APPENDIX B

(see http://www.tceq.state.tx.us/compliance/field_ops/dam_safety/damsafetyprog.html)

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DAMS AND RESERVOIRS

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Subchapter A
General Provisions
§§299.1-299.5

These new sections are adopted under the Texas Water Code, 12.052, which provides that the Texas Water Commission shall adopt any regulations necessary to provide for the safe construction, maintenance, repair and removal of dams located in this state.

§299.1. Definitions. The following words and terms, when used in this chapter shall have the following meanings, unless the context clearly indicates otherwise:

Dam – Any barrier, including one for flood detention, designed to impound liquid, volumes and which has a height of dam greater than six feet. This does not include highway, railroad or other roadway embankments, including low water crossing that may temporarily detain floodwater, levees designed to prevent inundation by floodwater, closed dikes designed to temporarily impound liquids in the event of emergencies, or off-channel impoundments authorized by the commission in accordance with Texas Water Code, Chapter 26, or the Texas Solid Waste Disposal Act, Texas Civil Statutes Article 4477-7.

Effective crest of the dam – The elevation of the lowest point on the crest of the dam excluding spillways.

Existing Dam –

(A) Any dam constructed in accordance with necessary authorizations of the commission;

(B) Any existing dam exempt under Texas Water Code §11.142;

Height of dam – The vertical distance from the effective crest of the dam to the lowest elevation on the centerline or downstream toe of the dam including the natural stream channel.

Maximum storage capacity – The volume of the impoundment created by the dam at the effective crest of the dam, usually expressed in acre-feet.

Normal storage capacity – The volume of the impoundment created by the dam, at the lowest controlled spillway crest, usually expressed in acre-feet.

Probably maximum flood (PMB) – The flood magnitude that may be expected from the most critical combination of meteorologic and hydrologic conditions that are reasonable possible for a given watershed.

Probable maximum precipitation (PMP) – Theoretically the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location at a certain time of the year.

Proposed Dam – Any dam, constructed or to be constructed, which is not included in the definition of Existing Dam.

Spillway design flood (SDF) – The flood criteria that needs to be considered in the design of a proposed project.

Spillway evaluation flood (SEF) – The flood criteria that needs to be considered in the hydrologic evaluation of an existing structure.

§299.2. General.

(a) When the executive director finds that a dam or reservoir poses a level of danger to the public which is unacceptable when evaluated in accordance with commission rules, he may either refer the matter directly to the attorney general for injunctive relief or he may seek an order from the commission to direct the owner to take appropriate action to remove the danger to life and property. An owner who willfully fails or refuses to take appropriate action is liable for a penalty of not more than $1,000 a day for each day the violation continues.

(b) In determining whether an existing or proposed dam and reservoir constitutes an unacceptable danger to life or property, the commission shall evaluate both the hydrologic and, if possible, the structural adequacy of the dam. The commission may take into consideration conditions, including but not limited to, the possibility that the dam might be endangered by overtopping, seepage, piping, settlement, erosion, cracking, earth movement, uplift, overturning, or failure of bulkheads, flashboards, gates, spillways and conduits.

(c) Dams and associated facilities must be adequately maintained throughout their lives, including as necessary, the operation and maintenance of surveillance and monitoring devices to detect changes in the dam and/or its foundation and appurtenant facilities. If abandoned at any time, a dam must be removed or breached in a manner to eliminate any hazard to life and property downstream.

(d) Dam and spillway adequacy shall be evaluated utilizing standard engineering procedures and techniques including, but not limited to, those employed and recommended by the Corps of Engineers, Soil Conservation Service, Bureau of Reclamation, and the American Society of Civil Engineers.

§299.3. Duties, Obligations and Liabilities of Dam Owners. Nothing in these rules or orders made by the commission shall be construed to relieve an owner or operator of a dam or reservoir of the legal duties, obligations or liabilities incident to ownership or operation.

§299.4. Registered Engineer. Preparation of all plans and specifications, and the construction, enlargement, alteration, repair or removal of dams subject to commission review shall be under the supervision of an engineer registered in this state, unless a waiver of this requirement is authorized pursuant to §299.5 of this title (relating to Exception).

