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Express Terms

6 NYCRR Part 561 Closed Loop Geothermal Boreholes

A new Part 561 is added to read:

Part 561 Closed Loop Geothermal Boreholes

(Statutory Authority: Environmental Conservation Law § 23-0305(15))

Section 561.1 Permit Application, Application Fee, and Financial Security

(a) It is unlawful for any person or entity to commence operations associated with the construction or installation of a closed loop geothermal borehole greater than 500 feet in depth below the earth's surface until an application has been submitted and the department issues a permit.

(1) For purposes of this subdivision, an application includes an application for a permit to drill a single closed loop borehole or for a project encompassing multiple closed loop boreholes sharing a larger common plan of development.

(2) Additionally, an application is considered an application for a permit to deepen, plug back, or convert an existing well or wells into closed loop geothermal borehole(s), unless the conversion involves a closed loop stratigraphic test well that is subject to section 2 of Part 563 of this Title.

(b) An application fee shall be paid to the department for each application submitted as set forth below:

Number of Boreholes	Application Fee
1-10	$100
11-50	$200
51 +	$300

(c) Any borehole(s) that will be owned by the United States of America or any of its agencies or instrumentalities, the State of New York or any of its agencies, or any local agency are exempt from application fee requirements.

(d) Financial security is not required for closed loop geothermal boreholes as defined in section 3 of Part 550 of this Title.

Section 561.2 Application Requirements and Permit Issuance

(a) Application Requirements

(1) The applicant shall be a qualified contractor as described in section 2(b) of this Part.

(2) The applicant shall provide the proposed latitude and longitude of the borehole location(s) in decimal degrees using the North American Datum of 1983 on the application using survey quality GPS with a minimum accuracy of three feet or better and include the affected address(es) and tax parcel identification number(s).

(3) The application shall be accompanied by a site diagram that contains dimensional information including, but not limited to, the borehole location(s), distances between and direction to permanent structures, water wells, septic systems, utility lines, property lines, roadways, and any other applicable setback or surface restrictions identified in section 3(a) of this Part.

(4) The application shall be accompanied by a work plan that contains a chronological summary of planned activities including as applicable, but not limited to, information regarding drilling operations, installation of casing, tubing or loops, cementing, grouting, and any planned testing or logging.

(5) The application shall comply with the Climate Leadership and Community Protection Act,[1] the Community Risk and Resiliency Act, and any related department regulations and policies. If applicable, the applicant may be required to provide the department with additional reports or information to satisfy these requirements.

(6) Additional application materials may be requested by the department on a site-specific basis.

(b) Organizational Report

(1) Any entity that submits an application or intends to conduct geothermal drilling or decommissioning activities that are subject to regulation under this part shall file a completed Organizational Report with the department, on a department-approved form, to register as a qualified contractor.

(2) A qualified contractor shall maintain a valid and current Organizational Report on file with the department and shall submit a revised Organizational Report to the department within 30 calendar days of any changes to the information provided on the form.

(3) At the time of submission of the Organizational Report, the qualified contractor shall submit a statement, on a department-approved form, attesting that any employee responsible for the on-site supervision of drilling activities will hold a valid and current certification or accreditation, from a department-approved organization or association, related to the best practices for the drilling or decommissioning of closed loop geothermal boreholes.

[1] Chapter 106 of the Laws of 2019

(i) Proof of certification or accreditation shall be provided to the department upon request.

(c) Other Permits and Approvals

(1) Any other Federal, State, and local permits or approvals required for the permitted activity shall be obtained prior to site disturbance.

(d) Permit Issuance

(1) Upon receipt of a complete application as described in section 2(a) of this Part, the department will review the application and determine whether a permit can be issued. Permits will only be issued to a qualified contractor registered with the department.

(2) The qualified contractor shall comply with all regulatory requirements and adhere to all conditions set forth in the permit.

(3) The qualified contractor shall post and maintain a legible copy of the applicable permit in a clearly visible and prominent location at the site throughout site preparation and drilling operations.

