

**Mitigation Measures**  
**Mount Spurr Geothermal Lease Sale Area**  
**Effective July 28, 2023**

Operations will be conditioned by mitigation measures that are attached to any leases issued and are binding on the lessee. These measures were developed to mitigate potential effects of lease-related activities, considering all information made known to the director. Additional measures may be imposed when the lessee submits a proposed plan of operations (11 AAC 84.750, 11 AAC 84.755, and 11 AAC 84.760) for exploration, production, development, or transportation uses, or in rights of way. The director may consult with local government organizations and other agencies in implementing the mitigation measures below. The lessee is subject to applicable local, state, and federal laws and regulations as amended.

The director may grant exceptions to these mitigation measures upon a showing by the lessee that compliance with the mitigation measure is not practicable and that the lessee will undertake an equal or better alternative to satisfy the intent of the mitigation measure. Requests and justifications for exceptions must be included in the plan of operations application as specified by the application instructions, and decisions of whether to grant exceptions will be made during the plan of operations review.

## **A. Mitigation Measures**

### **1. Facilities and Operations**

- a. A plan of operations must be submitted and approved before conducting exploration, development, or production activities, and must describe the lessee's efforts to minimize impacts on residential, commercial, and recreational areas, Native allotments and subsistence use areas. At the time of application, the lessee must submit a copy of the proposed plan of operations to the KPB and all surface owners whose property will be entered.
- b. Facilities must be designed and operated to minimize sight and sound impacts in areas of high commercial, recreational, and subsistence use and important wildlife habitat. Methods may include providing natural buffers and screening to conceal facilities, sound insulation of facilities, or by using alternative means approved by the director.
- c. To the extent feasible and prudent, the siting of facilities will be prohibited within 500 feet of all fish-bearing streams and water bodies and 1,500 feet from all current surface drinking water sources. Facilities may be sited within these buffers if the lessee demonstrates to the satisfaction of the director, that site locations outside these buffers are not feasible and prudent or that a location inside the buffer is environmentally preferred. Road, utility, and pipeline crossings must be consolidated and aligned perpendicular or nearly perpendicular to watercourses.
- d. The operator must provide a plan to address any potential geohazard impact on operations to mitigate risk to facilities and personnel.
- e. Measures will be required to minimize the impact of industrial development on important wetlands. Lessees must identify on a map or aerial photograph the largest surface area, including

reasonably foreseeable future expansion areas, within which a facility is to be sited, or an activity will occur. The map or photograph must accompany a plan of operations. To minimize impacts, the lessee must avoid siting facilities in the identified sensitive habitat areas. Further, all activities within wetlands require permission from the U.S. Army Corps of Engineers.

- f. With the exception of drill pads, airstrips, and roads permitted under Mitigation Measure 5.a., exploration facilities must be consolidated, temporary, and must not be constructed of gravel unless the director determines that no feasible and prudent alternative exists. Reuse of abandoned gravel structures may be permitted on a case-by-case basis by the director. Approval for use of abandoned structures will depend on the extent and method of restoration needed to return these structures to a usable condition.
- g. Where feasible and prudent, onshore pipelines must be located on the upslope side of roadways and construction pads, unless the Director determines that an alternative site is environmentally acceptable. All pipelines must be designed, constructed, and maintained to assure integrity against climatic conditions, tides and current, geophysical hazards, corrosion, and other hazards as determined on a case-by-case basis.
- h. Wherever possible, onshore pipelines must utilize existing transportation corridors and be buried where soil and geophysical conditions permit. In areas where pipelines must be placed above ground, pipelines must be sited, designed, and constructed to allow free movement of large mammals. Lessees shall consider increased snow depth in the Sale Area in relation to pipe elevation to ensure adequate clearance for wildlife. DO&G may require additional measures to mitigate impacts to wildlife movement and migration.
- i. Gravel mining within an active floodplain is prohibited. Gravel mining in upland sites will be restricted to the minimum area necessary to develop the field in an efficient manner.
- j. Dismantlement, Removal and Rehabilitation (DR&R): Upon abandonment of material sites, drilling sites, roads, buildings, or other facilities, such facilities must be removed and the site rehabilitated to the satisfaction of the director, unless the director determines that such removal and rehabilitation is not in the state's interest.
- k. Wherever possible, transmission lines must utilize existing transportation corridors and must be designed and constructed to minimize impacts to fish and wildlife movement. Minimizing impacts may include burying lines, consolidating stream crossing structures or similar measures.
- l. Lessees must conduct a second order survey of the land surface before and during hydrothermal resources production to determine any elevation changes. If production results in subsidence, and if subsidence is determined to be hazardous to geothermal production operations or adjoining land uses, the director will require lessees adjust production and injection rates or to suspend operations.
- m. The state may install seismographs or other instruments in producing geothermal fields to detect induced seismic activity. If geothermal production induces increased seismicity and if induced seismicity is determined to be hazardous to geothermal production operations or adjoining land uses, the director, will require lessees adjust production and injection rates or to suspend operations.

