

**NO. R.1560**

**25 JULY 1986**

**REGULATIONS IN TERMS OF SECTION 9C(6) OF THE WATER ACT, 1956,  
RELATING TO DAMS WITH A SAFETY RISK**

By virtue of the powers vested in me by section 9C(6) of the Water Act, 1956 (Act 54 of 1956), I Jacob Johannes Greyling Wentzel, in my capacity as Minister of Water Affairs, hereby make the regulations contained in the Schedule to this Notice relating to dams with a safety risk.

J.J.G. WENTZEL,  
Minister of Water Affairs

**NOTE: THIS IS A SOURCE DOCUMENT FOR COMPILATION OF REGULATIONS  
IN TERMS OF CHAPTER 12 OF THE NATIONAL WATER ACT, 1998 (ACT  
NO. 36, 1998) RELATING TO DAMS WITH A SAFETY RISK**

## SCHEDULE

<b>ARRANGEMENT OF REGULATIONS</b>	<b><i>Regulations</i></b>
Definitions .....	1
Classification of dams .....	2
Use of classification of dams with safety risk .....	3
Requirements for issuing of permits to construct, to enlarge or to alter .....	4, 5
Conditions and requirements of permits to construct, to enlarge or to alter ....	6
Requirements for issuing of permits to impound on putting into operation of dams .....	7, 8
Conditions and requirements of permit to impound .....	9
Conditions and requirements regarding the operation and maintenance of dams with a safety risk, and safety inspections .....	10 - 14
Registration of dams with a safety risk .....	15
Conditions and requirements in connection with abandonment of dams with a safety risk .....	16
Objections to directions by Director-General .....	17
Approval of professional engineers .....	18
Offences and penalties .....	19
Application form for registration of dams .....	Schedule A

**1. DEFINITIONS:**

1.1 In these regulations "the Act" means the Water Act, 1956 (Act 54 of 1956), and any word or expression to which a meaning has been assigned in the Act bears the meaning so assigned to it, and, unless the context otherwise indicates -

- 1.2 "completion certificate" means a written statement issued by the approved professional engineer concerned as soon as the construction work, in his view, for all practical purposes has been completed in accordance with the plans and specifications and an agreement has been concluded to finalise all outstanding work within a stipulated maintenance period; (1.6)
- 1.3 "condition affecting the safety of a dam" means any condition of or event in respect of a dam with a safety risk, or a component thereof, including -
- (a) natural phenomena such as floods and earthquakes;
  - (b) failure or unusual movements or subsidence of any part of the dam or foundation thereof;
  - (c) seepage or leaks which occur or which perceptibly increase in the course of time or which remove material, or defects in the dam wall or its components which could in the course of time lead to a leak;
  - (d) deterioration of concrete or the forming of cracks in the concrete, including the starting of new cracks or the lengthening or widening of existing cracks;
  - (e) the occurrence of sinkholes in the dam wall or dam basin;
  - (f) the movement of material masses near the perimeter of the dam basin;
  - (g) unusual instrument readings;
  - (h) damage to slope protection;
  - (i) unserviceability of spillways;

(j) unserviceability of outletworks capable of lowering the water level in an emergency; and

(k) incidents of sabotage or vandalism,

which pose a threat to the safety of the works or holds a risk of loss or economic loss, or could pose any such threat or hold any such risk, or which could develop into any such condition or event; (1.5)

1.4 "emergency" means a threatened or actual sudden release of water from a dam with a safety risk as a result of a natural disaster, an accident or failure of the dam or a part thereof; (1.3)

1.5 "hazard potential" means a qualitative indication of the potential loss of life or economic loss that any failure of a dam with a safety risk could have as a result; (1.2)

1.6 "professional team" means a group of persons with expertise in disciplines in which expertise is required, and which disciplines have been determined by the approved professional engineer concerned with the concurrence of the Director-General, and who after submission of particulars of their names, qualifications and professional experience have been approved by the Director-General. (1.4)

## **2. CLASSIFICATION OF DAMS:**

2.1 Every dam with a safety risk shall be classified in accordance with regulation 2.4 on the basis of its size and hazard potential to determine the level of control over the safety of such structure that is applicable in terms of these Regulations.

2.2 The size classification of a dam with a safety risk shall be based on the maximum wall height in accordance with the following table:

**TABLE****SIZE CLASSIFICATION**

Size class	Maximum wall height in metres
Small .....	More than 5 but less than 12 m;
Medium .....	equal to or more than 12 but less than 30 m;
Large .....	equal to or more than 30 m.

- 2.3.1 The classification of a dam with a safety risk by hazard potential shall be effected in accordance with the following table:

**TABLE****HAZARD POTENTIAL CLASSIFICATION**

Hazard potential rating	Potential loss of life	Potential economic loss
Low .....	None .....	Minimal.
Significant .....	Not more than ten .....	Significant.
High .....	More than ten .....	Great.

- 2.3.2 The hazard potential rating for a given dam shall be the highest level as determined by the separate consideration of the potential loss of life and potential economic loss.
- 2.4.1 The Director-General or an officer of the Department designated by him shall in accordance with Regulations 2.2 and 2.3 carry out the size and hazard potential classification of each dam with a safety risk on the basis of its size and hazard potential in his opinion, and shall notify the owner or other person in control of the dam of the classification.
- 2.4.2 The Director-General or such officer may from time to time, or when new information comes to his attention, revise the classification of any dam with a safety risk, and shall

notify the owner or person in control of the dam concerned of any alteration in the classification.

