

**Kenai Sterling Pool 6 Gas Storage Lease  
ADL 390821**

**Final Finding of the Director**

**Prepared by  
Alaska Department of Natural Resources  
Division of Oil and Gas  
Anchorage, Alaska  
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## Introduction

On December 16, 2005, Marathon Oil Company (Marathon) applied to the Alaska Department of Natural Resources (ADNR), Division of Oil and Gas (Division) for a gas storage lease under AS 38.05.180(u) and 11 AAC 83.500-520. The application included a proposed form of storage lease and \$50 application fee as required by 11 AAC 83.520 and 11 AAC 88.105. To support the application, Marathon supplied pertinent geological and geophysical data, which are held confidential under AS 38.05.035(a)(9).

Marathon applied to store natural gas in a partially depleted gas reservoir utilizing an existing gas well and facilities located approximately 6 miles west of Soldotna, Alaska. The State of Alaska (state) owns a portion of the lands within the proposed storage boundary (see Attachment 1). The proposed storage lease is within the Kenai River Unit, consisting of oil and gas leases owned and operated by Marathon. The Kenai River Unit is connected to the Cook Inlet gas pipeline grid system. Marathon must obtain approval from agencies with jurisdiction, including the Alaska Oil and Gas Conservation Commission (AOGCC), prior to any gas injection.

Only the state's portion of the 7,589.87-acre gas storage reservoir is addressed in this finding. The state's portion of the reservoir includes all acreage leased or subject to lease under AS 38.05.180. The approved storage lease includes 2,637.96 acres of state lands in the following described tracts:

### T. 5 N., R. 11 W., Seward Meridian, Alaska

- Section 28:  $W\frac{1}{2}SW\frac{1}{4}$ ; 80.00 acres;
- Section 29:  $E\frac{1}{2}$ ,  $E\frac{1}{2}W\frac{1}{2}$ ,  $W\frac{1}{2}SW\frac{1}{4}$ ,  $NW\frac{1}{4}NW\frac{1}{4}$ , 600.00 acres;
- Section 30:  $NE\frac{1}{4}NE\frac{1}{4}$ ,  $S\frac{1}{2}NE\frac{1}{4}$ ,  $SE\frac{1}{4}$ , Lots 13, 14 & 15, 295.43 acres;
- Section 30: All tide and submerged land within the  $SE\frac{1}{4}SW\frac{1}{4}$ , 19.48 acres;
- Section 31:  $NE\frac{1}{4}SE\frac{1}{4}$ ,  $W\frac{1}{2}E\frac{1}{2}$ , Lots 3, 4, 5, 7, 8, and 10, 284.67 acres;
- Section 31: All tide and submerged land within  $E\frac{1}{2}NW\frac{1}{4}$  and  $SW\frac{1}{4}$ , 139.04 acres;

### T. 4 N., R. 12 W., Seward Meridian, Alaska

- Section 1:  $NE\frac{1}{4}NE\frac{1}{4}$ ,  $E\frac{1}{2}SE\frac{1}{4}$ , Lots 1, 2, 4 & 5, 209.20 acres;
- Section 1: All tide and submerged land within the  $W\frac{1}{2}E\frac{1}{2}$  and  $E\frac{1}{2}W\frac{1}{2}$ , 217.63 acres;
- Section 12:  $E\frac{1}{2}E\frac{1}{2}$ ,  $E\frac{1}{2}W\frac{1}{2}E\frac{1}{2}$ , Lots 5 thru 18 & 20, 269.81 acres;
- Section 12: All tide and submerged land within the  $E\frac{1}{2}W\frac{1}{2}$  and  $W\frac{1}{2}E\frac{1}{2}$ , 207.70 acres;
- Section 13:  $E\frac{1}{2}NE\frac{1}{4}$ ,  $E\frac{1}{2}W\frac{1}{2}NE\frac{1}{4}$ ,  $E\frac{1}{2}W\frac{1}{2}SW\frac{1}{4}NE\frac{1}{4}$ ,  $NE\frac{1}{4}SE\frac{1}{4}$ ,  $E\frac{1}{2}NW\frac{1}{4}SE\frac{1}{4}$ ,  $E\frac{1}{2}W\frac{1}{2}NW\frac{1}{4}SE\frac{1}{4}$ ,  
Lots 5 thru 12 and the easterly 2.5 acres in Lots 15 and 16; 226.08 acres;
- Section 13: All tide and submerged land within  $W\frac{1}{2}NE\frac{1}{4}$  and  $E\frac{1}{2}NW\frac{1}{4}$ , 88.92 acres.

The lease limits the gas storage area vertically to the Kenai Sterling Pool 6 gas reservoir, described as follows:

The gas sands occurring in the Kenai Field Sterling Gas Pool 6 in the stratigraphic equivalent of formations occurring between the measured depth of 4,366 feet and 4,569 feet below the surface of the ground in the KU 31-07x well, the surface wellhead of which is located in Section 6, Township 4 North, Range 11 West, Seward Meridian, Alaska.

Issuance of the gas storage lease will extend the term of three oil and gas leases issued by the state: ADL 588, 593, and 594. These oil and gas leases have a fixed 12.5 percent royalty rate and their primary terms have been extended by ADNR indefinitely through unitization. Marathon agrees to segregate these leases at the gas storage lease boundary, creating three new separate and distinct leases outside the gas storage area having the same terms and conditions as the original leases within the gas storage area.

