Dams Safety Committee

Annual Report

2003/2004

NEW SOUTH WALES

NSW DAMS SAFETY COMMITTEE

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BUSINESS AND SERVICE HOURS ARE NORMALLY

9.30 am to 4.00 pm MONDAY to FRIDAY

Please note that the NSW Dams Safety Committee (DSC) only has a small number of technical staff who are often away from the office on inspections, etc. Accordingly, technical questions may not be able to be answered immediately, although every effort will be made to pass on messages to ensure a prompt response.

Cover Picture: *Jindabyne Dam is a 72m high rockfill dam forming a major component of the Snowy Hydro Scheme in southern NSW. The photograph has been enhanced to show the new auxiliary spillway and outlet works currently being constructed at the dam by Snowy Hydro Ltd. to provide upgraded flood capacity for the dam and permit environmental releases down the Snowy River*

NOTE: The DSC has prepared 200 copies of this report for distribution to Parliament, relevant organizations, and the public, at a cost of $3,020 (i.e. $15.10 per copy).

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NEW SOUTH WALES

The Hon. Craig Knowles, MP
Minister for Infrastructure and Planning
and Minister for Natural Resources
Parliament House
SYDNEY NSW 2000

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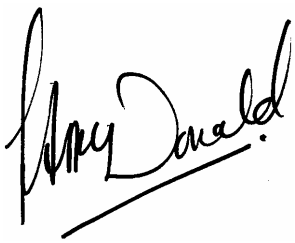
Our Ref: 10.102.007

Dear Mr Knowles,

We have pleasure in submitting to you, for presentation to Parliament, the NSW Dams Safety Committee's Annual Report for the year ended 30th June 2004.

This Annual Report has been prepared in accordance with the Annual Reports (Statutory Bodies) Act 1984 and the Annual Reports (Statutory Bodies) Regulation, 2000.

Yours sincerely,



Len McDonald
Chairman

Adrian Williams
Deputy Chairman

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Overview by Chairman

Our Objectives

The NSW Dams Safety Committee's (DSC's) mission is to develop and implement effective policies and procedures for:

- *regulation of dams safety; and*
- *regulation of mining that could affect dams or stored waters.*

In deciding on tolerable risks from dams, the DSC takes into account modern principles of safety regulation across all industries, as well as relevant international dam safety practices and those recommended by the Australian National Committee on Large Dams (ANCOLD). A dam is classified as safe if it meets the Committee's requirements.

That no prescribed dam has failed does not demonstrate an adequate dam safety management program. International experience has shown the need for systematic programs, involving consequence rating, responsible operations, maintenance and emergency preparedness practices, regular surveillance reporting, periodic safety reviews and implementation of necessary risk reduction measures. During the year, the DSC confimed its requirements for dam safety management programs in line with the newly issued ANCOLD *Guidelines on Dam Safety Management 2003*. Most owners have such programs in place.

In managing threats to stored waters, or to dam structures, from mining under or near the reservoirs, there is not the same degree of guidance from international practice. Upon establishment of the DSC in the late 1970's, a cautious approach was taken in regulating mining activity, based on the then existing scientific knowledge of the effects of mining. Monitoring of these effects continues to provide new knowledge and experience, and the DSC has continued to modify its requirements so as to allow the safe extraction of more coal and mineral resources. The result has been significant economic benefit to the State, whilst maintaining the security of stored waters and the safety of the dams.

Targets

The DSC has adopted the targets given in Sub-section 5.2, Table 2, of this report. During the year, the DSC's main focus continued to be on the key targets requiring that there be programs, approved by the DSC, for reducing risks to tolerable levels on dams identified as having significant deficiencies, that the DSC monitor progress against the program, and that it follow up in a timely manner. Identification of deficiencies and implementation of risk reduction measures for a dam usually requires a period of several years. The DSC must monitor progress, assist the process as needed, and be prompt in stating its requirements.

Highlights

The DSC continued with its review of safety policies, to bring them into line with modern principles of good regulation. Drafts of a position paper on the proposed policies were reviewed by leading specialists and were forwarded to the Treasury in preparation for finalisation and submission for Government approval in late 2004. The policy review involves complex considerations of public safety policy analysis and imposes heavy demands on the DSC's members and small staff.

Safety improvements were completed during the year on Chichester Dam and Green Meadows Detention Basin. Interim improvements were completed on Chaffey Dam and investigations continued into the need for upgrading Hume Dam's flood capacity. The owners of these dams are to be commended for committing substantial funds to the safety improvement of their dams. Starts were made in upgrading deficient Council dams, according to revised priorities identified in a portfolio risk assessment completed in 2002. Progress was made with planning of the risk reduction measures for other dams.

There were no damaging earthquakes in NSW during the year. The only significant dam safety occurence was a piping incident in the embankment of Warkworth Tailings Dam in September 2003. This was detected by required inspection procedures and the flow stemmed before any significant damage to the dam occurred.

Work continued on updating of detailed technical policies and the preparation of new Information Sheets dealing with tailings dams, spillway gates and fusible elements.

Mining, under and near to stored waters continued throughout the year, without any significant adverse effects. The major new Dendrobium Mine, with potential for affecting the reservoir of Cordeaux Dam, commenced operation.

All targets were substantially met, except that on-site inspections were reduced in the short term, while maintaining monitoring oversight, because of priority tasks on mining applications and policy development. Plans are in hand to address these matters in 2003/4 with submissions to restructure funding arrangements to meet essential dam safety regulatory requirements. Submission of dam Surveillance Reports is returning to an acceptable rate following letters that were sent to owners with a view to redressing the back-log situation that had developed.

Our People

The Chairman recently concluded his involvement on the ICOLD International Commission on Large Dams) Committee on Dam Safety after it produced a bulletin of international practice on risk assessment for dams in 2003. He also finished his role with ANCOLD when it published guidelines on risk assessment in October 2003. The DSC is represented on the Board of the Mine Subsidence Technological Society and Engineers Australia.

Most DSC members and technical staff attended the 2003 ANCOLD Conference on Dams. Other training for members and staff included attendance at seminars and refresher courses on Information Technology matters and first aid.

The DSC greatly appreciates the dedication of all staff in their efforts to improve the efficiency of the DSC's operations.

Our Stakeholders

Dam owners, mining companies, and their engineering consultants, have the most immediate contact with the DSC, which seeks to work co-operatively with these people in order to achieve mutually satisfactory outcomes to dam safety and mining issues. Most dam owners and mining companies understand their responsibilities and liability, and are committed to safe practices. The DSC takes a flexible approach and considers proposals on their merits, provided they will achieve tolerably low risks.

The DSC monitors the satisfaction of dam owners, mining companies and other stakeholders with its administration by feedback at meetings and training programs. To assist with proper management of dams, the DSC places considerable importance on providing technical information to owners and their consultants. Updated Technical Information Sheets and relevant technical papers are available on CD-ROM and at the DSC's Internet site. Dam operator training courses were conducted jointly with the Department of Energy, Utilities and Sustainability (DEUS) in December 2003, February 2004 and June 2004.

The Future

The DSC will continue with the comprehensive updating of its safety policies, initially on acceptable flood capacity for dams, since this is the main area of safety deficiency and has the most immediate and significant effects on dam owners.

The DSC will continue to refine its requirements in relation to mining near dams in the light of developments in international practice and the knowledge gained from monitoring the effects of mining.

A survey of international experience with performance of spillway gates will guide the preparation of a technical Information Sheet on gate systems, to be produced in the coming year. The DSC will continue with its support of research on piping risks and slope stability by the University of New South Wales. Detailed policies on risk assessment practices will be developed through a consideration of the new ANCOLD *Guidelines on Risk Assessment-2003*.

The steady increase in the number of prescribed dams, increased mining activities near dams, and the increasing demands of policy development are placing a strain on the DSC's resources which will need to be redressed in 2004/5.

The DSC aims to keep New South Wales at the forefront of good regulation for dam safety by world standards. An extensive network of international contacts, both within the dams' community and among regulators of industrial safety generally, is yielding benefits in continual improvements to DSC policies.

The risks posed by dams are being continually reduced, with priorities set, in conjunction with dam owners, so as to achieve the greatest rate of risk reduction. Once risks are reduced to tolerable levels, they will be kept under review through the owner's regime of routine monitoring, surveillance, safety review, staff training and dam safety documentation procedures. The task of bringing all dams up to standard will not be completed for some years, but much has already been achieved, with nearly all risks of pressing concern now dealt with and the overall level of risk much lower than it was a decade ago.

Len McDonald, Chairman

1. Charter

The DSC is required to "formulate measures to ensure the safety of dams in NSW"

Glennies Creek Mine Pit Dam *was constructed in 2004 to provide mine water storage in the Hunter Valley*

1.1. Why do we have a Dams Safety Committee (DSC) in NSW?

In the 1970's, international concern at several major overseas dam failures led to the Australian National Committee on Large Dams (ANCOLD) raising the need for dam safety regulation. There was also significant consideration by the NSW Government as to the extent of mining that should be permitted adjacent to Sydney's major water storages. Against this background, the NSW Government constituted the NSW Dams Safety Committee (DSC) under the NSW Dams Safety Act, 1978.

It is the nature of risk that, frequently, those who create the risk do not bear it sconsequences or the wider costs. So the market does not function properly as a distributive mechanism. The State must intervene to regulate risk. [Jenny Bacon, then Director-General of the United Kingdom Health and Safety Executive, 1999]

1.2. What Legislation defines our Function?

The DSC has statutory functions under the Dams Safety Act 1978, the Mining Act 2000 and the Coal Mines Regulation Act 2000.

1.3. What is the Function of the DSC?

The DSC is required to "formulate measures to ensure the safety of dams" in NSW. It "prescribes" those dams with a potential for failure that could threaten downstream life, cause extensive property or environmental damage, or have a severe impact on the public welfare. Currently there are 311 prescribed dams (see Appendix B and centre pull-out map).

For prescribed dams, the DSC adopts a regulatory ongoing watchdog role to ensure the owners of those dams, and organizations (eg mining companies) undertaking significant activities near their storages, conform to appropriate safety requirements.

The aim of regulation is that the risks of failures, with consequent community and environmental effects, will be tolerably low. In this context, a "safe" dam, or associated activity, is taken to be one that complies with the DSC's current requirements.

2. Access

The DSC's access details are outlined in the inside front cover of this report.

3. Aims and Objectives

In interpreting its legislative charter, the DSC has adopted the following mission statement.

The NSW Dams Safety Committee's mission is to develop and implement effective policies and procedures for:

- *regulation of dams safety; and*

regulation of mining that could affect dams or stored waters.

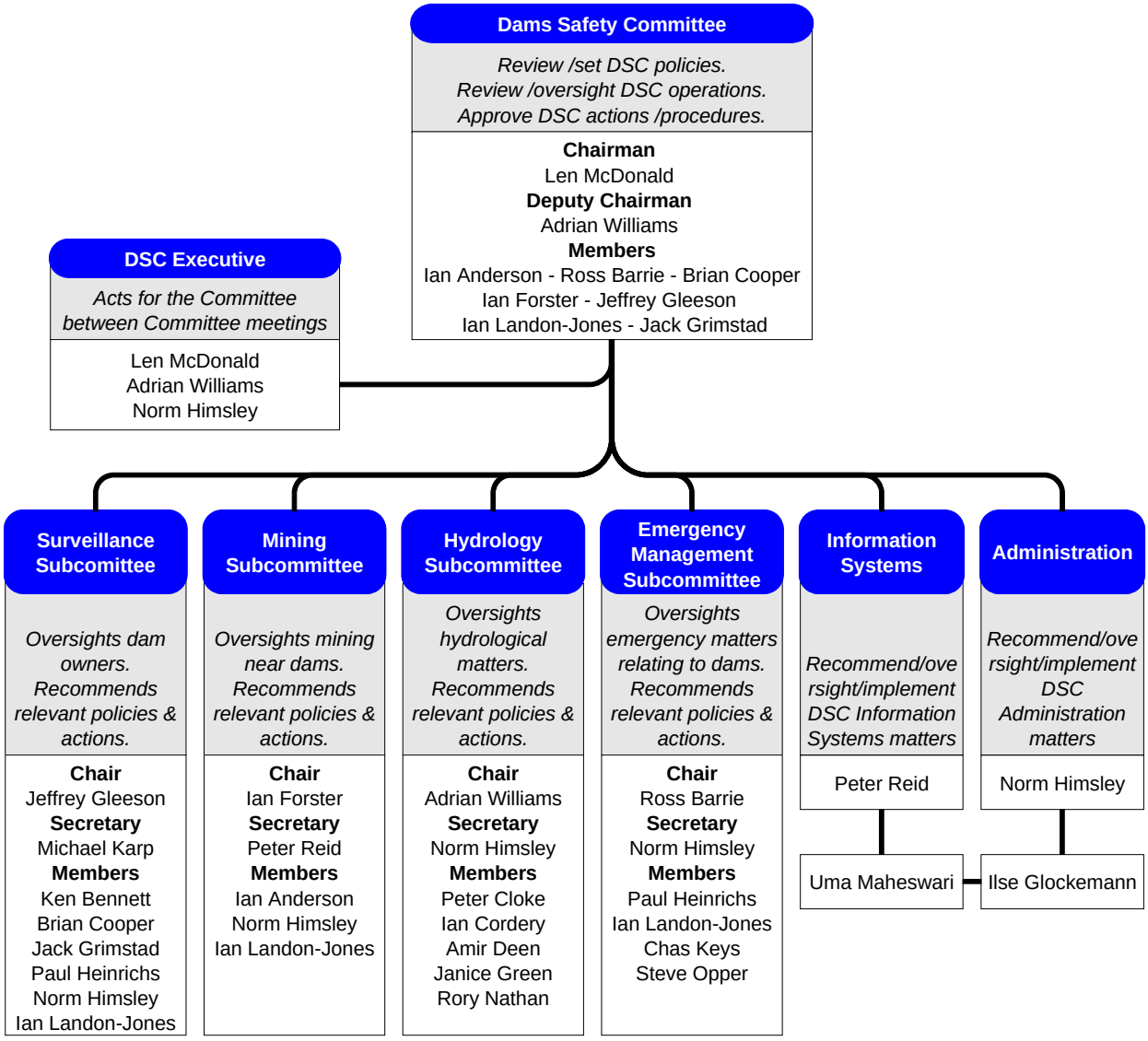
Relevant to this mission statement, the objectives of the DSC are to:

- Protect the safety, welfare and interests of the community from dam failure by ensuring that risks from prescribed dams are reduced to tolerable levels;
- Ensure that risks from prescribed dams remain tolerable over the long-term, by requiring that the risks are regularly reviewed, and further reduced if need be; and
- Protect the security of the waters stored by dams from the effects of mining or other activities.

4. Management and Structure

The DSC is a small statutory body with virtually no assets; it owns no real estate, employs no staff itself but uses staff seconded from the organizations of members, and hires contract staff when required. It operates through two Standing Sub-committees, responsible for Dam Surveillance and for Mining matters, together with ad hoc Advisory Sub-committees on Hydrology and on Emergency Management matters. Most business is dealt with, initially, by the appropriate Sub-committee, which reports to main Committee meetings. The functional organization structure of the DSC is outlined in the following chart:

Dams Safety Committee Organisational Chart



4.1. Committee Members

The DSC consists of nine part time members appointed by the DSC's Minister for four-year terms and usually re-appointed for continuity of Committee experience. Eight members are nominated for their experience in dams engineering and one for experience in coal mining.

In routine matters, the Executive Engineer and standing Sub-committees act for the DSC. Between Committee meetings, its Executive deals with urgent important business or emergencies on behalf of the DSC. Policy initiatives originate both in Committee and in Sub-committees, but all policies are approved by the Committee.


