Dams Safety Committee

NEW SOUTH WALES

DSC2C June 2010

SURVEILLANCE REPORTS FOR DAMS

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1. INTRODUCTION

The *normal requirements* of the NSW Dams Safety Committee (DSC) are set out in its guidance sheets with its principal guidance sheet, *DSC Background, Functions and Operations - DSC1A*, outlining the DSC's general operations and authority.

The DSC considers that a vital part of dam safety management programs is the preparation of dam *Surveillance Reports*. Each dam *surveillance report* contains, within the one document, information on all aspects affecting the safety of the dam for the period since the previous *Surveillance Report*.

Accordingly, this sheet is provided for the guidance and direction of dam owners, and their consultants, in preparing S*urveillance Reports* for their dams. However, dam owners, and their professional advisers, are reminded that they are responsible for the safety of their dams and will own the liabilities for the safety of their dams in the event risks are realised.

The purpose of this guidance sheet is to provide the owners of prescribed, or proposed, dams with general advice on good dam surveillance practice, along with specific advice on their responsibilities and the requirements of the DSC in this area.

The DSC Surveillance Safety Goal and Key Requirements (Section 2) at the start of the sheet are a summary - the whole sheet is to be read for a proper understanding of DSC considerations on dam surveillance.

2. DSC SURVEILLANCE SAFETY GOAL & KEY REQUIREMENTS

2.1 DSC Surveillance Safety Goal

The DSC's goal, relevant to this guidance sheet, is to ensure that owners, as part of their responsibility for the safety of their dams, arrange the preparation and submission of Surveillance Reports to the DSC at intervals not greater than five years, in order to achieve and/or maintain risks to community interests that are tolerable.

The following sections of this sheet aim to provide direction and guidance to assist the owner in achieving this DSC goal.

2.2 DSC Key Requirements

This section summarises the DSC requirements outlined in this sheet.

3. BACKGROUND

Surveillance Reports required by the DSC broadly correspond with "Comprehensive" reports as described in the Australian National Committee on Large Dams (ANCOLD) *Guidelines on Dam Safety Management*, August 2003.

4. FREQUENCY & TRANSMITTAL OF SURVEILLANCE REPORTS TO DSC

Prescribed dam owners are required to have Surveillance Reports prepared for their dams one year after their construction, or on first filling if earlier, and at five yearly periods thereafter.

The dam owner is to formally transmit the Surveillance Report to the DSC as soon as reasonably practicable after its preparation. The letter of transmittal from the owner, accompanying each Surveillance Report, is to outline the actions proposed in response to the recommendations in the report, and the program for those actions. A completed "Dam Owners Address Form" (D8 form) is also to be included to update the DSC on any changes of ownership and dams personnel. (Note that intermediate reports for ash and mining dams are also to be forwarded for DSC consideration - see DSC3F.

5. TYPES OF SURVEILLANCE REPORTS

The DSC's requirements for these Surveillance Reports vary as follows:

- Type 1 Reports are required for all Extreme, High A and High B consequence category dams.
- Type 2 Reports are required for High C consequence category dams, and Significant consequence category dams over 15 m in height.
- Type 3 Reports are required for Significant consequence category dams, up to 15 m in height and all Low consequence category prescribed dams.

6. SURVEILLANCE TEAM

The personnel preparing a Type 1 or 2 Surveillance Report shall complete a D15 Form (see Appendix A), and enclose the signed form with the copy of the report submitted to the DSC.

The DSC requires that Type 1 Surveillance Reports be prepared by a team comprising qualified engineers, experienced in dams engineering, supported by other technical specialists as necessary. However, this team could be as small as two people, provided it includes an experienced dams engineer and a dams surveillance engineer; with further appropriate assistance in large dams from various specialists as required (e.g. experienced mechanical or electrical engineer, geologist etc.).

The DSC requires that Type 2 Surveillance Reports be prepared by a qualified, experienced dams engineer as a minimum.

A suitably experienced hydrologist should review flood estimates quoted in Type 1 and 2 Reports. Similarly, a suitably experienced seismologist should advise on the validity of any seismic loading estimates quoted in these reports.

The DSC requires that Type 3 reports (D5 form) are to be prepared by dam owners, or their representatives or agents acting on the authority of the owner.