## **Statutory Background**

Under AS 38.05.035(e), an ADNR director must make a written finding that a disposal of state land, resources, property, or interests will serve the best interests of the state. The proposed gas storage lease is such a disposal. This best interest finding is a written analysis that describes for the public the facts and applicable law relevant to the disposal and gives a decision based on these factors. The finding must also discuss material issues that were raised during the period allowed for receipt of public comment. The Director must make this written finding public at least 21 days before issuing the storage lease.

Under AS 38.05.180(u), the Commissioner of ADNR may authorize the subsurface storage of oil or gas to avoid waste or to promote conservation of natural resources. It does not matter whether the oil or gas is produced from state land, so long as storage occurs in land leased or subject to lease under section AS 38.05.180. An oil and gas lease on which storage is authorized shall be extended at least for the period of storage and as long thereafter as oil or gas not previously produced is produced in paying quantities. By memorandum dated September 2, 2004, the Commissioner approved a supplement to Department Order 003 and delegated the authority to authorize subsurface storage to the Division Director.

The gas storage lease ADL 390821 grants the lessee the exclusive right to store gas and associated substances in the portions of the gas storage formation reservoir identified in Paragraph 1 of the gas storage lease, subject to the lease terms and applicable statutes and regulations, including mitigation measures and lessee advisories incorporated by reference into the lease. The lease is attached to this finding as Attachment 1.

## Scope of Review

The scope of this administrative review is limited to reasonably foreseeable, significant effects of the disposal or leasing phase of this activity as set out in the attached lease. This review is limited to applicable statutes and regulations; material facts pertaining to the land, resources, or property, or interest in them; and issues that are material based on the statutes, regulations, and facts. Accordingly, the Division has considered some generalized activities following issuance of the gas storage lease that are reasonably foreseeable and expected within the initial ten-year term of the lease. Unanticipated future uses or operations, however, are beyond the scope of this review and will be subject to future public reviews and authorizations by the state.

ADNR is allowed to review projects as "multi-phased development," when three conditions are met (AS 38.05.035(e)(1)(C)):

- (a) the only uses to be authorized are part of the discrete phase being reviewed;
- (b) ADNR's approval is required before the next phase may proceed (i.e., a plan of operations or permit must be authorized before another phase or segment may begin); and
- (c) ADNR describes its reasons for allowing phased review and conditions the approval to ensure that any additional uses or activities proposed for that or any later phase will serve the best interests of the state.

Phased review is based in part on the fact that some multiphased projects are subject to continued review throughout the succeeding stages. Phased review is intended to allow for consideration of subsequent issues when sufficient data are available upon which to make reasonable decisions. Future phases cannot be reviewed with any accuracy when information regarding future activities is unknown, nonspecific, undefined, unavailable, or unreliable.

Condition (a) is met because the proposed gas storage lease gives the lessee the right to conduct storage activities; it does not authorize any activities by the lessee on leased area.

Condition (b) is met because state approval is required before the next phase may proceed. Before any operation may be undertaken in the leased area, the lessee is required to comply with all applicable statutes and regulations, and secure approval of a plan of operations and all applicable permits.

The plans of operation must identify the specific measures, design criteria, construction methods, and standards that will be employed to meet the provisions of the lease. Plans of operation are subject to extensive technical review by a number of local, state, and federal agencies. They are also subject to consistency with the Alaska Coastal Management Program (ACMP) standards if the affected lands are within the coastal zone. The plans are available for public review upon submittal to the state. Oil and gas storage-related activities will be permitted only if proposed future operations comply with all borough, state, and federal laws and the provisions of the lease.

Condition (c) is met because ADNR is conditioning this best interest determination and the lease with a number of mitigation measures designed to ensure that future activities will serve the best interests of the state. The mitigation measures are developed by ADNR through its review of the material facts and issues, including the reasonably foreseeable cumulative effects of storage in the lease area. ADNR may also condition subsequent plan of operation approvals with stipulations as deemed necessary to serve the best interests of the state.

Therefore, the scope of review in this finding is limited to the applicable statutes and regulations; the material facts and issues that are known to the director that pertain to the storage lease phase; and the reasonably foreseeable, significant effects of gas storage. This includes all the items listed in AS 38.05.035(g) and all material facts and issues raised by the public during the public comment period. Specific future storage activities will be considered at each phase, when permit applications for specific proposed activities at specific locations are reviewed by various government agencies and the public. Every individual activity on the proposed storage lease is or has been subject to public review and agency permitting.

## **Public Process**

On January 5, 2006, in compliance with AS 38.05.945, the division issued a public notice (Notice) of receipt of a gas storage lease application, in compliance with AS 46.40.096(c). That notice stated that the proposed storage area is within the Kenai Peninsula Borough (KPB) Coastal Resource District. In addition, as required under AS 38.05.035(e), the Notice called for separate comments regarding whether the issuance of the proposed storage lease would best serve the interests of the state. The Notice was posted on the state public notice website and on the division's website, and was sent to interested parties on the division's Cook Inlet lease sale mailing list, including public libraries; federal, state, and local governments; non-governmental organizations; electric and natural gas utilities; and to 71 potential storage interval owners. Additionally, it was published in the *Anchorage Daily News* on January 8, 2006, and in the *Peninsula Clarion* on January 9, 2006.

The Notice established a public comment period that ended at 5:00 p.m. on February 13, 2006. The Notice stated that the proposed gas storage lease would be a phased activity under AS 46.40.094(a)(2). The Notice called for comments on the application's consistency with the ACMP, including the enforceable policies of the KPB Coastal Resource District's Coastal Management Plan. Comments relative to ACMP consistency were required to identify the enforceable policy or standard at issue and explain how the application is inconsistent.

