

TITLE 19 NATURAL RESOURCES AND WILDLIFE
CHAPTER 11 GEOTHERMAL RESOURCES DEVELOPMENT
PART 4 CONSTRUCTION AND OPERATION

19.11.4.1 ISSUING AGENCY: Energy, Minerals and Natural Resources Department, Energy Conservation and Management Division.
[19.11.4.1 NMAC - N, 2/27/2018]

19.11.4.2 SCOPE: All persons who engage in the exploration, development or production of a geothermal resource.
[19.11.4.2 NMAC - N, 2/27/2018]

19.11.4.3 STATUTORY AUTHORITY: Geothermal Resources Development Act, Section 71-9-1 et seq. NMSA 1978 (2016).
[19.11.4.3 NMAC - N, 2/27/2018]

19.11.4.4 DURATION: Permanent.
[19.11.4.4 NMAC - N, / /2018]

19.11.4.5 EFFECTIVE DATE: February 27, 2018, except where a later date is cited at the end of a section.
[19.11.4.5 NMAC - N, 2/27/2018]

19.11.4.6 OBJECTIVE: The objective of 19.11.4 NMAC is to establish rules to ensure the exploration, development and production of geothermal resources is conducted in a manner that safeguards life, health, property, natural resources, the environment and the public welfare, and to encourage maximum economic recovery.
[19.11.4.6 NMAC - N, 2/27/2018]

19.11.4.7 DEFINITIONS: [RESERVED]
[See 19.11.1.7 NMAC for definitions.]
[19.11.4.7 NMAC – N, 2/27/2018]

19.11.4.8 GEOTHERMAL WELL LOCATION LIMITATIONS: Any well drilled for the exploration, development or production of geothermal resources or as an injection well shall be located 100 feet or more from and within the outer boundary of the parcel of land on which the well is situated, or 100 feet or more from a public road, street or highway dedicated prior to the commencement of drilling. The division may modify or waive this requirement upon written request if the applicant can demonstrate that public safety is preserved and that the integrity of the geothermal source is not jeopardized.
[19.11.4.8 NMAC - N, 2/27/2018]

19.11.4.9 PERMITTEE'S NOTIFICATION REQUIREMENTS AND REQUESTS FOR APPROVAL TO DIVISION: A permittee shall notify the division with:

- A.** a written notice of intent to engage in any one of the following activities:
 - (1) make a minor change in the operation of the well (minor changes include changing capillary tubing, pulling or replacing a pump or any other change the division considers a minor change);
 - (2) conduct a spinner, pressure or temperature survey test or another test that does not modify the well structure;
 - (3) conduct a flow test on a production well;
 - (4) perform routine maintenance on a well;
 - (5) removal of fluids from on-site pits or closed-loop systems per Paragraph (3) of Subsection D of 19.11.4.17 NMAC; or
 - (6) change in location of a well that is within the approved area of a geothermal well or facility permit (this will require the permittee to apply for a minor permit modification pursuant to Subparagraph F of 19.11.2.10 NMAC so that the permit will reflect the new location).
- B.** a written notice of intent and request for approval for any one of the following activities:
 - (1) activities not specifically approved or exempted under an existing permit;

- (2) activities that do not require a permit application per 19.11.2.10 NMAC;
- (3) tracer tests;
- (4) mechanical integrity tests;
- (5) increasing depth of a well;
- (6) conduct a flow test on an injection well;
- (7) entering or opening a plugged well;
- (8) shooting, acidizing or fracturing a well;
- (9) abandoning and plugging a well;
- (10) directional drilling (drilling in a direction not intended to be vertical);
- (11) changing the construction of a hole or well, except for injection wells, including placing a plug in the hole or well and recovering or altering the casing;
- (12) conducting a major workover or cleaning of a well; or
- (13) any other activity for which the division conducts a field inspection or evaluates information or documentation regarding the construction of a hole or well.

C. The director may determine, based on the notices submitted under Subsections A or B of 19.11.4.9 NMAC, that the permittee is required to apply for a permit modification in accordance with 19.11.2.10 NMAC. [19.11.4.9 NMAC - N, 2/27/2018]

19.11.4.10 WELL CONSTRUCTION AND CASING REQUIREMENTS: Permittees shall construct and case all geothermal wells in a manner to protect or minimize damage to life, health, property, ground water and surface waters, geothermal resources, other natural resources, the environment and the public welfare. No permittee shall construct, operate, maintain, convert, plug, abandon or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the contaminant may cause a violation of drinking water regulations or rules or may otherwise adversely affect the health of persons. The permittee has the burden of showing that it meets these requirements. The permittee shall attach the permanent well head completion equipment to the production casing or to the intermediate casing if production casing does not reach the surface. The permittee shall install an annular blowout preventer on wells when the division deems it necessary. All surface, intermediate and production casing strings reaching the surface shall provide adequate anchorage for BOPE, pressure control and protection for all natural resources. The casing design criteria listed below represent minimum requirements.

