.

...4.

The Groundwater estimation committee has recommended the return seepage from irrigation fields as 40% of water delivered at the outlet in case of irrigation by surface water and 35% with irrigation by Groundwater for paddy.

Based upon the status of knowledge/detailed studies undertaken in similar areas it is understood that the recharge contribution in the irrigated dry crop areas, (considering the evapotranspiration requirements, non availability of standing water and seasonal variations when compared to paddy) may not contribute any usable groundwater recharge as return seepage from I.D. irrigation.

As stated earlier based on the GEC Norms the utilisable groundwater resources in the command including main canal seepage work out to 6860 ham.(2.42 TMC). The utilisable resource per Sq.Km. of the Srisailam Right Bank canal command is about 7 ha.m., when compared with the average value of 13.2 Sq.Km for Andhra Pradesh reflects the poor recharge characteristics of some of the zones in the command. The total draft and the balance potential in the command are 1656 ham (2.42 TMC) and 5203 ham.(1.84 TMC) respectively.

The total groundwater resources computed would be available for utilisation for irrigation, domestic and industrial uses. The utilisable recharge may be taken as 85 percent of the total groundwater flow available for development. It is also recommended that 15 percent of total groundwater resources be kept for drinking and industrial purposes and to account for unrecoverable losses. Hence, the limited seepage available from applied water irrigation can meet the drinking water requirement which is worked out to be about 961 ha.m.

The extra wells needed for development of 5203 ham. (1.84 TMC) available as balance potential in post project stage is 3060. The investment needed for construction of

...5.

3060 wells at the rate of Rs.45,000 each including pumpset workout to Rs.137.70 millions with this available 5203 ham. (1.84 TMC) of groundwater in the command the additional irrigation potential to be erected is 8670 ha. The total potential available including 2760 existing irrigation is 11,430 ha. for the potential accounted for 2.42 TMC. The cost of 1 TMC of groundwater development is Rs.75 million which provides irrigation to 4700 ha. Therefore the cost of 1 ha. irrigation through groundwater is Rs.15,800 which is cost effective compared to 150 million for 1 TMC of surface water. The project also augments yields of existing well besides additional irrigation. From a study of the groundwater levels in the proposed Srisailam Right Bank canal command where paddy irrigation is already in vogue under minor irrigation tanks and from the study of the groundwater levels in Mylavaram project command where Rabi irrigated dry crops are being grown during the last one decade, it is observed that no waterlogging problems are experienced. Since the Srisailam Right Bank canal command contemplates I.D. pattern, no major waterlogging problems need be anticipated.

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T A B L E -I

DETAILS OF GROUNDWATER POTENTIAL IN L.B.C COMMAND

Rainfall recharge	=	4820 ham
Seepage from existing Irrigation from tanks	=	1235 ham
Total recharge during preproject	=	6055 Ham
Additional recharge available from main canal	=	804 ham
Total recharge available during post project	=	6859 ham. 68.59 Hm^3 (2.43 TMC)
Number of existing wells in the command	=	1456 (including all types)
Draft from the existing wells	=	1656 ham.
Balance potential available in post project for further development.	=	(6859-1656) 5203 ham. (1.84 TMC)
Average unit draft from each well	=	1.7 ham
No.of wells feasible for further development.	=	3060
Irrigation potential with balance potential available	=	5203/0.6 8670 Ha
Existing Irrigation potential	=	1656/0.6 2760 Ha
Total Irrigation potential during post project period	=	11430ha
Cost of each well including pumpset	=	Rs.45,000
Total cost of 3060 wells	=	137.70 Millions
Cost of 1 Ha irrigation.	=	Rs. 15,900 (137.70/8670)
For the development of 1.84 TMC cost works out to	=	137.70 Million
Cost of 1 TMC of Groundwater	=	75 Million
i.e., 1 TMC of groundwater irrigates.	=	4700 Ha of ayacut.

...2..