7. SURVEILLANCE REPORT FORMAT

All Surveillance Reports are to be signed by the person(s) responsible for preparation of the report. Their name, designation and organisation are to be given. The author(s) of the report is to ensure that all relevant issues are addressed.

The format of both Type 1 and Type 2 Reports are similar, but Type 1 Reports require a more detailed treatment.
Type 1 and 2 Reports should include the items listed in a typical report format as follows:

1. Executive Summary;
2. Conclusions & Recommendations;
3. General Information;
4. Surveillance Inspection;
5. Review of Surveillance Procedures;
6. Operation & Maintenance and Emergency Management;
7. Mining Activities;
8. Review of Dam Safety Status;
9. Appendices including completed DSC Forms D15 (Surveillance Report Checklist), D12 (Dam Safety Management System Report) and an electronic copy (e.g. CD) of the entire report including drawings and photos.

Type 3 Reports involve completion of a standard form (DSC Data Form D5) listing relevant items to be inspected and commented upon, along with relevant current photographs of the dam.

3. BACKGROUND

This Guidance Sheet supersedes DSC15 and applies to all prescribed dams in NSW. It has been prepared to outline and clarify the items the DSC considers are necessary for inclusion in Surveillance Reports. Surveillance Reports required by the DSC broadly correspond with 'Comprehensive' reports as described in the Australian National Committee on Large Dams (ANCOLD) *Guidelines on Dam Safety Management*, August 2003 which the DSC has had significant input to, and has adopted in principle as its requirements for dam owners. Consequently, it is the DSC's policy that dam owners should normally comply with these ANCOLD guidelines, including the inspection and monitoring procedures and frequencies set out in that document, unless otherwise indicated in this or other Guidance Sheets.

4. FREQUENCY & TRANSMITTAL OF SURVEILLANCE REPORTS TO DSC

Prescribed dam owners are required to have Surveillance Reports prepared for their dams one year after their construction, or after first filling if earlier, and at five yearly periods thereafter.

The dam owner is to formally transmit the Surveillance Report to the DSC as soon as reasonably practicable after its preparation. The letter of transmittal from the owner, accompanying each Surveillance

Report, is to outline the actions proposed in response to the recommendations in the report, and the program for those actions. A completed "Dam Owners Address Form" (D8 form) is also to be included to update the DSC on any changes of ownership and dams personnel. (Note that intermediate reports for ash and mining dams are also to be forwarded for DSC consideration - see DSC3F).

5. TYPES OF SURVEILLANCE REPORTS

Surveillance Reports rely on an inspection of the dam and existing information (whereas safety reviews – see DSC2D – typically generate new information). The DSC's requirements for these Surveillance Reports vary according to the height and consequence category (consequences of failure - see DSC3A) of a dam as follows:

- Type 1 Reports are required for all Extreme, High A and High B consequence category dams.
- Type 2 Reports are required for High C consequence category dams, and Significant consequence category dams over 15 m in height.
- Type 3 Reports are required for Significant consequence category dams up to 15 m in height, and all Low consequence category prescribed dams.

In addition to the five yearly Surveillance Reports outlined in this guidance sheet, the DSC requires that owners of dams, which can experience rapid changes in dam configuration, safety status, or consequence category (e.g. ash and tailings dams), provide intermediate reports (usually annually) updating the status and condition of their dams (see DSC3F for details and DSC Form D19).

6. SURVEILLANCE TEAM

The personnel preparing a Type 1 or 2 Surveillance Report shall complete a D15 Form (see Appendix A), and enclose the signed form with the copy of the report submitted to the DSC. The personnel required to prepare various types of Surveillance Reports are set out as follows:

6.1 Type 1 Reports

The DSC requires that Type 1 Surveillance Reports be prepared by a team comprising qualified engineers, experienced in dams engineering, supported by other technical specialists as necessary. However, this team could be as small as two people, provided it includes an experienced dams engineer and a dams surveillance engineer; with further appropriate assistance in large dams from various specialists as required (e.g. experienced mechanical or electrical engineer, geologist etc.).

6.2 Type 2 Reports

The DSC requires that Type 2 Surveillance Reports be prepared by a qualified, experienced dams engineer as a minimum.

