

ENVIRONMENTAL ASSESSMENT

SWANSON RIVER NATURAL GAS STORAGE PROJECT

Kenai National Wildlife Refuge - - - - - Soldotna, Alaska



MARCH 2005

P.O. Box 2139
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PURPOSE AND NEED FOR ACTION

Proposed Action

Union Oil Company of California (Unocal) has applied to the Bureau of Land Management (BLM) and U.S. Fish and Wildlife Service (FWS) for permission to expand the Kenai Gas Storage Facility (KGSF) in the Swanson River Field (SRF) located within Kenai National Wildlife Refuge (KNWR) in South-central Alaska.

Background

The SRF started producing oil in what was then the Kenai National Moose Range in 1957. In subsequent years the Field has also been developed for natural gas. As of January 2005 SRF had produced a total of 228,688,608 barrels of crude oil and 46.9 billion cubic feet of gas. As oil production declined, a 16 inch gas pipeline from Nikiski to SRF, and a compression plant, were constructed for the purpose of importing natural gas and injecting it to aid in the production of oil through reservoir pressure maintenance. Over the next three decades, 331 billion cubic feet of gas were imported and injected in the SRF. In 1993, field blowdown was commenced and gas was no longer imported. Since 2001 Unocal has been injecting gas into a depleted gas reservoir during summer months, when the local gas supply is in excess, and producing that gas back during the winter months, when demand may exceed the supply. To date, all of the gas placed into storage has come from within the SRF; however, starting in 2005 Unocal believes that additional storage capacity will be required to handle forecasted seasonal deliverability demands. This belief has been substantiated by concerns raised by the local utility companies, Kenai Peninsula Borough, and the Governor's Office. Natural gas delivery concerns were also raised in a June 2004 Department of Energy report on future of natural gas exploration, production, and use within the Cook Inlet Region of Alaska. Unocal proposes to supplement gas produced within the SRF by piping in gas produced outside the lease area through the existing pipeline where it would be compressed with existing compressors, and piped to existing storage wells or any of several new wells that would be developed on existing gravel pads within the SRF. While this use is similar to longstanding activities within the Field, it is a new use of the lease area not guaranteed to Unocal as the unit operator since it is a use unrelated to exploration and production of oil and gas from the lease area. A gas storage agreement, authorized under the provisions of the Minerals Leasing Act, would need to be issued by BLM for any new storage wells and related structures to facilitate the expanded storage proposal. Additionally, the FWS must review the proposed use for compatibility with KNWR purposes, consistent with the requirements of the National Wildlife Refuge System Administration Act, and provide concurrence to the BLM. A separate compatibility determination accompanies this environmental assessment (EA).

Alternatives Considered

Five alternatives were evaluated for the Swanson River Gas Storage Project. Alternative A is the no action alternative. Alternatives B through D provide for the gas storage project to be developed and give more flexibility to industry in their construction and operation of gas storage operations. Alternatives C and D provide for the gas storage project to be developed with more of a long-term certainty for use of the facility past the normal production phase life of the SRF. Alternative E is the preferred alternative. It provides for the gas storage project to be developed but in a way that minimizes negative environmental impacts and complies with the compatibility requirements of KNWR.

Alternative A – No Action

Under Alternative A, gas storage within SRF would remain limited to the storage of natural gas produced within the lease area. It would not meet the purpose and need of the proposed action as insufficient gas deliverability exists within the lease area to meet expected demands during peak use periods in winter months.

Alternative B – Gas Storage (Most Cost Efficient Construction and Operation)

Under Alternative B, the Swanson River Gas Storage Project would be authorized and the purpose and need of the proposed action would be met. Gas storage authorization would run concurrently with the existing oil and gas lease. The gas storage agreement, however, would not limit the placement of structures or building of new facilities within KNWR. Unocal would be able to site pipelines in undisturbed areas and build new roads and pads to drill gas storage wells.

Alternative C – Gas Storage (Unlimited Life)

Under Alternative C, the Swanson River Gas Storage Project would be authorized and the purpose and need of the proposed action would be met. The gas storage agreement would limit the development of gas storage facilities to only those areas already disturbed by existing production activities and would not extend the development footprint within the SRF. The terms of the authorization, however, would allow for extending the life of the lease so long as the area was serving a useful purpose for gas storage.