DETAILS OF SURFACE WATER IRRIGATION POTENTIAL

The average annual rate as in para 20 of initial hydrology appraisal is

Ac. 5607 for 1 TMC

78 ha for 1 hm^3

1 ha for 13690 m^3

i.e., 1 TMC of surface water irrigates 2230 ha

1 TMC of Surface water = 150 Million

Therefore cost for 1 ha of irrigation with surface water. = 150/2230
Rs.67,200

But for SRBC command irrigation potential of 1 TMC. = 4052 ha
i.e.,
(77,000/19)

Cost for development of 1 TMC Surface Water. = 150 Million

Cost of 1 ha development by surface water = Rs.37,000
i.e.,(150/4052)

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TABLE - II

GROUNDWATER POTENTIAL AVAILABILITY AND COST OF GROUNDWATER DEVELOPMENT IN SRISAILAM RIGHT BANK CANAL COMMAND.

Name of Command	Utilisable Resources Ham.	No. of existing wells	Present draft (Ham)	Potential available for further development (Ham)	Additional wells feasibility	Total cost for ground water development (Crores)	Institutional finance at 75% (Crores)	Government subsidy @ 25% (crores)
Srisailam Right Bank canal 76,900 ha. of ayacut.	6859 ham. (2.43 TMC)	1436	1656 (0.59 TMC)	5203 (1.84 TMC)	3060	13.77	10.33	3.44

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ANNEX-VI

SRISAILAM RIGHT BRANCH CANAL PROJECT - AP

Statement showing the no. of population affected

Name of Reservoir	No. of families affected			Total	Population
	SC	ST	Others(backward)		
1. Gorakallu B.R.	nil	47	2	49	212
2. Owk B.R.	152	13	250 + 86	501	2130

ANNEXURE - VII

SHIRDI BRANCH CANAL SCHEME

ABSTRACT OF COST

PRICE LEVEL: 1993-94
(AMOUNT IN LAKHS)

S.No.	Detailed Head	Expenditure upto 10/93 Rs. in lakhs	Total Amount of R.E. Rs. in lakhs.
I.	Direct Charges of Works:		
	Sub Head :		
1.	A- Preliminary	140.23	519.65
2.	B- Land	1148.19	4441.64
3.	C- Works	-	33202.00
4.	D- Regulators and Measuring deviced	65.28	567.55
5.	E- Falls(for canals only)	-	11.49
6.	F- Cross drainage works (for canals only)	2040.94	7991.76
7.	G- Bridges(for canals only)	162.62	969.05
8.	H- Escapes	22.42	265.92
9.	I- Navigation Works	-	-
10.	J- Power Plant Civil Works	-	-
11.	K- Buildings	610.95	1798.79
12.	L- (for canals only)		
	i) Earth work	11828.81	35208.18
	ii) Lining	840.61	7313.96
	iii) Service Road	-	-
	iv) Tunnel	-	-
13.	M- Plantation	2.42	320.70
14.	N- Tanks and reservoirs	-	-
15.	O- Miscellaneous	81.90	898.02
16.	P- Maintenance (May be taken as 1% of the cost of I-Works,less A-Preliminary,B-Land and Q Spl. T & P)	31.83	1002.43
17.	Q- Speical T & P	5.16	198.09
18.	R- Communications	125.26	311.06

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19.	S- Power Plant & Electrical System	-	-
20.	T- Water Supply Works	-	-
21.	U- Distributaries, Minors and Sub Minors	-	9791.40
22.	V- Water Courses & field channels	-	1178.73
23.	W- Drainage	-	88.58
24.	X- Environment & Ecology.	30.00	325.60
25.	Y- Losses on stock & unforeseen (Generally 0.25% of the cost of I-Works less A-Preliminary B-Land and Q-Spl. T & P	-	253.11
	Total Direct Charges :	17136.62	106657.71
II.	Establishment (10%) of cost of I-Works less B- Land	-	9495.34
III.	Tool and Plants (Generally 1% of cost of I-Works including cost of land .	-	1066.58
IV.	Suspense.	-	-
V.	Receipts & Recoveries on Capital Account.	-	(-) 253.59
	Total Direct Charges :		116966.04
	Indirect Charges		
	(a) Capitalised value of abatement of land revenue		109.32
	(b) Audit and Accounts charges (Generally 1% of cost of I-Works)		1066.57
			1175.89
	Total Indirect Charges		~~118141.93~~
	Total of Direct & Indirect Charges		118141.93
	Provision for Ground Water Development for conjunctive use		416.00
			118557.93
		Say Rs.	1185.58 Crores.