6.3 Specialist Assistance for Type 1 and Type 2 Reports

A suitably experienced hydrologist should review flood estimates quoted in Type 1 and 2 Reports to determine that they were prepared by a suitable hydrologist and remain valid. Similarly, a suitably experienced seismologist should advise on the continued validity of any seismic loading estimates quoted in these reports.

6.4 Type 3 Reports

The DSC requires that these reports (D5 form) are prepared by dam owners, or by their representatives or agents acting on the authority of the owner.

7. SURVEILLANCE REPORT FORMAT

7.1 General

All Surveillance Reports are to be signed by the person(s) responsible for preparation of the report. Their name, designation and organisation are to be given. The author(s) of the report is to ensure that all relevant issues are addressed.

The format of both Type 1 and Type 2 Reports are similar, but Type 1 Reports require a more detailed treatment. Type 3 Reports involve completion of a standard form (DSC Data Form D5) listing relevant items to be inspected and commented upon, along with relevant current photographs of the dam.

7.2 Format for Type 1 and Type 2 Surveillance Reports

Type 1 and 2 Reports should be supported where necessary by such things as plans, photographs and instrumentation plots and should include, as appropriate to the type of dam and its appurtenant works, information on, but not limited to, the items listed in a typical report format as follows:

1) EXECUTIVE SUMMARY (OPTIONAL)

This should include a general summary of the points of interest in the report. A précis of report content may be included for the owner's purposes.

2) CONCLUSIONS AND RECOMMENDATIONS

Setting out clear and specific conclusions and recommendations on proposed actions and priorities in point format is essential. The text of the report should support each conclusion and recommendation. For any dam where there is potential for non-itinerant loss of life in the event of failure, the report is to have a conclusion regarding the continued adequacy of any existing *failure modes analysis (FMA)*. If there is no such analysis there needs to be a recommendation that a FMA be undertaken. Each report is to include a conclusion on whether or not changed circumstances (such as changes to guidelines, standards, scientific knowledge, analysis methodologies, extent of downstream development or the appearance of signs of vulnerability in the dam) warrant the undertaking of a *safety review* (refer *Demonstration of Safety for Dams - DSC2D* and *Dams Safety Management Systems - DSC2A*). Where the conclusion is that a *safety review* is warranted there should be a corresponding recommendation which includes the proposed rigour and timing of the *safety review*. *Safety reviews* can be very costly and should only be recommended where they are necessary to conclusively re-establish the safety status of a dam or where there has been no safety review for a period of fifteen years for Extreme and High consequence category dams or twenty years for Significant consequence category dams.

3) GENERAL INFORMATION

(a) Background/purpose of dam.

(b) Dam details - location (including grid position), access, type of dam, height, volume, crest length, catchment area, reservoir surface area, river or stream, purpose, designer, construction date.

(c) Consequence category (consequences of failure) – Sunny Day and Flood Consequence Categories and basis of assessment - note any new developments in the downstream area (refer DSC3A). The population at risk (PAR) and potential loss of life (PLL) values from the latest dambreak study/risk assessment are to be provided for the Sunny Day, Total Flood and Incremental Flood failure cases.

(d) Appurtenant works - type, nature, number, size.

(e) Spillway type

- Design flood capacity (m^3/s & annual exceedance probability - AEP);
- Dam crest flood capacity (m^3/s & AEP);
- Critical probable maximum precipitation (PMP) flood inflows, outflows and AEP;
- Provide details of any auxiliary spillway or fuse-plugs.

Note that the flood capacity of dams is to be assessed in terms of floods derived from generalised probable maximum precipitation and runoff routing procedures. Where a flood estimate based on a runoff routing procedure, or current generalised PMP, is not available, it is not required that such an estimate be prepared for purposes of the surveillance report. In such a case, however, the surveillance report should highlight this deficiency and recommend a safety review (may be partial) in which the appropriate flood studies (including completion of the DSC's D6 Form on hydrologic capability) would be undertaken. An update of the relevant section of an existing safety review would also be acceptable.

(f) Regional and site geology and potential seismology, including whether there are available estimated seismic loadings prepared by a seismologist.

