STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

In the Matter of:	)	
PROPOSED AMENDMENT TO 20.6.2 NMAC (Copper Rule)	)	No. WQCC 12-01(R)

EXHIBIT SCOTT – C

RULES AND REGULATIONS

GOVERNING DAM DESIGN, CONSTRUCTION

AND DAM SAFETY

December 31, 2010

The New Mexico Office of the State Engineer Dam Safety Bureau is located in Santa Fe. Copies of forms referred to herein, a copy of these rules and regulations and other reference material can be obtained from the Office of the State Engineer website. All documents filed for dams shall be delivered to the Dam Safety Bureau in Santa Fe.

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TITLE 19 NATURAL RESOURCES AND WILDLIFE
CHAPTER 25 ADMINISTRATION AND USE OF WATER - GENERAL PROVISIONS
PART 12 DAM DESIGN, CONSTRUCTION AND DAM SAFETY

19.25.12.1 ISSUING AGENCY: New Mexico Office of the State Engineer
[19.25.12.1 NMAC - N, 3/31/2005]

19.25.12.2 SCOPE: These regulations apply to the design and construction of all jurisdictional dams in New Mexico and are intended to facilitate the continued safe operation and maintenance of all non-federal jurisdictional dams. These regulations govern the review and acceptance of plans for construction, alteration, modification, repair, enlargement and removal of a jurisdictional dam. These regulations ensure the continued safe operation, maintenance, site security and emergency preparedness for existing non-federal jurisdictional dams. These regulations do not authorize the appropriation or use of water pursuant to 19.26 NMAC and 19.27 NMAC.
[19.25.12.2 NMAC - N, 3/31/2005]

19.25.12.3 STATUTORY AUTHORITY: Section 72-5-32 NMSA requires any person, association or corporation, public or private, the state or the United States that is intending to construct a jurisdictional dam to submit detailed plans to the state engineer. Sections 72-5-9 and 72-5-10 NMSA establish the state engineer's authority over the construction of works and issuing certificates of construction. Sections 72-5-8 and 72-5-14 NMSA require construction to be completed in a time limit set by the state engineer and procedures for requesting an extension of time. Sections 72-5-11, 72-5-12 and 72-5-13 NMSA gives the state engineer jurisdiction over unsafe works, penalties for failure to comply with state engineer orders and priority of liens. Section 72-2-6 NMSA gives the state engineer the authority to assess fees. Section 72-2-8 NMSA gives the state engineer authority to adopt regulations and codes to implement and enforce any provision of any law administered by him. Section 72-8-1 NMSA gives the state engineer the authority to enter upon private property for the performance of his duties. Nothing in these rules shall be construed so as to limit the state engineer's authority to take lawful alternative or additional actions relating to the design, construction and safety of dams.
[19.25.12.3 NMAC - N, 3/31/2005]

19.25.12.4 DURATION: Permanent.
[19.25.12.4 NMAC - N, 3/31/2005]

19.25.12.5 EFFECTIVE DATE: March 31, 2005 unless a later date is cited at the end of a section.
[19.25.12.5 NMAC - N, 3/31/2005]

19.25.12.6 OBJECTIVE: To establish minimum design requirements, minimum submittal requirements and dam site owner responsibilities that shall be addressed to the state engineer's satisfaction in order to ensure a dam is designed, constructed, operated, maintained and secured in a safe manner.
[19.25.12.6 NMAC - N, 3/31/2005]

19.25.12.7 DEFINITIONS: Unless defined below or in a specific section of these regulations, all other words used herein shall be given their customary and accepted meaning.

A. Terms starting with the letter 'A' are defined as follows:

(1) Abutment: That part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer viewing the dam looking in the downstream direction.

(2) Aesthetic fill: Cosmetic fill added to the downstream slope of a dam that is not required to address the safe design. Aesthetic fill shall not be considered when determining the properties of the dam for the purposes of evaluating the jurisdictional status and shall not be used to support the safe design.

(3) Alteration, modification, repair, rehabilitation or enlargement of an existing dam: To change from the state engineer accepted construction drawings and specifications or current condition.

(4) Appurtenant structure: Auxiliary features of a dam such as outlets, spillways, access structures, tunnels and related housing at a dam.

(5) ASTM: Standards promulgated by ASTM international for testing the properties of materials. Methods cited in these regulations include laboratory compaction characteristics of soils.

B. Terms starting with the letter 'B' are defined as follows: Breach: An opening through a dam or spillway that is capable of draining a portion of the reservoir or the entire reservoir. A controlled breach is a constructed opening. An uncontrolled breach is an unintentional discharge from the reservoir.

C. Terms starting with the letter 'C' are defined as follows:

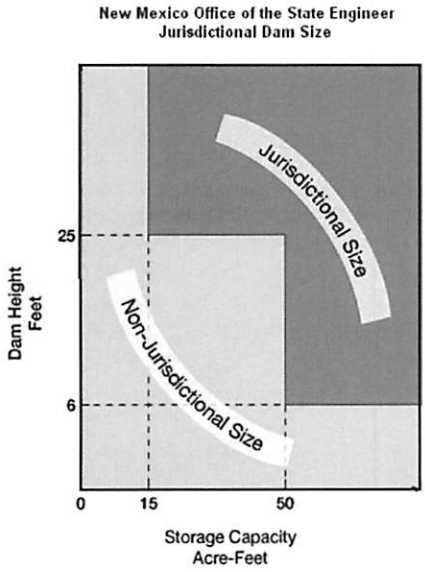
(1) Consequences of failure: Potential loss of life or property damage downstream of a dam caused by waters released at the dam or by waters released by partial or complete failure of dam; includes effects of landslides upstream of the dam on property located around the reservoir.

(2) Crest width: The thickness or width of a dam at the crest level (excluding corbels or parapets). In general, the term thickness is used for gravity and arch dams and width is used for other dams.

D. Terms starting with the letter 'D' are defined as follows:

(1) Dam: A man-made barrier constructed across a watercourse or off-channel for the purpose of storage, control or diversion of water.

(a) Jurisdictional dam: A dam 25 feet or greater in height, which impounds more than 15 acre-feet of water or a dam that impounds 50 acre-feet or more of water and is 6 feet or greater in height. For purposes of these regulations, reference to a dam means a jurisdictional dam unless otherwise noted. See figure of jurisdictional dam size.



(b) Non-jurisdictional dam: Any dam not meeting the height and storage requirements of a jurisdictional dam. The state engineer does not regulate the design, construction and operation of a non-jurisdictional dam unless the dam is unsafe and there is a threat to life or property, as determined by the state engineer. Waters impounded by a non-jurisdictional dam may not be exempt from water right permit requirements; therefore a separate state engineer water right permit for the water impounded in the reservoir created by a non-jurisdictional dam may be required. Non-jurisdictional dams shall meet the requirements of 19.26.2.15 NMAC unless otherwise exempt. The structures listed below are considered non-jurisdictional dams:

(i) Levee or diversion dike: A structure where water flows parallel to the length of the levee or diversion dike as determined by the state engineer.

(ii) Roadway embankment: A structure across a watercourse designed for the sole purpose of supporting a roadbed or other means of conveyance for transportation as determined by the state engineer; where the area upstream has not been enlarged to increase flood storage; and where the embankment is provided with an uncontrolled conduit of sufficient capacity to satisfy requirements of the appropriate state or local transportation authority. If no transportation authority has jurisdiction over the structure, the current drainage design criteria of the New Mexico department of transportation shall apply.

(2) Dam crest: The uppermost surface of a dam, usually a road or walkway excluding any parapet wall, railing, etc.

(3) Dam failure: The breakdown of a dam, characterized by the uncontrolled release of impounded water.

(4) **Dam height:** The vertical distance from the lowest point on the downstream toe to the lowest point on the dam crest.

(5) **Dam incident:** An event at a dam that interrupts normal procedures and performance, affects the safety of the dam or results in a potential loss of life or damage to property.

E. Terms starting with the letter 'E' are defined as follows:

(1) **Earthquake:** A sudden motion or trembling of the earth caused by the abrupt release of accumulated stress along a fault.

(a) **Operating basis earthquake:** The earthquake that can reasonably be expected to occur within the service life of the dam or appurtenant structures.

(b) **Maximum credible earthquake:** The greatest earthquake that can reasonably be expected to be generated by a specific source on the basis of seismological and geological evidence.

(2) **Evacuation map:** A map prepared in collaboration with local emergency managers defining the area to be evacuated from a dam failure.

F. Terms starting with the letter 'F' are defined as follows:

(1) **Fetch:** The straight-line distance between the dam and farthest reservoir shore subject to wind forces. The fetch is one of the factors used to calculate wave heights in a reservoir.

(2) **Freeboard:** The vertical distance between the spillway crest and the lowest point of the dam crest not including camber.

(3) **Functional exercise:** A meeting in a conference room environment involving the dam owner and state and local emergency personnel with responsibilities in the emergency action plan. The exercise takes place in a stress-induced environment with time constraints and involves simulation of a dam failure and other specific events. The exercise is designed to evaluate both the internal capabilities and responses of the dam owner and the workability of the information in the emergency action plan used by emergency management officials.

G. Terms starting with the letter 'G' are defined as follows: Geotextile: Any fabric or textile (natural or synthetic) used as an engineering material in conjunction with soil, foundations or rock. Geotextiles provide the following uses: drainage, filtration, separation of materials, reinforcement, moisture barriers and erosion protection.

H. Terms starting with the letter 'H' are defined as follows: High water line: The highest water level elevation in the reservoir as determined from routing the spillway design flood or inflow design flood.

I. Terms starting with the letter 'I' are defined as follows:

(1) **Incremental impacts:** Under a given flood, earthquake or other conditions, the difference in impacts that would occur due to failure or misoperation of the dam and appurtenant structures compared to those that would have occurred without failure or misoperation of the dam and appurtenant structures.

(2) **Inundation map:** A map delineating the area that would be flooded by a particular flood event.

J. Terms starting with the letter 'J' [Reserved]

K. Terms starting with the letter 'K' [Reserved]

L. Terms starting with the letter 'L' are defined as follows:

(1) **Length of dam:** The length measured along the dam axis at the dam crest. This also includes the spillway, powerplant, navigation lock, fish pass, etc., where these form part of the length of the dam. If detached from the dam these structures shall not be included.

(2) **Loss of life:** The likely number of human fatalities that would result from a dam failure flood event. No allowances for evacuation or other emergency actions by the population shall be considered.

M. Terms starting with the letter 'M' [Reserved]

N. Terms starting with the letter 'N' are defined as follows:

(1) **Naturally dry watercourse:** A watercourse or portion thereof, which under normal conditions is dry, which flows only in direct response to precipitation and whose channel is at all times above the groundwater table.

(2) **Normal operating level:** The water level elevation corresponding to the maximum storage level that excludes any flood control or surcharge storage.

(3) **North American vertical datum 1988 (NAVD 88):** The current vertical control datum in use in North America established from nine space geodetic stations. This basis of establishing elevation provides a precise surface, whereas the national geodetic vertical datum 1929 (NGVD 29) is elevation established from mean sea level.