Len McDonald


Adrian Williams


Ian Anderson


Ross Barrie


Brian Cooper


Ian Forster


Jeffery Gleeson


Ian Landon-Jones


Jack Grimstad

Committee membership during 2003/2004, with brief member biographies, is as follows:

Leonard McDonald, B.E., M. Eng. Sc., M.I.E. Aust, C.P. Eng., L.G.E. (appointed to June 2005). Chairman, Nominee of Institution of Engineers, Australia. Initially appointed 1987. Len has practised as a private dams' consultant since his retirement as Assistant Principal Engineer, Dams & Civil section, of the then NSW Department of Public Works and Services. He took over the Chairmanship of the DSC in mid-1997. Until late 2003, he was the Assistant Secretary to ANCOLD and a member of the ICOLD Committee on Dam Safety. Len has more than thirty years experience in the water industry and over twenty-eight years has developed a wide background in all aspects of dam engineering with his involvement as a full time specialist in the design and safety evaluation of many dams.

Adrian Williams, B.E., F.I.E. Aust, C.P. Eng. (appointed to December 2004). Deputy Chairman, Nominee of Sydney Catchment Authority (SCA) until end 2000 and then the Institution of Engineers. Initially appointed 1986. Adrian was General Manager, Dam Safety in the SCA until retiring in December 2000. He has over thirty years investigation, design and construction experience with dams, through work with AWT/Sydney Water and the former Water Conservation and Irrigation Commission. He is a past Chairman of ANCOLD, past Vice-President of ICOLD and is Chairman of the DSC's Hydrology Sub-committee.

Ian Anderson, B.E.(Hons.1), M.E.(Mining), Certificated Coal Mine Manager, Undermanager & Mines Rescueman. (appointed to June 2006). Nominee of the Minister for Mineral Resources. Initially appointed 1994. Ian is a Senior Inspector of Coal Mines with the Department of Primary Industries. He has over thirty years experience in underground, and open-cut, coal mining and is a member of the DSC's Mining Sub-committee.

Ross Barrie, B.E., M.Eng.Sc., MBA, MIE Aust, C.P.Eng. (appointed to March 2007). Nominee of the Water Administration Ministerial Corporation. Initially appointed 1999. Ross is the Assets Services Manager of State Water. He has over thirty years water industry experience and is the Chairman of the DSC's Emergency Management Sub-committee.

Brian Cooper, B.E., M. Eng. Sc., Grad. Dip. Eng. Mgt., M.I.E. Aust, C.P.Eng. (appointed to June 2005). Nominee of the Minister for Commerce. Initially appointed 1997. Brian is Principal Engineer, Dam Safety, with the Department of Commerce, Water Technologies. He has over thirty years water industry experience including extensive dam design experience working with the Department of Public Works and Services and the former Water Resources Commission. He is a member of the DSC's Surveillance Sub-committee.

Ian Forster, B.Sc., M.A.I.G., RPGeo. (appointed to October 2007). Nominee of the State owned Electricity Generators. Initially appointed 1989. Ian is a specialist dam safety consultant with Connell Wagner. He is currently responsible for the safety management of dams owned by the NSW State-owned power generators. Ian has over thirty years experience in dam safety management and geotechnical engineering and hydrogeology related to dams, power stations, tunnels and coal mining. He is the Chairman of the DSC's Mining Sub-committee and a board member of the Mine Subsidence Technological Society.

Jeffrey Gleeson, B.E., F.I.E. Aust, C.P. Eng. (appointed to December 2005). Nominee of Hunter Water Corporation. Initially appointed 1990. Jeff is Manager, Engineering, Hunter Water, the consultancy division of the Hunter Water Corporation. He has over twenty-five years experience in the water and waste-water field with involvement in various aspects of dam engineering and structural design. He is the Chairman of the DSC's Surveillance Sub-committee.

Ian Landon-Jones, B.E. (Hons), M.Eng.Sc., M.I.E. Aust, C.P.Eng (appointed to December 2004). Nominee of Sydney Catchment Authority (SCA). Appointed in January 2001. Ian is Executive Director, Dam Safety with the SCA. He has over twenty-five years experience in the water and waste-water fields, through his work with the SCA and previously with Sydney Water, with involvement in various aspects of dam engineering and structural design. He is a member of the DSC's Surveillance, Mining and Emergency Management Sub-committees.

Jack Grimstad, B.E., M.B.A., M.I.E.Aust, CPEng (appointed to October 2007). Nominee of Snowy Hydro Ltd. Initially appointed 2003. Jack is Manager, Dams & Civil Engineering with Snowy Hydro Ltd. He has over thirty years experience in dam safety and hydro management related to dams, power station and tunnels. He is a member of the DSC's Surveillance Sub-committee.

4.2. Committee Staff

The Committee is assisted by a full time staff of five, seconded from authorities nominating Committee members, with sub-contract assistance where required. Given the extensive workload of the DSC's activities, this small staff provides an effective and efficient service to the DSC's functions. During the year the DSC staff comprised:

Executive Engineer: Norman Himsley, B.E., M. Eng. Sc., Grad Dip Bus, F.I.E. Aust, C.P. Eng. Norm was seconded to DSC in 1986 from a position currently aligned with the Department of Infrastructure, Planning & Natural Resources (DIPNR). He has over thirty years investigation, design and construction experience in dams and engineering services.

Surveillance Engineer: Michael Karp, B.E. (Seconded in April 1999-DIPNR position). Michael has over twenty years experience in water and dams engineering.

Engineering Geologist and Information Systems Coordinator: Peter Reid, B.Sc. B.A. (seconded in 1987-State Water position) Peter has over fifteen years experience in geological/mining fields and extensive computer / information technology experience.

Dams Engineer: Engin Hizbas, BE (seconded in July 2003-DIPNR position).

Administrative Officer: Ilse Glockemann, (Seconded in 1995-DIPNR position).

Information Systems Support Officer: Uma Maheswari, (Seconded in 2001-DIPNR position).

Project Officer Mining Regulation: David Hilyard, BA, MAppl Sc (temporary appointment from June 2003)

Information Systems Support Officer: Kathy Zhou (7 month temp. appointment-2003/4)


Norm Himsley


Michael Karp


Peter Reid


Ilse Glockemann


Uma Maheswari


Engin Hizbas


David Hilyard

4.3. Sub-committees

There are two standing Sub-committees, one on Dam Surveillance and one on Mining. There are two ad hoc Sub-committees, the Emergency Management Sub-committee and the Hydrology Sub-committee, that meet as required. Membership of the Sub-committees is outlined in the DSC's organization chart (see page 8).

Mr Himsley has been appointed to each of the Sub-committees for his technical input, and to provide effective liaison between the Sub-committees and the Committee. He also provides an important role of liaison with dam owners.

4.4. Meetings

The Committee held eight normal meetings during the year, of which six were in Sydney and one each at Jindabyne, and at Keepit Dam, in association with dam inspections. Attendance at Committee meetings was as follows:-

- Mr L.A. McDonald attended 7 out of 8
- Mr A.C. Williams attended 7 out of 8
- Mr I. Forster attended 7 out of 8
- Mr I. Anderson attended 5 out of 8
- Mr J. Gleeson attended 8 out of 8
- Mr R. Barrie attended 7 out of 8
- Mr B. Cooper attended 8 out of 8
- Mr I. Landon-Jones attended 8 out of 8.
- Mr J.Grimstad attended 5 out of 6.

5. Summary Review of Operations

5.1. Major Achievements for 2003/2004

"Substantial progress on producing a policy paper recommending new safety policies, including the incorporation of risk assessment practices into dam safety management"

During the year the following milestones and deliverables were attained:

- Substantial progress on producing a policy paper recommending new safety policies, including the incorporation of risk assessment practices into dam safety management in NSW;
- Further progress in reducing the risks posed by deficient dams in NSW with the upgrading of Chichester Dam and Green Meadows Detention Basin, and the completion of interim protection works at Chaffey Dam;
- Substantial compliance with core business activities, as in Table 2 on the following page;
- Investigation and approvals for several technically challenging applications for coal mining near dam storages;
- Running of three training courses for dam operators;
- Upgrading and networking of the DSC computer systems;
- Upgrading and documentation of DSC procedures;
- Production of updated DSC public information materials; and
- Upgrading of the Committee's record system, including scanning and archiving of old records.

"Three deficient dams significantly upgraded in 2003/4"

5.2. Performance Indicators

During the year the DSC monitored performance indicators, which reflect the objectives of its mission statement, as shown in Table 2 on the following page. Because of the nature of the DSC's work, and the relatively small size of its organization, quantitative indicators are often not entirely appropriate and some of its significant indicators are therefore qualitative.

"DSC updated its records system and procedures"

5.3. Budget Highlights

A summary of the DSC's financial performance is shown in Table 1 with full details given in Section 10 of the Report.

Table 1 - Budget Highlights

Item	$
Income	745,000
Expenditure	770,000
Bank Balance drawdown	25,000

Table 2 - DSC Performance Indicators

#	PERFORMANCE TARGET	PERFORMANCE INDICATOR	RATING
1	Approved programs for safety improvements to dams with known deficiencies	Percentage of deficient dams with current programs in place	100%
2	Follow up action taken within three months of due date	Percentage performance	90%
3	Reports and programs reviewed and response sent within three months of receipt	Percentage performance	100%
4	Significant risk dams (18) inspected yearly	Number inspected this year	9 (Poor)
5	Medium risk dams (32) inspected every two years (average of 16 per year)	Number inspected this year	8 (Poor)
6	Low risk dams (262) inspected every five years (average of 52 per year)	Number inspected this year	54 (Good)
7	Request programs for preparation of dam safety documentation for each dam.	Percentage of dams with documentation requested	100%
8	Update dam safety education material every two years.	Time since last update issued	Updated in 2002/3
9	Annual involvement in providing at least one dam safety education course in NSW.	Number of courses this year	3
10	Compliance with approved Committee funding allocation	Percentage deviation	3%
11	Surveillance Sub-committee	Subjective based on policy progression, reports received and reviewed (average 70 reports / yr) and matters followed up.	Satisfactory. 60 reports reviewed
12	Mining Sub-committee	Subjective based on compliance with monitoring programs, matters followed up and mining impacts as predicted.	Satisfactory
13	Hydrology Sub-committee	Subjective based on policy progression, research oversight and updating of procedures.	Good
14	Emergency Management Sub-committee	Subjective based on policy progression, coordination of matters and implementation of emergency plans for dams	Good
15	Compliance with Records Management Standards	Subjective based on progression in updating procedures and systems, and programs achieved.	Satisfactory
16	Administration	Subjective, based on meeting HR, accounting and logistical needs of the DSC	Good

6. The Future

6.1. Regulation of Dams Safety

"DSC requires NSW dams to present a tolerably low risk to downstream residents, property and environmen."

The DSC sees that the number of dams in NSW will continue to grow and existing dams will be improved to meet community expectations. The DSC's main objective is to ensure that all prescribed dams present a tolerably low risk to downstream residents, property, the environment and associated community interests.

In particular, the DSC will:

- Continue with its dam safety policy development, with a view to having a revised overall policy framework and updated policies in place on key aspects, such as flood capacity for dams and tailings dam management, by mid-2005;
- Develop futher Information Sheets to assist dam owners on such subjects as gated spillways (DSC20), risk assessment (DSC21), embankment dam stability (DSC22) and community and other stakeholder consultation (DSC 23);
- Continue to monitor programs for remedial action on dams, especially those identified as having significant deficiencies;
- Continue to develop the risk indexing of dams, as a basis for assessing the priority and urgency of safety improvements and activities, in order to achieve the greatest rate of risk reduction with the available resources;
- Allow use of risk assessment to better clarify the safety of dams;
- Continue support of research into dam safety risks, suc as the risks of piping (internal embankment erosion) and slope stability;
- Work with NSW dam owners to ensure appropriate dam emergency and security arrangements are in place, and will liase with the State Emergency Management Committee and the State Emergency Service (SES) to facilitate these arrangements;
- Pursue a program to ensure dam owners have in place, and regularly update, Operation and Maintenance Manuals for their dams;
- Maintain liaison with NSW dam owners by continuing its emphasis on education, and by arranging training courses for dam's personnel. The DSC will also arrange staff presentations at meetings and conferences on relevant dam matters, and will provide input to ANCOLD Guidelines;
- Continue to advise dam owners of the value of installing rainfall and flow monitoring equipment to enhance catchment/storage management and flood warning, and to assist in flood analysis, safety review and design. The DSC will continue to promote research into extreme flood estimation and probability;
- Support expansion of the earthquake monitoring network in NSW and collaborate with other agencies in the development of improved seismic analysis of dams, relevant to the characteristics of Australian earthquakes;
- Continue its program to determine the condition of unprotected pipelines through dams and ensure appropriate remedial actions are implemented;
- Maintain liaison with the Department of Environment and Conservation (DEC) and DIPNR to ensure that DSC dam safety requirements are compatible with environmental protection and planning policies; and
- Hold further forums with agencies responsible for nuclear safety and land planning regulation, to update thinking and practices on risk management.

DSC staff leading dam operators in an inspection of ***Mount Thorley Central Ramp Tailings Dam*** *as part of a training course run by the DSC in June 2004*

"The DSC will continue to monitor progress of remedial actions on NSW dams"

"DSC will further develop the integration of risk assessment methods into the traditional dam safety evaluation framework"

6.2. Regulation of Mining near Dams

In the Southern Coalfield, the Dendrobium Mine proposes to longwall mine adjacent to Cordeaux and Avon reservoirs and Upper Cordeaux dam for at least five years. Bellpac No.1 colliery plans further limited mining adjacent to Cataract Reservoir. In 2004/5, Westcliff colliery will continue to mine away from Westcliff Dam and Avon colliery will continue to mine away from Broughtons Pass Weir. A major application from Metropolitan colliery to mine under Woronora reservoir is likely to be made in 2004/5.

To the north of Sydney, United colliery will continue to mine longwalls under Wambo Tailings Dam. The possible stabilisation and decommissioning of this dam may remove the dam safety issues. Applications are also expected in 2004/5 from Wambo Mine (near Wambo Tailings Dam), Duralie Mine (near two surface mine water dams) and Newpac No. 1 colliery (near Ravensworth Void 3 Ash Dam).

The DSC's objective is to regulate mining so as not to restrict extraction of these coal resources, within the constraint that risks to dams, and the stored waters, are tolerable. It continues to urge mine owners to develop a more scientific approach to prediction of the effects of mining utilizing results from a growing database of monitoring information, allied with more sophisticated computer simulation techniques. There is increasing sophistication of mining applications reviewed by the DSC. Improved knowledge has resulted, over time, in the DSC being able to approve the extraction of some coal from under NSW storages, where mining would have not been approved in earlier years.

The DSC's proposed initiatives to achieve its objective are to:

- Ensure adequate protection of dam walls and stored waters by reviewing the maximum extent of ground movements induced by coal mining and, if necessary, increasing the size of Notification Areas;
- Ensure adequate security deposits are held by the State to allow for the timely implementation of dam safety mitigation works in the event that the safety of a prescribed dam or its storage is threatened by mining;
- Promote compliance within the mining industry, and promote an understanding within other Government agencies, of the DSC's mining regulation requirements. Work closely with the recently instituted Subsidence Management Plan Review Committee to facilitate a combined Government approach to mining regulation;
- Develop a revised basis for providing funding needs for mining regulation to cover significantly varying workloads each year;
- Investigate applications of risk management to various aspects of mining developments, and monitor practice and update guidelines accordingly; and
- Explore use of new equipment and techniques for prediction and monitoring to provide a clearer picture of mining induced ground behaviour.