A. Conductor casing. The permittee shall install a minimum of 40 feet of conductor casing. The permittee shall cement the annular space solid to the surface. The permittee shall allow a 24-hour cure period for the grout prior to drilling out the shoe unless the permittee uses additives, approved by the division, to obtain early strength.

B. Surface casing. A surface casing shall provide for control of formation fluids, for protection of shallow usable ground water and for adequate anchorage for BOPE. The permittee shall cement all surface casing solid to the surface. The permittee shall allow a 24-hour cure period prior to drilling out the shoe of the surface casing unless the permittee uses additives, approved by the division, to obtain early strength. The permittee shall set sufficient casing to reach a depth below all known or reasonably estimated levels of fresh water and water of present or future value for domestic, commercial or agricultural use and to protect those aquifers and to prevent blowout or uncontrolled flows.

C. Intermediate casing. Intermediate casing is required for protection against unusual pressure zones, cave-ins, wash-outs, abnormal temperature zones, uncontrollable lost circulation zones or other drilling hazards. The permittee shall cement intermediate casing strings solid to the surface or to the top of the liner hanger whenever the permittee runs intermediate casing string as a liner. The permittee shall pressure test the liner lap, of any unslotted liner, prior to resumption of drilling.

D. Production casing. The permittee shall set production casing above or through the producing or injection zone and cement it above the injection zones. The permittee shall use sufficient cement to exclude overlying formation fluids from the geothermal zone, to segregate zones and to prevent movement of fluids behind the casing into zones that contain fresh ground water. The permittee shall either cement production casing solid to the surface or lap it into intermediate casing, if run. If the permittee laps production casing into an intermediate casing, the casing overlap shall be at least 100 feet, cemented solid and pressure tested to ensure its integrity.

E. All casing materials shall be suitable for the proposed operating design stresses and temperatures. [19.11.4.10 NMAC - N, 2/27/2018]

19.11.4.11 BLOWOUT PREVENTION: The permittee shall take all necessary precautions to always keep wells under operational control and mechanical integrity. The permittee shall install BOPE, capable of shutting in the well during any operation, on the surface casing and always maintained ready for use. If necessary, the permittee shall equip the BOPE to be remotely activated. The equipment shall be rated for operating at pressures and temperatures exceeding the maximum pressure and temperature anticipated for the well.
[19.11.4.11 NMAC - N, 2/27/2018]

19.11.4.12 OPERATING LIMITATIONS: The division shall establish operating limitations, for all production or injection wells, deemed necessary to protect life, health, correlative rights, property, natural resources, the environment or the public welfare. The permittee shall operate all wells within the operating parameter limits established in the permit. The permittee shall not operate a new injection well before receiving authorization to inject from the division.
[19.11.4.12 NMAC - N, 2/27/2018]

19.11.4.13 TESTING AND MONITORING:

A. Well construction testing and monitoring.

(1) The permittee shall log all injection or production wells with an induction electrical log, or equivalent, or by gamma-neutron log after running casing. The permittee shall log the well from the bottom of the hole to the bottom of the production casing. This requirement may vary from area to area, depending upon the amount of pre-existing subsurface geological data available. If sufficient subsurface geologic data is available, the division may not require the permittee to log the well. However, the permittee shall obtain the division's written permission to omit this requirement prior to running surface casing.

(2) The permittee shall take cuttings a minimum of every 10 feet for all geothermal wells. The cuttings must be cleaned, dried, marked for location and depth and placed in appropriate containers and maintained with the well or facility records per Subsection A of 19.11.4.14 NMAC.

(3) The permittee shall regularly monitor the temperature of the return mud during the drilling of the surface casing hole, below the conductor casing. The permittee shall either install and maintain in working condition a continuous temperature monitoring device, or read the temperature manually. In either case, the permittee shall log the return mud temperature after each joint of pipe has been drilled down 30 feet.

(4) After installation and prior to drilling out the guide shoe from the production or injection casing, the permittee shall test the well casing and BOPE under pressure. The test pressure shall be 1.5 times the saturated steam pressure (psia) of water at the predicted bottom hole mud return temperature. An acceptable test shall maintain pressure in the well between the guide shoe and BOPE, with no more than a ten percent drop from the initial test pressure, for 30 minutes.

(5) Prior to operation of an injection well, the permittee shall test the well construction to demonstrate that the casing cement has acceptably bonded to the casing. The permittee shall conduct the cement bond log test by a method approved by the division and submit the test results to the division for approval before placing the well into operation.

(6) Prior to operation, the permittee shall test all injection wells to demonstrate that the casing has complete integrity. The permittee shall conduct the MIT by a method approved by the division and submit the test results to the division for approval before placing the well into operation.

