

Augustine Island Geothermal Resources Disposal

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 DO&G.
- 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, in consultation with ADF&G.
- c. The siting of onshore facilities, other than docks, roads, utility or pipeline corridors, or terminal facilities will be prohibited within one-half mile of the mean high water of Cook Inlet, except where land use plans classify an area for development, or established usage and use history show development. The siting of facilities other than docks, roads, utility, and pipeline crossings will also be prohibited within 500 ft of all fish bearing streams and water bodies and 1,500 ft of all current surface drinking water sources. Facilities may be sited within these buffers if the lessee demonstrates to the satisfaction of the Director, in consultation with ADF&G, that site location inside the buffer is environmentally preferred. Road, utility, and pipeline crossings must be consolidated and aligned perpendicular or near perpendicular to watercourses.
- d. Impacts to identified wetlands must be minimized to the satisfaction of the Director, in consultation with ADF&G and ADEC. The Director will consider whether facilities are sited in the least sensitive areas. Further, all activities within wetlands require permission from the USCOE (see Lessee Advisories below).
- e. Exploration facilities must be temporary unless the Director approves a proposed alternative. Use of gravel structures may be permitted on a case-by-case basis by the Director, after consultation with DMLW and ADF&G. Approval for use of existing structures will depend on the extent and method of restoration needed to return these structures to a usable condition.
- f. Pipelines and gravel pads must be designed to facilitate the containment and cleanup of spilled fluids. Onshore pipelines must be located on the upslope side of roadways and construction pads unless an alternative site is environmentally acceptable, as determined by the Director, in consultation with DMLW. Wherever possible, onshore pipelines must be buried where soil and geophysical conditions permit. All pipelines, including flow and gathering lines, must be designed, constructed, and maintained to maximize integrity against climatic conditions, tides and currents, geophysical hazards, corrosion and other hazards as determined on a case-by-case basis.
- g. Pipelines that must cross marine waters will be constructed beneath the marine waters using directional drilling techniques, unless the Director, in consultation with ADF&G

approves an alternative method based on technical, environmental, and economic justification. Offshore pipelines must be located and constructed to prevent obstruction to marine navigation and fishing operations.

- h. 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, in consultation with DMLW, ADF&G, and ADEC and any non-state surface owner, determines that such removal and rehabilitation is not in the state's interest.
- i. Gravel mining sites required for exploration and development activities will be restricted to the minimum necessary to develop the field efficiently and with minimal environmental damage. Gravel mine sites required for exploration activities must not be located within an active floodplain of a watercourse unless DMLW, after consultation with ADF&G, approves a proposed alternative, or that a floodplain site would enhance fish and wildlife habitat after mining operations are completed and the site is closed.
- j. 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 may require lessees to adjust production and injection rates or to suspend operations.
- k. The state may require lessees to 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 may require lessees to adjust production and injection rates or to suspend operations.
- l. Except for approved off-road travel, exploration activities must be supported only by ice roads, winter trails, existing road systems or port facility, or air service, or by vehicles that do not cause significant damage to the ground surface or vegetation. Wintertime off-road travel may be approved in areas where snow and frost depths are sufficient to protect the ground surface. Summertime off-road travel may be authorized subject to time periods and vehicle types approved by DMLW. Exceptions may be granted by DMLW and the Director 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.
- m. Public access to, or use of, the lease sale area may not be restricted, except within the immediate vicinity of drill sites, buildings, and other related facilities. Areas of restricted access must be identified in the plan of operations. Lease facilities and operations will not be located so as to block access to or along navigable or public waters, as defined in AS 38.05.
- n. Construction of temporary roads may be allowed. In this section, "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 may be prohibited during the exploration stage.

2. Habitat, Fish, and Wildlife

- a. Detonation of explosives is prohibited in open water areas of fish bearing streams and lakes. Explosives must not be detonated beneath, or in close proximity to fish bearing

streams and lakes if the detonation of the explosive produces a pressure rise in the water body greater than 2.7 pounds per square inch (psi) unless the water body, including its substrate, is solidly frozen. Detonation of explosives within or in close proximity to a fish spawning bed during the early stages of egg incubation must not produce a peak particle velocity greater than 0.5 in per second. Blasting criteria have been developed by ADF&G and are available on request from ADF&G. The location of known fish bearing waters within the lease sale area can be obtained from ADF&G.