O. Terms starting with the letter 'O' are defined as follows:

(1) **One-hundred year flood:** A flood that has 1 chance in 100 of being equaled or exceeded during any year.

(2) **Owner:** The individual, association or corporation, public or private, the state or the United States, owning the land upon which a dam is constructed; having a contractual right to construct, operate or maintain a dam; or the beneficiary of an easement to construct, operate or maintain a dam.

P. Terms starting with the letter 'P' are defined as follows:

(1) **Probable:** Likely to occur, reasonably expected, realistic.

(2) **Probable maximum precipitation:** Theoretically, the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular location during a certain time of year.

Q. Terms starting with the letter 'Q' [Reserved]

R. Terms starting with the letter 'R' are defined as follows: Residual freeboard: The vertical distance between the high water line and the lowest point on the dam crest.

S. Terms starting with the letter 'S' are defined as follows:

(1) **Spillway:** A structure over or through which excess flow is discharged from a reservoir. If the rate of flow is controlled by mechanical means such as gates, it is considered a controlled spillway. If the geometry of the spillway is the only control, it is considered an uncontrolled spillway. For purposes of these regulations, an uncontrolled outlet conduit that is used to drain the reservoir is not considered a spillway.

(2) **Spillway crest:** The lowest level at which water can flow over or through the spillway.

(3) **Spillway design flood:** The required flood that a spillway must pass without failure of the dam.

(4) **Storage:** For purposes of determining whether a dam is jurisdictional, the storage is the volume of water impounded by the dam above the lowest elevation of the downstream toe to the elevation of the spillway crest. For dams with no spillway, storage is measured to the dam crest. Definitions of specific types of storage in reservoirs are:

(a) Dead storage is the storage volume of a reservoir that lies below the invert of the lowest outlet and therefore, cannot readily be withdrawn from the reservoir.

(b) Flood surcharge storage is the storage volume between the maximum operating level and the maximum water level during the spillway design flood.

(c) Live storage is the storage volume of a reservoir that is available for use and lies above the invert of the lowest outlet.

(d) Reservoir storage capacity is the sum of the dead and live storage of the reservoir.

(e) Maximum storage is the sum of the reservoir storage capacity and flood surcharge storage.

(5) **Sunny day failure:** Dam failure with the reservoir at the normal operating level.

T. Terms starting with the letter 'T' are defined as follows:

(1) **Tabletop exercise:** A meeting in a conference room environment involving the dam owner and state and local emergency personnel with responsibilities in the emergency action plan. The format is a discussion of an emergency event, response procedures to resolve concerns regarding coordination and responsibilities.

(2) **Toe:** The contact line between the outer shell of the dam and the natural ground surface.

U. Terms starting with the letter 'U' [Reserved]

V. Terms starting with the letter 'V' [Reserved]

W. Terms starting with the letter 'W' are defined as follows: Wave runup: Vertical height above the water level to which water from a specific wave will run up the face of a structure or embankment.

X. Terms starting with the letter 'X' [Reserved]

Y. Terms starting with the letter 'Y' [Reserved]

Z. Terms starting with the letter 'Z' [Reserved]

[19.25.12.7 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.8 FEE SCHEDULE: The state engineer assesses fees for filing forms, reviewing plans and specifications for dams and appurtenant structures and construction inspections.

A. For filing an application for permit to construct and operate a dam the fees shall be $25.

B. For filing an application to alter, repair or rehabilitate a dam the fee shall be $25.

C. For each review of design plans, construction drawings and specifications for a dam the fee shall be $2 per $1000 or fraction thereof of the estimated construction cost. For determination of fees, inclusion of contingencies, taxes and other permit fees is not required. Assessment of multiple review fees for the same application is at the sole discretion of the state engineer.

D. For issuing an extension of time for construction of a dam the fee shall be $50.

E. For inspecting construction of a dam the fee shall be $100/8-hour day and actual and necessary traveling expenses.

F. For filing a proof of completion of works for a dam the fee shall be $25.

G. For filing a change of ownership for a dam the fee shall be $5.

H. The state engineer shall charge reasonable fees for copy and reproduction to offset the cost of the service, consistent with the state engineer's current policy adopted pursuant to the New Mexico Inspection of Public Records Act, NMSA 1978 Section 14-2 et seq.

[19.25.12.8 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.9 SIZE CLASSIFICATION: A dam shall be less than or equal to the maximum height and storage to qualify for the size classification.

A. Small: A small dam is 25 feet or greater but less than or equal to 40 feet in height, or 50 acre-feet or greater but less than or equal to 1000 acre-feet of storage.

B. Intermediate: An intermediate dam is greater than 40 feet but less than or equal to 100 feet in height, or greater than 1000 acre-feet but less than or equal to 50,000 acre-feet of storage.

C. Large: A large dam is greater than 100 feet in height or greater than 50,000 acre-feet of storage.

[19.25.12.9 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.10 HAZARD POTENTIAL CLASSIFICATION: The hazard potential classification is a rating for a dam based on the potential consequences of failure. The rating is based on loss of life, damage to property and environmental damage that is likely to occur in the event of dam failure. No allowances for evacuation or other emergency actions by the population shall be considered. The hazard potential classification is not a reflection of the condition of the dam.

A. Low hazard potential: Dams assigned the low hazard potential classification are those dams where failure or misoperation results in no probable loss of life and low economic or environmental losses. Losses are principally limited to the dam owner's property.

B. Significant hazard potential: Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in populated areas with significant infrastructure.

C. High hazard potential: Dams assigned the high hazard potential classification are those dams where failure or misoperation will probably cause loss of human life.

[19.25.12.10 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.11 DESIGN OF A DAM: Any person, association or corporation, public or private, the state, or the United States that is intending to construct a dam shall submit an application to construct and operate a dam and supporting documentation acceptable to the state engineer. This section primarily addresses the design and construction of embankment dams. Other types of dams shall conform to sound engineering principles and current state of the practice. Because each site, design and operating practice is unique, waivers of specific requirements in this section will be considered on a case-by-case basis. Request for waiver shall be in writing accompanied with documentation justifying the request. If the request is not justified to the satisfaction of the state engineer the request will be denied. If the supporting documentation for the design of a dam does not meet acceptable engineering standards and does not conform to these regulations, as determined by the state engineer, a quality management plan or third party review may be required by the state engineer. Construction shall not begin until the state engineer has accepted the supporting documentation and approved the application with permit conditions. The application and supporting documentation shall include the information described below.

A. Application: An application form shall be completed with original signature of the dam owner and accompanied with a filing fee in accordance with Subsection A of 19.25.12.8 NMAC. The form will be the only information available to the public before the project is approved for construction. All other supporting documentation is considered draft until accepted by the state engineer. A plan review fee in accordance with Subsection C of 19.25.12.8 NMAC shall accompany the submittal of the design report, construction drawings and specifications. A detailed estimate of the construction cost for the proposed dam and appurtenant structures shall be submitted in support of the plan review fee.

B. Water right: A water right is required for water impounded by the dam. If the dam owner has a permit for the diversion of water, documentation addressing the necessity for storage, diversion periods and release conditions for the reservoir may be required. This requirement is waived for flood control dams that do not detain

water longer than 96 hours in accordance with Subparagraph (b) of Paragraph (7) of Subsection C of 19.25.12.11 NMAC or provide documentation that a waiver by the state engineer has been granted. Flood control dams that do not drain within 96 hours require a water right for water permanently stored beyond the 96-hour drain time requirement and for associated losses due to evaporation and other potential depletions to the system unless a waiver in accordance with 19.25.12.11 NMAC is obtained.

C. Design report: A design report, which includes information to evaluate the safe design of the dam and appurtenant structures, shall be submitted in a form acceptable to the state engineer. The final design report shall also be submitted in an electronic format acceptable to the state engineer. The design report may be submitted as a single report or as individual reports documenting the information described below. A professional engineer licensed in the state of New Mexico qualified in the design and construction of dams shall prepare or supervise the preparation of the design report. The front cover shall show the name of the dam, the county in which the dam is located, the dam owner and the type of report. The first page behind the front cover shall show the name of the dam, the county in which the dam is located, a signed certification from the engineer and a certification for the state engineer in accordance with Subsections B and E of 19.25.12.12 NMAC. The design report shall contain the information described below and any other additional information determined necessary by the state engineer to evaluate if the design is safe.

(1) Hazard potential classification. A hazard potential classification shall be based on the dam failure condition that results in the greatest potential for loss of life and property damage. If the state engineer concurs, the classification may be based on the judgment and recommendation of the professional engineer. For all other cases, a low or significant hazard potential classification shall be supported by a dam breach and flood routing analysis, which includes calculations and data that supports the predicted dam failure flood. This analysis shall also address the potential for foreseeable future development. Evaluation of the effects of flooding from dam failure shall extend at least to the location downstream where the classification can be properly identified. The dam breach and flood routing analysis shall include, but not be limited to:

(a) description of the dam breach and flood routing methodology;

(b) a tabulation and justification of parameters used in the analysis;

(c) a sensitivity analysis of the parameters used in the analysis;

(d) references to all computer models, data and supporting justification used in the analysis;

(e) appropriate data sheets, computer program input and output computations and electronic files from computerized analysis;

(f) table of results for the flood routing for the sunny day failure and the failure and no failure scenarios for multiple flood events up to and including the spillway design flood as defined in Subparagraph (a) through (d) of Paragraph (3) of Subsection C of 19.25.12.11 NMAC; the table of results for all critical locations downstream shall include the depth of flow in feet, velocity of flow in feet per second, rate of flow in cubic feet per second and the incremental impacts; and

(g) dam failure inundation maps downstream of the dam for the sunny day failure and failure during the spillway design flood event showing the depth of flow in feet, average velocity in feet per second and rate of flow in cubic feet per second at critical locations downstream.

(2) Hydrologic analysis. The hydrologic analysis shall include a discussion of methodology used to calculate the spillway design flood for determining the available flood storage and spillway capacity. Consideration of how the dam will perform under these hypothetical flood conditions shall be evaluated. The hydrologic analysis shall include, but not be limited to:

(a) a topographic map of the drainage area above the dam with the drainage area and sub-basins delineated and presented on a map of appropriate scale and size;

(b) a description of the topography, soils and vegetative cover and land treatment of the drainage area;

(c) a discussion of the depth, duration and distribution of the spillway design storm;

(d) a tabulation, discussion and justification of all hydrologic parameters and methodology used to calculate runoff from rainfall;

(e) a discussion of the peak inflow, volume of runoff and maximum reservoir water level elevation for the inflow hydrograph;

(f) a plot of the reservoir inflow and outflow hydrographs extended until flow is negligible and plotted on the same figure of appropriate size and scale;

(g) a table showing the reservoir area (in acres) and storage capacity (in acre-feet) for each foot of elevation above the bottom of the reservoir to the dam crest; the table shall be determined from the reservoir

topography map; indicate the amount of dead storage, elevation of the invert of the outlet and elevation of the crest of each spillway; all elevations shall be based on North American vertical datum 1988 or more recent adjustment; and

(h) appropriate data sheets and computer program output computations from computerized analysis.