ANNEXURE - VII(A)

SRISAILAM RIGHT BRANCH CANAL SCHEME, REVISED ESTIMATE OF 93-94
S.S.R. ANALYSIS OF REASONS FOR THE INCREASE IN THE COST.

Sl. No.	Descriptions	Estimate amount as per 80-81	Estimate amount as per 93-94	Difference	Variation due to: Rise in price	Change in price	Inadequate provisions	Inadequate investigations.	Change in design & additional requirements.	Other causes	Remarks
1.	A- Preliminary	158.59	519.65	361.06	161.06 (A)			200.00 (B)			A. The increase is due to price rise over the period. B. To carry out additional Geological Survey studies on Dam foundations.
2.	B- Land	333.23	4441.64	4108.41	1165 (A)		2943.41 (B)				A. Due to increase in cost of land over the period. B. Due to inadequate provisions towards rehabilitation & resettlement & additional land acquisition required as per final survey/estimate.
	C- Works	7808.09	33202.00	25393.91	23424 (A)				1969.91 (B)		A. Increase is due to rise in price over the period. B. Change in length & section of dam as per detailed investigation & design.
	D- Regulators	177.95	567.55	389.60	267 (A)		122.60 (B)				A. Increase is due to rise in price over the period. B. The increase is due to additional structures provided as per site conditions.
	E- Falls	-	11.49	11.49	-		11.49 (A)				A. The increase is due to new provisions as per requirement at site after detailed investigations.
6.	F- C.D. Works	530.89	7991.76	7460.87	1593 (A)		5867.87 (B)				A. The increase is due to price Rise over the period. B. The increase is due to additional structure provided after detailed investigations.
7.	G- Bridges	154.85	969.05	814.20	674 (A)		140.20 (B)				A. The increase is due to price rise over the period. B. The increase is due to additional structure provided after detailed investigations.
8.	H- Escapes	24.01	265.92	241.91	76 (A)		165.91 (B)				A. The increase is due to price rise over the period. B. The increase is due to additional structures provided after detailed investigations.

....2/-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
9.	I- Navigation	-	-	-	-	-	-				
10.	J- Power Plant Appurtenants.	-	-	-	-	-	-				
11.	K- Buildings	474.44	1798.79	1324.35	1324.35 (A)						A. The increase is due to price rise over the period
12.	L- i) Earth Work ii) Lining	5480.15	42522.14	37041.99	16440 (A)		20601.99 (B)				A. The increase is due to price rise over the period. B. Due to contractual clauses in the works taken up under World Bank aid in which negotiations are not permitted and price escalation has to be paid resulting in high tender premium.
13.	M. Plantation	5.47	320.70	315.23	20 (A)		295.23 (B)				A. Dur to price rise over the period. B. Due to additional requirements as per actual.
14-	N- Tanks & Reservoirs	-	-	-	-		-				
15.	O- Miscellaneous	631.71	898.02	266.31	266.31 (A)						A. Due to price rise over the period
16.	P- Maintenance	152.54	1002.43	849.89	849.89 (A)						A. Dur to change of provision in other sub heads.
17.	Q- Special T & P	110.94	198.09	87.15			87.15 (A)				A. Due to marginal increase in the provision of inspection vehicles.
18.	R- Communications	39.82	311.06	271.24	120.00 (A)		151.24 (B)				A. Due to price rise over the period. B. Due to additional requirements as per actual at site.
19.	S- Power Plant & Electrical System.	-	-	-	-		-				
20.	T- Water Supply Works	-	-	-	-		-				
21.	U- Distributories	-	9791.40	9791.40	9791.40 (A)						A. Due to price rise over period & due to wrong classification of sub head in 80-81 estimate.
22.	V- Water Courses	-	1178.73	1178.73	1178.73 (A)						A. - do -
23.	W- Drainage	-	88.58	88.58	88.58 (A)						A. - do -
24.	X- Environmental & Ecology.	-	325.60	325.60			325.60 (A)				A. Due to no provision made towards this sub head in the estimate of 80-81.
25.	Y- Ex Loss on stock	38.56	253.11	214.55	-					214.55 (A)	A. Due to change in target date of completion of the project.