§299.5. Exception. Written approval of the executive director is required for exception from any or all of the requirements of §299.4 of this title (relating to Registered Engineer), §299.22 of this title (relating to Approval of Plans and Specifications), §299.23 of this title (relating to Content of Construction Plans and Specifications), §299.24 of this title (relating to Maintenance of Records), §299.25 of this title (relating to Construction Progress Report), §299.26 of this title (relating to Construction Inspection), §299.27 of this title (relating to Plan and/or Specification Changes and Amendments), §299.28 of this title (relating to Noncompliance with Approved Plans and Specifications), §299.29 of this title (relating to Deliberate Impoundment), and §299.31 of this title (relating to As-built Drawings and Permanent Reference Mark). The executive director may grant exception if he determines that the physical conditions involved, when evaluated using standard engineering procedures and techniques, render the requirements unnecessary. Written approval will specify the extent of the exception granted and the executive director's reasons for granting it. This rule does not limit the executive director's authority under §299.27 of this title (relating to Plan and/or Specification Changes and Amendments) to require amendments, modifications or changes to ensure the safety of a structure.

Subchapter B
Design and Evaluation of Dams
§§299.11-299.18

These new sections are adopted under the Texas Water Code, 12.052, which provides that the Texas Water Commission shall adopt any regulations necessary to provide for the safe construction, maintenance, repair and removal of dams located in this state.

§299.11. Classification of Dams. All dams will be classified or reclassified as necessary to assure appropriate safety considerations. The three size classifications (small, intermediate and large), based on height of dam or impoundment capacity, and the three hazard classifications (low, significant and high), are combined to indicate a dam's downstream hazard potential. Thus, the classification assignment reflects the hazard potential associated with assumed failure of the dam. For example, dams located such that resulting failure could be catastrophic are classified so as to require a higher degree of design consideration than would be required for similar dams located in remote areas. Classification does not indicate the physical condition of a dam.

§299.12. Size Classification Criteria. The classification for size based on the height of the dam or maximum reservoir storage capacity, shall be in accordance with Table 1 of this subsection. The appropriate size is the largest category determined for either storage or height.

TABLE 1
SIZE CLASSIFICATION

Category	Impoundment Storage (Ac-Ft)	Height (Ft.)
Small	Less than 1000	Less than 40
Intermediate	Equal to or Greater than 1000 & Less than 50,000	Equal to or Greater than 40 & less than 100
Large	Equal to or Greater than 50,000	Equal to or Greater than 100

§299.13. Hazard Classification Criteria. The hazard potential classification shall be in accordance with Table 2 of this subsection. Hazard classification pertains to potential loss of human life and/or property damage within either existing or potential developments in the area downstream of the dam in event of failure or malfunction of the dam or appurtenant facilities. Hazard classification does not indicate any condition of the dam itself. Dams in the low hazard potential category are normally those in rural areas where failure may damage farm buildings, limited agricultural improvements and county roads. Significant hazard potential category dams are usually those in predominantly rural areas where failure would not be expected to cause loss of human life, but may cause damage to isolated homes, secondary highways, minor railroads, or cause interruption of service or use (including the design purpose of the facility) of relatively important public utilities. Dams in the high hazard potential category are usually those in or near urban areas where failure would be expected to cause loss of human life,

extensive damage to agricultural, industrial, or commercial facilities, important public utilities (including the design purpose of the facility), main highways or railroads.

TABLE 2
HAZARD POTENTIAL CLASSIFICATION

Category	Loss of Human Life	Economic Loss
Low	Non expected (No permanent Structures for human habitation	Minimal (Undeveloped to occasional structures or agricultural improvements)
Significant	Possible, but not expected (A small number of inhabitable structures)	Appreciable (Notable agricultural, industrial or commercial development)
High	Expected (Urban development or large number of inhabitable structures)	Excessive (Extensive public, industrial, commercial or agricultural development)

§299.14. Hydrologic Criteria for Dams.

(a) The hydrologic criteria contained in Table 3 are the minimum acceptable spillway design flood (SDF) for proposed dams as defined in §299.1 of this title (relating to Definitions), including those to be constructed in accordance with Texas Water Code, §11.142.