(7) For fresh water aquifers the division determines may be affected by the operation of an injection well, prior to operation, the permittee shall sample and analyze water quality from the fresh water aquifer through a monitoring or observation well, located down gradient (static water level of fresh water aquifer) and within 500 feet of each injection well. During sampling, the permittee shall also measure the static water level and water temperature. The division shall establish the scope of the water quality analysis based on the potential contaminants from the geothermal resource and geothermal ground operations.

B. Well operation testing and monitoring.

(1) To verify the integrity of the annular cement above the shoe of the casing of any injection well, the permittee shall make sufficient surveys within 30 days after the permittee begins injection into a well to prove that all the injected fluid is confined to the intended zone of injection. Thereafter, the permittee shall make surveys at least every five years or more often if necessary. If the permittee can substantiate by existing data that these tests are not necessary, then, after review of the data, the division may grant a waiver exempting the permittee from the tests.

(2) The permittee of a geothermal production well shall daily monitor the rate of flow of water or steam or both, and the surface pressure and temperature of the fluids from each production well.

(3) The permittee of an injection well shall daily monitor the rate of flow of injected geothermal fluid or wastewater, and the surface pressure and temperature of the fluids injected into each injection well.

(4) The permittee of a geothermal facility shall continuously monitor the rate of flow, pressure and temperature of geothermal resource water or steam or both at the inlet and outlet of the facility.

(5) Based on site conditions and the potential for geothermal resource intrusion into an underground source of usable water, the division may require the permittee to install one or more monitoring wells and to submit a water quality monitoring and analysis plan for division approval.

(6) The permittee shall perform all pit testing and monitoring in accordance with Subsection D of 19.11.4.17 NMAC.

[19.11.4.13 NMAC - N, 2/27/2018]

19.11.4.14 RECORDKEEPING AND REPORTING: The permittee shall maintain all records, notifications and reports, according to the following timelines, at the well location, if the well is associated with an operating surface facility, or at the permittee's business office located within the state of New Mexico.

A. Recordkeeping of well-construction testing and monitoring. The permittee shall maintain records and reports associated with well-construction testing and monitoring in Subsection A of 19.11.4.13 NMAC, generated and collected during construction of all injection or production wells for the life of the well up to the time the well is plugged and abandoned.

B. Recordkeeping of well-operation testing and monitoring. The permittee shall maintain records and reports associated with well-operation testing and monitoring in Subsection B of 19.11.4.13 NMAC, generated and collected during operation of all injection or production wells for a period of five years from the date the record or report was created.

C. The permittee shall submit reports of well-construction testing and monitoring associated with Paragraphs (1) through (3) of Subsection A of 19.11.4.13 NMAC to the division no later than 60 days after completion of drilling activities. The permittee shall submit records of well-construction testing and monitoring associated with Paragraphs (4) through (5) of Subsection A of 19.11.4.13 NMAC to the division no later than 30 days prior to placing the well into operation. The responsible official shall sign reports.

D. The permittee shall submit reports of well-operation testing and monitoring associated with Paragraph (1) of Subsection B of 19.11.4.13 NMAC to the division no later than 60 days after injection is started. The permittee shall submit records of well-operation testing and monitoring associated with Paragraphs (2) through (5) of Subsection B of 19.11.4.13 NMAC to the division semi-annually in a format specified by permit. The responsible official shall sign reports.

E. The permittee shall perform all pit recordkeeping and reporting in accordance with Paragraphs (4) through (5) of Subsection D of 19.11.4.17 NMAC.

[19.11.4.14 NMAC - N, 2/27/2018]

19.11.4.15 GEOTHERMAL SURFACE FACILITIES:

A. General. The permittee shall maintain all well heads, separators, pumps, mufflers, manifolds, valves, pipelines and other equipment of geothermal resources in good condition to prevent loss of or damage to life, health, property, natural resources, the environment or the public welfare.

B. Corrosion. The permittee shall quarterly inspect all surface well-head equipment and pipelines and subgrade appurtenances and master valves for signs of corrosion to safeguard life, health, property, natural resources, the environment and the public welfare.

C. Tests. The division may require such tests or remedial work as in its judgment are necessary to prevent damage to life, health, property, natural resources, the environment and the public welfare and to protect geothermal reservoirs from damage or to prevent the infiltration of detrimental substances into underground or surface water suitable for irrigation or other beneficial uses to the best interest of the neighboring property owners and the public. Such tests may include casing tests, cementing tests and equipment tests.

D. Reclamation. Where the permittee is not the surface owner, the permittee shall maintain a post-geothermal resource production land use plan that details how the surface area disturbed by the geothermal surface facilities will be reclaimed to achieve the proposed use and written approval of the surface owner for the proposed use.

[19.11.4.15 NMAC - N, 2/27/2018]

19.11.4.16 PLUGGING AND ABANDONMENT:

A. Prior to plugging and abandoning a geothermal well, the permittee shall file with the division an application for permission to abandon and plug a geothermal well. The application shall be accompanied by a detailed statement of the proposed activity. This condition applies only to wells that have not received plugging and abandoning approvals in a well or facility permit.

