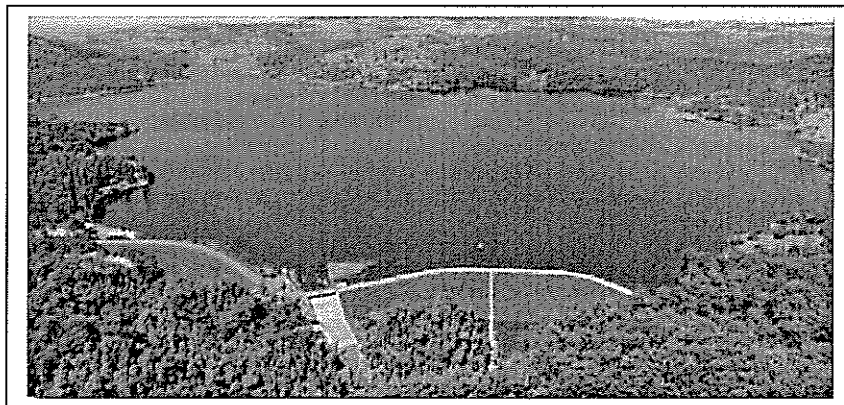


INSTRUCTIONS ON HOW TO FORMULATE CONDITIONS RELATING TO DAM SAFETY FOR REFERABLE DAMS

(To be used following proclamation of the Dam Safety
sections of Water Act 2000)



FOREWORD

There are a number of guidelines and advisory documents that have been developed (or are currently under development) relating to the dam safety regulatory program in Queensland.

Water Act 2000 and Integrated Planning Act 1997

The current legislation under which dam safety is regulated, administered and enforced throughout the State.

Queensland Dam Safety Management Guidelines 2002 (QSM Guideline)

An advisory guideline that outlines the regulator's expectations (both with respect to technical requirements and documentation) of owners' dam safety programs. The Department of Natural Resources and Mines (NR&M) produce these guidelines. The current version is still in final draft form.

Guidelines for Failure Impact Assessment of Water Dams

A regulatory guideline that defines the requirements for determining the failure impact of a dam and hence whether it is referable (and subject to regulation) or not. NR&M produce these guidelines. The current version is still in final draft form.

ANCOLD Guidelines

These guidelines are produced by the Australian National Commission On Large Dams, and cover all aspects of dam engineering. They define current best practice. They are being reviewed and revised regularly in pace with the development of technology.

Instructions on how to formulate conditions relating to dam safety for Referable Dams.

These are a guide for NR&M officers engaged in developing conditions relating to dam safety for referable water dams in Queensland. They are an internal document and will not be widely available.

Administrative procedures for

- **Processing an application for a Referable Dam Development Permit,**
- **Processing a Failure Impact Assessment for a Water Dam,**
- **Imposing safety conditions on Referable Dams.**
- **Enforcement of conditions relating to dam safety for referable dams.**

These are a series of internal administrative procedures to be used by officers throughout the State to deal with administration of referable dams.

Primarily for use by NR&M officers.

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1. PURPOSE

This document has been prepared: -

1. To explain the issues to be considered when formulating conditions relating to dam safety for referable dams;
2. To be used by NR&M officers to formulate conditions relating to dam safety for referable dams.

Since the bulk of the activity of setting these conditions will be to do with existing dams, using sections 491 and 492 of the Water Act 2000, setting conditions under those sections is the focus of this document.

Conditions for new dams, and for operational works that will increase the storage capacity of a referable dam by more than 10% will be imposed under the Integrated Planning Act 1997 may require a more flexible approach than is outlined in this document, but this document should be used as a first approximation in those cases.

2 INTRODUCTION

Each referable dam in Queensland will be regulated for safety by imposing conditions relating to dam safety using either the Water Act 2000 or the Integrated Planning Act 1997. The conditions will set standards in performance in design, construction, emergency preparedness and decommissioning.

The conditions will also address the operational and management aspects of dam ownership of surveillance, inspection and incident response, operation, and maintenance.

The conditions for each dam will :-

either

cite existing documentation of studies and management practices such as drawings, reports, or procedures

or

require the commissioning of studies or development and implementation of management practices and documentation through drawings or reports.

The above documents will be used by the dam owner to either demonstrate compliance with the standards relating to dam safety as set by the conditions, or assist in achieving ongoing compliance with those standards.

The conditions will generally refer to a guideline that sets the standard of engineering required. That guideline is currently the QSM Guideline. This document should be read in conjunction with the QSM Guideline.