(b) Exemptions to Minimum Hydrologic Criteria – Proposed low hazard dams exempt under Texas Water Code, §11.142 are exempt from the minimum criteria. Any other proposed structure may be exempt from the minimum criteria if properly prepared dam breach analyses show that existing downstream improvements are known or planned future improvements will not be adversely affected. A properly prepared breach analysis should include at least three events, the normal storage capacity non-flood event, the barely overtopping event and the PMF event. Data on additional flood magnitudes may be provided as necessary to document other conditions or conclusions. Downstream flooding differentials of one-foot or less between breach and non-breach simulations are not considered to be adverse.

TABLE 3
HYDROLOGIC CRITERIA FOR DAMS

Classification		Minimum Flood Hydrograph
Hazard	Size	
Low (No. 3)	Small	¼ PMF
	Intermediate	¼ PMF to ½ PMF
	Large	PMF
Significant (No. 2)	Small	¼ PMF to ½ PMF
	Intermediate	½ PMF to PMF
	Large	PMF
High (No. 1)	Small	PMF
	Intermediate	PMF
	Large	PMF

NOTE: The flood hydrograph in this table is the minimum required flood for a given project, i.e., the project will be required to safely pass this hydrograph. Where a range is given, the minimum flood hydrograph will be determined by straight line interpolation within the given range. Interpolation shall be based on either hydraulic height or impoundment size (§229.12, Table 1 of this title (relating to Size Classification Criteria), whichever is greater. The minimum flood hydrograph is computed as a percentage of the PMB hydrograph.

§299.15. Evaluation of Existing Dams.

(a) Existing dams, as defined in §299.1 of this title (relating to Definitions), are subject from time to time to reevaluation in consideration of continuing downstream development. Hydrologic criteria contained in §299.14, Table 3 of this title (relating to Hydrologic Criteria for Dams) are the minimum acceptable spillway evaluation flood (SEF) for reevaluating dam and spillway capacity for existing dams to determine whether upgrading is required. Dams not meeting minimum criteria are considered to be blow acceptable limits and are subject to action as necessary under §299.2 of this title (relating to General).

(b) Exemptions from Minimum Hydrologic Criteria – Existing low hazard dams are exempt from the minimum hydrologic criteria as given in table 3 and any other existing structure may be exempt from the minimum hydrologic criteria is properly prepared dam breach analyses show that existing downstream improvements are known or planned future improvements will not be adversely affected. A properly prepared breach analysis should include at least three events, the normal storage capacity non-flood event, the barely overtopping event and the PMF event. Data on additional flood magnitudes may be provided as necessary to document other conditions or conclusions. Downstream flooding differentials of one-foot or less between breach and non-breach simulations are not considered to be adverse.

(c) Structural Evaluation – Evaluating the structural condition of an existing dam includes, but is not limited to, visual inspections and evaluations of potential problems such as seepage, cracks, slides, conduit and control malfunctions and other structural and maintenance deficiencies which could lead to failure of a structure. An active and progressive deteriorating condition is sufficient for a finding that an existing dam is structurally inadequate.

§299.16. Interim Alternatives. At the time the commission considers the permanent upgrading or removal of an inadequate dam, the dam owner may request the commission to consider interim alternatives including but not limited to temporary repairs, reservoir dewatering, insurance coverage, and/or downstream warning and evacuation plans. Consideration shall be given to the time required to overcome economic, physical and legal restraints to upgrading, the prospect of permanent repair, current use of the facility, degree or risk and public welfare.

§299.17. Emergency Management. As required for emergency management planning, the executive director may request, and/or the commission may order a dam owner to provide sufficient data to plan for potential effects of failure or malfunction of a dam and/or associated appurtenant facilities.

§299.18. Variance. The owner of an existing dam that does not meet the hydrologic criteria of §299.14, Table 3 of this title (relating to Hydrologic Criteria for Dams) may request the commission to consider a variance from this criteria, based upon but not limited to the owner's evaluation of the consequences of potential dam failure, proposals to reduce potential hazard, and/or the economic and physical limitations to upgrading.