B. The following provisions apply to the abandonment of an exploration or observation well.

(1) If the well was drilled with air and no water was encountered, the permittee shall backfill the hole with cuttings and place a cement plug of 50 linear feet at the top of the well.

(2) If the well was drilled with mud or drilled with air and water was encountered, the permittee shall fill the bore with mud and place a cement plug 50 linear feet at the top of the well.

(3) The permittee shall restore the surface to near original condition including the restoration of native vegetation.

C. The following provisions apply to the abandonment of a geothermal production or injection well.

(1) Except for cement used for surface plugging, the permittee shall plug the well by pumping cement in the hole through the drill pipe or tubing. The cement shall consist of a mix that resists high temperatures.

(2) The permittee shall place cement plugs in the uncased portion of wells to protect all subsurface resources. These plugs shall extend a minimum of 100 lineal feet above the producing zones and 100 lineal feet below the producing zones or to the total depth drilled, whichever is less. The permittee shall place cement plugs to isolate formations and to protect the fluids in those formations from interzonal migration.

(3) Where there is an open hole, the permittee shall place a cement plug in the deepest casing string by:

(a) placing a cement plug across the guide shoe extending a minimum of 100 lineal feet above and below the guide shoe, or to the total depth drilled, whichever is less; or

(b) setting a cement retainer with effective control of back pressure approximately 100 lineal feet above the guide shoe, with at least 200 lineal feet of cement below, or to the total depth drilled, whichever is less, and 100 lineal feet of cement above the retainer.

(4) If there is a loss of drilling fluids into the formation or such a loss is anticipated or if the well has been drilled with air or another gaseous substance, a permanent bridge plug shall be set at the casing shoe and capped with a minimum of 200 lineal feet of cement.

(5) The permittee shall place a cement plug across perforations, extending 100 lineal feet below, or to the total depth drilled, whichever is less, and 100 lineal feet above the perforations. When the permittee uses a cement retainer to squeeze cement into or across the perforations, the permittee shall set the retainer a minimum of 100 lineal feet above the perforations. Where the casing contains perforations at or below debris or collapsed casing, which prevents cleaning, the permittee shall set a cement retainer at least 100 lineal feet above that point and squeeze cement in the interval below the retainer.

(6) The permittee shall obtain the division's approval before casing is cut and recovered. The permittee shall place a cement plug in such a manner as to isolate all uncased intervals and guide shoes that are not protected by an inner string of casing. The plug shall extend a minimum of 50 feet above and below any such interval or guide shoe.

(7) In the case of a well not constructed with cement in the annulus running the full length of each casing, the permittee shall plug all annular spaces extending to the surface with cement.

(8) The permittee shall cement the innermost string of casing that reaches ground level to a minimum depth of 50 feet below the top of the casing.

(9) The permittee shall verify the hardness and location of cement plugs placed across perforated intervals and at the top of uncased or open holes by setting down with tubing or drill pipe a minimum weight of 15,000 pounds on the plug or, if less than 15,000 pounds, the maximum weight of the available tubing or drill pipe string. If the permittee uses a cement retainer or bridge plug to set the bottom plug, a test is not required for that interval.

(10) The permittee shall fill any interval that is not filled with cement with good quality, heavy drilling fluids.

(11) All casing strings shall be cut off below ground level and capped by welding a steel plate on the casing stub. The steel plate shall include a corrosion resistant marking that identifies the well name or number. The permittee shall remove all structures and other facilities.

(12) The permittee shall restore the surface to near original condition including the restoration of native vegetation.

[19.11.4.16 NMAC - N, 2/27/2018]

19.11.4.17 PIT AND CLOSED LOOP DESIGN, CONSTRUCTION AND OPERATING PLAN AND CLOSURE-REMEDIAL PLAN REQUIREMENTS: All geothermal resources permit applications shall include details regarding the design, construction and operation of a system designed to temporarily store and dispose of drilling wastes and other process fluids during periods of well or facility maintenance. The division will approve two methods, pit or closed-loop system, for the handling of drilling fluids or other process fluids released during well or facility maintenance activities. The plan for design and construction of a pit shall follow the applicable liner manufacturer's requirements. The operating details shall include operating and maintenance procedures, a closure plan and hydrogeologic data that provides sufficient information and detail on the site's topography, soils, geology, surface hydrology and ground water hydrology to enable the division to evaluate compliance with acceptable siting criteria. In the absence of site-specific ground water data, the permittee may provide a reasonable determination of probable ground water depth using data generated by models, cathodic well lithology, published information or other tools as approved by the division.