Alternative D – Gas Storage (Most Cost Efficient and Unlimited Life)

Under Alternative D, the Swanson River Gas Storage Project would be authorized and the purpose and need of the proposed action would be met. The gas storage agreement would allow for the placement of structures and the building of new facilities in any area that best served the purpose and maximized cost effectiveness. The agreement would also allow for extending the life of the existing lease to facilitate ongoing gas storage.

Alternative E (Preferred Alternative) – Gas Storage (Limited Footprint and Life)

Under Alternative E, the Swanson River Gas Storage Project would be authorized and the purpose and need of the proposed action would be met. The gas storage agreement would restrict the development to existing roads, pads, and pipeline corridors. Gas storage would not extend the industrial presence of the SRF. Stipulations would be included in the agreement to ensure compatibility with KNWR purposes.

Affected Environment

The proposed project would occur within the SRF of KNWR (Figures 1 & 2). The KNWR, managed by FWS, was first set aside as part of the National Wildlife Refuge System in 1941 as the Kenai National Moose Range. In 1980, under provisions of the Alaska National Interest Lands Conservation Act (ANILCA), the Refuge name and purposes were changed and acreage was added. As required by ANILCA, a Final Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review document was published in 1985 and describes in detail the physical, biological, and human environments of KNWR. The sections that follow provide a brief summary of the discussions primarily derived from that document.

Climate: The climate of South-central Alaska is subarctic. Temperatures range between – 30 degrees F and 80 degrees F on the Kenai Peninsula. The average annual temperature on KNWR is 33.2 degrees F. The frost-free growing season varies from 71 to 129 days depending upon the location. The effects of the brief growing period are partially offset by long days (up to 19 hours of sunlight) in the summer. Annual precipitation on the western side of the Kenai Peninsula is about 19 inches.

Landforms: The western portion of the Kenai Peninsula where the project site is located is characterized by the Kenai Lowlands. These lowlands consist of ground moraine and stagnant ice terrain with low ridges, hills, and muskeg. Relief ranges from 50 to 250 feet and most of the land is less than 500 feet above mean sea level. This area contains thousands of lakes. The lowlands are within the Cook Inlet Sedimentary Basin, the reservoir for oil and gas in the area.

Geology: The geology of the project area consists of Tertiary rock formations covered by glacial deposits. Collectively known as the Kenai Group, it is mostly siltstone, fine sandstone, and shale with some petroleum-bearing sandstone and conglomerate, and locally abundant coal beds. Thick, unconsolidated glacial moraine and outwash cover this rock in most areas. Faults that separate the Kenai Group and the Mesozoic rock on the west flank of the Kenai Mountains are inactive; no movement of these faults was detected in the catastrophic earthquake of 1964. No other mapped faults on KNWR are considered large enough to cause a destructive quake, although the area is within a zone

of greatest likelihood of structural damage in the event of earthquake. The faults most likely to cause such quakes, however, are located in Prince William Sound to the east.

Soils: The Kenai Lowlands are mantled by glacial deposits that vary in texture and are overlain by well-drained to poorly drained silt loams. Depression areas such as muskeg are usually covered by peat soils produced by the slow decomposition of organic materials in the subarctic climate. Although some of the soils can be productive most are considered submarginal for agriculture. Sloped areas are vulnerable to erosion, especially if the vegetation cover is removed.

Water Resources: The Swanson River, flowing through the SRF is the largest flowing water in the area. Thousands of small lakes and ponds dot the Kenai Lowlands and many of them are located within the SRF. Most of the lakes are frozen from November to May; streams such as the Swanson River freeze later and thaw earlier. Summer water temperatures rarely exceed 68 degrees F. The high-flow period for streams is in the summer. The combination of cold water, reduced light, and low mineral content limits the productivity of waters in the area. These characteristics are partially offset by high oxygen content, lack of pollution, and a wide diversity in the physical characteristics of the aquatic habitats. Such conditions are favorable to the early life stage of anadromous fish which are present in the Swanson River and the many connected streams and lakes.