For existing dams (built or licensed under the Water Resources Act 1989) that become referable dams under the water Act 2000, NR&M officers will have the power to impose, and change, conditions relating to dam safety, using sections 491 and 492 of the Water Act 2000. Setting conditions under these sections is the focus of this document, as it is expected that the bulk of NR&M's activities will be to do with existing dams.

New dams will generally be made subject to conditions relating to dam safety as a result of the IDAS process set out in the Integrated Planning Act 1997, rather than under sections 491 and 492 of the Water Act 2000. The process of setting conditions for new dams under the Integrated Planning Act 1997 may require a more flexible approach than is outlined in this document, but this document should be used as a first approximation in those cases.

Conditions relating to dam safety can also be imposed by NR&M when approving operational work that will increase the storage capacity of a referable dam by more than 10%. These conditions will generally be imposed as a result of the IDAS process set out in the Integrated Planning Act 1997, rather than under sections 491 and 492 of the Water Act 2000. Again, the process of setting conditions for these works and dams may require a more flexible approach than is outlined in this document, but this document should be used as a first approximation in those cases.

Dam owners are required by the Integrated Planning Act 1997 to comply with the conditions relating to dam safety for their dams. There are penalties under the Integrated Planning Act 1997 to ensure compliance. Emergency directions can also be given under the Water Act 2000 if there is a danger of a referable dam failing and action is necessary to prevent or minimise the impact of the failure.

The NR&M Dam Safety program as outlined in the QSM Guideline includes an independent 5 yearly report on the dam owner's safety management program (a comprehensive inspection) as well as random regulator audits. Both of these reviews will allow NR&M to assess compliance with development permit conditions relating to dam safety. They will also allow NR&M to assess the extent and effectiveness of the application of dam safety standards throughout the State.

3 CONDITIONS RELATING TO DAM SAFETY UNDER THE WATER ACT 2000

The conditions that are applied to referable dams under sections 491 and 492 of the Water Act 2000 are referred to as “ safety conditions”. Safety conditions are taken to be conditions attaching to a development permit for the referable dam, this means the conditions are treated the same as other development permit conditions with respect to enforcement.

NR&M has some powers relating to safety conditions (eg the power to impose and change a safety condition that apply to them from the Water Act 2000, these powers do not apply in the case of other development permit conditions imposed under the Integrated Planning Act 1997. The appeal process for safety conditions is also different to the process used for appealing other development permit conditions.

When developing safety condition we must remember that the Water Act 2000 requires that the conditions be “relevant to, but not an unreasonable imposition on, the dam or reasonably required for the dam” (section 491(6)).

The Water Act 2000 (section 492) also allows for safety condition to be changed by the Chief Executive, if the Chief Executive is satisfied the change should be made in the interests of dam safety. This power is likely to be used to :-

- upgrade safety management conditions across the portfolio
- bring conditions on existing dams in line with current practice
- apply special conditions to specific dams.

It is anticipated that the administrative process to be followed for changing a safety condition will be convoluted and time consuming. An administrative procedure is to be developed for use under such circumstances.

It is hoped to use wording for all safety conditions that is common throughout the referable dam portfolio. Standard conditions will be used where possible.

However, most dams will have specific issues that need to be addressed in the conditions, and the conditions will need to be individually drafted to address those issues.

The general steps in using these instructions for formulating safety conditions are: -

1. Develop a good understanding of the current state of dam safety management for the dam
2. Develop a good understanding of the engineering of the dam
3. Determine the elements of the dam’s management that are more generic
4. Select from the sample standard wordings for condition relating to dam safety for elements of the dam’s management that are more generic
5. Determine for which element of the management of the dam specific condition relating to dam safety are required (eg. Design Report, E.A.P.)
6. Using the samples from these instructions as guidance, formulate those specific conditions

Copies of the condition relating to dam safety for a dam will be held on Head Office WIC files. An electronic copy will be held on the Dam Safety register.

The following documents relating to the condition relating to dam safety for a dam will be held in the Dam Safety filing system at Mineral House.

- The Design Report
- The Safety Review
- The As-constructed documentation
- The Standing Operating Procedures - (Controlled Document)
- The Emergency Action Plan – (Controlled Document)
- All Comprehensive and Special Inspection Reports

Regional offices will hold a controlled copy of the Emergency Action Plan (EAP). (The location of all documentation held by NR&M will be noted in the Dam Safety Register)

4 HOW and WHEN THESE INSTRUCTIONS WILL APPLY

4.1 FOR EXISTING DAMS

4.1.1 LICENSED DAMS (under Water Resources Act 1989)

Existing waterworks licence conditions will continue to apply as development permit conditions. NR&M generally will not consider changing these conditions until receipt of the initial failure impact assessment confirming the dam is referable ie can be up to five years after proclamation date. An administrative procedure is to be developed for use under such circumstances.