Subchapter C
Construction Requirements
§§299.21-299.31

These new sections are adopted under the Texas Water Code, §12,052, which provides that the Texas Water Commission shall adopt any regulations necessary to provide for the safe construction, maintenance, repair and removal of dams located in this state.

§299.21. Applicability. This subchapter applies only to engineering plans and specifications for the construction, enlargement, repair, or alteration of dams requiring commission authorization, except as follows:

(1) Exceptions approved in accordance with §299.5 of this title (relating to Exception);
(2) Dams designed by and constructed under the supervision of federal agencies such as the Corps of Engineers, Bureau of Reclamation and the Soil Conservation Service.

§299.22. Approval of Plans and Specifications. Construction of a dam or the enlargement, repair, or alteration of an existing dam requiring commission authorization shall not be commenced prior to the executive director's written approval of final construction plans and specifications. Construction plans and specifications shall be submitted to the executive director and shall be as completely detailed as necessary for submission to the contractors bidding on the proposal. Contractors shall not commence construction until provided with a copy of the plans and specifications evidencing the approval. This does not apply to ordinary maintenance or emergency repair. The executive director may require the filing of additional information and data which, in his opinion, may be necessary for determining the adequacy of operational functions and safety of the structures and works related thereto. The official name of the dam and reservoir by resolution of the governing body or by certificate if individually owned, shall be submitted to the department as early as possible, preferably with the construction plans.

§299.23. Content of Construction Plans and Specifications.

(a) Construction plans requiring approval by the executive director may include the following, as determined by the executive director:
  (1) A topographic map of the dam site with contour intervals of not to exceed five (5) feet. A plan of the dam shall be superimposed on this map showing the location of spillways, outlet conduit, cutoff walls and other structures;
  (2) A profile of the dam site taken on the long axis of the dam and a profile of each spillway along its long axis. The profile shall also show the location of the outlet conduit and spillway. A log showing the classification of materials encountered below the surface as shown by test pits or borings should be included;
  (3) A cross section of the dam at maximum section showing complete details and dimensions;
  (4) Detailed plans showing sections of outlet conduits, control works and spillways. These sections should be of sufficient number and detail to delineate clearly all features of the structure; and
  (5) The location of all permanent instrumentation shall be shown on the plans. All pressure cells, settlement plates, piezometers, slope indicator casing or other devices shall be noted.
(b) Construction plans shall be accompanied by specifications which may include, but are not limited to the following:

(1) The requirements for the various types of materials to be used in the constructions of all pertinent works;
(2) A specified time of completion, i.e., a requirement that the contractor's bid contain a time of completion;
(3) A provision to the effect that plans and specifications shall not be substantially or materially altered without prior written approval of the executive director.

(c) Other engineering reports and additional information are sometimes prepared and may be required by the executive director for review. These reports, applicable to the type of structure (earthfill, rockfill or concrete) in question, may include details such as geology of the project site and vicinity, location and logs of test borings, pits and shafts, results of field and laboratory tests on structural and foundation materials; seepage studies, and stability analyses of embankments, spillways, retaining walls, etc. Additional information required may include recommendations concerning embankment slopes, crest width, berms, core trench depths, moisture-density and strength requirements, minimum compressive strength for concrete, construction sequence procedures and/or techniques for excavations and embankments, and types of compaction equipment, borrow excavation techniques and sequence of fill placement.

§299.24. Maintenance of Records.

(a) The owner shall continuously maintain records to insure compliance with the approved plans and specifications during construction. Copies of these records shall be furnished to the executive director at monthly intervals during the construction period, and may include but not necessarily be limited to such items as soil moisture-density test results, and concrete trial batch designs test and compression test results.

(b) Other observations which may be recorded include final bottom width and elevations of core and cutoff trenches, structural excavations, permanent sheet piles or bearing piles, and documentation of foundation groutings, dewatering problems, or observations during the construction period of any instruments installed to measure movements, stresses and pore pressure.

§299.25. Construction Progress Report. Within 10 days after beginning actual construction of a project, the executive director shall be notified in writing of the date work began. Thereafter, monthly reports of progress shall be forwarded to the executive director by the 10^{th} of each month during construction. The report shall show the work accomplished during the month, the percent of time used and the percentage of completion of the project as of the close-out date of the report. In addition, the report shall show the inclusive dates of the reporting period.

