Sub: Safety of Head Works - Conducting Regular inspections and Reporting procedure

Ensuring the safety of all the type of irrigation head works is a vital responsibility of Irrigation Department. The head works of all the schemes (Storage, Diversion, Lift Irrigation, SWE & Drainage Schemes) should be inspected by the field officers regularly to detect undesired developments in those structures. Taking care of dams and appurtenant structures, whether it is a small dam or a large dam is specially emphasized always to prevent or mitigate any hazardous event to ensure safety of lives and properties in downstream of the reservoirs.

This circular guides on regular inspection of head works by responsible officers, recording the status and reporting to head office, emphasizing the importance of each activity. Dam safety circular 15/98 dated 10\textsuperscript{th} July 1998 is superseded with this circular and all the relevant officers are advised to adhere to the instructions given below with regards to safety of head works.

1.0 General

At present Irrigation Department is responsible for operation and maintenance of 336 Gravity Schemes. Out of above, 232 are reservoir schemes of which 82 schemes are formed by large dams. It is necessary to carryout inspection of these head works by the responsible officers periodically as stipulated in section 3 and report as guided in section 4 this circular.

When allocating the annual funds for improvements to head works for additional safety, continuous records on defects of dams are always referred by the Dam Safety Division for fixing the priority. Furthermore, records on regular inspection will provide facts for progressive development of defects in head works which would be useful for the dam safety experts to conclude the causes of defects and frame the remedial proposals.

As an emergency response to a sudden safety issue faced, it is needed to deviate from this regular process to identify problem after inspection and report to Dam Safety Division immediately. It will make easy to coordinate with specialized Branches for their advice and allocate the funds to carryout remedial measures without delay.
According to the Irrigation Ordinance, Irrigation Department is responsible to ensure safety of minor schemes too, even if those are not under purview of the department, if those are threat to the safety of a Major/Medium scheme, during hazardous event. Hence DII and DIEE are instructed to coordinate with Provincial Councils and Agrarian Services Department where and when necessary to carry out safety inspections along with the officers of these organizations.

A list of Major/Medium Reservoir irrigation schemes in your District/Province and sample forms for monthly, quarterly and seasonal inspection reports are attached herewith.

2.0 Categorization of Schemes

For the purpose of safety review, Irrigation schemes are categorized into two types, namely major and medium schemes. (Please see annex 3) Criteria for the definitions are as follows.

2.1 Major Irrigation Schemes

Major Irrigation Scheme is defined as a scheme of

(a) a reservoir having capacity more than 25 MCM (20,000Acft) or
(b) a reservoir impounded by a large dam as classified by ICOLD viz;
   • All the Dams not less than 15m in height reckoned from the lowest point or
   • A dam between 5m and 15m in height impounding 3 MCM storage
(c) having irrigation command area more than 810ha (2000 Acs) or
(d) rating as “Highly Hazardous” depending on the location / age / peculiarity of structure / foundation.

The schemes falling under above category in your District / Division are identified in Annex 3 based on the information available in Head office. You are free to add any scheme to the list and send the inspection report if you feel that need special attention due to current condition. But if any scheme is proposed to be taken out of the list, prior approval should be obtained from Director (AM).

2.2 Medium Irrigation Schemes

All other scheme under the purview of Irrigation Department which do not fall into above category.

3.0 Regular inspection

The head works of all the Major/Medium Irrigation schemes (storage and diversion schemes) should be inspected by the field officers regularly as per the following schedules.
### 3.1 Inspection of Major Irrigation Schemes

Frequency of inspection, delegated authority and responsibility on major irrigation schemes are given in the table below.