A. Siting.

(1) A permittee may locate a pit containing fluids containing 10,000 mg/l or less of TDS and 1 mg/l or less of H₂S:

- (a) where ground water is more than four feet below the bottom of the pit;
- (b) 100 feet or more from any continuously flowing watercourse or any other significant watercourse;
- (c) 100 feet or more from any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark);
- (d) 200 feet or more from an occupied permanent residence, school, hospital, institution or church in existence at the time of initial application;
- (e) 200 feet or more from a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes; or 200 feet or more from any other fresh water well or spring, in existence at the time of the initial application;
- (f) outside incorporated municipal boundaries or outside a defined municipal fresh water wellfield covered under a municipal ordinance adopted pursuant to Section 3-27-3 NMSA 1978, as amended, unless the municipality specifically approves;
- (g) 100 or more feet from a wetland;
- (h) outside the area overlying a subsurface mine, unless the division grants a variance that approves the proposed location based upon the permittee's demonstration that the pit's construction and use will not compromise the subsurface integrity;
- (i) outside an unstable area, unless the division grants a variance upon a demonstration that the permittee has incorporated engineering measures into the design to ensure that the pit's integrity is not compromised; and
- (j) outside a 100-year floodplain unless the division grants a variance for temporary use.

(2) A permittee shall not locate a pit containing fluids containing more than 10,000 mg/l of TDS and more than one mg/l of H₂S:

- (a) where ground water is less than 50 feet below the bottom of the pit;
- (b) within 300 feet of any continuously flowing watercourse or any other significant watercourse;
- (c) within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark);
- (d) within 300 feet from an occupied permanent residence, school, hospital, institution or church in existence at the time of initial application;
- (e) within:
 - (i) 500 feet of a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes; or
 - (ii) 1,000 feet of any other fresh water well or spring, in existence at the time of the initial application;
- (f) within incorporated municipal boundaries or within a defined municipal fresh water wellfield covered under a municipal ordinance adopted pursuant to Section 3-27-3 NMSA 1978, as amended, unless the municipality specifically approves;
- (g) within 300 feet of a wetland;

(h) within the area overlying a subsurface mine, unless the division grants a variance that approves the proposed location based upon the permittee's demonstration that the pit's construction and use will not compromise the subsurface integrity;

(i) within an unstable area, unless the division grants a variance upon a demonstration that the permittee has incorporated engineering measures into the design to ensure that the pit's integrity is not compromised; or

(j) within a 100-year floodplain.

B. Design and construction. A permittee shall design and construct a pit or closed-loop system to contain liquids and solids; prevent contamination of fresh water; and protect life, health, property, natural resources, the environment and the public welfare.

(1) The pit or closed-loop system shall ensure the confinement of liquids to prevent releases.

(2) A pit shall have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. The permittee shall construct a pit so that the slopes are no steeper than two horizontal feet to one vertical foot (2H:1V).

(3) The permittee shall design and construct a pit with a geomembrane liner. The geomembrane liner shall consist of 20-mil string reinforced LLDPE or equivalent liner material that the division approves. The geomembrane liner shall be composed of an impervious, synthetic material that is resistant to petroleum hydrocarbons, salts and acidic and alkaline solutions. The liner material shall be resistant to ultraviolet light. Liner compatibility shall comply with EPA SW-846 Method 9090A.

(4) The permittee shall minimize liner seams and orient them up and down, not across, a slope. The permittee shall use factory welded seams where possible. Prior to field seaming, the permittee shall overlap liners four to six inches. The permittee shall minimize the number of field seams in corners and irregularly shaped areas. Qualified personnel shall field weld and test liner seams.

(5) Construction shall avoid excessive stress-strain on the liner.

(6) Geotextile is required under the liner where needed to reduce localized stress-strain or protuberances that may otherwise compromise the liner's integrity.

(7) The permittee shall anchor the edges of all liners in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep, unless anchoring to encountered bedrock provides equivalent anchoring.

(8) The permittee shall ensure that the liner is protected from any fluid force or mechanical damage at any point of discharge into or suction from the lined pit.

(9) The permittee shall design and construct a pit to prevent run-on of surface water. A berm, ditch, proper sloping or other diversion shall surround a pit to prevent run-on of surface water. During drilling operations, the edge of the pit adjacent to the drilling or workover rig is not required to have run-on protection if the permittee is using the pit to collect liquids escaping from the drilling or workover rig and run-on will not result in a breach of the pit.

(10) The volume of a pit shall not exceed 10 acre feet, including freeboard.

(11) **Stockpiling of topsoil.** Prior to constructing a pit, the permittee shall strip and stockpile the topsoil for use as the final cover or fill at the time of closure.

(12) **Signs.** The permittee shall post an upright sign not less than 12 inches by 24 inches with lettering not less than two inches in height in a conspicuous place on the fence surrounding the pit. The permittee shall post the sign in a manner and location such that a person can easily read the legend. The sign shall provide the following information: the permittee's name; the location of the site by quarter-quarter or unit letter, section, township and range; and emergency telephone numbers.