(4) If permitted operations have not commenced within 180 days from the date of issuance of the permit, the permit will expire.

(e) Reissuance of Permit

(1) A new permit will not be required for a revised borehole location which has been moved no more than 25 feet from the original location as a result of surface obstructions or topography unless the move would result in a violation of any setback or surface restriction detailed in section 3(a) of this Part. The qualified contractor shall notify the department in writing of any such minor changes and receive department approval prior to the commencement of operations.

(i) If the proposed relocation of the borehole would result in violation of a setback or surface restriction detailed in section 3(a) of this Part, the qualified contractor shall submit a new application for the affected borehole, in addition to submitting a request for exception as described in section 3(b) of this Part.

(ii) A borehole that cannot be drilled to its originally permitted total depth due to mechanical problems or unsatisfactory downhole conditions that result in the inability to use the borehole for its intended purpose is considered a non-routine incident that shall be reported in accordance with section 5(a)(4) of this Part, after which the borehole shall be decommissioned within thirty (30) days of notifying the department, as described in section 7 of this Part.

(2) A permit may also be reissued as a new permit to any other qualified contractor if prior to the completion of the planned operations the alternate qualified contractor takes charge of the operations. Before a permit will be reissued,

the qualified contractor who has assumed responsibility for drilling operations shall submit a written statement setting forth that they have taken charge of the borehole(s) and will assume full responsibility for conducting operations in conformity with the permit. Reissuance of the permit will be made by the department after determination that all submissions are acceptable, and the new qualified contractor has furnished the required Organizational Report as described in section 2(b) of this Part.

Section 561.3 Borehole Siting

A borehole shall be sited in a manner that will prevent trespass and protect public safety and the environment.

(a) General Setbacks and Surface Restrictions

(1) The following setback and surface restrictions are applicable to closed loop geothermal boreholes:

Closed Loop Borehole Setbacks and Surface Restrictions

Distance (feet)	Description
3	Horizontally from any buried utilities (electrical, gas, water, communication)
3	Horizontally from any existing or planned building, above-ground structure, or parking garage
10	Property boundary
10	Laterally from any unpressurized (gravity flow) sewer lateral into a building
20	Laterally from any pressurized (pumped) sewer lateral into a building
25	From a septic tank or subsurface sewage leaching field
25	From a stream, river, or other body of water
50	From a private water well
200	From other ECL Article 23 well types, such as oil or gas (excludes closed loop geothermal and closed loop stratigraphic test wells)
200	From a public water supply well

(2) The setback requiring a borehole to be minimum of three feet horizontally from any existing or planned building, above-ground structure, or parking garage does not apply to Bronx, Kings, Nassau, New York, Richmond, Rockland, Suffolk, and Westchester counties.

(b) Exceptions

The department may allow reasonable borehole location exceptions if it determines site-specific justification exists to permit an exception to the general setbacks and surface restrictions described in subdivision (a) of this section. Any request for such an exception shall be made in writing and included with the application for a permit and set forth the reason(s) for the exception request.

Section 561.4 Design and Construction

(a) Design Specifications

(1) A closed loop geothermal borehole shall be designed and constructed in a manner that will prevent pollution of land, air, groundwater, and surface waters, and protect public safety. A borehole shall be designed to meet or exceed the minimum material and performance requirements referenced in the complete ANSI/CSA C448 series and prevent potential long-term thermal storage effects in the subsurface.

(2) The drilling, casing, and completion program implemented for any borehole(s) shall prevent pollution and the migration of hydrocarbons or other fluids and gases from one geologic stratum to another. If the probability exists that hydrocarbons, other fluids, gases, or artesian flow will be encountered during drilling operations in sufficient quantities to be deleterious to the environment, the project shall be designed so that such fluids or gases will be handled, stored, and disposed of in accordance with any applicable Federal, State, or local requirements.