- 2.4.3 The owner or other person in control of a dam with a safety risk shall, when requested to do so by the Director-General, furnish any information needed for the revision of the classification of the dam.
- 2.4.4 When an owner intends to build a new dam with a safety risk or to enlarge or alter an existing dam with a safety risk, he shall, after completion of the feasibility studies for the proposed project, furnish the Director-General with the following information for classification purposes:
- (a) Name and address of the owner and that of the person in control concerned;
  - (b) situation of the dam (description as contained in the title deed of the property concerned, magisterial district, nearest town, the distance thereto, the name of the river or watercourse wherein situated (if any) and the location in terms of longitude and latitude to the nearest minute of accuracy);
  - (c) object to the scheme, with an indication of the users of the water;
  - (d) in the case of an alteration to or enlargement of an existing dam, a description of the nature and extent of the intended alteration or enlargement;
  - (e) maximum proposed height of the wall;
  - (f) gross storage capacity of the dam basin; and
  - (g) particulars on a plan of a suitable scale of the nature and situation of development downstream of the dam in the area that would be threatened by a failure of the dam.

**3. USE OF THE CLASSIFICATION OF DAMS WITH A SAFETY RISK:**

3.1 The requirements to be compiled with relating to a dam with a safety risk in respect of the design, construction, putting into operation, operation, maintenance and abandonment of any such dam shall be determined in accordance with the category classification in the following table:

**TABLE**

**CATEGORY CLASSIFICATION OF DAMS WITH A SAFETY RISK**

Size class	Hazard potential rating					
	Low		Significant		High	
Small .....	Category I .....		Category	II	Category	II
Medium .....	Category	II	Category	II	Category	III
Large .....	Category	III	Category	III	Category	III

3.2 The Director-General may, where he considers that circumstances justify it, assign to a dam a category classification other than that indicated by the Table contained in regulation 3.1.

**4. REQUIREMENTS FOR ISSUING OF PERMITS TO CONSTRUCT, TO ENLARGE OR TO ALTER:**

4.1 Any person intending to build a dam with a safety risk, or to enlarge or alter an existing dam with a safety risk, may not begin any construction work, including -

- (a) any preparation of the foundations;

- (b) storage of building materials, including aggregate, earth and rock;
- (c) development of quarries or borrow areas;
- (d) diversion of the watercourse concerned or any works incidental thereto; and
- (e) in the case of the enlargement or alteration of an existing dam, steps to change the existing structure or equipment,

before he is in possession of a permit to construct issued by the Minister.

4.2 The conditions and requirements that must be met before a permit to construct is issued by the Minister are the conditions and requirements set out in regulation 5 for each category classification of dams as determined in the Table contained in regulation 3.1.

5.1 Any person who intends to build a Category I dam, or to alter or enlarge an existing dam so that the completed dam can be classified as a Category I dam, shall apply for a permit to construct by submitting the following to the Director-General and furnish him with the following information:

5.1.1 An application form containing the following information on the proposed project:

5.1.1.1 General details of the project:

- (a) Name and address of the owner and the person in control concerned;
- (b) situation of the dam [description as contained in the title deed of the property concerned, magisterial district, nearest town and the distance thereto, the name of the river or watercourse wherein situated (if any) and the location in terms of longitude and latitude to the nearest minute of accuracy];
- (c) object of the scheme, with an indication of the users of the water; and

- (d) in the case of an alteration or enlargement of an existing dam, a description of the nature and extent of the intended alteration or enlargement.

5.1.1.2 details of the proposed dam:

- (a) Type of wall, with an indication of the quantities of construction material (e.g. volume of earthfill);
- (b) maximum height of the wall;
- (c) base width and crest width at the maximum cross-section;
- (d) gradient of the upstream and the downstream sides and nature of slope protection measures;
- (e) total crest length of the wall;
- (f) a description of the construction materials for use in different zones of the wall, with an indication of their composition, nature and origin;
- (g) a description of the general nature and distribution of the materials forming the foundation of the dam;
- (h) a description of seepage control measures;
- (i) gross storage capacity of the dam basin;
- (j) crest length of the spillways;
- (k) height difference between spillway crest and non-overspill crest;

(l) a description of the type of spillway; and

(m) a description of the outlets of the dam.

5.1.1.3 Particulars relating to the construction of the works:

(a) Planned date of commencement of the construction work;

(b) expected duration of the construction work;

(c) name of the contractor, if known; and

(d) name and particulars of the person responsible for supervision during the construction phase, if known; and

5.1.1.4 name and qualifications of the person responsible for the design of the project; and

5.1.2 any other information on the design of the project that the Director-General may require.