(3) Spillway design flood. The spillway design flood is the flood that a spillway must be capable of conveying without dam failure. For perimeter embankment dams with no spillway and no external drainage area, the dam must be capable of impounding the spillway design flood without dam failure. A spillway design flood less than these requirements is acceptable to the state engineer if an incremental damage analysis is presented to justify the inflow design flood in accordance with Paragraph (4) of Subsection C of 19.25.12.11 NMAC. The spillway design flood is based on size classification and hazard potential classification of the dam as described below.

(a) Dams classified as low hazard potential, regardless of size, shall have spillways designed to pass a flood resulting from a 100-year precipitation event expressed as a percentage of the probable maximum precipitation.

(b) Dams classified as small and intermediate, with a significant hazard potential rating shall have spillways designed to pass a flood resulting from 50 percent of the probable maximum precipitation.

(c) Dams classified as large, with a significant hazard potential rating shall have spillways designed to pass a flood resulting from 75 percent of the probable maximum precipitation.

(d) Dams classified as high hazard potential, regardless of size, shall have spillways designed to pass a flood resulting from the probable maximum precipitation.

(4) Incremental damage assessment. Where spillways are not in compliance with Paragraph (3) of Subsection C of 19.25.12.11 NMAC an incremental damage assessment shall justify the inflow design flood used to size the spillway. The spillway design flood from an incremental damage assessment is the flood above which the incremental increase in downstream water surface elevation due to failure of a dam is no longer considered to present an unacceptable additional downstream threat when compared to the same flood without dam failure. The lower limit is the flood resulting from the 100-year precipitation. The assessment shall compare the incremental impacts on downstream areas including existing and foreseeable future development. The assessment shall include a dam breach and flood routing analysis in accordance with Subparagraphs (a) through (g) of Paragraph (1) of Subsection C of 19.25.12.11 NMAC for the failure and non-failure conditions. Methods for assessing the damage between failure and non-failure conditions shall be fully documented.

(5) Spillway capacity. The spillway capacity shall be adequate to pass the spillway design flood in accordance with Paragraph (3) of Subsection C of 19.25.12.11 NMAC or accepted inflow design flood in accordance with Paragraph (4) of Subsection C of 19.25.12.11 NMAC without failure of the dam. If the outlet works are gated, the design discharge of the outlet works shall not be considered when routing the spillway design flood through the reservoir and spillway. The water level shall be at the normal operating level at the beginning of the spillway design storm. A spillway rating curve and table showing elevation in one-foot increments versus maximum discharge capacity shall be prepared. The rating curve and table shall include data from the crest of the spillway to the dam crest. The parameters used to calculate the spillway capacity shall be justified and appropriate data sheets and computer program output computations from computerized analysis shall be provided. Elevations shall be based on North American vertical datum 1988 or more recent adjustment.

(6) Spillway design. Spillways shall be evaluated for erosion potential during normal operation and the design flood event. Damage to a spillway during the design flood event is acceptable; however, a breach of the spillway is unacceptable. The spillway design shall address the minimum requirements described below.

(a) The material required for spillway lining depends on the spillway location, frequency of discharge and velocity of discharge to adequately address erosion and breach potential. The design shall provide adequate justification for the material selected.

(b) The design shall provide aeration of the nappe for cavitation control where control weirs are used at the spillway crest.

(c) The spillway must discharge away from the toe of the dam and abutment slopes.

(d) The design shall address the potential for the accumulation of debris that may block the spillway.

(e) The design shall address energy dissipation to adequately control erosion of the natural channel due to spillway discharge reasonably expected to occur during the life of the dam.

(f) Channel lining shall be placed on a suitably prepared, stable subgrade. All edges and joints in channel lining material must be designed to prevent undermining and erosion. Concrete channel lining must be

provided with adequate jointing to permit thermal expansion and contraction and adequate reinforcing to control thermal cracking. Adequate water stops are required at joints in the spillway lining. Concrete lining shall be adequately anchored against displacement and uplift and shall be provided with adequate subdrainage to relieve hydrostatic pressure and prevent frost heave.

(g) Where training dikes are used to divert the water away from the dam, the dike shall be designed with a compaction to at least 95% of the maximum standard Proctor density, ASTM D 698, or at least 90% of the maximum modified Proctor density, ASTM D 1557. Erosion protection for the dike shall be addressed in accordance with Paragraph (16) of Subsection C of 19.25.12.11 NMAC.

(7) Outlet works capacity. Dams shall be designed with a low level outlet to drain the entire contents above the elevation of the downstream toe of the dam. If environmental consequences prevent draining of the reservoir, the state engineer will grant a waiver if written justification is provided to the satisfaction of the state engineer. The outlet shall be sized to provide adequate capacity to satisfy water rights of downstream priority users. A stage discharge curve and table showing elevation in one-foot increments versus discharge capacity shall be prepared. The rating curve and table shall be from the invert of the outlet to the dam crest. The parameters used to calculate the outlet works capacity shall be justified and appropriate data sheets and computer program output computations from computerized analysis shall be provided. Elevations shall be based on North American vertical datum 1988 or more recent adjustment. The outlet works capacity shall meet the minimum requirements described below.

(a) Outlets for water storage dams shall drain the reservoir in 45 days with supporting calculations provided.

(b) Outlets for flood control dams shall drain the reservoir in 96 hours unless a waiver is granted by the state engineer. The 96-hour time frame begins once the reservoir storage drops to the emergency spillway crest or reaches its peak during the 100-year, 24-hour event. Documentation supporting the waiver shall include the time to drain more frequent events.

(8) Outlet works design. The outlet works design includes the intake structure, conduit and terminal structure. The outlet works design shall meet the minimum requirements described below.

(a) Minimum conduit diameter is 18 inches unless a waiver is granted by the state engineer. Documentation supporting a waiver shall include identification of methods to inspect the interior of the conduit.

(b) Metal conduits used in dams that are classified as significant hazard potential where the sole purpose of the dam is flood control, or in dams classified as low hazard potential, shall have adequate strength after corrosion for a minimum of 200 years, based on corrosivity testing of onsite soils. Cathodic or other protection of metal conduits is permissible and may be considered in this analysis. Metal conduits are not acceptable for dams classified as high hazard potential or dams classified as significant hazard potential with permanent water storage except as interior forms for cast-in-place concrete conduits.

(c) Outlet conduits for storage reservoirs shall be gated at the upstream end unless a waiver is granted by the state engineer. Where gates are located other than at the upstream end of the conduit, a guard gate or bulkhead shall be provided at the upstream end to allow draining of the conduit for inspection, maintenance and repair.

(d) Outlet conduits shall be adequately vented and shall include all supporting calculations. Where the outlet conduit ties directly to a downstream pipe, a by-pass valve shall be provided. An exception to the by-pass valve will be granted when the conduit discharges to an ungated downstream storm drain with adequate access for inspection and maintenance.

(e) Outlet controls and equipment shall be properly designed to be secure from damage due to vandalism, weather, ice, floating debris, wave action, embankment settlement and other reasonably foreseeable causes. The outlet control operators shall remain accessible during outlet works and spillway releases.

(f) Outlets for flood control structures shall be ungated. Where a gate is required to satisfy downstream release restrictions, a waiver from the state engineer is required. The written request for waiver shall include a plan for timely release of the floodwater.

(g) Outlet works intake structures shall be provided with trash racks or grates to prevent clogging with debris. Grate opening area or bar spacing shall be adequate to satisfy applicable public safety requirements, if appropriate. Total area of grate openings must be at least three times the cross-sectional area of the outlet conduit.

(h) The design of the outlet works terminal structure shall address energy dissipation to prevent erosion and shall include supporting calculations.

(i) Outlet conduits shall be designed for full embankment loading and for hydrostatic pressure equal to the maximum reservoir head, acting separately and in combination, with an adequate factor of safety for the conduit material. If future increases in embankment height or reservoir head are foreseeable, allowance shall be made in the design.

(j) The conduit together with all joints and fittings shall be watertight at the design pressure and shall be pressure tested prior to backfilling. Conduits shall be designed for all reasonably foreseeable adverse conditions including corrosion, abrasion, cavitation, embankment settlement and spreading, thermal effects and seismic loading. The ability of the conduit to withstand deflection and separation at the joints shall be addressed in the design of the outlet conduit.

(k) Outlet works shall be supported by stable, well-consolidated foundation materials. Where the conduit is placed in embankment fill or native overburden materials, settlement analysis shall be performed.

(l) Minimizing seepage along conduits shall be addressed including the methods for ensuring compaction of backfill around and beneath the conduit. Seepage collars are not an acceptable design standard for controlling seepage.

(m) All supporting documentation and calculations for the outlet works design shall be provided. The outlet works design shall include all foreseeable loading conditions, including but not limited to ice loading, debris buildup, wave action and embankment settlement. Structural design calculations for the intake structure, conduit and outlet structure shall be submitted.

(9) Geological assessment. A geological assessment of the dam and reservoir site is required for all dams classified as high or significant hazard potential. The geological assessment may be included in the geotechnical investigation or seismic study, or may be submitted as a separate document. The geological assessment shall address regional geologic setting; local and site geology; geologic suitability of the dam foundation; slide potential of the reservoir rim and abutment areas; and seismic history and potential.

(10) Geotechnical investigation. A geotechnical investigation shall assess site conditions and support the design. A professional engineer licensed in the state of New Mexico qualified to provide geotechnical expertise in the design and construction of dams shall prepare, stamp and sign the geotechnical investigation, which may be submitted as a separate report. The scope of the geotechnical investigation is dependent on the size classification, hazard potential classification, anticipated materials and construction methods, site geology and seismicity, anticipated soil strata and other site-specific conditions. The geotechnical investigation shall include a field investigation and laboratory testing. Results of field and laboratory testing shall be presented in a report, including recommended parameters to be used in design and construction of the dam and appurtenant structures. The field investigation and laboratory testing shall include but not be limited to the following:

(a) test borings in the footprint of the embankment, spillway excavations and appurtenant structures extending to bedrock or to a depth equal to at least the height of the dam; where appropriate, borings may include coring of bedrock materials to determine the quality and character of the rock;

(b) standard penetration tests or other field-testing to assess soil character and consistency;

(c) "undisturbed" sampling for further tests such as insitu density, shear strength and compressibility;

(d) supplemental test pits, if deemed necessary, to obtain bulk and undisturbed samples, assess soil layering and measure bedrock orientation;

(e) measurement of water level in drill holes;

(f) field permeability testing, if feasible;

(g) logs of test borings and test pits, location map and profile along dam axis with soil information shown;

(h) testing to determine the relevant properties of the material to be used in construction, including but not limited to shear strength, permeability, compressibility and filter characteristics; the testing method shall conform to accepted industry standards and be appropriate for the material being tested;

(i) evaluation of liquefaction potential and dynamic shear strength testing if deformation analysis is required; and

(j) identification of the location of the borrow material to be used during construction.