## 2. Fish and Wildlife Habitat

- a. The director, in consultation with ADF&G, will impose seasonal restrictions and sound pressure levels on seismic activities in or near fresh water to minimize impacts to fish and marine mammals. The director, in consultation with ADF&G, will impose sound pressure levels for the use of explosives in or near fish bearing streams and lakes. Blasting criteria have been developed by ADF&G and are available upon request.
- b. Removal of water from fish-bearing rivers, streams, and natural lakes shall be subject to prior written approval by DMLW and ADF&G.
- c. Water intake pipes used to remove water from fish-bearing water bodies must be surrounded by a screened enclosure to prevent fish entrainment and impingement. Screen mesh size shall be no greater than 0.1 inches and the maximum water velocity at the surface of the screen enclosure may be no greater than 0.2 feet per second unless another size or velocity has been approved by ADF&G. Screen material must be corrosion resistant and must be adequately supported to prevent excessive sagging which could result in unusable intake surface. The intake structure must be designed and installed to avoid excessive fouling from floating debris, and a minimum of eight square feet of effective wetted screen surface must be provided for each multiple of a 450-gallon per minute (one cubic-foot per second) pumping rate. The pump intake opening must be placed equidistant from all effective wetted screen surfaces.
- d. Compaction or removal of snow cover overlying fish bearing rivers, streams, and natural lakes shall be prohibited, except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, ice or snow bridges may be required.
- e. Surface entry will be prohibited within one-quarter mile of trumpeter swan nesting sites April 1 through August 31. The siting of permanent facilities, including roads, material sites, storage areas, power lines, and above-ground pipelines will be prohibited within one-quarter mile of known nesting sites.
- f. Bears:
  - i. Before commencement of any activities, lessees shall consult with ADF&G to identify the locations of known bear den sites that are occupied in the season of proposed activities. Exploration and development activities between November 15 and March 31 must not be conducted within one-half mile of occupied brown bear dens, unless alternative mitigation measures are approved by ADF&G. A lessee who encounters an occupied brown bear den not previously identified by ADF&G must report it to ADF&G, within 24 hours. Mobile activities shall avoid such discovered occupied dens by one-half mile unless alternative mitigation measures are approved by the director. Non-mobile facilities will not be required to relocate.
  - ii. For projects in close proximity to areas frequented by bears, lessees are required to prepare and implement bear interaction plans to minimize conflicts between bears and humans. These plans should include measures to:
    - A. Minimize attraction of bears to drill sites.
    - B. Organize layout of buildings and work areas to minimize interactions between humans and bears.

- C. Warn personnel of bears near or on facilities and the proper procedures to take.
  - D. If authorized, deter bears from the facilities.
  - E. Provide contingencies in the event bears do not leave the site.
  - F. Discuss proper storage and disposal of materials that may be toxic to bears.
  - G. Provide a systematic record of bears on site and in the immediate area.
- g. The director, in consultation with ADF&G shall restrict or modify lease-related activities if scientific evidence documents the presence of Steller's eider from the Alaska breeding population in the area and it is determined that geothermal activities will impact them or their overwintering habitat.

