GOVERNMENT OF ORISSA,
DEPARTMENT OF WATER RESOURCES

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STATE DAM SAFETY ORGANISATION

PREFACE

Dams have played a very vital role throughout the history of civilization but failure of many dams causing damage to life and property has increased the awareness not only among Engineers, but also among the general public about safety of the dams. As the dams grow older the responsibility of the Engineers increases many fold.

Orissa has 163 numbers of large dams (as per ICOLD classification), which is the 5th largest in India in terms of numbers. This includes 10 major project dams, 45 medium project dams and rest 108 dams under minor irrigation projects. The State Dam Safety Organisation (SDSO) was established in the year 1981 and has been responsible for monitoring the safety of these dams. Since its inception the SDSO has sincerely taken up this stupendous task of monitoring the health of Dams and is rendering necessary advice to the field units.

Although details about all these large dams are well preserved in the State DSO, the present effort is intended to prepare a handy book containing activities of the State Dam Safety Organisation and very pertinent information about each large dam of the State for ready reference. As new dams are constructed and added to the list of large dams and as health status of a particular dam changes from time to time depending on its upkeep, this report needs to be updated accordingly.

The Report has been compiled by Sri Akshaya Kumar Das, Assistant Director with assistance of other officers / staff of SDSO.

Er Sisir Rao, Chief Engineer, Design and Research constantly inspired to get this work done within a stipulated time. The authors wish to acknowledge and express their gratitude to him.

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CONTENTS

1. INTRODUCTION

Dams occupy a very pivotal role in the development activities of the civilization. Dams also pose hazard in the event of its failure. The International Commission on Large Dams (ICOLD) has been pioneer in projecting various aspects of dam engineering to ensure proper design and construction of safe dams. During the international conference on large dams at New Delhi in 1979 the dam safety activity in India got an impetus. A dam safety organization was established in May 1979 in Central Water Commission to assist the State Governments in various activities on dam safety.

The Safety of the Dams in our country is the principal concern of State Agencies those are involved in the various aspects of investigation, planning, design and construction, operation and maintenance. Although most of the dams in the country have performed well, there have been few failures. These failures highlighted the need to review the procedures and the criteria those were adopted by various States with the objective of establishing the best assurance of dam safety within the limitations of present state of art. Consequent to the proposal made during the 5th Conference of Irrigation Ministers in November, 1980, the Dam Safety Organisation in Orissa was setup in May,1981 with its Headquarters at Burla.

During April 1989, the World Bank proposed to establish a centrally funded scheme for a possible assistance by the Bank as a project to support the institutional strengthening and investments in safety assurance works as identified by an upgraded safety assurance programme.

Accordingly an agreement was signed in 1991 for an assistance of US $130 Million for Dam Safety Assurance and Rehabilitation Project (DSARP) in Central Water Commission and 4 participating States i.e., Orissa, Rajasthan, Madhya Pradesh and Tamil Nadu. The provision for Orissa was Rs.1273.30 Million (IN-2241)as per the Staff Appraisal Report (SAR).

The objective

a) To strengthen the institutional frame work for Dam Safety assurance

b) To upgrade the physical features in and around the selected dams to enhance the safety status as required through basic safety facilities and remedial works.

Later during 1992 the Dam Safety Organisation was shifted from Burla to Bhubaneswar and strengthened with additional staff as proposed in the Staff Appraisal Report (SAR) of World Bank. More often the World Bank as well as Central Water Commission(CWC) have emphasised to retain the strengthened structure of the Dam Safety Organisation permanently to look after the safety of the large dams in the State as is being done in other dam owning states. Presently the State Dam Safety Organisatioin is a permanent Organisation under Non-Plan budgetary provision functioning in its own office building inside Secha

Sadan Compound. It is headed by Director, Dam Safety in the rank of Superintending Engineer supported by 46 technical and non technical core staff.

2. PRIMARY FUNCTION OF STATE DAM SAFETY ORGANISATION (SDSO)

Only large dams as per the ICOLD (International Commission on Large Dams) definition are under the purview of Dam Safety Organisation.

Definition of Large Dams

As per ICOLD, a large dam is defined as a dam which satisfies the following criteria.

(i) a dam above 15m in height from the lowest portion of general foundation to the crest and

(ii) a dam between 10 & 15m height provided it complies with at least one of the following condition.

(a) the length of crest of dam should not be less than 500m,

(b) the capacity of reservoir formed by the dam to be not less than 1 Mm^3.

(c) the maximum flood discharge should not be less than 2000 M^3/sec.

(d) the dam has specially difficult foundation problem

(e) the dam is of unusual design.

Large dams in Orissa

Orissa has built 163 nos. of large dams of which 55 nos. are Major & Medium Project Dams and 108 nos. of Minor Irrigation Project Dams.

2.1 Inspection of Dams – Phase-I Investigation

The State Dam Safety Organisation has to make Phase-I investigation of all large dams once in 5 years to identify expeditiously the dams which may pose hazard to human life and property. The investigation include an assessment of general condition with respect to safety of the project based on available data and a visual inspection and determines the need for emergency measures and conclude if additional study, investigation and analysis are necessary and warranted.

The work includes:

a) review of data book
b) review of available engineering data related to design assumptions and design of structures, construction records, post construction changes, hydrological and hydraulic assumptions and features
c) review existing record of operation of dam and appurtenant structure including mechanical and electrically operated equipments
d) review existing maintenance procedure

e) review of structural behavior based on reading of instruments mounted or embedded in Dam
f) review periodical inspection reports
g) conduct detailed field inspection as per proforma
h) record at the end of investigation, the assessment of safety of dam, need for additional study, investigation, analysis considered essential to assess the safety of dam, urgency of such additional investigation & advice for Phase-II investigation, if needed.

2.2. Phase-II Investigation

The Phase-II investigation will be supplementary to Phase-I investigation and is conducted when the results of Phase-I investigation indicates the need for additional in-depth study, investigation and analysis.

The work includes
a) additional visual inspection and surveillance
b) measurements through instrument mounted or embedded in dams
c) foundation exploration
d) material testing
e) hydraulic and hydrologic analysis &
f) structural stability analysis.

2.3. Pre & Post-monsoon inspection

Pre-monsoon and Post-monsoon inspection are periodical inspection done every year by the field engineers as per the guidelines prescribed by the Central Water Commission. The reports are received by end of June and November, respectively. Each year these reports of inspections are reviewed at State Dam Safety Organisation & the Annual Health status of the dams is published and sent to Government in Department of Water Resources and Central Water Commission for their appraisal.

2.4. Hydrological Review of Large Dam

Hydrological review of all the large dams are essential with respect to the safety of dam as in most cases the design flood has been calculated with the help of some empirical formula based on regional experience. With the advent of new methodology and development of Hydrological Science, the hydrological review of dams has become essential based on hydro-metrological approach following the guidelines fixed by the CWC. The adequacies of existing spillways are reviewed for the enhanced inflow design flood. The method of computation needs specialization of the subject as many assumption, probability, justification are connected with the subject.

2.5. Structural Review

After the hydrological review of a dam, if the spillway is found to be inadequate, alternatives like putting an auxillary spillway/fuge plug, adding parapet walls, strengthening the existing spillway are studied and design of such structure are studied indepth.

The structural safety of the dams are also reviewed by analyzing the instrument data.

2.6. Emergency Action Plan (EAP)

Inspite of all precautions and proper maintenance of the dam, some times due to unprecedented natural phenomenon, or due to faulty operation of the reservoir, the dam may face emergency situation such as dam over topping, dam break etc. which may lead to disaster. To cope up with such exigency, Energency Action Plan (EAP) is to be prepared.

National Council of Dam Safety (NCDS) is always emphasizing the preparation of EAP for all dams of National Importance (Major Dams).

The EAP consists of three phase of work. (i) Dam Break Analysis (2) Preparation of Inundation map (3) Preparation of Emergency Action Plan.

Preparation of Emergency Action Plan involves association of Irrigation Engineers, Civil Authorities and Public administrators.

2.7. Inter State Dam Safety Sub-Committee

In pursuance to the Terms of Reference of NCDS, Inter-State Dam Safety Sub-committees were formed. To monitor the safety aspects of inter-state dams relating to Orissa two Sub-committees were constituted in March 1990 and later reconstituted in 2004 after formation of Chattishgarh and Jharkhand State, One for Mahanadi system and other for Subernarekha system. The Chief Engineer, Designs & Research, Water Resources, Orissa is the Member-Secretary and Convener for both the Sub-Committees. The other members are the Chief Engineer, Mahanadi Project, Raipur for Mahanadi system and the Chief Engineer, Central Design, Irrigation Department, Jharkhand and the Chief Engineer, Subarnarekha Barrage Project, West Bengal, as the Members for Subarnarekha System. The State Dam Safety Organisation is responsible in organizing such meetings.

Three such meetings for Mahanadi basin and four meeting of Subarnarekha system have been conducted till April 2007.

2.8. Dam Safety Review Panel (DSRP)

A Dam Safety Review Panel has been constituted for Orissa having engineers, geologists, hydrologists with National and International reputation as its members. The main objective of the panel is to provide independent expert review of the reports of distress observed in the investigation, analysis performed and remedial action proposed prior to initiation of rehabilitation activities. The State Dam Safety Organisation organizes the meetings, site visits of Dam Safety Review Panel, gives the feed back to its member and transmits the suggestion of the panel to Government for approval.

During DSARP from 1992-1999, the Dam Safety Review Panel headed by Sri M.G. Padhye have inspected the distress dams and fifteen meetings have been organized. The other members were Dr. R.S. Varshney, Mr S. Balasubramanyam, Dr satish Chandra, Mr G.S.M. Rao. All the members of DSRP are eminent engineers of the country.

The Government of Orissa reconstituted the DSRP with Mr A.D.Mohile as Chairman and Mr Suresh Chandra,Mr R.C.Rath ,Mr R.C. Tripathy are the other members. The reconstituted DSRP have visited all the major project dams of the state and hold three meetings.

2.9. State Dam Safety Committee (SDSC)

To carryout the Dam Safety Assurance Programme, a high level committee comprising senior Administrators & Engineers of Water Resources Department, representative of CWC have been formed. The Secretary of DOWR is the Chairman of the Committee. This committee reviews the progress of the Dam Safety works. The Director, Dam Safety being the Member-Secretary, organizes the committee meeting at regular intervals. Seventeen such meeting have been organized and very important decisions pertaining to dam safety have been taken.

2.10. Workshops, Seminars & Trainings

The State Dam Safety Organisation is the nodal agency for conducting workshops, trainings and seminars pertaining to Dam Safety in the State of Orissa.

Five such workshops and trainings have been conducted in Bhubaneswar during DSARP between 1992 to 1997. After DSARP, one workshop cum training on dam safety has been organized on dam safety. Engineers of the State have attended nine National Level Workshops on Dam. Engineers of the State also attended four international study tour and training in USA and Canada during DSARP.

2.11. Monitoring of rehabilitation work

The State Dam Safety Organisation monitors the rehabilitation works of large dams. Regular progress report, expenditure statements are being sent to Government, Central Water Commission, World Bank at regular intervals.

2.12. Dam Safety Assurance & Rehabilitation Project(DSARP)

The Dam Safety Assurance & Rehabilitation Project under World Bank Assistance was operational in Orissa between June-1991 to September 1997. Under the project fifteen nos of large dams Viz Hirakud, Derjang, Ghodahado, Soroda, Bhanjanagar, Salia, Budhabudhiani, Sarafgarh, Alikuan, Jharanai, Ganianala, Behera, Kumbho, Badjore and Damsal have been provided with basic safety facility like all weather approach road, instrumentation and standby power.

Remedial works of eleven (11) dams namely Hirakud, Derjang, Ghodahado, Bhanjanagar, Soroda, Alikuan, Jharranai, Ganianalla, Behera, Kansbahal and Kuanria were taken up. The major works taken up are : 1. treatment of cracks and cavities, upgradation of hydraulic gates of Hirakud dam, 2. treatment of crest of dam surface, drainage arrangement and repair of head regulator and radial gates of Derjang dam, 3. resectioning of dam body, providing new spillway with gates of Bhajanagar dam, providing new Sorismuli barrage with gates, 4. rehabilitation of Soroda spillway, raising of dam, drainage arrangement, renovation of Padma anicut with new gates, 5. drainage arrangement and new spillway for Ghodahado dam, 6. protection of spill channel and drainage arrangement in Alikuan dams, 7. spill channel protection and grouting,raising of Behera dam, 8. surface drainage arrangement in Kuanria dam, 9. spill channel protection work in Kansbahal dam and 10. drainage arrangement and spill channel protection works of Jharanai dam.

2.13 Expert Panels for Safety Review of Dams Once in ten Years :

Large dams those having 15 meter height or with 60 M m^3 storage capacity are to be inspected by independent panel of experts once in 10 years as per the dam safety Guidelines , published by Central Water Commission.

Out of 163 large dams of the State, 121 dams come under this category . Three Expert Panel have been constituted during 2003 by Department of Water Resources. Each panel constitutes three members. For each dam separate reports are prepared by the panels after visiting the dam. All the panel members also meet frequently to sort out the problems. List of members in the panel are

Panel 1: Er Govinda Chandra Sahoo, Chairman
Er Jaya Prakash Das, Member
Er Sudhakar Patri, Member

Panel 2: Er Sarat Kumar Mohanty, Chairman
Er Prafulla Kumar Misra, Member
Er Bana Bihari Mohanty, Member

Panel 3: Er Gopinath Das, Chairman,
Er Harekrushna Nayak, Member
Er Yudhistira Samal, Member

Apart from the regular jobs enlisted above the State Dam Safety Organisation provides support services to dam operators by way of guiding in preparation of Operation & Maintenance Manual, Rule Curve etc. The SDSO also acts as a data bank for large dams of Orissa.

3. Major Project Dams and their brief Safety Status.

BALIMELA DAM

Balimela dam has been constructed across river Sileru near village Chitrakonda of Chitrakonda Tahasil in the district of Malkangiri at Latitude – 18^0-08'-25"N and Longitude 82^0-07'-22"E. The reservoir, having a gross storage of 3610 M m^3 and live storage of 2676 M m^3, is created by building a 1821m long earth dam across the river with three nos. of dykes in the saddles. The maximum height of the dam is 70 m. The live storage is utilized for generation of 135MW of firm power at Balimela for Orissa State and at Guntuwarda in Andhra Pradesh State. Both the States share the live storage equally. The spillway is located in the 4^{th} saddle. It is straight gravity masonry spillway, ogee crested with its crest level at RL 449.88m. fitted with 10 nos. radial gates of size 12.19m x 12.19m (40' x 40'). Total length of the spillway is 262.40m including non-overflow section is on both sides. Two nos. of sluices of size 2.44 x 3.66m (8'-0" x 12'-0") with its sill level at RL 432.61m have been provided on the left flank in block no.5 of the non-over flow section of spillway which acts as a silt vane and also releases water for Sileru PH in Andhra Pradesh, when Andhra Pradesh tunnel is closed. Maximum discharge capacity of the sluices are 227 m^3/sec. Andhra Pradesh power tunnel with discharge capacity of 283m^3/s (10,000 cusecs) is located on the other side toe of right abutment hill.

The released water from power house of Balimela is picked up by constructing a barrage at Surulikonda to irrigate about 60,000 ha of CCA. This project also helps in flood control of Godavari river in Andhra Pradesh. Even though, the project was originally contemplated for power generation, later this has turned to be a multipurpose project. Construction of the dam started in the year 1962 and completed in the year 1977. The project is a joint venture of the State of Orissa and Andhra Pradesh.

The dam safety deficiencies are: The rock toe has been chocked completely. The drainage gallery in the spillway needs lighting arrangements and standby pumps are to be provided. The gates needs special repair with replacement of ropes. .

HIRAKUD DAM

Hirakud dam has been built at Latitude 21^0-32' N and Longitude 83^0-52'E across river Mahanadi at about 15 km upstream of Sambalpur town. This is the first post independence major multipurpose river valley project in India. The project provides 1,55,635 ha of Kharif and 1,08,385 ha of rabi in the districts of Sambalpur, Bargarh, Bolangir and Subarnapur. The installed capacity for power generation is 307.5 MW though Burla and Chipilima power houses. The water released from power house further irrigates 4,36,000 ha in Mahanadi delta. Besides these benefits flood protection to 9500 km^2 of delta area in districts of Cuttack and Puri are being provided. The dam was completed in 1956. The maximum height of the dam is 60.96 m. The main dam is 4.8 km. long spanning between Lamdungri hill on left and Chandidunguri on right .It is a combination of concrete gravity, masonry and zoned earth fill sections. The spillway on either side are solid gravity type with ogee crest. The right and left spillway have respectively 24 nos. and 40 nos. under sluices of size 3.658 m. x 6.08m. each.

Besides this, there are radial gates of 13 nos. on right spillway and 21 nos. on left spillway of size 15.54m. x 6.10m., each. The power dam close to right abutment is provided with 7 nos. of penstocks,5nos of 7.6m. diameter and 2nos. of 6.1m diameter. The power house is located at the toe of power dam on the right flank. Full supply discharge from power house-I at Burla is 990.50 m^3/sec (35,000 cusecs). The dam is flanked by two earthen dykes of 10.76 km on right and 9.83 km on left. The gross storage of the reservoir is 8136 M. m^3 (Original)/5896M. m^3 (Revised) and Live Storage Capacity is 5818 M. m^3 (Original) / 4823 M m^3 (Revised). The catchment area of the dam is 83400 km^2. The inflow design flood is 42450 m^3/sec.The revised inflow design flood has been computed to be 69632 m^3/sec.

The dam safety deficiencies are: 1. Inadequate spillway 2.cracks in gallery and upstream face of concrete dam 3. cavities at the bell mouth entry of under sluices in the spillway.

Jalaput Dam

The location of the Jalput Dam geographically situated at latitude 18^0-27'-20" N and Longitude 82^0-23'-46" E. This scheme was drawn up in the year 1931 by Sri Henry Howard of the composite Madras state. Machkund river became the boundary at the project site between Madras and Orissa States. Consequent to the later's formation in 1936, the preliminary survey to harness the Duduma falls on the river for generating electricity were carried out in the year 1929. The detailed investigation of the scheme was started in the year 1941 and completed in the year 1943. Actual work in the project was started in the year 1946. Subsequently on formation of the separate Andhra Pradesh state in 1953, the project has become the joint venture of Andhra Pradesh and Orissa State Governments sharing the capital cost and power benefit in the ratio of 70:30 respectively. The transmission lines were however constructed by individual states at their cost. The 1^{st} stage of the scheme, 3 units of 17000 KW generating each was inaugurated on 19^{th} August, 1955 by Dr.Rajendra Prasad, the first President of Republic of India. The 2^{nd} stage of another 3 units of 21,000 KW generating each was completed by August, 1959 thus developing a total power potential of 1,14,000 KW. The project comprises of a main storage dam of 1375 feet long at Jalaput across the Mackhund river with a gross storage capacity of 34,273 Mcft. and a live storage of 34,023 Mcft. at FRL +2750 ft. The Jalaput dam is located 1.50 miles d/s of the confluence point of Machkund and its main tributary Patala. The Jalaput dam is provided with a spillway of 550 ft. length with 8 nos. of vertical gates of 60 ft. x 20 ft. size to discharge a maximum flood of 2,00,000 cusecs. The height of the Jalaput dam is 60.65m. The catchment area of the reservoir is 755 sq. miles (1963 sq. km.). Design flood adopted is 5660 m^3/sec.

The dam safety deficiencies are: The gate components needs thorough examination and remedial measures for corrosion.

RENGALI DAM

The foundation stone was laid by the then Prime Minister Smt.Indira Gandhi on December 23rd,1973. The excavation of dam started in April,1974.On December 12th, 1985 the reservoir was impounded up to Full Reservoir Level. The Rengali masonry-cum-concrete dam constructed across river Brahmani is 1,040m long and maximum height above foundation is 70.50 m. It has 51 blocks for construction purpose. Of these, 24 blocks in the center are spillway blocks provided with radial gates and spillway bridge. There are 8(eight) non-over flow blocks in the right flank and 19 in the left. Block 10 to 14 from the left are power dam blocks through which penstock pipes of 6 m diameter are embedded. The power house is located just down stream of the power dam. This dam connects two hill ranges on in either side of it. The catchment up to Rengali dam is 25,250 km^2. The Design flood has been calculated by CWC and adopted Inflow Design Flood(PMF) is 55,540 km^2. The maximum routed discharge is 46970 m^3/sec when all the 24 radial gates are open. The FRL is at 123.5 m and MWL is at 125.4 m.