4.1.1.1 UNLICENSED DAMS

Existing unlicensed dams currently have no condition relating to dam safety applying. When such dams are determined to be referable, the chief executive will apply conditions relating to dam safety using the power to impose “safety conditions” in the Water Act 2000.

Circumstances that will cause a dam to become referable are:-

- The dam is ‘deemed’ by regulation to have a failure impact rating of category 1 or 2.
- A failure impact assessment accepted by the chief executive determines the failure impact rating to be category 1 or 2. A failure impact assessment could be required either

- because the dam exceeds the specified minimum dimensions (see section 1067 of the Water Act 2000) (the assessment must be submitted within twelve months of proclamation date 2) or
- in response to a s.483(2) notice may be issued if the chief executive considers the dam would have a category 1 or 2 failure impact rating.

To assist in determining the required conditions relating to dam safety the chief executive may request the owner to provide information on the dam (section 491(2)). It is intended to advise all owners of information/details currently held by NR&M on their dam, and request the following details from each owner:-

- information on the currency of this data,
- copies, if available, of other documentation which NR&M requires to hold copies of according to the QSM Guideline, that is not already at hand, and
- details of the status of the remaining documentation not able to be provided to NR&M.

4.2 FOR CONSTRUCTION OF NEW DAMS AND FOR EXISTING REFERABLE DAMS WHERE OPERATIONAL WORK IS CARRIED OUT THAT WILL INCREASE THE STORAGE CAPACITY OF THE DAM BY MORE THAN 10%

In the case of a new referable dam, or where operational works are carried out on an existing referable dam that will increase its storage capacity by more than 10%, NR&M has the power to impose conditions on the referable dam as part of the IDAS process under the Integrated Planning Act 1997.

Conditions imposed on a referable dam as a result of the IDAS process are not called safety conditions because they are not imposed under the Water Act 2000. However, they still relate to issues of dam safety for the referable dam and have the same aims safety conditions imposed under the Water Act 2000.

Development permits for dams may have development permit conditions applied to them that relate to issues other than dam safety (eg boating, signage). These conditions will have been imposed by someone other than the referable dams area of NR&M, for example, conditions may have been imposed by the relevant local government as part of the IDAS process under the Integrated Planning Act 1997.

This instruction document should be referred to by NR&M staff when drafting conditions relating to dam safety for referable dams as part of the IDAS process under the Integrated Planning Act 1997, to maintain consistency of approach where possible.

However, preparation of such conditions will be done within the provisions of the Integrated Planning Act 1997 rather than the Water Act 2000. The conditions relating to dam safety will therefore be prepared in response to Development Applications. Tight time constraints apply in dealing with development applications.

Conditions should be formulated in accordance with these instructions taking into account the information available when the application is to be decided. The assessment manager is to be advised of the required conditions relating to dam safety for inclusion on the development permit.

NR&M officers must ensure the conditions they impose comply with the requirements of the Integrated Planning Act 1997 and are lawful conditions in other respects. Therefore the following must be borne in mind when conditions are prepared:

- The requirements of the Integrated Planning Act 1997 and the Water Act 2000 relating to the power of NR&M to assess the application and require conditions to be imposed;
- The requirements of the Integrated Planning Act 1997 relating to setting conditions, including the provisions set out in Chapter 3, Part 5, Division 6 of the Act;
- The need for conditions to be certain;
- The need for conditions, and decisions, to be final.

The preparation of conditions relating to dam safety for new dams and for existing referable dams where operational work is carried out that will increase the storage capacity of the dam by more than 10% will be reviewed following amendment of the Integrated Planning Act.

5 CONDITIONS FOR EVERY REFERABLE DAM

The following conditions are general in their content and would be required for every dam in the portfolio.

5.1 DESCRIPTION

This condition identifies the dam and gives a brief description to provide a perspective, in terms of size and type of dam, for the engineering and management conditions that follow. The condition must be specific enough to unambiguously identify the dam. This is particularly important where more than one dam is located on a lot.

The lot numbers stated in the conditions should cover all the blocks covered by the dam and its storage. Where more than one or two lot numbers are required, it may be appropriate to list these in a schedule.

The following conditions apply to Gordon brook Dam. Gordon brook Dam is a 320 metre long zoned earth and rock fill dam 21 metres high. The storage capacity is 6500 mega litres. The dam was constructed to full height in 1943. The dam is used to supply water to the city of Kingaroy. The dam is on Lot XXX

5.2 DOCUMENTATION

This condition is to ensure that the information on the dam is securely stored and is accessible by the regulator if necessary.