Scenic Resources: The effects of ice, water, and vegetation over time have produced scenic views of the highest order on the Kenai Peninsula. This quality is noted in ANILCA as a concern for KNWR planning. The scenic character of KNWR has been altered in some areas by electric transmission lines, roads, recreation facilities, wildlife habitat manipulation activities, oil and gas operations, and timber removal. These features and practices may create artificial focal points that can interrupt the otherwise natural appearance of the landscape.

Fire: Many fires have occurred on the KNWR in the past 100 years. There were major fires of unknown origin in 1871, 1883, 1891, and 1910. In 1947 and 1969, two large human-caused fires burned 310,000 acres and 86,000 acres, respectively. The 1969 fire occurred in the area of the project site. These fires resulted in the natural replacement of mature spruce forests with a mosaic of brush and young forest in various states of succession. This mixture of vegetation provides excellent habitat for certain species of wildlife such as moose. The areas have now aged, however, where hardwood re-growth no longer provides high quality food for moose. The project area is included in a fire management zone where all fires are suppressed to protect human life and property.

Vegetation: The vegetation of KNWR may be divided into three major classes: 1) humid coastal forests dominated by Sitka spruce (*Picea stichensis*), 2) interior forests of white and black spruce (*Picea glauca*, *P. mariana*) with a mixture of birch (*Betula papyrifera*), and 3) mountain tundra, including glaciers and snowfields. The project site

is found within the interior forest zone and consists of a mosaic of spruce forest, swampy forests of black spruce, peat bogs, and grassy mires. Aspen (*Populus tremuloides*) is also found with white spruce and birch.

Terrestrial Habitats: The KNWR includes a variety of wildlife habitats and species. The history of fires, and to a much lesser degree mechanical habitat modifications, have influenced the distribution of these habitats. At least 199 species of amphibians, birds, and mammals permanently reside in, seasonally use, or are casual or rare visitors to the KNWR. None of these species are known to be threatened or endangered. The ecologically dominant and representative species for KNWR habitats include:

<u>Habitat Type</u>	<u>Ecologically Dominant Species</u>	<u>Representative Species</u>
Wetlands	Caribou, sandhill crane, common snipe, wood frog, bog lemming, arctic tern, least sandpiper, northern harrier, greater yellowlegs, mew gull, red-necked phalarope	Greater yellowlegs
Mature Forest (70-200 years)	Black bear, masked shrew, red squirrel, black-capped chickadee, spruce grouse, yellow-rumped warbler, hairy woodpecker, three-toed woodpecker, great horned owl	Three-toed woodpecker
Intermediate Stage Forest (20-40 years)	Wolf, moose, snowshoe hare, coyote, masked shrew, red-backed vole, dark-eyed junco, white-crowned sparrow, yellow warbler, song sparrow	Moose and wolf

Wetland habitats, which include bogs and peatlands, are found in the area of the project site, including an abundance of isolated palustrine emergent, scrub/shrub, and open water wetlands in the vicinity of the project site.

Mature forest habitat, which is characterized by trees 70-200 years of age, is found in the project area. The spruce bark beetle has caused significant mortality of mature white spruce forests throughout much of the Western Kenai Peninsula. While mortality of mature spruce stands has occurred within the project area, many of the older trees remain in small untouched stands, perhaps because they are somewhat isolated from each other

as result of the 1969 wildfire which left a discontinuous mosaic of older trees in some areas.

Intermediate stage forest habitat, comprised of primarily 20-40 year old trees, is the dominant forest habitat type in the project area since much of the area burned in 1969. Early successional stage forest habitat, dominated by trees less than 20 years old, is now rare in the area. This habitat type is the most productive for moose and snowshoe hares, and the predatory animals that feed primarily on these species such as wolves and lynx. Moose numbers in the area, though still strong, are believed to be declining as the habitat quality declines. Wolf and black bear numbers are believed to be stable. Snowshoe hare numbers fluctuate widely under normal cycles and are now rebuilding after several years of a population low. Lynx numbers generally follow the hare population cycles. Brown bears and wolverine are rare in the project area and their population status is of special interest throughout KNWR. Red fox and marten, while once were believed to occur in the project area are now rare or absent. Caribou were extirpated from the Kenai Peninsula early in the twentieth century but have been restored to four distinct areas; however, caribou rarely if ever use the project area. Bald eagles, osprey, and several species of hawks and owls are common throughout the area.