"The DSC will investigate applications of risk management to various aspects of mining developments"

Cadia North Tailings Dam.
The DSC continues to monitor the progressive raising of this major tailings storage facility as mining proceeds at Cadia Gold mine south of Orange

"The DSC continues to develop a more scientific approach to prediction of the effects of mining"

6.3. Administration and Information Systems

The DSC will maintain a commitment in 2004/5 to ongoing implementation of Total Quality Management principles. Procedures and practices will be formalised and updated progressively, records management will continue to be updated, and the DSC's database on dam information will be extended and consolidated to assure the timely provision of dam safety information. Training of DSC staff will be kept up-to-date with appropriate requirements to facilitate effective and safe work practices.

The DSC will keep dam owners informed of its current requirements by regularly releasing updated Information Sheets in paper format, as well as on CD-ROM, and on its Internet site.

"The DSC aims to keep dam owners informed by regularly releasing updated Information Sheets"

7. Review of Operations

7.1. Regulation of Dams Safety

7.1.1. What Dams are Regulated?

The DSC is required to formulate measures to ensure the safety of dams in NSW. The total number of dams in the state is estimated at many tens of thousands, predominantly farm dams. However, the charter of the DSC is to protect life and significant property, environmental and community interests from the effects of dam failure. That is why the DSC only "prescribes" and regulates the safety of those 311 dams with significant failure consequences as detailed in Appendix B.

7.1.2. Policies and Procedures that Apply to the Regulation of Dams Safety

After being informed of a proposed dam, the initial DSC decision is on the need, or otherwise, for prescription of the dam and its regulation by the DSC. These matters are outlined in the DSC's Information Sheet DSC 1. Then for prescribed dams, as shown in the chart below, the Committee has a range of policies and procedures that facilitate its interactions with dam owners and other affected organizations at all stages of the life of that dam.

Interaction of DSC Over Dam Life Cycle

Phase	Interaction
Investigation	Owners provide proposed dam details DSC decides on prescription DSC provides ongoing requirements (see DSC14)
Design	DSC reviews suitability of designers DSC requires design report DSC reviews major design standards (does not review details)
Construction	DSC requires designer oversight of construction DSC requires construction report / certificate on completion
Commissioning	DSC requires Surveillance report one year after construction DSC requires Operation & Maintenance Manual DSC requires Dam Safety Emergency plan if downstream lives at risk
Operation	DSC requires regular surveillance DSC conducts random audits DSC requires submission of Surveillance Reports at regular intervals (usually 5 yearly) DSC requires Safety Reviews at regular intervals (usually 10 yearly)
Upgrading	DSC requirements similar to that for new dam
Decommissioning	DSC reviews proposal DSC requires decommissioning report

For further information on the policies that apply to the regulation of dam safety, refer to the Information Sheets listed in the table below. These are available on-line on our web page (www.damsafety.nsw.gov.au).

Table 3 - Information Sheets for Dams Safety

Document	Description	Update Date
DSC 01	General Information	April 1998
DSC 02	Role, Policies and Procedures	August 1999
DSC 03	Glossary of Terms	April 1998
DSC 05	Advice on Legal Matters for Dam Owners	August 1996
DSC 11	Acceptable Flood Capacity for Dams	August 1992
DSC 12	Operation, Maintenance and Emergency Management Requirements for Dams	April 2003
DSC 13	Consequence Categories for Dams	March 2002 (b)
DSC 14	Requirements for Submission of Information by Dam Owners	August 2000(b)
DSC 15	Requirements for Surveillance Reports	January 2003
DSC 16	Requirements for Earthquake Assessment of Dams	February 2000(b)
DSC 17	Requirements for Assessment of Flood Retarding Basins	August 2000(a)
DSC 18	Dam Design and Construction Issues requiring Particular Consideration	June 2003

Note: (a), (b) indicate revisions of initial Information Sheets.

7.1.3. Changes introduced in 2003/2004

During 2003/4 the DSC:

- Further developed the policy paper, which consolidates and extends the DSC's policies and proposes a staged implementation of risk assessment methodologies into dam safety regulation;
- Finalised protocols with State emergency authorities (eg SES, police) for emergency arrangements relating to dams (see DSC 12 addendum); and
- Implemented a new Information Sheet DSC 18 on "Dam Design and Construction Issues requiring Particular Consideration".

"Staged implementation of risk assessment proposed for dam safety regulation."

7.1.4. 2003/2004 Dams Surveillance Matters

The DSC continually reviews its list of prescribed dams in the light of new proposals, changed conditions, staff inspections and information supplied, to ensure that only dams with the potential for significant failure consequences are prescribed. During the year 11 dams were prescribed, and 4 dams were de-prescribed, giving a total of 311 prescribed dams (see Appendix B and centre pull-out map).

For proposed dams and dam modifications, the DSC requires dam owners to provide design information for its review before construction. In all, 34 such submissions were processed during 2003/4. The DSC does not have, or require, the resources to examine designs in detail, but audits the design process to ensure major safety criteria (e.g. flood capacity, filter provisions) are addressed, and that the designers are competent. The DSC also requires the preparation of design reports and submission of copies to the DSC.

Cowarra Dam. *Surveillance of this 40m high earthfill dam near Port Macquarie is at a high level during its initial filling phase.*

The DSC requires designers to be integrally involved throughout the dam construction process, to approve design changes and thus to "sign-off" that the "as-built" design is sound. DSC staff also undertake inspections to audit construction and to maintain close contact with, and assistance to, the owner's personnel.

Upon completion of construction, the DSC requires dam owners to submit work-as-executed drawings and the "construction certificate" (certifying designer's approval) for the DSC's records. Some dam owners have been slow to comply with this requirement during the year and the DSC has issued follow-up letters requesting the information.

The DSC then requires the dam owner to submit Surveillance Reports at regular intervals summarising the behaviour of the dam since construction. The first report is to be submitted usually after first filling of the dam, which is a critical phase in dam safety, but no later than one year after completion of construction.

Thereafter, dam owners are to provide Surveillance Reports at not more than five yearly intervals (annually for most tailings dams). These reports provide information on the safety status of existing dams and are checked in a staged process by DSC staff, its Surveillance Sub-committee and then the full Committee. These reports enable the DSC to monitor whether dam owners are continuing with a responsible approach to their dams at all stages during the lives of the structures. The extent of reporting varies, with comprehensive reporting required for extreme consequence category dams, down to brief reports for dams of low consequence category (see DSC 15).

"11 dams prescribed, 4 dams deprescribed and 34 dam designs processed in 2003/4"

During 2003/4, the DSC reviewed 60 dam Surveillance Reports (see Appendices A and B for details). This was slightly below the number that needs to be processed annually to avoid a back-log developing. Procedures have been put into place to automatically send letters to dam owners when reports are due, stressing their liabilities and the importance of submitting these reports on time.

"60 dam surveillance reports reviewed in 2003/4"

Surveillance Reports are stored in the DSC's record system, and relevant information from the reports is being progressively incorporated into a computer database. This has been simplified recently by requiring owners to provide electronic copies of each report. The DSC considers that the content and presentation of Surveillance Reports is now of a generally high standard and that owners are responding in a positive and responsible manner to its requirements.

"74 dams inspected during 2003/4"

In addition to the Surveillance Report review procedures, the DSC continued with regular staff inspection of dams, and discussion with owners, throughout the State. There were also inspections by DSC members in conjunction with country meetings. Overall 74 prescribed dams were inspected during the year (see Appendices A and B for details). This number was down in the short-term due to priority tasks on mining applications and policy development. Such inspections and meetings are essential to audit the general safety standard of each dam, its consequence category, and the actual performance of each dam owner in complying with DSC requirements. At the same time, any deficiencies detected are brought to the attention of the owner's representative, and any concerns discussed on site. The inspections also provide useful background knowledge and photographs, against which Surveillance Reports can be evaluated and assessed by the DSC.

Chaffey Dam.
Interim flood upgrading works were completed at this dam in May 2004.

7.1.5. Status of Dams Safety Assessment

Effective safety management of dams requires continual updating by drawing on the results of operational experience and the latest techniques for design, construction and asset management. Each dam is site specific and uncertainties exist in the many areas related to dam safety assessment and risks and society's expectations can change with time.

Dam owners (and their agents) are legally responsible for assessment of all these factors, and to make informed judgments, to ensure the risks associated with their dams continues to be tolerable. As a regulator, the DSC ensures that dam owners discharge this responsibility and that community interests are adequately protected.

To assist owners in this regard, the DSC provides regular updated Information Sheets on relevant dam safety matters. The policy of the DSC is to judge each case on its merits. It will consider any dam safety proposals from dam owners provided they are soundly researched, within the bounds of accepted practice, and, for some situations, are proven acceptable to the community through appropriate consultation programs.

"The DSC provides regular updated Information Sheets to dam owners on relevant dam safety matters"

To adequately assess these proposals, the DSC needs to keep itself updated in all areas of dam safety regulation and management through the continuing education of staff and members. For this purpose, staff and members attend relevant technical symposia, along with meetings with representatives of various dams' organizations, and of hazardous industries generally.

To provide background data needed for safety assessment studies, and the estimation of design loadings for rare, but credible, extreme floods and earthquakes, the DSC has continued to encourage dam owners and Government agencies to install and maintain rainfall/runoff and seismic monitoring equipment.

Hume Dam.
Major upgrading works to bring this dam up to appropriate static and seismic safety standards were completed during the year.

A process of risk assessment, used to better clarify the safety of dams, is now considered desirable to assist in evaluating the relative safety of each dam, to assess risk reduction options, and to assign priority and urgency. During the year, the DSC has continued to assess developments in risk assessment as applied to dams and has fostered discussion in this developing field. It has also supported research into the estimation of risk associated with piping in embankments and foundations, the derivation of extreme rainfall estimates, and the risk assessment of slopes.

The DSC sees that the risk assessment approach provides a framework for comprehensive assessment of dam safety over the whole range of potential failure situations and provides a better understanding of relative risks and consequences. Risk assessment will better clarify safety and thus provide for more informed decision-making. Risk assessment requires that the analysis team work with the decision-maker, and communicate appropriately with the affected community, to formulate an informed overall judgment of the safety requirements for a dam.

A factor in determining that risks are acceptable is the effectiveness of emergency response actions. Effectiveness is difficult to determine before the emergency occurs. To maximize effectiveness, the DSC, through its Emergency Management Sub-committee, has developed a protocol with the SES for the development of appropriate interim emergency procedures for deficient dams in NSW. The Sub-committee is also examining the feasibility of developing acceptable "long-term" flood emergency plans to minimise the risk to life from dam failure events.

From information received on dams, the DSC identifies those with possible safety deficiencies and reaches agreements with owners on needed safety improvements, or the activities needed to clarify safety, and a timetable for actions. Once it has been established that a dam has a significant deficiency, the owner is to submit a program for safety improvement. To focus the attention of the DSC across owners, it regularly updates its provisional risk index ranking of dams and the SES is informed to guide them with interim flood planning downstream of deficient dams.

The DSC then oversights progress against the approved safety improvement program, which can necessarily extend over many years to allow for detailed investigations and community consultation, financing and implementation.

This process continued throughout the year. As a result, forty one deficient dams have now been modified for safety upgrading following the DSC's establishment, as shown in Table 4. For some of these dams, there has been a series of improvements made. In 2003/4 flood upgrading works were completed on Chichester Dam and Green Meadows Retarding Basin, and interim upgrading works were completed on Chaffey Dam while investigations continued into long-term upgrading options for that dam.

Table 4 - Dams Modified for Safety Upgrading

Dam	Upgrade Cost Orders ($M)	Deficiency	Year Upgrading Completed	Nature Of Upgrading
Ben Chifley	10-100	Flood	2001	Dam raised and spillway post-tensioned
Burrinjuck	10-100	Flood	1996	Dam raised 15m and post-tensioned
Blackbutt	<1	Flood	1995	Spillway upgraded
Bonalbo	<1	Flood	1989	Spillway upgraded
Captains Flat	1-10	Flood/Stability	1993	Dam post-tensioned
Cataract	10-100	Flood/Stability	1987	Dam post-tensioned
Chichester	1-10	Flood/Stability	1995/2003	Dam post-tensioned, abutment stabilised
Coalcliff	<1	Flood/Stability	1999	Spillway enlarged, embankment upgraded
Cordeaux	<1	Flood	1988	Internal drainage improved
Dungowan	1-10	Flood	1992	Spillway augmentation, dam raising
Dunn Swamp	<1	O&M	1995	New outlet, wall repair
Emigrant Creek	1-10	Flood	2001	Dam post-tensioned, abutments raised.
Foothills Rd	<1	Flood	1997	Embankment stabilised, new spillway
Glenbawn	10-100	Flood	1986	Dam raised, storage augmented, new spillway
Googong	10-100	Flood	1992	Dam raised, spillway stabilized
Grahamstown	1-10	Flood	2001	Dam core raised, face armoured, spillway improved
Green Meadows Basin	<1	Flood	2003	Embankment & crest stabilised, new spillway
Honeysuckle Ck	<1	Flood	1991	Post-tensioned and raised
Hume	10-100	Stability/ Earthquake	1973/2003	Embankments stabilised, gates/outlets upgraded
Killara	1-10	Stability	1994	Embankment walls stabilized
Lyell	10-100	Flood	1996	Dam raised, spillway and storage augmented
Manly	1-10	Flood	1984	Dam post-tensioned
Mardi	1-10	Earthquake	1991	Embankment stabilized
Moolarben	<1	Flood	1993	Spillway augmented
Nepean	10-100	Flood/Stability	1992	Spillway augmented, dam post-tensioned
Northmead Basin	<1	Flood	1994	Embankment raised, strengthened
Oberon	10-100	Flood	1996	Dam raised, additional spillway
Orange Agricultural	<1	Flood	1997	Spillway augmented
Palm Tree Grove	<1	Flood	1990	Embankment raised, strengthened
Pindari	10-100	Flood	1993	Dam raised, storage augmented, new spillway
Prospect	10-100	Earthquake	1997	Upstream dam embankment stabilised
Rydal	1-10	Stability/Flood	1993	Dam wall stabilised, spillway augmented
Rylstone	<1	Flood	1995/2003	Auxiliary embankments removed.
St Joseph Sch. Basin	<1	Flood	2001	Bank stabilisation and new spillway
Tilba	<1	Flood/Stability	1997/2003	Dam wall raised, toe drained
Tumbarumba	<1	Stability	1999	Embankment drainage installed
Warragamba	>100	Flood	2001	Dam post-tensioned, raised 5 m, new spillway
Wentworth Falls	<1	Flood	1993/2003	Dam raised, spillway augmented
Wellington	<1	Flood/Stability	1996/2002	Dam demolished
Wollondilly Wash.	<1	Flood	1998	Dam raised, emergency spillway installed
Woronora	<1	Flood	1988	Internal drainage improved

The dams currently identified as posing significant safety risks are ranked in Table 5 together with the year in which the deficiency was determined, and the status of the safety improvement program for each dam. Dam owners have commenced remedial studies or upgrading works for all of these deficient dams, and the DSC monitors their progress. If owners fail to achieve satisfactory progress, the DSC works with the owners to ensure an improved outcome. Should owners not respond positively, the DSC could issue a notice under Section 18 of the Dams Safety Act. It was not necessary to issue any Section 18 notice during the year. In addition, the DSC is monitoring owners' progress in developing action programs for dams with minor deficiencies, and owners' nvestigations into several other dams to confirm their safety status (see Appendix B for details).

As mentioned in previous DSC Annual Reports, significant upgrading works at Hume Dam have been completed at a cost of over $80 million. In addition, a Dam Safety Emergency Plan (DSEP) by the owner, and a downstream flood plan by the relevant emergency agencies, has been instituted and tested to minimise the risks to downstream residents. The remaining safety evaluation area for the dam, the dam's flood capacity, is currently nearing the end of its investigations as a prelude to development of improvement options.

The DSC has been observing closely the work of State Water on its risk assessments for its portfolio of dams, in particular, the need for the early reduction of risks at Keepit, Chaffey and Bethungra Dams. At Keepit and Chaffey Dams interim remedial actions have been implemented and community consultations continued to facilitate planning for long-term safety improvements. An interim flood warning system has been implemented at Bethungra Dam to minimise the risks to downstream residents while investigations continue into long-term options.