5.2 Any person who intends to construct a Category II dam or to alter or enlarge an existing dam so that the completed dam can be classified as a Category II dam, shall acquire the services of an approved professional engineer to design the proposed project and to draw up plans and specification for it, and shall apply for a permit to construct by submitting to the Director-General the following application form, specification, plans and reports, and furnishing him with the following information:

5.2.1 An application form containing the following information on the proposed project:

5.2.1.1 General particulars of the project:

(a) Name and address of the owner and the person in control concerned;

- (b) situation of the dam [description as contained in the title deed of the property concerned, magisterial district, nearest town and the distance thereto, the name of the river or watercourse wherein situated (if any) and the location in terms of longitude and latitude to the nearest minute of accuracy];
- (c) object of the scheme, with an indication of the users of the water;
- (d) type of wall, with an indication of the quantities of construction material (e.g. volume and earthfill); and
- (e) in the case of an alteration or enlargement of an existing dam, a description of the nature and extent of the intended alteration or enlargement;

5.2.1.2 hydrological particulars of the project:

- (a) The catchment area;
- (b) gross storage capacity of the dam basin;
- (c) net storage capacity of the dam basin;
- (d) surface area of the water at full supply level;
- (e) size of the design flood and the expected recurrence interval thereof; and
- (f) size of the expected regional maximum flood;

#### 5.2.1.3 Particulars of the hydraulic structures and components:

- (a) Type of spillway and its dimensions;
- (b) amount of freeboard (the vertical difference between the design flood level and the non-overspill crest);
- (c) relative elevations of the river bed immediately downstream from the structure, spillway crest and non-overspill crest;
- (d) discharge capacity of the spillway with "no" freeboard;
- (e) description of any spillway gates;
- (f) identification of any type of energy dissipators and their dimensions;
- (g) tailwater level during design flood;
- (h) description of the outlet works;
- (i) description of any auxiliary spillway; and
- (j) number of days needed to draw down the water-level of the dam basin to different depths between full and ten per cent of the full water depth with no inflow;

#### 5.2.1.4 Particulars of the stability of the proposed dam:

- (a) Maximum height of the wall;
- (b) base width and crest width at the maximum cross-section;
- (c) gradient of the upstream and downstream sides;

- (d) total crest length of the wall; and
  - (e) a general engineering description of the construction materials for use in different zones of the wall, with an indication of their composition, nature, grading and geological origin; and
- 5.2.1.5 a brief geological description of the general nature of the materials forming the foundation of the dam;
- 5.2.2 project specifications for the construction of the dam and related structures, wherein the following is specified:
- 5.2.2.1 The requirements with which construction and foundation materials must comply;
  - 5.2.2.2 the procedure that must be followed in the construction of the dam and the equipment to be used;
  - 5.2.2.3 the permissible tolerances for the finishing of structural parts; and
  - 5.2.2.4 particulars of quality control to be applied.
- 5.2.3 engineering drawings of the proposed project, showing the following particulars:
- 5.2.3.1 General situation of the dam, with an indication of access routes from the nearest town;
  - 5.2.3.2 contour plan of the dam basin up to at least one metre above the non-overspill crest height;
  - 5.2.3.3 general layout of the proposed works;

- 5.2.3.4 typical particulars of the various parts or zones of the wall, including the outlet works, spillways, foundation excavation and treatment, wall and foundation drainage, joint grouting, instrumentation and special or unusual characteristics;
- 5.2.3.5 particulars of river diversion works;
- 5.2.3.6 nature and situation of any development within and adjacent to the flooded area within the dam basin;
- 5.2.3.7 in the case of the enlargement or alterations of existing works, particulars of the connection between existing and new works;
- 5.2.3.8 particulars on a plan of suitable scale of the nature and situation of development downstream of the dam in an area that would be threatened by a failure of the dam; and
- 5.2.3.9 particulars on a plan of a scale of 1:250 000 of the situation of other dam projects in the catchment area upstream of the proposed works that could influence its safety in the event of an emergency occurring there; and
- 5.2.4 a design report giving the following information:
  - 5.2.4.1 Particulars of the design flood hydrograph, indicating the criteria, data source and methods used to determine the design flood;
  - 5.2.4.2 description of the flood-handling procedure, indicating the criteria and methods used to determine the dimensions of the spillways, energy dissipators and river diversion works;
  - 5.2.4.3 geological maps and profiles with a description of the general geology of the dam site and a classification of foundation materials on the basis of index tests to indicate their engineering-geological characteristics, geological composition, type, origin and distribution; and

- 5.2.4.4 a statement of the load assumptions, methods of calculation, assumed material properties and design norms used for the stability calculations; and
- 5.2.5 any further information concerning any aspects of the design about which the Director-General requires more particulars.
- 5.3.1 Any person who intends to build a Category III dam or to alter or enlarge an existing dam so that the completed dam can be classified as a Category III dam, shall obtain the services of an approved professional engineer, assisted by a professional team, to design the proposed project and to draw up plans and specifications for it.
- 5.3.1.1 The Director-General may in the case of a project which in his opinion is an extraordinarily large one, or where unusual design principles or methods of analysis have in his opinion been used, or where unusual construction procedures or construction materials have in his opinion been specified, or where he is of the opinion that there are extraordinary circumstances, require that the owner or person in control of the proposed project appoint an independent expert or team of experts to check the proposed design, plans and specifications in whole or in part, or any aspect thereof, and report on them, and that such report be submitted to him.
- 5.3.1.2 The appointment of such experts must be approved by the Director-General beforehand and for this purpose particulars of the qualifications and experience of the experts shall be submitted to the Director-General.
- 5.3.1.3 Any change in the membership or composition of a professional team or independent team of experts shall be submitted to the Director-General for approval.
- 5.3.3 Any person who intends to build a Category III dam, or to alter or enlarge an existing dam so that the completed dam can be classified as a Category III dam, shall apply for a permit to construct by submitting to the Director-General the following application form, drawings, specifications and reports, and furnishing him with the following information:

- 5.3.3.1 An application form containing the information on the proposed project set out in regulation 5.2.1;
- 5.3.3.2 project specifications for the building of the dam and related structures that contain the particulars set out in regulation 5.2.2;
- 5.3.3.3 engineering drawings of the proposed project on which the particulars set out in regulation 5.2.3 are shown.
- 5.3.3.4 a design report of the proposed project, containing the particulars set out in regulation 5.2.4, and which also includes the following particulars:
- (a) An evaluation of the reliability and acceptability of the hydrological data used for the design of the spillways and river diversions;
  - (b) results of the proposed flood handling procedure applied to various alternative inflow hydrographs;
  - (c) calculated or model study results to typify the flood conditions through spillways and energy dissipators;
  - (d) results of backwater curve calculations upstream of the dam wall;
  - (e) an evaluation of the expected rate of silting and its influence on the characteristics of the flood hydrograph and backwater curves upstream of the dam;
  - (f) hydraulic aspects of the river diversion works;
  - (g) discharge curves for outlets that could be used to lower the water-level in the dam basin;

- (h) geological maps and profiles with a description and evaluation, based on tests performed on samples or tests *in situ*, of the distribution and engineering-geological characteristics of foundation materials and geological discontinuities that could have an effect on the dam wall;
- (i) an evaluation of the stability of natural slopes in an in the immediate proximity of the dam basin based on a geological map with information on the distribution and characteristics of geological materials and discontinuities;
- (j) an evaluation of the natural and induced seismicity of the area near the dam based on a geological map with information on the distribution and characteristics of geological materials and discontinuities, and particulars of any historical earthquakes which had a significant effect at the dam site;
- (k) a description of the scope of the materials investigations and results obtained;
- (l) results of structural and stability analyses of the dam and foundations, including safety factors, stresses and displacements; and
- (m) a discussion of the objectives and design principles of the instrumentation layout; and

5.3.3.5 any other information on any aspect of the design on which the Director-General may require more particulars.

## **6. CONDITIONS AND REQUIREMENTS OF PERMITS TO CONSTRUCT, TO ENLARGE OR TO ALTER:**

6.1 The following conditions and requirements with which the holder of a permit to construct, enlarge or alter a dam with a safety risk shall comply, shall be specified in such permit in respect of a Category I dam:

- 6.1.1 That any deviation from the expected condition of the foundation, or the expected quality of the construction materials that comes to light during the construction phase, be reported to the Director-General without delay;
- 6.1.2 that any design adjustment that in the opinion of the Director-General may be necessary on the grounds of new information becoming available, be executed and effected meticulously and without delay;
- 6.1.3 that any information in connection with the construction work that is required by the Director-General be supplied to him without delay; and
- 6.1.4 that assistance be given to the Director-General or any person instructed by him, to conduct an investigation or obtain information or carry out inspections that, in his opinion, are needed in connection with the evaluation of the safety of the construction work.
- 6.2 The following conditions and requirements with which the holder of a permit referred to in regulation 6.1 shall comply, shall in addition to the conditions and requirements mentioned in that regulation, be specified in such permit in respect of a Category II dam:
  - 6.2.1 That in the case of any change of typical particulars that appear on engineering drawings submitted under regulation 5.2.3, or changes to design principles that are considered necessary by the **approved engineer** and on which information has been furnished in the documents submitted under regulation 5.2.4, a report shall be made in writing to the Director-General on the nature, extent and implications of such changes at least 30 days before the changes are implemented, and where such changes are made to deal with an emergency situation, the approved professional engineer shall report them to the Director-General without delay, followed by the submission of a written report on the changes;
  - 6.2.2 that an approved professional engineer shall be appointed -

- 6.2.2.1 to see that adequate measures are taken to ensure that the provisions of the design drawings and specifications are complied with;
- 6.2.2.2 to keep up to date a set of "as built" drawings on which all alterations are shown;
- 6.2.2.3 to keep up to date information on the construction of the dam and to compile a construction completion report; and
- 6.2.2.4 to issue a completion certificate;
- 6.2.3 that where an existing dam is altered or enlarged, a maximum controlled water-level determined by the Director-General shall not be exceeded before a permit to impound referred to in regulation 7 has been issued;
- 6.2.4 that in the case of a new dam the river diversion works shall not be closed before such a permit to impound has been issued;
- 6.2.5 that copies of the completion certificate, the "as built" plans and specifications, and the construction completion report shall be submitted to the Director-General within 120 days after the date of the completion certificate;
- 6.2.6 that if the approved professional engineer is no longer able to carry out his duties, the Director-General shall be notified without delay, and steps shall be taken to replace him; and
- 6.2.7 that if the Director-General deems it necessary, the approved professional engineer must have an approved alternate to take over his duties if he himself is not able to carry them out.
- 6.3 The following conditions and requirements with which the holder of a permit referred to in regulation 6.1 shall comply, shall in addition to the conditions and requirements

mentioned in that regulation and in regulation 6.2, be specified in such permit in respect of a Category III dam, namely that the Director-General may require -

- 6.3.1 that reports on the quality control of the construction work and progress reports be submitted to him at prescribed times;
- 6.3.2 that in cases where in his opinion this is justified, construction work on a part of the project shall not begin before information or particulars requested by the Director-General are supplied to him, and his requirements have been complied with;
- 6.3.3 that record shall be kept of geological conditions as exposed by excavations or drilling work during construction of the dam, in order to identify deviations from assumed conditions and to compile information on true "as built" foundation conditions; and
- 6.3.4 that the approved professional engineer shall have an alternate approved to take over his duties if he himself is unable to carry them out.