Whilst a general condition it would be most appropriate for this condition to be the last in the list of conditions.

*Any documentation prepared to comply with these conditions must be stored securely until such time as the dam is decommissioned.
The documentation is to be available for inspection by the Department of Natural Resources and Mines within 7 days of a written request for access being received by the owner.*

5.3 INCIDENTS, FAILURES AND REMEDIAL ACTION

The condition is required to ensure that NR&M and NR&M officers are involved in deliberation on the response to any dam safety crisis at a referable dam.

Further, reporting of such incidents allows NR & M to accumulate data on dam incidents for analysis and prediction of future problems

All these conditions should have the following wording: -

The dam owner must report in writing all incidents and failures (as defined in the Queensland Dam Safety Management Guideline –2002) to the Department of Natural Resources and Mines within 7 days of becoming aware of the incident or failure.

The dam owner must advise the Department of Natural Resources and Mines on proposed remedial actions. In writing within one month of the incident or failure.

6 CONDITIONS FOR SPECIFIC DAM SAFETY ISSUES

6.1 DESIGN REPORT

Conditions relating to dam safety for preparation of a Design Report will be in two forms: -

EITHER

An existing and approved Design Report will be cited

OR

A Design Report will be required to be prepared by a nominated date and to the standard set in the QDSM Guideline.

The QDSM Guideline discusses the issues to be addressed in a Design Report, and so no specific issues would normally be listed in the conditions relating to dam safety.

On small, relatively simple dams the condition will require the submission of an initial design report by a specified date and that design report updated within 3 months of practical completion.

On larger dams the Design Report for each dam may need to be developed in stages that reflect the complexity of the investigations and construction.

The most likely stages would be: -

- On completion of investigation for the dam - Addressing issues relating to dam site selection, dam form and materials selection, and stream hydrology.
- On completion of the design of the dam - Addressing all the issues considered in the design and constraints on the operation of the dam.
- Prior to commencement of filling the dam - Addressing compliance with construction specifications and design modifications necessary as a result of information obtained through the construction phase.
- On completion of construction - Finalisation and editorial changes.

For each of these stages the latest report should be cited.

The requirements of each stage and a date for submission to the chief executive should be in the condition.

Choose from the following wording: -

The current Design Report for the dam is Document XX.

OR

The dam owner must prepare a Design Report in accordance with the Queensland Dam Safety Management Guidelines 2002.

The Design Report must include:-

SOME EXAMPLES

- *Designer's Operating Criteria (DOC)*
- *design parameters adopted and assumptions made (and their bases)*
- *methods of analyses*
- *results of analyses and investigations*
- *complete set of drawings and specifications*

The Design Report must be developed in the following stages and address the matters outlined below for each stage: -

SOME EXAMPLES

- *On completion of investigation for the dam - Addressing issues relating to dam site selection, dam form and materials selection, and stream hydrology.*
- *On completion of the design of the dam - Addressing all the issues considered in the design and constraints on the operation of the dam.*
- *Prior to commencement of filling the dam - Addressing compliance with construction specifications and design modifications necessary as a result of information obtained through the construction phase.*
- *On completion of construction - Finalisation and editorial changes*

The owner is to notify the Department of Natural Resources and Mines of the date of completion of each stage within 30 days of its completion and submit the design report for that stage within three months of that date.

The Final Design Report must be submitted to the Department of Natural Resources and Mines within three (3) months after practical completion of construction

6.2 CONSTRUCTION AND DESIGN

This condition is intended to cite the latest drawings and specifications that describe the dam structure as it is to be constructed. It may be that these drawings and specification are consolidated into a contract document.

It is necessary to include the date (or revision number of the drawings) to ensure the appropriate version is referred to.

The drawings and specification cited should be those submitted to the regulator during the approval process.

Where modifications are required to the submitted drawings and specifications these modifications must be listed in the condition.

Any significant variation from these drawings and specifications would be viewed as failing to comply with the conditions.

The dam is to be designed and constructed to comply with the Queensland Dam Safety Management Guidelines

The dam must be constructed generally in accordance with the following :-

Drawings:

AAAA prepared by Engineer 1111

Specifications:

BBBBB prepared by Engineer 1111

Any remedial works or reconstruction of the dam must ensure that the dam remains generally in accordance with that documentation.

6.3 DATA BOOKS

Conditions relating to preparation of a Data Book will be in two forms:-

EITHER

An existing Data Book will be cited. (This may require the description of several volumes of reports and electronic data.)

OR

A Data Book will be required to be prepared by a nominated date and thereafter maintained to the standard set in the QSM Guideline.