The dam safety deficiencies are: 1. There are longitudinal cracks in the floor of the drainage gallery. 2. There are horizontal cracks in the d/s face of block 51. 3. Horizontal cracks in Adit gallery. 4. Cracks in irrigation sluice in block no 49. 5. There is vertical cracks in pier 15,16,17 & 18. 6. There is problem in lifting gates 9, 10 & 11.

Salandi Dam

Salandi dam has been constructed across river Salandi, a tributary of Baitarani at Latitude 21^0-17'-18" N and longitude of 86^0-18'-00" E. Salandi dam is a composite dam with 640m length earth dam and 114.6m long masonry dam having spillway gates of 8 spans of 12.2m each. The height of the dam is 51.82m. The catchment area of the reservoir is 673 km^2 and design flood discharge is 5140 m^3/sec. The water spread area of the reservoir is 31.82 km^2 at FRL (82.3m) with gross storage capacity of 601 M m^3. The project was started in 1960 and completed in 1976. The average annual rain fall of the catchment is 1550mm. But during the Super Cyclone from 29th to 31st October,1999, the record rain fall was 690mm at Hadgarh with maximum one day rain fall of 468mm on 31.10.1999. This resulted very high flood in the catchment and the downstream.

The dam safety deficiencies are: The sluice gate no.1 and radial gate no.8 are not working.

UPPER INDRAVATI PROJECT DAMS

The Upper Indravati Hydroelectric Project (UIHEP) is a large multipurpose river valley project in the State of Orissa. The foundation stone of Upper Indravati Project was laid by the then Hon'ble Prime Minister of India, Sri Morarji Desai on 4th April, 1978 at Mukhiguda in the district of Kalahandi.

The Primary objectives of the project are 1) to generate 600 MW of electricity 2) To provide irrigation to 1.28 lakhs ha. of land in Kalahandi district.

The project comprises of four dams, eight dykes and two link channels (within the reservoir). In the power side there is an intake structure, one head race tunnel, surge shaft; two pressure tunnels, valve house, four penstocks, power house and tail race channel, barrage on the Hati river with headworks, and three main canals, with a distribution network. The reservoir has combined catchment of 2630 km^2 and at full reservoir level (FRL) of RL 642.00m will have a water spread of 110 km^2 with 1500 Mm^3 live storage and 800 Mm^3 dead storage. The reservoir has a maximum depth of 71m. The reservoir is approximately 43 km long in the NNE-SSW direction, and 9 km wide at its widest point. The essential characteristics of the four dams of the project are described below.

INDRAVATI DAM

This is a masonry gravity dam on the Indrvati river. The dam has a maximum height of 45m and length 539m. It is provided with seven spillway gates (total capacity 11,430 m^3/sec) and four low-level depletion sluices (total capacity 555 m^3/s). A total quantity of 2,06,340 cum of masonry and 1,15,000 cum of concrete has been used and the dam has been completed.

PODAGADA DAM

This is a homogeneous earth fill dam with a maximum height of 77.5 m and length of 462 m. It impounds the Podagada River, a major tributary of Indravati river. Podagada Dam is provided with a Diversion cum depletion sluice of 650 m^3/s capacity but no spillway.

KAPUR DAM

Kapur is a homogeneous earthfill dam of maximum height of 64m and crest length of 537m. It closes the Kapur river. It has no spill way or sluice. All the works of this dam has been completed.

MURAN DAM

Located on the Muran River, a major left - bank tributary of river Indravati, this dam is a masonry gravity structure with a maximum height of 65m and a crest length of 494 m. It is provided with five spillways with a combined capacity of 8,060 m^3/sec. It has four depletion sluices with a total capacity of 588 m^3/s.

The dam safety deficiencies are: Heavy leakage in the drainage gallery of Muran dam.

UPPER KOLAB DAM

The Upper Kolab dam is situated in the district of Koraput . The Dam is located near village Koranga at Latitude 18^0-47'N & Longitude 82^0-37'E on river Kolab. The catchment area at Dam site is 1630 km^2. The work of the project started in 1975 & completed in 1988. The reservoir spread area at FRL is 155.40 km^2. The maximum height of the Dam is 49.90m and length of this masonry cum Concrete dam is 630.5 m. including spillway. Maximum design discharge is 7650 m^3/sec. The reservoir has a storage capacity of 1215 Mm^3. The GCA is 55679 ha. Installed capacity is 240 MW and firm power is 90 MW.

The dam safety deficiencies are: damage to the sit blocks of the gate hoist arrangement.

4. Medium Project Dams and their brief Safety Status

BADANALLAH DAM

This is a homogeneous earth fill dam with vertical chimney constructed in the year 1992 across Badanalla in Vansadhara Basin and located at Latitude 19^0-19'-15"N and Longitude 83^0-52'-30" E near village Kenduguda in the district of Rayagada. The length and height of the dam are 325m and 48.00m respectively. Gross storage capacity at FRL is 75.64 Mm^3. Catchment area is 352 km^2. The spillway is ogee type and provided with 8 numbers of radial gates of size 12 x 8m having total discharge capacity of 4328.70 m^3/sec.

The dam safety deficiencies are: There is a small leakage through the conduit concrete of Head regulator .Transverse drains are damaged.

BAGHALATI DAM

This is a homogeneous earth fill dam constructed across Bahuda river in Bahuda Basin as a truncated section which is completed in the year 2000.The full section is under construction near village Nuagada in the district of Ganjam . The length and height of the dam are 1.645 km and 39.00 m respectively. Gross storage capacity at FRL is 43.21 M m^3. Catchment area is 9.07 km^2. The spillway is a chute with 4 number of radial gates of size 12 x 6 m having a discharge capacity 1522 m^3/sec.

The Spillway is yet to be constructed in complete shape.

BAGHUA DAM

Baghua dam has been constructed across Baghua river a tributary of river Rushikulya near village Matajhari in Bhanjanagar sub division of Ganjam District. It is located at Latitude 19°57' 30"N and Longitude 84°57'00"E. The dam was completed in the year 2003 The Project consists of 740 m long homogeneous earth fill dam and a gated(6 nos 12x6 m) ogee spillway of 84.5 m length located centrally. There is one Head Regulators located at RD 440 m having discharge capacity of 5.87 m^3/sec to irrigate 6240 ha in Kharif and 2640 ha in Rabi. The Catchment area intercepted at dam site is 150 km^2. The spillway design flood has been computed to be 1182 m^3/sec, Maximum height of dam from deepest foundation level is 16.85 m and gross storage capacity is 37.50 Mm^3 .

The major dam safety problems are: Scouring in stilling basin.Seepage and slushy patches near toe of the dam. The crest is undulated. Cavities in spillway.The head regulator barrel ,head wall and wing wall cracked.

BANKBAL DAM

The Project is located at Lat. 20º 10' 30" N and longitude 86º 18' 0" E in Bijatala Block of Rairangapur Tahasil in the district of Mayurbhanj. The Dam intercepts a catchment of 168.5 km^2 in the Similipal hill range across river Bankbal which is one of the major right bank tributary of river Khadkhai under Subarnarekha basin. The Project comprises of homogeneous earth fill dam of length 1818 m with 82 m length of gravity type Ogee crested spillway having 6 Nos. of 12m x 5.5m size radial gates. The original Inflow Design Flood is 1432 m^3/sec which has been revised to 1970 m^3/sec. No drainage gallery has been provided in the spillway. For energy dissipation, slotted roller bucket arrangement has been made. There are two Head Regulators one on Left and the other on Right with designed capacity of 2.99 m^3/sec and 5.16 m^3/sec respectively to irrigate C.C.A. of 7200 ha. Construction activities commenced during 1982 and head works completed in 1988.

The major dam safety problems are :Standing pool of water at the d/s of toe.Rain cuts at earth dam junction. The wire ropes of gates worn out.

BHANJANAGAR DAM

Bhanjanagar dam is a homogeneous rolled earthfill dam with puddle core constructed across Boringa nalla a tributary of river Loharkhandi near village Dindipalli in Ganjam district .This is a century old dam constructed in the year 1894 and rehabilited under DSARP during 1992-99.The maximum height of the dam is 21.55 m. The total length of the dam is 1310.6 m. A broad crested gated spillway of 70 m long with 6 vertical lift gates of size 10x2 m have been provided. The gross storage capacity is 57.66 M m^3.The head regulator has three vents to carry 17.5 m^3/sec. The catchment area of the dam is 64 km^2 .The inflow design flood is 912 m^3/sec. The reservoir caters to the drinking water need of Bhanjanagar town and irrigates 807 ha between Gallary anicut to Bhanjanagar Reservoir and 1348.47 ha between Bhanjanagar reservoir to Madhabbeda Anicut.

The major dam safety problems are : A deep pool near the toe of the dam. The surface drains have been filled with debris.

BHASKEL DAM

Bhaskel dam has been constructed across Bhaskel river of Indravati sub basin of Godavari basin near village Durkuguda in Umerkote Tahasil of Nabarangapur District. It is located at Latitude $19^{o}42'$ 30"N and Longitude $82^{o}8'0"$E. The dam was completed in 1966 The Project consists of 1585 m long homogeneous earth fill dam and an un-gated ogee spillway of 87.78 m length in the extreme right. There are two Head Regulators one at left having discharge capacity of 1.579 m^3/sec and other at right side having discharge capacity of 2.546 m^3/sec to irrigate 3400 ha in Kharif and 1913 ha in Rabi. The Catchment area intercepted at dam site is 87.00 km^2. The spillway design flood has been computed to be 566 m^3/sec, Maximum height of dam from deepest nallah bed level is 22.86 m and gross storage capacity is 29.82 Mm^3 .

The major dam safety problems are : The toe drain is chocked . Retrogression in spill channel .The guide wall near escape cracked. The head regulator body wall leaks.

BHATRAJORE DAM

This is a homogeneous earth fill dam constructed in the year 1958 across Bhatrajore in Mahanadi Basin and located at Latitude 19^{o} -50'-15" N and Longitude 83^{o} -0'-45" E near village Rampur in the district of Kalahandi. The length and height of the dam are 655.32 m and 12.80m respectively. Gross storage capacity at FRL is 4.304 Mm^3. Khariff ayacut is 1440ha and Rabi Ayacut is 203.25 ha. Catchment area is 93.24 km^2. The spillway is ungated chute with a discharge capacity 433.25 m^3/sec.

The dam safety deficiencies are : There is no toe drain & outfall drain. There is heavy leakage at the junction of the chute spillway & the Wing wall. A cavity has been formed in the left wing wall & there is leakage through this.

BUDHABUDHIANI DAM

Budhabudhiani dam was constructed across river " Duant" which is a tributary of river Kusumi. The river Kusumi is a tributary of river Mahanadi joining the river at the right flank. Total length of dam is 1341m along with 1305m earth dam and a spillway of 36 m length. The maximum height of the dam is 24.39m. It was a zoned fill section with impervious core and semi pervious shell. The location of the spillway was at a right bank saddle very close to the dam abutment. The spillway is located on solid rock foundation with no geological problems. The Project was completed in 1967. The falling shutters on the chute spillway have been replaced by 5 nos vertical gates of size 6x3.28 m. The catchment area is 72 km^2. The adopted design flood is 481.31 m^3/sec.

Renovation work for the dam has been done during 1997-2002. Major dam safety problems are: Wet patches are found in d/s slope. A DG set is highly essential for gate operation.

DADARAGHATI DAM

Dadaraghati masonry dam is located at at latitude 15^0-48'-8' North and Longitude 85^0-5'-8" East and constructed across Gambharia nalla, a tributary to river Brahmani near village Rangathali, 50 km away from Kamakhyanagar in Parajanga block of Dhenkanal district. The project was completed in 1979. The dam comprises of a masonry dam of 240.00 m length, 92.0 m long Spillway. The maximum height of the dam is 19 m. The gross capacity of the dam is 27.77 Mm^3. The head regulator is located on right to cater the irrigation requirement of 5150 ha of cultivable command area. The dam intercepts a catchment area of 202.00 km^2. The maximum inflow has been calculated to be 722.00 m^3/sec .

The major dam safety problems are: The drainage holes are chocked. Profuse leakage in head regulator gates.

DAHA DAM

Daha Irrigation project is located at Latitude 19^0-58'-00"N and Longitude 84^0-28'-00"E. The main Earth Dam & Spillway are constructed across "Daha" nalla, a tributary of Loharkhandi, which itself is a tributary of "Bada Nadi" river. The total length of the rolled filled homogeneous earth dam including dykes is 3.45 km. Maximum height of the dam is 19.3 m. The gross storage capacity is 28 M m^3. A central ogee type spillway with slotted roller Bucket type Energy dissipator is provided at the river gap with 4 radial gates of size 12x6m. The spillway discharge capacity is 1380 m^3/sec.The head regulator is located near the right abutment of spillway with two vents of 2m x 1.5m. Records show that the construction works were started during 1975 and gap closure was done during 83-84. Dam was completed fully in 1985 and Reservoir was impounded for the first time during 1984 monsoon. The project was completed in 1988 with all irrigation works. The project is providing Irrigation facilities to 4762 ha of ayacut in Kharif and 2285 ha in Rabi. The original inflow design flood is 1380 m^3/sec and later it has been revised to 2172 m^3/sec.

The major dam safety problems are : The u/s parapet has been destroyed. D/s slope is not in good condition.The tail pool ,right and left flank have been damaged.

DERJANG DAM

Derjang Irrigation Project is a reservoir scheme and is the first Medium irrigation project of the State in the post independence era. The construction of the Project was started in 1960 and was completed during 1977-78. The project is situated in Angul district and located at Latitude 20^0 51' 00"N & Longitude 85^0 21' 00" E. The Dam is zoned type earth fill dam of length 1875m with maximum height of 27.31m built across the twin rivers Mathili and Lingara. These two rivers join together in the downstream of present dam site and ultimately fall into Brahmani river as its right tributary. There are two dykes on both sides of the dam continuous with it. Lengths of right and left dykes are 1830M and

1220M respectively. The spillway is a masonry gravity type of length 164.63m and with crest level at RL 144.78m. It has been provided with 6 Nos. of radial gates of 15.545m x 6.096m . There is one head regulator with one vent (2.43m x 1.82m) on left side of the dam with design discharge of 8.33 m^3/sec. The sill level is at RL 135.64m. The ayacut has been developed in two stages- In stage-I for 5951 ha. and in Stage-II for 1441 ha. totaling to 7392 ha. Catchment area at dam site is 339.00 km^2 and is approximately fan shaped. The inflow peak as approved by DSRP is 3973 m^3/sec .

The major dam safety problems are: The surface drainage arrangements are not proper or adequate. The drainage pipes and relief wells have been chocked..

DHANEI DAM

Dhanei Irrigation Project was taken up for construction during the 2nd plan Period. The dam is a zoned fill dam with a horizontal filter & Rock toe constructed across river Dhanei which is a tributary of river Rusikulya. There is a small ungated spillway located to the right of the deep channel and the spillway is located on rock foundation. The dam is located at Latitude 21^0-47'-30"N and Longitude 84^0-53'-30"E. The dam provides Kharif Irrigation to an ayacut of 3820 ha & Rabi Irrigation of 1420 ha. Subsequently, there has been some extension of the ayacut. The maximum height of Dam is 20.57m. The total length is 1341 m including spillway length of 33.5 m. There is a single head regulator located at right flank to release water for Irrigation. The catchment area is 106 km^2.The spillway capacity is 355 m^3/sec for a design flood of 733 m^3/sec . The revised inflow design flood is 1379 m^3/sec. the gross storage capacity of the reservoir is 15.32 M m^3. The dam has been completed in 1965.

The major dam safety problems are : Erosion in the d/s slope . u/s parapet has been damaged completely. The toe drain is filled with mock.

DUMERBAHAL DAM

This is a Rolled filled earth fill dam with vertical chimney completed in the year 1982/83 across unnamed tributary of river Ong in Mahanadi Basin and located at Latitude 20^0-51'-00"N and Longitude 82^0-41'-00" E near village Dumerbahal in the district of Nawapara. The length and height of the dam are 462 m and 21.75 m respectively. Gross storage capacity at FRL is 22.30 M m^3. Catchment area is 90.00 km^2. The spillway is a gated(5 nos) chute type having a discharge capacity of 815 m^3/sec. The inflow design flood is 815 m^3/sec which has been revised to 1050 m^3/sec. The kharrif ayacut is 2660 ha and Rabi ayacut is 1120 ha.

The dam safety deficiencies are: The crest width reduced by 1 m.Gullies have been formed at d/s slope. There is boiling in the d/s of dyke no 4.

GAIKHAI DAM

The Gaikhai Dam has been constructed across Gaikhai nalla, a small tributary of Ong sub basin of Mahanadi Basin near village Salbhata of Loisinga tahasil in Bolangir district located at Latitude 20º–58' N, Longitude 83º–31' E. The Dam is a homogenous earth fill dam completed in the year 1987 to provide irrigation in to 648 ha of Khariff crop and 324 ha of Rabi crop. Main canal of Ong passes through this reservoir. The length of earth dam is 807.70m with maximum height of 15.84m above lowest river bed level and has been constructed across nalla by joining a hillock on the right side and high ground on the left side. The surplus escape which is Ogee shaped spillway crest . There are two head regulators on both sides of nalla. Ong main Canal enters into the reservoir through and inlet (Fall cum Cross regulator) structure and provided with 3 vents and fitted with 6 Nos. of vertical lift gates. The outlet of Ong main canal Head Regulator is provided with 4 vents fitted with 8 Nos. of vertical lift gates. Both inlet and outlet of Ong Canal are on either ends of the dam axis away from the dam section. The catchment area of the dam is 20 km^2 and Inflow Design Flood is 212.34 m^3/sec .The gross storage capacity of the dam is 2.12 Mm^3.

The major dam safety problems are : The structural review of spillway is essential for increase in height. Down stream slope is not in order. The rock toe has been chocked.

GHODAHADA DAM

The Dam site is located at a distance of 20 km from Digapahandi in Ganjam District at Latitude 19^0-17'-00"N and Longitude 84^0-20'-30"E constructed across Ghodahada tributary of river Rushikulya. The Catchment area is 138 km^2. The Dam originally constructed was a homogenous fill earth Dam, having a length of 1724m and maximum height of 25.98m. The TBL of the Dam was 119.63m with a crest width of 3.66m. The upstream & downstream slopes were 3:1 and 2.5:1 respectively with 1.5m berms at Downstream slope. The Dam was completed in the year 1974. The gross reservoir capacities is 24.17 M m^3. The ungated Ogee spillway had a length of 71.63m and crest level of EL 114.91m. The discharging capacity of the spillway was 906 m^3/sec with a flood lift of 2.89m. The dam has been rehabilitated under DSARP. For a revised design flood of 1698 m^3/sec, the dam height has been raised to a maximum height of 26.65 m. The gross capacity has increased from 29.00 M m^3 to 3489 M m^3. A new gated ogee spillway of 71.63 length has been provided . The Head sluice, had a sill level of 103.85m with two vents of size 1.07m x 1.45m with a design discharge of 6.78 m^3/sec to irrigate an ayacut of 7203 ha (CCA).

The major dam safety problems are : Several raincuts at junction of d/s slope and rock toe. There is a deep hole at the dam surface.The spill channel needs treatment.

GOHIRA DAM

Gohira Irrigation Project is a reservoir project situated at Lat. 21°-28'-10" N and Long. 84°-34'-10" E near village Ambaghat in Deogarh district of Orissa. The Dam intercepts a fan-shaped catchment area of 236 km^2 in Deogarh hill ranges across river Gohira a right bank tributary of river Brahmani . It provides irrigation to an ayacut area of 8120 ha. during Kharif and 5700 ha during Rabi . The construction of the project was started in 1977 and was fully completed by 1985. The dam is a homogenous rolled fill earth dam of total length 3550m with maximum height of 28m above the deepest foundation level. An Ogee Crested 70m long spillway is provided on the left flank saddle fitted with 5 Nos. of 12m x 6m size radial gates. A roller bucket with 10m radius is provided in downstream of the spillway to dissipate the energy of spilling water. A gallery of size 1.50m x 2.20m is provided in the spillway. Originally the estimation of design flood was done by Dicken's envelope method with C = 2200 in fps unit which came to 1840 m^3/sec . The recomputed SPF is 3772 m^3/sec .