(g) Visual inspections - frequencies and details of regular inspections by dam operator/caretaker and periodic inspections by an engineer including experience and training status of these personnel.

(h) Monitoring - type of instrumentation, frequency of monitoring and monitoring personnel.

(i) Engineering information available - plans, design and construction reports, *safety review* reports, photographs, and history.

(j) Comparison to previous report's recommendations including outstanding matters.

4) THE SURVEILLANCE INSPECTION

The names of the inspection team, time and date of inspection including weather conditions, storage level and comment on the following matters as appropriate; with emphasis on changes from previous inspections, particularly new seepage and cracking, or changes to existing cracks and seepage. See also the SEED Manual

(USBR 1983) and the FEMA Manual (FEMA 1987) for further guidance on visual inspections.

(a) Dam Structure

(i) Embankment dams (including homogeneous and zoned earthfill, earth core/rockfill and concrete faced rockfill)

The inspections should cover the upstream and downstream faces and the crest, noting such items as:

- condition of concrete, bitumen or other impervious face, noting any cracks, erosion and joint movements;
- condition of rip-rap protection or rockfill (movement, weathering or erosion);
- evidence of slips, erosion, cracks, sink holes, piping, subsidence, movements and mis-alignment;
- condition of embankment with regard to vegetation (ie. grass cover, presence of trees and bushes, impairment of slope protection);
- condition of drainage provisions; and
- seepage through, around and under the dam structure, rate of flow, deposition of iron or other precipitates, colour and turbidity. Correlate between rainfall and seepage to determine rainfall initiated seepage, how collected and measured.

(ii) Concrete Dams (including masonry and roller compacted concrete)

The inspections should cover such items as:

- abnormal settlements, heaving, deflections, lateral movement or mis-alignment;
- condition of joints and sealants;
- cracking or spalling;
- deterioration, erosion or cavitation of concrete and associated materials;
- abnormal leakage through formed drains, concrete surfaces or construction and contraction joints, calcite deposition;
- condition of pressure relief holes and blockage of drains (blocked for how long and what measures taken);
- seasonal effects on seepage flows, dam movement and joint or crack opening;
- condition of galleries (eg. cracks, leakage, movement etc.); and
- during periods of low water level, the condition of structures normally submerged.

(b) Abutment and Foundations

The inspection should cover such items as:

- flows from natural springs;
- seepages from reservoir (differentiate this from other seepage where possible);
- slips and rock movements; including those which may come from above, and which could block the spillway or damage the dam;

- erosion, sinkholes or signs of piping;
- condition of grassing, trees, undergrowth encroachment; and
- drainage, including deposition of sediments.

(c) Spillways (including fuse-plug and emergency spillways)

The inspection should cover such items as:

- channel bank or bed erosion and silting;
- stability of channel batters;
- condition of rip-rap area;
- presence and condition of undergrowth in hollows and on sides of channels;
- abnormal subsidence of back-fill or embankment area;
- blockage of spillway entrance and exit including trees, debris and rockfalls;
- abnormal settlements, heaving, deflections or lateral movement of concrete structures;
- condition of joints and sealants;
- cracking or spalling of concrete;
- deterioration, erosion or cavitation of concrete and associated materials;
- abnormal leakage through formed drains, concrete surfaces or construction and contraction joints;
- condition of pressure relief holes and blockage of drains (blocked for how long and what measures taken);
- during low storage periods, the condition of structures normally submerged; and
- condition of fuse-plugs and emergency spillway as for earth/rock embankments and in terms of likelihood that they will operate as intended.

(**NOTE:** Gates and operating equipment are to be covered in Mechanical and Electrical Equipment - sub section (h).)

(d) Reservoir Basin and Rim

The inspection should cover such matters as:

- sinks or seepage holes on the exposed portions of the storage basin slopes and reservoir floor;
- unusual beaching conditions or cracking;
- signs of debris accumulations with a potential to interfere with spillway operation;
- evidence of landslips or movement of the basin slopes (to note whether recent or old or continually moving);
- seepage through reservoir rim; and
- presence of vortices on surface of reservoir just upstream of main dam wall.

(e) Downstream Areas

The inspection should cover the areas immediately downstream of the dam including such matters as:

- siltation/blockage of downstream river channel;
- erosion and scour of river banks immediately downstream; and
- remote seepage related to the reservoir.