### **3. Subsistence, Commercial, and Sport Harvest Activities**

- a. Exploration, development, and production operations shall be conducted in a manner that prevents unreasonable conflicts between lease-related activities and subsistence activities. Lease-related use will be restricted when the director determines it is necessary to prevent conflicts with local subsistence, commercial, and sport harvest activities. In enforcing this condition, DO&G will consult with other agencies, the affected local borough, and the public to identify and avoid potential conflicts. In order to avoid conflicts with subsistence, commercial, and sport harvest activities, restrictions may include alternative site selection, requiring directional drilling, seasonal drilling restrictions, and other technologies deemed appropriate by the director.
- b. Before submitting a plan of operations for either onshore or offshore activities which have the potential to disrupt subsistence activities, the lessee shall consult with the potentially affected subsistence communities and the KPB (collectively "parties") to discuss the siting, timing, and methods of proposed operations and safeguards or mitigating measures that could be implemented by the operator to prevent unreasonable conflicts. The parties shall also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee shall make reasonable efforts to assure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable interference with subsistence harvests.
- c. A discussion of agreements reached or not reached during the consultation process and any plans for continued consultation shall be included in the plan of operations. The lessee shall identify who participated in the consultation and send copies of the plan to participating communities and the KPB when it is submitted to DO&G.
- d. If the parties cannot agree, then any of them may request the commissioner, or their designee, to intercede. The commissioner may assemble the parties or take other measures to resolve conflicts among the parties.
- e. The lessee shall notify the director of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns.
- f. Traditional and customary access to subsistence areas shall be maintained unless reasonable alternative access is provided to subsistence users. "Reasonable access" is access using means generally available to subsistence users.

#### 4. Fuel, Hazardous Substances, and Waste

- a. Secondary containment shall be provided for the storage of fuel or hazardous substances and sized as appropriate to container type and according to governing regulatory requirements in 18 AAC 75 and 40 CFR 112
- b. Containers with an aggregate storage capacity of greater than 55 gallons that contain fuel or hazardous substances shall not be stored within 100 feet of a water body or within 1,500 feet of a current surface drinking water source.
- c. During equipment storage or maintenance, the site shall be protected from leaking or dripping fuel and hazardous substances by the placement of drip pans or other surface liners designed to catch and hold fluids under the equipment, or by creating an area for storage or maintenance using an impermeable liner or other suitable containment mechanism.
- d. During fuel or hazardous substance transfer, secondary containment or a surface liner must be placed under all container or vehicle fuel tank inlet and outlet points, hose connections, and hose ends. Appropriate spill response equipment, sufficient to respond to a spill of up to five gallons, must be on hand during any transfer or handling of fuel or hazardous substances. Trained personnel shall attend transfer operations at all times.
- e. Vehicle refueling shall not occur within the annual floodplain, except as addressed and approved in the plan of operations. This measure does not apply to waterborne vessels.
- f. All independent fuel and hazardous substance containers shall be marked with the contents and the lessee's or contractor's name using paint or a permanent label.
- g. A freshwater aquifer monitoring well, and quarterly water quality monitoring, is required down gradient of a permanent storage facility, unless alternative acceptable technology is approved by ADEC.
- h. Waste must be reduced, reused, or recycled to the maximum extent feasible and prudent. Garbage and domestic combustibles must be incinerated whenever possible or disposed of at an approved site in accordance with 18 AAC 60.
- i. New solid waste disposal sites will not be approved or located on state property during the exploratory stage of lease activities. Disposal sites may be provided for drilling waste if the facility complies with 18 AAC 60.
- j. Impermeable lining and diking, or equivalent measures, such as double-walled tanks, will be required for sewage ponds and sumps. Additional site-specific measures may be required as determined by ADNR and will be addressed in the existing review of project permits or C-Plans. Buffer zones of not less than 500 feet will be required to separate sewage ponds from marine waters and freshwater supplies, streams and lakes, and important wetlands.
- k. Proper disposal of garbage and putrescible waste is essential to minimize attraction of wildlife. The lessee must use the most appropriate and efficient method to achieve this goal.
- l. All produced water must be disposed to the subsurface to eliminate the potential for contamination of surface water or a drinking water aquifer.