The major dam safety problems are : Drainage and uplift pressure release holes have been chocked. Rock protruding over spill channel obstructs the flow. There is scouring in the d/s of cut off of spillway bucket. Rain cuts and gullies have been formed in the d/s slope of the earth dam.

HALDIA DAM

Haldia Dam was constructed by Raja of Moyurbhanj during the 1st decade of twentieth century in the Budhabalanga Basin across Chipat nalla for providing Irrigation to 2429 ha (CCA), mostly inside Kuliana Block of Mayurbhanj district. As mentioned in the "Report on the administration of Mayurbhanj" for the year 1909 – 10, Haldia bund was almost completed. It is an earth dam constructed of local materials with the state of the art prevailing at that time. For nearly a century, the project has been providing irrigation. After merger of the Mayurbhanj State with Orissa in 1949, the maintenance of the project came under works department first ad next under Irrigation Department. Haldia project will now become a part of the Interstate Subarnarekha Irrigation project (SIP) which is under execution in Mayurbhanj district to irrigate 1,09,627 ha of CCA in Mayurbhanj & Balasore Districts. As per the present scheme, the Haldia Dam will be upgraded to enhance its height, storage capacity & ayacut area. The present dam will be a part of the new upgraded dam at the upstream toe and this will have a maximum height of 23.10m and the live storage capacity will be enhanced from 716 ham to 4688 ham. As per the proposed up-gradation programme, Haldia Reservoir will be directly fed by Subranarekha Main Canal through a link channel upstream of the Head Regulator of Betonati Branch canal. The length of the dam, as constructed originally is 1745.6m with at least four kinks. The spillway is located towards the left abutment in a straight reach having a length of 137.2m. After up-gradation, the dam length would become 4.2 km, the extension being effected from left flank for a considerable length even though the height is less. The original spillway was provided with 52 nos of automatic falling shutters of 1m height.

The major dam safety problems are : There are seepages at several places and the most dangerous looking seepage spot is at the left Training wall of the right head regulator.

HARABHANGI DAM

The Harabhangi dam has been constructed across river Harabhangi near Adaba at latitude $19^0$30'N and longitude $84^0$8'E.It consist of a 49m high earth dam and a concrete ogee type spillway in the saddle. The length of the dam is 690m and length of spillway is 117m.. The inflow design flood is 4608 m^3/sec.There are 8 nos of radial crest gates of size 12x9 m. the gross storage capacity of the reservoir is 141.25 M m^3. The dam has been completed in1998. It irrigates an ayacut of 9150 ha in Kharif .

There is substantial seepage from toe of the hillock to which the right side of the Earth dam and left side of spillway has butt.

HARIHARJORE DAM

The Hariharjore dam has been constructed across Hariharjore nallah near village Luhakhandi under Birmaharajpur tahasil of Subarnapur District. It consist of a 27m high homogeneous rolled earth filled dam and a concrete ogee type spillway. The length of the dam is 2296m and length of spillway is 128m. The catchment area of the dam is 425 km^2. The revised inflow design flood is 3785 m^3/sec.There are 9 nos of radial crest gates of size 12x6 m. the gross storage capacity of the reservoir is 79.88 M m^3. The dam has been completed in1997-98. It irrigates an ayacut of 9450 ha in Kharif and 4250 ha in Rabi .There is a head regulator with masonry barrel conduit situated at RD 2225 m of 13.20 m^3/sec discharging capacity.

JAMBHIRA DAM

The dam is a trunckated one .The major portion of work completed in the year of 1998 across a Jambhira river in Subarnarekha Basin and located a Latitude 22^0-02'-32"N and Longitude 86^0-48'-45"E near village Deuli in Baripada town of Maurbhanja district. The length and height of the dam are 3450m and 26.00m respectively. Gross storage capacity at FRL is 17.99 Mcum. Kharif ayacut is 31868ha and Rabi ayacut is 22169ha. CA is 76.5 sq.km. The spillway is ungated and stepped with discharge capacity of 510 m^3/sec.

The dam is under construction.

JHARABANDHA DAM

The Jharbandh reservoir Project has been constructed across Kokrijhor nala, a tributary of Ong river in Mahanadi basin to harness the water resources to irrigate a culturable command area of 2043 ha. It is a 97.80m long, 19.80 m high concrete dam constructed at about 2.5km from Village Kotra in Paikmal Tahasil of Baragarh District. An ungated ogee shaped central spillway of 51.75m. long has been provided to surplus the maximum flood discharge of 614 m3/sec.The catchment area is 62.0 km^2. The revised Inflow Design flood is

867m^3/sec. The gross storage capacity is 12.67 Mm^3. The distribution system consists of two main canals. The right main canal (Toral main canal) with a head discharge of 0.95 m^3/sec irrigates a C.C.A. of 570ha. through a distribution system. The left main canal (Jharbandh main canal) with a head discharge of 1.925 m^3/sec irrigates a C.C.A. of 1473 ha. through a distribution system.

The major dam safety problems are : The overflow section of the spillway needs to be smoothened. At u/s left side of spillway, the packing has been disturbed. Obstruction in spillchannel needs to be cleared. The cover plates of left and right head regulators have been corroded ,need replacement.

KALO DAM

The dam is located in the district of Mayurbhanj at Lat. 20^0-31'-15"N and Long. 86^0-27'-50"E. The dam intercepts a catchment of 153 km^2 for providing irrigation to 4800 ha. in khariff and 1920 ha. in Rabi. An earth dam, partly zoned and partly homogeneous section of 2388 m length and 70m long spillway have been constructed across river Kalo in Budhabalanga basin. It also intercepts Kusabhadra arm before its confluence with Kalo. The earth dam was completed in 1981. The earth dam is in two reaches i.e. 2174m on the left of spillway and the remaining 214m on the right. The 70m long spillway is on Kalo arm between RD 2174m and 2244m having 5 nos. of 12m x 6m radial crest gates. There exists one H.R with design discharge of 4.6 m^3/sec at RD 160m.The adopted design flood is 1750 m^3/sec.The dam has been investigated under Phase-II investigation. The DSRP approved a design flood of 2476 m^3/sec against a original design flood of 965 m^3/sec .

The major dam safety problems are: There are cavities at the lower nappe of ogee spillway. There is scouring at endsill. Longitudinal cracks at dam crest.

KANJHARI DAM

Kanjhari Irrigation Project is a reservoir scheme across Kanjhari nallah, a tributary of river Baitarani to provide irrigation to an ayacut of 9800 ha. The project is located at Latitude 21^0-35'-30"N and Longitude 85^0-43'-30"E near village Chaka in Keonjhar block of Keonjhar district. Construction of the project commenced during 1980 and completed in 1989. It comprises of homogeneous rolled fill earth dam of 1135m length with ogee shaped gated central spillway. The spillway is provided with 7 nos. of 12 x 6 m radial gates. There exists masonry non-over flow section of 13.50 m length between the spillway and right earth dam. There are two head regulators one on left and the other on right having design discharge of 5.74 and 6.75 m^3/sec respectively. The catchment area of the reservoir is 358 km^2 The adopted design inflow flood for the project is 2286 m^3/sec. The revised design flood is 3157 m^3/sec.

The major dam safety problems are : Longitudinal cracks developed at d/s edge of earth dam at several locations. Cracks are also seen at the centre on either side of the spillway.connecting bolts and seals of spillway gates damaged.

KANSBAHAL DAM

The dam has been constructed across Badjore nalla near village Kadambahal in Rajgangpur Tahasil of Sundargarh district and located at Latitude 22^0 10' 45"N & Longitude $84^0$39' 00"E. The dam comprises of a homogenous earth fill embankment with vertical & horizontal graded filters & D/S rock-toe. The length of the earth dam is 980m. The length of the gated Ogee crested chute spillway is 70m . Maximum height of earth dam is 28.0m. The spillway crest level is at RL 222.00m fitted with 5 nos. of radial gates of size 12m X 6m each. Catchment area at dam site is 179 km^2 . The original design flood is 1356 m^3/sec which has been subsequently revised to 1745 m^3/sec.

The major dam safety problems are: scouring observed in the d/s of chute spillway.

KHADAKHAI DAM

Khdakhai Dam is located near village Suleipat in Rairangpur Tahesil of Mayurbhanj Distt. Across river Khadakhai at Latitude 20^0 08'30"N & Longitude $86^0$14'19". A zoned earth fill dam of 204.5m length on left, spillway of 58.56m length and non-overflow section of length 102.34m on right side has been constructed to provide irrigation to an ayacut 7990 ha in Khariff and 4040 ha. in Rabi. One H.R on left side at R.D 55.7m. has been provided to irrigate the ayacut between the river Khadakhai and Kanhu on left side of Khadakhai. The Project work commenced during 1975 and was completed in 1979. Certified ayacut in Khariff is 7672 ha and Rabi 372 ha. The design flood using Dickens Coefficient of 1800 in FPS unit was calculated as 1415 m^3/sec. But flood of 1975 necessitated revision of design flood. It was revised to 2240 m^3/sec

The problems are : An auxillary spillway is essential for revised PMF. The rock mass obstructing the flow from the spillway needs to be removed.

KUANRIA DAM

Kuanria Dam is located near village Odasar of Dasapalla Tahasil in Nayahgarh district at Lat. 20^o –20'-0"N and Long 84^o –28'-0"E. The dam intercepts a catchment area of 124 km^2 across the stream Kuanria and Khalkhala. River Kuanria is the right bank distributary of river Mahanadi. The project provides irrigation facilities to an ayacut of 3600 ha. in Khariff and 1908 ha. in Rabi. A homogeneous earth fill dam of 1576m total length with a saddle spillway of 75m length having 5 Nos. of radial gates of size 13x5m has been constructed across above two streams to create a reservoir. The maximum height of the dam is 21 m. The gross storage capacity of the reservoir is 22 M m^3. The spillway capacity is 1472 m^3/sec.The Project has two head regulators located one on the left of spillway and the other at the right side of earth dam. The design discharge of left and right head regulators are 1.98 m^3/sec and 2.0 m^3/sec respectively. The construction of the Project commenced in the year 1977. The dam and spillway works were completed in the year 1982 and distribution system by March 1988.

The major dam safety problems are : The outfall drain is not freely draining, there is standing pool of 2 m depth of water. U/s and d/s parapet walls are damaged. The gates need painting.

KUKUDAJODI DAM

Kukudajodi dam located at Latitude 21°55'30"N and Longitude 86°52'00"E constructed across Kukudajodi nalla a tributary of river Panchapara in Budhabalanga basin near village Salabani village in Mayurbhanja District. The dam was completed in 1988. The Project consists of 853.44 m long homogeneous earth fill dam including a broad crested surplus escape of length 91.44 m at the left flank. One head regulator at RD 583.39 m of discharge capacity 0.92 m^3/sec has been provided to irrigate 545.06 ha in Kharif and 200 ha in Rabi.The Catchment area intercepted at dam site is 12.95 km^2. The spillway design flood has been computed to be 132.52 m^3/sec, Maximum height of dam from deepest nallah bed level is 12.19 m and gross storage capacity is 1.712 Mm^3.

The dam safety deficiencies are : The junction between spillway and earth dam is not well compacted.

MANDIRA DAM

Mandira dam has been constructed by Hirakud Project Authority during the years 1957 – 1959 across river Sankh, a tributary of the Brahmani river at Lat. 22° 16' N & Long. 84°40'E. The earth dam is a zoned embankment of 426.72 m length with gate-controlled spillway on right saddle. Maximum height of earth dam is 35.38 m from the deepest foundation level. The dam is exclusively meant for the purpose of storing water for supply to the Rourkela Steel Plant (RSP) located about 24 km downstream in river course. A regulated supply of water of 100 cusecs is being released through an outlet sluice of size 8' X 8'. A weir is constructed across the river Brahmani near Rourkela and water is being pumped out from the pond to plant area. The total length of he spillway is 243.14m with 11 nos. of radial gates of size 15.5 x 6.1m each. Mandira Dam intercepts a catchment area of 6152 km^2.

The major dam safety problems are : cavities at foundation level of left training wall of spillway. The relief wells are chocked.

NESA DAM

Nesa dam is located at Lat. 22°-24'-0" N and Long. 86°-08'-40"E in the district of Mayurbhanja across Nesa nallah, a tributary of Khadakai river in Subarnarekha basin. It has a catchment area of 24.61 km^2 for providing irrigation to 1202 ha. in Khariff and 370 ha. in Rabi. The work of the project commenced during 1976 and was completed in 1980. The initial impounding of reservoir was made in June 1980. The dam comprises of a homogeneous earth fill embankment of 720m long with 100m long spillway on the right flank and a Head Regulator at

RD 694.8m having design discharge of 0.85 m^3/sec. The maximum height of the dam above deepest foundation level is 18m. The spillway is a broad crested un-gated weir and negotiates a head of 3.08m. At a distance of 60m downstream of the spillway, there is another straight glacis type fall of 50m length on the spill channel which negotiates a fall of 3.22m. The design flood adopted is 280 m^3/sec.Based on the recommendation of DSRP, DOWR approved a maximum flood of 351 m^3/sec for adoption. The Dam has undergone Phase-II investigation by STUP Consultant Ltd .

The major dam safety problems are: The outlet conduit is leaking.Seepage at junction between earthdam and left masonry retaining wall of head regulator in the d/s. The erosion on d/s slope has to be filled up.

PILLASALKI DAM

This is a homogeneous earth fill dam constructed in the year 1984 across River Pilasalki near village Burupada in the district of Kandhamala & located at Latitude 20^0 26'N, Longitude 84^0 20'E. The length and height of the dam are 441.00m and 26.5m respectively. Gross storage capacity at FRL is 19.2 Mm^3. Khariff ayacut is 2268 ha and Rabi. Ayacut is 1200 ha. Catchment area is 87.36 km^2. The spillway is Broad crested saddle spillway having a discharge capacity 793 m^3/sec.

The dam safety deficiencies are : There is no toe drain & surface drainage arrangement. Displacement of stones have been noticed in rock toe & scouring noticed at 44m of d/s of spill channel.

PITAMAHAL DAM

Pitamahal Dam has been constructed near village Balanda of Kuanr Munda Tahasil in Sundargarh District at a distance of 20 km from Rourkela town. The dam has been completed in the year 1978 across river Pitamahal, a tributary of river Sankha which meet river Koel upstream of Panposh to form river Brahmani. The total length of the dam which includes the spillway and the non-overflow section of the dam on both sides of spillway is 660.20m. The overflow section i.e. spillway length is 45.72m. Length of masonry dam which includes non-overflow section and spillway is 115.83m. Earth dam length is 498.65m. The maximum height of the dam is 25.96 m. The earth dam is a rolled fill-zoned embankment and the core is of impervious earth. There are two Head Regulators on both side of main river. The left head regulator is located in the masonry dam and non-overflow section having circular vent of 0.11m dia. The right head regulator is located in the main earth dam and the vent size is 1.22m dia. The catchment area is 104 km^2.The Inflow design flood is 501.21 m^3/sec .

The major dam safety problems are: The rock toe has been chocked.Cracks have been observed in the left side of non overflow section.The drain holes in gallery have been chocked.No lighting arrangement in drainage gallery.

RAMIALA DAM

This Medium Irrigation Project has been constructed across river Ramiala, a tributary of river Brahmani near village Budhibil of Kankadahad Block in Dhenkanal district located at Lat. 21^{o}-06'-43" N and Long. 86^{o}-35'-300"E , provides irrigation to 7325 ha. in Khariff and 6000 ha. in Rabi. The project lies in the Northern plateau region of the state. The ayacut lies in the Kamakshyanagar Sub-division of the district. The area is undulating upland and generally sloping from North to South. Construction work of dam commenced during 1975 and completed in 1983, but the distribution system was completed during 1987.It intercepts a catchment of 328 km^{2} and comprises of homogeneous rolled earth fill dam of 424.5 m. length and an ogee spillway of 55.5 m on left flank. The spillway has 4 Nos. of 12 x 6 m. size radial gates. The highest point in the catchment is at El. 472.44 m. and the river bed is at RL 87.20 m. No retrogression in the spill channel is observed. There are two Head regulators at R.D. 55 m. and R.D. 375 m. having design discharge of 6.77 m^{3}/sec and 2.97 m^{3}/sec respectively. The adopted design flood is 2831 m^{3}/sec. The revised inflow design flood is 3860 m^{3}/sec.

The major dam safety problems are : Appropriate measure needs to be done for passing the revised inflow design flood. Heavy leakage in head regulators.

REMAL DAM

Remal Irrigation Project is a reservoir scheme near village Gaduan in Harichandanpur block of Keonjhar district across Remal nallah, which is a tributary of river Kusei in Baitarani basin located at Lat. 21^{o}-10'-00" N and Long. 85^{o}-56'-00"E . The dam is homogeneous earth fill one of 1454 m length and maximum height of 39m.. The spillway is located in a saddle on the left with four radial gates of size 12x6m having design discharge of 1037 m^{3}/sec.The left canal having design discharge of 1.48 m^{3}/sec takes off on left abutment of spillway and right canal of 2.54 m^{3}/sec capacity takes off from the head regulator located close to the left abutment of earth dam. Both the canals have total design ayacut of 4705 ha. in Khariff and 2118 ha. in Rabi. The Catchment area of the reservoir is 98.5 km^{2}. The adopted design flood is 963 m^{3}/sec and revised design flood is 1037 m^{3}/sec. Construction of dam commenced in 1979 and was completed in the year 1984. Spillway gates were erected during 1985.

The major dam safety problems are : Rock toe and toe drains have been chocked. The spillway gate no 1 and 4 are not functioning.

SAIPALA DAM

This is a rolled earth fill dam constructed in the year 1977 across a tributary of river Ong in Mahanadi basin and located at Latitude 20^{0}-48'N and Longitude 82^{0}-48'E near village Saipala in Nuapada district. The length and height of the dam are 330.0m and 20.12m respectively. Gross storage capacity at FRL is 21.30 Mm^{3}. The khariff ayacut is 2064 ha .and. rabi is 1032 ha. Catchment

area is 86.30 km^2. The spillway is chute type, with discharge capacity of 792 m^3/sec.

The gate operation of the dam is not smooth.

SALIA DAM

Salia dam is located at latitude 15^0-48'-8' North and Longitude 85^0-5'-8" East constructed across Salia river which drains in to Chilika lake. It is located in the Banapur tahasil of Khurda Distrct . The catchment area of the dam is 245 km^2. The gross storage capacity is 60 M m^3. The dam is a Zoned Rolled fill earth dam of length 423.67 m. The maximum height of the dam is 32.91 m. The 98.68 m long chute spillway is located in left saddle. The spillway discharge capacity is 1019.42 m^3/sec. The gross command area is 10,796 ha & culturable command area is 9455 ha. The dam was completed in 1971.

The major dam safety problems are: Erosion in d/s slope. There is profuse leakage in head regulator gates.

SAPUA DAM

The Sapua nallah, a tributary of Mahanadi & the Badjhora nallah, a tributary of Brahmani, both descending down from Bankmundi hill ranges, a majour water divide between Mahanadi & Brahmani basins form the two main surface run-offs. An integrated project was contemplated over these two rivers for proper utilization of water for irrigation. It is contemplated to transfer the water of Sapua river (Mahanadi Basin) to Badjhore river (Brahmani Basin) through a link channel.The regulated waters from reservoirs of both the rivers will be picked up at a 38m long pick-up weir (subsequently changed to a barrage at Nuabag over river Badjhore) located about 6km downstream of proposed Badjore dam site.It was aimed at utilizing 2368 ham of water of Sapua & Badjhore nallah for irrigating an area of 2680 ha of C.C.A. through the above mentioned link canal & through two main canals off taking from Nuabag. Some area will be irrigated directly by canals emerging from Sapua & Badjora Dam. Sapua dam ia a 24.32m high earth dam constructed over Sapua river near village Nahada at Latitude 20^0 35' 30"N & Longitude 85^0 38' 10" E in Dhenkanal district. Sapua spillway is lybrinth spillway with discharging capacity of 375.20 m^3/sec.

The major dam safety problems are : Slushy condition up to 50 from toe of the dam between RD 540 m to 640 m. Boils observed at RD 600m.

SARAFGARH DAM

Sarafgarh Medium Irrigation reservoir project is situated over river Ichha under IB sub basin of Mahanadi basin at Latitude 22^0-10'-45"N and Longitude 83^0-45'-45"E near the village Sarafgarh of Lephripara Tahasil in Sundargarh District of Orissa. The dam consists of a 236.65m long homogeneous rolled fill dam with vertical chimney and horizontal filter. An Ogee crested chute spillway of 62.50m long exists in the right side saddle. The design flood of the spillway is 695

m^3/sec. the gross storage capacity is 13.75 M m^3.The dam has been completed in the year 1984.