(11) Seepage and internal drainage. The effects of seepage and potential for internal erosion shall be evaluated. For dams with aesthetic fill on the downstream slope, the effects of seepage shall be evaluated with and without the aesthetic fill. A seepage analysis shall be performed to address the performance of the embankment under steady-state conditions for dams classified as high or significant hazard potential. All parameters and assumptions used in the analysis shall be summarized in a table and justified in the seepage analysis. A waiver may

be requested in writing for flood control dams that drain in 96 hours. The seepage analysis and internal drainage design shall include the minimum requirements described below.

(a) Flow nets of appropriate size and scale shall be prepared. The effects of anisotropy with respect to permeability shall be addressed. Ratios of horizontal to vertical permeability of less than 4 for constructed embankments and less than 9 for native deposits shall be supported by field and laboratory permeability tests. Appropriate data sheets and computer program output computations from computerized analysis shall be provided.

(b) The design shall address the effects of anticipated seepage beneath, around and through the dam. Seepage shall not exit on the dam face and excessive exit seepage gradients are unacceptable. All filter, transition and drainage zones within earth dams shall have a thickness adequate to address constructability and enhance seismic stability with a minimum thickness of 3 feet for each zone.

(c) Collector pipes and conduits for internal drains shall be made of non-corrodible material capable of withstanding the anticipated loads. If possible, pipes shall be located where they can be exposed for repair or replacement without threatening the stability of the dam. Collector pipes for drains shall be enveloped in a free-draining medium meeting filter criteria for adjacent embankment or foundation zones. Where surging or hydraulic gradient reversal is likely, perforation size must be less than the diameter at which 15 percent of the surrounding medium is finer. Where surging or hydraulic gradient reversal are unlikely, the perforation size must be less than the diameter at which 85 percent of the surrounding medium is finer.

(d) Drain pipes shall be sized to provide a flow depth no more than ¼ of the pipe diameter when carrying the anticipated discharge. Drain pipes shall be at least 6 inches in diameter unless the availability of technology for inspection and maintenance can be demonstrated. Individual pipes shall discharge to a gallery, well, manhole, or to daylight such that the flow of each pipe can be monitored and measured. Manifold connections, tees and wyes are not permitted. A seepage measuring device must be appropriate for the rate of anticipated flow. The measuring device must include an upstream catchment to detect any sediment in the seepage. Where pipes from internal drains are discharged to daylight, a rodent screen shall be provided.

(12) Stability analysis. Cross-sectional design for dams shall be supported by slope stability analysis. For dams with aesthetic fill on the downstream slope, the stability of the downstream slope shall be evaluated with and without the aesthetic fill. Dams classified as low hazard potential with upstream slopes no steeper than 3 horizontal to 1 vertical, downstream slopes no steeper than 2 horizontal to 1 vertical and which are 25 feet or less in height will not require slope stability analysis. Stability analysis of the reservoir rim is required where slopes are steeper than 3 horizontal to 1 vertical. The analysis model shall adequately represent the geometry and zoning, shear strength parameters, material unit weights, pore pressure and seepage conditions, external loading and other relevant factors of the critical cross section or sections. Manual computations in the analysis will be accepted if judged to be sufficiently rigorous. Where appropriate, the analysis shall consider noncircular or block and wedge type failure surfaces as well as circular failures. All parameters and assumptions used in the analysis shall be summarized in a table and justified in the geotechnical investigation. A scale drawing, utilizing the same scale for vertical and horizontal dimensions, shall be provided for each cross-sectional model used in the analysis, with the critical failure surface(s) identified. Appropriate data sheets and computer program output computations from computerized analysis shall be provided. Dams shall be designed to provide the following minimum factors of safety from the stability analysis:

(a) 1.5 for steady state long-term stability;

(b) 1.5 for operational drawdown conditions;

(c) 1.3 for rapid drawdown conditions; and

(d) 1.3 for end of construction.

(13) Seismic design and analysis. Dams and appurtenant structures classified as high or significant hazard potential shall be analyzed for seismic stability. Seismic analysis for water storage dams shall be based on full reservoir under steady state seepage conditions. Flood control dams with ungated outlets that satisfy Subparagraph (b) of Paragraph (7) of Subsection C of 19.25.12.11 NMAC without waiver shall be designed for earthquake loads under empty reservoir conditions and need not consider steady-state seepage. Dams sited on active faults shall obtain a waiver from the state engineer. To obtain a waiver the analysis shall show that the location of the dam is unavoidable and the dam must be designed to withstand anticipated fault movement without compromising its integrity. Appropriate data sheets and computer program output computations from computerized analysis shall be provided. The seismic analysis shall meet the minimum requirements described below.

(a) A seismological investigation for the dam area and reservoir area shall be performed. This study may be part of the geological or geotechnical report for the structure, or may be a separate effort. The study shall determine and justify the appropriate seismic parameters to be used for design. The dam and appurtenant

structures shall be capable of withstanding the operating basis earthquake with little to no damage and without interruption of function. The operating basis earthquake has a 50% probability of exceedance during the service life of the dam or appurtenant structures. In no case shall the service life be less than 100 years. The dam and appurtenant structures critical to the safety of the dam shall be capable of withstanding the design earthquake without failure. The seismic parameters shall be based on the design earthquake requirements described below.

(i) Dams classified as high hazard potential other than flood control structures shall be designed for the maximum credible earthquake or for a 1% probability of exceedance in 50 years (approximately 5000-year return frequency).

(ii) Dams classified as significant hazard potential or high hazard potential dams whose sole purpose is for flood control shall be designed for a 2% probability of exceedance in 50 years (approximately 2500-year return frequency).

(b) An analysis of materials in the foundation, reservoir area and proposed embankment shall be completed to determine the potential for liquefaction, earthquake-induced sliding, or other seismic sensitivity, which may be accomplished as part of the geotechnical investigation.

(c) Pseudostatic analysis will be acceptable for the following cases:

(i) the embankment is to be mechanically compacted to at least 95% of the maximum standard Proctor density, ASTM D 698, or at least 90% of the maximum modified Proctor density, ASTM D 1557; no materials prone to liquefaction are present in the foundation and peak ground acceleration is 0.20g or less; or

(ii) the embankment is to be mechanically compacted to at least 95% of the maximum standard Proctor density, ASTM D 698, or at least 90% of the maximum modified Proctor density, ASTM D 1557; potentially submerged portions of the embankment except for internal drain elements are constructed of clayey material; the dam is constructed on clayey soil or bedrock foundation and peak ground acceleration is 0.35g or less; and

(iii) all safety factor requirements in accordance with Subparagraphs (a) through (d) of Paragraph (12) of Subsection C of 19.25.12.11 NMAC are met;

(iv) minimum freeboard requirements in accordance with Subparagraphs (a) through (e) of Paragraph (15) of Subsection C of 19.25.12.11 NMAC are met; and

(v) the pseudostatic coefficient selected for analysis must be at least 50% of the predicted peak ground acceleration, but not less than 0.05g and the factor of safety under pseudostatic analysis shall be 1.1 or greater. In determining the factor of safety for pseudostatic analysis, a search for the critical failure surface shall be made.

(d) For dams not satisfying the requirements for pseudostatic analysis, a deformation analysis is required. The resulting embankment must be capable of withstanding the design earthquake without breaching and with at least 3 feet of freeboard remaining after deformation. The analysis shall also assess the potential for internal erosion as a result of cracking during deformation.

(14) Dam geometry. The dam geometry shall be supported by the stability and seismic analysis and shall meet the minimum requirements described below.

(a) The crest width shall be at least equal to the dam height in feet divided by 5 plus 8 feet, with the minimum permissible crest width being 10 feet and the maximum required crest width being 24 feet.

(b) Roads located on the crest shall have appropriate surfacing to provide a stable base that resists rutting and provides adequate friction for safety in wet conditions.

(c) The crest design shall provide a minimum of 2 feet of cover or the depth of frost penetration; whichever is greater, above clay cores to prevent cracking of the core due to desiccation or frost penetration.

(d) Turnarounds shall be provided on dead-end service roads on dam crests, located in such a manner that backing maneuvers longer than 300 feet are eliminated.

(e) The crest shall be provided with adequate cross slope to prevent ponding.

(f) The slope or slopes to which crest drainage is directed must be provided with adequate erosion protection to accept the crest drainage.

(g) The crest longitudinal profile shall be provided with adequate camber to maintain the profile after embankment settlement. Camber shall be based on a settlement analysis and shall be at least 2 percent of the total embankment height, with a minimum of 1 foot at the highest point of the dam. The tops of internal core zones shall also be provided with camber in a similar manner to the crest of the dam.

(h) In the event that safety berms, street curbs, or other longitudinal features which block, control, or concentrate drainage are required on the dam crest, the design shall provide for collection and conveyance of accumulated water to discharge away from the embankment without erosion.

(15) Freeboard. Dams shall be provided with adequate freeboard. Wave runup shall be determined taking into consideration wind speed, reservoir fetch, embankment slope and roughness of the slope surface. Freeboard shall satisfy the minimum requirements described below.

(a) Anticipated wave runup resulting from a 100 mph wind with reservoir level at the spillway crest will not overtop the dam.

(b) Anticipated wave runup resulting from a 50 mph wind with maximum reservoir level from routed spillway design flood will not overtop the dam.

(c) Clay core cover and capillary rise requirements in accordance with Subparagraph (c) of Paragraph (14) of Subsection C of 19.25.12.11 NMAC are satisfied.

(d) A minimum of 3 feet of freeboard remains after seismic deformation.

(e) In any case, at least 4 feet of freeboard shall be provided. The minimum of 4 feet of freeboard may be waived for perimeter embankment dams with no spillway and no external drainage area, provided a written request is made to the state engineer accompanied with supporting justification.

(16) Erosion protection. Erosion protection shall be addressed to protect the dam and appurtenant structures from erosion that can threaten the safety of the structure. Erosion protection shall address the minimum requirements described below.

(a) Wave erosion. The upstream slope shall be protected from wave erosion. The material selected and area of coverage shall be appropriate for the protection required with justification provided. Flood control dams in compliance with Subparagraph (b) of Paragraph (7) of Subsection C of 19.25.12.11 NMAC without waiver are exempt from wave protection.

(b) Surface erosion. The slope, crest, abutment and groins, toe areas and any other constructed areas associated with the dam and appurtenant structures shall be protected from wind erosion and erosion from concentrated and sheet flows. The material selected and area of coverage shall be appropriate for the protection required with justification provided.

(17) Geotextile design. Geotextiles are an acceptable material for use in dam design only if the geotextile is placed so that it does not jeopardize the dam or appurtenant structures during repair or failure of the geotextile. The geotextile shall be used in accordance with the manufacturer's recommendations and intended use for the product. Geotextile design computations shall be provided. Where a geotextile is used for fluid containment the installation shall be performed by certified personnel and the completed installation shall be certified by a qualified independent entity.

(18) Structural design. The structural design information for all appurtenant structures, addressing water, earth, ice and any other applicable load shall be provided. Reinforced concrete design including assumptions for loads and limiting stresses and sample calculations shall be provided. Appropriate data sheets and computer program output computations from computerized analysis shall be provided.