.....3/-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
25.	I Works total	16121.24	106657.71	90536.47	57439.32	-	30712.69	200	1969.91	214.55	
27.	II Establishment	1571.74	9495.34	7923.60	7923.60 (A)						(A) Due to change in target date of completion of the project.
28.	III Ordinary T & P	161.18	1066.58	905.40						905.40 (A)	(A) Due to change in provision of other sub heads.
29.	IV Suspense	-	-	-							
30.	V. Receipts & Recoveries	(-) 94.44	(-)253.59	(-)159.15						(+)159.15	- do -
										960.80	
	Indirect Charges	17759.72	116966.04	99206.32	65362.92		30712.69	200	1969.91		
	Indirect Charges										
	Abatement of land Revenue.	161.18	109.32	(-) 51.86						(-) 51.86 (A)	A. Due to change of provision under 'B' Land.
	Audit A/cs Charges	12.05	1066.57	1054.52						(-) 1054.52 (A)	A. Due to change of provision of other sub heads.
		17932.95	118141.93	100208.98	65362.92		30712.69	200	1969.91	1963.46	
	Provision for ground water for conjuctive use of water		416.00								
		17932.95	118557.93								
	Say Rs.	179.33 Crores.	1185.58 Crores.								

ANNEXURE-VIII

SRISAILAM RIGHT BRANCH CANAL SCHEME

CALCULATION OF BENEFIT COST RATIO (BCR) AS ADOPTED BY THE TECHNICAL ADVISORY COMMITTEE (TAC)

		Before Irrigation (Rs.in Lakhs)	After Irrigation (Rs.in Lakhs)
A.	GROSS RECEIPTS		
1.	Gross Value of farm produce	7568.345	32809.660
2.	Dung Receipts (at 30% of fodder expenditure)	340.575	984.289
3.	Total (A) : Gross Receipts (1+2)	7908.920	33793.949
B.	EXPENSES		
1.	Expenditure on seeds	138.237	1069.651
2.	Expenditure on manures etc.	1027.491	3861.158
3.	Expenditure on hire labour (Human & Bullock)	1621.280	3967.688
4.	Fodder expenses (as % of Gross value of produce)	1135.251 (15% of item A1)	3280.966 (10% of item A1)
5.	Depreciation on implements	204.345 (2.7% of item A1)	885.861 (2.7% of item A1)
6.	Share & Cash Rent	378.417 (5% of item A1)	984.289 (3% of item A1)
7.	Land Revenue	151.367	656.193
8.	Total (B) : Expenses(1 to 7)	4656.388	14705.806
C.	NET VALUE OF PRODUCE		
1.	Total Gross Receipts (Total A.3)	7908.920	33793.949
2.	Minus Total Expenses (Total B.8)	4656.388	14705.806
3.	Net Value (1 - 2)	3252.532	19088.143
D.	ANNUAL BENEFITS		
1.	Net Value after Irrigation(C.3)		19088.143
2.	Minus Net Value(Before Irrigation)		3252.532
3.	Net Annual Benefits (1 - 2)		15835.611

Contd....2.

(Rs. in Lakhs)

I.	a)Estimated cost of Project	125245.000
	b)Cost of Land @ Rs.2000/- per Ha per 76890 Ha :	1537.800
	TOTAL	126782.800
II.	ANNUAL BENEFITS	
	1. Net benefit Post Project	19088.143
	2. Net benefit Pre-Project	3252.532
	3. Loss in Agricultural Produce for the area going out of cultivation due to Canal: DISNET (3286 Ha) @ Rs.6007 per Ha.	197.300
III.	Net benefits II(1) - [II(2) + II(3)]	15638.311
IV.	ANNUAL COST	
	i) Interest @ 10% of the total cost of Project	12678.280
	ii) Depreciation of the project @ 1% of the cost of the Project (assuming life of the project as 100 years)	1267.830
	iii) Annual O & M charges @ Rs.180/-per Ha for gross irrigation of 100800 Ha	181.440
	iv) Maintenance of Headworks @ 1% of cost of Headworks.	399.710
	TOTAL	14527.260

Benefit Cost Ratio = $\frac{15638.311}{14527.260}$ = **1.08**

SRISAILAM RIGHT BRANCH CANAL

Statement showing the cost of the Scheme including apportionment costs towards common works and K.C.Canal modernisation.