The major dam safety problems are : A pool of water at d/s of dam. The dam top and berm at places settled, d/s slope has bulging, deep retrogression at the d/s of spillway.

SATIGUDA DAM (MALKANGIRI)

This is a rolled earth fill dam constructed in the year of 1985 across a tributary of Sabari river in Godabari Basin and located at Latitude 18^0-21'-42" N and Longitude 81^0-58' E near village Satiguda in the district of Malkangiri.. The length and height of the dam are 1707.00m and 36.80 m respectively. Gross storage capacity at FRL is 76.00 M m^3. The irrigation Ayacut is 9065 ha and it also provides drinking water to Malkangiri town & pisci-culture is also done . The catchment area is 129.5 km^2 . The spillway is ogee type ungated with discharge capacity of 1060 m^3/sec.

The dam safety problems are : The edges of the crest have been eroded.There is leakage at the left side of spillway. The stilling basin has been damaged. There is sliding at a distance of 100 m from spillway.

SATIGUDA DAM (UKP)

This is an earthen dam constructed in the year of 1986 in the river Satinallah near village Jeypore on the down stream of Upper Kolab Power house which serves the purpose of maintaining the tail water level as well as the necessary head for irrigation.The length and height of the dam are 1144.15m and 16.84m respectively. The gross storage capacity of F.R.L is 1.71 M m^3. The canals of Upper Kolab Project namely Jeypore Main Canal & Padmapur Distributary are offtaking from this resorvoir which provides Khariff Irrigation to 47715 ha. & Rabi Irrigation to 35786 ha.

The catchment area is 18.15 km^2. The Spillway is ogee type with 3 nos. of vertical gates having a discharge capacity of 424.00 m^3/sec.

The dam safety deficiencies are : There is profuse leakage from the walls of Head Regulator barrel of Padmapur Distributary. Sandy calcinated material is coming with the drainage water inside the gallery. There is scouring on the down stream of energy dissipation device of Jeypore main canal.

SORODA DAM

This is a homogeneous earth dam constructed in the year of 1896 and located at Latitude 19^0 45'N and Longitude 84^0-26'E near Sorada town of Ganjam district.The water is fed to the resorvoir through a leading channel from Padma Barrage constructed across river Padma,a tributary of Rushikulya river in Rushikulya basin. The length and height of the dam are 326 m and 17.90 m respectively. Gross storage capacity at FRL is 49.75 M m^3. This is an integral part

of century old Rushikulya Irrigation system which supplies kharif irrigation to an ayacut of 61,231 ha. & provides drinking water to Berhampur & Soroda towns . The catchment area of Padma barrage is 498 km^2 & own catchment is 43 km^2 . The spillway is ogee type & ungated with discharge capacity of 596 m^3/sec.

The dam has been rehabilitated in the year 1998 under DSARP with World bank fund.The dam has been no dam safety deficiency.

SUNDAR DAM

Sundar dam has been constructed across Sundar river of Mahanadi basin near village Ichhapur in Nuapada District. It is located at Latitude 20°35'30"N and Longitude 82°35'30"E. The dam was completed in 1977 The dam consists of 2700 m long homogeneous earth fill dam and an gated(5 nos 12.2x4.75 m) ogee spillway of 69.56 m length. There are two Head Regulators to irrigate 4463 ha in Rabi and 2778 ha in Kharif. The Catchment area intercepted at dam site is 145 km^2. The spillway design flood has been computed to be 812.5 m^3/sec, Maximum height of dam from deepest nallah bed level is 19.76m and gross storage capacity is 47 Mm^3 .

The major dam safety problems are : Deep raincuts and gullies in the d/s slope and settlement up to .47 m. Dam is not in design section.

SUNEI DAM

Sunei dam is situated at latitude 21°-27'N and Longitude 84°-28'E across river Sunei, in Bhudhabalanga basin in the Kaptipada Sub-Division of District Mayurbhanj. The maximum height of the dam is 30 m. Length of earth dam is 1789 m and spillway length is 84.5 m. The ogee shaped spillway has been constructed with 6 nos. of radial gates of size 12m x 6m.. Catchment area at Dam site is 227 sq.km The project irrigates 5200 Ha in Rabi and 10000 Ha in Khariff. The design flood has been reviewed on the basis of Probable Maximum Precipitation (PMP) of 881mm in 48 hours and it worked out to 2874 m^3/sec. When this flood was routed with 5 gates fully opened and one gate inoperative, the MWL rises up to 86.5m. With all six gates opened, the MWL became 85.7m. As per this study, the spillway capacity was found to be inadequate.

The problems are : The hydrology needs review as the inflow recorded in 1999 was 2918 m^3/sec against PMF of 2874 m^3/sec. There is settlement on the crest of the dam. The relief wells need reactivation. Heavy erosion in the spill channel. Appreciable seepage at junction of earth dam and the ridge.

TALASARA DAM

Talsara Medium Irrigation dam is situated at Latitude 20°-20'-0" N and Longitude 84°-07'-0"E across river Badabandha nala of Ib sub-basin of Mahanadi Basin near village Talsara of Balisankara Tahasil in Sundaragarh District of Orissa. The Dam consists of a 1003.75m. long homogenous earth fill dam with vertical chimney & horizontal filter. An Ogee crested spillway of 91.25m. long exists in the right side flank. The dam has been constructed to provide irrigation to G.C.A of 4337 ha. &

C.C.A of 3036 ha. The spillway has been designed for 820 m^3/sec. The revised SPF is 1318 m^3/sec .

The problems are : The retrogressions in the spill channel and scour near the left guide wall. An auxiliary DG set to be provided.

UPPER JONK DAM

This is a homogeneous earth dam with vertical chimney constructed in the year of 1997 on the river Jonk of Mahanadi basin and located at Latitude 20^0-44'-00" N and Longitude 82^0-27'-00" E near village Patora of Nuapada district . The length and height of the dam are 647m. and 28.10m respectively. The gross storage capacity of F.R.L is 73.83 M m^3. It's C.C.A. is 9920 ha. It's catchment area is 342 km^2. The spillway is ogee type with 7 No. of radial crest gates of size 12x8.50m having total discharge capacity of 3535.00 m^3/sec .

The dam safety deficiencies are :There is scouring in the spill chanel on the downstream of bay No.5. The d/s slope in deep channel section does not have proper pitching between EL 335.60m to EL 341.60m. The d/s will be affected upto EL 341.50m during heavy outflow from spillway.

UPPER SUKTEL DAM

The dam is situated at Latitude 20^0-43'-20" N and Longitude 82^0-52'-52" E across river Suktel, a tributary of river "Tel" which ultimately joins with river Mahanadi and is situated near the village Mohurandi in Khaparakhol block of Patnagarh Tahasil of Bolangir district in Orissa. The project consists of a homogeneous earth fill dam of 1573 m long with vertical and horizontal graded filters, a solid gravity type ogee spillway 60 m long. Two head regulator have been provided on either side of the stream to irrigate a total CCA of 1408.80 ha during Kharif and 774.86 ha during Rabi. The water spread area at FRL of 307.60m is only 270 ha.The catchment area at dam site is 45.00 km^2.

The problems are : The hydrology needs fresh review. The toe drains have been chocked. The crest of the dam is not in proper shape. The junction between earth dam and spillway retaining wall has a big erosion channel.

5. Minor Project dams and their brief Safety Status

ALIKUAN DAM

The Alikuan dam is located at Latitude 19°40'00" N and Longitude 84°30'00" E constructed across Badanalla, a tributary of river Rushikulya in Sorada Block of Ganjam district to provide irrigation to 1092 ha. in Khariff and 282 ha. in Rabi. Work commenced during 1971 and completed in 1975. Most of the distress conditions have been attended during DSARP from 1992-1999. It has a Catchment area of 27.70 km^2 . This is a homogeneous earth fill dam of 23.52 m height 1600 m long including ogee spillway of 91.5m length. Design flood earlier adopted was 168 m^3 using Dicken's formula which has been revised to 598 m^3/sec (S.P.F.) and routed discharge of 570 m^3/sec . Accordingly TBL and MWL has been raised to RL 125.50 m and 124.0 m respectively. The spillway is ungated one. There was retrogression in the spill channel. To arrest the same, 4 nos. of 4 m falls have been constructed in the spill channel negotiating from RL 120.04m to RL 103.42 m.

Only problem is the silted outfall drain.

ARDEI DAM

This is a homogeneous earth fill dam constructed in the year 1978 across Ardei in Baitarani Basin and located at Latitude 21^0-35'-00"N and Longitude 85^0-37'-00" E near village Sirisaipal in the district of Keonjhar. The length and height of the dam are 1112 m and 16.41 m respectively. Gross storage capacity at FRL is 1.48 M m^3. Khariff ayacut is 809.20 ha. Catchment area is 25.60 km^2. The spillway is ungated ogee type having a discharge capacity 222.64 m^3/sec.

The dam safety deficiencies are : Slushy condition observed from RD 940 m to 1040 m.There is heavy leakage through Head regulator gates. All the falls in the spill channel are damaged due to retrogression.Left side return wall of spillway is damaged.

ARIKUL DAM

Arikul dam is located at Latitude 21°48'27" N and Longitude 86°36'06" across the stream Arikul in the Budhabalanga basin. A 16.74m high earth dam has been constructed across the stream near village Kamtamara within Khunta Block and Udala Tahsil of Mayurbhanj District. The project envisaged the construction of surplus Escape which is centrally located, a little away from the deep channel to the left. The head regulator was constructed to the left of surplus Escape. The designed ayacut of the project was 1052 ha in Kharif and 202 ha in Rabi. The dam was completed in 1980. Only one drop was provided in the ungated surplus escape at RD 499.88m-585.22m from EL 77.72m to El 74.83m and the flow was allowed to flow in the surplus channel which had a bed fall of 18.87m in a distance of 457.2m . Due heavy retrogression every year a second drop has been constructed in 1982. At the Arikul Dam site, the Catchment area is 34.2 km^2. Gross storage capacity & live capacity were computed as 2.49 M m^3 and 2.18 M

m^3 .Maximum flood discharge was computed from Dicken's formula as 274.71m^3/sec.

The dam safety problems are : The dam crest is uneven. U/s pitching has been disturbed. Depression of rip rap at three locations.D/s apron has cracked. Retrogression reached the dam toe.

ASHOKNALLA DAM

Ashoknalla is situated in Banapur Tahasil of Khurda District at latitude 19^0 -53'-00''N and Longitude 85^0 -13' - 0'' E. The project is designed for irrigating 202 ha in Khariff and 81 ha in Rabi in Banpur Block of Khurda District. The construction work of the project work started in the year 1972 and completed in the year 1986. The project comprises of a homogeneous earth fill Dam of 580m length having 0.44 M m^3 live storage and a broad crested spillway of length 25.90m located on left flank. The outlet for providing irrigation is a well type head regulator constructed with R.R. stone masonry and hume pipe conduit located at RD 207 m. The design discharge of spillway is 69.34 m^3/sec and head regulator discharge is 0.245 m^3/sec.

The dam safety problems are : longitudinal cracks on dam top. U/S pitching damaged. D/S slope eroded due to rain cuts. The rock toe has been silted up. Masonry abutments have been collapsed. Scouring at the toe of second fall. The outlet well has been damaged. Head regulator gates are inoperative.

BADABANDHA DAM

Badabandha dam has been constructed across pandakhianalla/Badagengutinalla in Birupa sub basin of Brahmani Basin near village Karanji in Tangi Choudwar Block of Cuttack district. The dam was completed in 1985. The Project consists of 968.5 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 37.50 m located at left flank of the dam. One head regulator at RD 755 m with a discharging capacity of 0.283 m^3/sec has been provided. The Catchment area intercepted at dam site is 5.63 km^2. The spillway design flood has been computed to be 102.50 m^3/sec. Maximum height of dam from deepest foundation level is 15.22 m and gross storage capacity is 0.64 Mm^3. The project irrigates an area of 182.20 ha. in Kharif and 93.10 ha in Rabi.

The dam safety problems are : The d/s slope has been damaged and raincuts formed. Standing pool of water at RD 335m .

BADAJORE DAM

This is a zoned earth fill dam constructed in the year 1974 across Badajore nalla in Budhabalanga Basin and located at Latitude 21^o -49'-30" N and Longitude 86^o -47'-00" E near village Badajore in the district of Mayurbhanja. The length and height of the dam are 1621m and 12.00m respectively. Gross storage capacity at FRL is 3.55 Mm^3. Khariff ayacut is 1184.40 Ha and Rabi Ayacut is 86.85 Ha. Catchment area is 43.70 km^2. The spillway has been provided with 40 numbers

automatic falling shutters of 0.9 m height with a discharge capacity 327.70 m^3/sec.

The dam safety deficiencies are : Wet patches are observed at RD 732 m and in between RD 975.60 m to 1006 m. Longitudinal cracks are seen at many places.There is leakage of water through abutment wall. Ogee surface concrete has been damaged. All six Falls in the spill channel are damaged.

BAGHUA DAM

Baghua dam is located at Latitude 19°57' 30"N and Longitude 84°57'00"E constructed across Baghua river a tributary of river Rushikulia of Mahanadi river basin near village Dhanurjaypur in Odagaon block of Nayagarh District. The dam was completed in 1980. The Project consists of 1134 m long homogeneous earth fill dam and a ogee spillway of 67 m length in the left flank. There are two Head Regulators having discharge capacity of 0.679 m^3/sec to irrigate 960 ha in Kharif and 320 ha in Rabi. The catchment area intercepted at dam site is 12.8 km^2. The spillway design flood has been computed to be 189.61 m^3/sec, Maximum height of dam from deepest nallah bed level is 13.41 m and gross storage capacity is 3.68 Mm^3 .

The dam safety deficiencies are: The toe drain has been filled up with debries. There is disturbance of pitching in the up stream.

BAGIJHARAN DAM

This is a homogeneous earth fill dam constructed in the year 1983 across Bagjharan nalla, a tributary of Katangi Nallah in Mahanadi Basin and located at Latitude 20^0-31'-00"N and Longitude 82^0-51'-00" E near village Bagjharan in the district of Bolangir . The length and height of the dam are 1524 m and 13.31 m respectively. Gross storage capacity at FRL is 1.121 M m^3. Catchment area is 11.00 km^2. The spillway is ungated ogee type having a discharge capacity 117.45 m^3/sec. Khariff ayacut is 406.50 ha. and rabi ayacut is 164.63 ha.

The dam safety deficiencies are: There is more seepage through dam and surplus escape. Wet patches observed from RD 270 m to 360 m. Surface drains , Toe Drain & Outfall Drains are not provided. There is leakage at the junction of left side abutment of surplus escape. There is failure of slope of dyke near Spill channel.

BAGIRIJHOLA DAM

This is a homogeneous earth fill dam constructed in the year 1986 across Gundara garah nalla in Godabari Basin and located at Latitude 21° -49'-30" N and Longitude 86° -47'-00" E near village Bagirijhola in the district of Rayagada. The length and height of the dam are 480m and 28.52m respectively. Gross storage capacity at FRL is 1.44 Mm^3. Khariff ayacut is 311.54 ha and Rabi Ayacut is 222.53 ha. Catchment area is 7.77 km^2. The spillway is open cut type with a concrete wall having a discharge capacity 116.19 m^3/sec.

The dam safety deficiencies: The spillway needs renovation by providing a suitable structure and energy dissipation arrangement. Heavy retrogression in the spill channel . Toe drain & outfall drains have not been provided.

BALASKUMPA DAM

The Project is located at Lat. 20^{o}-24'-36" N and Long. 84 ^{o} 19'-06" E across Purnapani nallah which is a tributary of Pilasalki in Kandhamal Dist. It is a homogenous earth fill dam of 421 m length with 49m un-gated Ogee Spillway on left flank. The designed ayacut is 497 ha. in Khariff and 182 ha. in Rabi.. There are two head regulators one on left (at RD 201m) and the other on right (at RD 411.50m). Gross storage capacity at FRL is 1.16 Mm^3. Construction of dam commenced in the year 1972 and was completed in 1974. First reservoir impounding was done in the monsoon of 1974.

The dam safety problems are : There is no toe drain or outfall drain. The edges on the crest has been damaged. Heavy retrogression in spill channel.

BANKSAL DAM

Banksal dam is located at Latitude 21^{o}38' 0"N and Longitude 84^{o}22'0"E constructed across Bankasal nalla of Bheden sub basin of Mahanadi basin near village Sudbalanda in Jamankira Block ,Kuchinda Tahasil of Sambalpur District. It. The dam was completed in the year 1981 The Project consists of 609m long homogeneous earth fill dam and a ogee spillway of 107.6 m length in the left flank. There is one Head Regulators in the right side at RD 578.2 m having discharge capacity of 2.97 m^3/sec to irrigate 1571.18 ha in Kharif and 149.6 ha in Rabi. The Catchment area intercepted at dam site is 60.22 km^2. The spillway design flood has been computed to be 420.22 m^3/sec, Maximum height of dam from deepest foundation level is 14.32 m and gross storage capacity is 4.97 Mm^3 .

The dam safety deficiencies are : The rock toe is chocked .The u/s slope has concavity and the pitching is disturbed. Raincuts in d/s slope . The wearing coat of spillway and body wall damaged . Left side wing wall damaged. Heavy retrogression in spill channel Service gate completely damaged.

BAUTIA NALLA DAM

This is a homogeneous earthfill dam constructed in the year 1984 across Bautia Nalla, a sub-tributary of Baitarani in Baitarani Basin and located at Latitude 21^{0}-25'-00"N and Longitude 85^{0}-40'-00" E near village Kantapada of Harichandanpur Block in the district of Keonjhar. The length and height of the dam are 731.50m and 12.04m respectively. Gross storage capacity at FRL is 0.56 M m^3 Khariff ayacut is 171 ha and Rabi Ayacut is 28.34 ha. Catchment area is 5.9 km^2 . The spillway is ungated Ogee type having a discharge capacity 74.19 m^3/sec.

The dam safety deficiencies are : There is seepage through the right side guide bundh. Rock toe & Toe drain are choked. Surface drainage arrangement has not been provided. Down stream of deepest section is slushy due to absence of proper drainage system.Upstream Well of Head regulator is damaged.

BEDAPADA DAM

Bedapada dam is located at Latitude 20^0-44' N and Longitude 85^0-25' E . This is a homogeneous earth fill dam constructed near village Bedapada in Hindol Block of Dhenkanal District in the year 1983 across a tributary of river Badjore of Brahmani Basin .. The length and height of dam are 976m and 12.93m respectively. The gross storage capacity at FRL is 1.16 M m^3. Khariff ayacut is 243.90 Ha and Rabi Ayacut is 32.52 Ha.. The catchment area is 15.317 km^2. The ungated spillway has a discharge capacity of 138.30 m^3/sec.

The dam safety deficiencies with the dam are Longitudinal and transverse cracks are developed on the crest as well as u/s and d/s slopes. Retrogression observed in the tail channel due to damage of grade wall.

BEHERA DAM

This is a masonry gravity dam constructed in the year 1983 across Behera nalla, a second order tributary of river Tel in Mahanadi Basin located at Latitude 20^0-27'-10" N and Longitude 82^0-42'-20" E near village Dudkathenga 970 km from Bhawanipatna in the district of Kalahandi. Length and height of the dam are 110.95m and 25.26m respectively. Gross storage capacity at FRL is 5.04 Mm^3. The Khariff ayacut is 2420 ha and Rabi Ayacut is 1214 ha. The catchment area is 67.34 km^2. The spillway is ungated one with a discharge capacity of 456.40 m^3/sec.

The dam has been rehabilitated under DSARP.

BENIKPUR DAM

Benikpur M.I.Project is a reservoir scheme constructed across a tributary of river Sandel which is tributary of river Uttei in Mahanadi basin. The project is situated near village Benikpur in Lanjigarh block of Kalahandi district. The village Benikpur is 45 km away from Bhawanipatna. The project intercepts a catchment area of 3.45 km^2 and comprises of a homogeneous earth dam of 278.00m long with vertical chimney, a flush type escape of length 28.50m and two nos. of irrigation sluices to cater the irrigation requirement of 128 ha in Khariff and 36 ha in Rabi.The maximum height of the dam is 16.3 m. The inflow design flood is 49.52 m^3/sec. The gross storage capacity is 0.35 M m^3.