## **7. REQUIREMENTS FOR THE ISSUING OF PERMITS TO IMPOUND ON PUTTING INTO OPERATION OF DAMS:**

- 7.1 No permit to impound shall be required for a Category I dam.
- 7.2 Any person who builds a new dam classified by the Director-General as a Category II or III dam, shall not close the river diversion works before he is in possession of a permit to impound issued by the Minister.
- 7.3 Any person who enlarges or alters an existing dam so that it can thereafter be classified by the Director-General as a Category II or III dam, shall not allow the water level in the dam basin to rise above the maximum controlled level determined in the permit to construct, before he is in possession of a permit to impound issued by the Minister.

- 7.4 Application for the issue of a permit to impound shall be made by submitting the particulars set out in regulations 8.1 and 8.2 to the Director-General at least 60 days before the planned date for closure of the river diversion works.
- 8.1 Any person who constructs, alters or enlarges a Category II dam shall apply to the Director-General for a permit to impound by supplying the following particulars:
- 8.1.1 The name and address of -
- (a) the owner and any other person in control of the dam;
  - (b) the representative of the owner or other person concerned who has been granted authority to issue instructions in connection with the operation of the dam;
  - (c) the person directly responsible for the day-to-day operation of the scheme;
  - (d) the South African Police station nearest to the scheme;
  - (e) representatives of local authorities or representative bodies or of any communities potentially threatened by the presence of the dam and with whom arrangements have been made in connection with the issue of warning should a condition that affects the safety of the dam arise;
  - (f) the person charged with the taking of monitoring instrument readings at the dam;
  - (g) the person charged with the regular evaluation of the monitoring instrument readings; and
  - (h) the person charged with the routine inspections of the dam.
- 8.1.2 a construction progress report with an indication of work that has not yet been completed;

- 8.1.3 a control programme for the first filling period and the assumptions on which it is based;
- 8.1.4 the planned date on which the river diversions works will be closed;
- 8.1.5 the methods that will be used to issue warning timeously to the areas downstream of the dam if a condition affecting the safety of the dam arises;
- 8.1.6 information on existing road, air, telephone, radio and telex links with the dam; and
- 8.1.7 a copy of the operating and maintenance manual for the dam, drawn up by an approved professional engineer and which the following particulars are included:
- (a) Instructions for the maintenance of the civil components of the dam, including the drainage systems, slope protection, hydraulic structures and other parts requiring maintenance;
  - (b) instructions for the operation and maintenance of the mechanical and electrical components of the dam that are used for the control of floodwater or that could be used in an emergency to lower the water-level in the dam basin;
  - (c) particulars of a regular inspection programme to check the condition and the serviceability of the various components of the dam, including an item list to serve as a guideline for such inspection;
  - (d) information on the layout, reading procedure and reading frequency of monitoring instruments, and particulars on the procedure for the processing and assessment of the instrument readings, including guideline values for the assessment of the instrument readings;
  - (e) any limitations on the rate of releases or changes in the water-level in the dam;

- (f) in the case of a dam with a controlled spillway, the flood handling procedure, including particulars on flood warning systems for incoming floods, limits on water-levels, water changes, rate of releases and administrative actions in connection with the flood;
- (g) descriptions of circumstances at the dam that should be considered a condition affecting the safety of the dam, with guidelines for the evaluation of such a condition and procedure and actions to be followed to limit the impact of such circumstances on the works and the downstream areas;
- (h) a set of engineering drawings to indicate important operating particulars, including the situation of control points, measuring instruments and access routes that could be used during floods; and
- (i) a plan indicating the nature and situation of development downstream of the dam in an area that would be threatened by a failure of the dam.

8.2 Any person who constructs a Category III dam or alters or enlarges an existing dam so that it can be classified as a Category III dam shall apply to the Director-General for a permit to impound by submitting the particulars prescribed in respect of a Category II dam in regulation 8.1 to the Director-General: Provided that the operation and maintenance manual shall be drawn up by an approved professional engineer, assisted by a professional team.

## **9. CONDITIONS AND REQUIREMENTS OF PERMITS TO IMPOUND:**

9.1 The following conditions and requirements with which the holder of a permit to impound referred to in regulation 7 shall comply, shall be specified in the permit:

9.1.1 That the Director-General be notified in writing within 30 days of any changes in the names of addresses furnished in terms of regulation 8.1.1;

- 9.1.2 that instructions and procedure in the operating and maintenance manual submitted in terms of regulation 8.1.7 be meticulously complied with;
- 9.1.3 that the requirements of regulation 10 of these Regulations, in so far as it applies to the dam, be complied with;
- 9.1.4 that the Director-General be notified without delay as soon as a condition affecting the safety of a dam is identified, and that a written report on the nature, extent and causes of the condition and the steps that have been taken to improve the safety of the dam, be submitted to the Director-General within 30 days;
- 9.1.5 that if, in the opinion of the Director-General, the circumstances of a particular project require it, the controlled water-level in the dam basin shall not exceed a height determined by him, and which may be lower than the full supply level; and
- 9.1.6 that any other requirement of the Director-General shall be complied with.