Cultural Resources: Archeological studies on the Kenai Peninsula began in the 1930s and have revealed approximately 10,000 years of human history in the area, including occupation by Kachemak Eskimo and Athabascan Indian peoples. Most known archeological sites are on dry terraces adjacent to major rivers and lakes in KNWR. Based on the geography and characteristics of the terrain at the project site location, and previous archaeological surveys, there is a low probability of finding new sites of cultural significance in the project area.

Historical Resources: Several sites within KNWR have been selected as historical or cemetery sites under Sec. 14(h)(1) of the Alaska Native Claims Settlement Act (ANCSA). Additionally, numerous historic cabins are also found on KNWR. Many of these sites and structures may meet the criteria for listing in the National Register of Historic Places; however, none of these sites and structures are found within the project area.

Social and Economic Characteristics: The project site lies within the Kenai Peninsula Borough with an approximate population of 60,000 people. More than of half of the people in the Borough live in or near the cities of Kenai, Soldotna, Sterling, Kasilof, and Nikiski with the largest of these cities being Kenai. The Borough supports a diversified economy with basic industries including oil and gas extraction, petroleum refining, fishing and fish processing, recreation and tourism, timber harvesting, and transportation. Kenai is the center of oil and gas industry on the Peninsula and Sterling, located approximately 17 miles from the project area, is the nearest community.

Subsistence: Much of the Kenai Peninsula is considered non-rural under federal subsistence management regulations and little subsistence activity occurs in the area today. Four communities: Ninilchik, Port Graham, Nawalek, and Seldovia, have been determined to have customary and traditional use of moose in Game Management Unit 15(a) where the project is located. This determination, and subsequent federal regulations, established a special moose hunting opportunity that allows qualified subsistence users several more days to hunt (before the regular hunting season opens in August); however, there have not been any moose reported as harvested under federal subsistence permits within the project area since the special hunt was established approximately 10 years ago.

Additionally, all qualified rural residents within the State of Alaska (regardless of whether they reside on the Kenai Peninsula or not) are currently eligible to subsistence fish on the KNWR for traditional species, such as trout and salmon; however, current subsistence fishing regulations employ the same seasons and bag limits, and restrictions on methods and means, as the regular State fishing regulations, providing no special benefits to qualified users beyond being excused from requiring a State fishing license. The State of Alaska has issued special permits to the Kenaitze Tribe to take salmon with nets near the mouth of the Swanson River (below KNWR boundary), but there is no known subsistence fishing activity currently taking place within the project area. An ANILCA Section 810 subsistence determination accompanies this EA with a finding that the proposed action would not result in a significant restriction to subsistence uses and needs on KNWR.

Recreation: KNWR supports more recreational use than all other refuges in Alaska combined. Approximately 2 ½ million people travel through the Refuge each year with an estimated 540,000 people specifically targeting the Refuge for specific recreational activities, primarily fishing, camping, hiking, canoeing, hunting, and wildlife viewing. The accessibility of KNWR is influenced by natural features such as lakes and rivers, and by human influences such as roads, trails, and seismic lines. KNWR has more roads and trails and is accessible to more people using aircraft, because of its close proximity to Anchorage, than any other refuge in Alaska. Oil and gas exploration and development have greatly increased the access to KNWR. Swanson River Road, the primary access to SRF, was constructed to access the lease area and is maintained by Unocal. It also provides access to two canoes system, several campgrounds, and dozens of trails to small lakes. While the main access road is open to public vehicular traffic, the SRF itself has restricted access and may only be used by the public on foot or horseback. Such access is commonly used for small game and moose hunting, primarily in August and September. The general area is also open to snowmachine use and trapping by the public in winter. Oil field workers and contractors with special access to the SRF are prohibited in using their access privileges to engage in hunting, fishing, or trapping. The 11 mile long Swan Lake Road continues past the entrance of the SRF and the terminus of Swanson River Road. It was constructed in the early 1960s for the drilling of an exploratory oil well and now is open for year-round public vehicular access. Over 874

miles of seismic lines also traverse KNWR lands through the extended area making access easier for hikers and snowmachiners.