**Table 3.1.1 Frequency of Inspection of Major Irrigation schemes**

<table>
<thead>
<tr>
<th>Inspection type</th>
<th>Responsible officer</th>
<th>Responsibility</th>
<th>Inspection frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td>Work Supervisor/Thakshanika Sahayaka (Field Assistant)</td>
<td>• Inspection of entire dam and appurtenant, Structures, hydro mechanical equipments</td>
<td>weekly</td>
</tr>
</tbody>
</table>
| Visual inspection and dam instrumentation monitoring | Engineering Assistant                                   | • Inspection of entire dam and appurtenant, Structures, hydro mechanical equipments  
• Taking readings of seepage and piezometers. Checking leveling monuments. | Fortnight during dry season  
Weekly during rainy season and more frequently as required in critical sections.  
As per table 3.1.2 |
| Visual inspection and dam instrumentation monitoring | Divisional Irrigation Engineer                           | • Inspection of entire dam and appurtenant, Structures, hydro mechanical equipment  
• Monitoring of observations of instruments.  
• Study and analyze the records | Once in month during rainy season  
Fortnight or weekly during rainy season in critical sections.  
Ensure measurements as per table 3.1.2  
Once in month and when abnormalities are reported |
| Visual inspection and testing as per the Guideline   | Director (Mechanical)/Chief Engineer (Mechanical)        | • Inspection of hydro mechanical work                                          | Twice a year specially before rainy season |
| Visual inspection                                    | Director of Irrigation/Chief Engineer                    | General inspection of entire dam with respect to maintenance and operational readiness. | Each scheme at least twice a year before every rainy season and any emergency situation |
| Safety Evaluation of Dams                           | Panel of experts appointed by Director (Asset Management) | Comprehensive inspection of the dam and entire area according to procedure given in SEED Manual. Report on status of dam with respect to safety and recommend any improvements. | Once in five years |
Table 3.1.2 Frequency of measurement

<table>
<thead>
<tr>
<th>Reservoir water level</th>
<th>Instrument type</th>
<th>Frequency of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above FSL</td>
<td>Water Level Gauge</td>
<td>hourly</td>
</tr>
<tr>
<td>All Reservoir water level</td>
<td>Water Level Gauge</td>
<td>daily</td>
</tr>
<tr>
<td>More than 75% full</td>
<td>All piezometers</td>
<td>daily</td>
</tr>
<tr>
<td>Above MOL</td>
<td>All piezometers</td>
<td>weekly</td>
</tr>
<tr>
<td>More than 75% full</td>
<td>V – notch weirs</td>
<td>daily</td>
</tr>
<tr>
<td>Above MOL</td>
<td>V – notch weirs</td>
<td>weekly</td>
</tr>
<tr>
<td></td>
<td>Level monuments</td>
<td>yearly</td>
</tr>
</tbody>
</table>

3.2 Inspection of medium Irrigation Schemes

Frequency of inspection and delegated authority on Medium irrigation schemes are given in the table below.

Table 3.2.1 Frequency of Inspection of Medium Irrigation schemes

<table>
<thead>
<tr>
<th>Inspection type</th>
<th>Responsible officer</th>
<th>Responsibility</th>
<th>Inspection frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td>Engineering Assistant</td>
<td>Inspection of entire dam and appurtenants, structures, hydro mechanical equipments</td>
<td>Fortnight along with work supervisor/Thakshanika Sahayaka (Field Assistant) during rainy season</td>
</tr>
<tr>
<td>Visual inspection</td>
<td>Divisional Irrigation Engineer</td>
<td>Inspection of entire dam and appurtenants, structures, hydro mechanical equipments</td>
<td>Once in month during rainy season</td>
</tr>
<tr>
<td>Visual inspection and testing as per the Guideline</td>
<td>Chief Engineer (Mechanical)</td>
<td>Inspection of hydro mechanical work</td>
<td>Twice a year specially before rainy season</td>
</tr>
</tbody>
</table>

3.3 Monitoring Mechanism

CE in consultation with DI should prepare an annual inspection schedule to cover all Major/Medium Irrigation schemes in the Districts / Divisions and send to Dam Safety Branch for information.

Check lists to be maintained at DIE’s office and DI’s office to ensure timely delivery of monthly and quarterly reports as relevant. Dam Safety Office will also circulate a progress report after the deadline of quarterly inspection report is due.