(b) Casing Requirements

(1) Surface casing may be required to ensure aquifer protection, if the department determines there is the potential for subsurface fluid and gas migration, or to ensure borehole integrity. Casing specifications shall meet or exceed the standards in American Petroleum Institute (API) "5CT, Specification for Casing and Tubing" or ASTM international (ASTM) in "A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes," as incorporated by reference in Part 569 of this title, unless otherwise approved by the department.

(i) Casing shall be sized to ensure adequate clearance between the outer casing annulus and the borehole. The borehole in which casing will be set and cemented shall be at least one inch greater than the outside diameter of casing collar to be installed, unless otherwise approved by the department.

(ii) Casing shall have the capability to withstand at least 1.2 times the maximum pressure under which the casing may be subjected during drilling operations.

(iii) Casing shall be centralized in the borehole. Centralizers shall be spaced at least one per every 120 feet; a minimum of two centralizers shall be run on surface casing.

(2) If surface casing is required, it shall be installed a minimum of 50 feet into competent bedrock and beyond the deepest potable aquifer, unless the applicant can demonstrate that drilling will not negatively impact public safety, groundwater resources, and the environment.

(i) For a borehole located in a primary or principal aquifer, surface casing shall extend a minimum of 75 feet into competent bedrock and beyond the deepest potable aquifer.

(ii) Surface casing shall not extend into zones known to contain measurable quantities of shallow gas.

(iii) Surface casing shall be cemented from casing setting depth to surface.

(iv) Surface casing shall be capable of securing a blowout preventor or other department-approved flow diversion equipment.

(c) Cement Specifications

(1) Cementing material shall meet or exceed the standards in API “10A, Specification for Cements and Materials for Well Cementing" or ASTM “C150/C150M Standard Specification for Portland Cement”, as incorporated by reference in Part 569 of this title, or otherwise be approved by the department prior to use.

(2) The cement slurry shall be prepared according to the manufacturer's specifications to minimize free water content in the cement.

(d) Tubing and grouting

(1) Tubing or Loop Specifications

(i) Tubing and associated components shall be approved by the department.

(a) Tubing and components shall be high-density polyethylene (HDPE) or cross-linked polyethylene (PEX) pipe and tubing.

(b) Any proposed alternatives to HDPE or PEX tubing and components shall be reviewed and approved by the department prior to use.

(1) Alternative materials shall:

(i) be corrosion, chemical, temperature, and impact resistant;

(ii) be flexible;

(iii) meet hydrostatic pressure necessary for the geothermal system; and

(iv) meet or exceed any other system requirements.

(2) Grouting Specifications

(i) Grouting material shall be bentonite- or cement-based unless an alternative is approved by the department. Grouting material shall meet or exceed the standards in ANSI/CSA/IGSHPA C448.3-16, Section 6.3.2, as incorporated by reference in Part 569 of this title and:

(a) Have a composition suitable for the anticipated downhole conditions;

(b) Have a known heat transfer capacity;

(c) Seal the borehole in a manner that protects groundwater aquifers and prevents the migration of fluids and gas between subsurface formations; and

(d) Remain flexible throughout the life of the borehole.

(ii) The maximum allowable hydraulic conductivity or permeability shall not exceed 3.94 X 10^{-8} in/s (1 x 10^{-7} cm/s).

(iii) Grouting material shall be able to maintain its thermal, hydrological, and mechanical properties over the lifetime of the borehole with less than 10% degradation of such properties over a 100-year period.

(3) Thermal Heat Transfer Fluids

(i) Heat transfer fluids shall meet or exceed the standards in ANSI/CSA/IGSHPA C448.3-16, Section 7 or be approved by the department. Heat transfer fluids shall consist of potable fresh water, but may also include:

(a) United States Food and Drug Administration-approved propylene glycol solution of up to 25 percent by weight,

(b) Ethanol solutions of up to 10 percent by weight or,

(c) Methanol solutions of up to 12.5 percent by weight.

(d) Alternative solution concentrations to those listed in *(a)*, *(b),* and *(c)* above, or other additives or inhibitors, such as corrosion inhibitors, are subject to department approval.