During the year Snowy Hydro Ltd commenced construction of a major flood capacity and environmental flow upgrading of Jindabyne Dam at a cost of over $50million. These works are programmed for completion in 2005.

Work continued, during the year, on the implementation of a prioritised program to improve safety on 20 deficient dams in the portfolio of dams owned by local government councils. This portfolio is under the jurisdiction of the Department of Energy, Utilities and Sustainability. Rylstone and Wentworth Falls Lake Dams were upgraded in 2003, and construction works are planned in 2004/5 for Company, Spring Creek and Sooley Dams.

Table 5 - Status of Dams with Significant Safety Risks

Dam	Deficiency		2003/2004 Upgrading Progress
	Type	Identified	
Company	F	1992	Upgrading construction programmed in late 2004. (FWS)
Sooley	F	1992	Upgrading programmed during 2004/5 (FWS)
Hume	F	1994	Stability and earthquake upgrading works completed, studies of flood requirements continuing (FWS)
Redbank Creek	F,E,S	1996	Upgrading options being further revised. (FWS)
Lake Endeavour	F,E,S	1995	Upgrading options being investigated. (FWS)
Spring Creek	F,S	1994	Finalising upgrade design, upgrade programmed in 2005/6. (FWS)
Keepit	F	1995	Interim works completed. Investigating long-term options. (FWS)
Chaffey	F	1995	Interim works completed. Investigating long-term options. (FWS).
Coeypolly Ck 2	F	1993	Upgrading options being investigated. (FWS)
Bethungra	F,E	2000	Upgrading options being finalized for construction in 2005. (FWS)
Dumaresq	F,S	2000	Upgrading design programmed for 2005. (FWS)
Blowering	F	1996	Staged upgrading works programmed to commence in 2005. (FWS)
Imperial Lake	F	2000	Upgrading options being investigated.
Jindabyne	F	2001	Upgrading commenced in May 2004 for completion in 2005. (FWS)
Lake Rowlands	F,S	2003	Deficiencies identified
Khancoban	F,S	2001	Upgrading options being investigated (FWS)
Winburndale	F	1995	Upgrading options being investigated (FWS)
Lake Canobolas	F	2002	Flood deficiency identified
Cecil Park Basin 3A	F,S	2002	Upgrading options being finalised. Sewer main in embankment fortified.

F – Inadequate Flood Capacity
E – Inadequate Earthquake Structural Resistance
S – Structural Inadequacy under Normal Operating Conditions
FWS—Flood Warning Systems installed

7.1.6. Flood Capacity and Hydrology

"Storms in NE Tasmania in February 2004 failed several dams"

In line with world-wide experience, inadequate flood capacity continues to be the most serious problem faced by NSW dam owners, as reflected in the deficient dams listing (Table 5). These deficiencies have become apparent as meteorologists and hydrologists have gained better data and a clearer understanding of extreme climatic events.

To keep pace with this increasing knowledge, the DSC requires NSW dam owners to undertake regular reviews of the flood capacity of their dams and to determine the need for any remedial action(s).

Initially, generalised Probable Maximum Precipitation (PMP) estimates are required to define extreme storm rainfalls for each dam. The Bureau of Meteorology sets the procedures for this work. These PMP events, while very rare, are plausible and several near PMP events have occurred. Generalised procedures are now available in NSW for PMP storms of any duration and area, following the Bureau's completion of its review of long duration tropical storm estimates for northern NSW in early 2004. Work on this review commenced in 1999, with the DSC involved in the project's Steering Committee and in co-ordinating financial support from the NSW dams' industry.

Grahamstown Dam.
Raising of the dam's storage capacity and complementary flood handling capacity is currently being undertaken by Hunter Water Corporation.

Rainfall estimates then need to be converted to flood predictions by the dam owner's hydrologists, using approaches outlined in *Australian Rainfall and Runoff*, produced and currently being updated by Engineers Australia. The DSC continues to monitor research into estimation of rare storm events for input into dam risk assessments, including current work to develop the FORGE method for estimating storms up to an annual exceedance probability (AEP) of 1 in 5,000.

The DSC has put on its web site a draft of updated normal flood requirements (Information Sheet DSC 11), which it plans to finalise in 2005. In setting out its requirements, the DSC has been guided by the advice of its Hydrology Sub-committee, which maintains a close liaison with ANCOLD and Engineers Australia, and with hydrologists from various dam-owning authorities, and academia, throughout Australia.

As rainfall and flow data are very limited in Australia, the DSC has continued to encourage dam owners to install hydrologic instrumentation around their dams to assist in calibration of hydrologic models, and to contribute to the improvement of knowledge of rainfall/runoff processes within the industry. The data will also assist in estimating available yield for water supply, as well as providing valuable input to planning and warning for flood conditions.

"A storm at Dapto in 1984 dumped 520 mm of rain in 6 hours – a near PMP event"

7.1.7. Earthquake Structural Capacity

Historically, several earthquakes of around Magnitude 7 have occurred in Australia and the 1989 Newcastle earthquake (Magnitude 5.6) provided a reminder that large damaging earthquakes can occur. Seismologists indicate that major earthquakes (ie up to Magnitude 7.5) could occur anywhere in NSW and that a Magnitude 7.5 earthquake has about 1,000 times the destructive power of the Newcastle earthquake.

Many overseas dams have survived nearby earthquakes up to Magnitude 8 and current knowledge indicates that well-constructed concrete, and compacted earth/rockfill, dams on good foundations are inherently stable during earthquake events. Fortunately these types form the bulk of NSW prescribed dams.

"Seismologists indicate that major earthquakes up to Magnitude 7.5 could occur anywhere in NSW"

The DSC initially directed its earthquake stability concerns to the owners of the few vulnerable dams and, following investigations by their owners, earthquake stability remedial works have been completed at Mardi, Prospect and Hume Dams. In addition, stability reviews are required to be included in the regular safety reviews of NSW prescribed dams. To provide current guidance for designers and reviewers, the DSC issued, in 2000, its revised earthquake safety requirements in a new Technical Information Sheet (DSC 16), which replaced its 1993 interim requirements.

In 2003/4 the largest seismic event in NSW was a Magnitude 4.2 earthquake near Moss Vale in December 2003 and the largest national event was a Magnitude 5.4 earthquake near Mount Redvers in the Northern Territory in February 2004

Scarcity of long-term seismic data in NSW to use as a basis for determining the earthquake design loadings for dams remains a concern for the DSC.

The seismic monitoring network, installed on Sydney Catchment Authority (SCA) dams in the early 1990s, has already recorded evidence of minor seismicity in the area and provided data for future design use on dams and other structures in the Sydney area.

The SCA network complements the Newcastle network installed after the 1989 earthquake, along with some seismic stations at State Water and Snowy Hydro dams, and the national grid installations of Geoscience Australia. The DSC will continue to support expansion of this seismic network throughout NSW to provide valuable design data and insight into earthquake activity in NSW.

"In 2003/2004 the largest seismic event in NSW was a Magnitude 4.2 earthquake near Moss Vale in December 2003 and the largest national event was a Magnitude 5.4 earthquake near Mount Redvers in the Northern Territory in February 2004"

7.1.8. Structural Safety under Normal Operating Conditions

Dams are long life structures, with the oldest dam in Europe some three thousand years old, and the oldest prescribed dam in NSW, Lake Parramatta Dam, being nearly 150 years old. Given that the average age of major NSW dams is over 40 years, the structural safety of these dams under normal operating conditions is considered to be generally satisfactory when checked using current methodology. Where deficiencies have been revealed, the DSC has required owners to undertake safety reviews and implement any consequent remedial action.

Particular areas of concern to the DSC include:

- The safety of older earth dams, without intercepting filters to control piping and seepage, which may require buttressing and/or supplementary drainage. Hume, Mardi, Tilba, Rydal and Tumbarumba dams have been upgraded in this regard. In addition, there appears to be no clearly recognized established international practice on piping safety for such dams. The DSC has plans for an Information Sheet to assist owners to address this problem.
- The deterioration, with time, of unencased pressure conduits through embankments could lead to uncontrolled high-pressure leakage through the embankment, leading to washout and dam failure. The DSC requires dam owners to investigate and monitor their conduits on a priority basis.
- The need to better understand piping and slope stability risks of embankment dams. A research program, initiated in 1996 by the University of NSW and sponsored by the DSC and several major dam owning organizations has developed valuable new understanding in this area. The DSC will continue to sponsor further research in this area.
- The reliability of spillway gates, given several serious incidents and dam failures world-wide involving gate failures. The DSC requires NSW dam owners to regularly review their gates' safety and to ensure high reliability through systems upgrades and proper operation and maintenance procedures. To assist in this area, the DSC has been jointly involved in issuing a questionnaire world-wide to dam owners with gated spillways to provide data for the production of a DSC Information Sheet for guidance on this aspect of dam safety.
- The safety of tailings dams usually associated with mining. Several incidents on prescribed dams have highlighted the special vulnerability of these types of dams. The DSC has concluded that there is a need to develop safety policies specific to tailings dams and an Information Sheet is being developed for guidance to owners of such dams.

Warkworth Tailings Dam. *Surveillance of this dam in the Hunter Valley detected an incipient piping incident in September 2003 with remedial actions quickly implemented by the owner.*

"The average age of major NSW dams is over 40 years with the oldest nearly 150 years old"

7.1.9. Operation, Maintenance and Surveillance

Dam materials, components and machinery deteriorate with time. Ongoing operation, maintenance and surveillance is essential and cost-effective, otherwise reduced life expectancy or failure could result (e.g. a near piping failure of a Hunter Valley tailings dam in 2003 was averted by timely detection). The rehabilitation works (eg. Bethungra Dam, Redbank Creek Dam), or decommissioning (eg Wellington Dam), found necessary for some older NSW dams illustrate the deterioration that can occur as dams age.

The DSC requires dam owners to develop and maintain operation and maintenance (O&M) manuals, based on organized programs and systematic inspections. The DSC maintains an active education program in this area and audits performance through the owner's five yearly Surveillance Reports and by regular inspections of dams by DSC members and staff.

The ANCOLD *Guidelines on Dam Safety Management-2003* set out contemporary requirements in this area, based on industry best practice. They provide a basis for a more uniform national approach to proper dam safety management, and the DSC has adopted them as its requirements for use in NSW. The DSC's Executive Engineer was the Convenor of the working group, which produced these guidelines.

Emigrant Creek Dam. *Surveillance of this dam has indicated the need to seal leaking post tensioning tendons recently installed to stabilise the spillway section of the dam*

"The DSC continually promotes the need to develop and maintain basic operations and maintenance programs and manuals for NSW dams"

7.1.10. Dams Safety Emergency Management

The DSC's primary objective is to protect the public from the uncontrolled release of water from dam storages and it requires that dam owners prepare Dam Safety Emergency Plans (DSEP) for dams posing a risk to downstream residents. During the year work continued on these plans, which are now in place for the majority of deficient, and extreme and high consequence category, dams. This planning covers monitoring procedures, actions to be taken by the owner's personnel, pertinent advice to emergency management agencies, and relevant information concerning the nature of dambreak flooding. These plans also take into account the general increase in security required world-wide for strategic assets such as dams.

Responsibility for developing and maintaining flood plans in NSW rests with the State Emergency Service (SES). The DSC requires dam owners to assist the SES in developing Flood Plans to protect residents against the impacts of major floods that pass through their dams, including a potential dam failure. The value of these plans, even for dams that meet normal safety requirements, was demonstrated in 1999 with activation of the Lyell Dam DSEP, facilitating the timely evacuation of campers after the unexpected failure of the dam's inflatable spillway section. Also, further demonstration was provided during the late 2000 Tamworth floods, with the timely evacuation of residents downstream of Chaffey Dam.

The SES has continued to prepare and update flood emergency plans for communities downstream of deficient NSW dams during the year. The DSC is pleased with the public response to implementation of this planning, and continues to press for early and comprehensive public awareness campaigns to inform affected residents of the details of these flood emergency plans

To mesh the responsibilities of dam owners and the SES, the DSC's Emergency Management Sub-committee meets, as necessary, to review and monitor the procedures used by the agencies concerned. As a result, an amendment has been made to the State Disaster Plan recognising the responsibilities of the DSC in the area of dam emergencies. Also dam incident warning protocols have recently been developed with all of the emergency agencies. The Sub-committee also provides a channel for information exchange between the DSC and the SES, giving the SES regular updates on the safety status of dams in NSW.

Mooney Upper Dam.

A dam safety emergency plan is currently being prepared for this dam in the light of a recent dambreak study determining population at risk downstream.

7.1.11. Flood Retarding Basins

Flood retarding basins, and some pollution control basins, are holding ponds normally constructed in urban areas to temporarily store stormwater runoff, and reduce downstream flood levels. They are usually designed to mitigate small, frequent, floods, but may also have considerable community benefits (e.g. recreational areas, scenic ponds). They vary in size from commercial/industrial on-site storages up to large basins several hectares in area, such as the Loyalty Road Retarding Basin, upstream of Parramatta, which is formed by a concrete dam over 20m high.

"The DSC requires that flood retarding basins are designed and constructed in accordance with good dams engineering practice"

When these basins store water they act as dams, and the DSC prescribes those that would pose a significant threat to downstream communities or the environment in the event of failure. Although basins are generally small, their potential threat to a community can be as significant as that from a major dam due to their location within residential areas. They thus need to be designed and constructed in accordance with good dams engineering practice.

The DSC's requirements for basin flood capacity extend past design standards, such as the 1% Annual Exceedance Probability (AEP) flood often used for urban drainage design. The community generally does not appreciate the potential for larger floods to occur. Recent examples, of events exceeding the 1% AEP mitigation limit, were the storm events in Wollongong in August 1998, in the southern Newcastle area in April 2001 and in Mudgee in February 2003. These floods caused severe damage to urban areas, except for those properties downstream of prescribed flood retarding basins and dams.

It should be noted that with several hundred basins in NSW, there is a strong possibility that one or more basins could be tested annually by an extreme storm.

The DSC's requirements aim to ensure that basins will withstand appropriately large floods, or that basin failure does not involve a significant risk to life. The design needs to allow for the effects of future development in the area and the "domino effect" of basin failure if there are multiple basins in a cascade arrangement.

"The DSC is concerned with the poor degree of maintenance of some flood retarding basins"

The DSC requires that prescribed retarding basins are subject to relevant procedures regarding surveillance, inspection, operation and maintenance but continues to be concerned with the poor maintenance some basins receive in the long-term. Inspections still reveal basins with partially blocked outlets which can significantly reduce the basins' flood capacity. This reinforces the need for basins to be inspected monthly, as part of their maintenance schedule, as well as after significant flood events.

The DSC continues to maintain close liaison with basin owners during the design stage, particularly to oversight urban drainage designers whose experience of dams engineering is often limited to small structures. DSC staff carry out regular basin inspections and the DSC has prepared an Information Sheet on retarding basins (DSC 17-updated in 2000).

Greenway Drive Basin 10 A/B.

The basin owner is currently investigating upgrading options for this basin to maximize its recreational potential and flood retarding features.

7.2. Regulation of Mining near Dams

7.2.1. Background

"The DSC sets Notification Areas around dams to provide a minimum buffer zone to unrestricted mining"

Under the NSW Dams Safety Act 1978, any activity that may impact on the safety of a prescribed dam, or its stored waters, may be regulated by the DSC. The most common activity that could result in a "dam safety" impact is mining, and the DSC uses powers under both the Dams Safety Act 1978, and the Mining Act 1992, to ensure that mining risks around dams are acceptably low

The DSC sets Notification Areas around selected prescribed dams (see Appendix B) on the basis of mining experience to provide a minimum buffer area, outside of which mining would be unlikely to prejudice the integrity of the dam or its storage. Details of these Notification Areas are published in the Government Gazette. The DSC requires mining companies to advise it of any proposed mining within those Notification Areas so it can recommend to the Minister for Mines appropriate conditions to be put on the proposed mining.