(13) A permittee who is using a closed-loop system with drying pads shall design and construct the drying pads to include the following:

(a) appropriate liners that prevent the contamination of fresh water and protect life, health, property, natural resources, the environment and the public welfare;

(b) sumps to facilitate the collection of liquids derived from drill cuttings; and

(c) berms that prevent run-on of surface water or fluids.

C. Fencing. The permittee shall fence or enclose a pit in a manner that deters unauthorized access and shall maintain the fences in good repair. Fences are not required if there is an adequate surrounding perimeter fence that prevents unauthorized access to the well site or facility, including the pit. During drilling or workover operations, the permittee is not required to fence the edge of the pit adjacent to the drilling or workover rig.

D. Operation. A permittee shall maintain and operate a pit or closed-loop system in accordance with the following requirements.

(1) The permittee shall operate and maintain a pit or closed-loop system, to contain liquids and solids and maintain the integrity of the liner, liner system or secondary containment system, prevent contamination of fresh water and protect life, health, property, natural resources, the environment and the public welfare.

(2) The permittee may only discharge fluids or mineral solids generated or used during the well drilling, completion or workover or facility maintenance operations process into a pit or closed-loop system. The permittee shall maintain a pit free of miscellaneous solid waste or debris.

(3) If the permittee elects to remove any stored fluids from a pit or a closed-loop system, the permittee shall dispose of the fluids pursuant to 19.11.4.20 NMAC.

(4) The permittee shall maintain at least two feet of freeboard in a pit. For temporary extenuating circumstances, a permittee may maintain a freeboard of less than two feet and shall maintain a log describing such circumstances and make the log available to the division upon request.

(5) The permittee shall inspect a pit or closed-loop system containing drilling fluids at least daily while the drilling or workover rig is on location. Thereafter, the permittee shall inspect the pit weekly so long as liquids remain in the pit. The permittee shall maintain a log of such inspections and make the log available for the division's review upon request.

(6) The permittee shall not discharge into or store any hazardous waste in a pit or drying pad associated with a closed-loop system.

(7) If a pit liner's integrity is compromised above the liquid's surface then the permittee shall repair the damage or initiate replacement of the liner within 48 hours of discovery.

(8) If a pit or closed loop system develops a leak, or if any penetration of the pit liner occurs below the liquid's surface, then the permittee shall remove all liquid above the damage or leak within 48 hours of discovery, notify the division and repair the damage or replace the pit liner or closed loop hardware.

(9) The permittee shall inject or withdraw liquids from a pit through a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.

(10) The permittee shall operate and install a pit to prevent the collection of surface water run-on.

(11) The permittee shall install, or maintain on site, a water absorbent boom or other device to contain an unanticipated release.

E. Closure and remediation. A closure plan shall describe the proposed closure method and the proposed procedures and protocols to implement and complete the closure.

(1) The permittee shall not commence closure without first obtaining division approval of the closure plan submitted with the permit application.

(2) Prior to closure the permittee shall remove all free liquids reasonably achievable from the pit or drying pad and tank associated with a closed-loop system and dispose of such liquids at a division-approved facility.

(3) When closing a pit, the permittee shall stabilize or solidify the remaining pit contents to a capacity sufficient to support the final cover of the pit. When transferring the geothermal waste contents from a drying pad and tank associated with a closed-loop system into a pit, the permittee shall stabilize or solidify the geothermal waste contents to a capacity sufficient to support the final cover of the pit. The permittee shall not mix the contents with soil or other material at a mixing ratio of greater than 3:1, soil or other material to contents. The geothermal waste mixture must pass the paint filter liquids test (EPA SW-846 Method 9095B or other test methods approved by the division).

(4) The permittee shall collect, at a minimum, a five-point composite of the contents of the pit to demonstrate that, after the geothermal waste is solidified or stabilized with soil or other non-geothermal waste material at a ratio of no more than 3:1 soil or other non-geothermal waste material to geothermal waste, the concentration of any contaminant in the stabilized geothermal waste is not higher than the parameters listed in Table 2 (19.11.4.19 NMAC).

(5) If, after appropriate stabilization, the concentrations of all contaminants in the contents from a pit are less than or equal to the parameters of listed in Table 2 (19.11.4.19 NMAC), the permittee may proceed with closure and remediation of the pit.

(6) If the concentration of any contaminant in the contents, after mixing with soil or non-geothermal waste material to a maximum ratio of 3:1, from a pit or drying pad associated with a closed-loop system

is higher than constituent concentrations shown in Table 2 (19.11.4.19 NMAC), then the permittee shall close the pit or drying pad by first removing all contents and, if applicable, synthetic liners and transferring those materials to a division-approved facility.