(Rs.in Lakhs)

1.	Cost of SRBC as per Revised Estimate of 1993-94		118558
2.	Cost of common works SRBC & TGP :		
	i)Cost of Approach Channel & Head Regulator at Pothireddy Padu (as per TGP updated cost)	677	
	ii)Cost of SRMC from KM 0.00 to KM 16.838 including Banakacherla Regulator (as per TGP updated cost)	8232	
		8909	
	Apportionment cost in the ratio of utilisation		
	$\frac{19}{63} \times 8909 = 2687$		2687
3.	Apportionment cost of K.C.Canal modernisation :		
	$\frac{8}{39} \times 19800 = 4000$		4000
			125245

SRISAILAM RIGHT BRANCH CANAL PROJECT - ANDHRA PRADESH

STATEMENT SHOWING VALUE OF PRODUCE - BEFORE IRRIGATION (PRE-PROJECT)

CROP	AREA in ha	Yield in Qntl. per ha.	Total Produce in Qntl.	Rate per Qntl. Rs.	Total Value of Produce Rs. '000	INPUTS Rs. '000						
						SEEDS	MANURE			Pesticides	Labour & Animal	Total Inputs Rs. '000
							N	P	K			
PADDY	3579	29.0	103791.0	400	41516.0	1073.70	1503.20	1861.0	751.6	894.75	12168.6	18253.0
JOWAR	25074	11.0	275814.0	426	117497.0	1003.00	5265.50	9778.8	-	-	36758.5	52805.8
COTTON	17387	12.5	217337.5	1600	347740.0	2260.30	9128.20	11301.5	6085.4	34774.00	66035.8	129585.2
GROUNDNUT	4405	9.0	39645.0	1200	47574.0	7929.00	616.70	2863.2	-	1101.25	9779.1	22289.3
OTHER CROPS	31155	13.0	405015.0	500	202508.0	1557.75	8723.40	8100.3	-	-	37386.0	55767.4
	81600		1041602.5		756834.0	13823.75	25237.00	33904.8	6837.0	36770.00	162128.0	278700.8
PADDY STABILISATION	668	29.0	19372.0	400	7748.8	200.40	280.56	347.36	140.28	167.00	2271.2	3406.8
GRAND TOTAL	82268		1060974.5		764583.8	14024.15	25517.56	34252.16	6977.28	36937.00	164339.2	282107.6

SRISAILAM RIGHT BRANCH CANAL PROJECT - ANDHRA PRADESH

Statement showing value of produce - After Irrigation (Post Project)