7.2.2. 2003/4 Overview

There has been a resurgence of interest in coal mining near dams and storages during the year. Nine new applications were processed, mainly for mining by the new large Dendrobium Colliery near Cordeaux Reservoir. Discussions regarding future applications were held with seven collieries (Dendrobium, Bellpac No. 1, Wambo Mine, United Colliery, Duralie Mine, Newpac No. 1 and Metropolitan Colliery). This is an unprecedented level of interest (see details-Tables 7 and 8) and the DSC had to re-prioritise its review and processing of applications while minimising delays on mining operations.

During 2003/2004, under the DSC's guidelines, 400,000 tonnes of coal were extracted from mine workings within the Notification Areas of prescribed dams in NSW, without jeopardising the integrity of these dams or their storages. Prior to the formation of the DSC, much of these coal deposits would not have been mined, due to the safety concerns of dam owners.

*DSC staff inspecting the geology adjacent to **Cordeaux Reservoir** prior to proposed undermining in 2004 by Dendrobium Colliery.*

"During 2003/4 some 400,000 tonnes of coal was extracted from under NSW storages"

7.2.3. Details of New Applications and Currently Monitored Mines

Westcliff Colliery continued to longwall mine over 1.9km from Brennans Creek Dam with negligible effects on the dam. The DSC will continue to monitor this situation.

Appin Colliery continued to longwall mine over 1.7km from Broughtons Pass Weir. Initially, nearby mining caused some cracking of the weir but its safety is still acceptable. Weir movements are tapering off as mining moves further away, with monitoring to continue until the movements become negligible. The colliery has assured the DSC that its problems of compliance with the conditions of mining will soon be resolved to ensure an adequate monitoring program is maintained.

Dendrobium Colliery commenced mining by first workings, in preparation for longwall mining, adjacent to and under Cordeaux Reservoir. An application for longwall mining in Area 1 is still being considered. Although a number of important management plans have yet to be finalised, small areas of first workings have been approved so far, some of these passing under the storage.

"Dendrobium Colliery commenced mining adjacent to and under Cordeaux reservoir in 2003/4"

The DSC has expressed concern to the colliery over a number of aspects relating to the application, and subsequent high level discussions have been positive to clarify the process for assessment of mining proposals and their timely approval. Compliance with mining approvals has improved throughout the year and the colliery is working with the DSC to achieve 100% compliance.

The Committee will continue its efforts to minimise the risk to Cordeaux Reservoir by requiring the applicant to fully investigate the impact of mining, and by continuing to ensure that an adequate monitoring program is maintained.

*Drilling investigations to determine site conditions prior to proposed mining by Dendrobium Colliery adjacent to **Cordeaux Reservoir** in 2004.*

"United Colliery applied for the first of a series of longwalls to be mined under Wambo Tailings Dam"

Bellpac No. 1 Colliery sought to re-commence mining of two pillar extraction panels adjacent to Cataract Reservoir. The colliery has a history of compliance failures, and during routine checks a small area of apparently unauthorised mining dating from 2001 was detected. A five point plan aimed at protecting the stored waters and allowing some mining to proceed was put to the new owners. Each point was satisfied and the Committee endorsed the proposal. Mining has yet to re-commence in the renewed area.

United Colliery applied for the first of a series of longwalls under Wambo Tailings Dam. The application is being processed.

Cooranbong Colliery maintained a monitoring program near Dora Creek Effluent Pond. Mining has now ceased in this area and the impact of mining on the stucture appears to have been negligible.

7.2.4. Policies, Procedures and Organizational Updates

The DSC has a range of policies and procedures, which vary through the life of a mine, to facilitate safe mining operations near dams. There was no significant policy or procedural change during the year and information on mining policies is given in the Information Sheets listed in Table 6 below and available on-line on our web page (www.damsafety.nsw.gov.au)

A new staff member (David Hilyard) joined the staff, and the Chairman of the Mining Subcommittee (Ian Forster) became the nominee of the NSW power generators (formerly the nominee of Pacific Power).

The Committee nominated a representative for the Department of Mineral Resources' Subsidence Management Plan Review Committee. Although the DSC will continue to manage the dam safety aspects of mine subsidence around major dams independently of the Department, the SMPRC is considered to be a worthwhile forum for fostering inter-departmental cooperation.

Table 6 - Information Sheets for Mining near Dams

Document	Title	Date
DSC 32	Notes on the Administrative Role of the Dams Safety Committee in the Granting of Mining Leases and Approval of Mining Applications	June 1998
DSC 33	Mining in Notification Areas of Prescribed Dams	June 1998
DSC 34	Typical Monitoring Program Requirements for Mining near Prescribed Dams	August 2000
DSC 35	Mining Contingency Plans to Minimise Loss of Stored Waters from Dams	June 1998

7.2.5. Mining Statistics

Table 7 - Mining in Notification Areas

Item		2001/2	2002/3	2003/4
Coal Removed from Notification Areas (million tonnes)		1.2	0.3	0.4
First Workings (km length)				13.5
Current Approvals:	Actively Mining	6	4	2
	Actively Monitoring	7	6	7
Applications Processed		4	1	9
Variations to Existing Approvals		6	1	0
Coal Titles Processed		0	2	3
New Proposals Discussed		3	4	7
Site Inspections (person days)		2	2	15

Table 8 - Monitored Approved Mining 2003/2004

Approval	Colliery	Dam	Mining Type	Possible Effect on Active Mining	Dam Storage	Dam Structure	Currently Monitoring
Bellambi 6-11	Bellpac 1	Cataract	Longwall	No	Yes	Yes	Yes
Bellambi-13/14	Bellpac 1	Cataract	Pillar extraction	No	Yes	No	Yes
Westcliff 2	Westcliff	Brennans Creek	Longwall	Yes*	Yes	Yes	Yes
Appin 2	Appin	Broughtons Pass Weir	Longwall	Yes*	Yes	Yes	Yes
Dendrobium 1	Dendrobium	Cordeaux	1st workings	Yes	Yes	No	Yes
Dendrobiyum 2	Dendrobium	Cordeaux	1st workings	Yes	Yes	No	Yes
Cooranbong-1	Cooranbong	Dora Ck	Pillar extraction	No	Yes	No	Yes

*-Mining outside Notification Area is still having minor influences on dam

7.3. Information Systems

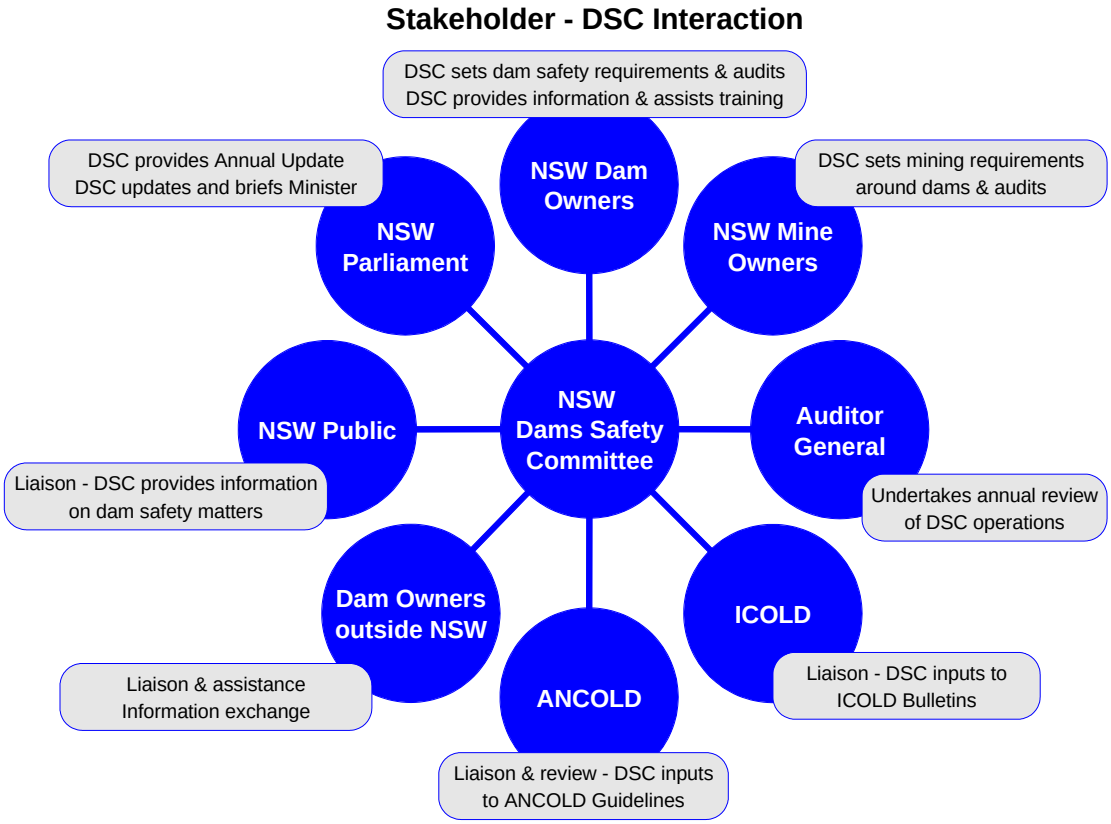
"In 2003/4 the DSC updated its databases and created a new meeting's minute database"

During 2003/4 the DSC information systems personnel:

- Regularly updated the DSC's public documents-the website (http://www.damsafety.nsw.gov.au), information sheets, CD-ROM and the Annual Report;
- Introduced an email mailing list for persons interested in policy changes or upcoming meeting dates (http://www.damsafety.nsw.gov.au/general/maillist/mailing list.htm);
- Developed a full text searchable database of DSC minutes dating back to 1978;
- Produced a range of internal reports for use by the Committee and staff;
- Continued to digitise critical technical information on dams to improve access and create a backup (ie GIS dam mapping, updated mining approval plans);
- Consolidated and maintained computer facilities for staff and members;
- Continued to upgrade and document DSC procedures; and
- Continued to maintain and upgrade the DSC's record system (eg correspondence lists, automatic requests for Surveillance Reports).

8. Stakeholders

The DSC's role as a regulator of dam safety in NSW requires interaction with a wide range of stakeholders as summarized in the following diagram:



8.1. Liaison with Stakeholders

In line with modern principles of good regulation, the DSC has adopted a goal of full "transparency". During the year, it continued to work toward having all its policies accessible to all stakeholders, by their incorporation into Information Sheets, available on the DSC Internet site.

The DSC recognizes that to be effective as a dam safety regulator, it needs to give all stakeholders an opportunity to comment on its policies. During the year, policy proposals were on the DSC Internet site and comment was invited.

"The DSC considers it essential to give all stakeholders an opportunity to comment on its policies"

The DSC has a role to educate dam owners on their responsibilities and on international standards, practice and technology. It communicates its objectives and concerns to dam owners and their representatives through various avenues, including its Internet site. The DSC has assembled a considerable library of publications, manuals and videotapes on various aspects of dams and their management. This material is freely loaned to dam owners to assist in staff training.

Close contact is maintained by the DSC with the major NSW dam owning authorities, through their nominees on the DSC, and through meetings held during the year to discuss specific dam requirements and general procedures.

The dam safety education of local government authorities, mining companies and private dam owners is of particular interest to the DSC, because their staff do not usually have specialist engineering knowledge of dams. Education of these owners is assisted by regular site visits by the DSC and/or its staff to meet owners' representatives to discuss relevant issues. Such meetings are invaluable in reaching a common understanding of the problems facing these owners in regard to asset management and responsibilities to the community, and obtaining feedback for enhancing the Committee's education role

"DSC staff were involved in running three dam safety training courses for NSW dam operators in 2003/4"

The DSC ran its first training course in 1991 for Local Government and private dam owners. As a result of the positive feedback, regular training courses for dam operators, are now run in NSW with the assistance of DSC staff. Three-day courses for dam operators were run by the Department of Energy, Utilities and Sustainability in December 2003 and February 2004 at Port Macquarie as part of this program. This work is seen as a key part of the DSC's educational role for dam owners in NSW and accordingly DSC cost recovery was limited to expenses associated with attending or running these sessions.

In addition, DSC staff ran a three day training course for tailings dam operators at Port Stephens in June 2004, with assistance from DEUS staff.

DSC members and staff addressed Council and public meetings on a number of occasions during the year.

The increasing emphasis by the DSC on owner education in NSW has been reflected in numerous requests from dam owners outside NSW for educational assistance. Such involvement is of value to the DSC in broadening its experience of dam safety management issues and in benchmarking its own performance against the procedures and practices of similar authorities. In this regard, the DSC's Executive Engineer, Norm Himsley, was invited to run a one day dam safety seminar in Launceston in October 2003 and a two day training course for dam operators in Auckland, New Zealand in November 2003, with full cost recovery to the DSC.

Craigbourne Dam, Tasmania.

DSC personnel inspecting the dam during the 2003 ANCOLD Dams Conference.

8.2. Education and Training of Members and Staff

The DSC's members and staff have extensive and varied experience in dams' engineering and mining. However, it is essential in any organization to keep abreast of modern developments in all the technical and societal fields related to its functions. This is particularly important in the case of the DSC, because of the diverse technical knowledge required from its small staff. Accordingly, the DSC's members and staff attended relevant conferences and courses during the year.

"DSC members and staff attended relevant conferences and courses during the year to keep abreast of modern developments"

In October 2003, the Chairman, Executive Engineer and Geologist attended the ANCOLD Conference on Dams, held in Hobart. Several other DSC members also attended, as representatives of their own organizations. Papers were presented on community, legal and environmental concerns with dams, along with recent developments in dam engineering. Also, the Chairman made a presentation to the Risk Workshop, held in Launceston before the conference.

During the year, DSC staff attended relevant local technical seminars and some staff also updated their first aid proficiencies.

In May 2004, Mr Ian Landon-Jones attended the ICOLD 72nd Annual Meeting and associated technical committee meetings, held in Seoul, Korea. Whilst this attendance was not arranged or funded by the DSC, the knowledge gained benefits the development of the DSC's policies.

9. Administration and Human Resources

The DSC continues to rent office space with the Department of Infrastructure, Planning and Natural Resources (DIPNR) in Parramatta and reimburses the DIPNR for use of that Department's administration and human resources assistance, accounting, insurance scheme and legal services. Other authorities, that nominate members to the DSC, continue to provide technical assistance in specialised areas and the DSC wishes to acknowledge the assistance of these organizations.

As part of the DSC's administrative arrangement with the DIPNR, it has been agreed that the DSC's Freedom of Information (FOI) statistics will be published in the corresponding issue of that Department's Annual Report. A supplement, pursuant to the Annual Reporting Requirements issued by the Premier's Department on 27 June 1991, will accompany the DSC's statistics. There were no requests for information under FOI legislation during the year, probably due to the ready assistance given by staff to the numerous inquiries that were received.

The DSC has adopted DIPNR's Code of Conduct and Ethics and the Occupational Health, Safety and Rehabilitation (OHS&R) practices, with necessary minor adaptations, to ensure the maintenance of appropriate standards of work practice in the DSC. As well, the DSC pursues individual initiatives in these areas. In relation to OHS&R there were no work injuries to DSC staff during the year and DSC staff received regular updates in first aid training to facilitate safe inspection practices.

As part of its contracted administration assistance to the DSC, the DIPNR implement Equal Employment Opportunity (EEO) and Ethnic Affairs matters (including Ethnic Affairs Priorities Statement program) for, and with, the DSC. The DSC is committed to the principles of multi-culturalism, and again provided technical training of a new migrant professional, Kathy Zhou, for eight months under a scheme organized by the Office of Employment, Equity and Diversity of the NSW Premiers Department. Feedback at the conclusion of the training period indicated that the scheme was extremely beneficial to both Kathy Zhou and the DSC. The DSC's Internet site provides initial information about the DSC in several languages.