The QSM Guideline contains a list of the issues to be addressed in the Data Book, and so normally no specific issues would be listed in the conditions.

Because of the diverse formats and the volume of information to be included in a Data Book it will not be required to provide a copy of the Data Book to the regulator. However, it will be necessary to ensure ready access to the owners data book is ensured. This should occur through the documentation condition discussed in section 5.2 of this document.

Since no Data Book is submitted to the regulator, comment on the Data Book will be made during the Comprehensive Inspection OR when a Regulator's Audit is carried out. Shortfalls and defects in the Data Book will be documented in the report on the Comprehensive Inspection or Audit. Persistent failure to update or remediate defects may result in the assessment that the owner is not complying with this condition and penalties could be applied.

Choose from the following wording: -

Data Book (if a satisfactory data book already exists)

The existing Data Book consists of:-

- Xxx
- Vvv
- Yyy

The data book must be updated in accordance with the Queensland Dam Safety Management Guideline .

Data Book (if no data book currently exists)

The dam owner must prepare a Data Book in accordance with the Queensland Dam Safety Management Guidelines by date.

The Data Book must include all pertinent records and history relating to the dam and must encompass the documentation of investigation, design, construction, operation, maintenance, surveillance, monitoring measurements and any remedial action taken and any other issues addressed in the Queensland Dam Safety Management Guidelines.

The Data Book must be updated in accordance with the Queensland Dam Safety Management Guideline.

6.4 AS CONSTRUCTED DOCUMENTATION

The Queensland Dam Safety Management Guidelines provide detailed advice on how to develop 'as constructed' documentation.

Dams that have a well documented Design Report will have incorporated into that report an "as constructed" report. In that case this condition would not be required.

If required the condition relating to as constructed documentation for each dam will need to be specific as to what topics are to be addressed in the 'as constructed' documentation for the dam.

When determining the specific issues to be addressed in the "as constructed" documentation some understanding of the construction methods used will be required along with judgements about the degree of detail necessary.

The condition will also need to specifically indicate who should certify the compliance with engineering standards addressed in the 'as constructed' report

This condition should result in a report that thoroughly documents the conditions experienced and any modifications carried out during the construction of the dam.

Where adequate documentation already exists the following wording should be used:-

As constructed documentation for this dam consists of :-

- *Document 1*
- *Document 2*
- *Document 3*

Where as constructed documentation is yet to be developed the following wording should be used:-

The dam owner must develop as constructed documentation in accordance with this condition and the Queensland Dam Safety Management Guidelines 2002.

The owner must provide one copy of the as constructed documentation to the Director General, Department of Natural Resources and Mines by date.

The as constructed documentation must include: (Delete if not applicable)

- *a record of any decisions to adapt the nominated design to suit actual field conditions*
- *as-constructed drawings indicating the actual lines, levels and dimensions to which the structure is built*
- *a description of the construction processes*
- *systematically compiled and comprehensive photographs and videos of the construction, with particular coverage of significant events which include:-*
 - *foundation treatment*
 - *material preparation and placement*
 - *filters, cut-offs*
 - *core material*
 - *joint preparation*
- *foundation surface mapping of rock defects*
- *material test results*
- *initial instrumentation data*
- *construction inspection reports.*
- *Certification by an RPEQ that the works have been constructed*

6.5 STANDING OPERATING PROCEDURES

Conditions relating to dam safety for preparation of Standing Operating Procedures will be in two forms: -

EITHER

Existing, approved SOPs that relate to dam safety management will be cited.

While the QSM Guideline provides information on preparation of SOPs it is proposed to cite existing operating procedures in the owner's format, provided the operating procedures are appropriate to the dam safety needs of the dam.

OR

Standing Operating Procedures for activities relating to dam safety management will be required to be prepared by a nominated date and to the standard set in the QSM Guideline.

Many owners will have written operating procedures for each of the operation and maintenance activities at the dam. It is required to document only those activities that could influence the safety of the dam.

It is expected that there will be a wide range in the format and standard of SOPs. Corporate owners may have quality assured and controlled documentation, while small farm dam owners may have a limited number of loose-leaf procedures in a folder.

While the QSM Guideline provides information on preparation of SOPs it is proposed to cite existing operating procedures in the owner's format, provided the operating procedures are appropriate to the dam safety needs of the dam.

Procedures will be required whenever operations need to occur to maintain dam safety.

To formulate the conditions relating to dam safety it will be necessary to gain a good understanding of how it is intended to operate the dam and to identify the operation activities that require procedures. Those activities should be listed in the condition relating to dam safety.