Oil and Gas Commercial Activity: The KNWR lies within the Cook Inlet Tertiary Petroleum Province. It has been identified as a Favorable Petroleum Geologic Province in accordance with ANILCA. Refuge lands were classified in the 1950s to identify areas that would not be subject to oil and gas leasing. Since that time leases, under the authority of the Minerals Leasing Act of 1920, have been issued for the SRF, Beaver Creek Field, and Birch Hill Field totaling approximately 13,252 acres of active leases. Additionally, Cook Inlet Region, Inc. (CIRI) received entitlements to approximately 200,000 acres of subsurface estate adjacent to these leases, under provisions of ANCSA, and has development rights to oil, gas, and coal resources on these lands.

The first substantial commercial oil discovery in Alaska occurred in 1957 within what is now the SRF. That discovery quickly developed into a major field and it produced over 200 million barrels of oil by 1985. A pipeline, 20 miles to the west, between the SRF and Nikiski carries the crude oil to market. Over 100 wells have been drilled in the nearly 8,000 acre field. Numerous support facilities have been built, including about 30 miles of access roads. The use of directional drilling and multiple-use drill pads has somewhat limited the size of the disturbed area. Natural gas production from within the SRF was pursued after oil production began to decline. A 16 inch gas pipeline from Nikiski to SRF and a compression plant were constructed to aid in the production of oil through reservoir pressure maintenance. Over the next three decades, 331 billion cubic feet of gas were imported and injected in SRF. In 1985, over 200 million cubic feet of gas was injected daily to maintain formation pressure for oil production. Current SRF production is about 700 barrels of crude oil per day from an average of 20 producing oil wells and approximately 19 million cubic feet of gas per day from an average of 8 producing gas wells. As of January 2005 a cumulative of 228,688,608 barrels of crude oil and 46.9 billion cubic feet of natural gas have been produced from SRF.

A 1999 KNWR compatibility determination, evaluating the permissibility of additional oil and gas activity on approximately 472,630 acres of KNWR found the use "not compatible" prohibiting further activity where discretionary oversight by FWS existed. The determination did not affect the rights of existing lease holders or CIRI's subsurface rights. Environmental concerns addressed in the determination highlighted at least 524.4 acres of KNWR (by 1998) being lost as wildlife habitat due to drill pads, facilities, and roads and an additional 424.3 acres were lost because of roads, pipelines, and powerlines. Lost forage in these habitats was estimated to be the equivalent of feeding 41 to 136 cow moose and 411 snowshoe hares a year, with less quantifiable impacts on other species. Oil and other hazardous substance spills were also an issue with an average of 13 spills per year between 1957 and 1998 within SRF totaling 452 gallons of diesel, 65 gallons of methanol, 12,745 gallons of crude oil, 2,213 gallons of triethylene glycol, 21,525 gallons of produced water, 100 gallons of solvents, 85 gallons of hydraulic fluid, and 35 gallons

of antifreeze. Additionally 107,000 tons of PCB contaminated soil have been remediated at a cost exceeding \$40 million, and a large but unknown quantity of xylene has been released at the Swanson River Pipe and Supply Yard and has been undergoing remediation actions for many years. Consumption of limited Refuge staff time, funding, and other resources; pre-emption of desired land management practices, such as prescribed fire; general disturbance to wildlife from industrial activity; and other issues also influenced the compatibility determination. For the Refuge to find a use compatible, it must determine that the use does not materially interfere with its purposes or the National Wildlife Refuge System conservation mission. FWS policy (603 FW 2.5 A.) dictates that "Uses that we reasonably may anticipate to reduce the quality or quantity or fragment habitats on a national wildlife refuge will not be compatible." Since National Wildlife Refuge System lands are not "multiple use lands" and must be managed primarily for wildlife conservation purposes, it is difficult to permit many types of new industrial uses on these lands when legal entitlements do not assure such uses may occur. The compatibility standard, however, was not a statutory requirement when the SRF was originally leased and is not applied to the normal exploration and development activities associated with the Field. It does apply to any new use of the area where the use is not part of the original entitlement. A new compatibility determination, specific to the gas storage proposal within SRF, has been prepared to supplement the 1999 determination, and accompanies this EA.