**10. CONDITIONS AND REQUIREMENTS REGARDING THE OPERATION AND MAINTENANCE OF DAMS WITH A SAFETY RISK, AND SAFETY INSPECTIONS:**

The Director-General may -

- 10.1 inspect any dam with a safety risk or test any components thereof or direct the owner or other person in control of the dam to have an inspection or test carried out or to have instruments for monitoring the behaviour of the dam installed;
- 10.2 direct the owner or such other person to provide information in a form prescribed by him on any matter affecting the safety of the dam or the protection of life and property related to the existence of the dam;

- 10.3 determine a time for the submission of information or the taking of steps concerning which he has issued directions;
- 10.4 require that maintenance work which according to a dam safety inspection report appears necessary, be carried out under the supervision of an approved professional engineer; and
- 10.5 in consequence of a dam safety inspection report, require that further studies be undertaken by an approved professional engineer to investigate any potential defects.
11. The owner or other person in control of a dam with a safety risk shall -
- 11.1 regularly inspect the dam or have it inspected to check whether all the components thereof are still in a satisfactory serviceable condition and are capable of performing the function for which they are intended;
- 11.2 as soon as a condition affecting the safety of a dam arises at the dam, investigate, or cause to be investigated and evaluate the circumstances and without delay take such steps as are necessary to clear up or control the condition. Provided that in the case of a Category II or Category III dam the nature of such steps as well as a programme for the implementation thereof shall be reported in writing to the Director-General within 60 days after the development of such condition;
- 11.3 from time to time in accordance with the provisions of these regulations and when requested to do so by the Director-General, report on a safety inspection of the dam in the manner set out in regulations 12, 13 and 14 and within the period determined by the Director-General;
- 11.4 when an emergency develops at the dam, without delay release information to make it possible to evacuate threatened areas downstream of the wall;

- 11.5 report any emergency that may develop at the dam to the Director-General without delay, and carry out any instructions arising therefrom, and shall within a period of 30 days provide the Director-General with a written report containing full details of the circumstances giving rise to the emergency, of how the conditions developed or were controlled and of the nature and extent of the damage;
- 11.6 apply appropriate operational procedures to prevent people or property downstream of the dam from being flooded without warning by sudden changes in water-levels;
- 11.7 furnish full co-operation and assistance in any investigation or inspection of any component of the dam being carried out at the direction of the Director-General;
- 11.8 compile and keep comprehensive and up to date record of the dam, which shall include -
- (a) plans of and any reports on the geology, design, construction, maintenance, operation and improvements or changes to the dam;
  - (b) in the case of a Category II or Category III dam with monitoring instruments, instrumentation observation data, and tables and graphs that are to be kept continuously up to date to illustrate the data collected; and
  - (c) in the case of a Category II or Category III dam, information regarding the fluctuation of water levels in the dam and the quantities of water permitted to flow past the dam wall as requested by the Director-General in each particular instance;
- 11.9 store the original records referred to in regulation 11.8 above, or usable copies thereof, at the dam site or in a nearby office where it can be consulted conveniently and will be protected against any damage.
- 11.10 if, for a Category II or Category III dam, the said records are not stored near the site of the dam, keep on site copies of the design drawings, instrument data and operational

history and any other documents that may be necessary for the safe and efficient operation of the works;

- 11.11 when ownership or control of the dam is transferred to another person, also transfer the said records of the dam to the new owner or other person in control of the dam, and shall notify the Director-General of this in writing within three months after any such change come into effect;
  - 11.12 if the dam becomes unusable owing to silting up or for any other reason, notify the Director-General of this in writing within one month after such occurrence; and
  - 11.13 if the dam is to be used for any purpose other than that for which it was originally built, notify the Director-General in writing thereof at least two months before any such change comes into effect.
- 
- 12.1 The owner or other person in control of a Category I dam shall, when so requested and within the period laid down by the Director-General and in any case at intervals of no longer than five years after the first request by the Director-General, submit a signed dam safety inspection report to the Director-General.
  - 12.2 The dam safety inspection report shall be completed by the owner or other person concerned or his representative, and shall provide details in respect of -
    - 12.2.1 the general condition of the crest and the upstream face and downstream face of the dam wall;
    - 12.2.2 the position and size of any wet patches or leakages through the wall or foundation thereof, mentioning the turbidity and flow rate of any leaking water;
    - 12.2.3 the position and extent of any cracks, subsidences or signs of relative movement on any part of the dam wall;