## **5. Access**

- a. Onshore activities must be supported by air service, an existing road system or port facility, ice roads, or by vehicles that do not cause significant damage to the ground surface or vegetation. Unrestricted surface travel may be permitted by the director and the director of DMLW, if an emergency condition exists, or if it is determined, after consulting with ADF&G, that travel can be accomplished without damaging the ground surface or vegetation.
- b. Construction of temporary roads may be allowed. Temporary means that a road must be removed to the extent that it is rendered impassable or is otherwise rehabilitated in a manner such that any placed gravel remaining approximates surrounding natural features. Construction of permanent roads will be prohibited during the exploration stage.
- c. Public access to, or use of, the Sale Area may not be restricted, except within 1,500 feet of drill sites, buildings, and other related facilities. Areas of restricted access must be identified in the plan of operations. Facilities and operations shall not be located so as to block access to or along navigable or public waters, as defined in AS 38.05.

## **6. Prehistoric, Historic, and Archeological Sites**

- a. Before the construction or placement of any structure, road, or facility resulting from exploration, development, or production activities, the lessee must conduct an inventory of prehistoric, historic, and archeological sites within the area affected by an activity. The inventory must include consideration of literature provided by the KPB, nearby communities, Native organizations, and local residents; documentation of oral history regarding prehistoric and historic uses of such sites; evidence of consultation with the Alaska Heritage Resources Survey and the National Register of Historic Places; and site surveys. The inventory must also include a detailed analysis of the effects that might result from the activity.
- b. The inventory of prehistoric, historic, and archeological sites must be submitted to the director and to the State Historic Preservation Officer (SHPO), who will coordinate with the KPB for review and comment. If a prehistoric, historic, or archeological site or area could be adversely affected by a lease activity, the director, after consultation with SHPO and the KPB, will direct the lessee as to the course of action to take to avoid or minimize adverse effects.
- c. If a site, structure, or object of prehistoric, historic, or archaeological significance is discovered during lease operations, the lessee must report the discovery to the director as soon as possible. The lessee must make reasonable efforts to preserve and protect the discovered site, structure, or object from damage until the director, after consultation with the SHPO and the KPB, has directed the lessee as to the course of action to take for its preservation.

## **7. Local Hire, Communication, and Training**

- a. The lessee is encouraged to employ local and Alaska residents and contractors, to the extent they are available and qualified, for work performed in the Sale Area. Lessees shall submit, as part of the plan of operations, a hiring plan that shall include a description of the operator's plans for partnering with local communities to recruit, hire, and train local and Alaska residents and contractors to the extent allowable under State and federal law. As a part of this plan, the lessee is encouraged to coordinate with employment and training services offered by the State of Alaska and local communities to train and recruit employees from local communities.

- b. A plan of operations application must describe the lessee's past and prospective efforts to communicate with local communities and interested local community groups.
- c. A plan of operations application must include a training program
  - i. for all personnel including contractors and subcontractors;
  - ii. designed to inform each person working on the project of environmental, social, and cultural concerns that relate to that person's job;
  - iii. using methods to ensure personnel understand and use techniques necessary to preserve geological, archaeological, and biological resources; and
  - iv. designed to help personnel increase their sensitivity and understanding of community values, customs, and lifestyles in areas where they will be operating.

## 8. Definitions

In this document:

- i. "Facilities" means any structure, equipment, or improvement to the surface, whether temporary or permanent, including, but not limited to, roads, pads, pits, pipelines, power lines, generators, utilities, airstrips, wells, compressors, drill rigs, camps, and buildings.
- ii. "Feasible and prudent" means consistent with sound engineering practice and not causing environmental, social, or economic costs that outweigh the public benefit to be derived from compliance with the standard.
- iii. "Important wetlands" means those wetlands that are of high value to fish, waterfowl, and shorebirds because of their unique characteristics or scarcity in the region or that have been determined to function at a high level using the hydrogeomorphic approach.
- iv. "Minimize" means to reduce adverse impacts to the smallest amount, extent, duration, size, or degree reasonable in light of the environmental, social, or economic costs of further reduction.
- v. "Practicable" means feasible in light of overall project purposes after considering cost, existing technology, and logistics of compliance with the mitigation measure.
- vi. "Plan of operations" means a geothermal plan of operations under 11 AAC 84.750.
- vii. "Secondary containment" means an impermeable diked area or portable impermeable containment structure, or integral containment space capable of containing the volume of the largest independent container. The containment shall, in the case of external containment, have enough additional capacity to allow for local precipitation.
- viii. "Temporary" means no more than 12 months.