The major dam safety problems are : The grade walls in spill channel are damaged. There is slippage in the earth dam at u/s near escape.

BHALUGHAI DAM

Bhalughai Dam across Kadava Nallah is situated at Latitude 19^0-13′-00”N, Longitude 84^0-36′-00” E near village Ambajhola in Chikiti block of Ganjam District. It comprises of a homogeneous rolled fill earth dam of 635.80 m length, ungated ogee surplus of 29m length on the right flank and one H.R. at R.D. 180 m of earth dam to irrigate 330 ha in Khariff and 121 ha in Rabi. Construction of the dam commenced during February 1979 and completed on 30.09.1982. The reservoir has a gross storage capacity of 1.076 M m^3 . The catchment area intercepted at dam site is 6.63 km^2. The catchment is hilly with mild forest growth. Spillway design flood has been calculated using Dicken's formula which is 80.24 m^3/sec.

The dam safety problems are : The rock toe has been chocked. Cracks on the d/s slope. The abutment ,wingwall and return wall are in leaking.

BHALUGUDA DAM

This is a homogeneous earth fill dam constructed in the year 1983 across a tributary of Bansadhara in Bansadhara Basin and located at Latitude 19^0-37'-0”N and Longitude 83^0-40'-0” E near village Bhaluguda in the district of Rayagada. The length and height of the dam are 570 m and 18.80 m respectively. Gross storage capacity at FRL is 0.67 Mm^3. Khariff ayacut is 151.82 ha and Rabi Ayacut is 91.09 ha. Catchment area is 7.77 km^2 . The spillway is ungated ogee type having a discharge capacity 129.25 m^3/sec.

The dam safety deficiencies are: There is no surface drainage arrangement. There is heavy leakage through Head regulator. Two numbers of falls in the spill channel have been damaged

BHETABAR DAM

Bhetabar dam is located at Latitude of $20^0$03' 30”N and Longitude $85^0$21'E constructed across Kankadajhar Nallah in Malaguni sub basin which falls in Chilika near village Bhetabar in the district of Nayagarh . The dam was completed in 1980. The Project consists of 1402 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 128 m located at right flank of the dam. One head regulator at RD 290 m with a discharging capacity of 1.90 m^3/sec has been provided.The Catchment area intercepted at dam site is 44.20 km^2. The spillway design flood has been computed to be 379 m^3/sec. Maximum height of dam from deepest foundation level is 16.16 m and gross storage capacity is 3.28 Mm^3. The project irrigates an area of 1215 ha. in Kharif and 324 ha in Rabi.

The dam safety problems are : There is leakage of water through body wall of the surplus escape. Longitudinal cracks on top of the dam. Erosion on crest and u/s slope. Heavy leakage through left wingwall.

BHITIRIBEDIGUDA DAM

This is a homogeneous earth fill dam constructed in the year 1991 across Baunsakata Nalla, a tributary of Loharakhandi river of Rushikulya Basin and located at Latitude 20^0-10'-00"N and Longitude 84^0-25'-00" E near village Bhitiribediguba in the district of Ganjam. The length and height of the dam are 255 m and 19 m respectively. Gross storage capacity at FRL is 0.995 M m^3. Khariff ayacut is 445.50 ha and Rabi Ayacut is 40.50 ha. Catchment area is 6.67 km^2 . The spillway is ungated ogee type having a discharge capacity 79 m^3/sec.

The dam safety deficiencies are: There is no toe drain & outfall drain. Surface drainage arrangement has not been provided. A fall in the surplus channel is required to negotiate the levels.

CHATTENJORE DAM

Chattenjore dam is located at Latitude 20^o1'N and Longitude 83^o43'E across Chatenjore nalla in Ib sub basin of Mahanadi Basin near village Tumulia in Hemagiri Tahasil of Sundergarh District. The dam was completed in 1983. The Project consists of 867 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 61 m. One head regulator at RD 658 m has been provided to irrigate 324 ha in Kharif and 41 ha in Rabi.The Catchment area intercepted at dam site is 9.89 km^2. The spillway design flood has been computed to be 112.07 m^3/sec. Maximum height of dam from deepest foundation level is 15.15 m and gross storage capacity is 1.265 Mm^3.

The dam safety deficiencies are : The dam is not in design section. Thre is settlement at RD 335-500 m. Retrogression in spill channel up to 2^{nd} fall.

CHHAMUNDIA DAM

Chhamundia dam is located at Latitude of $22^0$2'N and Longitude $86^0$6'30"E and constructed across Gandira nalla, in Baitarani river basin near village Chhamundia in the district of Mayurbhanja. The dam was started in 1977 and completed in 1979. The project irrigates an area of 312.12 ha. in Kharif. The Project consists of 304.28 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 30.48 m . One head regulator at RD 285 with a discharging capacity of 0.41 m^3/sec has been provided.The Catchment area intercepted at dam site is 9.06 km^2. The spillway design flood has been computed to be 90.36 m^3/sec. Maximum height of dam from deepest foundation level is 12.5 m and gross storage capacity is 1.189 Mm^3.

The dam safety problems are : Depression in u/s and d/s slope. Longitudinal crack on the crest. Standing pool of water at rd 300-600 m near toe. Leakage in the d/s slope near head regulator. Abnormal leakage from rock toe.

DAMSAL DAM

Damsal dam is located at Latitude 21°03'34"N and Longitude 85°43'49"E has been constructed near village Ragada of Sukinda Block in Jajpur district at a distance of 42 km from Bhuban.Construction of the Damsal Project was started during the year 1972 and completed in the year 1976. The dam has been constructed across Kharkhai Nalla a third order distributary of river Brahmani. The dam is homogenous earth fill having a length of 399.40m excluding the surplus escape and height of dam from the deepest river bed level is 18.25m. The ungated spillway is located in the right side of dam between the abutment hill and the earth dam. The spillway is un-gated and consist of two escapes i.e. (i) Broad Crested weir of length 28.04 m on earth dam side and (ii) Flush type escape of 32.62m on abutment hill side. The two types of escapes are separated by a divide wall of 0.75m thickness. There are two head regulators i.e. (i) Right Head Regulator at RD 106.68 and (ii) Left Head Regulator at RD 402.34m. The designed discharge of the left head regulator is 0.28 m^3/sec and that of right head regulator is 1.64 m^3/sec . The catchment area of the project at dam site is 63.70 km^2 and is fan shaped. Maximum flood discharge has been calculated as 436 m^3/sec.

The dam safety problems are : Standing pool of water in the d/s side near toe. Severe leakage at the junction of left head regulator and earth dam. The divide wall between flush escape and broad crested spillway has been collapsed. The spill channel has been deeply eroded. The spillway body has spalling and cavities. Cracks in the abutment wall. The guide wall is in critical condition. The head regulator barrel is leaking.

DASAMANTAPUR DAM

Dasamantapur dam is located near Dasamantapur at Latitude 19°5'0"N and Longitude 82°55'E constructed across Ghaigadai nalla of Muran sub basin of Indravati basin in Dasamantapur block of Koraput District. The dam was completed in 1982 The Project consists of 265 m long homogeneous earth fill dam and a ogee spillway of 32 m length in the left flank. There are two Head Regulators having discharge capacity of 0.123 m^3/sec each to irrigate 161.84 ha in Kharif and 80.92 ha in Rabi. The Catchment area intercepted at dam site is 7.68 km^2. The spillway design flood has been computed to be 90.6 m^3/sec, Maximum height of dam from deepest nallah bed level is 18.2 m and gross storage capacity is 0.441 Mm^3 .

The dam safety deficiencies are : The toe drains are discharging the seepage flow, but the drains are choked with slush, debris & bushes.

DEBIJHARA DAM

The Debijhara Dam located at Latitude 19°-43'-00" N and Long. 85 ° 07'-00" E has been constructed across Debijhara nalla in the Chilika basin in Khallikote Block of Ganjam District. The Dam intercepts a catchment area of 9.3 km^2. It provides irrigation to 501 ha in Khariff and 202 ha in Rabi. The Dam work was started in the year 1971 and completed in 1975. The Dam is homogeneous earth fill of 204.86m length, and 17.99m height (at the deepest foundation level)

having an ungated ogee spillway located in a saddle, and one H.R. having vent size 0.6m x 0.6m . The catchment area at the dam site is 9.3 km^2 . The design flood of 103.64 m^3/sec has been adopted using Dicken's emperical formula.

The dam safety problems are : The toe is heavily silted. U/s rip rap disturbed. The d/s slope is not in proper profile. The left side junction of the dyke and surplus escape scoured. Leakage in intake well.

DEOJHARAN DAM

This is a homogeneous earth fill dam constructed in the year 1987 across Deojharan nalla, a tributary of Hariharjore river in Mahanadi Basin and located at Latitude 21^0-13'-10"N and Longitude 84^0-09'-50" E near village Goilgudi in the district of Sambalpur . The length and height of the dam are 478.54 m and 14.58 m respectively. Gross storage capacity at FRL is 1.804 Mm^3. Catchment area is 9.07 km^2. The spillway is ungated ogee type having a discharge capacity 101.47 m^3/sec. Khariff ayacut is 283.22 ha. and rabi ayacut is 125.43 ha.

The dam safety deficiencies are: Wet patches observed from RD 270 m to 360 m. Surface drains , Toe Drain & Outfall drains are not provided. There is Leakage at the junction of left side abutment of surplus escape. There is failure of slope of dyke near spill channel.

DHULIPAUNSIA DAM

This is a homogeneous earth fill dam constructed in the year 1977 across Dhulipaunsia nalla, second order tributary of Mahanadi river in Mahanadi Basin and located at Latitude 20^0-10'-24"N and Longitude 85^0-01'-34" E at 16 km from Nayagarh in the district of Nayagarh. The length and height of the dam are 542 m and 12.91 m respectively. Gross storage capacity at FRL is 0.394 M m^3. Catchment area is 6 km^2. The spillway is flush type having a discharge capacity 39.64 m^3/sec. Khariff ayacut is 135 ha. and rabi ayacut is 16 ha.

The dam safety deficiencies are : Longitudinal cracks have developed on the crest of dam & down stream slope.The energy dissipation arrangment in escape is not sufficient.

DOMKUTCH DAM

Domkutch dam is located at Latitude 20°33'20" N, Longitude 84°58'0" E and constructed across Pichhiala Nalla in Mahanadi basin, near village Domkutch, Boudh Tahsil in Boudh district of Orissa. The dam site is 12 km away from NH 217 between Nayagarh and Madhopur. The dam intercepts a catchment area of 17.00 km^2 and creates a reservoir of 1.4 M.m^3 capacity in order to meet the irrigation requirements of 405 ha. of cultural command area. The dam is a homogeneous earth dam with a vertical sand chimney and horizontal filter connected to rock toe at RL 610.50m. The spillway consists of two parts of clear waterway; one a Ogee shaped crest of width 20.00m and another a flush escape of width 25.00m . The Head Regulator is located at RD 25.00m with a canal discharge of 0.283 m^3/sec.The inflow design flood is 230.5 m^3/sec.

The dam safety problems are : The rip rap settled at Rd 90m. a pit has been formed at Rd 20 m at a offset of 25 m from dam toe. Rain cuts in d/s slope.

DUMERBAHAL DAM

This is a homogeneous earth fill dam with vertical chimney completed in the year 1990 across dumarbahal nalla in Mahanadi Basin and located at Latitude 20^0-25'-00"N and Longitude 83^0-10'-00" E near village Suwapara in the district of Balangir. The length and height of the dam are 1385 m and 21.75 m respectively. Gross storage capacity at FRL is 1.48 M m^3. Catchment area is 75.00 km^2. The spillway is ungated ogee type having a discharge capacity 707.60 m^3/sec. It has no ayacut . It meets the requirement of Ordnance Factory, Badmal.

The dam safety deficiencies are: Longitudinal cracks are developed on the crest of dam. There is leakage through the body of ogee. Boilings found at 250 m away from the dam at three points.

GANIANALLA DAM

This is a homogeneous earth fill dam constructed in the year 1973 across a river Ganianala, of sub-basin Ghodahada in Rushikulya basin and located at Latitude 19^0-21'N and Longitude 84^0-39'E near village Bidheswar, in Digaphandi block of Ganjam district. The length and height of the dam are 1585m and 35.37m respectively. Gross storage capacity at FRL is 1.857M m^3.The designed ayacut is 1188.0 ha. . Catchment area is 14.20 km^2. The spillway is ungated ogee shaped with discharge capacity of 186 m^3/sec .

The dam safety deficiencies are: There is no surface drainage arrangement . Leakage of water through the masonry joints of left abutment and right wing wall in d/s side. The head regulator service gate is not in working condition and emergency gate damaged and is out of order.

GARH DAM

Garh dam is located at Latitude 20^0-17' N and Longitude 86^0-03' E constructed across Garh nallah, a tributary of Muhan nallah by connecting two hillocks on either side of the nallah near village Bada Ektali and Kendudihi of Anandapur Tahasil in Keonjhar district. The Construction of the project commenced during 1981 and completed in 1984. The project contemplates to provide irrigation to 830 ha in Khariff and 219 ha in Rabi. It is a homogeneous rolled fill earth dam of 637.71m length with ogee type ungated surplus escape of 50.29m on right flank. There are two nos. of H.Rs, one on left side at RD 58.70m and the other on right side at RD 668.66m having design discharge of 1.167 m^3/sec and 0.17 m^3/sec respectively. The catchment area intercepted at dam site is 21.50 km^2. The spillway design flood is calculated using Dicken's formula which works out to 194.00 m^3/sec .

The dam safety problems are : Standing pool of water between RD 400 to 450 m. Profuse leakage from right head regulator. Both the abutments are leaking.

GAYAPATHARA DAM

Gayapathara dam is located at Latitude of $20^0$18'N and Longitude $85^0$19'00"E constructed across Gayapathara nalla, in Mahanadi river basin near village Bhapur in the district of Nayagarh. The dam was completed in 1988. The Project consists of 1328 m long homogeneous earth fill dam and an flush escape of 65.5 m legnth. Two head regulators one at RD 381 m and other at RD 762 m have been provided. The Catchment area intercepted at dam site is 5.85 km^2. The spillway design flood has been computed to be 73.05 m^3/sec. Maximum height of dam is 13.74 m and gross storage capacity is 0.72 Mm^3.

The dam safety problems are : Rain cut in the d/s slope. Longitudinal cracks on the dam crest. Up stream rip rap has been disturbed.

GHAGARA DAM

Ghagara dam is located at Latitude 20^o24'N ,Longitude 84^o57'E constructed across Ghagara river in Mahanadi Basin near Gania town in Dasapalla Tahasil of Nayagarh District. The dam was completed in 1976. The Project consists of 707.32 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 51.82 m provided at the right end. One head regulator at RD 250 m has been provided to irrigate 364 ha in Kharif and 240 ha in Rabi. The Catchment area intercepted at dam site is 12.95 km^2. The spillway design flood has been computed to be 90.60 m^3/sec . Maximum height of dam from deepest foundation level is 14.89 m and gross storage capacity is 0.807 Mm^3.

The dam safety problems are : The dam is not in design section. Cracks on surface of surplus escape and leakage through foundation. Heavy seepage through dam. Cracks at the crest and slope of the dam.

GHURLIJORE DAM

The dam is located at Latitude 22^o3'7"N and Longitude 84^o7'36" E constructed over Ghurlijore nallah of Mahanadi basin near Sundargarh.The length of the earth dam is 547.6 m. The spillway length is 45 m . The maximum height of the dam is 12.19 m. The gross storage capacity is 2.179 M m^3. The project was originally constructed by state Revenue Department in 55-56. After being transferred to R.E.O, it was taken for renovation in 1971. The works were done very slowly till it was completed in 1984. The certified ayacut achieved was 272.83 Ha in Kharif and 30.92 Ha in Rabi.Further renovation & up gradation was again done during 2002-2003 with financial sanction under 11^{th} finance commission (Augmentation of water resources). After renovation, full designed ayacut was achieved i.e 364.37 ha in Kharif & 211.45 ha in Rabi.

The dam safety deficiencies are: Heavy rainfall in July/August 2004 caused high flood. The junction of right abutment with right earth dam gave away and outflanked the abutment structure and deep gully was formed. The wingwalland return wall undermined. The spillway has also been damaged.

GUNDURIPOSI DAM

Gunduriposi dam is located at Latitude 20º-43'-15" N and Longitude 85º -47'-06" E constructed across Remei nalla, in Brahmani river basin, by connecting two high grounds on either side of the nalla near village gundiriposi of Gondia block in Dhenkanal district. Construction of the project was commenced during 1971 and completed in 1975. The project irrigates an area of 1041 ha. in Kharif and 81 ha. in Rabi seasons. The Project consists of 1097.5 m long earth fill dam with ogee shaped un-gated surplus escape of 75.8m length . There are two head regulators ,one at left side with a discharging capacity of 0.41 m^3/sec and the other at right side with discharging capacity of 1 m^3/sec. Catchment area intercepted at dam site is 22 km^2. The spillway design flood has been computed to be 212.34 m^3/sec. Maximum height of dam from deepest foundation level is 11.12 m and gross storage capacity is 4.248 Mm^3.

The dam safety problems are : Cavitation inside the barrel of the head regulator. Leakage from abutment and wing wall. Retrogression in the spill channel. The rock toe has been chocked.

HAGURI DAM

Haguri dam is located at Latitude of $20^0$17'N and Longitude $84^0$50'E constructed across Haguri nalla, in Kuanria sub basin of Mahanadi river basin near village Godibida in the district of Nayagarh. The dam has been completed in 1975. The project irrigates an area of 546 ha. in Kharif and 243 ha. in Rabi seasons. The Project consists of 738 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 51.83 m . There are two head regulators ,one at left side with a discharging capacity of 0.99 m^3/sec and the other at middle of the dam. Catchment area intercepted at dam site is 14.3 km^2. The spillway design flood has been computed to be 141.6 m^3/sec. Maximum height of dam from deepest foundation level is 12.63 m and gross storage capacity is 1.71 Mm^3.

The dam safety problems are : The spillway wearing coat has been damaged. The dam is not in proper design section. The gate of the left head regulator needs repair.

HANUMANTIA DAM (KEONJHAR)

This is a homogeneous earth fill dam constructed in the year 1985 across Hanumantia Nalla , a tributary of Samakoi river in Brahmani Basin and located at Latitude 21º -24'-30" N and Longitude 85º -24'-0" E near village Dimiria in the district of Keonjhar. The length and height of the dam are 552 m and 15.85 m

respectively. Gross storage capacity at FRL is 2.434 Mm^3. Khariff ayacut is 607 ha and Rabi Ayacut is 202 ha. The catchment area is 37.50 km^2. The spillway is an ungated chute with a discharge capacity 294.49 m^3/sec.

The dam safety deficiencies are : There is no outfall drain. There is leakage of water from Rock toe at R.D.490 m. Heavy raincuts occur due to absence of turfing & surface drains. There is seepage through foundation in the river gap portion which caused slushy condition & bulging on just downstream of toe. There are longitudinal cracks from RD 494 m to 503 m.

HANUMANTIA DAM (KHURDA)

The dam is located in village Kaipadar of Khurda Tehsil in Khurda district at Latitude 20-06'-20" N and Longitude 850-33'-00" E. The project site is about 3.5 km from Malipada on N.H-5.A homogeneous rolled fill earth dam with an ungated ogee spillway on right flank has been constructed across a local stream "Hanumantia" which is a tributary to river Daya. The catchment area intercepted at dam site is 5.3 km^2 to provide irrigation to 243 ha. in Khariff and 182 ha. in Rabi. There is one H.R on the left at RD 222.50m with 0.9m dia hume pipe barrel . The project work commenced during 1979-80 and head works completed in 1983. Maximum design flood has been calculated using Dicken's empirical formula which works out to 66.67 m^3/sec.

The dam safety problems are : Erosion on the d/s slope. Depression on the u/s rip rap of u/s slope. Rock toe and toe drain chocked. Leakage from H/R well. No outfall drain. Mining activity close to right abutment.