Section 561.5 Drilling and Completion Procedures

(a) Drilling Procedures

(1) The qualified contractor shall notify the following persons:

(i) The owner of any water well located less than 100 feet from a proposed closed loop geothermal borehole a minimum of 24 hours prior to the commencement of permitted operations; and

(ii) The department a minimum of 24 hours prior to drilling a permitted borehole.

(2) Drilling operations shall be conducted in a manner that will ensure public safety and prevent the pollution of land, air, groundwater, and surface waters.

(i) The qualified contractor shall ensure the site is secured from unauthorized entry.

(ii) In the event the fluid or gas is encountered, the site shall not be left unsupervised until all fluids or gases are controlled.

(iii) The qualified contractor shall have the necessary materials onsite to effectively absorb or otherwise contain pollutants.

(iv) The qualified contractor shall drill borehole(s) using air, fresh water, a freshwater-based drilling fluid, or a combination of the above as approved by the department. Alternative drilling fluids must be approved by the department and are only allowed if cemented surface casing is installed below the deepest potable aquifer.

(v) In the event that a hydrocarbon bearing zone or other pollutant is encountered before the potable aquifer is cased off, the qualified contractor shall immediately notify the department and take department approved actions to protect the fresh water zone(s).

(3) The qualified contractor shall control, manage, and dispose of hydrocarbons, brine, and other polluting fluids and gases encountered during drilling operations in accordance with industry standards and any applicable Federal, State, or local requirements, and in a manner that will ensure public safety and prevent the pollution of land, air, groundwater, and surface waters.

(i) The use of a blowout preventor (BOP) or a department-approved flow diversion equipment may be required if it is reasonably expected that hydrocarbons, brine, or other fluids may be encountered during permitted operations.

(4) The qualified contractor is responsible for reporting and handling any non-routine incident including, but not limited to, spills, loop or tubing failures, or any instances where hydrocarbons, hydrogen sulfide gas, or brine are encountered in a quantity that poses a hazard to drilling operations, public health and safety, or the environment. In the event of a non-routine incident, the qualified contractor shall:

(i) Provide immediate verbal notification to the department and describe the actions taken to remedy or mitigate potential hazards.

(ii) Within 24 hours of discovery of the non-routine incident, submit a Non-Routine Incident Report to the department on a form prescribed by the department.

(iii) Provide any data, if requested by the department, which the department believes may be useful in the evaluation of a non-routine incident.

(iv) Ensure the borehole is sealed to prevent the migration of fluids and gas between subsurface formations and the ground surface.

(v) If mitigation measures are not taken or are taken but do not eliminate all potential hazards, the borehole shall be decommissioned in a timeframe determined by the department based on site-specific circumstances.

(5) No borehole may intentionally deviate from vertical, unless permitted to do so.

(6) No borehole may deviate or trespass onto uncontrolled property.

(i) If for any reason the department determines that the borehole has deviated such that it poses a potential risk to the environment or public safety, or the deviation resulted in a trespass onto uncontrolled property, the department may require the qualified contractor to complete an angular deviation and directional survey.

(ii) The survey shall be certified as to correctness at the qualified contractor's sole cost, risk, and expense.

(iii) In the event the survey reveals any violations of regulatory setbacks or surface restrictions, the department will require the borehole to be plugged back to controlled property or plugged and decommissioned at the option of the qualified contractor.

(b) Cementing or Grouting Procedures

The following cementing or grouting procedures shall be conducted to ensure groundwater protection and prevent the migration of fluids and gas.

(1) Cementing Procedures

(i) All casing shall be cemented unless otherwise specified by the department. Cement shall be emplaced using a methodology approved by the department that will seal the casing annulus and prevent the migration of fluids and gas in the subsurface.

(ii) The qualified contractor shall notify the department a minimum of 24 hours prior to the commencement of primary cementing operations for any surface and intermediate casing that is to be installed.

(iii) Cement baskets or other approved devices shall be installed above any voids or lost circulation zones.