In addition to the general public notice, the ACMP review package was mailed to ADNR's Office of Project Management and Permitting (OPMP), Office of Habitat Management and Permitting (OHMP), Division of Mining Land and Water (DMLW), and State Historic Preservation Office (SHPO); the KPB; Alaska Department of Fish and

Game (ADFG); Alaska Department of Environmental Conservation (ADEC); AOGCC; and the applicant, Marathon.

To be eligible to appeal this final finding, a person must have provided written comments during the comment period as stated in the Notice.

## **Comments on Proposed Gas Storage Application**

The Division received comments from KPB, the ADNR Office of History and Archaeology, and the Keener family of Kenai.

The KPB has no opposition to Marathon's proposed gas storage lease provided the Borough's interests are protected, adding that the Borough may have an ownership interest in pore space within the storage area other than what was proposed by Marathon in its application.

Paragraph 1 of the lease states, "If the state's ownership interest in the leased area is less than an entire and undivided interest, the grant under this lease is effective only as to the state's interest and the payments provided in this lease must be paid to the state in the proportion that the state's interest bears to the entire undivided fee. The state makes no representations or warranties, express or implied, as to title, or access to, or quiet enjoyment of, the leased area. The state is not liable to the lessee for any deficiency in title to the leased area, nor is the lessee or any successor in interest to the lessee entitled to any refund due to deficiency in title for any payments made under this lease."

The Office of History and Archaeology does not have any concerns with the proposed project because it utilizes existing facilities, but requests that it be able to review specific plans if any are developed, to assure compliance with the Alaska Historic Preservation Act.

The Keener family expressed concerns with underground injection of chemicals and drilling fluids at the Kenai gas field over the years, and the possible effects on water quality and wildlife. In addition, they are dissatisfied with the amount of rent Marathon offered them for leasing their interest in the storage area. The Keeners also raised a number of other questions. ADNR responded to the Keeners on March 7, 2006, regarding these issues.

First, the underground injection operations of existing leases are conducted under authority of the AOGCC, and are unrelated to the proposed gas storage activity, including the strata within which gas is proposed to be stored. The applicant must obtain approval of a Storage Injection Order from the AOGCC prior to injecting. The division referred underground injection questions to the AOGCC, who responded by letter on March 21, 2006. The AOGCC explained that the prior injections are authorized and that it is reviewing all relevant data to ensure the gas storage is safe and protects the environment.

Second, ADNR inquired of the Alaska Department of Environmental Conservation (ADEC) regarding water quality of existing waterbodies, industrial wastewater concerns relative to the proposed project, and drinking water quality. ADEC representatives responded that no known water quality issues of any type exist in the area. A representative of the Drinking Water section contacted Mr. Keener to further discuss his concerns.

Third, ADNR cannot comment on Marathon's rental offer or on the Keener's business decision regarding that offer, and does not consider a private business arrangement germane to the decision whether the proposed project is in the state's best interests.

Finally, answers to the Keeners' other questions, or appropriate referrals, were provided.

The division independently determined that all available data indicate that the reservoir sands proposed for storage are contained wholly within the proposed Pool 6 gas storage formation. The Sterling Formation Pool 6 gas reservoir is hydraulically isolated from other producing gas pools of the Kenai Unit and is not in communication with any potential gas reservoir. Further, the AOGCC must determine, prior to issuance of an Injection Order, that injection levels are beneath and not in communication with strata containing drinking water aquifers.

Paragraph 1 of the lease provides that the lessee's storage rights must be "exercised in a manner that will not unreasonably interfere with the rights of any permittee, lessee or grantee of the state consistent with the principle of reasonable concurrent uses as set out in Article VIII, Section 8 of the Alaska Constitution."

Paragraph 13(b) requires the lessee to notify the division of any anticipated changes in a project resulting in alteration of conditions that were originally approved, including: increase in size of the project; increase in the approved zone pressure; changes in the injection and withdrawal intervals; changes in the observation and collection intervals; or changes in monitoring procedures. No changes may be carried out without Commissioner approval. Paragraph 23 of the lease states that if the Commissioner determines that stored gas is migrating from the gas storage formation to other formations or that stored gas within the gas storage formation is expanding beyond the limits of the leased area, this lease may be amended, effective as of the date prescribed by the Commissioner, to include formations or lands subject to the same terms and conditions applicable to the lands and formations previously committed to this lease.

## **Alaska Coastal Management Program**

If the proposed activity, leasing of the state's proportionate ownership of the Pool 6 storage formation, occurs in a coastal area, AS 46.40 requires that the activity be consistent with the ACMP, which includes approved local coastal district management

plans. The Notice described above, solicited comments relative to such a consistency determination.

Under 11 AAC 110.255, the Department issued a *Proposed ACMP Consistency Determination for Proposed Gas Storage Lease Application (ADL 390821)* on March 7, 2006, which addressed all relevant comments received in response to the Notice and identified the mitigation measures to be applied to the gas storage lease.

Issued concurrently with this Best Interest Finding and as conditioned by the identified mitigation measures, the Final Consistency Determination finds this disposal to be consistent with the ACMP, including the KPB Coastal Resource District's Coastal Management Plan.