The Director may approve the use of explosives for seismic surveys.

- b. Removal of water from fish bearing rivers, streams, and natural lakes is subject to prior written approval by DMLW and ADF&G. 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 will be no greater than 1 mm (0.04 in) unless an alternative screen size has been approved by ADF&G. The maximum water velocity at the surface of the screen enclosure may be no greater than 0.4 ft per second unless an alternate velocity has been approved by ADF&G.
- c. Removal of snow from fish bearing rivers, streams, and natural lakes will be subject to prior written approval by ADF&G. Compaction or removal of snow cover overlying fish bearing rivers, streams, and natural lakes will be prohibited, except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, ice or snow bridges may be required.
- d. 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. Trumpeter swan nesting sites will be identified by ADF&G at the request of the lessee.
- e. The Director, in consultation with ADF&G, will restrict or modify lease related activities if scientific evidence documents the presence of Steller's eiders from the Alaska breeding population in the lease area and it is determined that geothermal exploration and development will impact them or their over-wintering habitat in the near-shore waters of Augustine Island.
- f. The Director, in consultation with ADF&G, may impose seasonal restrictions on activities located in and adjacent to important waterfowl and shorebird habitat during the plan of operations approval stage.
- g. Permanent, staffed facilities must be sited outside identified brant, white-fronted goose, snow goose, tundra swan, king eider, common eider, Steller's eider, and spectacled eider nesting and brood rearing areas, unless the Director approves a proposed alternative.
- h. At this time, there is no evidence to indicate that large terrestrial mammals inhabit Augustine Island. Future project reviews may require additional mitigation measures and lessee advisories if large mammals are encountered during exploration, development, production, or transportation.

3. Subsistence and Other Fish and Wildlife Uses

- a. Lease-related use will be restricted when DO&G determines it is necessary to prevent unreasonable conflicts between disposal-related activities and subsistence, and commercial, sport, personal use, and educational harvest activities. In enforcing this term DO&G, during review of plans of operation, 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, sport, and educational harvest

activities, restrictions may include alternative site selection, requiring directional drilling, seasonal drilling restrictions, and other technologies deemed appropriate by DO&G.

- b. Traditional and customary access to subsistence areas will be maintained unless reasonable alternative access is provided to subsistence users. "Reasonable access" is access using means generally available to subsistence users. Lessees will consult nearby communities, and native organizations for assistance in identifying and contacting local subsistence users.

4. Fuel, Hazardous Substances, and Waste

- a. Secondary containment will be provided for the storage of fuel or hazardous substances. "Secondary containment" means an impermeable diked area or portable impermeable containment structure capable of containing 110 percent of the volume of the largest independent container. Double walled tanks do not qualify as secondary containment unless an exception is granted for a particular tank.
- b. Containers with a storage capacity of greater than 55 gal that contain fuel or hazardous substances will not be stored within 100 ft of a water body or within 1,500 ft of a current surface drinking water source.
- c. During equipment storage or maintenance, the site will 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 will attend transfer operations at all times.
- e. Vehicle refueling will 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 will be marked with the contents and the lessee's or contractor's name using paint or a permanent label.
- g. A fresh water aquifer monitoring well, and quarterly water quality monitoring, may be required down gradient of a permanent above-ground liquid hydrogen storage facility.
- h. Waste from operations must be reduced, reused, or recycled to the maximum extent practicable. Garbage and domestic combustibles must be incinerated or disposed of at an approved site in accordance with 18 AAC 60 (See Lessee Advisories, ADEC).
- i. New solid waste disposal sites will not be approved or located on state property during the exploration stage. Exceptions may be provided for drilling waste if the facility will comply with the applicable provisions of 18 AAC 60.
- j. Wherever practicable, the preferred method for disposal of muds and cuttings from geothermal activities is by underground injection, as regulated by AOGCC. Other methods of disposal will be allowed only upon approval by the Director, in consultation with ADEC and ADF&G.