HATIANALLA DAM

Hatianala Dam is a part of the Hatianala Minor Irrigation project located near village Dudukabahal .The M.I.P is located in Laikera Block in Jharsuguda district within the Bheden sub-basin of Mahanadi Basin at the upstream of Hirakud Dam. The project construction was taken up between 1987 – 97. The reservoir gross storage capacity is 11.6128 M m^3 .The 1555m long dam has a maximum height of 19.20m above the deepest foundation level. The storage is being utilized to provide Irrigation to 2023 ha in Kharif and 910.35 ha in Rabi. The dam has a fairly large catchment area of 122.88 km^2. The flood discharging capacity of the surplus Escape (Spillway) is 723 m^3/sec . The surplus height above the apron is 3.65m and there are two falls in the spill channel of height 5.41m & 4.97m. The length of surplus Escape & first fall is 137.16m. There are two canals taking off from the reservoir. The Left canal, which is the main canal, has a discharge of 3.11 m^3/c where as the right canal's discharge is a meager 0.20 m^3/s.

The dam safety problems are : The hydrology needs review. The right abutment of first fall in surplus channel has cracked.

JAGADALA DAM

This is a homogeneous earth fill dam constructed in the year 1996 across a Jagadala nalla, one of the tributaries of Aradei in Baitarani Basin and located at Latitude 21^0-48'N and Longitude 85^0-28'E near village Godatapa in the district of Keonjhar.. The length and height of the dam are 1018.m and 14.78m respectively. Gross storage capacity at FRL is 3.962 M m^3. Kharif ayacut is 1012 ha.and rabi ayacut is 404 ha. Catchment area is 45.32 km^2. The spillway is chute type with discharge capacity of 339.60 m^3/sec .

The dam safety deficiencies are : Surface of the crest is undulated and longitudinal cracks have developed. Profuse leakage and piping is noticed in the junction of right side abutment wall of spillway. In the outlet conduit water leaks from the left side wall .

JAMBONALLA DAM

This is a homogeneous earth fill dam constructed across Jambonalla of Mahanadi Basin located at Latitude 20^0-49'30" N and Longitude 83^0-36' E near village Barajha in the district of Jharsuguda. The dam was completed in the year 1985-86. The Length of dam is 365.76m including 30m length of spillway. Height of the dam is 15.25m. Khariff ayacut is 325 Ha and Rabi Ayacut is 122 ha. Catchment area is 8.4 sq.km. Gross storage capacity at FRL is 1.44 Mm^3. Spillway capacity is 95.95 m^3/sec.

The problems with the dam are : Appreciable seepage is noticed in between right abutment of Head Regulator and nearby hillock.

JAMUNABANDHA

Jamunabandha dam is located at Latitude of $20^0$29'N and Longitude $85^0$32'E constructed across Barajharanallah in Mahanadi river basin near village Sudarsanpur in the district of Cuttack. The dam was completed in 1986. The Project consists of 866.2 m long homogeneous earth fill dam and an ogee shaped un-gated surplus escape of length 51.82 m. One head regulator at RD 229 m with a discharging capacity of 0.41 m^3/sec has been provided. The Catchment area intercepted at dam site is 9.06 km^2. The spillway design flood has been computed to be 144.8 m^3/sec. Maximum height of dam from deepest foundation level is 15.39 m and gross storage capacity is 0.54 Mm^3.

The dam safety problems are : The toe drain has been silted up. Up-stream rip rap disturbed.

JAYAGARH

Jayagarh dam is constructed near village Kakchhi which is 60 km from district headquarters Angul and is by the site of Cuttack-Sambalpur Road (NH-42). The dam has been constructed across Jayagarh nalla is a tributary of Peranda Jhar which falls on river Manjore, a tributary of river Mahanadi. The location of the

dam is at Latitude 20^0-58'-26" N and Longitude 84^0-36'-50" E. Total length of the earth dam is 246.90m out of which 5m length is on the left of the surplus escape and the balance length of 241.90m is on the right side of escape. The dam height at the deepest section is 18.70m. It is a homogeneous earth fill dam with vertical chimney and horizontal filter and rock toe provided at d/s toe of dam. The surplus escape is located in the left flank and the length of the surplus escape is 39.62m. The catchment area of dam site is 6.47 km^2 and is fern shaped. The design flood of 112.12 m^3/sec.

The dam safety problems are : Leakage at junction of right abutment and earth dam at d/s apron level. The dam top has eroded.

JHARANAI DAM

The Jharanai dam located at Latitude 19^o-40'-00" N and Longitude 84 ^{o}-55'-00" E has been constructed across Jharanai Nalla, a tributary of Kharkhari Nadi of Chilika basin, in the Kodala block of Ganjam District. The dam provides irrigation to 728.28 ha in Khariff and 202.30 ha in Rabi. The catchment area is 9.22 km^2. The project was started in the year 1972 and completed in 1976. The project comprises of 274.5 m long 28.3 m high homogeneous earth fill dam, an ungated ogee spillway of 45.73 m length, a single vent head regulator and its distribution system. The catchment area intercepted at dam site is 9.22.km^2. The Design flood earlier adopted was 104 m^3 / sec using Dicken' formula with value of 'C' as 1400 in FPS unit, which was later revised to 250 m^3 / sec (SPF) and routed discharge is 219 m^3 / sec . The MWL was changed to EL 72.45m from EL 71.63m, thus raising the TBL of the Dam from EL 73.15 m to 73.95m.

The dam safety problems are : Concavity in the upstream. Profuse leakage in the down stream.water is seeping through junction of the earth dam and the right abutment. The intake well as well as the conduit of head regulator has heavy leakage.

JHUMUKA DAM

Jhumuka reservoir has been created by constructing a homogeneous earth fill dam across Jhumuka nalla, a tributary of river Kuakhai near Village Kantabada of Bhubaneswar Tahasil in Khurda District at Latitude 30°-30' N and Longitude 88°-50' 10" E to provide irrigation to 640 ha. in Khariff and 160 ha. in Rabi. Length of earth dam is 517.39m which connects hillocks at both ends. On left side, an ungated ogee type spillway of 67.05m length has been provided for passage of design flood of 188.48 m^3/sec. Construction of the Project commenced during 1970 and became operational in 1975. Catchment area intercepted by the project is 20.72 km^2 and lies in the wild life sanctuary of Chandaka Reserve Forest. Design flood has been computed with Dicken's fomula which works out to 188.48 m^3/sec.

The dam safety problems are : Depression /sink holes in the u/s slope close to left head regulator. Water is leaking heavily from masonry wall of head regulator barrel and the intake well. There is piping on the d/s slope near head regulator.

JODABADIA DAM

This is a homogeneous earth fill dam constructed in the year 1976 across a Jodabadia nalla,in Brahmani basin and located at Latitude 20^0-48'N and Longitude 85^0-28"E near village Dhobabahali in the Kamakhyanagar block in Dhenkanala district. The length and height of the dam are 1615m and 11.89m respectively. Gross storage capacity at FRL is 1.51 M m^3. Kharif ayacut is 110 ha and.rabi ayacut is 80 ha. CA is 12.95 km^2. The spillway is ogee shaped and ungated one with discharge capacity of 132.52 m^3/sec .

The dam safety deficiencies are: Surface drainage system is not provided in d/s slope.There is no arrangment for seepage measurement. Leakage in the junction of ogee and left abutment.

JUANRIA DAM

Jaunria Dam has been constructed across Jaunria nallah near village Maniabindha of Ghatagoan Tahasil in the district of Keonjhar at latitude 21^0-17'-30" N and longitude 85^0-53'-35" E. The Project work commenced in the year 1982 and was completed in 1991 to provide irrigation to 810 ha. in Khariff and 405 ha. in Rabi. This is a homogeneous rolled fill earth dam of 935.70m long with an ungated spillway of 60.96m long on right flank. The maximum height of the dam is 17.37 m. There are two H.Rs, one on left and the other on the right to command the above ayacut. The catchment area is 24.62 km^2. The inflow Design flood has been calculated with Dicken's formula which works out to 306.4 m^3/sec.

The dam safety problems are : Leakage at corner of the left abutment and return wall. Local depression ar RD 200-275 m on the u/s riprap. Erosion at d/s at RD 215-240 m. Raincuts in the d/s slope. The first and second fall has been damaged.

KALAKALA DAM

This is a homogeneous earth dam constructed across Gobapalla nallah in Brahmani Basin located at Latitude 20^0-42'30" N and Longitude 85^0-59'00" E near village Kalakala in Jajpur district. The dam was completed in the year 1975. Length and height of dam are 1174.98m and 11.45m respectively. Area irrigated during Khariff is 950 Ha and during Rabi is 600 ha. The gross storage capacity at FRL is 2.90 Mm^3. Catchment area is 18.13.km^2. The spillway capacity is 170.37 m^3/sec.
The problems with the dam are : Wet patches found in between RD 750m to 800m. There is retrogression in spill channel. Body wall of spillway is not in good condition.

KALIJODI DAM

This is a homogeneous earth fill dam constructed across river Kalijodi nalla of Brahmani Basin and located at Latitude 20^0-35'0" N and Longitude 85^0-50' E near village Guhelipal in the district of Dhenkanal. The dam was completed in the year

1973. Length and height of dam are 306.00m and 16.15m respectively. Gross storage capacity at FRL is 1.20 Mm^3. Catchment area is 13 km^2. The inflow design flood based on Dicken's formula is 133.22 m^3/sec. The Khariff Ayacut is 406.50 ha and Rabi Ayacut is 406.50 ha.

The dam safety deficiencies are : Settlement noticed at places including junction of earth dam and spillway.

KALIMATI DAM

Kalimati dam is located at Latitude 210-25'-0" N and Longitude 850-47'-30" E constructed across Kukurkata nalla near village Kalimati in Keonjhar district having a live storage capacity of 3.60 M m^3 to provide irrigatioin to an ayacut of 1400 ha . It comprises of 915m long, 20.00m high rolled homogeneous earth dam with 70.00m long ungated ogee spillway on right flank The project work commenced in the year 1982 and completed in 1999. There exists one H.R on the right side at RD 155m from right end having design discharge of 2.208 m^3/sec. Catchment area intercepted at dam site is 35.22 km^2 and spillway design flood has been estimated as 280.70 m^3/sec . There is an ungated ogee shaped surplus of 70.00m long on right flank with crest level at RL 371.5m. The gross storage capacity of the reservoir is 4.5 M m^3 .

The dam safety problems are : Leakage at junction of earth dam and abutment. A 1.2 m deep sink holes has occurred in the u/s slope at junction of masonry wall. Leakage through horizontal joint. Ogee surface has been pitted out.

KANGANINALLAH DAM

Kanganinalla dam has been constructed over a local nalla called Kanganinalla in Mahanadi basin near village Gandapadar in Phulbani Block. The location of the project is at Latitude 20^0-22'-04" N and Longitude 84^0-12'-36" E. The dam site is 15 km from Phulbani, the district headquarters. The construction of the homogeneous earth fill dam was started in the year 1972 and was completed in the year 1980. The surplus escape is ungated and ogee shaped. The escape has been provided outside the body of the earth dam on the right side of river between two hillocks. The saddle between the two hillocks serves as the approach channel to the spillway and the escape has been constructed at the end of the hillocks. The length of surplus escape is 105m. The d/s apron of the surplus escape has been provided with dented end sill for a length of 65m. and no end sill has been provided for the balance length of 40m. The end sill with the d/s cut-off serves as the fall as the d/s of cut-off has been provided with floors of concrete cubes 1.00m below the d/s apron level of the surplus escape. There are two head regulators on the body of the earth dam on both sides of river at RD 28m (left H/R) and 222m (right HR). The H/Rs are well type provided with hume pipe barrels of 0.91m dia.

The dam safety deficiencies are : There are leakages in the d/s slope of the dam at RD 110m and RD 180m at joints of the earth dam with high lands. There is no toe drain and cross drain arrangement to carry seepage water away from the rock toe .The dam section from RD 00m to 10m has been cut by local people for use as ramp, thus reducing the free board.

KANHEIMUNDA DAM

This is a earth dam constructed in the year 1991 across Kanheimunda nalla , a tributary of Indravati river in Godavari basin and located at Latitude 19^0-16'-00''N and Longitude 82^0-4'-00''E near village Khatiguda in the Bejuguda block in Nawarangpur district. The length and height of the dam are 660m and 13m respectively. Gross storage capacity at FRL is 0.51 M m^3. Kharif ayacut is 60ha and.rabi ayacut is 20 ha. Catchment area is 5.0 km^2. The spillway is Ogee shaped & ungated with a discharge capacity of 66.676 m^3/sec .

The dam safety deficiencies are : There are no toe drain & outfall drain.Longitudinal cracks are found at RD 465 m to 480 m.Grade walls in the spill chanel have been damaged.

KANHEI NALLA DAM

The project is located at Latitude 19^o17'00" N and Longitude 84^o38'00" E near village Lochapada under Digapahandi Block in Ganjam District. An earthen dam of length 1021 m & maximum height 17.37m has been constructed across a stream, "Kanheinalla" in Bahuda river basin. The dam construction was completed in 1975. The dam is located at a distance of 18 km from Digapahandi, The catchment area is 10.36 km^2. The project was originally contemplated to provide irrigation to 405 ha in Kharif and 304 ha in Rabi, but during construction it self, it was revised to provide Kharif Irrigation to 857 ha and Rabi Irrigation to 324 ha. The FRL was increased by 0.6m i.e up to 85.97m during construction. The surplus escape is located at the left flank of dam. The surplus has been divided in to two parts. The left portion 14.02m is a flush escape. The balance portion is an ogee type escape with a waterway of 14.63m. The Irrigation outlet has a design discharge of 0.753 m^3/sec.

The dam safety problems are : The slopes have been eroded. The crest profile has been eroded. Profuse leakage below the right wingwall.

KANSABANSA DAM

The Dam has been constructed across Kansbasa nalla, which is a tributary of Singdajore nalla which ultimately joins river Brahmani. The dam is located at about 3km. from village Kisinda at Latitude 20^0 57'30" N and Longitude. 84^0 49' 10"E in Chhendipada Block of Anugul District to provide irrigation to 971.66 ha in Khariff and 323.88 ha in Rabi. The construction of the dam was started in the year 1972 and completed in 1975. The dam intercepts a fan shaped catchment of 20.71 km^2, which is full of forest. The dam is a homeogeneous earthfill dam of 557.7 m length and an ungated broad crested weir as surplus.. There is one H.R. at RD 170m having design discharge of 1.00 m^3/sec. The maximum height of the dam at the deepest bed level is 17.86m.The maximum design flood has been computed as 188.28 m^3/sec using Dicken's empirical formula.

The dam safety problems are : the toe drains are chocked .rain cuts in both u/s and d/s slopes. The chute blocks and end sill have been damaged.

KANTESIR DAM

This is a earth dam constructed in the year 1976 across a Kantesir nalla, a tributary of Tel river in Mahanadi basin and located at Latitude 20^0-12'-6''N and Longitude 83^0-10"-00''E near village Kantesir, in the Kesinga block of Kalahandi district. The length and height of the dam are 1074m and 12.46m respectively. Gross storage capacity at FRL is 1.37 Mm^3. Kharif ayacut is 253 ha and.rabi ayacut is 121 ha. Catchment area is 7.77 km^2. The spillway is ogee shaped ungated with discharge capacity of 90.27 m^3/sec .

The dam safety deficiencies are : There are no toe drain,outfall drain & surface drains.The spillway needs repair due to cracks and spalling. The fishery ponds constructed at a distance of 15.20 m from downstream toe are to be filled-up.

KARADA DAM

This is a homogeneous earth fill dam constructed across river Keradanalla in Mahanadi Basin located at Latitude $20^0$27'30" N and Longitude $85^0$24'00" E near village Karada in the district of Cuttack. The dam was completed in the year 1988. The length and height of dam are 434.70m and 19.94m respectively. The gross storage capacity at FRL is 0.764 Mm^3. Khariff ayacut is 226.70Ha and Rabi Ayacut is 81.00 ha. Catchment area is 8.96 km^2. The spillway design flood capacity is 101.10 m^3/sec.

The problems with the dam are : There is standing pool of water from RD 240m to RD 350m. Heavy leakage on top of emergency gate shutter.

KARANJKOTE DAM

This is an earth dam constructed in the year of 1977 across karanjkot nalla, a tributary of river Tel of Mahanadhi basin and located at Latitude 20^0– 3'-30" N and longitude 82 $^{0-}$56$^{'}$-30'' E near village Karanjakote in Golomunda block of Kalahandi district.. The length and height of the dam are 350.60m and 19.59m respectivel.y .The gross storage capacity at F.R.L is 1.92 Mm^3.It's Khariff ayacut is 937 ha and Rabi ayacut is 303 ha.The catchment area is 18.43 km^2 .There is a flush type spillway with a discharge capacity of 176 m^3/sec .

The dam safety deficiencies are : There is a slope failure on the upstream slope at RD 269 m.There is heavy leakage in body wall of waste weir.The Energy dissipation device is not sufficient.Slushy condition is found on downstream side from RD 150 m to 250 m.

KHAJURIA DAM

Khajuria dam is located at Latitude 20°-18' 45" N and Longitude 85°-25' 45" E across Khajuria nallah near village Khajuria in Telkoi Tahasil of Keonjhar district. The nallah lies in Samakoi subbasin of Brahmani basin. It is a homogeneous earth fill dam of length 670.10m. Maximum height of the dam above deepest foundation level is 17.65m. Surplus escape in the form of ground bar is located on the right saddle. A well type H.R. has been provided on the left flank of earth dam at R.D. 137.20m having design discharge of 0.51 m^3/sec to irrigate 323.8 ha. in Khariff and 81.00 ha. in Rabi. Catchment area intercepted at the dam site is 7.70 km^2 .The design flood has been worked out using Dicken's empirical formula which comes to 90.30 m^3/sec.

The dam safety problems are :Heavy seepage at two locations. Rock toe has been chocked.

KHANDIJHARAN DAM

This is a homogeneous earth fill dam constructed in the year 1985 across river Khandijharan in Mahanadi Basin and located at Latitude 20^0-46' N and Longitude 82^0-53' E near village Saleipalli in the district of Bargarh. Length and height of dam are 1310m and 14.87m respectively. Gross storage capacity at FRL is 2.038 Mm^3. Khariff ayacut is 558 ha and Rabi Ayacut is 205 ha. Catchment area is 16.04 km^2. The spillway is ungated one with a discharge capacity of 210.6 m^3/sec.

The problems with the dam are : Wet patches found at RD 615m. Toe drain and outfall drains do not exist. Longitudinal cracks of width 20mm is observed on the crest . Profuse leakage on the left and right HR. Right H/R well is in unsafe condition with settlement of surrounding filling soil.

KHASBAHAL DAM

Khasbahal dam is located at Latitude 20^o12'0"N and Longitude 82^o49'30E constructed across Artatrana nalla a tributary of river Sumdan in Tel sub basin of Mahanadi basin near village Chacherabhata in Khariar Tahasil of Nuapada

District. The dam was completed in 1986. The Project consists of 765 m long homogeneous earth fill dam and a flush escape of 75 m length. There are two Head Regulators at RD 263 m and 706 m having total discharge capacity of 0.67 m^3/sec has been provided to irrigate 172.064 ha in Kharif and 60.728 ha in Rabi. The catchment area intercepted at dam site is 7.776 km^2. The spillway design flood has been computed to be 129.09 m^3/sec, Maximum height of dam from deepest nallah bed level is 11.56 m and gross storage capacity is 0.778 Mm^3 .

The dam safety deficiencies are : The toe drain has been covered by debries. Concavity at the u/s slope.

KODABAHAL DAM

This is a homogeneous earth fill dam constructed across a tributary of river Tel in Mahanadi Basin, located at Latitude 19^0-59'30" N and Longitude 82^0-56'-10" E near village Padampur (90 km from Bhawanipatna) in the district of Kalahandi. The dam was completed in the year 1982. Length and height of dam are 210.3m and 21.52m respectively. Gross storage capacity at FRL is 0.90 Mm^3. Catchment area is 6.99 km^2. The spillway capacity is 58.32 m^3/sec. The Khariff Ayacut is 165 ha and Rabi Ayacut is 101 ha.

The problems with the dam are : Dam section has been reduced due to rain cuts.

KODIGAM DAM

Kodigam dam is located at Latitude 18^o42'30"N and Longitude 82^o49'00"E constructed across Godagoda nalla a tributary of river Kolab in Godavari basin near village Kodigam in Potangi tahasil of Koraput District The dam was completed in 1969. The Project consists of 427 m long homogeneous earth fill dam including an ogee crested surplus escape of length 42.70 m at the left flank. The dam has been constructed to provide irrigation to 440.54 ha in Kharif and 117 ha in Rabi.The Catchment area intercepted at dam site is 22 km^2. The spillway design flood has been computed to be 197 m^3/sec, Maximum height of dam from deepest nallah bed level is 17.68 m and gross storage capacity is 2.72 Mm^3 .