## **Material Facts and Issues**

The Kenai Gas Field was discovered in 1959 by Union Oil Company of California while drilling for oil on the Kenai Peninsula near the mouth of the Kenai River. The U.S. Department of Interior approved the Kenai River Unit on May 1, 1959. Chevron, U.S.A., Inc., discovered gas in the Sterling Formation in 1959 with the Kenai Unit #14-6 well. Natural gas production at Kenai began in 1961 and today produces from 8 distinct pools of the Sterling, Beluga, and Tyonek Formations. As of year-end 2005, five Sterling Formation pools (Sterling 3, 4, 5.1, 5.2, and 6) had produced 1.832 trillion cubic feet of gas.

The Kenai Sterling Pool 6 was defined by the AOGCC Order No. 82, dated December 3, 1969. In that order, the Kenai Sterling Pool 6 is defined as "the accumulation of gas common to and which correlates with the accumulation found in the interval 4,880' to 5,213' in the KU 21-6 Well". The Sterling Unit Pool 6 has two gas sands, labeled by Marathon as the C-1 and C-2 sands. These sands are present throughout the field, are identified easily on well logs, are in pressure communication with one another, and are produced as a common management unit.

Marathon plans to cycle 6 to 11 billion cubic feet (bcf) of natural gas each year, injecting in summer and withdrawing in winter to meet annual base-load demand. The Kenai project will add 6 to 11 bcf of storage capacity/year to an existing 2.7 bcf storage capacity at Swanson River and Pretty Creek.

Pool 6 gas production is measured separately from other gas streams for reservoir management and royalty allocation purposes. As of January 30, 2006, Pool 6 had produced 524.184 billion cubic feet of gas. In the month of January, Marathon produced 948 million cubic feet of gas out of nine Pool 6 wells. The current Pool 6 reservoir pressure is 193 psi; down from the original pressure of 2,505 psi.

The Pool 6 storage lease boundary was drawn in a manner consistent with and accepted by the ADNR and the Bureau of Land Management for establishing participating areas. Because some recoverable native gas will remain in the storage

reservoir, full payment of royalties will be made on the estimated volume of native gas according to Exhibit C of the state storage lease, underlying oil and gas leases, and Kenai Unit Agreement.

Storage injections are limited to the Sterling C-1 and C-2 sands. The C-1 injection interval is from 4366-feet and 4500-feet true vertical depth (TVD) (134-feet thickness) in injection well KU 31-07X. The C-2 injection interval is from 4530-feet and 4569-feet TVD (39-feet thickness) in injection well KU 31-07X.

The applicant proposes to conduct injection and withdrawal operations from the existing KU 31-07X well and associated gravel pads, roads, and utilities infrastructure. No additional impact to the surrounding environment, including the habitat and the fish and wildlife species that depend on that habitat, is foreseeable after issuance of the gas storage lease.

A complete description of the storage project facilities and operations is included in the Plan of Operations required by Paragraph 12 of the lease. A complete description of the gas storage reservoir capacity will be included in the storage development plan, required under Paragraph 13 of the lease, prior to first injection.

Natural gas production from the Kenai field and neighboring Cannery Loop is shipped to the City of Kenai and Nikiski Industrial Complex via the 20-inch Kenai Nikiski Pipeline (KNPL). Kenai and Cannery Loop gas is also shipped to Sterling Unit and Anchorage via Enstar's dual 12-inch pipelines. Natural gas from Ninilchik and Cannery Loop Units may be injected into the Pool 6 Storage reservoir. Potentially, non-odorized gas from other producing fields connected to the Kenai-Kachemak Pipe Line KKPL line, including Ninilchik, Deep Creek, and Kasilof, may be injected into the Pool 6 storage reservoir. Royalties must be paid on gas when it leaves the formation, regardless of the unit of origin.

As specified in the lease, Marathon may only inject its own gas into the Pool 6 reservoir, and no storage of third-party owned gas is planned at this time. The remaining recoverable native gas estimate of 32.5 bcf is based on an abandonment pressure of 75 pounds per square inch (psi) that is limited by existing facilities.

Marathon will measure and keep a record of all gas injected into and withdrawn from the gas storage formation, as well as surface casing and reservoir pressures in accord with Paragraph 16 of the lease. Continuous monitoring will be performed to ensure the confinement and containment of the stored gas. Public safety, protection of the environment (surface and subsurface), and conservation of the resource are the main goals of the monitoring program. Additionally, monitoring data will be used to evaluate project performance and to optimize the storage operations.

All relevant statutes and regulations have been considered in this finding, including AS 38.05.180(u), 11 AAC 83.500-520, AS 41.06, and 20 AAC 25.252. All terms are specified in the lease. To prevent the storage lease from extending the term of

oil and gas leases covering large tracts of land not used for storage, the applicant agrees that the oil and gas leases underlying the storage lease area will be segregated, and that new oil and gas leases be issued for the acreage outside the storage lease.

## **Environmental Impacts**

No construction, facility development, or surface changes of any kind are anticipated as a result of lease issuance or anticipated future activities. Therefore, no negative environmental impacts are currently anticipated. The mitigation measures discussed in the next section are terms of the lease and apply to all currently planned and future activities.

The storage lessee must comply with all applicable local, state, and federal statutes and regulations, and with any terms imposed in this lease or in any subsequent plan of operation approvals, or in the AOGCC Storage Injection Order. ADNR has the authority to amend the proposed storage lease if stored gas migrates from the gas storage formation to other formations or if stored gas expands beyond the limits of the leased area. The storage lessee shall notify the Division of any anticipated changes in the project resulting in alteration of conditions that were originally approved and must obtain further approval before implementing those changes.

The storage activity at Pool 6 does not require any additional authorizations, except the AOGCC injection order. The Injection Order must protect any aquifer suitable as a drinking-water source. AOGCC will review the injection order application to ensure the mechanical integrity of area wells, monitoring, and contingency planning.