5. Access

- a. Exploration activities must be supported by air service, an existing road system or port facility, ice roads, or by off-road vehicles that do not cause significant damage to the vegetation or ground surface. Construction of temporary drill pads, airstrips, and roads may be allowed. Construction of permanent roads may be allowed upon approval by the Director. Unrestricted surface travel may be permitted by the Director and DMLW, if an emergency condition exists.

6. Prehistoric, Historic, and Archeological Sites

- a. Before the construction or placement of any gravel, or other 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: 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 may result from the activity.
- b. The inventory of prehistoric, historic, and archeological sites must be submitted to the Director and to DPOR Office of History and Archaeology. If a prehistoric, historic, or archeological site or area could be adversely affected by an activity, the Director, after consultation with DPOR Office of History and Archaeology, 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 permit/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 DPOR Office of History and Archaeology and the KPB, has directed the lessee how to take action for its preservation.

7. Local Hire, Communication, and Training

- a. Lessees are encouraged to employ local and Alaska residents and contractors, to the extent they are available and qualified, for work performed in the lease sale area. Lessees will submit, as part of the plan of operations, a proposal detailing the means by which the lessee will comply with the measure. The proposal must include a description of the operator's plans for partnering with local communities to recruit, hire, and train local and Alaska residents and contractors. The lessee is encouraged, in formulating this proposal, 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 information about the project with local communities and interested local community groups.
- c. A plan of operations application must include a training program for all personnel, including contractors and subcontractors. The program must be designed to inform each person working on the project of environmental, social, and cultural concerns that relate to that person's job. The program must use methods to ensure that personnel understand and use techniques necessary to preserve geological, archeological, and biological resources. In addition, the program must be designed to help personnel increase their sensitivity and understanding of community values, customs, and

lifestyles in areas where they will be operating. The program must include an explanation of the applicable laws protecting cultural and historic resources. The program will address the importance of not disturbing archeological, cultural and historic resources and provide guidance on how to avoid disturbance.

8. Definitions

- a. Facilities: 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.
- b. Hazardous substance: an element or compound that, when it enters into or on the surface or subsurface land or water of the state, presents an imminent and substantial danger to the public health or welfare, or to fish, animals, vegetation, or any part of the natural habitat in which fish, animals, or wildlife may be found; or a substance defined as a hazardous substance under 42 USC 9601 - 9675 (Comprehensive Environmental Response, Compensation, and Liability Act of 1980). It does not include uncontaminated crude oil or uncontaminated refined oil (AS 46.09.900).
- c. Identified wetlands: areas identified as wetlands by the USCOE under Section 404 of the Clean Water Act.
- d. Minimize: 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.
- e. Plan of operations: a lease plan of operations under 11 AAC 84.750 or a unit plan of operations under 11 AAC 84.870.
- f. Practicable: feasible in light of overall project purposes after considering cost, existing technology, and logistics of compliance with the standard.
- g. Reasonable access: access using means generally available to subsistence users.
- h. Temporary: no more than 12 months.

B. Lessee Advisories

Lessees must comply with all applicable local, state, and federal codes, statutes, and regulations in place at the time of a given project or activity. ADNRR provides the following lessee advisories to alert lessees to additional obligations and restrictions that government entities other than DO&G may impose on the lessee. These advisories are not intended to be exhaustive or as commentary on the jurisdiction of any government entity or propriety of any code, statute, or regulation. It is the lessee's responsibility to obtain all necessary state, federal or local authorizations or permits relating to lease activities.

1. Alaska Department of Environmental Conservation (ADEC)

- a. Pursuant to AS 46.04.030, lessees are required to have an approved oil discharge prevention and contingency plan (C-plan) before commencing operations. The plan must include a response action plan to describe how a spill response would occur, a prevention plan to describe the spill prevention measures taken at the facility, and supplemental information to provide background and verification information.
- b. Pursuant to state regulations administered by ADEC and the Clean Air Act administered by EPA, lessees are required to obtain air quality permits before

construction and operation. The permits will include air quality monitoring, modeling, and emission control obligations.

- c. Unless authorized by an ADEC permit, surface discharge of reserve pit fluids and produced waters is prohibited.
- d. Unless authorized by National Pollutant Discharge Elimination System or state permits, disposal of wastewater into fresh water bodies is prohibited.