The dam safety deficiencies are : Heavy seepage in d/s toe of earth dam. Down stream slope has settled .Piping in the junction of earth dam and abutment of surplus escape. The spillway is damaged condition.

KOSKA DAM

The dam is located near village Kusumara under Khandapara block at Latitude 20^0-19'-00" N and Longitude 85^0-01'-00" E across Bandhapathar nallah which is a tributary of Kuanria. The project comprises of a homogeneous earth fill dam of 823m length and with an ungated ogee type surplus of 76.20m length in the left flank to provide irrigation to 971.66 ha in Khariff and 242.91 ha in Rabi. There

are two Head Regulators, one on left and the other on right and a feeder channel to Diversion Weir off taking on left main canal. Thus this is an integrated scheme of a reservoir and a Diversion Weir. Construction of the project commenced in the year 1971 and completed in 1978. The catchment intercepted at the dam site is 30.70 km^2.The inflow design flood of 255.60 m^3/sec has been considered for the project with Dicken's empirical formula.

The dam safety problems are : The dam has become under-section. The grade wall in spill channel has been damaged.

KUKURPETA DAM

Kukurpeta dam is located at Latitude 20°02'10"N and Longitude 84°33'50"E constructed across KukurpetaNalla, a tributary to river Tikira in Brahmani Basin. The project is situated near the village Kasidiha, 35 km off Angul on way to Chhendipada. The dam intercepts a catchment area of 14.89 km^2 .The gross storage capacity is 1.37 Mm^3 . It irrigates 587 ha in Khariff and 121 ha in Rabi. The earth dam with impervious core is of length 1219.20m inclusive of a surplus escape of length 91.44m on left flank. A head regulator is located on right side with design capacity of 0.871 m^3 . The design flood inflow of the dam is 147.16 m^3/sec .

The dam safety problems are :The surface of d/s slope has been eroded. There is progressive erosion in the spill channel due to damage to the second grade wall.

KUMBHO DAM

Kumbho dam is located at Latitude 20°-18' 45" N and Longitude 85°-25' 45" E across Kumbho nalla, a tributary of Dharkata nala which is a tributary of Kankan nalla. Kankan nalla falls into river Mahanadi near village Chikili in Bargarh district . Kumbho nala originates from Sarasidamaka Budharaja reserve forest and flows in north-westerly direction to meet Dharkata nala. The overall length of dam is 158.50m out of which earth dam length is 128.02m, length of ungated ogee spillway is 9.14m and length of flush spillway is 21.34m..There is a divide wall of 130m long between both the spillways. The dam intercepts a catchment area of 27.18 km^2 .The design flood was calculated by applying Dicken's empirical formula which is 231 m^3/sec.

The dam safety problems are :Cavities formed over 2nd berm at RD 100-108 m. D/s slope near right head regulator appreciably depressed. A big cavity in divide wall at 1.8 m above cistern level. Foundation of right wingwall of surplus escape is exposed. The apron of ogee spillway scoured.

KUREIJODI DAM

Kureijodi dam is located at Latitude 21°24' 30"N and Longitude 85°43'30"E constructed across Kureijodi nalla of Musal sub basin of Baitarani basin near village Manapur in Harichandanpur block of Keonjhar District. It. The dam was completed in 1995 The Project consists of 1463.04 m long homogeneous earth

fill dam and a ogee spillway of 60.96 m length in the left flank. There is one Head Regulators having discharge capacity of 0.872 m^3/sec to irrigate 485 ha in Kharif. The Catchment area intercepted at dam site is 17.61 km^2. The spillway design flood has been computed to be 166.93 m^3/sec, Maximum height of dam from deepest nallah bed level is 15.07 m and gross storage capacity is 1.935 Mm^3 .

The dam safety deficiencies are : Longitudinal and vertical cracks on the embankment. The rock toe has been chocked.

KUSUNPUR DAM

This is a homogeneous earth dam constructed in the year 1982 across river Gandhanadi nalla, a tributary of river Badagenguti river in Brahmani Basin and located at Latitude 20^0-33'-20" N and Longitude 85^0-48'-20" E near village Tangi of Cuttack district. Length and height of the dam are 890m and 12.45m respectively. Gross storage capacity at FRL is 2.26 Mm^3. The Khariff ayacut is 559 ha and Rabi Ayacut is 242 ha. Catchment area is 38.85 km^2. The spillway discharge capacity is 303 m^3/sec.

The problems with the dam are : The dam section is reduced due to severe rain cuts.

LAIGAM DAM

This is an earth dam completed in 1971 across Gouduni Nallah in Mahanadi Basin and located at Latitude 20^0-41'-0''N and Longitude 84^0-21"-0''E near village Laigaon, in the Harabhanga block in Baudh district. The length and height of the dam are 580m and 17.37m respectively. Gross storage capacity at FRL is 1.245 Mm^3. It's CCA is 1030 ha. Catchment area is 40 km^2. The ogee shaped ungated spillway has a discharge capacity of 345.26 m^3/sec .

The dam safety deficiencies are : Surface drainage arrangement has not been provided. Retrogression is noticed in the spill channel. Grade wall/Fall to be provided.

LANKAGADA DAM

This is a homogeneous earth fill dam constructed in the year 1975 across Lankagada nalla (Bhusanda Nalla) a tributary of Badanadi in Rushikulya Basin and located near village gungapalli (35 km from Bhanjanagar) in District Ganjam. The length and height of dam are 950.95m and 18.29m respectively. Gross storage capacity at FRL is 1.47 Mm^3. Khariff ayacut is 728.28 ha and Rabi Ayacut is 238.27 ha. The catchment area is 10.49 km^2. The spillway is an ungated one with discharge capacity 113.27 m^3/sec.

The problems with the dam are : There is appreciable seepage in the junction of spillway and dam embankment. There is retrogression in the tail channel.

LAKHAPARBAT DAM

This is a homogeneous earth fill dam constructed in the year 1991 across a tributary of Mehuruni river in Mahanadi Basin and located at Latitude 20^0-38'-30" N and Longitude 83^0-49'-15" E near village Lakhaparbat in the district of Boudh. The length and height of the dam are 1495m and 11.74m respectively. Gross storage capacity at FRL is 0.95 Mm^3. Khariff ayacut is 187 Ha and Rabi Ayacut is 48.80 ha. Catchment area is 8.67 km^2. The spillway is ungated with discharge capacity 129 m^3/sec.

The problems with the dam are : D/s slope is under section. Toe drain and outfall drains are not provided. There are cracks in the grade walls of surplus channel.

LAUPAL DAM

This is a homogeneous earth dam constructed in the year 1970 across Laupal nalla of Mahanadi Basin and located at Latitude 20^0-47' N and Longitude 84^0-27' E near village Laupal of district Angul. The length and height of dam are 1127.76 m and 13.6 m respectively. The gross storage capacity at FRL is 2.88 M m^3. Khariff ayacut is 413.18 ha and Rabi Ayacut is 121.00 ha. Catchment area is 10.36 km^2. The spillway is ungated one with a discharge capacity of 111.93 m^3/sec.

The problems with the dam are : There are cracks in the ogee face. There is retrogression in spill channel. The third grade wall and left side retaining wall of spill channel are damaged.

LAXMIPUR DAM

Laxmipur dam is located at Latitude 19^o17'30"N and Longitude 83^o56'30"E constructed across Laxmipur nalla a tributary of Sahnadi of Nagavali basin near village Nisar of Koraput District. The dam was completed in 1982. The Project consists of 349 m long homogeneous earth fill dam including an ogee shaped un-gated surplus escape of length 46 m at the left flank. One head regulator at RD 190 m of discharge capacity 0.34 m^3/sec has been provided to irrigate280 ha in Kharif and 46 ha in Rabi. The Catchment area intercepted at dam site is 8.32 km^2. The spillway design flood has been computed to be 96 m^3/sec, Maximum height of dam from deepest nallah bed level is 19m and gross storage capacity is 0.55 Mm^3

The dam safety problems are: At the right flank the d/s slope has been badly damaged. Cosiderable seepage from the dam .

LIARD DAM

Liard minor Irrigation Project is a reservoir scheme constructed across a tributary of river Udang in Mahanadi Basin. The project is located at Latitude 20^o07'15"N and Longitude 82^o47'48" E near village Liard in Sinapally block of Nuapara district, 35 km away from town Khariar. The Project comprises of an earth dam of height 16.66m, a spillway of length 57.912m and a Head Regulator of 0.275 m^3 capacity to cater the irrigation requirements of 202.00 ha in Khariff and

121.00 ha in Rabi with an impounding capacity of 1.387 M. m^3 at FRL. The dam intercepts a catchment area of 11.65 km^2 and spillway has been designed for a flood discharge of 157.52 m^3/sec. The Head Regulator is located at RD 412.00m ; the canal taking off from the Head Regulator crosses the spill channel at RD 90.00m through a underground conduit of 0.90m diameter hume pipe beneath the apron of the second fall.

The major dam safety problems are : The dam crest width has been reduced by 0.6 m. The spill channel has been eroded.

MAGARANALLA DAM

Magaranalla dam is located at Latitude 21^0-01'-15" N and Longitude 820-52'-30" constructed across Magaranalla, tributary to river Ong in Mahanadi Basin. The dam site is 4 km away from the village Musapalli, 32 km away from Padampur town of Bargarh district. The dam intercepts a catchment area of 12.43 km^2 thereby creating a reservoir of gross storage capacity of 1.472 M m^3 at FRL 303.40m to meet the irrigation requirement of 462 ha in Khariff and 162 ha in Rabi seasons. The dam is a homogeneous earth fill dam with maximum height of 16.80m. The spillway is ungated ogee type with crest length of 33.55m and crest level of 304.90m. One head regulator on left at RD 225m and one head regulator on right at RD 705m are located on the body of the dam. The inflow design flood discharge of the spillway is 128.37 m^3/sec.

The dam safety problems are : Profuse leakage through the foundation which appears at 240 m d/s of river bed. The end sill of spillway basin has been damaged. Heavy retrogression in spill channel.

MAHARANI SAGAR DAM

This is a homogeneous earth fill dam constructed in the year 1981 across Maharani Nalla, directly discharging to chilika lake and located at Latitude 19^0-32'-20"N and Longitude 85^0-2'-30" E near village Kharini Pada in the district of Ganjam. The length and height of the dam are 780 m and 9.25 m respectively. Gross storage capacity at FRL is 0.85 Mcum. Khariff ayacut is 121.50 ha and Rabi Ayacut is 40.50 ha. Catchment area is 5.44 km^2 . The spillway is ungated flush type having a discharge capacity 69.45 m^3/sec.

The dam safety deficiencies are: There is no toe drain & outfall drain. Surface drainage arrangement has not been provided. The drop wall in the spill channel has been damaged which caused scouring.

MAHISANALA DAM

Mahisanalla dam is located at Latitude 20^o15'10"N and Longitude 84^o49'40"E constructed across Mahisanalla in Mahanadi basin near village Sukeni of Daspalla Tahasil of Nayagarh District. The dam was completed in 1975. The Project consists of 914.63 m long homogeneous earth fill dam including an ogee shaped un-gated surplus escape of length 91.46 m at the left flank. One head regulator at RD 260 m of discharge capacity 0.37 m^3/sec has been provided to

irrigate 665 ha in Kharif and 202 ha in Rabi. The Catchment area intercepted at dam site is 24.70 km^2. The spillway design flood has been computed to be 214.60 m^3/sec. Maximum height of dam from deepest nallah bed level is 12.19 m and gross storage capacity is 2.54 Mm^3

The dam safety deficiencies are : Depressions on the u/s slope of the dam. Rock toe has been chocked. Heavy seepage through the dam.

MALKANGIRI DAM

Malkangiri dam is located at Latitude 19°55'N and Longitude 82°50'E constructed across a local nallah of Indravati sub basin of Godavari Basin near Malkangiri village in Koraput Tahasil. The dam was completed in 1981. The Project consists of 122.5 m long homogeneous earth fill dam including an ogee shaped un-gated surplus escape of length 16 m at the left flank. One head regulator at 17 m from right end of dam of discharge capacity 0.17 m^3/sec has been provided. The Catchment area intercepted at dam site is 1.25 km^2. The spillway design flood has been computed to be 46.80 m^3/sec. Maximum height of dam from deepest nallah bed level is 17.35 m and gross storage capacity is 0.296 Mm^3.

The dam safety deficiencies are: Seepag of water at the junction between earth dam and spillway.

MASINANALLA DAM

Masinanalla dam is located at Latitude 22^0-13'-00"N and Longitude 83^0-37'-30" E constructed across Masinanalla of IB sub-basin of Manahadi Basin. The nearest village is Birkaldihi of Balisankara Tahasil in Sundargarh district of Orissa. The project consists of 817m long homogeneous earth fill dam with a central ungated ogee spillway of length 39.62m. The total length of dam is 896m including spillway. The maximum height of earth dam is 15.15m above lowest river bed level. The catchment area intercepted at dam site is 15.53 km^2. Spillway capacity of 152 m^3/sec has been calculated based on Dicken's formula. The project irrigates 486 ha during Khariff and 81 ha during Rabi.
The dam safety problems are :The rock toe has been chocked. Seepage through d/s face of ogee spillway. The ogee fall below the spillway has been outflanked.

MATHANPALLA DAM

Mathanpalla Minor Irrigation Project is a reservoir project constructed across Konda Nalla, a tributary to river Tel in Mahanadi Basin. The Project is situated near village Mathanpalla in Titlagarh Tahasil of Bolangir district. The dam site is 15 km away from Titlagarh. The dam intercepts a catchment area of 49.25 km^2 .The reservoir capacity is 5.134 M m^3. The ayacut area of the project is 1274 ha in Khariff and 405 ha in Rabi Season. The dam is a homogeneous earth dam of length 1453.90m with rock toe and vertical sand chimney. The height of the dam is 15.24 m. The spillway length at crest level is 250.00 ft. (76.2m) and a head regulator is located at RD 180.00m on right. The dam was completed in 1978.

The major dam safety problems are Uneven settlement of crest. Rock toe has been chocked. Bubbling noticed at dam toe.

NAREIJANI DAM

This is a homogeneous earth fill dam,near village Kusapal the district of Cuttack . The length of the dam is 588.26m. The spillway is an ungated ogee type surplus escape having a discharge capacity 142.35 m^3/sec.

The dam safety deficiencies are : The toe drain is silted.,surface drainage arrangement has not been provided. Turfing is damaged .

PADAMPUR NALLA DAM

Padampur nalla dam is located at Latitude 21^0-02'10" N and Longitude 82^0-59'35" E This is a homogeneous earth fill dam constructed in the year 1978 across Padampur nalla of Mahanadi Basin and near village Salahar of District Bargarh. The length and height of dam are 1828.80m and 14.17m respectively. The gross storage capacity at FRL is 4.872 M m^3. Khariff ayacut is 1619 ha and Rabi Ayacut is 283 ha. Catchment area is 38.85 km^2. The ungated spillway has a discharge capacity of 303.00 m^3/sec .

The dam safety deficiencies with the dam are : There is depression of embankment on the u/s slope at the junction of spillway. Retrogression of spill channel has started. There is heavy leakage through the abutment walls.

PAITAGAON DAM

Paitagaon Minor Irrigation Project is a reservoir scheme across Paitagaon nallah in Mahanadi basin located near Gudaragaon village in Chakapada Block of Kandhamal district at Latitude of 20^o 14' 30"N and Longitude of 84^o 29' 15" E. It irrigates an ayacut of 560 ha in Khariff and 311 ha in Rabi. Construction of the Project commenced in 1982 and completed in 1989. The dam intercepts a catchment area of 22 km^2 .It is a homogeneous earth fill dam of 517 m length and 51 m long Ogee type ungated masonry spillway. There is one Head Regulator at RD 260m having design discharge of 0.83 m^3/sec. The canal crosses the spill channel below the apron of 1^{st} fall through hume pipe. Three falls have been provided in the spill channel to negotiate the difference in level of 13.3m. The design flood of 282 m^3/sec has been estimated by using Dicken's formula. The height of the dam from deepest foundation level being 22.7m.

The dam safety problems are : There is no toe drain or outfall drain. The hydrology needs review.

PANASKHAL DAM

This is a homogeneous earth fill dam constructed in the year 1982 across stream Panaskhal near village Nuagaon in the district of Nayagarh & located at Latitude-$20^0$5'N, Longitude $85^0$54'E. The length and height of the dam are 915m and 14.32 m respectively. Gross storage capacity at FRL is 1.13 M m^3. Khariff

ayacut is 182.20 ha and Rabi Ayacut is 121.50 ha. Catchment area is 6.5 km^2 . The spillway is an ungated one having a discharge capacity 78.80 m^3/sec.

The dam safety deficiencies are : The d/s toe drain & rock toe have been chocked .Wearing coat of spillway is damaged in patches.Spill channel grade walls & stone pitching is disturbed. Crest width is not uniform.

PANASPAL DAM

Panaspal Dam is constructed across a hilly stream locally known as "Panaspal Nallah" near village Baunsapokhari in Hindol Tahasil of Dhenkanal District. The original dam of low height constructed much earlier was breached between RD 1900 ft. to RD 2100 ft. on 26.07.1959 due to flood which was then under the control of Revenue Department. The project was transferred to the Rural Engineering Organisation in the year 1965. Improvement to the Dam was taken up during 1966 by closing the breach raising and strengthening of dam. Improvement to the spillway was also taken up and the modification of the project was completed during the year 1968. The dam provides irrigation to 487.8 ha of Khariff and 219.5 ha of Rabi crop. Total length of earth dam is 914.00m including surplus escape length of 39.62m. The height of dam from the deepest bed level is 17.5m. The surplus escape of length 39.62m is a broad crested weir of top width 1.83m provided in the middle of earth dam. It is made up of R.R. stone masonry with concrete lining. It is provided with 13 nos. of automatic falling shutters of 0.91m height over the broad crested weir. There is one head regulator provided at RD 91m of right earth dam. The designed discharge of the H/R is 0.515 m^3/sec. The flood discharge of 142.36 m^3 /sec has been arrived using Dicken's formula with "C" value of 1400 in FPS unit. Storage capacity of reservoir at FRL is 1.493 M m^3 .

The major dam safety problems are : Crest profile is undulated. The vertical cracks on right abutment of surplus escape and leakage through weepholes. The rock toe has been silted up.

PARHEL DAM

Parhel dam is located at Latitude 22^0-13'-00"N and Longitude 83^0-37'-30" E constructed across Parahel nalah in Mahanadi basin situated near village Parahel in Kantamal block of Boudh district. The project construction was started in 1986 and completed in 1988. The project site is about 20 km from Kantamal. Parahel dam is a homogenous earth fill dam having a length of 482.50m and a maximum height of 15.40m.The length of original un-gated Ogee type surplus escape is 47.50m. There is one head regulator at RD 170.00m of the dam provided with one row of hume pipe of 1.00m diameter with a design discharging capacity of 0.2745 m^3/sec. The catchment area at dam site is 8.30 km^2. The spillway has been designed for maximum discharge of 132.44 m^3/sec.The live and dead storage capacity of the reservoir are 0.77 and 0.21 M m^3 respectively.

The dam safety problems are : Rock toe has been chocked. No toe drains. Earth behind the retaining wall of 2^{nd} ogee fall has been washed out. Rain cut and erosion channels at down stream slope.

PAUNSIANALLAH DAM

This is a homogeneous earth fill dam constructed in the year 1981 across stream Paunsianalla near village Jhumpoda the district of Mayurbhanj & located at Latitude-21^{0}—45'N,Longitude-86^{0}-35'-30" .The length and height of the dam are 960.12m and 12.53 m respectively. Gross storage capacity at FRL is 1.59 M m^{3} .Khariff ayacut is 607.07 ha and Rabi Ayacut is 202.42 ha. Catchment area is 5.6 km^{2} . The spillway is Ungated having a discharge capacity 138.05 m^{3}/sec.

The dam safety deficiencies are : The rock toe is damaged . Surface drainage arrangement has not been provided. Outlet gate is damaged .Leakage noticed through body wall & surplus escape. Longitudinal crack on the dam crest is noticed.