- 12.2.4 the condition of the spillways, including any erosion thereof in the area directly upstream or downstream of the spillway; and
- 12.2.5 any buildings or developed areas downstream of the wall that could be threatened by floodwater owing to failure of the dam.
- 13.1 A safety inspection of a Category II dam shall be carried out by an approved professional engineer to identify any actual or potential shortcomings in the condition of the dam or in the quality and adequacy of the procedures for the maintenance, operation and monitoring of behaviour that might endanger human lives or property.
- 13.2 The owner or other person in control of a Category II dam built or altered in terms of a provision of these regulations shall, within three years after the issue of a permit to impound, have an initial dam safety inspection of the dam carried out, and shall thereafter have further inspections carried out at intervals of not more than five years: Provided that the Director-General may at any other time request that a safety inspection be carried out within such period as he may determine.
- 13.3 The owner or other person in control of a Category II dam that began to impound water before the date on which the requirement for obtaining a permit to impound came into effect, shall have an initial safety inspection of the dam carried out when so requested by the Director-General and within such period as he may determine, and shall thereafter have further safety inspections carried out at intervals of not more than five years.
- 13.4 An inspection by an approved professional engineer referred to in regulation 13.1 shall include the following:
- 13.4.1 A study of all existing reports on the safety of the dam and related matters;
- 13.4.2 an on-site inspection during which -

- (a) available data on the condition and structural behaviour of the dam and its foundations are inspected and assessed;
  - (b) note is taken of any visible signs of subsidence, movement, cracking, internal stress, erosion, sink-holes, seepage, leakage and ageing of materials, the functioning of the drainage and pressure relief systems and anything else that may affect the safety of the dam; and
  - (c) the serviceability of equipment used to regulate floodwater and to draw down the water-level quickly in an emergency is investigated;
- 13.4.3 an assessment of the geological conditions on site and of the stability of slopes near the dam and in the dam basin;
- 13.4.4 an evaluation, based on available information, of -
- (a) the adequacy of the spillways;
  - (b) the consequences of overtopping of the non-overspill crest;
  - (c) the potential economic loss and loss of life as a result of a failure of the dam;
  - (d) the structural adequacy and stability of structures under the effect of normal and abnormal load conditions;
  - (e) applicable hydrological data collected since the dam was built or since any previous inspection in terms of these Regulations;
  - (f) the behaviour of the dam, with due consideration of the available instrument observations;

- (g) the quality and adequacy of the level of maintenance, the monitoring programme and the operating procedures to protect human lives and property; and
  - (h) precautions to safeguard members of the public who gain free access to the dam, against accidents.
- 13.5 The approved professional engineer shall compile a dam safety inspection report that complies with the requirements of this regulation, and one copy of the report shall be submitted to the Director-General within such period as he may determine.
- 13.6 The first dam safety inspection report submitted in respect of a dam in terms of these Regulations shall contain the following information:
- 13.6.1 A concise description of the project of which the dam is part;
  - 13.6.2 a site plan of the project;
  - 13.6.3 plans, elevations and sections that show the characteristic features of the dam and the position of any monitoring instruments;
  - 13.6.4 a summary of the design assumptions, design analyses, design flood data and safety factors used during the design phase to evaluate the structural adequacy and stability; and
  - 13.6.5 a summary of the geological conditions that could affect the safety of the dam;

Provided that -

- (a) if the said information is included in another report that is already in the **possession** of the Director-General, only a full reference to that report need be provided; and

- (b) in cases where any of the said information is not available, or is inadequate, or is available but is regarded as invalid, the approved professional engineer shall indicate in his report what additional information is regarded as necessary to complete the dam safety inspection properly.

13.7 All dam safety inspection reports submitted in terms of these Regulations shall contain the following information:

13.7.1 An analysis of the safety, the operating procedures and the maintenance of the dam based on the inspections, assessment and evaluations effected by the approved professional engineer in terms of regulation 13.4, as well as reference to the methods used, assumptions made and standards applied for the evaluation as required in terms of regulation 13.4.4;

13.7.2 the identification of any change in respect of the information required in terms of regulation 13.6 that has come into effect since the last dam safety inspection, and an analysis of the effects of such change;

13.7.3 if the dam is equipped with monitoring instruments, the monitored information to provide a representative picture of the results upon which assessments of the behaviour and safety have been based, the information being presented graphically to represent the changes over time on a scale that makes it possible to distinguish trends in the pattern of behaviour, and including a drawing to indicate the position and distribution of instruments in the structure;

13.7.4 an analysis of the adequacy of the existing monitoring instrument installation, the monitoring programme and the programme of the owner or other person in **control** for periodic inspections of the dam in the light of the potential threat to human life and property;

- 13.7.5 recommendations by the approved professional engineer based on his inspections, assessment analysis and evaluations as required in terms of these Regulations, with regard to -
- (a) any corrective measures required to eliminate actual or potential shortcomings in the condition of the dam or in the quality and adequacy of the procedures for the maintenance, operation and monitoring of the dam;
  - (b) the urgency in respect of the taking of such corrective measures;
  - (c) the need for further studies to investigate any potential shortcomings; and
  - (d) any additional instruments, inspections or observations considered necessary;
- 13.7.6 if the analyses required in regulations 13.7.1 and 13.7.4 above amount merely to a confirmation of the findings of a previous report, a statement that this is so and a full reference to the previous report in which the analyses were set out;
- 13.7.7 a list of all professional staff that have taken part in the inspection or the compilation of the report; and
- 13.7.8 the signature of the approved professional engineer responsible for the dam safety inspection.
- 13.8 The contents of the dam safety inspection report referred to in regulation 13.7 shall be limited to the information necessary to support the findings and recommendations contained in the dam safety inspection.
14. The requirements and conditions as set out in regulation 13 in respect of a safety inspection of a Category II dam, shall also apply to such an inspection of a Category III dam, except -

- 14.1 that the dam safety inspection shall be conducted by an approved professional engineer assisted by a professional team; and
- 14.2 that the information required by regulation 13.7.1 shall also include characteristic results obtained in the process of evaluation in terms of regulation 13.4.4.