The inspection should also cover the dambreak affected zone where the interest is to identify environmental and development changes downstream which could affect the dam's consequence category;

(f) Inlet and Outlet Works and Associated Structures

The inspection should cover such aspects as the condition of:

- intake structures;
- valve blocks and associated structures;
- pipes (in particular unencased pressure pipes and conduits - assessment of internal and external condition);
- tunnels; and
- access roads and bridges that could affect the safety of the dam.

Operational problems in relation to any of the above are to be reported in terms of surging, damage and noise due to cavitation, fatigue, vibration, and corrosion.

NOTE: All mechanical and electrical equipment including valves should be covered under Subsection (h).

(g) Other Facilities

The inspection should cover the condition of those other facilities that could affect the safety of the dam or the integrity of the storage.

(h) Mechanical and Electrical Equipment

Inspection should cover such items as:

- spillway gates;
- valves and penstocks;
- conduit gates;
- sump pumps needed for dam safety;
- trashracks, shutters, bulkheads, stoplogs;
- hoisting equipment including cranes;
- trunnions;
- lifting cables;
- switches and other items on switchboards;
- wheels, bearings and seals on gates;
- backup hoisting equipment;

- alarms and other emergency systems;
- power including backup;
- control systems;
- electrical systems and actuators and backup;
- hydraulic systems and backup;
- telemetry systems; and
- access for operation including emergency access.

Specialist mechanical or electrical personnel should participate in the inspection where warranted by the complexity of the equipment selected. Items of equipment should preferably be checked for their operation through the full range that is practicable during the inspection. Alternatively, the DSC will accept evidence of properly documented operation in the last year.

There is to be a statement of criticality of each item to the safety of the dam or security of the storage. For spillway gates especially, the inspection party should be alert to any potential for *common cause* failures where a single fault could cause loss of all gates, or a significant number of them. The inspection party should sight reports and records that show equipment is functional and that maintenance schedules have been complied with, particularly for those items listed as critical. The dam operator is to be asked to advise of any problems experienced in operation of the equipment.

5) REVIEW OF SURVEILLANCE PROCEDURES

(a) Inspection procedures

Comment on compliance with the ANCOLD *Guidelines on Dam Safety Management*, August 2003. Review and comment on procedures, both routine inspection by operator/caretaker and periodic inspection by engineer as follows:

- inspection frequency (relates to “sunny day” consequence category);
- inspection check lists;
- inspection report forms and the policy on their retention and retrieval;
- procedures for review and recording of inspection reports;
- resident or off site inspection staff access availability;
- length of experience of personnel in routine dam inspection; and
- any formal training undertaken by personnel in dam inspection procedures.

(b) Monitoring

Review and comment on procedures:

- compliance of monitoring procedures and frequencies with the ANCOLD *Guidelines on Dam Safety Management*, August 2003, requirements;
- monitoring frequencies (relates to “sunny day” consequence category);
- extent of monitoring;
- performance of instrumentation;
- measurements and observations obtained (note records length, how processed, analysed, filed and interpreted) for all instrumentation including:

- pore pressures;
- earth and rock pressures;
- uplift pressures;
- groundwater levels;
- flows of seepage, leakage, drainage and natural springs;
- temperatures;
- rainfall and reservoir level;
- vertical & horizontal movement from deformation surveys;
- internal movement in concrete dams, i.e. tilting, displacement;
- foundation deformation;
- alignment and deflections, crack monitoring;
- performance of post-tensioning systems; and
- seismic monitoring.

- review and analysis of inspection and monitoring data;
- determination of trends, changes and detection of anomalies - this is most important as monitoring data provide the basis for assessing anomalies and checking design assumptions (e.g. data should be suitably presented in graphical or cross-sectional format so that trends and changes can be readily identified); and
- comment on results.

6) OPERATION, MAINTENANCE AND EMERGENCY MANAGEMENT (refer DSC2F and DSC2G for requirements)

(a) Operation and Maintenance Manuals

Advise whether an O&M Manual for the dam is available. If not, then comment on the program for preparing the Manual.