2. Alaska Department of Fish and Game (ADF&G)

- a. The measures listed below may be imposed by ADF&G below the ordinary high water mark to protect designated anadromous water bodies and to ensure the free and efficient passage of fish in all fish bearing water bodies. However, exceptions may be authorized with a Fish Habitat permit. Specific information on the location of anadromous water bodies in and near the area may be obtained from ADF&G.
 - i. Alteration of riverbanks may be prohibited.
 - ii. The operation of equipment, excluding boats, in open water areas of rivers and streams may be prohibited. Except for approved stream crossings, equipment must not be operated within willow stands (*Salix* spp.).
 - iii. Bridges or non-bottom founded structures may be required for crossing fish spawning and important rearing habitats.
 - iv. Culverts or other stream crossing structures must be designed, installed, and maintained to provide free and efficient passage of fish.
- b. Removal of water from fish bearing water bodies is subject to AS 16.05.841, AS 16.05.871, and 11 AAC 93.035-.147.
- c. The use of explosives for seismic activities with a velocity of greater than 3000 ft-per-second in marine waters is prohibited.
- d. The Director, in consultation with ADF&G, may impose seasonal restrictions on activities located in and adjacent to important waterfowl, shorebird and seabird habitat during the plan of operations approval stage.
- e. Management of legislatively designated state game refuges and critical habitat areas is the co-responsibility of ADF&G, under AS 16.20.050-.060 and AS 16.20.500-.530, and ADNR, under AS 38.05.027. For activities occurring within a refuge or critical habitat area, the lessee will be required to obtain authorizations and permits from both ADNR and ADF&G.

3. Alaska Department of Natural Resources, Office of History and Archaeology

- a. Under AS 11.46.482, criminal mischief in the third degree occurs when a “person knowingly defaces, damages, or desecrates a cemetery or the contents of a cemetery or a tomb, grave or memorial regardless of whether the tomb, grave, or memorial is in a cemetery or whether the cemetery, tomb, grave, or memorial appears to be abandoned, lost, or neglected; or removes human remains or associated burial artifacts from a

cemetery, tomb, grave, or memorial regardless of whether the cemetery, tomb, grave, or memorial appears to be abandoned, lost, or neglected.”

- b. The Alaska Heritage Resource Survey data set is comprised of “restricted access documents” and specific site location data should not appear in final reports or be distributed to others.
- c. Under AS 41.35.010, the Alaska Historic Preservation Act states, “It is the policy of the state to preserve and protect the historic, prehistoric, and archaeological resources of Alaska from loss, desecration, and destruction so that the scientific, historic, and cultural heritage embodied in those resources may pass undiminished to future generations.”
- d. Under AS 41.35.200, unlawful acts are when a person may not appropriate, excavate, remove, injure, or destroy, without a permit from the Commissioner, any historic, prehistoric, or archaeological resources of the state. “Historic, prehistoric, or archaeological resources” includes deposits, structures, ruins, sites, buildings, graves, artifacts, fossils, or other objects of antiquity which provide information pertaining to the historical or prehistorical culture of people in the state as well as to the natural history of the state (AS 41.35.230(2)).
- e. Under AS 41.35.210, criminal penalties are required for a person who is convicted of violating a provision of AS 41.35.010 –.240. The person is guilty of a class A misdemeanor.
- f. Under AS 41.35.215, civil penalties are required in addition to other penalties and remedies provided by law. A person who violates a provision of AS 41.35.010 –.240 is subject to a maximum civil penalty of \$100,000 for each violation.

4. Alaska Department of Natural Resources (ADNR)

- a. Removal of gravel from state land must have prior approval from DMLW, under AS 38.05.110-.120, AS 38.05.810, and 11 AAC 71.045.

5. Alaska Department of Labor and Workforce Development

- a. The lessee will facilitate Alaska resident hire monitoring by reporting project wages on a quarterly basis for each individual employed by the lessee in the lease area, through electronic unemployment insurance reporting, and by requiring the same of the lessee’s contractors and subcontractors.