(7) Upon achieving all applicable geothermal waste stabilization in the pit or transfer of stabilized geothermal wastes to the pit, the permittee shall:

(a) fold the outer edges of the pit liner to overlap the geothermal waste material in the pit prior to installing the geomembrane cover;

(b) install a geomembrane cover over the geothermal waste material in the pit; the permittee shall install the geomembrane cover in a manner that prevents the collection of infiltration water in the pit and on the geomembrane cover after the soil cover is in place; the geomembrane cover shall consist of a 20-mil string reinforced LLDPE liner or equivalent cover that the division approves; the geomembrane cover shall be composed of an impervious, synthetic material that is resistant to petroleum hydrocarbons, salts and acidic and alkaline solutions; cover compatibility shall comply with EPA SW-846 Method 9090A; and

(c) cover the pit with non-geothermal waste containing uncontaminated, earthen materials and construct a soil cover prescribed by the division.

(8) If the permittee has removed the geothermal wastes and the liner from a drying pad associated with a closed-loop system to a pit, the permittee shall test the soils beneath the drying pad as follows.

(a) At a minimum, the permittee shall take a five-point composite sample to include any obvious stained or wet soils, or other evidence of contamination under the liner and have that sample analyzed for the constituents listed in Table 1 (19.11.4.18 NMAC).

(b) If any contaminant concentration is higher than the parameters listed in Table 1 (19.11.4.18 NMAC) the division may require additional delineation upon review of the results and the permittee must receive division approval before proceeding with closure.

(c) If all contaminant concentrations are less than or equal to the parameters listed in Table 1 (19.11.4.18 NMAC), the permittee can proceed to backfill the pad or excavation with non-geothermal waste containing, uncontaminated, earthen material.

(9) A permittee shall notify the division at least 60 days prior to cessation of operations and provide a proposed schedule for closure. If there is no closure plan on file with the division applicable to the pit, the permittee shall provide a closure plan with this notice. Upon receipt of the notice and proposed schedule, the division shall review the current closure plan for adequacy and inspect the site. When onsite burial occurs on private land, the permittee shall file a deed notice identifying the exact location of the onsite burial with the county clerk in the county where the onsite burial occurs.

(10) Within 60 days of closure completion, the permittee shall submit a closure report that documents all closure activities including sampling results; other information the division requires and details on back-filling, capping and covering, where applicable. In the closure report, the permittee shall certify that all information in the report and attachments is correct and that the permittee has complied with all applicable closure requirements and conditions specified in the approved closure plan. If the permittee elects to conduct onsite burial in an onsite pit, the permittee shall also provide a plat of the pit location. The permittee shall place a steel marker at the center of an onsite burial. The steel marker shall be not less than four inches in diameter and shall be cemented in a three-foot deep hole at a minimum. The steel marker shall extend at least four feet above mean ground level and at least three feet below ground level. The permittee name, lease name, well number and location, including unit letter, section, township and range, and that the marker designates an onsite burial location shall be welded, stamped or otherwise permanently engraved into the metal of the steel marker. A person shall not build permanent structures over an onsite burial without the division's written approval. A person shall not remove an onsite burial marker without the division's written permission.

(11) A permittee shall close a drying pad associated with a closed-loop system or a pit within one year from the date that the permittee releases the drilling or workover rig. The permittee shall note the date of the drilling or workover rig's release, upon the well's or workover's completion. The division may grant an extension not to exceed one year.

(12) Reclamation of pit and drying pad locations.

(a) A permittee shall reclaim the pit or drying pad location and all areas associated with the closed-loop system or pit including associated access roads to a safe and stable condition that blends with the surrounding undisturbed area.

(b) The permittee may propose an alternative to the re-vegetation or re-contouring requirement if the permittee demonstrates to the division that the proposed alternative provides equal or better

prevention of erosion and protection from contamination of fresh water, and protection of life, health, property, natural resources, the environment and the public welfare.

(c) The permittee shall compact, cover, pave or otherwise stabilize and maintain areas reasonably needed for production operations or for subsequent drilling operations in such a way as to minimize dust and erosion to the extent practicable.

(d) The soil cover for closures after site contouring, where the permittee has removed the drying pad contents and liner, and if necessary remediated the soil beneath the drying pad liner to chloride concentrations less than 600 mg/kg as analyzed by EPA Method 300.0, shall consist of the background thickness of topsoil or one foot of suitable material, whichever is greater.

(e) The soil cover for burial in-place pits shall consist of a minimum of four feet of non-geothermal waste containing uncontaminated, earthen material with chloride concentrations less than 600 mg/kg as analyzed by EPA Method 300.0. The soil cover shall include either the background thickness of topsoil or one foot of suitable material to establish vegetation at the site, whichever is greater.

(f) The permittee shall construct the soil cover to the site's existing grade and prevent ponding of water and erosion of the cover material.