(19) Utilities design. Utility placement or relocation shall be addressed as applicable. Utilities located in the vicinity of the proposed embankment, spillway and seepage footprint should be relocated and trenches backfilled and compacted with suitable material to the satisfaction of the state engineer. If utilities are allowed to remain, they will be required to satisfy applicable provisions for outlet conduits in accordance with Paragraph (8) of Subsection C of 19.25.12.11 NMAC.

(20) Miscellaneous design. Because each design is unique, all design elements not specifically addressed in these regulations shall be documented and justified with sample calculations and appropriate data sheets and computer program output computations from computerized analysis shall be included in the design report.

D. Construction drawings: Construction drawings shall be submitted in a form acceptable to the state engineer. The final construction drawings shall also be submitted in an electronic format acceptable to the state engineer. A professional engineer licensed in the state of New Mexico qualified in dam design and construction shall prepare the construction drawings. Illegible, mutilated, careless or otherwise poorly prepared drawings are not acceptable for filing with the state engineer. The construction drawings shall contain the information described below and any other additional information determined necessary by the state engineer to evaluate if the construction drawings are consistent with the design.

(1) Quality. Construction drawings and maps shall be made from actual field or photogrammetric surveys of an accuracy acceptable to the state engineer. Construction drawings and maps shall be prepared with

permanent black ink on mylar. All original signatures, dates and acknowledgments appearing on the sheet(s) shall be in permanent ink. Construction drawings and maps shall always be rolled, never folded, for transmittal.

(2) Scale and size. Sheets shall range in size from twenty-two (22) to twenty-four (24) inches by thirty-four (34) to thirty-six (36) inches with one (1) inch margins on all sides. The scale(s) used on the drawings may vary according to requirements and space available to show all necessary data in detail clearly in feet and decimals and to be clearly legible when the drawings are reduced to eleven (11) inches by seventeen (17) inches. Detailed dimensions of appurtenant structures shall be given in feet and inches. All sheets shall have bar scales in order to allow scaling of reduced drawings.

(3) Sheet numbers. Each sheet shall be numbered sequentially with the first sheet being sheet number one in conjunction with the total numbered sheets (example Sheet 1 of 5). The sheet number on the last sheet shall equal the total number of sheets.

(4) Engineer's seal and signature. Each sheet shall have the responsible engineer's seal and signature.
Seals and signatures shall be presented in accordance with 16.39.3 NMAC.

(5) Orientation and date. The direction of north and the basis of bearings shall be shown on all maps. The date that field surveys are made or the date of the aerial photography used shall be shown on the maps.

(6) Title sheet. The first sheet of a set of construction drawings is the title sheet. The title sheet shall only contain sufficient information to summarize the scope of the project, the title of the project, signed certifications from the dam owner, engineer and a certification for the state engineer in accordance with Subsections A, B and E of 19.25.12.12 NMAC. The title sheet shall summarize the properties of the dam and shall include the following information, as appropriate:

(a) name of the dam (same as shown on the application);
(b) type of dam (material);
(c) hazard potential classification;
(d) maximum height above the downstream toe in feet;
(e) maximum length in feet;
(f) crest width in feet;
(g) slope of the upstream face (horizontal to 1 vertical);
(h) slope of the downstream face (horizontal to 1 vertical);
(i) elevation of the dam crest in feet;
(j) elevation of spillway crest in feet;
(k) length of the conduit in feet;
(l) invert elevation of the upstream end of the conduit in feet;
(m) invert elevation of the downstream end of the conduit in feet;
(n) freeboard in feet;
(o) residual freeboard in feet;
(p) maximum spillway discharge capacity in cubic feet per second;
(q) type of outlet conduit (give size and material);
(r) maximum outlet conduit discharge capacity in cubic feet per second; and
(s) location of the outlet works intake structure (using latitude and longitude in decimal degrees at least to the fifth place after the decimal).

(7) Vicinity map. A vicinity map of sufficient scale and size to locate the pertinent area shall be shown on the title sheet or second sheet of the drawings.

(8) Site topography. A detailed topography of the dam site including sufficient area upstream and downstream and at the abutments shall be provided. Elevations shall be based on North American vertical datum 1988 or more recent adjustment.

(9) Design details. Detailed information of the various construction features including plan view, elevations, cross-sections at the maximum section and along the outlet works, profile along and section through the centerline of the dam showing the foundation materials, construction features and cross-sections and a profile of the emergency spillway with dimensions and construction details shall be provided. Any other information necessary for the state engineer to determine the feasibility and safety of the dam shall be provided.

(10) Reservoir area, capacity and high water line traverse. The topography of any proposed reservoir site shall be determined to industry standards and a contour map with a contour interval of 1 foot shall be prepared. Elevations of the contours shall be tied to the North American vertical datum of 1988 or more recent adjustment.

The elevation of the high water line will be highlighted on the contour map. A curve and table of elevation versus area and storage capacity for the reservoir shall be prepared from the contour map. The curve and table shall be from the bottom of the reservoir to the dam crest. Area shall be provided in acres and storage capacity in acre-feet.

(11) Permanent bench mark. A permanent bench mark shall be established above the high water line at a location unlikely to settle or be disturbed. The North American vertical datum of 1988 or more recent adjustment for the bench mark elevation and the latitude and longitude in decimal degrees at least to the fifth place after the decimal for the bench mark location shall be provided. A detail of construction of the permanent bench mark shall be provided.

E. Specifications: A specification package shall be prepared for each project describing work to be done and materials to be used to supplement construction drawings. Specifications shall be submitted in a form acceptable to the state engineer. The specifications shall also be submitted in an electronic format acceptable to the state engineer. Reference to standard technical specifications is not acceptable. Inclusion of appropriate specification sections derived from model specifications is acceptable. Specifications must be clear and concise. Specifications shall include detailed methods of construction, qualities and sizes of materials, unit amounts to be used, methods and frequency of testing and quality control, construction supervision and frequency of inspection. Specifications shall be prepared by a professional engineer licensed in the state of New Mexico qualified in the design and construction of dams. The specifications shall contain the information described below and any other additional information determined necessary by the state engineer to evaluate if the construction methods are consistent with the design and construction drawings.

(1) The front cover of the specifications shall show the name of the dam (identical to the application) and the county in which the dam is located. The first page behind the front cover shall show the name of the dam (identical to the dam name on the application), the county in which the dam is located, a signed certification from the engineer and a certification for the state engineer in accordance with Subsections B and E of 19.25.12.12 NMAC.

(2) The specifications shall include a table of contents.

(3) The specifications shall be bound and submitted on 8 1/2-inch by 11-inch white paper.

(4) The general conditions shall include a statement that the construction drawings and specifications cannot be changed without the prior written approval of the state engineer and must recognize the authority of the state engineer to perform inspections during construction. An approved model statement is provided below. Changes to the model statement require prior approval of the state engineer. "All construction shall be performed in strict accordance with the accepted construction drawings and specifications. Changes to the accepted construction drawings or specifications require prior written approval of the state engineer. Representatives of the state engineer shall have full authority to perform inspections during construction and shall have full power to act pursuant to the law and in accordance with Title 19, Chapter 25, Part 12, Dam Design, Construction and Dam Safety of the New Mexico Administrative Code if construction drawings and specifications are not followed."

F. Boundary, easement or right of way plat of survey: A plat of survey shall be submitted in a form acceptable to the state engineer. A professional surveyor licensed in the state of New Mexico shall prepare a plat of survey showing the dam owner's property boundaries or easement or right of way granted by the land owner. The plat of survey shall be prepared in conformance with the requirements as set forth in the Minimum Standards for Surveying in New Mexico, 12.8.2 NMAC. The plat of survey shall clearly state to whom an easement is granted and what rights are conveyed with the easement. The plat of survey shall show the footprint of the dam and appurtenant structures and the high water line in the reservoir. The plat of survey shall be recorded with the county clerk of the county or counties in which the survey is located. A certificate signed by the surveyor in accordance with Subsection C of 19.25.12.12 NMAC shall appear on the plat of survey. A certified copy of the recorded plat of survey bearing the recorded page and endorsement of the county clerk shall be submitted to the state engineer for filing. Adequate property ownership, easement or right of way shall be required for the following conditions:

(1) to access the dam and outlet controls during normal and flood events;

(2) to prevent development encroachment into the reservoir area defined by normal operation and the spillway design flood that adversely affects the performance of the dam;

(3) to prevent development in the approach, control and discharge section of the spillway that may restrict flow through the spillway;

(4) to return outlet works and spillway discharge to the natural drainage and allow the outlet works to discharge freely; and

(5) to perform maintenance on the dam, appurtenant structures and surrounding areas to ensure the safe performance of the dam.

G. Dam site security: Dams classified as high or significant hazard potential shall address security at dams to prevent unauthorized operation or access. If in the opinion of the state engineer, the failure of the dam will result in catastrophic consequences, a security and risk management program for the dam will be required. Elements of a security and risk management program are:

(1) threat, vulnerability and risk assessments;
(2) physical security plans; and
(3) integration of security operational procedures.

H. Instrumentation plan: An instrumentation plan shall be submitted in a form acceptable to the state engineer. An instrumentation plan providing the ability to monitor and evaluate the performance of a dam is required for dams classified as high or significant hazard potential. Instrumentation details must be included on construction drawings and specifications must be consistent with the instrumentation plan. The instrumentation plan may be submitted as a separate report or as part of the design report. Minimum requirements of the instrumentation plan shall include:

(1) description and purpose;
(2) detailed description of installations;
(3) calibration and maintenance schedule and instructions;
(4) reading schedule and instructions;
(5) data reduction and interpretation instructions; and
(6) identification of critical readings.

I. Operation and maintenance manual: An operation and maintenance manual is required for dams classified as high or significant hazard potential. The operation and maintenance manual identifies activity necessary to address the continued safe operation, maintenance and overall performance of the dam. Any restrictions imposed by the design shall be addressed in the operation and maintenance manual. The operation and maintenance manual shall conform to the requirements set forth in 19.25.12.17 NMAC.

J. Emergency action plan: An emergency action plan is required for dams classified as high or significant hazard potential. The emergency action plan identifies potential emergency conditions at a dam and specifies preplanned actions to be followed to minimize property damage and loss of life. The emergency action plan shall conform to the requirements set forth in 19.25.12.18 NMAC.

[19.25.12.11 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.12 CERTIFICATIONS: Signed certifications by the dam owner, engineer, surveyor, local and state emergency management officials and the state engineer are required by these regulations on specific documents. Approved model certifications for the dam owner, engineer, surveyor, local and state emergency management officials and state engineer are provided below. Changes to the model certifications require prior approval of the state engineer.

A. DAM OWNER'S CERTIFICATE: A certificate followed by the dated signature of the dam owner and notary public acknowledgment is required on the title sheet of the construction drawings and first page behind the front cover of the operation and maintenance manual and emergency action plan. The following model certification is considered to be an example of the minimum that the dam owner shall certify. If the dam owner is a corporation, political subdivision or other governmental entity a model certificate is also provided.

I, (dam owner's name) ,being first duly sworn, upon my oath, state that I have read and examined the accompanying _____ (construction drawings consisting of ____ sheets, operation and maintenance manual, or emergency action plan) and know the contents and representations therein for _____ dam and all that is shown herein is done with my free consent and in accordance with my wishes and state that the same are true and correct to the best of my knowledge and belief.