The review of SOPs throughout the life of the dam will be an aspect of dam safety management that will be assessed during Comprehensive Inspections and Regulator Audits.

Note: The EAP is a form of SOP however for the purpose of Dam Safety the Conditions relating to it is dealt with separately.

In formulating these conditions officers should chose the appropriate sections from the following: -

The current Standing Operating Procedures for the dam are:-

- *Document XX.*
- *Document YY*

The dam owner must submit copies of the Standard Operating Procedures to the Chief Executive, Department of Natural Resources and Mines by date A

The dam must be operated in accordance with the Standing Operating Procedures.

The dam owner must ensure the Standing Operating Procedures are reviewed annually by date B.

The dam owner must submit copies of any changed SOPs to the Chief Executive, Department of Natural Resources and Mines within three (3) months after date B

OR

The dam owner must develop Standing Operating Procedures in accordance with the Queensland Safety Management Guidelines for Referable Dams (July 2001) by date A

Standing Operating Procedures must be developed for the following activities: (Select from following list and include any others that may be applicable)

Personnel Training and Procedural Issues

- *Operator Training*
- *Documentation control and review*
- *Undertaking of a Failure Impact Assessment every five years*
- *Setting of Normal Operation Criteria*

Emergency Action and Incident Reporting

- *Accident and Incident Reports*
- *Emergency Action Plan (EAPs)*
- *Verification of Emergency Contact Numbers*
Communication procedures and procedures covering the Loss of Communication during an Emergency Event
- *Maintenance of Dam Log Book*

Critical Operating Procedures

- *Test operation of critical equipment*

- *Pump operation plan for water harvesting that includes monitoring*
- *Notification of Spillway Discharge*
- *Spillway Gate flood operations including*
- *Water level monitoring procedures*
- *Discharge Control and flood release protocols including monitoring and warning of areas of impact prior to releases (for campers etc) as required in the Emergency Action Plan*
- *Coordination of releases with other dams or downstream tributaries (where appropriate)*
- *Communication security and failsafe procedures*
- *Bulkhead Gate Installation,*
- *Penstock drainage,*
- *Trash screen removal and installation*
- *Confined Space Access*

Monitoring and Surveillance

- *Water level monitoring procedures and the monitoring of inflow events*
- *Instrumentation surveillance and data recording*
- *Owners routine dam safety inspection including checklists and reporting requirements*
- *Dam Safety Annual inspections (if annual inspections are required by conditions relating to dam safety)*
- *Dam Safety 5 yearly comprehensive inspection (if required by conditions relating to dam safety)*
- *Requirement for inspection during and after flood events and after seismic events*
- *Inspection, testing and maintenance of mechanical and electrical equipment*
- *Log Book recordings*

The dam owner must submit copies of the Standard Operating Procedures to the Chief Executive, Department of Natural Resources and Mines within three (3) months after date A

The dam must be operated in accordance with the Standing Operating Procedures.

The dam owner must ensure the Standing Operating Procedures are reviewed annually by date B

The dam owner must submit copies of any changed SOPs to the Chief Executive, Department of Natural Resources and Mines within three (3) months after date B

6.6 DETAILED OPERATING AND MAINTENANCE MANUALS

While a SOP outlines the protocols for operation of a system in the dam (eg water releases by gate operation), Detailed Operations and Maintenance manuals (DOMMs) address how to operate, maintain and overhaul individual pieces of equipment for a dam and its associated structures (eg the operation, maintenance and replacement of valves and motors for the gates). The dam owner should operate and maintain the dam in accordance with the DOMMs.

NR&M will not normally require a copy of these procedures. However, the dam owner should maintain copies of these documents wherever they are used.

These conditions would have the following wording: -

The current Detailed Operating and Maintenance Manuals for the dam are

- *Document XX.*
- *Document YY*

The dam must be operated and maintained in accordance with the Detailed Operating and Maintenance Manuals.

The dam owner must ensure the Detailed Operating and Maintenance Manuals are reviewed annually by date.

OR

The dam owner must prepare a Detailed Operating and Maintenance Manual in accordance with the Queensland Safety Management Guidelines for Referable Dams (July 2001) by date.

The operating and maintenance issues to be addressed in the DOMM are:-

- *Qqqqq*
- *Wwwww*
- *eeeeee*

The dam must be operated and maintained in accordance with the Detailed Operating and Maintenance Manual.

The dam owner must ensure the Detailed Operating and Maintenance Manual is reviewed annually by date.