(g) The permittee shall reclaim all areas disturbed by the closure of pits, except areas reasonably needed for production operations or for subsequent drilling operations, as early and as nearly as practicable to their original condition or their final land use and maintain them to control dust and minimize erosion to the extent practicable. The permittee shall replace top soils and subsoils to their original relative positions and contour them to achieve erosion control, long-term stability and preservation of surface water flow patterns. The permittee shall reseed disturbed area in the first favorable growing season following closure of a pit or drying pad associated with a closed-loop system. Reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent of pre-disturbance levels and a total percent plant cover of at least seventy percent of pre-disturbance levels, excluding noxious weeds.

(h) The permittee shall notify the division when reclamation and re-vegetation are complete.

[19.11.4.17 NMAC - N, 2/27/2018]

19.11.4.18 TABLE 1 – CLOSURE CRITERIA FOR SOILS BENEATH DRYING PADS ASSOCIATED WITH CLOSED-LOOP SYSTEMS:

Depth below bottom of pit to ground water less than 10,000 mg/l TDS	Constituent	Method*	Limit**
≤50 feet	Chloride	EPA 300.0	600 mg/kg
51-100 feet	Chloride	EPA 300.0	10,000 mg/kg
>100 feet	Chloride	EPA 300.0	20,000 mg/kg

*Or other test methods approved by the division

**Numerical limits or natural background level, whichever is greater

[19.11.4.18 NMAC - N, 2/27/2018]

19.11.4.19 TABLE 2 – CLOSURE CRITERIA FOR GEOTHERMAL WASTE LEFT IN PLACE IN PITS:

Depth below bottom of pit to ground water less than 10,000 mg/l TDS	Constituent	Method*	Limit**
25-50 feet	Chloride	EPA 300.0	20,000 mg/kg
51-100 feet	Chloride	EPA 300.0	40,000 mg/kg
>100 feet	Chloride	EPA 300.0	80,000 mg/kg

*Or other test methods approved by the division

**Numerical limits or natural background level, whichever is greater

[19.11.4.19 NMAC - N, 2/27/2018]

19.11.4.20 DISPOSAL OF GEOTHERMAL RESOURCES, RESIDUE OF GEOTHERMAL RESOURCES OR NONDOMESTIC WASTE FROM THE EXPLORATION, DEVELOPMENT OR

PRODUCTION OF GEOTHERMAL RESOURCES: Persons disposing of geothermal resources, residue of geothermal resources or nondomestic waste from the exploration, development or production of geothermal resources shall do so in a manner that does not constitute a hazard to life, health, property, natural resources, the environment or the public welfare. The permittee shall dispose of geothermal resources, residue of geothermal resources or nondomestic waste from the exploration, development or production of geothermal resources as provided in 19.11.4.17 or 19.11.4.20 NMAC, or at a facility permitted to accept the products.

A. The permittee may discharge geothermal resources, residue of geothermal resources or nondomestic waste from the exploration, development or production of geothermal resources to an above ground surface impoundment that meets the requirements of Subsection B of 19.11.4.20 NMAC, provided the other requirements of 19.11.4 NMAC are met and the permittee submits, and the division approves, a discharge plan that conforms to the following requirements:

- (1) the effluent shall not contain any detectable toxic pollutant as defined in 20.6.2 NMAC;
- (2) the amount of effluent that enters the subsurface from a surface impoundment shall not exceed 0.5 acre-feet per acre per year, calculated as a monthly rolling 12-month total;
- (3) the effluent is in conformance with the New Mexico Water Quality Standards in 20.6.2.3103 NMAC or the total weight of each water contaminant, that is not in conformance with the New Mexico Water Quality Standards in 20.6.2.3103 NMAC, that enters the subsurface from a surface impoundment shall not exceed 200 pounds per acre per year, calculated as a monthly rolling 12-month total;
- (4) the discharge plan shall include adequate provisions for sampling of effluent and adequate flow monitoring so that the amount being discharged onto or below the surface of the ground can be determined; and
- (5) the discharge plan shall include a minimum annual reporting frequency of monitoring data to the division.

B. For discharges approved per Subsection A of 19.11.4.20 NMAC, the permittee shall construct and operate a surface impoundment in accordance with the following:

- (1) the permittee shall design and construct a surface impoundment to prevent run-on of surface water and out flow of effluent; a berm, ditch, proper sloping or other diversion shall surround a surface impoundment to prevent run-on of surface water and out flow of effluent;
 - (2) the permittee shall site the surface impoundment according the requirements in Paragraph (1) of Subsection A of 19.11.4.17 NMAC;
 - (3) the permittee shall inject or withdraw liquids from a surface impoundment through a header, diverter or other hardware that prevents damage to the berm, ditch, sloping or other diversion system by erosion, fluid jets or impact from installation and removal of hoses or pipes; and
 - (4) the permittee shall maintain a surface impoundment to prevent the collection of surface water run-on and surface ground flow of effluent out from the surface impoundment.
- [19.11.4.20 NMAC - N, 2/27/2018]

HISTORY of 19.11.4 NMAC: [RESERVED]