## **Mitigation Measures and Lessee Advisories**

AS 38.05.035(e) and the departmental delegation of authority provide the director, Division of Oil and Gas with the authority to impose conditions or limitations, in addition to those imposed by statute, to ensure that a resource disposal is in the state's best interests. Consequently, to mitigate any potential adverse social and environmental effects of lease-related activities, DO&G has developed the following mitigation measures and will condition all approvals related to this lease based on these measures, regardless of the surface ownership status of the land.

A plan of operations must identify the specific measures, facilities, methods and standards to be employed to comply with the restrictions listed below. It must also address any potential geophysical hazards that may exist at the site. Plans of operation must comply with coastal zone consistency review standards and procedures established under 6 AAC 50 and 80 including coastal district plans. DO&G will require, as a condition of approval, such modification or terms as may be necessary to ensure consistency with the ACMP standards.

In addition to compliance with these mitigation measures and the ACMP, the lessee must comply with all applicable local, state and federal codes, statutes and regulations, and any subsequent amendments. The lessee must also comply with all current or future ADNR area plans

and recreation rivers plans and with ADF&G game refuge plans, critical habitat area plans, and sanctuary plans that are or may become applicable.

Also, information to lessees is presented in the “Lessee Advisories,” which contain precautions which may apply to lease-related activities, and reflect existing state, and federal law or policy at the time of the lease award.

For those mitigation measures and lessee advisories that are within ADNR’s authority, the lessee may request, and the director may grant, exceptions if compliance with the mitigation measure is not feasible or prudent or if an equal or better alternative is offered. Requests and justifications for exceptions must be included in the initial plan of operations application when one is required. The decision whether to grant an exception will be based on review of the plan of operations by the public and in consultation with appropriate state resource agencies.

Abbreviations used in the following section include: Alaska Department of Environmental Conservation (ADEC), Alaska Department of Fish and Game (ADF&G), Alaska Department of Natural Resources (ADNR), director (director, ADNR/Division of Oil and Gas), ADNR/Division of Forestry (DOF), ADNR/Division of Mining, Land and Water (DMLW), ADNR/Division of Parks and Outdoor Recreation (DPOR), Kenai Peninsula Borough (KPB), ADNR/Office of Habitat Management and Permitting (OHMP), ADNR/State Historic Preservation Officer (SHPO), U.S. Army Corps of Engineers (USCOE), and U.S. Fish and Wildlife Service (USFWS).

### **Facilities and Operations**

1. Lessees must submit a plan of operations to the state for approval as required by 11 AAC 83.158. Where surface activities are proposed on non state-owned land, lessees must submit a copy of the plan of operations to the private surface owner. Plans of operation must describe the lessee’s efforts to minimize impacts on residential areas and privately-owned surface lands.
2. Lessees must disclose any requests for exceptions to these mitigation measures and advisories in their plans of operation and applicable permit applications.
3. A plan of operations 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 all surface owners whose property will be entered.
4. Facilities must be designed and operated to minimize sight and sound impacts in areas of high residential, 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 OHMP.
5. The siting of facilities other than docks, roads, utility or pipeline corridors, will be prohibited within 500 feet of all fish bearing waterbodies. A facility may be sited within this buffer if the lessee demonstrates to the satisfaction of the Director, in consultation with OHMP and the KPB, that a site location outside this buffer is not feasible and

- prudent or that a location inside the buffer is environmentally preferred. Road, utility and pipeline crossings must be aligned perpendicular or near perpendicular to watercourses.
6. Impacts to important wetlands must be minimized to the satisfaction of the Director, in consultation with OHMP and ADEC. The Director will consider whether facilities are sited in the least sensitive areas. Further, all activities within wetlands require permission from the U.S. Army Corps of Engineers (see Lessee Advisories).
  7.
    - a. Pipelines that must cross marine waters will be constructed beneath the marine waters using directional drilling techniques, unless the Director, in consultation with OHMP and the local borough, approves an alternative method based on technical, environmental, and economic justification.
    - b. 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 wildlife.
    - c. Pipelines must be located upslope of roadways and pads and must be designed to facilitate the containment and cleanup of any associated hydrocarbons and petroleum products. Pipelines, flowlines, and gathering lines must be designed and constructed to assure integrity against environmental conditions and geophysical hazards.
  8. Dismantlement, Removal and Rehabilitation (DR&R): Upon abandonment of material sites, well sites, roads 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, OHMP, DEC, KPB, and any non-state surface owner, determines that such removal and rehabilitation is not in the state's interest.
  9. With the exception of facilities specifically permitted, facilities must be consolidated, and the use of gravel must be minimized. Use of abandoned gravel structures may be permitted on an individual basis.
  10. Gravel mining within an active floodplain will be prohibited. Upland sites will be restricted to the minimum necessary to effect lease operations efficiently.

#### **Fish and Wildlife Habitat**

11. Compaction or removal of snow cover overlying fish bearing waterbodies is prohibited except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, ice or snow bridges may be required.
12. Surface entry will be prohibited within one-quarter mile of trumpeter swan nesting sites from April 1 through August 31. The siting of permanent facilities, including roads, material sites, storage areas, powerlines, 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.
13. Before commencement of any activities requiring human presence, lessees shall consult with ADF&G to identify the locations of known bear den sites that are occupied in the season of proposed activity. Activities requiring human presence may not be conducted

within ½-mile of known occupied brown bear dens, unless alternative mitigation measures are approved by ADF&G. A lessee who encounters an occupied bear den not previously identified by ADF&G must report it to the Division of Wildlife Conservation, ADF&G, within 24 hours (Soldotna, 907-262-9368).