The DSC is progressively implementing the Government's Waste Reduction and Purchasing Policy by implementing more electronic storage of information and use of recycled paper.

10. Finance

10.1. Dams Safety Committee Certificate

DAMS SAFETY COMMITTEE
FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNE 2004
CERTIFICATE UNDER SECTION 41C (1B) AND 1(C) OF THE PUBLIC FINANCE AND AUDIT ACT, 1983

In our opinion the financial statements consisting of the Statement of Financial Performance, Statement of Financial Position, Statement of Cash Flows and Notes attached thereto for the year ended 30 June 2004 exhibit a true and fair view of the financial position and transactions of the Dams Safety Committee.

The financial statements have been prepared in accordance with the provisions of the Public Finance and Audit Act 1983, and the Public Finance and Audit Regulation, 2000 and the Treasurer's Directions as they relate to the preparation of accounts.

We are not aware at this time of any circumstances, which would render any particulars in the financial statements to be misleading or inaccurate.

This certificate is given for and on behalf of the Committee.

L A McDONALD
CHAIRMAN

A C WILLIAMS
DEPUTY CHAIRMAN

10.2 Auditor General's Certificate

AUDITOR-GENERAL
NEW SOUTH WALES

GPO BOX 12
SYDNEY NSW 2001

INDEPENDENT AUDIT REPORT

Dams Safety Committee

To Members of the New South Wales Parliament

Audit Opinion

In my opinion, the financial report of the Dams Safety Committee:

(a) presents fairly the Dams Safety Committee's financial position as at 30 June 2004 and its financial performance and cash flows for the year ended on that date, in accordance with applicable Accounting Standards and other mandatory professional reporting requirements in Australia, and

(b) complies with section 41B of the *Public Finance and Audit Act 1983* (the Act).

My opinion should be read in conjunction with the rest of this report.

The Committee's Role

The financial report is the responsibility of the members of the Dams Safety Committee. It consists of the statement of financial position, the statement of financial performance, the statement of cash flows and the accompanying notes.

The Auditor's Role and the Audit Scope

As required by the Act, I carried out an independent audit to enable me to express an opinion on the financial report. My audit provides reasonable assurance to Members of the New South Wales Parliament that the financial report is free of material misstatement.

My audit accorded with Australian Auditing and Assurance Standards and statutory requirements, and I:

- evaluated the accounting policies and significant accounting estimates used by the Committee in preparing the financial report, and
- examined a sample of the evidence that supports the amounts and other disclosures in the financial report.

An audit does not guarantee that every amount and disclosure in the financial report is error free. The terms 'reasonable assurance' and 'material' recognise that an audit does not examine all evidence and transactions. However, the audit procedures used should identify errors or omissions significant enough to adversely affect decisions made by users of the financial report or indicate that members had not fulfilled their reporting obligations.

My opinion does not provide assurance:

- about the future viability of the Dams Safety Committee,
- that it has carried out its activities effectively, efficiently and economically, or
- about the effectiveness of its internal controls.

Audit Independence

The Audit Office complies with all applicable independence requirements of Australian professional ethical pronouncements. The Act further promotes independence by:

- providing that only Parliament, and not the executive government, can remove an Auditor-General, and
- mandating the Auditor-General as auditor of public sector agencies but precluding the provision of non-audit services, thus ensuring the Auditor-General and the Audit Office are not compromised in their role by the possibility of losing clients or income.

P K Brown

P K Brown, FCPA
Director of Audit

SYDNEY
20 October 2004

10.3. Audited Financial Report

STATEMENT OF FINANCIAL PERFORMANCE FOR THE FINANCIAL YEAR ENDED 30 JUNE 2004

	Note	2004 $'000	2003 $'000
Revenues from ordinary activities	3	853	691
Administration Expenses		(712)	(539)
Depreciation expenses		-	(5)
Lease expenses		(58)	(44)
Other Expenses		(110)	(105)
Expenses from ordinary activities	4	(880)	(693)
(Loss) from Ordinary Activities		(27)	(2)
Total revenues, expenses and valuation adjustments recognised directly in equity		-	-
Total changes in equity other than resulting from transactions with owners as owners	8	(27)	(2)

STATEMENT OF FINANCIAL POSITION AS AT 30 JUNE 2004

Current Assets			
Cash Assets		25	32
Receivables	5	10	7
Total Current Assets		35	39
Non-Current Assets			
Plant and Equipment	6	-	-
Total Non-Current Assets		-	-
Total Assets		35	39
Current Liabilities			
Payables	7	53	30
Total Current Liabilities		53	30
Total Liabilities		53	30
(Net Liabilities)/Net Assets		(18)	9
Equity			
(Accumulated Loss)/Retained profits	8	(18)	9
		(18)	9

STATEMENT OF CASH FLOWS FOR THE FINANCIAL YEAR ENDED 30 JUNE 2004

Cash Flows From Operating Activities			
Recurrent Government Contribution Received		700	578
Interest Received		8	9
Other Income		45	13
Payment to Suppliers		(760)	(588)
Net cash flows (used in) / provided by operating activities	12	(7)	12
Cash Flows From Investing Activities			
Proceeds from sale of plant and equipment		-	19
Net cash flows from Investing Activities		-	19
Net (decrease)/increase in cash held		(7)	31
Cash at the beginning of the financial year		32	1
Cash at the end of the financial year		25	32

NOTES TO AND FORMING PART OF THE ACCOUNTS FOR THE YEAR ENDED 30 JUNE 2004

1. Reporting Entity

The Dams Safety Committee was constituted in 1979 to adopt a regulatory ongoing "watchdog" role to ensure the owners of the State's major dams conform to appropriate safety requirements in order to prevent uncontrolled loss of their storages with consequent effects on the community, environment and water supply.

The Committee operates in New South Wales, Australia. The office is located on Level 3, 10 Valentine Avenue, Parramatta, NSW 2150.

2. Summary of Significant Accounting Policies

a) Basis of Accounting

The Committee's financial statements are a general purpose financial report, and has been prepared in accordance with:

- applicable Australian Accounting Standards;
- other authoritative pronouncements of the Australian Accounting Standards Board (AASB);
- Urgent Issues Group (UIG) Consensus Views;
- the requirements of the Public Finance and Audit Act and Regulations.

Where there are inconsistencies between the above requirements, the legislative provisions have prevailed.

In the absence of a specific Accounting Standard, other authoritative pronouncement of the AASB or UIG Consensus View, the hierarchy of the pronouncements as outlined in AAS 6 “Accounting Policies” is considered.

The financial report has been prepared on an accrual basis and in accordance with the historical cost convention except where stated.

2. Summary of Significant Accounting Policies (continued)

b) Revenue Recognition

Revenue is recognised to the extent that it is probable that the economic benefits will flow to the entity and the revenue can be reliably measured. The following specific criteria must also be met before revenue is recognised:

(i) Rendering of services

Revenue from a contract to provide services is recognised by reference to the stage of completion of the contract. When the contract outcome cannot be reliably measured, revenue is recognised only to the extent that costs have been incurred.

(ii) Interest

Interest revenue is recognised as it accrues.

(iii) Contributions of assets including grants and subsidies

Contributions and grants from other bodies are recognised as revenue when the agency obtains control over the relevant assets or receipt of cash.

c) Significant Government Subsidies

Dams Safety Committee obtains the major portion of its funding from the State Government through a budget allocation. Other expenditure incurred by government departments and other statutory authorities in direct support of the Committee is now accounted as revenue and expense in the financial report.

d) Financial Instrument

A financial instrument is any contract that gives rise to both a financial asset of one entity and a financial liability or equity instrument of another entity. For the Dams Safety Committee, financial instruments range from cash at bank and accounts receivable to creditors. Financial instruments are carried in the accounts at net fair value.

(i) Interest Rate Risk

Interest rate risk, is the risk that the value of the instruments will fluctuate due to changes in market interest rates. The entity's exposure to interest rate risk and the effective interest rates of financial assets and liabilities at the balance date are in Note 13.

(ii) Credit Risk

Credit risk is the risk of financial loss arising from another party to a contract/or financial position failing to discharge a financial obligation thereunder. The entity's maximum exposure to credit risk is represented by the carrying amounts of the financial assets included in the Statement of Financial Position.

e) Accounting for the Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except:

- The amount of GST incurred by the agency as a purchaser that is not recoverable from the Australian Taxation Office is recognised as part of the cost of acquisition of an asset or as part of an item of expense.
- Receivables and payables are stated inclusive of GST.

f) Employee Entitlements

Dams Safety Committee has no employees and accordingly there are no employee entitlements. Employees are on secondment from the Department of Infrastructure, Planning and Natural Resources. Fees for Services represents the cost of the seconded employees.

g) Non-Current Assets

Accounting control of assets is maintained by way of an asset register. The Committee has reviewed all the assets and it is considered that assets shown in the asset register/general ledger are at Fair Value as at 30 June 04. Depreciation is provided for on a straight-line basis for all depreciable assets so as to write off the depreciable amount of each depreciable asset as it is consumed over its useful life to the Committee.

Plant and equipment costing $5,000 and above individually are capitalised.

The normal life expectancies of the asset categories are as follows:

Asset Class	Number of years
Office Equipment	4
Scientific Instruments	5-8
Motor Vehicles	5

h) Receivables

Trade receivables are required to be settled within thirty days. A provision for doubtful debts has not been established as it is considered by the Committee that all debt owing is recoverable.

i) Payables

Trade accounts payable is generally settled within thirty days. The Committee considers the carrying amounts of creditors approximate to their net fair value.

j) Impact of adopting Australian Equivalents to International Financial Reporting Standards

(i) Explanation of how the transition to AIFRS is being managed

The Committee will apply the Australian Equivalents to International Financial Reporting Standards (AIFRS) from the reporting period beginning 1 July 2005.

The Committee is in the process of commencing transitioning its accounting policies and financial reporting from current Australian Standards to Australian equivalents of International Financial Reporting Standards (AIFRS). To manage the transition the Committee will be allocating internal resources and/or engaging consultants to analyse and identify key areas regarding policies, procedures, systems and financial impacts affected by the transition. The Committee has taken the following steps to manage the transition to the new standards:

The Committee's accounting functions are carried out by the Department of Infrastructure Planning and Natural Resources (DIPNR). Therefore steps, taken to manage the transition by DIPNR, are applicable to the Committee. A special project team is to be established by DIPNR, which reports to their Chief Finance Officer on progress against the plan. DIPNR's Internal Audit Committee also will provide input to the process.

2. Summary of Significant Accounting Policies (continued)

The following phases have been identified:

- Scope and identify impact of the changes
- Determine changes to be made to systems, processes, policies.
- Train staff
- Implement changes and review

We anticipate all changes including the requisite changes to systems will be completed by the end of November 2004.
NSW Treasury is assisting agencies to manage the transition by developing policies, including mandate of options; presenting training seminars to all agencies; providing a website with up-to-date information to keep agencies informed of any new developments; and establishing an IAS Agency Reference Panel to facilitate a collaborative approach to manage the change.

(ii) Key Differences in Accounting Policies

The agency has identified a number of significant differences in accounting policies that will arise from adopting AIFRS. Some differences arise because AIFRS requirements are different from existing AASB requirements. Other differences could arise from options in AIFRS. To ensure consistency at the whole of government level, NSW Treasury has advised the agency of options it is likely to mandate, and will confirm these during 2004-05. This disclosure reflects these likely mandates.

The agency's accounting policies may also be affected by a proposed standard designed to harmonise accounting standards with Government Finance Statistics (GFS). This standard is likely to change the impact of AIFRS and significantly affect the presentation of the income statement. However, the impact is uncertain, because it depends on when this standard is finalised and whether it can be adopted in 2005-06. Based on current information, the following key differences in accounting policies are expected to arise from adopting AIFRS:

- **AASB *1 First-time Adoption of Australian Equivalents to International Financial Reporting Standards*** requires retrospective application of the new AIFRS from 1 July 2004, with limited exemptions. Similarly, AASB Accounting Policies, Changes in Accounting Estimates and Errors requires voluntary changes in accounting policy and correction of errors to be accounted for retrospectively by restating comparatives and adjusting the opening balances of accumulated funds. This differs from current Australian requirements, because such changes must be recognised in the current period through profit or loss, unless a new standard mandates otherwise.
- **AASB 116 *Property, Plant and Equipment*** requires the cost and fair value of property, plant and equipment to be increased to include restoration costs, where restoration provisions are recognised under AASB 137 *Provisions, Contingent Liabilities and Contingent Assets*. Major inspection costs must be capitalised and this will require the fair value and depreciation of the related asset to be re-allocated.
- **ASB 117 *Leases*** requires operating lease contingent rentals to be recognised as an expense on a straight-line basis over the lease term rather than expensing in the financial year incurred.
- **AASB 120 *Accounting for Government Grants and Disclosure of Government Assistance*.** For profit entities will either apply the current AASB 120 or early adopt a revised AASB 120, based on the grant requirements in AASB 141 *Agriculture*. The current AASB 120 spreads income over the period necessary to match related costs. A revised AASB 120 based on AASB 141 is likely to require revenue recognition when conditions are satisfied. Both of these alternatives may have the effect of delaying revenue recognition.
- **AASB 1004 *Contributions* applies to *not-for-profit entities* only**. Entities will either continue to apply the current requirements in AASB 1004 where grants are normally recognised on receipt, or alternatively apply the proposals on grants included in ED 125 *Financial Reporting by Local Governments*. If the ED 125 approach is applied, revenue and/or expense recognition will be delayed until the agency supplies the related goods and services (where grants are in-substance agreements for the provision of goods and services) or until conditions are satisfied.
- **AASB 132 *Financial Instrument Disclosure and Presentation*** prohibits in-substance defeasance. Agencies can no longer offset financial assets and financial liabilities when financial assets are set aside in trust by a debtor for the purposes of discharging an obligation, without assets having been accepted by the creditor in settlement of the obligation. This will have the effect of increasing both assets and liabilities but will have no net impact on equity.
- **AASB 136 *Impairment of Assets*** requires an entity to assess at each reporting date whether there is any indication that an asset (or cash generating unit) is impaired and if such indication exists, the entity must estimate the recoverable amount. However, the effect of this Standard should be minimal because all the substantive principles in AASB 136 are already incorporated in Treasury's policy *Valuation of Physical Non-Current Assets at Fair Value.*

3. Revenue from ordinary activities	**2004**	**2003**
Committee Support costs	110	105
Loss on Disposal of Non Current Assets	-	(3)
Training Income	33	-
Interest Income	10	11
Recurrent Government contribution from Treasury	700	578
	853	691

4. Expenses from ordinary activities

	2004 $'000	**2003 $'000**
Administration Expenses		
Auditor's remuneration - audit of the financial report	6	5
Fees for services rendered	675	515
Members' Expenses	31	19
	712	539
Depreciation expenses	-	5
Lease expenses		
Minimum lease payments	58	44
Other Expenses		
Committee Support costs	110	105
	880	693

Members' expenses include Board Members' fees of $26,651. Board Members received no other benefits

5. Current Assets - Receivables

Interest Income receivable	5	4
Input Tax recoverable from Taxation Office	3	3
Other Income accrued	2	-
	10	7

6. Plant and Equipment

	Plant and Equipment $'000	Motor Vehicles $'000	Total $'000
2004			
Carrying amount at 1/7/2003			
At cost	-	-	-
Additions	-	-	-
Disposals	-	-	-
Depreciation expense	-	-	-
Carrying amount at 30/06/2004			
At cost	**-**	**-**	**-**
2003			
Carrying amount at 1/7/2002			
At cost	1	27	28
Additions	-	-	-
Disposals	(1)	(22)	(23)
Depreciation expense	-	(5)	(5)
Carrying amount at 30/06/2003			
At cost	-	-	-

7. Current Liabilities - Payables

	2004 $'000	2003 $'000
Accrued Expenses	29	29
Payables	24	1
	53	30

8. Equity

	2004 $'000	2003 $'000
At 1 July 2003	9	11
Transactions with owners as owners	-	-
Other than Transactions with owners as owners		
Loss for the year	(27)	(2)
At 30 June 2004	(18)	9

The Committee is a going concern despite accumulated losses as the Department of Infrastructure, Planning and Natural Resources will be providing sufficient funds to cover the above losses and the future operating costs of the Committee.