**15. REGISTRATION OF DAMS WITH A SAFETY RISK:**

- 15.1 A dam with a safety risk shall be registered as envisaged by section 9C(4) of the Act, by the submission to the Director-General of a completed form in accordance with Schedule A to these Regulations.
- 15.2 The Director-General shall keep a register of all dams with a safety risk and any such dam may be removed from the register only under regulation 16.5.
- 15.3 For the purposes of the registration of a dam with a safety risk referred to in section 9C(4)(b) of the Act, it shall for the purposes of that section be deemed that a dam becomes capable of diverting or storing water -
- 15.3.1 on the date of completion of the construction of a Category I dam; and
- 15.3.2 on the date of the completion certificate in respect of a Category II or Category III dam.

**16. CONDITIONS AND REQUIREMENTS IN CONNECTION WITH THE ABANDONMENT OF DAMS WITH A SAFETY RISK:**

- 16.1 No person in control shall abandon a dam with a safety risk without steps having been taken to ensure that the remaining structure will, without any further operational action, maintenance or inspection, hold no danger or potential danger to human life or property.

- 16.2 No person in control shall begin altering a dam with a safety risk or altering its normal operation with a view to abandonment, unless he is in possession of an abandonment permit issued by the Director-General.
- 16.3.1 Any person in control who intends abandoning a dam with a safety risk shall apply to the Director-General for an abandonment permit, and satisfy him that steps necessary in respect of the **relevant** dam have been taken in terms of regulation 16.1.
- 16.3.2 In the case of a Category I dam the information mentioned in regulation 16.3.2.1 below shall be furnished in any such application and, if the Director-General so requires, the information mentioned in regulations 16.3.2.2 and 16.3.2.3 and in the case of Category II and III dams, the information mentioned in all the said regulations shall be furnished:
- 16.3.2.1 General details of the project:
- (a) Name and address of the owner or other person in control;
  - (b) situation of the dam (description as contained in the title deed of the property concerned, magisterial district, nearest town and distance thereto, the name (if any) of the river or watercourse wherein situated and the location in terms of longitude and latitude to the nearest minute of accuracy); and
  - (c) detailed reasons for the abandonment of the dam.
- 16.3.2.2 Engineering drawings of the proposed alterations and changes indicating the following particulars:
- (a) The proposed alterations and changes to the hydraulic components of the dam to release water that could be dammed up by the remaining structure; and

- (b) the proposed structural alterations and changes to the dam to ensure that the remaining structures will not, without any further maintenance, inspection or operational action, hold any danger or potential danger to human life or property.
- 16.3.2.3 A written report by an approved professional engineer setting out in full the principles applied in determining the proposed changes and alterations to the dam as shown on the engineering drawings.
- 16.4 The Director-General may lay down the following requirements in an abandonment permit:
  - 16.4.1 That an approved professional engineer shall be appointed to see to it that the necessary measures are taken to ensure that the changes and alterations to the dam are performed in accordance with the engineering drawings and specifications; and
  - 16.4.2 that a completion certificate issued by an approved professional engineer and certifying that the work has been carried out in accordance with the engineering drawings and specifications shall be submitted to the Director-General within 60 days after completion of the changes and alterations.
- 16.5 Upon receipt of the said completion certificate or after the issuing of an abandonment permit, should a completion certificate not be required, the Director-General shall delete the dam from the register of dams with a safety risk.

## **17. OBJECTIONS TO DIRECTIONS BY THE DIRECTOR-GENERAL:**

- 17.1 Objections to directions referred to in section 9C(8)(b) of the Act which are lodged with the Minister in terms of that section may, within 60 days of the date of the direction, be lodged in writing with the Director-General, with a statement of the ground for the objection, for submission to the Minister.

## **18. APPROVAL OF PROFESSIONAL ENGINEERS:**

- 18.1 A professional engineer desiring for the purposes of a provision of these Regulations to be approved as the approved professional engineer for a task required in terms of these Regulations in connection with a specific project, shall apply in writing by supplying the Director-General -
- 18.1.1 with particulars of his qualifications, training and experience in dam engineering; and
- 18.1.2 with a description of the project and the nature of the task to be undertaken by him.

## **19. OFFENCES AND PENALTIES**

- 19.1 Any person who -
- 19.1.1 contravenes or fails to comply with any provision of these regulations;
- 19.1.2 fails to supply any information when requested to do so by the Director-General in terms of these Regulations; or
- 19.1.3 contravenes or fails to comply with a condition or requirement of a permit, shall be guilty of an offence and upon conviction liable to a fine not exceeding R10 000 or to imprisonment for a period not exceeding six months.
- 19.2 In the case of an offence referred to in regulation 19.1 which continues, the person concerned shall on conviction be liable in addition to a fine not exceeding R50 or to additional imprisonment not exceeding one day in respect of each day on which the offence is or has been persisted with.