(iv) Prior to conducting cementing operations, the borehole shall be conditioned to stop the flow of any gas and fluid and the qualified contractor shall attempt to establish circulation to promote adequate cement displacement and ensure a high-quality bond between cement and the borehole.

(v) The pump and plug method shall be used to cement casing unless an alternative method is approved by the department. The amount of cement will be determined on a site-specific basis and a minimum of 25% excess cement shall be used, with lost circulation materials, if necessary, unless additional excesses are specified by the department.

(vi) The qualified contractor shall test or require the cementing contractor to test the mixing water for pH and temperature prior to mixing the cement and to record the results on the cementing ticket.

(vii) After the cement is placed and the cementing equipment is disconnected, the qualified contractor shall wait until the cement achieves a minimum calculated compressive strength of 500 psi before the casing is disturbed in any way. If cement returns are not present at the surface, the qualified contractor may be required to run a log to determine the top of the cement.

(2) Grouting Procedures

(i) Prior to conducting grouting operations, the borehole shall be conditioned to stop the flow of any gas and fluid and the qualified contractor shall circulate water or drilling fluids in the annular space to clear any potential obstructions.

(ii) The amount of grout will be determined on a borehole-specific basis and a minimum of 25% excess grout shall be available for use on site to account for the loss of grout to subsurface formations or voids.

(iii) Grout shall be placed in the borehole by pressure pumping through a tremie pipe unless an alternative method is approved by the department.

(a) During grouting operations, the qualified contractor shall verify the grout mixture properties, including density and water content, to ensure the grout is mixed in accordance with manufacturer specifications.

(iv) Tremie grouting of the entire borehole shall be completed to the maximum extent possible in a single continuous operation upward from the bottom of the borehole. The closed loop borehole shall be completely grouted from total depth to the surface to prevent fluid and gas migration and ensure groundwater protection.

(v) Grout levels shall be monitored for a minimum of 48-hours after initial placement. If settling occurs, the borehole shall be filled with grout from the top of grout to surface.

(c) Pressure and Flow Testing

(1) Prior to completion, the loop or loop field shall be filled with water or other department approved fluid and tested to 1.5 times the operating pressure of the system, or the pressure recommended by the manufacturer specifications, whichever is greater. The qualified contractor shall monitor and inspect the system to ensure there are no leaks.

(d) Marking Locations of Subsurface Components

(1) If a borehole is buried below surface, the qualified contractor shall mark the underground location of the borehole, all sections of underground piping associated with the borehole, and any utilities with metallic detectable tape or similar underground detection.

(e) Completion and Notice Requirements

(1) Notice of Completion of Closed Loop Geothermal Borehole(s)

(i) Within thirty (30) days after the completion of all closed loop boreholes associated with a project, the qualified contractor shall file a Notice of Completion of Closed Loop Geothermal Borehole(s) with the department.

(ii) The Notice of Completion of Closed Loop Geothermal Borehole(s) shall contain information including, but not limited to, borehole location(s) and depth(s), borehole construction, and any testing or logging performed.

(iii) The Notice of Completion of Closed Loop Geothermal Borehole(s) shall be accompanied by a final dimensioned site layout as described in section 2(a)(4) of this Part.

(iv) A copy of the Notice of Completion of Closed Loop Geothermal Borehole(s) shall be provided to the owner of the geothermal borehole(s).

(2) Waste Disposal and Site Restoration

(i) Within 30 days after cessation of permitted operations, the qualified contractor shall:

(a) Dispose of all cuttings and fluids in accordance with any Federal, State, or local disposal requirements.

(b) Reclaim and stabilize areas disturbed in support of drilling operations to prevent erosion and sedimentation.

(c) For a closed loop borehole beneath a building, structure, parking lot, or similar, the site shall be stabilized and restored to match the surrounding grade. Borehole marking and identification shall adhere to subdivision (d) of this section and section 6(a) of this Part, respectively.