6.7 DAM SAFETY INSPECTION AND REPORTS

In choosing the inspection and reporting regime for a dam, officers should take into consideration that: -

- Dam Failure Impact Category 2 dams require annual and five yearly periodic inspections. However, annual inspections need not be as extensive as the five yearly periodic inspection.
- Dam Failure Impact Category 1 dams require only a five yearly periodic inspection.

It is appropriate to note particular aspects of a specific dam's performance that need to be inspected and reported on in Periodic Inspections. Such aspects might include previously identified and persistent defects (eg tree management, spillway performance and condition, or seepage) and peculiarities of a type of dam.

All referable dams will require a five yearly Comprehensive Inspection to review and report on the dam safety management of the dam.

Special Inspections

When directed by the Chief Executive, Department of Natural Resources and Mines a Special Inspection must be carried out and reports must be prepared in accordance with the Queensland Safety Management Guidelines for Referable Dams (July 2001)

In formulating these conditions officers should chose the appropriate sections from the following: -

Comprehensive inspections must be carried out and reports must be prepared in accordance with the Queensland Safety Management Guidelines for Referable Dams (July 2001).

Dams with a Category 1 Failure Impact Rating

The dam owner must carry out a comprehensive inspection of the dam on or before date and on or before every fifth anniversary thereafter.

The comprehensive inspection for the dam must address the following issues:

SOME EXAMPLES (This list should cite all known problems and should

be modified to suit this type of dam)

- seepage management
- operation of the outlet valve
- tree management on downstream face
- appropriateness, currency and operational history of the Emergency Action Plan and the Standing Operating Procedures.

A Comprehensive Inspection Report detailing the findings of the comprehensive inspection must be submitted to Chief Executive, Department of Natural Resources and Mines within three months after completion of each comprehensive inspection.

Dams with a Category 2 Failure Impact Rating

The dam owner must undertake an annual inspection of the dam on or before date and on or before every yearly anniversary thereafter.

The owner must produce a record of these annual inspections to be used in the Comprehensive Inspection.

The annual inspection for the dam must address the following issues:

SOME EXAMPLES (This list should cite all known problems and should be modified to suit this type of dam)

- concrete cracking in spillway structure
- operation of the gates.
- Any other issue that the inspecting engineer considers appropriate.

The dam owner must carry out a comprehensive inspection of the dam on or before date and on or before every fifth anniversary thereafter.

The comprehensive inspection for the dam must address the following issues:

SOME EXAMPLES

- appropriateness, currency and operational history of the Emergency Action Plan and the Standing Operating Procedures
- quality and currency of the Safety Review and data book.

A Comprehensive Inspection Report detailing the findings of the comprehensive inspection must be submitted to the Chief Executive, Department of Natural Resources and Mines within three (3) months after completion of each comprehensive inspection.

6.8 SAFETY REVIEWS

Safety Reviews are generally carried out at 20 years intervals.

There is a section in the QSM Guidelines that provides a list of the issues that are to be addressed in a Safety Review. Therefore there is generally no need to list the issues for each dam in the conditions relating to dam safety. However, it may be necessary to highlight any novel or troublesome issue relating to a particular dam and conditions relating to dam safety. may also need to be drafted to accommodate situations whereby a safety review is required

- into a particular aspect of a dam or
- in response to major changes in technology
- incidents at the dam
- new information becoming available

which could impact on the safety of the dam.

All these conditions should have the following wording: -

Safety Review (where a satisfactory safety review has been undertaken)

The current Safety Review for the dam is Document XX.

The dam owner must carry out a Safety Review in accordance with the Queensland Safety Management Guidelines for Referable Dams (July 2001) The dam owner must provide one copy of the Safety Review Report to the Chief Executive, Department of Natural Resources and Mines by date, and at 20 year intervals.

Safety Review (where a satisfactory safety review has not been undertaken)

The dam owner must carry out a Safety Review in accordance with the Queensland Safety Management Guidelines for Referable Dams (July 2001) , and at 20 year intervals.

The dam owner must provide one copy of the Safety Review Report to the Chief Executive, Department of Natural Resources and Mines by date.

Specific issues to be addressed in the Safety Review for this dam include:

SOME EXAMPLES

- *Adequacy of spillway to pass Probable Maximum Flow.*
- *Stability of embankment in seismic events.*

6.9 EMERGENCY ACTION PLANS

A condition addressing EAP's will be needed for each dam .

The complexity of the EAP varies throughout the portfolio depending on the extent and distribution of the people living downstream and with the level and type of communication available.

The requirements for internal distribution of the EAP will vary with type of organisation of the dam owner. However, this condition should contain a list of the specific external organisations to get a controlled copy of the EAP.

The QSM Guideline for referable dams has a section that outlines acceptable practice for developing an Emergency Action Plan for a dam.