Comment on the status of any existing manual (is it up-to-date, does it comply with ANCOLD *Guidelines on Dam Safety Management*, August 2003 and is it being followed?) In particular, are all the mechanical and electrical items operated, tested and maintained in accordance with the manual? This area is particularly critical for gated spillways.

(b) Dam Safety Emergency Plan

Advise whether there is a Dam Safety Emergency Plan (DSEP) available. If not, then comment on the need and program for preparing the DSEP.

Comment on the status of the existing DSEP (is it in draft or interim form, or being tested, is it up-to-date and does it comply with ANCOLD Guidelines and DSC2G). Is the DSEP being followed? Has it been issued to the DSC and been endorsed by the relevant emergency response agencies? Comment on any associated flood emergency plans if applicable.

(c) Security Measures

Provide a statement on whether adequate measures have been undertaken to ensure security of the dam and storage from terrorist or civil disobedience attacks. Has there been an adequate assessment of threats and vulnerabilities? (Note: Such assessments are sensitive and are not to be included in the report).

7) MINING ACTIVITIES

Provide relevant information on any past, current or proposed mining activity which is sufficiently close that it could affect the dam or its storage, including such matters as:

- location of mine (provide plan in relation to dam);
- materials mined;
- type of mining operation (open cut or underground);
- whether the DSC has been notified of mining;
- whether mining operations are currently in progress or the programmed starting date;
- name of mine operator; and
- whether dam or storage is in a declared mine subsidence area.

8) REVIEW OF DAM SAFETY STATUS

Comparison should be made, where appropriate, between actual behaviour and the original design basis and expected behaviour; also compare design basis with current practice taking into account changes in technology and methodology since the dam was built. Comment on behaviour in relation to historical records, what trends, discrepancies and potential problems.

Areas which must be covered include:-

(a) Action taken as a result of previous report recommendations and matters outstanding;

(b) Findings of, and actions taken as a result of, any reports produced, or incidents which may have occurred (e.g. floods, earthquakes, unusual monitoring results or trends) since the previous surveillance report;

(c) The effect on dam safety of any modifications to the dam undertaken since the previous surveillance report;

(d) Review, and comment on likelihood of, dam failure, and the adequacy of, the dam in light of current criteria (e.g. flood capacity, earthquake capacity, seepage and piping, structural stability, emergency dewatering capability, operation and maintenance, emergency planning, risk assessment and safety review);

(e) Whether the dam clearly meets (or does not meet) DSC requirements (documentation in support of the conclusion must exist), or the dam's safety status is uncertain;

(f) Whether there are changed circumstances that warrant the undertaking of a *safety review* (see *Demonstration of Safety for Dams - DSC2D*); and

(g) An owner is to report on the dam safety management program for a dam by completing the DSC Form D12 (see DSC2A, particularly Appendix A for details), and including it within the surveillance report for the dam.

9) APPENDICES

(a) Dam data sheet, including the consequence category.

(b) Plans

  (i) location & site;

  (ii) general arrangement;

  (iii) cross section; and

  (iv) other drawings as appropriate, particularly foundation treatment.

(c) Photographs, particularly of issues raised as a result of the surveillance inspection. In particular, aerial photographs (or imagery such as Google Earth) of the dambreak inundation zone could be valuable if not already available to the DSC in a dambreak report or DSEP;

(d) Monitoring data summary sheets;

(e) List of files, plan numbers, reports and references relating to the dam;

(f) Completed DSC Surveillance Report Checklist Form D15;

(g) Completed DSC Form D12 - Status of Dam Safety Management System (see DSC2A, Appendix A);

(h) An IBM compatible CD, or equivalent, containing a Microsoft Word format file of the text of the report and a PDF of the entire Report including drawings and photos. This is to meet long-term DSC data storage requirements and assist in preparation of report summaries by DSC staff.

8. REFERENCES

- ANCOLD (Australian National Committee on Large Dams), 2003, *Guidelines on Dam Safety Management*, August.

- DSC (New South Wales Dams Safety Committee) Guidance Sheets (see DSC website-www.damsafety.nsw.gov.au).

- FEMA (United States Federal Emergency Management Agency), 1987, *Manual on Dam Safety: An Owner's Guidance Manual*, August.