_____
Dam owner signature Date

Subscribed and sworn to before me this _____ day of _____, 20__.

_____
Notary public

My commission expires _____ (SEAL)

If a claimant is a corporation, political subdivision or other governmental entity the following shall be used:

I, (representative's name) ,being first duly sworn, upon my oath, state that I am the _____ (officer) of the _____, a (corporation or political subdivision) duly organized under the laws of the state of _____, that the accompanying _____ (construction drawings consisting of ____ sheets, operation and maintenance manual, or emergency action plan) for _____ dam were made under authority of the board of directors of said (corporation or political subdivision) and that, in their behalf, I have read and examined the statements and representations and all that is shown herein is done with their free consent and in accordance with their wishes and state that the same are true and correct to the best of my knowledge and belief.

_____
Representative signature, title Date

Subscribed and sworn to before me this _____ day of _____, 20__.

_____
Notary public

My commission expires _____ (SEAL)

B. ENGINEER'S CERTIFICATE: A certificate followed by the dated signature, license number and seal of the engineer responsible for preparing the report, construction drawings, specifications, operation and maintenance manual and engineering elements of the emergency action plan is required. The certificate shall be placed on the title sheet of the construction drawings and first page behind the front cover of the report, specifications, operation and maintenance manual and emergency action plan. The following model certification is considered to be an example of the minimum that the engineer must certify to:

I, (engineer's name) , hereby certify that I am a professional engineer licensed in the state of New Mexico, qualified in _____ (civil, geotechnical, etc.) engineering; that the accompanying _____ (report, construction drawings consisting of ____ sheets, specifications, _____ elements of the operation and maintenance manual, or _____ elements of the emergency action plan) for _____ dam was prepared by me or under my supervision; that the accompanying _____ (report, construction drawings consisting of ____ sheets, specifications, _____elements of the operation and maintenance manual, or _____ elements of the emergency action plan) is in compliance with the Dam Design, Construction and Dam Safety Regulations (19.25.12 NMAC) and that the same are true and correct to the best of my knowledge and belief.

(Engineer's signature) _____, License number _____ (SEAL)
Engineer's name

Date: _____

C. SURVEYOR'S CERTIFICATE: The professional surveyor licensed in the state of New Mexico preparing the plat of survey showing property boundaries, acquired easements or rights-of-way shall include a certificate on the plat of survey as modeled in Paragraph (2) of Subsection J of 12.8.2.9 NMAC, the Minimum Standards for Surveying in New Mexico. The following model certificate is considered to be an example of the minimum that the surveyor must certify to:

I, (surveyor's name) , New Mexico professional surveyor no. (surveyor's license number), do hereby certify that this (boundary, easement, or right of way) plat of survey and the actual survey on the ground upon which it is based were performed by me or under my direct supervision; that I am responsible for this survey; that this survey meets the Minimum Standards for Surveying in New Mexico; and that it is true and correct to the best of my knowledge and belief. I further certify that this survey is not a land division or subdivision as defined in the New

Mexico Subdivision Act and that this instrument is a (boundary, easement, or right of way) plat of survey of _____ dam.

(Surveyor's signature)_____, License number_____ (SEAL)
Surveyor's name

Date: _____

D. LOCAL AND STATE EMERGENCY MANAGEMENT OFFICIAL'S CERTIFICATE: Certificate forms for the local and state officials responsible for emergency management shall be placed at the front of the emergency action plan and immediately after the engineer's certificate. The local official's certificate shall be placed in front of the state official's certificate.

I hereby certify that the accompanying emergency action plan for _____ dam has been duly examined by me and accepted for filing on the _____ day of _____, 20__.

(Official's signature)_____
(Print official's name)
(Print name of local or state emergency management entity)

E. STATE ENGINEER'S CERTIFICATE: A certificate form for the state engineer acceptance shall be placed on the title sheet of the construction drawings and first page behind the front cover of the report, specifications, operation and maintenance manual and immediately after the state official responsible for emergency management in the emergency action plan. This certificate is to be signed by the state engineer or his representative after all necessary corrections or additions, if any, have been made.

I hereby certify that the accompanying _____ (report, construction drawings, specifications, operation and maintenance manual or emergency action plan) for _____ dam and appurtenant structures has been duly examined by me and accepted for filing on the _____ day of _____, 20__.

_____
State engineer

[19.25.12.12 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.13 PERMIT CONDITIONS: After reviewing the required documentation, the state engineer will notify the dam owner if any deficiencies are found with the submittal to construct and operate a dam. The dam owner will be given an opportunity to correct any deficiencies noted in the review process. Once all deficiencies have been addressed the state engineer will approve the application for permit to construct and operate a dam with conditions under which construction and operation shall occur. Failure to comply with conditions of the approved permit may result in the state engineer issuing an order to redesign, reconstruct or restrict operation of the dam and reservoir until conditions are met. Construction must be completed within two years of approving the application unless an extension of time for the construction is requested and approved by the state engineer. The permit conditions are described below and may include additional conditions determined necessary by the state engineer to ensure the dam is constructed and operated in a safe condition.

A. Engineer supervising construction: Prior to initiation of construction, the dam owner shall designate a professional engineer licensed in the state of New Mexico qualified in the design and construction of dams to supervise construction. If the state engineer finds the engineer acceptable, an order is issued approving the engineer and setting forth conditions under which the engineer will supervise construction. Construction supervision conditions are described below.

(1) The engineer supervising construction shall submit monthly progress reports that are signed and sealed. The report shall include:

(a) summary of construction activities;
(b) summary of test results;
(c) captioned and dated construction photographs; and

(d) a discussion of problems encountered and their solutions.

(2) Construction shall be in accordance with accepted drawings and specifications. State engineer approval of any modifications to the accepted drawings or specifications is required prior to undertaking the modifications. Requests for changes or modifications by the engineer supervising construction shall be submitted in writing, supported with appropriate documentation.

(3) The engineer supervising construction shall provide the state engineer a minimum of 72 hours notice to perform inspections as specified in the conditions of construction.

(4) Upon completion of construction, the engineer supervising construction shall submit to the state engineer the items described below.

(a) A construction completion report, which shall include a signed certification from the engineer supervising construction and a certification for the state engineer in accordance with Subsections B and E of 19.25.12.12 NMAC. The construction completion report shall also include:

(i) description of construction activities including problems and their solutions;

(ii) a summary of materials test data; and

(iii) captioned and dated construction photographs.

(b) Record mylar construction drawings including a signed certification on the title sheet from the dam owner and a certification for the state engineer in accordance with Subsections A and E of 19.25.12.12 NMAC. The record mylar drawings shall also contain a signed certificate from the engineer supervising construction that the dam was constructed in accordance with the record drawings and specifications and is in satisfactory condition. If design changes are made during construction, the design engineer may also be required to sign a certification in accordance with Subsection B of 19.25.12.12 NMAC. An approved model certificate for the engineer supervising construction is shown below. Changes to the language in the certification require prior approval by the state engineer.

I,_____,(engineer's name) state that I am a qualified professional engineer licensed in the state of New Mexico, that I have supervised the (construction, repair, rehabilitation) of _____dam and appurtenant structures and find them to be completed in accordance with the record construction drawings and specifications and are now in a satisfactory condition for acceptance.

(Engineer's signature)_____, License number _____ (SEAL)
Engineer's name

Date: _____

B. State engineer's authority during construction: The state engineer may perform inspections at any time during construction of the dam and appurtenant structures. Inspections will vary with each project, based on the complexity of the design. Inspection of specific construction items are standard construction conditions in the permit and require the engineer supervising construction to provide the state engineer with a minimum of 72 hours advanced notice. If the state engineer receives a minimum of 72 hours advanced notice, a delay of construction to schedule a state engineer inspection is not required. State engineer inspection fees are charged in accordance with Subsection E of 19.25.12.8 NMAC. Fees for inspection of construction by the state engineer not paid on demand shall become a lien on any land or other property of the dam owner and may be recovered by the state engineer.

C. Completion of construction: Upon completion of construction, a proof of completion of works form for the dam shall be submitted in accordance with 19.25.12.14 NMAC. Owners of dams classified as high or significant hazard potential shall submit to the state engineer any required updates to the operation and maintenance manual in accordance with 19.25.12.17 NMAC and any required updates to the emergency action plan in accordance with 19.25.12.18 NMAC incorporating any modifications made during construction. Upon the satisfactory completion of all conditions in the permit, pending the issuance of a certificate of construction and license to operate a dam, use of the reservoir shall require written permission from the state engineer. Use of the dam and reservoir are restricted until the state engineer accepts the updated operation and maintenance manual and emergency action plan, if required.

D. Extension of time for construction: The state engineer will grant an extension of time for completing construction upon proper showing by the dam owner of due diligence or reasonable cause for delay and accompanied with a fee in accordance with Subsection D of 19.25.12.8 NMAC. An affidavit by a professional engineer licensed in the state of New Mexico qualified in the design and construction of dams shall be filed with the

state engineer providing evidence that the design of the dam meets or exceeds the design requirements in accordance with 19.25.12.11 NMAC. An extension of time may be granted for a period not to exceed five (5) years. No extension of time shall be granted which in combination extend the time allowed by the permit beyond ten (10) years from the initial date of approval of the application, unless the state engineer in his discretion expressly waives this limitation pursuant to NMSA 1978, Section 72-5-14. Failure to request an extension of time shall result in cancellation of the permit by the state engineer.

E. Operation conditions: Operation conditions will be identified in the permit to construct and operate a dam. Operation conditions are described below:

(1) The owner shall comply with the office of the state engineer rules and regulations for dams.

(2) Changes to the easements, that adversely affects the conditions outlined in paragraphs (1) through (5) of Subsection F of 19.25.12.11 NMAC require prior approval from the state engineer.

(3) Changes, alterations, or modifications to the dam or sediment removal or dredging not outlined in the operation and maintenance manual requires state engineer approval prior to making the change.

(4) The dam owner shall provide access to the state engineer for periodic dam safety inspections.

(5) The dam owner must comply with all state engineer safety orders issued for the dam.

(6) Owners of dams classified as low and significant hazard potential shall have the hazard classification periodically evaluated by a professional engineer licensed in New Mexico if downstream development occurs to ensure the dam design is not deficient.

(7) Operation of the dam must be in compliance with the approved operation and maintenance manual and emergency action plan.

(8) The dam owner shall operate the dam in compliance with any specific condition, requirement, or limitation established by the design engineer or otherwise applicable to the dam.

(9) Failure by the dam owner to comply with operation conditions may result in revocation of the permit or license to operate and an order to breach the dam in accordance with Subsection B or C of 19.25.12.19 NMAC.

[19.25.12.13 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.14 PROOF OF COMPLETION OF WORKS: Upon completion of the construction conditions a proof of completion of works for the dam shall be filed on a form provided by the state engineer with appropriate fees in accordance with Subsection F of 19.25.12.8 NMAC. The proof of completion of works for the dam shall be filed with original signature of the dam owner and engineer supervising construction. The proof of completion of works form shall be provided to the state engineer as a separate submittal.