The inspection by Engineering Assistant & work Supervisor/Thakshanika Sahayaka/ Field Assistant should be mentioned in their W.P.RR. Any matter of special interest should be brought to the notice of immediate supervising officer without awaiting the submission of reports under the section 4.0.
4.0 Documentation and Reporting

Monthly & quarterly Inspection reports of each Major/Medium scheme including analysis of instrumental data should be filed scheme wise in separate files. These files must be available in DIE’s office at any time for reference by inspection officers from Head office and District office.

4.1 Monthly Reports
(to be filled by EA and kept at DIE’s office)

A specimen format for monthly inspection report is attached herewith (Annex-1). It is the responsibility of EA in-charge of head works to report the condition of head works in Major/Medium schemes including analysis of Instrumental data, monthly for DIE’s endorsement.

You may reproduce this form for your requirement by duplication or photocopying the same, but it should not be changed in any manner. Important observations with regard to any possible improvements to the format would be brought to the notice of CE (Dam Safety) promptly.

4.2 Quarterly Reports
(to be filled by EA, checked by DIE and
- Major scheme reports to be sent to CE (DS) with copy to DI (District)
- Medium scheme reports to be sent to DI (District) only.)

A specimen format for a Quarterly Inspection Report is attached herewith (annex 2). Using this format DIE should develop a scheme specific report format incorporating only the relevant sections. For example if there are no gates in spillway, section 4.2 can be deleted. The scheme specific form should be sent to CE (Dam Safety) for scrutiny.

Duly completed report should be received by Dam Safety office at the end of each quarter. (1st quarter report before 15th April, 2nd before 15th July, 3rd before 15th October and 4th before 15th January of the following year) on Major schemes given in annex 3. This report should be sent directly to CE (Dam Safety) by DIE with copies to DI.

Quarterly report for medium schemes should be sent to DI by DIE at the end of each quarter before the dates mentioned as above.

4.3 Seasonal Report
[two reports per year to be filled by CE (District office) & to be sent to CE (DS)]

Seasonal report submit by DI/CE should include a summary of defects identified during inspection and proposed remedial action for all Major/Medium schemes. The specimen format is given in annex 4.
This seasonal inspection report prepared by CE (District office) should be sent to Dam Safety Branch with the endorsement of DI at the end of March and September in each year. Director (AM)/CE (Dam Safety) too will join some of the inspection programs once the inspection program is informed in advance.

4.4 Special report on Hydro – Mechanical Instruments

Hydro mechanical work of each Head works to be inspected by Director (Mechanical)/ Chief Engineer (Mechanical) twice a year as per table 3.1.1 and table 3.2.1. Chief Engineer (Mechanical) should prepare an annual inspection schedule to cover up all Major/Medium Irrigation schemes in consultation with relevant District Directors and send to Dam Safety Branch. The inspection reports prepared by Chief Engineer (Mechanical) should be sent to Director (AM) with the endorsement of Director (Mechanical) with copies to relevant District Directors.

The guideline for inspection will be issued by Director Mechanical (Headquarters & Southern).

4.5 Instrumental reading and analysis

Specimen data sheets to record readings of Piezometers and V-notches are attached herewith (Annex 5 and Annex 6). Two separate registers for piezometers and v notches in all the schemes of the division should be maintained at DIE’s office.

Please make available copies of this circular to all the EAA, WSS, FAA in the Divisions and instruct them to inspect and submit information accordingly. Soft copy of this circular is already sent to you. Please feel free to contact Chief Engineer (Dam Safety) at any moment if you need further clarifications and more details.

Eng
Director General of Irrigation

Copies:-
1. Addl. DGI (I&WM) / (RD&C) / (PD&SS) -To monitor the Programme pls.
2. Zonal Director (Southern/Uva/Central /North Central /North) - For Information and Guidance of field staff pls.
3. Director Mechanical (Head quarters & southern /central/North central)/ CE (Mechanical) - To carry out Inspection as para 4.4 and follow up action pls.