9. Contingent liabilities

The Committee's contingent liability was $Nil at 30 June 2004 (30 June 2003-$Nil)

10. Consultancies

Consultancy expenditure during the year amounted to Nil (30 June 2003-Nil).

11. Lease commitments

Lease commitments represent property, photocopier and motor vehicle leases.

Not later than 1 year	79	56
Later than 1 year but not later than 5 years	84	114
Total (inclusive of GST)	**163**	**270**

The total commitments above include input tax credits of $14,806 (30 June 2003-$15,460) that is expected to be recoverable from the Australian Taxation Office.

12. Note to the Statement of Cash Flows

For the purposes of the statement of cash flows, cash includes cash on hand and in the bank.

Reconciliation of net cash provided by operating activities to operating surplus/(loss)	2004	2003
(Loss) from ordinary activities	(27)	(2)
Depreciation	-	5
Loss on disposal of non-current asset	-	3
	(27)	6
Changes in Operating Assets and Liabilities		
(Increase) in Receivables	(3)	-
Increase in Payables	23	6
Net Cash (used in)/provided by Operating Activities	(7)	12

13. Additional Financial Instruments Disclosure

	Weighted average effective interest rate %	Floating Interest Rate $000	Fixed Interest Rate Maturities			Non Interest Bearing $000	Total Carrying amount as per the Statement of Financial Position $000
			1 year or less $000	1 to 5 Years $000	> 5 Years $000		
30 June 2004							
Financial Assets Cash	4.06	25	-	-	-	-	25
Receivables		-	-	-	-	10	10
Total Financial Assets		**25**	**-**	**-**	**-**	**10**	**35**
Financial Liabilities							
Payables		-	-	-	-	53	53
Total Financial Liabilities		**-**	**-**	**-**	**-**	**53**	**53**
Net Financial Assets / (Liabilities)		**25**	**-**	**-**	**-**	**(41)**	**(18)**
30 June 2003							
Financial Assets Cash	3.75	32	-	-	-	-	32
Receivables		-	-	-	-	7	7
Total Financial Assets		**32**	**-**	**-**	**-**	**7**	**39**
Financial Liabilities							
Payables		-	-	-	-	30	30
Total Financial Liabilities						**30**	**30**
Net Financial Assets / (Liabilities)		**32**				**(23)**	**9**

End of Audited Financial Statements

10.4. Dams Safety Committee 2003/2004 – Budgetary Information

	2003/4 Budget ($)	2003/4 Actual ($)	2004/5 Budget ($)
Income			
Consolidated Fund	751,000	700,000	825,000
Interest Income	12,000	9,545	-
Miscellaneous (eg Training courses, rebate)	4,000	34,692	4,000
Total	**767,000**	**744,237**	**829,000**
Expenditure			
Members Related	36,000	36,541	-
Administration (incl Audit-$6,000)	123,000	94,078	*220,000
Dam Surveillance	263,000	274,403	*337,000
Mining Investigations	157,000	168,381	*272,000
Information Systems	165,000	142,678	-
Research	11,000	11,354	-
Conference & Training	9,000	9,424	-
Information Delivery	20,000	32,240	-
Total	**784,000**	**770,099**	**829,000**
Operating Deficiency	**17,000**	**25,862**	**0**

*-Funding in 2004/5 redistributed to main DSC program

Appendix A – Dam Owner Summary 30 June 2004

Dam Owner	Prescribed Dams	Surveillance Reports Received 03/04	Dams Inspected by DSC in 03/04
Councils	118	9	25
Sydney Water / Catchment Authority	37	7	14
Delta, Macquarie Generation, Eraring Energy	17	3	8
Dept. of Energy, Utilities & Sustainability	22	1	3
Other State Authorities	8	-	3
Snowy Hydro	15	6	1
Non State Authorities	3	-	-
Mining Companies	71	13	18
Other Ownership	20	2	2
TOTAL	**311**	**41**	**74**

Appendix B – 2004-Current Prescribed Dams in NSW

Dam	Map Ref	Presc. 2002/3	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Abbotsbury Park Pond 2	F10	P			2004	TE	6	18	RTA
AH Whaling Reserve Basin	F10	P			-	TE	2	7	Baulkham Hills Council
Aldriges Creek *	D11				1994	TE	24	1200	Hunter Pastoral
Antiene Mine Lease Tails	E11				2000	TE/ER	15	3000	Rio Tinto Coal
Avon *	G10				1927/71	PG/ER	72	214400	SCA
Bagnalls Beach Rd Basin *	E12				1998	TE	2	5	Port Stephens Council
Bakers Road Basin	C13	P			-	TE	7	200	Coffs Harbour Council
Bamarang	G10				1983	TE	26	3800	Shoalhaven Council
Banks Rd Basin	F10				1997	TE	4	40	Liverpool Council
Baryulgil Mine	B12				1996	TE	8	70	Dept. of Mineral Resources
Bayswater Ash *	E10				1985	TE	39	22000	Macquarie Generation
Bayswater Brine Decant *	E10				1986	TE	21.5	650	Macquarie Generation
Bayswater Cooling Makeup *	E10				1984	TE	16	460	Macquarie Generation
Bayswater 2 Main *	E10				1979	TE	27	1200	Bayswater Colliery
Beardy Waters	B11				1932/60	PG	8.5	500	Glen Innes Municipal Ccl
Beargamil	F8		S		1914	TE	16	480	Parkes Council
Ben Boyd	J9				1978	TE	29	800	Bega Valley Council
Ben Chifley	F9				1957/2001	TE	27	30000	Bathurst Council
Bendeela Pondage	G10				1973	TE/ER	18	1200	SCA
Bengalla Mine Raw Water	E10				2000	TE	11	270	Bengalla Mining Co P/L
Bethungra *	G7			R	1895	PG	13	580	DLWC
Blackbutt Reserve *	G10				1957/95	TE	6	25	Shellharbour City Council
Blowering *	H8			R	1968	TE/ER	112	1628000	DLWC
Bobs Dump Tails	E10		S		-	TE/ER	25	2100	Coal & Allied
Bogolong	F8		S	M	1932	TE	11	360	Central Tablelands Cnty Cncl
Bonalbo	A12			M	1969/89	TE	13	55	Kyogle Council
Boorowa	G8				N/A	PG/TE	8	180	Boorowa Council
Bootawa	D12			I	1967	TE	25	2270	North Power
Borenore Creek	F8			I	1928	VA	17	230	Cabonne Council
Brennans Creek	G10				1976	DR	17	320	Coal Cliff Collieries Pty Ltd
Brogo	I9				1976	DR	43	9800	DLWC
Brokers Rd Retarding Basin	G10				2000	TE	5	70	Wollongong Council
Brooklyn Retarding Basin	F11				1995	ER	5	5	State Rail Authority
Broughton Pass Weir	G10				1888	PG	6	50	SCA
Broula King Tails 1 *	F8				-	TE/ER	18	138	Broula King Joint Venture
Broula King Tails 2 *	F8				-	TE/ER	18	25	Broula King Joint Venture
Browns Creek Tails 4	F9				1991	TE/ER	32	1400	Hargraves Resources NL
Buckland's Retarding Bsn	G10				1991	TE	5	2	P. Buckland
Bundanoon *	G10		S		1960	VA	35	2040	Wingecarribee Council
Burrendong	E9			M	1967	TE/ER	76	1188000	DLWC
Burrinjuck	H8				1928/56/96	PG	93	1026000	DLWC
Cadiangullong *	F8		S		1997	PG	45	4200	Cadia Holdings Pty Ltd
Cadia SouthernTails *	F8				2001	TE/RE	79	91000	Cadia Holdings Pty Ltd
Cadia Tails Stage 2 *	F8				1997/2000	TE/ER	56	40000	Cadia Holdings Pty Ltd
Cadia-Upper Rodds Ck *	F8		S		2001	TE	31	3000	Cadia Holdings Pty Ltd
Cadia Waste Dump Basin *	F8				2002	TE/ER	18	50	Cadia Holdings Pty Ltd
Camberwell Tails 2	E11				-	TE/ER	40	1660	Camberwell Coal P/L
Campbelltown Link Basin	G10				2003	ER	6	26	Landcom
Campbelltown Nth Basin	G10				2001	TE	3	30	Campbelltown Council
Captains Flat	H9				1939/93	PG	16	820	Yarrowlumla Shire Council

Dam	Map Ref	Presc. 2002/3	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Carcoar	F9				1970	VA	46	35800	DLWC
Cascade 1	F10				1915	VA	15	160	SCA
Cascade 2	F10				1926	TE	26	320	SCA
Cascade 3	F10				1938	TE	30	1700	SCA
Cataract *	G10				1907/87	PG	56	94300	SCA
Cecil Hills Basin 100 *	F10				2001	TE	4	30	Liverpool Council
Cecil Park Basin 3A *	F10			R	1992	TE	6	52	Liverpool Council
Centennial Pk Res No. 1 *	F11		S		1899	PG	7	82	Sydney Water
Centennial Pk Res No. 2	F11				1925	PG/TE	11	89	Sydney Water
Chaffey *	D11			R	1976	TE/ER	54	61800	DLWC
Chain of Ponds 13B	E11		S		-	TE	18	4000	Liddell Coal operations
Chichester *	E11				1923/84/95	PG	41	21000	Hunter Water Corporation
Clarrie Hall	A13			M	1982	DR	43	16000	Tweed Council
Coalcliff	G10				1971	TE	7	130	Illawarra Coke Co Pty Ltd
Cochrane	I9				1958	TE	29	3085	Eraring Energy
Coeypolly Ck 1	D10				1932	VA	19	860	Parry Council
Coeypolly Ck 2 *	D10			R	1955	TE	21	5435	Parry Council
Colongra Ck Ash	F11		S		1965	TE	6	5550	Delta Electricity
Comberton Grange Basin	G10				1990	TE	15	65	Shoalhaven Council
Comin Place Basin	F10				2000	TE	5	20	Fairfield Council
Company *	F8			R	1867	TE	6	113	Weddin Council
Copeton	B11			M	1976	TE/ER	113	1364000	DLWC
Cordeaux	G10				1926/77/88	PG	49	93600	SCA
Cowarra *	D12				2001	TE	40	10000	Hastings Council
Cowarra Creek Tails *	H9			M	1986	ER	23	52	Horizon Pacific Ltd
Crookwell	G9				1937	PG/VA	15	450	Crookwell Council
CSA Tails	D5				1960	TE	8	1932	Cobar Management / DMRes
CSIRO Retarding Basin	F10				1990	TE	6	58	Holroyd Council
Danjera	G10				1971	CB/ER	30	7700	Shoalhaven Council
Dapto Heights Basin *	G10				1991	TE	7	16	Wollongong Council
Dartbrook Mine Water	E10				2000	TE	11	450	Dartbrook Mine
Dartbrook Tails	E10				Prog	TE/ER	64+	16000	Dartbrook Coal
Daruk Park Basin *	F10		S		1987	TE	3	47	Liverpool Council
Deep Creek	H10				1983	TE	31	4500	Eurobodalla Council
Deep Creek (Snowy)	I8				1961	PG	21	5	Snowy Hydro
Delegate Retarding Basin	J8			M	1984	TE	7	7	Bombala Council
DEP Retarding Basin	F10				1990	TE	9	110	Blacktown Council
Dover Heights Reservoir	F11				1929	PG/TE	8	85	Sydney Water
Drayton 1690 *	E10		S		1993	TE	16	440	Drayton Coal Pty Ltd
Drayton W.S. *	E10				1980	TE/ER	18	390	Drayton Coal Pty Ltd
Dumaresq *	C11		S	R	1896	PG	12	440	Armidale Council
Dungowan	D11				1957/92	TE	31	5900	Tamworth Council
Duralie Coal Shaft Creek	E11				2003	TE/ER	17	1400	Duralie Coal Pty Ltd
Duralie Mine Water	E11				2003	TE/ER	18	1100	Duralie Coal Pty Ltd
Edgewood Retarding Basin	G10				2002	TE	7	19	Illawarra Land Development
Elanora	C11			I	?	TE	7	100	Hillgrove Mine
El Klaros	E11				1995	TE	25	200	Mawipalivier P/L
Emigrant Creek	A13				1968/2001	TE/PG	12	820	Rous County Council
Eraring Ash	F11				1982	TE	25	20500	Eraring Energy
Eucumbene	I8				1961	TE/ER	116	4798000	Snowy Hydro
Fitzroy Falls *	G10				1974	TE/ER	14	22200	SCA
Floraville Road Basin *	F11		S		1992	TE	4	20	Lake Macquarie Council
Foothills Estate Basin 1	G10				1994	TE	5	20	Wollongong Council
Foothills Estate Basin 3	G10				1995	TE	5	20	Wollongong Council
Foothills Rd Basin	G10				1982/97	TE	5	24	Wollongong Council
Fountaindale	G10			I	1915	VA	15	61	Kiama Council
Fox Hills Basin	F10				1990	TE	4	127	Blacktown Council
Galambine	E9		S		1982	TE	18	227	Gooree Pastoral Co
Gannet Place Basin	G10				1992	TE	10	5	Wollongong Council
Garden Suburbs Basin 2 *	E11		S		2000	TE	8	17	Lake Macquarie City Council
Geehi	I8				1966	ER	91	21100	Snowy Hydro
Geo. Bass Drive Basin	H10				2000	TE	3	11	Eurobodalla Council
Glenbawn	E10				1958/86	TE/ER	100	750000	DLWC
Glenlee Tails	G10				Prog	ER	29	1500	Sada Pty Ltd
Glenmore Park Basin	F10				1997	TE	4	232	Penrith Council
Glennies Creek	E11			M	1983	DR	67	283000	DLWC
Glennies Ck Mine Pit Water*	E11	P			2004	TE	14	1250	Glennies Ck Joint Venture
Glenquarry Cut	G10				1974	PG	18	34510	SCA
Gooden Reserve Basin	F10				1997	PG	5	380	Baulkham Hills Council
Googong	H9				1977/1992	ER	67	124000	ACT Electricity & Water
Gosling Creek	F9			M	1890	PG	8	650	Orange Council
Grahamstown *	E11		S		1964/96/01	TE	11	132000	Hunter Water Corporation
Greaves Creek	F10				1942	VA	17	320	SCA
Green Meadows Basin *	G10				1981/93	TE	4	165	Shellharbour Council
Greenway Dve Basin 10A/B	F10				2000/3	TE	5	132	Landcom