Sl. No.	Crop	Area in Ha	Yield per Ha in Qntl.	Total Produce in Qntl.	Rate per Qntl. Rs.	Value of Produce Rs. '000	Inputs Rs. '000						
							Seeds	MANURE			Pesticides	Labour & Animal	TOTAL
								N	P	K			
	KHARIF												
1.	JOWAR	7700	22	169400	426	72164	739.20	4042.50	2502.50	1347.50	3850.00	15962.10	28443.80
2.	GROUNDNUT	10300	20	206000	1200	247200	25029.00	3605.00	7766.20	1802.50	5150.00	30076.00	73428.70
3.	SUNFLOWER	5900	18	106200	1050	111510	885.00	3304.00	4602.00	0.00	1475.00	9062.40	19328.40
4.	PULSES	6000	15	90000	1000	90000	2700.00	1680.00	2340.00	840.00	3000.00	9438.00	19998.00
5.	VEGETABLES & OTHERS	900	120	108000	220	23760	198.00	756.00	1170.00	504.00	450.00	3151.80	6229.80
		30800		679600		544634	29551.20	13387.50	18380.70	4494.00	13925.00	67690.30	147428.70
	RABI												
6.	GROUNDNUT	7466	22	164252	1200	197102	18142.38	2613.10	5629.36	1306.55	3733.00	21800.72	53225.11
7.	SUNFLOWER	9018	20	180360	1050	189378	1352.70	5050.08	7034.04	0.00	2254.50	13851.65	29542.97
	SUNFLOWER SEED	403 N S	10 5	4030 2015	3000 1050	12090 2116	604.50	338.52	314.34	84.63	201.50	1447.57	2991.05
8.	JOWAR SEED	202 NS	18 4	3636 808	750 426	2727 344	101.00	113.12	157.56	70.70	252.50	606.00	1300.88
9.	TOBACCO	6000	15	90000	1300	117000	3600.00	3360.00	7800.00	0.00	3000.00	18684.00	36444.00
10.	PULSES	4181	15	62715	1000	62715	1881.45	1170.68	1630.59	585.34	2090.50	6576.71	13935.27
11.	VEGETABLES & OTHERS	12000	120	1440000	220	316800	2640.00	10080.00	15600.00	6720.00	6000.00	42024.00	83064.00
		39270		1947816		900272	28322.03	22725.50	38165.89	8767.22	17532.00	104990.70	220503.30
	TWO SEASONAL												
12.	CHILLIES	7560	30	226800	1300	294840	4536.00	11271.96	15233.40	17728.20	11340.00	44535.96	104645.50
13.	COTTON	16732	30	501960	1600	803136	6692.00	23424.80	21751.60	8784.30	62745.00	87341.04	210739.50
	COTTON SEED	302	7.5	2265	11000	24915	188.75	761.04	1256.32	634.20	1510.00	8546.60	12896.91
		LINT	3.5	1057	3500	3699							
		KAPAS	7.5	2265	1600	3624							
14.	TURMERIC	3830	48	183840	1800	330912	23937.50	2681.00	3734.25	1340.50	1915.00	38043.39	71651.64
15.	SUGAR CANE	1520	1000	1520000	40	60800	7600.00	1915.20	988.00	532.00	380.00	16841.60	28256.80
16.	MULBERRY	706	52	36712	850	31205	564.80	1976.80	1101.36	593.04	0.00	11691.36	15927.36
17.	BETELVINE	80	62.5	5000	3600	18000	772.00	112.00	260.00	168.00	0.00	4688.00	6000.00
		30730		2479899		1571132	44291.85	42142.80	44324.93	29780.24	77890.00	211688.00	450117.80
	GRAND TOTAL	100800		5107315		3016038	102165.10	78255.80	100871.50	43041.46	109347.00	384368.90	818049.80
	PADDY STABILI-ZATION	668	54	36072	400	14429	200.40	748.16	998.66	350.70	835.00	2782.22	5915.14
	FRUIT CROPS	4000	136	544000	487	264928	4800.00	8400.00	10400.00	2800.00	3000.00	12400.00	41800.00
		105468		5687387		3295395	107165.50	87403.96	112270.20	46192.16	113182.00	399551.10	865764.90

SRISAILAM RIGHT BRANCH CANAL PROJECT - A.P.

ANNEXURE-IX

COMPUTATION OF INTERNAL RATE OF RETURN (I.R.R.)

C.C.A. = 76890 ha.