The list of parties to whom the EAP should be provided should be determined in consultation with the local Disaster District Manager ("DDM") of Department of Emergency Services. The list of the current Disaster District Manager's is attached as Appendix A.

Choose from the following wording: -

Emergency Action Plans (if a satisfactory plan already exists)

The current Emergency Action Plan for the dam is Document XX as updated from time to time.

The dam owner must provide one copy of the current Emergency Action Plan to the Chief Executive, Department of Natural Resources and Mines by date.

The contact details contained in the Emergency Action Plan must be reviewed prior to DATE each year.

The Emergency Action Plan must be reviewed at least every five years from (date).

The dam owner must ensure that the current (and changed?) Emergency Action Plan is provided to the following parties

- *specific local government(s) eg Esk Shire Council*
- *local counter disaster agencies affected by emergency events .eg Ipswich Counter Disaster Coordination Committee*
- *NR&M – Dam Safety*
- *Any additional group specific to this dam*

In all emergencies, the dam owner must respond in accordance with the Emergency

Action Plan.

In the event of an emergency, the dam owner must also, within 7 days of the event, prepare an Emergency Event Report and provide a copy of the report to the Department of Natural Resources and Mines. .

The Emergency Event Report must contain:

- *a description of the event;*
- *instrumentation readings (where appropriate);*
- *description of any observed damage;*
- *photographs;*
- *details of communication which took place during the emergency; and*
- *comment on the adequacy of the EAP*
- *any recommendations or suggested changes to the EAP.*

Emergency Action Plans (if satisfactory plans do not already exist)

The dam owner must prepare an Emergency Action Plan and provide one copy to the Chief Executive, Department of Natural Resources and Mines by date.

The Emergency Action Plan must:

- *Determine and identify those conditions that could forewarn of an emergency and specify the actions to be taken and by whom.*
- *Identify all jurisdictions, agencies and individuals who could be involved in the Emergency Action Plan (for example, local governments, the Queensland Police Service, State Emergency Service and downstream residents).*
- *Identify primary and secondary communication systems, both internal (between persons at the dam) and external (between dam personnel and outside entities).*
- *Identify all resources, special tools, equipment, keys and where they can be located if required in an emergency.*
- *List and prioritise all persons and entities involved (including contact details) in the notification process and the roles and responsibilities assigned to them (eg. a flow chart may be used).*
- *Be disseminated to those who have responsibilities under the EAP.*

The Emergency Action Plan must be reviewed at least every five years from (date).

The contact details contained in the Emergency Action Plan must be reviewed every 12 months.

The dam owner must ensure that the current (and changed?) Emergency Action Plan is provided to the following parties : -

- *specific local government(s) eg Esk Shire Council*
- *local counter disaster agencies affected by emergency events .eg Ipswich Counter Disaster Coordination Committee*
- *NR&M – Dam Safety*
- *Any additional group specific to this dam*

In all emergencies, the dam owner must respond in accordance with the Emergency Action Plan.

In the event of an emergency, the dam owner must, within 7 days of the event, prepare an Emergency Event Report and provide a copy of the report to the Department of Natural Resources and Mines.

The Emergency Event Report must contain:

- *a description of the event;*
- *instrumentation readings (where appropriate);*
- *description of any observed damage;*
- *photographs;*
- *details of communication which took place during the emergency; and*
- *Comment on the adequacy of the EAP and any changes proposed.*

6.10 DECOMMISSIONING PLANS

At time of writing very few decommissioning plans for water supply dams have been developed in Queensland. The QSM Guideline gives some general guidance. Since the format and contents of a good plan is still to be decided the generic condition below is appropriate for any dam.

Major issues in decommissioning a dam are related to environmental risk. Hence, the Environmental Protection Authority would require input into any decommissioning plan.

All these conditions should have the following wording: -

The dam must not be taken out of service (decommissioned) except in accordance with a Decommissioning Plan accepted by the Department of Natural Resources and Mines.

The Decommissioning Plan must indicate how the dam is to be rendered safe in the long term and how the contents are to be drained in a controlled and safe manner.

7 SPECIAL CONDITIONS

From time to time it will be necessary to apply specific and special conditions to a particular dam or to a group of dams. These conditions may require investigations or studies to be carried out, or may require a program of works to be completed. These conditions will usually have a fixed time frame.

Examples of the issues that would have required such a condition to be applied to the dam include :-

- Hydrological studies to accommodate changes to the Generalised Tropical Storm Method for determining the probable maximum rainfall.
- Remedial works programs to repair erosion in spillway chutes.

The condition will need to be worded to suit the specific situation.

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