§299.26. Construction Inspection. Inspection of construction work shall be conducted by a registered professional engineer experienced in the construction of dams and responsible directly to the owner. Continuous daily inspections shall be made and may be delegated to a qualified technician (inspector) provided he is under the supervision of the owner's engineer. The executive director may make periodic inspections for the purpose of ascertaining compliance with approved plans and specifications. The executive director shall require the owner, at his expense, to perform the work or tests necessary and to disclose information sufficient to enable the executive director to determine that conformity with approved plans and specifications is accomplished.

§299.27. Plan and/or specification Changes and Amendments. If after inspection, investigation or examination, or at any time as the work progresses, the executive director finds that changes or amendments are necessary to insure safety, he may request the owner to revise his plans and/or specifications. Alterations of the plans and specifications must be approved by the executive director before work commences under the changes, except in emergencies requiring immediate action of which the executive director shall be immediately notified. If the proposed alterations would result in deviation from the permitted right, amendment of the permit must be obtained from the commission.

§299.28. Non-Compliance with Approved Plans and specifications. If at any time during construction, enlargement, repair, or alteration of any dam or reservoir the executive director finds that the work is not being done in accordance with approved plans and specifications or in accordance with approved revised plans and specifications, he shall give written notice thereof and direct compliance by certified mail to the owner. If the owner fails to comply with the directive, the executive director may take appropriate action to assure compliance. Failure to comply with approved plans and specifications will be grounds for revocation of the permit and/or civil penalty as provided by law. The commission may order the structure removed to eliminate any safety hazard to life and property.

§299.29. Deliberate Impoundment. Written approval of the executive director must be obtained prior to deliberate impoundment of water in a partly or newly completed reservoir designed to impound more than 100 acre-feet at normal storage capacity. Deliberate impoundment shall mean any act which results in the intentional impoundment of water in the reservoir and includes but is not limited to closure of the lowest planned outlet or spillway serving the reservoir, blocking the diversion works used during the construction and beginning backfill within the closure section of a dam. Temporary closing of a valve or spillway gate for operational testing shall not be construed as an act of deliberate impoundment.

§299.30. Certificate of Completion. Immediately upon completion of a new dam and reservoir, or enlargement, repair or alteration of an existing dam and reservoir, the owner shall file a certificate with the executive director, signed by the responsible engineer supervising the work for the owner, certifying that, to the best of the engineers knowledge, the construction, alterations, or repairs were completed in accordance with the approved plans and specifications. In the case of projects excepted under §299.5 of this title (relating to Exception), the owner shall notify the executive director in writing that construction, alterations, or repairs were completed.

§299.31. Record Drawings and Permanent Reference Mark. As soon as possible after completion of construction, the owner or his engineer shall submit to the executive director a complete set of record drawings of the project for filing with the permanent records of the department. One or more permanent reference mark(s) shall be established for future use near but separate from the project. Accurate location(s) and elevation(s) above mean sea level shall be shown on the record drawings.

Subchapter D
Removal of Dams
§299.51

This new section is adopted under the Texas Water Code, §12.052, which provides that the Texas Water Commission shall adopt any regulations necessary to provide for the safe construction, maintenance, repair and removal of dams located in this state.

§299.51. Removal of Dams and Reservoirs. Removal or modification of a dam shall be done at the owner's expense, and except for emergency action required to protect lives and property, only after executive director approval. The executive director may require the owner to provide plans and specifications. The executive director may seek an order from the commission or an injunction through the attorney general requiring the removal or modification of dams and reservoirs which are not authorized by law or which have been determined to pose an unacceptable hazard to downstream lives or property.

Subchapter E
Emergency Action
§299.61

This new section is adopted under the Texas Water Code, §12.052, which provides that the Texas Water Commission shall adopt any regulations necessary to provide for the safe construction, maintenance, repair and removal of dams located in this state.

§299.61. Emergency Action. Pursuant to the provisions of Texas Water Code, §12.052, emergency orders may be issued, without notice to the owner, directing the owner of a dam to take immediate and appropriate action to remedy situations posing serious threat to human life, health, and/or property.