- USBR (United States Department of the Interior, Bureau of Reclamation), 1983, *Safety Evaluation of Existing Dams Manual.*

APPENDIX A

D15 (August 2009)

REQUIREMENTS FOR SURVEILLANCE REPORTS

Checklist for owners and consultants preparing Type 1 & Type 2 Surveillance Reports

The following checklist covers the minimum items to be included in Type 1 and 2 Surveillance Reports submitted to the NSW Dams Safety Committee (DSC). Type 3 Surveillance Reports are prepared using the DSC D5 form. Please tick against each item to indicate completion of the item in the Report, and enclose the signed D15 Form with the copy of the Report submitted to the DSC. Please note that Reports which do not address all relevant items may not be accepted.

- ❑ Owner to provide cover letter containing program to carry out recommendations and a completed "Dam Owners Address Form" (D8 form).
- ❑ Conclusions (in point form), including the necessity or otherwise for a *safety review.*
- ❑ Recommendations (in point form), separate from the Conclusions.
- ❑ Dam details – location, type of dam, height, crest length, storage volume, etc.
- ❑ Assessment of Sunny Day Consequence Category & Flood Consequence Category in accordance with DSC3A. Include the Population At Risk (PAR) and Potential Loss of Life (PLL) values for the Sunny Day, Total Flood and Incremental Flood dam failure cases.
- ❑ Appurtenant works, e.g. outlet works – details of type, nature, number, size.
- ❑ Spillway type and Hydrologic data – dated and in accordance with DSC3B.
- ❑ Description of site geology, highlighting any problems.
- ❑ Monitoring – type of instrumentation and frequency of monitoring.
- ❑ Comment on compliance with storage level monitoring requirements in DSC2F/2G.
- ❑ Comparison to the previous Surveillance Report, action taken as a result of the previous Report's recommendations and recommendations not carried out.
- ❑ Details of inspection – names of inspection team and qualifications/experience, date, weather conditions, storage level.
- ❑ Condition of dam - evidence of slips, erosion, cracks, sink holes, piping, subsidence, seepage, settlement, movement, misalignment, etc. & history (old, recent or continuing).
- ❑ Abutments & foundations – seepages related to the storage, slips, erosion, piping, etc. & history.
- ❑ Spillways – stability, erosion, blockages, movement, etc. & history.
- ❑ Reservoir basin & downstream areas.
- ❑ Condition & operability of inlet & outlet works, spillway gates and other mechanical & electrical equipment.

- ❑ Comment on compliance/frequency of inspection and monitoring procedures with the ANCOLD "Guidelines on Dam Safety Management, August 2003".

- ❑ Comment on the instrumentation data over the period since the previous Surveillance Report – seepage rates, pore pressures, deformation surveys, rainfall, storage level, etc.

- ❑ Comment on status of O & M Manual and Dam Safety Emergency Plan (DSEP).

- ❑ Provide information on mining activities close to the dam or storage.

- ❑ Findings of any reports produced since the previous Surveillance Report.

- ❑ Incidents which have occurred since the previous Surveillance Report and actions taken.

- ❑ Changes including operating procedures, developments, management, operating staff.

- ❑ The effect on dam safety of any modifications to the dam undertaken since the last Surveillance Report.

- ❑ Review the likelihood of dam failure in the light of current criteria e.g. flood capacity, structural stability, earthquake capacity, seepage, piping, etc.

- ❑ Statement on security measures.

- ❑ Signatures of Report writers.

- ❑ Dam data sheet.

- ❑ Drawings, e.g. Site, General Arrangement, Cross-Section, Spillway, Outlet Works, etc.

- ❑ Photographs of main aspects of dam taken during the inspection, particularly areas commented on in the Surveillance Report.

- ❑ Monitoring data summary sheets.

- ❑ Completed D15 form.

- ❑ Completed D12 form.

- ❑ An IBM compatible CD, or equivalent, containing a Microsoft Word format file of the text and a PDF of the entire report including drawings and photos.

***Checklist completed by**: .....*

This Guidance Sheet is one of a series available from our Website at:

http://www.damsafety.nsw.gov.au

In order to read this file you need a Portable Document Format (PDF) reader. A free PDF reader is available from http://www.adobe.com/

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