Section 561.6 Operating Practices and Requirements

(a) Borehole Identification

(1) Each closed loop borehole or system shall be labeled at the loop charging valve(s) with a label completed by the qualified contractor. The label(s) shall be of a permanent type, prominently displayed with the following information:

(i) Qualified contractor and phone number;

(ii) Heat transfer fluid type and concentration; and

(iii) Installation date.

(b) Operating Practices

(1) At the conclusion of drilling operations, the owner of the geothermal borehole(s) is responsible for the operation, maintenance, and ultimate decommissioning of the permitted borehole(s).

(2) The owner shall maintain the borehole(s) and associated components in a manner that will prevent pollution and protect public safety.

Section 561.7 Decommissioning

(a) Borehole Decommissioning

(1) If a closed loop geothermal borehole is unable to function for its intended, permitted purpose, the owner of the borehole must ensure the borehole is decommissioned in accordance with the requirements described in this Part.

(2) A borehole lacking mechanical integrity or a borehole that poses an immediate threat to public safety or the environment shall immediately be decommissioned in the manner prescribed in this Part.

(3) Borehole decommissioning shall be performed by a qualified contractor registered with the department.

(4) The qualified contractor shall notify the department a minimum of 24-hours prior to commencing decommissioning activities.

(b) Notice of Decommissioning for Closed Loop Geothermal Borehole(s)

(1) A qualified contractor shall file a Notice of Decommissioning for Closed Loop Geothermal Borehole(s) and receive approval from the department, prior to conducting decommissioning operations. The notice shall describe the methodology proposed to plug and decommission the borehole(s), including surface reclamation and restoration of the site.

(2) If multiple boreholes are being decommissioned at the same time, the qualified contractor may file a single Notice of Decommissioning for Closed Loop Geothermal Borehole(s) for all closed loop boreholes associated with the project.

(c) Closed Loop Geothermal Borehole Decommissioning Procedures

(1) Qualified contractors shall decommission closed loop borehole(s) in accordance with ANSI/CSA/IGSHPA C448.3-16, as incorporated by reference in Part 569 of this title.

(i) Any heat transfer fluids shall be removed and disposed of in accordance with Federal, State, or local requirements.

(ii) Downhole components, casing, and tubing that are not cemented or grouted in place shall be removed, unless an alternative procedure is approved by the department.

(a) Cement shall be emplaced in the borehole using a department-approved methodology that will seal the borehole and prevent the migration of fluids and gas in the subsurface.

(b) If loop tubing is to remain in place, it shall be permanently filled with grout, cement, or other substance approved by the department.

(iii) If accessible, the borehole, including casing and loop tubing, shall terminate a minimum of two feet below ground level, and a steel plate or similar cover shall be affixed to the top of the well to ensure that a magnetic locator can be used to find the location of the borehole at a future date. Any alternative method shall be approved by the department.

(iv) The site shall be reclaimed to match adjacent contours and in a manner that will prohibit erosion and sedimentation, including revegetation of the site as necessary, unless otherwise approved by the department.

(d) Reporting Requirements

(1) Within 30 days after the completion of plugging and decommissioning operations, the qualified contractor shall file a Closed Loop Geothermal Borehole Decommissioning Report with the department. The report shall describe the methodology used to plug and decommission the borehole(s), including surface reclamation and restoration of the site.

Section 561.8 Ongoing Operations

(a) The department shall be notified, in writing, of any ongoing project subject to the permitting requirements of this Part within 30 days after the effective date of this Part.

(1) An ongoing project is considered any active operations to drill, install, or otherwise construct one or more closed loop geothermal boreholes greater than 500 feet in depth on or after the effective date of this Part.

(b) For any project that will commence and be completed within 30 days from the effective date of this Part, the boreholes are subject to the operating, reporting, and decommissioning requirements described in this Part.

(c) For any ongoing project that will not be completed within 30 days from the effective date of this Part, a qualified contractor shall submit a completed application for the remaining planned, but undrilled, boreholes and receive a department-issued permit.

(d) Any boreholes drilled prior to the effective date of this Part are not subject to operating, reporting, or decommissioning requirements described in this Part.