**Access**

14. Public access to, or use of, the leased area may not be restricted except within the immediate vicinity of well sites and related structures. Areas of restricted access must be identified in the plan of operations. Lease facilities and operations shall not be located so as to block access to or along navigable and public waters as defined at AS 38.05.965(13) and (17).

**Waste and Wastewater Disposal**

15. Waste from operations must be reduced, reused, or recycled to the maximum extent practicable. Garbage and domestic combustibles must be incinerated whenever possible or disposed of at an approved site in accordance with 18 AAC 60.
16. Discharge of drilling mud and cuttings into lakes, streams, rivers, or important wetlands is prohibited. On pad temporary cuttings storage will be allowed as necessary to facilitate annular injection, regulated by AOGCC, or backhaul operations in accordance with ADEC solid waste regulations at 18 AAC 60.
17. Wastewater disposal:
  - a. Unless authorized by NPDES and/or state permit, disposal of wastewater into freshwater bodies, intertidal areas, or estuarine waters is prohibited.
  - b. Disposal of produced waters to freshwater bodies, intertidal areas, and estuarine waters is prohibited.
  - c. Disposal of produced waters in upland areas, including wetlands, will be by subsurface disposal techniques approved by AOGCC.
  - d. Surface discharge of reserve pit fluids will be prohibited unless authorized in a permit issued by ADEC and approved by DMLW.

**Fuel and Hazardous Substances**

18. Secondary containment shall be provided for the storage of fuel or hazardous substances.
19. 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.
20. 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.

21. Vehicle refueling shall not occur within the annual floodplain, except as addressed and approved in the plan of operations.
22. 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.
23. A fresh water 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.

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

24.
  - a. Prior to the construction or placement of any structure, road, or facility, 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 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 must be submitted to the Director for distribution to Division of Parks and Outdoor Recreation (DPOR) for review and comment. In the event that a prehistoric, historic, or archeological site or area may be adversely affected by a leasehold activity, the Director, after consultation with DPOR and the KPB, will direct the lessee as to what course of action will be necessary to avoid or minimize the adverse effect.
  - c. In the event any site, structure, or object of prehistoric, historic, or archaeological significance is discovered during leasehold operations, the lessee must immediately report such findings to the Director. The lessee must make every reasonable effort to preserve and protect such site, structure, or object from damage until the Director, after consultation with the SHPO, has given directions as to its preservation.

#### **Local Hire and Training**

25. To the extent they are available and qualified, the lessee is encouraged to employ local and Alaska residents and contractors for work performed on the leased area. Lessees shall 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 and hire local and Alaska residents and contractors. The lessee is encouraged, in formulating this proposal, to coordinate with employment services offered by the state of Alaska and local communities and to recruit employees from local communities.
26. A plan of operations application must include a description of 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 the individual'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.

## Lessee Advisories

Lessee Advisories are intended to alert the lessee to possible additional restrictions that may be imposed at the permitting stage of a proposed project or activity, especially where entities other than DO&G have permitting authority.

### **ADNR/OHMP and ADNR/DMLW**

1. Under the provisions of Title 41 of the Alaska Statutes, the measures listed below may be imposed by OHMP to protect designated anadromous fish bearing streams and to ensure the free and efficient passage of fish in all fish-bearing water bodies. Specific information on the location of anadromous waterbodies and prior written approval for activities affecting fishbearing waterbodies may be obtained from OHMP.
  - a. Alteration of river banks may be prohibited.
  - b. Operation of equipment within riparian habitats may be prohibited.
  - c. The operation of equipment, excluding boats, in open water areas of rivers and streams will be prohibited.
  - d. Bridges or non-bottom founded structures will be required for crossing fish spawning and important rearing habitats. In areas where culverts are used, they must be designed, installed, and maintained to provide for the efficient passage of fish.
2. Removal of water from fish bearing waterbodies shall be subject to prior written approval by OHMP and DMLW.
3. For activity in proximity to areas frequented by bears, lessees are encouraged to prepare and implement bear interaction plans to minimize conflicts between bears and humans. These plans could include measures to: (a) minimize attraction of bears to drill sites; (b) organize layout of facilities and work areas to minimize human/bear interactions; (c) warn personnel of bears near or on work sites and the proper procedures to take; (d) if authorized, deter bears from the work site; (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; and (g) provide a systematic record of bears on site and in the immediate area.

**DNR/OPMP**

4. Pursuant to Alaska Statutes, lessees are required to comply with all requirements of the Alaska Coastal Management Program, including the District Coastal Management Plan.

**ADEC**

5. Lessees are advised that air quality permits may be required prior to construction and operation, pursuant to state regulations administered by ADEC and the Clean Air Act administered by EPA.

**USCOE**

6. Any activity involving wetland-related dredge or fill activities requires a permit from the USCOE.

**USFWS**

7. Bald eagles are protected under the Bald Eagle Protection Act (16 U.S.C. 668-668c) and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712) and are under authority of the U.S. Fish and Wildlife Service (USFWS). Lessees are responsible to ensure their actions do not take bald eagles. The Eagle Protection Act defines “take” to include disturbing birds. Any nests located within ½-mile of the project site must be mapped, and destruction of nest trees or locations is prohibited. If any nests are located within ½-mile of a project site, Lessees shall meet with the USFWS to review any site-specific concerns regarding the subject nest. USFWS generally recommends no clearing of vegetation within 330 feet of any nest. No activity should occur within 660 feet of any nests between March 1 and June 1. Between June 1 and August 31, no activity should occur within 660 feet of active eagle nests until after juvenile birds have fledged, unless specifically authorized by the USFWS. While the USFWS can recommend ways to avoid the take of eagles, final accountability lies with the party responsible for the action.
8. Lessees are advised of the need to comply with the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703) which is 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.