Year	Sl. No.	Project Cost Rs.in lakhs	C.C.A. Developed %	C.C.A. Developed Area in ha	O&M Cost @Rs.180 per ha Rs.in lakhs	Total Cost Rs.in lakhs (3 + 6)	Benefit Rs.in lakhs	Net Cash Rs.in lakhs (8 - 7)	Discount Factor 12%	Discount Factor 14%	% Worth of Cash Flow at Discount 12%	% Worth of Cash Flow at Discount 14%
1	2	3	4	5	6	7	8	9	10	11	12	13
1977-78	1											
1978-79	2	236.38	-	-	-	236.38	-	(-) 236.38	1.00	1.00	(-) 236.38	(-) 236.38
1979-80	3											
1980-81	4											
1981-82	5	107.03	-	-	-	107.03	-	(-) 107.03	0.892	0.877	(-) 95.47	(-) 93.87
1982-83	6	157.50	-	-	-	157.50	-	(-) 157.50	0.797	0.769	(-) 125.53	(-) 121.12
1983-84	7	88.09	-	-	-	88.09	-	(-) 88.09	0.712	0.675	(-) 62.72	(-) 59.46
1984-85	8	114.21	-	-	-	114.21	-	(-) 114.21	0.636	0.592	(-) 72.64	(-) 67.61
1985-86	9	515.09	-	-	-	515.09	-	(-) 515.09	0.567	0.519	(-) 292.06	(-) 267.33
1986-87	10	750.32	-	-	-	750.32	-	(-) 750.32	0.507	0.456	(-) 380.41	(-) 342.15
1987-88	11	701.72	-	-	-	701.72	-	(-) 701.72	0.452	0.400	(-) 317.18	(-) 280.69
1988-89	12	1127.05	-	-	-	1127.05	-	(-) 1127.05	0.404	0.351	(-) 455.33	(-) 395.59
1989-90	13	1350.00	-	-	-	1350.00	-	(-) 1350.00	0.361	0.308	(-) 487.35	(-) 415.80
1990-91	14	1399.99	-	-	-	1399.99	-	(-) 1399.99	0.322	0.270	(-) 450.80	(-) 378.00
1991-92	15	5025.12	-	-	-	5025.12	-	(-) 5025.12	0.288	0.236	(-) 1447.23	(-) 1185.93
1992-93	16	5424.54	-	-	-	5424.54	-	(-) 5424.54	0.257	0.207	(-) 1394.11	(-) 1122.88
1993-94	17	14055.00	-	-	-	14055.00	-	(-) 14055.00	0.229	0.182	(-) 3218.60	(-) 1967.70
1994-95	18	19940.00	-	-	-	19940.00	-	(-) 19940.00	0.205	0.160	(-) 4087.70	(-) 2791.60
1995-96	19	25900.00	-	-	-	25900.00	-	(-) 25900.00	0.183	0.140	(-) 4739.70	(-) 3626.00
1996-97	20	17500.00	57.41	44148	79.47	17579.47	9631.00	(-) 7948.43	0.163	0.123	(-) 1295.59	(-) 977.65
1997-98	21	13000.00	84.63	65073	117.73	13117.13	14192.42	(+) 1075.29	0.146	0.108	(+) 156.99	(+) 116.13
1998-99	22	7400.00	97.64	75073	135.13	7535.13	16373.42	(+) 8838.29	0.130	0.095	(+) 1148.97	(+) 839.63
1999-2000	23	3765.96	100.00	76890	138.40	3904.36	16769.71	(+) 12865.35	0.116	0.082	(+) 1492.38	(+) 1067.82
2000-2094	24	-	100.00	88320	158.97	158.97	19262.59	(+) 19103.62	0.971	0.594	(+) 18549.62	(+) 11347.55
		118558.00									(+) 2189.16	(-) 958.63

NOTE : Beyond 2000 year Ground Water utilization for 11430 ha is considered as per latest assessment of State Ground Water Department.

Total benefit = 21979.88 lakhs

Benefit per ha = 0.2181 lakhs

$$IRR = 12 + \frac{2(2189.16)}{2189.16 + 958.63}$$

IRR = 13.39

ANNEXURE - X

SRISAILAM RIGHT BRANCH CANAL SCHEME

Statement showing percentage return on sum of charges

(Rs.in lakhs)