Dam	Map Ref	Presc. 2002/3	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Gunyah Park Basin	G10				1992	TE	4	5	Wollongong Council
Guthega	I8				1955	PG	34	1550	Snowy Hydro
Hamilton Valley Basin 5A	I6				1993	TE	4	135	Albury Council
Hamilton Valley Basin 5B	I6				1993	TE	3	62	Albury Council
Hillgrove Tails 1 *	C11			M	1982	TE/ER	40	700	Hillgrove Gold NL
Hillgrove Tails 2	C11				U/C	TE/ER	40	1280	Hillgrove Gold NL
Honeysuckle Creek	F11				1962/91	PG	9	12	Killara Golf Club Ltd
Hovell Weir	H7			M	1986	TE	8	2000	Tumbarumba Council
Hume *	I7		S	R	1936/1967	PG/TE	51	3038000	MDBC
Humphreys Creek	A12				1988	TE	15	750	Norminco Ltd
Humphreys Creek Tails	A12			M	1989	TE/ER	15	1100	Norminco Ltd
Hungerford Hill *	E11		S		1970/2002	TE	8	545	Southcorp Wines P/L
Hunter Valley Nth Pit Tails	E10				Prog	TE/ER	50	20000	Coal & Allied Operations
Huntley Colliery 2	G10				Prog	TE	28	59	Powercoal
Imperial Lake	D1			R	1967	TE	8	700	Aust. Inland Energy & Water
Island Bend	I8				1965	PG	49	3020	Snowy Hydro
Jindabyne *	I8			R	1967	ER	72	690000	Snowy Hydro
Jounama	H8				1968	ER	44	43500	Snowy Hydro
Junction Reefs	F8				1898	MB	19	300	DLWC
Kanahooka Basin	G10				1993	TE	5	26	Forest Grove Estate
Kangaroo Pipeline	G10				1974	ER/PG	20	23500	SCA
Karangi	C13				1980/96	TE/ER	38	5600	Coffs Harbour Shire Council
Keepit *	C10			R	1960	PG/TE	55	423000	DLWC
Kentucky Creek	C11				1944/84	PG	12	500	Uralla Shire Council
Khancoban	I8			R	1966	TE	18	21500	Snowy Hydro
Killara Reservoir *	F11				1931/94	PG/TE	11	166	Sydney Water
Lake Canobolas	F9			R	1918	VA	12	700	Orange City Council
Lake Cowal Gold Tails	F7	P			2004	TE	20	3600	Barrick Gold Australia
Lake Cowal Protection Bund	F7	P			2004	TE	5	194000	Barrick Gold Australia
Lake Endeavour	F8		S	R	1940	TE	21	2400	Parkes Shire Council
Lake Ettamogah	H6				1993	TE	13	2100	ANM Mill
Lake Inverell	B11				1938	PG	13	1500	Inverell Shire Council
Lake Medlow	F10		S		1907	VA	20	290	SCA
Lake Pambulong Basin	E11				2002	TE	5	57	Hammersmith Mgt
Lake Parramatta	F11				1857/98	VA	14	490	Parramatta Council
Lake Rowlands	F9		S	I	1953	CB/TE	20	4690	Central Tablelands Council
Lake Tullimba	C11				1982	TE	18	1200	New England Uni
Lemington Mine Tails *	E10		S		1991	TE/ER	12	2000	Lemington Mine
Lemington Mine Tails 5	E10				2000	TE/ER	22	2000	Lemington Mine
Lidcombe Ret Basin 6	F11				2003	TE	4	11	Sydney Olympic Park Auth.
Liddell Ash *	E10				1971/82	TE	31	28500	Macquarie Generation
Liddell Ash Levee *	E10				-	TE/ER	21	Variable	Mac. Gen / Drayton Coal
Liddell Cooling Water *	E10				1968	TE	43	148000	Macquarie Generation
Liddell Water Supply *	E10		S		1970	TE	31	4500	Macquarie Generation
Lithgow 1	F10			M	1896	VA	11	69	Lithgow Council
Lithgow 2	F10			M	1907	VA	27	440	Lithgow Council
Lostock	E11				1971	TE/ER	38	20000	DLWC
Loyalty Rd. Ret Basin	F11				1995	PG	27	1520	Upper Parramatta Trust
Lyell	F10				1983/96	DR	50.5	33500	Delta Electricity
Malpas *	C11			M	1968	TE/ER	31	13000	Armidale Council
Mangrove Creek *	F11			M	1983	DR	80	170000	Gosford Council
Manly	F11				92/1922/84	PG	18	2000	Sydney Water
Mannering Ck Ash	F11		S		1963	TE	12.5	20000	Delta Electricity
Mardi	F11			M	1963/91	TE	26	7280	Wyong Council
Maroubra Reservoir *	F11		S		1966	PG/TE	12	128	Sydney Water
McCoy Park. Basin	F11				1989	TE	6	500	Parramatta Council
McKinnons Gold Project	D5				1996	TE	17	3030	Burdekin Resources
Medway *	G10		S		1964	VA	23	1270	Wingecarribee Council
Menindee Storages	E2			M	1960	TE	12	2287280	DLWC
Minmi Rd Retarding Basin	E11				1995	TE	5	55	Newcastle City Council
Molong Creek	F9		S	M	1987	PG	16	1000	Cabonne Council
Moolarben Creek	E9		S		1957/93	ER	12	375	Ulan Coal Mines Ltd
Mooney Lower	F11			M	1937	VA	13	310	Gosford Council
Mooney Upper	F11				1961	VA	27	4630	Gosford Council
Moore Creek	C10				1898	VA	19	220	DLWC
Mt Annan Wetlands 1	G10	P			-	TE	7	80	Landcom
Mt. Arthur Nth Environment	E10				2002	TE	17	1260	Coal Operations Aust
Mt Owen Nth Void 2 Tails	E10				2003	TE/ER	14	2000	Hunter Valley Coal Corp.
Mt Owen Tails 4	E10				2003	TE/ER	12	5000	Hunter Valley Coal Corp.
Mt Thorley Ministrip 24 Tails	E11	P			-	ER	50	2520	Mt Thorley Operations
Mt Owen Tails 5		P			-	TE	11	5000	Hunter Valley Coal Corp.
Mt. Thorley Ramp Tails *	E11		S		Prog	TE	75	4700	Mt Thorley Operations
Muirfield Golf Club	F11		S		1969	TE	8	6	Muirfield Golf Club
Muirfields Golf Ret Basin	F11			I	1993	TE	4	12	Baulkham Hills Council
Murray 2	I8		S		1968	VA	43	2310	Snowy Hydro

Dam	Map Ref	Presc. 2002/3	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Murrurundi *	D10				1984	TE	11	170	Murrurundi Council
Narranbulla	G9				1966	TE	7	1445	Narranbulla Pastoral Co.
Nepean	G10				1935/92	PG	81	81400	SCA
Newstan Contingency Tails	E11				2003	TE/ER	20	78	Newstan Colliery
Nixon	C10		S		1971	TE	16	222	J. Nixon
Northmead Ret Basin	F10				1990/94	TE	6	30	Baulkham Hills Council
North Parkes Tails	E8		S		1993	TE	20	25000	North Parkes Mines
Nth Turramurra Golf	F11				2001	TE	5	10	Ku-ring-gai Council
Nyrang Park Basin	G10				1993	TE	4	21	Wollongong Council
Oak Flats Reservoir	G10				1978	TE	15	56	Sydney Water
Oaky River *	C12		S		1956	PG/ER	18	2700	New England County Cncl
Oberon	F9				1949/96	CB	34	45400	DLWC
Orange Research Station	F9				1993/97	TE	7	175	NSW Agriculture Dept
Palm Tree Grove Basin *	F11		S		1975/90	TE/ER	3	3	Gosford Council
Pasminco Site D Tails	E1		S		1998	TE	26	6600	Pasminco Broken Hill Mine
Peak Gold Mine Tails	D5				1990?	TE	13	4200	Peak Gold Mines P/L
Pecan Close Basin	F11				1998/03	TE	5	100	Gosford Council
Pejar	G9				1979	TE/ER	23	9000	Goulburn Council
Pindari	B11		S	I	1969/93	DR	85	312000	DLWC
Pipers Flat	F10			M	1920	TE	10	645	Centennial Coal Pty Ltd
Plashett	E10				1987	TE	46	70000	Macquarie Generation
Porters Creek	H10			M	1968	TE/PG	17	2541	Shoalhaven Council
Port Macquarie *	D12				1980	TE	19	2500	Hastings Council
Port Waratah Fines Disp	E11			I	1990	TE	5	1750	Port Waratah Coal
Potts Hill Res. 2 *	F11		S		1923	PG/TE	8	799	Sydney Water
Prospect *	F10		S		88/1979/97	TE	26	50200	SCA
Puddledock Creek *	C11		S	M	1928	VA	21	1730	Armidale Council
Ravensworth Mine Inpit	E11				1994	TE	12	1000	Peabody Resources
Ravensworth Void 3 Ash	E11		S		2001	TE	20	12000	Macquarie Generation
Redbank Creek	E9			R	1899	VA	16	180	Mudgee Council
Rocky Creek	A13			M	1953	TE	28	14000	Rous County Council
Rouse Hill Ret Basin 5 *	F10		S		1993	TE	4	72	Sydney Water
Rouse Hill Ret Basin 9 *	F10		S		1993	TE	5	46	Sydney Water
Rouse Hill Basin 9B	F10				2001	Te	7	55	Sydney Water
Rouse Hill Ret Basin 13 *	F10		S		1994	TE	5	99	Sydney Water
Rouse Hill Ret Basin 16	F10				2000	TE	4	13	Sydney Water
Rydal	F10				1957/96	TE	15	370	DLWC
Rylstone	E9				1953	VA	15	3210	Rylstone Council
Sawyers Swamp Creek Ash	F10		S		1979	TE	40	8500	Delta Electricity
School House Ck Ret Basin	F10		S		1989	TE	4.5	138	Penrith Council
Seladon Ave Ret Basin	E11				1993	TE	2	3	Newcastle Council
SE Tails	E10		S		Prog	ER	35	1200	Coal & Allied
Sheahan-Grants Tails	F8				1990	TE	26	1280	Climax Management Pty Ltd
Shellcove Estate Basin	G10				2003	TE	7	27	Shell Cove Estate
Sierra Place Basin	G10				1991/2001	TE/ER	9	213	Blacktown Council
Smiths Ck Ret Basin 1	G10				2001	TE	9	55	Campbelltown Council
Smiths Ck Ret Basin 2	G10				1996	TE	8	50	Campbelltown Council
Smiths Ck Ret Basin 3	F10				1996	TE	7	32	Campbelltown Council
Sooley *	G9			R	1930/1961	PG	13	4500	Goulburn Council
South Bulli Stormwater Dam	G10				1992	TE	9	89	Bellambi Coal Company P/L
Split Rock	C10				1987	DR	66	397370	DLWC
Spring Creek	F9			R	1931/47/69	TE/VA	16	4700	Orange Council
Stephens Creek	D1			M	1892/1909	TE	15	20400	Aust. Inland Energy & Water
Steuart McIntyre *	D12				2000	TE	25	2500	Kempsey Council
St Josephs School Basin	G10		S		1990/2001	TE	5	17	Shellharbour Council
Stockton Borehole Tails	E11				1982/1985	TE/ER	21	360	Broken Hill Prop. Co Ltd
Suma Park	F9			M	1962	VA	34	18000	Orange Council
Sunlight Gully Upper Dam	C11			I	1900?	TE	4	28	Hillgrove Gold NL / D Hanlan
Sunlight Gully Lower Dam	C11			I	1900?	TE	5	65	Hillgrove Gold NL / D Hanlan
Talbingo	H8			M	1970	ER	162	921400	Snowy Hydro
Tallong Railway	G10				1883/1975	MB	7	318	State Rail Authority
Tallowa	G10		S		1976	PG	46	110200	SCA
Tantangara	H8				1960	PG	45	254000	Snowy Hydro
Tenterfield Creek	B12		S	M	1930/74	PG	11	1170	Tenterfield Shire Council
The Cove	F11			M	1972	TE	7	140	Old Sydney Town
Thompsons Creek	F9				1992	TE/ER	53.5	27500	Delta Electricity
Thornleigh Reservoir	F11				1971	TE	9	409	Sydney Water
Tilba	I10			I	1970/97	TE	17	135	Bega Valley Council
Timor	D9				1961	VA	19.5	1140	Coonabarabran Council
Tooma	I8				1961	TE	67	28100	Snowy Hydro
Toonumbar	A12				1971	TE/ER	44	11000	DLWC
Triako Tails	E6		S		1989	TE	12.5	950	Triex Ltd
Tritton Tails	D6	P			2004	TE	14	5500	Tritton Resources Ltd
Tumbarumba	H8		S	M	1972	TE	6	68	Tumbarumba Council
Tumut Mill Freshwater	H8				2001	TE	11	190	Visy Pulp & Paper

Dam	Map Ref	Presc. 2002/3	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Tumut Mill Winter Storage	H8				2001	TE	11	700	Visy Pulp & Paper
Tumut Pond	H8				1959	VA	86	52800	Snowy Hydro
Tumut 2	H8				1961	PG	46	2700	Snowy Hydro
Tumut 3 Inlet	H8				1971	PG	35	160000	Snowy Hydro
Umberumberka	D1				1914	PG	26	8180	Aust. Inland Energy & Water
Upper Cordeaux 2	G10				1915	VA	19	1200	SCA
Vales Point Ash	F11		S		1984	TE	6	42000	Delta Electricity
Wallerawang	F10				1978	TE	14	4300	Delta Electricity
Wambo Hunter Pit Tails	E11	P			-	ER	50	8300	Wambo Mining Corp.
Wambo NE Tails *	E11		S		Prog	TE	26	2060	Wambo Mining Corp
Warkworth Tails *	E11				1992/94	TE	24	3500	Warkworth Mining
Warkworth Tails 2 *	E11				1997	TE	21	1900	Warkworth Mining
Warragamba *	F10				1960/92/02	PG	113	2091800	SCA
Warringah Reservoir	F11				1936/95	PG/TE	8	77	Sydney Water
Waverley Res. WS133 *	F11		S		1917	PG/TE	8	19	Sydney Water
Wentworth Falls Lake	F10				1906/93	TE	10	300	Blue Mountains Council
Whitford Rd Basin	F10				1997	TE	4	44	Liverpool Council
Winburndale	F9			R	1936	PG	25	1850	Bathurst Council
Windamere	E9		S		1984	TE/ER	67	368000	DLWC
Winding Creek 5 Basin	E11				1993	TE	5	72	Hunter Water Corp
Wingecarribee *	G10			M	1974	TE/ER	20	34510	SCA
Wollondilly Washery	G10				1968	ER	18	150	Sada Pty Ltd
Woll'gong High Basin	G10				2001	Te	5	80	Wollongong Council
Woodford Creek *	F10				1928/48	VA	18	850	SCA
Woodlawn Mine Evap.	H9				1989	TE	6	750	Woodlawn Mines
Woodlawn Mine Evap. 2	H9				1989	TE	10	290	Woodlawn Mines
Woodlawn Nth Tails	H9				1977	TE/ER	18	2100	Woodlawn Mines
Woodlawn Sth Tails	H9				1982	TE/ER	25	2400	Woodlawn Mines
Woodlawn West Tails	H9				1989	ER	35	2400	Woodlawn Mines
Woolgoolga	C13				1967	TE	14	270	Coffs Harbour Council
Woronora	G10				1941/88	PG	63	71800	SCA
Wyangala	F8			I	1971	TE/ER	85	1220000	DLWC
Wyong Road Basin	F11				1975	TE	3	50	Wyong Council
Yarrawonga Weir	I6				1939/2001	PG/TE	7	120000	MDBC
Yass	G8				1927	VA/PG	12	1125	Yass Council
Yellow Pinch	I9				1987	ER	40	3000	Bega Valley Council

LEGEND:

*****	**Inspected by DSC–2003/4**	**U/C**	**Under Construction**	**PG**	**Concrete gravity**
R	**Significant Risk Dam**	**Prog**	**Progressive**	**CB**	**Concrete buttress**
M	**Medium Risk Dam**	**TE**	**Earthfill embankment**	**VA**	**Concrete arch**
I	**Dam under Investigation**	**ER**	**Rockfill embankment**	**MB**	**Masonry buttress**
NA	**Not Available**	**DR**	**Decked rockfill embankment**		

Cadia South Tailings Dam
The DSC continues to monitor the progressive raising of this major tailings storage facility as mining proceeds at Cadia Gold Mine south of Orange