To ensure compliance with the MBTA, it is recommended that Lessees survey the project area prior to 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 Service can recommend methods to avoid unintentional take, responsibility for compliance with the MBTA rests with the Lessee.

## Analysis of State Benefits

Currently, the Cook Inlet gas delivery system cannot supply the market when demand spikes in the coldest days of winter. Gas storage increases reliability of gas delivery to electric utility companies, industrial users, and all residents who use gas in the Cook Inlet Basin. Nearly 60 percent of Alaskans depend on Cook Inlet gas to heat or light their homes and businesses (ADOLWD, 2004). All electric utilities in the Cook Inlet region depend on reliable supplies of natural gas. Most homes located along the natural gas pipeline grid system are heated with natural gas or gas-generated electricity. The ConocoPhillips-Marathon Liquefied Natural Gas (LNG) Facility, Tesoro Petroleum Refinery, and Agrium fertilizer-ammonia plant rely on natural gas delivered from the Cook Inlet pipeline grid (USDOE, 2004).

Gas for use in the Cook Inlet region along the gas pipeline distribution system is in short supply during the winter months of peak demand. When demand exceeds supply, gas delivery contracts specify that industrial use be curtailed, thus requiring plant operators to shut down facilities and output.

Of the 200 billion cubic feet of gas consumed in the Cook Inlet region in 2003, 20 percent was sold to Agrium for urea-ammonia production, 37 percent to ConocoPhillips-Marathon plant for LNG production, and the remainder was used for power generation (18 percent), utility gas (16.5 percent), field operations and other uses (8.3 percent). Industrial consumption is stable, but residential and commercial demand is growing (ADNR, 2004).

During the winter of 2004-2005, industrial use at Nikiski occasionally was curtailed because producers could not supply enough natural gas to all markets. During the last week of January 2006, Agrium shut-down operations when cold temperatures tightened supply (ADN, 2006). In the future, diverting supply from industrial users such as the Agrium fertilizer plant or the ConocoPhillips-Marathon LNG plant may not be enough to avoid interrupting deliveries of gas to commercial and residential users. Gas storage will help alleviate peak demand shortages, thereby helping to provide a reliable supply to industrial, commercial, and residential end users.

On July 29, 2005, Alaska Governor Murkowski's *Agrium Task Force* recommended that state and federal government and industry actively support and promote the establishment of new natural gas storage facilities within the Cook Inlet Basin to address the issue of natural gas deliverability shortfalls in winter.

“The natural gas system may be challenged to meet future peak demand periods in winter. Without adequate natural gas storage capacity in place, industrial users are the first to feel the effects of deliverability shortfalls through curtailment of their natural gas supplies in deference to the needs of utility consumers. Curtailments of supply create increasingly unfavorable economic conditions for industrial users that may ultimately result in the closure of one or more natural gas based industrial plants.”

Reserves estimated at less than 2 trillion cubic feet will eventually be produced, but daily demand for gas, especially on cold winter days, exceeds the supply that currently can be delivered (ADNR, 2006).

While industrial demand is relatively stable throughout the year, residential and commercial demand for gas ranges from 35 million cubic feet per day (cfd) in the summer to 200 million cfd or higher on the coldest days of the year. Enstar forecasts daily gas contract needs to grow 2 percent each year over the next 10 years. Demand for gas on an average annual basis will exceed contracted supply beginning in 2009 (Enstar, 2005). After 2009, some gas will come from undeveloped reserves; however production rates from ageing fields and existing wells are declining and there are virtually no new large gas discoveries in Cook Inlet to replace existing production.

Marathon's proposed gas storage facility at Pool 6 may deliver a maximum of 60 million cfd or 11 bcf annually to the Cook Inlet gas pipeline grid. The Pool 6 storage facility will help alleviate peak winter shortages, but not eliminate them. The storage lease allows continuous gas depletion, maximizing recovery and royalty income from gas pools, and will increase the reliability of supply to meet customer demand (annual baseload demand) (ADNR, 2006). Additional benefits include optimizing field efficiency, electric utility load balancing, and back-stopping daily shortages from unplanned well shut-ins.

## **Best Interest Determination**

State oil and gas leases exclude storage rights except for secondary or tertiary enhanced oil recovery or reservoir pressure maintenance. AS 38.05.180(u) allows ADNR to authorize underground storage of hydrocarbons as a separate activity from conventional oil and gas leasing. In Alaska, depleted reservoirs with established well control data are preferred storage zones.

Some unproduced "native" gas remains in the gas storage reservoir and serves as "cushion gas" to support gas withdrawal and delivery rates. Cushion gas is the volume of gas intended as permanent inventory in a storage reservoir to maintain adequate pressure and deliverability rates throughout the withdrawal season. Injected gas will mix with native gas in the reservoir.

The storage lease is for specified sand horizons only and does not give the lessee the right to drill, develop, produce, extract, remove, or market gas other than injected gas. The operator must comply with 20 AAC 25, specifically 20 AAC 25.252. There are no wells within 1,500 feet of the injection well (KU 31-07X). Because adjacent lease ownership boundaries are greater than 1,500 feet from the injection well, no spacing exception is required under (20 AAC 25.055(a)(2)). Before any gas may be injected, Marathon must obtain approval of the Injection Order from AOGCC.