PENDRAWAN DAM

Pendrawan dam is located at Latitude 20^{o}27'10"N and Longitude 82^{o}42'20"E constructed at a distance of about 3 kms from Pendrawan village in Komna block of Nuapada District. The dam has been constructed over Katparo Nalla a tributary of Sundar Nalla which is a tributary of Tel river in Mahanadi Basin. Construction of the Pendrawan Project was started during the year 1982 and completed in the year 1985. The dam is homogenous earth fill having a length of 443 m including the surplus escape. The height of dam from deepest bed level is 16.00m. The ungated spillway is located in the right side of the earth dam. The length of the spillway is 83.00m and is Ogee shaped with vertical upstream face. There is one head regulator at RD 10m in the body of the earth dam with discharging capacity of 1.64 m^{3}/sec. The catchment area of the project at dam site is 40.96 km^{2}. Maximum flood discharge has been calculated as 408 m^{3}/sec .

The major dam safety problems are : The dam section has reduced due to weathering. Concrete cover provided on the u/s face of the spillway has been eroded.

PIPALNALLA DAM

Pipalnalla M.I.P. is a reservoir scheme situated across Pipalnalla, a small tributary of Tel river in Mahanadi Basin near village Ranikata of Bhawanipatna block in Kahalandi district of Orissa. This is only 11 km. from Bhawanipatna. The dam was constructed during the year 1980. The fan shaped catchment area intercepted at Dam site is 25.90 km^{2}. The dam is located at latitude of 19^{0} – 52' – 0" N and Longitude of 83^{0} – 14' – 0" E. This homogenous earth fill dam with vertical chimney and horizontal filter has a length of 480m at its crest. The height of the dam is 21.03m. The ungated spillway has been designed for a discharge of 223.95 m^{3}/sec . The ogee crested spillway has a length of 42.68 m and flush type spillway has a length of 29 m. The project is intended to provide irrigation to 809.70 ha. during Kharif and 324.00 ha. during Rabi . The catchment area is 25.90 km^{2} is fan shaped.

The major dam safety problems are : Heavy leakage at Rd 409.45 m at toe. Leakage is also observed at junction of dam and right hill toe. No toe drain. The

crest, U/s and d/s slope has been settled. Appreciable leakage at junction of head regulator left wing wall and earth dam d/s slope.

POKHARIA DAM

This is a homogeneous earth fill dam constructed in the year 1987 across stream Pokharia nalla near village Pokharia in the district of Mayurbhanj & located at Latitude $22^0$28'30"N,Longitude$86^0$04'00".The length and height of the dam are 183m and 12.80 m respectively. Gross storage capacity at FRL is 1.805 M m^3. Khariff ayacut is 52.05 ha and Rabi Ayacut is 20 ha. Catchment area is 13.73 km^2 . The spillway is ungated ogee type surplus escape having a discharge capacity 138.47 m^3/sec.

The dam safety deficiencies are : There is no outfall drain .Toe drain is not in regular section. Surface drainage arrangement has not been provided. Longitudinal cracks , u/s slope concavities & rain cuts in the d/s noticed .There is seepage in d/s embankment

PRATAP PUR DAM

Pratap pur M.I.Project is a reservoir project situated near the village Pratappur in Lanjigarh Block of Kalahandi district and is 54 km away from Bhawanipatna, the district head-quarter at latitude 19^0-46'-20" N and longitude 80^0-24'-00" E. The dam is constructed across a tributary of river Vansadhara in the Vansadhara basin during the year 1983. The scheme consists of a homogenous earth filled dam of length 508m and a 55m long Ogee type surplus escape on the right side and one head regulator on the left side at RD 225.00m. The catchment is fan shaped of area of 10.25 km^2 at the dam site. The design flood is calculated by Dicken's formula & is found to be 112.35 m^3/sec.

The major dam safety problems are : Pool of water near toe at RD 350 m. The dam crest has settled at many places.Heavy damage to slopes due to rain cut. Rock toe has been clogged.

PUJILADU DAM

Pujiladu dam is constructed near village Pujiladu across Pujiladu Nallah a tributary of river Perancho which discharges to Mahanadi through Utei and Tel river of Madanpur-Rampur Block in Kalahandi district at a distance of 63 km from Bhawanipatna the district Head-quarters. The Dam was completed in 1983. The dam is a homogenous earth-fill dam having a length of 701.04 m. The spillway is an un-gated flush type one and has been provided in the right side of the dam from RD 0 m to RD 54.86 m .The maximum height of the dam is 21.04 m. There is one H/R with one vent at RD 518 m . The vent of Head Regulator is of 0.90 m. Maximum flood discharge of 71.59 m^3/sec has been calculated using Dicken's formula with value of C=1400 in F.P.S. unit. The catchment area is 6 km^2.

The major dam safety problems are : Boils observed at d/s toe when water is at FRL. Severe seepage at two portion near toe. The crest has settled at many places. The u/s and d/s slope has rain cuts. The head walls in the spill channel has been damaged. The head regulator gate is in bad shape.

RAGHUBEDA DAM

Raghubeda dam is located at Latitude 21º-28'-13" N and Longitude 85º-48'-21" E constructed across Raghubeda nalla near village Raghubeda in Ghatagaon Tahasil, Koenjhor district . The project work commenced in the year 1977 and was completed in 1982. The project envisages to provide irrigation to 242 ha in Khariff and 121 ha. in Rabi. This is a homogenous earth fill dam of length 710m with maximum height of 13.29m above deepest foundation. There exists one ogee type surplus escape of length 59.46m The dam joins two hillocks on either side of the nalla. There is one head regulator located on right side of nallah with design capacity of 0.34 m^3/sec and vent size of 0.60m x 0.650m. The catchment area intercepted at the dam site is 11.65 km^2. The design flood of 122.50 m^3/sec has been calculated using Dicken's formula.

The dam safety problems are : Heavy erosion in spill channel. The grade walls have been damaged. U/s rip rap disturbed at many places.Leakage in body wall of surplus escape.

RAIJHARAN DAM

This is a homogeneous earth fill dam constructed across river Ghurudia nalla in Brahmani Basin and located at Latitude 20^0-57'0" N and Longitude 84^0-58' E near village Raijharan in the district Angul. The dam was completed in the year 1994. Length and height of dam are 730.30m and 14.94m respectively. Gross storage capacity at FRL is 1.19 Mm^3. Catchment area is 11.65 km^2. The spillway capacity is 122.39 m^3/sec. Khariff Ayacut is 344 ha and Rabi Ayacut is 101 ha.

The problems with the dam are: There is appreciable seepage at RD 300m.

RAMAGUDA DAM

This is a homogeneous earth fill dam constructed in the year 1977 near village Banthapalli near Berhampur in the district of Ganjam & located at Latitude $19^0$18'N,Longitude 84^0-42'E.The length of the dam is 993.55m . Khariff ayacut is 243 ha.The catchment area is 3 km2.and gross storage capacity is 1.53 M m3.The length of the dam is 1006 m including spillway length of 36.58 m and maximum height is 15.24 m. The spillway having a discharge capacity 30.6 m^3/sec.

The dam safety deficiencies are: There are several rain cuts in u/s & d/s slope.Top width reduced at several sections.Pitching is disturbed. Retrogression in spill channel. The falls in spill channel have been damaged.

RANDA DAM

This is a homogeneous earth fill dam constructed in the year 1986 across stream Kusumi nalla near village Randa in the district of Nayagarh & located at Latitude-$19^0$55' N, Longitude $85^0$17'E. The length and height of the dam are 1098m and 16.70 m respectively. Gross storage capacity at FRL is 2.27 M m^3.

Khariff ayacut is 486 ha and Rabi Ayacut is 202 ha. Catchment area is 18.20 km^2 . The spillway is Ungated having a discharge capacity 170.35 m^3/sec.

The dam safety deficiencies are : No surface drain,toe drains provided. Leakage is observed at junction of earth dam and masonry abutment.. the 2nd fall foundation has been scored.

RISSIA DAM

The Rissia dam is located at Latitude 21°26'30" N and Longitude 86°35'15" in Balasore district.A 77.42m long Diversion Weir (D/W) was constructed across "Tangana Nalla" in 1964, a tributary of river Sone (Sunei) which itself is a tributary of river "Budhabalanga". The canal system comprised of the Rissia main canal, Dar Kholi Branch Canal & Jamuna Branch Canal taking off from the Darkholi Branch Canal, to irrigate an ayacut of 1214 ha. In order to stabilize the ayacut, a reservoir project was envisaged later at a distance of 2.5 km from the D/W in the upstream Direction with the construction of a 18.89 m high, 1203.96 m long earthen dam with an ungated surplus escape at the left abutment of Dam. The project was approved in 1980 and was completed in 1988. The reservoir project envisaged an ayacut (CCA)of 1822 ha. At the Dam site, the "Tangana Nalla" has a catchment area of 53.76 km^2. Maximum discharge from spillway was estimated as 554.90 m^3/sec

The dam safety problems are : Two pools have been formed in the d/s side. There is retrogression in spill channel.The head regulator gates are not operable.

RUNUGAON DAM

This is a homogeneous earth fill dam constructed in the year 1986 across Local Nalla near village Runugaon in the district of Sundargarh. The length and height of the dam are 947m and 14.40 m respectively. Gross storage capacity at FRL is 0.43 M m^3. Khariff ayacut is 277.50 ha and Rabi Ayacut is 310 ha. Catchment area is 5.6 km^2 . The spillway is ungated ogee type having a discharge capacity 70.75 m^3/sec.

The dam safety deficiencies are: There is leakage from right head regulator.In waste wear bar there is scouring on d/s side of the bar.Tail channel is scoured.There is no toe drain & Surface drainage arrangement .

SANASIALINAI DAM

Sanasiali Minor Irrigation Project is a reservoir scheme constructed across Sanasiali River, a tributary of river Gahira in Bhandan Sub-basin and Baitarani Basin, in Joshipur Block of Karanjia Tahsil in Mayurbhanj District at Latitude of 21^0-58'-50"N and Longitude 86^0-10'-20"E. It irrigates 400 ha. of Kharif and 40 ha. of Rabi crop. Construction of the project commenced in year 1972 and completed in year 1975. The dam intercepts a catchment area of 9.06 km^2. It is a homognous earth fill dam of 16.77m high and 587m long having a spillway 47.72m length, located in left flank. The spillway is a un-gated Ogee type stone

masonry with horizontal stilling basin. There is one Head Regulator of Vent size 1.5mx0.6m (Masonry walls with RCC top slab). The design discharge is 0.63 m^3/sec. The catchment area is 9.06 km^2. which is full of forest growth. The design flood discharge has been estimated as 101.43 m^3/sec using Dicken's formula .

The dam safety problems are : Longitudinal cracks on dam top. Subsidence of 1m dia in the u/s slope in the dam portion between hillock and spillway.

SANKUNDESWAR DAM

Sankundeswar dam constructed near village Nua-Burda of Jamankira Block in Sambalpur district at a distance of 40 km from Sambalpur, the district Head Quarters. The construction of the dam was started in the year 1979 and completed in 1983 across Sealjore Nalla of Harad Nadi sub basin of Mahanadi basin. The dam is homogenous earth fill dam having a length of 280.42m. The height of dam at the deepest river bed level is 15.466m. The top width of dam is 3.66m without provision of parapet The ungated ogee shaped surplus escape of length 30.48 m has been provided at the right side of dam between a hillock and the earth dam. There is one head regulator constructed at RD 231.65m of earth dam on the left side for a discharge of 0.67 m^3/sec. The shape of the catchment is fern shaped having catchment area of 11.17 km^2 and design flood of 120.23 m^3/sec.

The dam safety problems are : The rock toe has been chocked. The left bank of spill channel has been eroded at 50m from the structure.

SANMACHHAKANDANA DAM

Sanamachhakandana dam is located at Latitude 21^0-31'N and Longitude 85^0-34'E which is a multi-purpose project for Irrigation, Drinking Water Supply, Power Generation, Pisci-culture and Recreation. A dam has been constructed across Sanmachhakandana nallah, a tributary of Ardei in Baitarani basin. The Dam site is about 11 km from Keonjhar town, near village Dingapani / Anjar of Keonjhar block. The project was completed in the year 1978. It is a homogeneous rolled fill earth dam with over all length of 973m including ungated ogee surplus escape of 122m on left flank. From the project, 3 cusec to Keonjhar town for drinking purpose through an intake well at the downstream of head regulator by gravity flow. One Mini Hydel Plant (2 x 20 KW) was constructed in the year 1986 and is in operation since 1987, which generates 0.2 million unit of electricity between July to March. Water to the Hydel station taken through a masonry trough into the forebay from where it moves through the penstock to the turbine for generating power and finally released to the parent nallah. This is picked up for irrigation by the Diversion weir located 7.00 km downstream of dam near village Bhalidihi. Catchment area intercepted at dam site is 25.60 km^2.Spillway design flood was calculated using Dicken's formula which works out to 226.50 m^3/sec. The height of the dam from deepest foundation level is 17.61m. The Gross storage capacity 3.850 M m^3.

The dam safety problems are : U/s rip rap partially damaged. Rock toe covered with earth from d/s slope eroson. No toe drain. Body wall of spillway and stilling basin damaged. Leakage through body wall of head regulator barrel.

SAPUA DAM

Sapua dam is located at Latitude 21º-20'-30" N and Longitude 85º -37'-30" E constructed across Sapua nalla, in Samakoi sub-basin of Brahmani river basin near village Baliposi of Ghatagaon Tahasil in Keonjhar district. The construction of the project was commenced during 1990 and completed in 1993. The project was envisaged to provide irrigation to 587 ha. in Kharif and 283 ha. in Rabi seasons. The Project consists of 615m long earth fill dam with ogee shaped un-gated surplus escape of 45.72m length on the right flank. The main head regulator is on the left side at RD 53m of dam with design discharge of 1.047 m^3/sec. On demand of the local public one irrigation outlet of 0.028 m^3/sec capacity has been provided from the body wall of the surplus escape itself and through the left abutment wall through a H.P. conduit to irrigate a high patch of land close to right abutment of the earth dam. Catchment area intercepted at dam site is 18.13 km^2. The spillway design flood has been computed to be 243.0 m^3/sec. Maximum height of dam from deepest foundation level is 17.33m and gross storage capacity is 1.28 Mm^3.

The dam safety problems are : The toe drain and out fall drains have been silted up. Shallow erosion of the d/s slope.

SARAPA DAM

This is a homogeneous earth fill dam constructed across river Sarapa located at Latitude 20^0-44'33" N and Longitude 85^0-21'30" E near village Badalo in the district of Dhenkanal. The dam was completed in the year 1981. The length and height of dam are 1070 m and 15.00m respectively. The gross storage capacity at FRL is 2.18 Mm^3. Khariff ayacut is 803 ha and Rabi Ayacut is 172.80 ha. Catchment area is 31.08 km^2. The spillway discharge capacity is of 257.69 m^3/sec.

The problems with the dam are : Toe drain is not continuous. Wet patches are found near toe. Leakage observed through ogee. Standing pool of water at RD 375m.

SUHAGI DAM

Suhagi is a homogeneous compacted earth fill dam constructed across Suhagi nalla near village Sisupathar of Narasinghpur Tahasil in Cuttack district at Latitude 20°33'20" N, Longitude 84°58'0" E for providing irrigation to 2000 ha. in Khariff and 600 ha in Rabi. Construction of the Project commenced during 1982 and first reservoir impounding was done during 1986. The length of earth dam is 2119m. The dam is 23.16 m high above the deepest foundation. There exists an ogee crested ungated spillway of 152.40m length on right flank. There are two head regulators one on left and the other on right. The right canal which off takes from H.R. at RD 1950 m of the earth dam crosses to right side close to 3^{rd} fall in the spill channel to command an ayacut of 1180 ha. on right side.

Catchment area intercepted by the project is 94.70 km^2. Design flood of 764 m^3/sec has been considered using Dicken's formula .

SUNAGHAI DAM

This is a homogeneous earth fill dam constructed in the year 1999 across Gadachandi Nalla in Baitarani Basin and located at Latitude 20^0-12'-30"N and Longitude 86^0-16'-00" E near village Saralaposi in the district of Keonjhar. The length and height of the dam are 610 m and 11.52 m respectively. Gross storage capacity at FRL is 0.55 M m^3. Khariff ayacut is 242.76 ha and Rabi ayacut is 161.84 ha. Catchment area is 7.3812 km^2 . The spillway is ungated ogee type having a discharge capacity 87 m^3/sec.

The dam safety deficiencies are : There are no toe drain & outfall drain. Surface drainage arrangement has not been provided. Retrogression is noticed in the spill channel.

TALKHOL DAM

Talkhol dam is located at Latitude 21º-12'-00" N and Longitude 83º-15'-20" E constructed across Sanjora nalla, one of the tributaries of Ghensalli jore which is a tributary of river Ong in Mahanadi basin, near village Badmal in Sohella Block of Bargarh district. The catchment area intercepted at dam site is 16.8 km^2. Total length of the earth dam is 573m out of which 70.08m is on the left side of surplus escape and the balance length of 448.06m is on the right side. The dam height from deepest foundation level is 19.75m. The design flood of 157.13 m^3/sec.

The dam safety problems are : number of holes and cracks on body wall of surplus escape and both the abutments. Profuse leakage at joint of abutment and body wall. U/s apron and cut off for surplus escape not constructed. Retrogression in spill channel. Falls at RD 180 m and 244 m have collapsed.

TANGARAKANA DAM

This is a homogeneous earth dam constructed in the year 1978 across a local nala of Bansadhara basin and located at Latitude 19^0-43'-50" N and Longitude 82^0-22'-30" E near village Tangankana of Langigada block of Kalahandi district.. The length and height of the dam are 570 m. and 21.74m respectively. Gross storage capacity at FRL is 0.82 M m^3. Khariff ayacut is 386 ha and Rabi ayacut is 81 ha. Catchment area is 15.6 km^2. The spillway is ogee type ungated with a discharge capacity 152 m^3/sec .

The dam safety deficiencies are : There is no surface drainage arrangement on downstream slope.

TENAR DAM

Tenar dam is located at Latitude 21^0 20'00" N and Longitude 85^0 30'00" E near village Khuntapara in Telkoi Block of Keonjhar district. Project site is 6 km. from Telkoi Block. Construction of Project commenced in 1973 and was completed in the year 1979-80 to provide irrigation to 1012 ha. in Khriff and 202 ha. in Rabi. It comprises of a homogeneous rolled fill embankment dam of 868.68m length, an ungated ogee spillway of 76.2m length on the right flank and one H.R. having design discharge of 1.41 m^3/sec. Catchment area intercepted at Dam site is 35.22 km^2 and is hilly one. The spillway design flood has been worked out to be 282.22 m^3/sec.

The dam safety problems are : Concavity on the u/s slope and bulging on the d/s slope. Crest joining the d/s slope has settled near the Head Regulator. The toe drain has been silted up and there is no outfall drain.

TIKARAPADA DAM

This is a homogeneous earth fill dam constructed in the year 1984 across a tributary of Patama nalla of Mahanadi Basin and located at Latitude 19^0-52'N and Longitude 83^0-7'-50" E near village Tikarpara of Kalahandi district. The length and height of the dam are 325m and 15.20m respectively. Gross storage capacity at FRL is 0.748 M m^3. Khariff ayacut is 142 ha and Rabi ayacut is 109 ha. Catchment Area is 5.83 km^2. The spillway is Flush type escape with discharge capacity of 72.8 m^3/sec .

The dam safety deficiencies are : There is no toe drain, out fall drain & Surface drainage arrangement. Slushy condition is found on downstream side from RD 50 m to RD 100 m.There is progressive retrogression in the spill chanel .

TIKILIPADA DAM

Tikilipada dam is located at Latitude 21^o30'43"N and 85^o26'15"E constructed across Talubnalla in Mahanadi Basin near village Tilikipada in Jamankira block of Sambalpur district. The dam site is 60 km away from Sambalpur on 5 km diversion to right from National Highway to Deogarh.the dam was completed in the year 1981. The dam intercepts a catchment area of 9.04 km^2 .The gross storage of the dam is 1.545 M m3. It irrigates 364.00 ha in Khariff and 142.00 ha in Rabi season. The dam is a homogeneous type earth dam of 280.42 m length with a sand chimney and horizontal composite filter and rock toe. The spillway is a flush type escape located on extreme left on rocky ground having length of 25.90 m. No body wall and energy dissipation arrangement has been made with the surplus escape. The Head Regulator is located at RD 213.00m with a capacity of 0.57 m^3. The maximum height of the dam is 18.75 m. The design flood of the dam is 101.38 m^3/sec.

The major dam safety problems are : The dam crest has settle at many places. The u/s and d/s slope is not in good shape due to rain cuts.

Note: The status and deficiencies stated/reported are based on the field inspection reports.