[19.25.12.14 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.15 CERTIFICATE OF CONSTRUCTION OF A DAM: Upon receipt of the proof of completion of works form, the state engineer will determine if all construction conditions of the permit were met. Upon a determination by the state engineer that all construction conditions have been complied with, the state engineer shall issue a certificate of construction. The certificate of construction shall address the general properties of the dam and appurtenant structures. The dam owner shall record the certificate of construction with the county clerk of the county within which the works are located.

[19.25.12.15 NMAC - N, 3/31/2005]

19.25.12.16 LICENSE TO OPERATE A DAM: Upon issuance of a certificate of construction the state engineer shall issue a license to operate a dam. The license to operate a dam shall address operation conditions and dams shall be operated in accordance with the operation conditions. In addition, dams classified as high and significant hazard potential shall operate in accordance with the operation and maintenance manual and emergency action plan prepared in accordance with Sections 17 and 18 of 19.25.12 NMAC. Failure to comply with the conditions of the license to operate a dam may result in a state engineer order that limits operation, requires specific action by the owner and if necessary the license to operate a dam may be revoked by the state engineer. If a license to operate a dam is revoked the state engineer may order the dam breached in accordance with Subsections B or C of 19.25.12.19 NMAC.

[19.25.12.16 NMAC - N, 3/31/2005]

19.25.12.17 OPERATION AND MAINTENANCE MANUAL: Owners of dams classified as high or significant hazard potential shall prepare, maintain and adhere to an operation and maintenance manual that

addresses the continued safe operation, maintenance and performance of the dam. Because each site, design and operating practice is unique, waivers of specific requirements in this section will be considered on a case-by-case basis. Request for waiver shall be in writing accompanied with documentation justifying the request. If the request is not justified to the satisfaction of the state engineer the request will be denied. If deemed appropriate, the state engineer may require the owner to obtain the services of a professional engineer licensed in the state of New Mexico qualified in the design and construction of dams to prepare complex technical aspects of the operation and maintenance manual. The operation and maintenance manual shall be submitted in a form acceptable to the state engineer. The operation and maintenance manual shall also be submitted in an electronic format acceptable to the state engineer. The front cover shall identify the document as an operation and maintenance manual and shall show the name of the dam, the county in which the dam is located and the dam owner. The first page behind the front cover shall show the name of the dam, the county in which the dam is located, signed certifications from the dam owner, engineer if required and a certification for the state engineer in accordance with Subsections A, B and E of 19.25.12.12 NMAC. Operation or maintenance of the dam in violation of the procedures presented in the accepted operation and maintenance manual that affect the safety of the dam will result in an order being issued requiring the dam owner to address the problem. The state engineer may also issue an order restricting storage in order to improve the unsafe condition. Failure to comply with orders issued by the state engineer may result in the license to operate the dam being revoked and the dam being ordered breached in accordance with Subsection B or C of 19.25.12.19 NMAC. The operation and maintenance manual shall contain the information described below, if relevant to the project, and any other additional information determined necessary by the state engineer to evaluate if the dam will be operated and maintained in a safe condition.

A. General information: Information on the project shall include but not be limited to the following:

(1) location and access;

(2) purpose and description;

(3) table of properties; and

(4) history of construction, repairs and performance.

B. Operation: Operation instructions, frequency of operation and operator safety for the project shall include but not be limited to the following:

(1) Reservoir:

(a) water right storage allocations;

(b) elevation, area and storage curve and table to the dam crest;

(c) elevation of the high water line;

(d) discharge rating table for the outlet conduit;

(e) discharge rating table for the spillway;

(f) emergency reservoir evacuation procedures; and

(g) first filling criteria and monitoring requirements.

(2) Outlet works:

(a) first operation;

(b) seasonal startup;

(c) seasonal shutdown;

(d) installation and removal of bulkhead;

(e) operation procedures for specific equipment; and

(f) electrical systems and controls.

(3) Operator safety:

(a) confined space entry and permits;

(b) fall protection;

(c) lockout/tag out; and

(d) other applicable safety requirements.

C. Instrumentation: Instrumentation for the project shall include but not be limited to the following:

(1) description and purpose;

(2) detailed description of installation;

(3) calibration and maintenance schedule and instructions;

(4) reading schedule and instructions;

(5) data reduction and interpretation;

(6) identification of critical readings and notification procedures; and

(7) schedule for reporting data with interpretations to the state engineer.

D. Security: Projects that include security measures shall describe the security measures along with instructions for monitoring, maintaining and inspection.

E. Maintenance: Maintenance requirements and frequency shall be included.

F. Inspection: Inspection requirements, frequency and recommended checklist shall be included.

G. Updates and revisions: An update and revision procedure shall be included.

H. Appendices: Appendices shall include documentation that supports and supplements the manual. The appendices shall include but not be limited to the following:

(1) captioned and dated photographs;

(2) key sheets from the record construction drawing set;

(3) instrumentation construction drawings;

(4) instrumentation rating tables and calibration details;

(5) monitoring and inspection forms;

(6) instrumentation plan to ensure any restrictions imposed by the design are incorporated into the operation and maintenance manual; and

(7) copies of any relevant procedures.

[19.25.12.17 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.18 EMERGENCY ACTION PLAN: Owners of dams classified as high or significant hazard potential shall prepare, maintain and exercise an emergency action plan for immediate action in the event of a potential dam failure. Because each site and operating practice is unique, waivers of specific requirements in this section will be considered on a case-by-case basis. Request for waiver shall be in writing accompanied with documentation justifying the request. If the request is not justified to the satisfaction of the state engineer the request will be denied. The emergency action plan shall follow the format provided by the state engineer or a format that has prior approval of the state engineer. The emergency action plan shall also be submitted in an electronic format acceptable to the state engineer. The front cover shall identify the document as an emergency action plan and shall show the name of the dam, the county in which the dam is located and the dam owner. The pages immediately behind the front cover shall show the name of the dam, the county in which the dam is located, signed certifications from the dam owner, engineer, local and state officials responsible for emergency management and a certification for the state engineer in accordance with Subsections A, B, D and E of 19.25.12.12 NMAC. The dam owner shall coordinate with the local emergency management office in preparing the emergency action plan. The coordination is required to ensure that there is an agreement on the evacuation limits and responsibilities. The dam owner shall submit a copy to the local and state officials responsible for emergency management for acceptance prior to submittal to the state engineer. The dam owner shall review the emergency action plan annually, update as necessary and furnish a copy of updates to all official copyholders. The dam owner shall exercise the emergency action plan to verify those involved in its implementation know their roles and responsibilities. It is recommended the dam owner conduct a functional exercise of the emergency action plan every 5 years with a table top exercise conducted 2 to 3 years before the functional exercise. The exercise may result in updates to ensure the emergency action plan maintains operational readiness, timeliness and responsiveness. Failure to act in accordance with the accepted emergency action plan that affects public safety will result in an order being issued requiring the dam owner to address the problem. Failure to comply with orders issued by the state engineer may result in the license to operate the dam being revoked and the dam being ordered breached in accordance with Subsection B or C of 19.25.12.19 NMAC. A professional engineer licensed in the state of New Mexico qualified in the design and construction of dams shall prepare engineering information for the emergency action plan as specified below. An emergency action plan shall contain the information described below and any other additional information determined necessary by the state engineer or emergency management official to evaluate the planned response to an emergency situation by the dam owner.

A. Notification flowchart: A notification flowchart showing who is to be notified, by whom and in what priority.

B. Emergency detection, evaluation and classification: Procedures for reliably and timely identifying an emergency situation to ensure that an appropriate course of action is implemented. A professional engineer licensed in the state of New Mexico qualified in the design and construction of dams shall prepare this element.

C. Responsibilities: A list designating responsibilities for the emergency action plan related tasks including, but not limited to developing, maintaining, exercising, implementing, warning, evacuation and termination of the emergency.

D. Preparedness: A list of materials, equipment and manpower available to moderate or alleviate the effects of a dam failure or spillway release.

E. Evacuation map: An evacuation map delineating the areas that will be evacuated as a result of dam failure. The evacuation map shall extend to a point where the consequences of dam failure does not pose a threat to life and evacuation or restricting access is not required. If available, shape files from geographic information system software of the evacuation map shall be submitted. Evacuation maps shall include the following information at critical locations downstream when required by the local official responsible for emergency management:

(1) distance downstream from the dam;
(2) arrival time of the leading edge of the flood wave;
(3) peak flow depth, incremental rise or water surface elevation in feet; and
(4) peak velocity in feet per second.

F. Inundation map: An inundation map delineating the areas that will be flooded as a result of dam failure. The inundation map shall be supported by a dam breach and flood routing analysis report. The dam breach and flood routing analysis shall evaluate the sunny day failure, failure at the high water line and any additional event deemed appropriate by the dam owner. If appropriate considering the consequences of dam failure, a simplified dam breach and flood routing analysis may be used with approval from the state engineer. If a dam is located downstream, failure scenarios with the downstream dam shall also be evaluated. Evaluation of the effects of flooding from dam failure shall extend at least to the location downstream where the consequences of dam failure does not pose a threat to life and evacuation or restricting access is not required. A professional engineer licensed in the state of New Mexico qualified in the design and construction of dams shall prepare this element. If available, shape files from geographic information system software of the inundation map shall be submitted. Inundation maps shall include the following information at critical locations downstream:

(1) distance downstream from the dam;
(2) arrival time of the leading edge of the flood wave;
(3) peak flow depth, incremental rise and water surface elevation in feet; and
(4) peak velocity in feet per second.

G. Appendices: All information that supports and supplements the material used in the development and maintenance of the emergency action plan. The dam breach and flood routing analysis report shall be submitted as a separate document.

[19.25.12.18 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.19 CHANGES TO AN EXISTING DAM: A dam owner proposing to reconstruct, enlarge, modify, restore reservoir capacity, repair, remove or breach an existing dam must make application to and receive approval from the state engineer prior to undertaking any such action. The current condition of the dam, the type of repair or modification and the proposed means to achieve the repair or modification shall dictate the detail of the information provided to the state engineer in order to obtain approval. Because each site, design change and operating practice is unique, waivers of specific requirements in this section will be considered on a case-by-case basis. Request for waiver shall be in writing accompanied with documentation justifying the request. If the request is not justified to the satisfaction of the state engineer the request will be denied. Existing dams present the same hazards to life and property downstream as new dams. Therefore, owners of dams classified as high or significant hazard potential shall evaluate the current condition of the dam and address in the submittal to the state engineer whether the dam is in compliance with the design requirements in Subsection C of 19.25.12.11 NMAC. If the state engineer determines compliance with requirements in Subsection C of 19.25.12.11 NMAC are critical to the safety of the dam, the state engineer shall issue an order requiring the deficiency be addressed as part of the proposed change. Owners of dams classified as low hazard potential shall comply with the design requirements in Subsection C of 19.25.12.11 NMAC for the proposed change only. Maintenance activity performed in accordance with 19.25.12.17 NMAC does not require prior state engineer approval. Dam owners shall not abandon a dam without breaching or removing the dam to ensure the dam no longer poses a risk to life, property, the environment surrounding the dam or downstream of the dam. In the event of any changes of ownership affecting the title to a dam, the new owner shall file a change of ownership form for a dam with the state engineer. Recognition of the responsibility and liability associated with dam ownership is required along with fees for filing the change in ownership form for a dam in accordance with Subsection G of 19.25.12.8 NMAC. This section exempts federal dams if no change to the water storage permit is required. A proposed change to an existing dam shall require the submittal of the information described below and

any other additional information determined necessary by the state engineer to evaluate if the change to the dam is safe.