6. U.S. Army Corps of Engineers (USCOE)

- a. A U.S. Army Corps of Engineers permit is required when work is anticipated on, in, or affects navigable waters or involves wetland related dredge or fill activities. A Section 10 permit is required for construction, excavation, or deposition of material in, over, or under navigable waters, or for any work which would affect the course, location, condition, or capacity of navigable waters, or for any work which would affect the course, location, condition, or capacity of navigable waters (33 USC 403). A Section 404 permit (33 USC 404) authorizes the discharge of dredged and fill material into waters and wetlands of the United States. The process is similar for both permits and, at times, both may be required.

7. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration

- a. Any pipeline used for transportation of gas or hazardous liquids may be subject to federal pipeline safety laws (49 USC 60101 et seq.) and regulations (49 CFR 190-195) under the jurisdiction of the USDOT, Pipeline and Hazardous Materials Safety Administration.

8. U.S. Fish and Wildlife Service and National Marine Fisheries Service

- a. Migratory birds, sea otters, polar bears, and Pacific walrus are managed by the U.S. Fish and Wildlife Service. The National Oceanic and Atmospheric Administration, National Marine Fisheries Service is responsible for management of all other marine mammals. The lessee is advised that the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.) protects the following endangered or threatened species and candidate species for listing that may occur in the disposal area:

Species	Status
Beluga whale (Cook Inlet stock)	Endangered
Northern sea otter	Threatened
Spectacled eider	Threatened
Steller's eider (Alaska breeding population)	Threatened
Steller sea lion (west of 144° longitude)	Endangered
Steller sea lion (east of 144° longitude)	Threatened

- b. Lessees to comply with the Migratory Bird Treaty Act (MBTA; 16 USC 703) administered by the USFWS. Under the MBTA, it is illegal to “take” migratory birds, their eggs, feathers or nests. “Take” is defined (50 CFR 10.12) to include “pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting.” The MBTA does not distinguish between “intentional” and “unintentional” take. Migratory birds include songbirds, waterfowl, shorebirds, and raptors. In Alaska, all native birds except grouse and ptarmigan (which are protected by the State of Alaska) are protected under the MBTA.
- c. In order to ensure compliance with the MBTA, it is recommended that lessees survey the project area before construction, vegetation clearing, excavation, discharging fill or other activities which create disturbance, and confirm there are no active migratory bird nests. It is recommended lessees contact the USFWS for assistance and guidance on survey needs, and other compliance issues under the MBTA. While the USFWS can recommend methods (such as surveys and timing windows) to avoid unintentional take, responsibility for compliance with the MBTA rests with lessees.
- d. Lessees to comply with the provisions of the Marine Mammal Protection Act of 1972, as amended (16 USC 1361-1407). The lessee is advised to annually acquire updated information from these agencies. USFWS shares authority for marine mammals with the NMFS.
- e. The lessee is advised that off-shore activity (particularly seismic geophysical surveys) may result in the taking of beluga whales and other marine mammals. Such taking is prohibited by the federal MMPA unless otherwise authorized. The incidental taking of marine mammals may be authorized under the MMPA, and lessee is advised to discuss this matter with NMFS in advance of any geophysical survey activity.
- f. Critical habitat for beluga whales has been designated within Cook Inlet. It is the lessee's responsibility to obtain all necessary state, federal, and local authorizations or permits relating to prospecting permit and lease activities.

- g. The lessee is advised that the description of the techniques used to drill and conduct seismic operations should be thorough and assess potential effects of fish and their spawning substrate, migratory corridors, and over-wintering areas.
- h. Lessees are advised that the Magnuson-Stevens Fishery Conservation and Management Act requires identification of Essential Fish Habitat (EFH) for all species managed under a federal Fisheries Management Plan. Subsequent exploration and development activities associated with the lease sale may be subject to consultation under EFH. EFH information, consultation, guidance, and species life history information are available from NMFS.

9. Kenai Peninsula Borough (KPB)

- a. The Kenai Peninsula Borough has ordinances that govern land and water uses within the Borough. Refer to KPB Title 17 relating to land use of borough lands for more information. It is the lessee's responsibility to obtain all necessary local authorizations and permits relating to lease activities.