Year	Expenditure during year			Expenditure at the end of Year			Capital outlay on which interest is allowed Col.4+Col.7 / 2 of previous year	Simple interest @ 5.5% on Col.8	Accumulated interest	Net Revenue after deducting working expenses	Accumulated Revenue	Accumulated interest minus Accumulated Revenue Col.10-12	Sum at charges Col.7+13	% Return on Sum @ charges Col.11x100 / Col.14	
	Direct Charges	Indirect charges	Total	Direct Charges	Indirect charges	Total									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1977 - 78															
1978 - 79															
1979 - 80	236.38	-	236.38	236.38	-	236.38	118.19	6.50	6.50	-	-	6.50	242.88	-	
1980 - 81															
1981 - 82	107.03	-	107.03	343.41	-	343.41	289.89	15.94	22.44	-	-	22.44	365.85	-	
1982 - 83	157.50	-	157.50	500.91	-	500.91	422.16	23.22	45.66	-	-	45.66	546.57	-	
1983 - 84	88.09	-	88.09	589.00	-	589.00	544.96	29.97	73.63	-	-	73.63	664.63	-	
1984 - 85	114.21	-	114.21	703.21	-	703.21	646.10	35.53	109.16	-	-	109.16	812.37	-	
1985 - 86	515.09	-	515.09	1218.30	-	1218.30	960.75	52.84	162.00	-	-	162.00	1380.30	-	
1986 - 87	750.32	-	750.32	1968.62	-	1968.62	1593.46	87.64	249.64	-	-	249.64	2218.26	-	
1987 - 88	701.72	-	707.72	2670.34	-	2670.34	2319.48	127.57	376.91	-	-	376.91	3047.25	-	
1988 - 89	1127.05	-	1127.05	3797.39	-	3797.39	3233.87	177.86	554.77	-	-	554.77	4352.16	-	
1989 - 90	1350.00	-	1350.00	5147.39	-	5147.39	4472.39	245.98	800.75	-	-	800.75	5948.14	-	
1990 - 91	1399.99	-	1399.99	6547.38	-	6547.38	5847.38	321.60	1122.36	-	-	1122.36	7669.74	-	
1991 - 92	5025.12	-	5025.12	11572.50	-	11572.50	9059.94	498.29	1620.65	-	-	1620.65	13193.15	-	
1992 - 93	5424.54	-	5424.54	16997.04	-	16997.04	14284.77	785.66	2406.31	-	-	2406.31	19403.35	-	
1993 - 94	14055.00	-	14055.00	31052.04	-	31052.04	24024.54	1321.35	3727.66	-	-	3727.66	34779.70	-	
1994 - 95	19940.00	-	19940.00	50992.04	-	50992.04	41022.04	2256.21	5983.87	-	-	5983.87	56975.91	-	
1995 - 96	25900.00	-	25900.00	76892.04	-	76892.04	63942.04	3516.81	9500.68	-	-	9500.68	86392.72	-	
1996 - 97	17500.00	-	17500.00	94392.04	-	94392.04	85642.04	4710.31	14210.99	7.96	7.96	14203.03	108595.07	0.007	
1997 - 98	13000.00	-	13000.00	107392.04	-	107392.04	100892.04	5549.06	19760.05	11.74	19.70	19740.35	127132.39	0.009	
1998 - 99	7400.00	-	7400.00	114792.04	-	114792.04	111092.04	6110.06	25870.11	13.54	33.24	25836.87	140628.91	0.0096	Percentage Return on Sum @ charges maximum of Col.15 = 0.0096
1999-2000	3765.96	-	3765.96	118558.00	-	118558.00	116675.02	6417.12	32287.23	13.88	47.12	32240.11	150798.11	0.0092	
2000-2001	-	-75.59	-75.59	118482.41	-	118482.41	118520.20	6518.61	38805.84	13.88	61.00	38744.84	157227.25	0.0092	
2001-2002	-	-75.59	-75.59	118406.82	-	118406.82	118444.61	6514.45	45320.29	13.88	74.88	45245.41	163651.67	0.0092	
2002-2003	-	-75.59	-75.59	118331.23	-	118331.23	118369.02	6510.30	51830.58	13.88	88.76	51741.83	170073.03	0.0092	
2003-2004	-	-75.59	-75.59	118255.64	-	118255.64	118293.43	6506.14	58366.73	13.88	102.64	58234.09	176489.73	0.0092	
2004-2005	-	-75.59	-75.59	118180.05	-	118180.05	118217.84	6501.98	64838.71	13.88	116.52	64722.19	182902.24	0.0092	
2005-2006	-	-75.59	-75.59	118104.46	-	118104.46	118142.25	6497.82	71336.53	13.88	130.40	71206.13	189310.59	0.0092	
2006-2007	-	-75.59	-75.59	118028.87	-	118028.87	118066.66	6493.97	77830.20	13.88	144.28	77685.92	195714.79	0.0092	
2007-2008	-	-75.59	-75.59	117953.28	-	117953.28	117991.08	6489.51	84319.71	13.88	158.16	84161.55	202114.83	0.0092	
2008-2009	-	-75.59	-75.59	117877.69	-	117877.69	117915.48	6485.35	90805.06	13.88	172.04	90633.02	208510.71	0.0092	
2009-2010	-	-75.59	-75.59	117802.10	-	117802.10	117839.89	6481.19	97286.25	13.88	185.92	97100.33	214902.43	0.0092	

1) Percentage return on Capital Cost of Project = $\frac{\text{Col.11 x 100}}{\text{Col.4 (Total after 10 years of Project)}}$

= $\frac{185.92 \times 100}{117802.10}$ = 0.157

2) Percentage return on Capital Cost of project less betterment levy = $\frac{\text{Col.11 x 100}}{\text{Col.4 (upto year 2000)}}$

= $\frac{185.92 \times 100}{118558}$ = 0.156