A. Proposed changes to an existing dam: For dam owners proposing to reconstruct, enlarge, modify, restore reservoir capacity, repair or add aesthetic fill to an existing dam, the information described below is required prior to undertaking any such action.

(1) An application to alter, repair or rehabilitate the dam and appurtenant structures. Fees for filing the application and for reviewing drawings and specifications shall be in accordance with Subsections B and C of 19.25.12.8 NMAC. Review fees identified in Subsection C of 19.25.12.8 NMAC are waived for the first review if the state engineer requires the change to address a dam safety deficiency.

(2) Documentation of sufficient water rights if changes in storage or release requirements are proposed in accordance with the requirements of Subsection B of 19.25.12.11 NMAC.

(3) A design report addressing the proposed change in accordance with the requirements of Subsection C of 19.25.12.11 NMAC. Owners of dams classified as high or significant hazard potential shall submit a design report addressing whether the existing condition of the dam is in compliance with the design requirements listed in Subsection C of 19.25.12.11 NMAC. Where the existing condition of the dam is not in compliance with the design requirements of Subsection C of 19.25.12.11 NMAC, the design report shall propose changes to address compliance with the design requirements of Subsection C of 19.25.12.11 NMAC or request a waiver that the deficiency is not critical to the safety of the dam and provide adequate justification for the waiver.

(4) Construction drawings and specifications addressing the proposed change in accordance with the requirements of Subsections D and E of 19.25.12.11 NMAC.

(5) A plat of survey showing the dam owner's property boundaries, easement, or right of way. The plat of survey shall be in accordance with the requirements of Subsection F of 19.25.12.11 NMAC.

(6) For dams classified as high or significant hazard potential, a dam site security assessment in accordance with the requirements of Subsection G of 19.25.12.11 NMAC.

(7) For dams classified as high or significant hazard potential, an instrumentation plan in accordance with the requirements of Subsection H of 19.25.12.11 NMAC.

(8) For dams classified as high or significant hazard potential, an updated operation and maintenance manual and emergency action plan in accordance with the requirements of Sections 17 and 18 of 19.25.12 NMAC.

B. Removal or breach of dams classified as high or significant hazard potential: Dam owners intending to breach or remove a dam classified as high or significant hazard potential shall submit a plan to the state engineer for approval prior to breaching or removing the dam. The plan shall evaluate the potential effects of the dam removal or breach on life, property and the environment downstream. A professional engineer licensed in the state of New Mexico qualified in the design and construction of dams shall prepare the plan. The state engineer will revoke the license to operate a dam upon completion of all construction conditions. The plan shall meet the conditions described below.

(1) The reservoir shall be emptied in a controlled manner, which will not endanger lives or damage property downstream.

(2) The dam or breach area shall be excavated down to the level of natural ground and the breach shall be of sufficient width to safely pass the 100-year, 24-hour flood peak discharge without attenuation of the flood through the reservoir.

(3) The side slopes of the breach shall be excavated to a stable angle.

(4) The breach shall be armored as necessary to prevent erosion of the breach area.

(5) The plan shall address the control of sediment previously deposited in the reservoir.

(6) Drawings and specifications shall be prepared in accordance with the appropriate requirements listed in Subsections D and E of 19.25.12.11 NMAC and shall include a title sheet with required certifications and signatures, the location, dimensions and lowest elevation of the breach and any other detail to sufficiently describe the proposal.

(7) Designation of the professional engineer licensed in the state of New Mexico qualified in the design and construction of dams that will supervise construction of the breach or dam removal. Submittal of the professional engineer's qualifications for state engineer approval is required.

C. Removal or breach of dams classified as low hazard potential: Owners of dams classified as low hazard potential shall submit a written notice to the state engineer of intent to breach the dam. The state engineer will revoke the license to operate a dam upon completion of all construction conditions. The breach notice shall meet the minimum requirements described below.

(1) The bottom width elevation of the breach shall be to original ground.

(2) The bottom width of the breach shall be a minimum of one-half the height of the dam but not less than 10 feet.

(3) The side slopes shall not be steeper than one horizontal to one vertical.

(4) The excavated material shall not be placed in the streambed.

D. Closure of a tailings facility: A closure plan must be prepared to address the closure of a tailings facility. State engineer approval is required before any modification occurs to a jurisdictional tailings dam. A professional engineer licensed in the state of New Mexico qualified in the design and construction of tailings dams shall prepare the closure plan, which shall include a design report, drawings and specifications prepared in accordance with the appropriate requirements listed in Subsections C, D and E of 19.25.12.11 NMAC. The state engineer will revoke the license to operate a dam upon completion of all construction conditions. The plan shall address the following issues:

(1) long-term stability under static and dynamic conditions;

(2) control of surface runoff to avoid erosion;

(3) plan for long term monitoring, if appropriate; and

(4) identification of an engineer licensed in the state of New Mexico qualified in tailings dam design and construction to supervise implementation of the closure plan; submittal of the engineer's qualifications for state engineer approval is required.

E. Construction and operating conditions: After reviewing the required documentation, the state engineer will notify the dam owner if any deficiencies are found with the submittal. The dam owner will be given an opportunity to correct any deficiencies noted in the review process. Once all deficiencies have been addressed the state engineer will approve the amended application or proposed change with conditions under which construction and operation shall occur. Action by the state engineer will be in accordance with 19.25.12.13 NMAC, appropriately modified to address the proposed changes.

F. Proof of completion of works, certificate of construction and license to operate: The requirement for a proof of completion of works form for the dam, certificate of construction and license to operate a dam for changes to a dam will be made on a case by case basis by the state engineer. The proof of completion of works form for the dam, certificate of construction and license to operate a dam, if required, shall be in accordance with the Sections 14, 15 and 16 of 19.25.12 NMAC, appropriately modified to address the proposed changes. If the dam is breached, the state engineer will cancel the permit and revoke the license to operate a dam.

[19.25.12.19 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.20 CHANGES TO AN EXISTING NON-JURISDICTIONAL DAM: A dam owner proposing to reconstruct, enlarge, or modify a non-jurisdictional dam, resulting in a jurisdictional dam after construction is completed, shall comply with 19.25.12.11 NMAC before construction begins. If the ownership of a non-jurisdictional dam changes, resulting in a jurisdictional dam, the owner shall comply with 19.25.12.11 NMAC. The state engineer will give the owner a reasonable amount of time to comply with 19.25.12.11 NMAC. If the owner fails to comply with 19.25.12.11 NMAC, the dam will be ordered breached in accordance with Subsection B or C of 19.25.12.19 NMAC.

[19.25.12.20 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.21 EXISTING DAMS: The state engineer may inspect existing dams to verify dams are operated and maintained in a safe manner. Access to the dam site shall be made available to the state engineer upon request. If a critical dam safety problem is observed by the state engineer or reported to the state engineer, an order may be issued requiring the dam owner to address the problem. If a dam incident occurs at a dam, the dam owners shall report the incident to the state engineer within 72 hours. If a major repair is required at an existing dam, the plan to repair the dam shall be in accordance with 19.25.12.19 NMAC. Minor repairs not identified as maintenance activity in accordance with 19.25.12.17 NMAC require state engineer approval. Failure to comply with state engineer directives or these regulations may result in an order to reduce storage or to take corrective action. Failure to comply with orders issued by the state engineer may result in the license to operate a dam being revoked and the dam ordered breached in accordance with Subsection B or C of 19.25.12.19 NMAC. Owners of existing dams shall comply with the requirements described below.

A. Owners acquiring property with a dam shall promptly notify the state engineer on a form provided by the state engineer of the change in ownership. Recognition of the responsibility and liability associated with dam ownership is required along with fees for filing the change in ownership form for a dam in accordance with Subsection G of 19.25.12.8 NMAC.

B. Owners of dams classified as low or significant hazard potential shall evaluate the hazard classification if downstream development occurs. The dam owner shall submit the results of the hazard potential evaluation prepared in accordance with Paragraph (1) of Subsection C of 19.25.12.11 NMAC to the state engineer for approval. If the hazard potential classification changes due to downstream development, the state engineer shall give the dam owner a time limit to address deficiencies. Deficiencies shall be addressed in accordance with Subsection C of 19.25.12.11 NMAC and Sections 17 and 18 of 19.25.12 NMAC.

C. Dams classified as high or significant hazard potential shall be inspected on an interval no greater than 5 years by a professional engineer licensed in the state of New Mexico qualified in the design and construction of dams. The owner is responsible for securing the services of the professional engineer. The professional engineer shall provide a signed and sealed report to the state engineer describing the findings of the inspection and recommendations for corrective action or changes to the operating procedures. Routine inspection by the state engineer as described in 19.25.12.21 NMAC satisfies this requirement.

D. Owners of dams classified as high or significant hazard potential in an unsafe condition may receive an order from the state engineer to address the deficiency pursuant to NMSA 1978, Section 72-5-11 (1979). The state engineer may also issue an order to an owner of a non-jurisdictional dam if the dam is unsafe and a threat to life or property, as determined by the state engineer. Owners shall comply with orders issued by the state engineer pursuant to NMSA 1978, Section 72-5-12 (1979).

E. Owners of dams classified as high or significant hazard potential shall comply with 19.25.12.17 NMAC requiring an operation and maintenance manual. Upon compliance with 19.25.12.17 NMAC the state engineer will issue a license to operate the dam.

F. Owners of dams classified as high or significant hazard potential shall comply with 19.25.12.18 NMAC requiring an emergency action plan. Dams classified as significant hazard potential for flood control purposes with no permanent storage shall comply by December 31, 2012. Owners of 5 or more dams classified as high or significant hazard potential may propose a schedule for compliance with the emergency action plan requirement. The schedule must propose compliance dates for each dam and all dams must be in compliance by December 31, 2015. The compliance schedule is subject to review and approval or modification by the state engineer.

G. Dam owners that transfer the entire water right out of the reservoir shall have their license to operate a dam revoked and will receive from the state engineer an order to breach the dam in accordance with Subsection B or C of 19.25.12.19 NMAC.

H. Dam owners that fail to obtain state engineer approval prior to construction of a dam shall comply with all conditions imposed by the state engineer within a time limit established by the state engineer or the state engineer may order the dam breached in accordance with Subsection B or C of 19.25.12.19 NMAC.

[19.25.12.21 NMAC - N, 3/31/2005; A, 12/31/2010]

19.25.12.22 SEVERABILITY: If any portion of this part is found to be invalid, the remaining portion of this part shall remain in force and not be affected.

[19.25.12.22 NMAC - N, 3/31/2005]

History of 19.25.12 NMAC: [RESERVED]