Well data and seismic surveys indicate that the horizontal and vertical extent of the horizons proposed for injection are wholly contained within the storage lease area.

Data and interpretations of those data reasonably demonstrate that injection operations will not affect the pressure or movement of fluid beneath adjacent leases.

The state and lessee agree for the purposes of this lease that as of August 1, 2005, the estimated ultimate recovery of native gas from the gas storage formation shall be 552 bcf and that there are 32.51 bcf of recoverable native gas in the gas storage formation under the leased area. This estimate is based on a straight line  $p/z$  interpretation ( $p/z$ , where  $p$  is pressure and  $z$  is compressibility) of the entire Pool 6 well production history data set and an abandonment pressure of 75 pounds per square inch absolute. Upon initiation of storage operations, the allocation of native gas withdrawn from the storage area shall be as indicated in Exhibit B of the storage lease.

Developing the state's energy resources and ensuring reliability of supply are vital to the state economy and the well-being of its citizens. The gas storage project increases Marathon's ability to meet demand, results in operational efficiencies, and does not diminish royalty and tax payments that would occur without storage.

Because Alaska's population is growing, residential and commercial demand for natural gas is increasing. This growth will exacerbate gas shortages in the near future, unless gas storage or other deliverability measures are encouraged and implemented.

The feasibility of underground gas storage depends on favorable geological and engineering properties of the storage reservoir, including its size and its gas cushion (or base, gas requirements). It also depends on access to transportation, pipeline infrastructure, existing production infrastructure, gas production sources, and delivery points.

Favorable geologic characteristics and location along an important gas pipeline make the Pool 6 gas reservoir an ideal candidate for storing natural gas, thus conserving it for use during times of peak demand. All gas consumers in the Cook Inlet basin, and especially industrial users, will benefit from efficiencies created by reliable gas service. Consumers of natural gas in the Cook Inlet region may benefit from lower utility rates because of firm supply contracts between the producer and the gas delivery company (Enstar Natural Gas Company).

The Kenai Pool 6 natural gas storage facility is designed to provide increased security of supply to Marathon Cook Inlet natural gas customers during high demand periods. The storage lease allows the operator to store gas during lower demand periods (usually summer) and withdraw and deliver that gas during the high demand periods of winter. This helps Marathon to meet contract demands year-round, thus furthering the goal of uninterrupted service for all consumers of gas in the Cook Inlet region.

The proposed gas storage lease is conditioned by its terms, including mitigation measures and lessee advisories. It provides for a reasonable fee in exchange for exclusive use of the subsurface storage container, consisting of two nearly depleted gas reservoirs. The storage lease will have a 10-year primary term with one or more additional ten-year

term periods and will continue in effect as long as the terms are met. The storage lessee must inject and withdraw gas on a regular basis to keep the lease. The state will be paid a minimum annual fee for use of the storage reservoir.

The division tailored the fee to the stated purpose of the gas storage lease and finds this fee reasonable. The division based the fee on estimated working gas usage and considered the stated purpose of the gas storage facility, namely operational balancing and annual contract supply, and not direct customer service. Should the purpose of the storage facility change, the lessee must file an amended storage development plan. Further, state interests are protected because any change in the material conditions under which this lease was originally approved, including any increase in the size of the project or increase in zone pressure, requires ADNR approval.

On the basis of the facts and issues, comments received, applicable laws and regulations, and the documents reviewed during preparation of this finding, I conclude that issuing gas storage lease ADL 390821 will best serve the interests of the state of Alaska.

This finding is a final administrative decision of the department. A person affected by this decision who provided timely written comment on this decision may request reconsideration, in accordance with 11 AAC 02. Any reconsideration request must be received by 5:00 p.m. (local time), April 27, 2006 and may be mailed or delivered to Michael Menge, Commissioner, Department of Natural Resources, 550 W. 7th Avenue, Suite 1400, Anchorage, AK 99501; faxed to 1-907-269-8918; or sent by electronic mail to [dnr\\_appeals@dnr.state.ak.us](mailto:dnr_appeals@dnr.state.ak.us). If reconsideration is not requested by that date or if the Commissioner does not order reconsideration on his own motion, this decision goes into effect as a final order and decision on May 8, 2006. Failure of the Commissioner to act on a request for reconsideration within 30 days after issuance of this decision is a denial of reconsideration and is a final administrative order and decision for purposes of an appeal to Superior Court. The decision may then be appealed to Superior Court within a further 30 days in accordance with the rules of the court and to the extent permitted by applicable law. An eligible person must first request reconsideration of this decision in accordance with 11 AAC 02 before appealing this decision to Superior Court. A copy of 11 AAC 02 may be obtained from any regional information office of the Department of Natural Resources.

*Signed by Pirtle Bates, Deputy Director for*

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William Van Dyke  
Acting Director, Division of Oil and Gas

I concur with the Director's Finding:

*Signed by Kenneth W. Griffin, Deputy Commissioner for*

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Michael Menge, Commissioner

## References

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2004 Alaska Population Estimates 2000-2004. Alaska Department of Labor & Workforce Development, Research & Analysis Section.

ADNR (Alaska Department of Natural Resources)

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2005 Personal communication with Dan Dickegraff, Enstar Natural Gas Company, August 18, 2005.

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2004. South-Central Alaska Natural Gas Study. Charles P. Thomas, et al. United States Department of Energy, National Energy Technology Laboratory, Arctic Energy Office, Final Report, June.