Gas Storage Operations (Existing and Proposed)

Since 2001 Unocal has been injecting natural gas into a depleted gas reservoir during the summer months (when there is an excess supply) and producing the gas back during winter months (when demand exceeds supply). To date, all of the gas placed into storage has physically come from the Sterling, Beluga, Tyonek, and Hemlock oil or gas wells within the SRF. The proposed action would increase gas storage capacity within the SRF and would authorize gas produced outside the lease to be piped into the SRF via the 16-inch SRF gas line and stored along with gas produced from within the field. Metering would be required to quantify volumes and origin of gas being stored for royalty and other accountability and ownership purposes.

Gas to be stored originates primarily from gas reservoirs but may also come from the associated gas produced from oil reservoirs. The gas being earmarked for storage is contained in the existing process stream and is compressed and dehydrated prior to storage. It is then transported to the storage wells through high pressure gas injection pipelines, metered, heated, and injected into the gas storage reservoir. Because the transportation and injection pressures are within the existing compression and line pressure limits, there is no increased risk of line leak, rupture, or explosion.

When the storage gas is produced back into the SRF process stream, it is first heated and metered. It then flows through gas flow lines, usually to the nearest tank setting, and then on through the gas gathering pipelines to the processing plant to be dehydrated again and

sold to the customer. The gas produced from gas storage may need to be compressed prior to this final dehydration.

To achieve the desired gas rates for both injection into and production out of storage, automated valves with remote control at the main plant control room are used. These valves permit field operators to monitor gas rates and pressures going into and coming out of the ground, and to exercise full rate control on the gas flowing into and out of the ground.

Environmental Consequences

Alternative A – No Action

There would be no additional impacts to the environment in the SRF or KNWR if the no action alternative was chosen. There could be social and socioeconomic impacts if the Swanson River Natural Gas Storage Project was not developed. South-central Alaska is almost wholly dependent upon natural gas for domestic heating in the winter and most of the electrical power for the region is generated by natural gas fired plants. Gas deliverability is a growing issue and without gas storage seasonal shortages could impact consumers as early as winter 2005-06. The need for gas storage and/or additional development of gas reserves in the Cook Inlet Basin is widely accepted, and although there may be alternative areas that could be developed for gas storage other than the SRF it is the only proposed project at this time and the only known proven area that meets basic gas storage requirements for the area.

Alternative B – Gas Storage (Most Cost Efficient Construction and Operation)

This alternative would have an unknown level of impacts to wildlife within SRF and the KNWR. Frequently gas storage agreements are issued that provide for surface occupation of the area as necessary to meet the gas storage needs and allow for construction of pipelines, buildings, and other structures as needed and purposeful to facilitate gas storage. Such open-ended permits are desired by industry to maximize flexibility in developing the gas storage infrastructure and operation, and minimize construction and maintenance costs. While the impacts to wetland and upland habitats is unknown without specific proposals, it is unlikely to be significant in terms of the total industrial development within SRF; however, FWS policy evaluates discretionary proposals such as the Swanson River Natural Gas Storage Project in light of any long-term loss of wildlife habitat and does not consider significant alteration or long-term loss of habitat as acceptable in meeting its Congressionally mandated wildlife purposes and conservation mission.

Alternative C- Gas Storage (Unlimited Life)

This alternative would not allow the development footprint to expand within the SRF but would allow for industrial use to be extended beyond the authorized production period for the Field. How long the use might persist beyond what the current lease agreement allows is uncertain, but extended use of the area would provide additional wildlife disturbance and risks to wildlife and habitat from contaminants spills, collision, or other factors beyond what would otherwise occur. Alternative C may also delay the required demobilization, remediation, and restoration of the area that may best benefit wildlife.

Alternative D – Gas Storage (Most Cost Efficient and Unlimited Life)

Alternative D would allow for maximum flexibility on use of the SRF for gas storage in terms of how it was developed and operated, and how long it would be allowed to persist. There are many unknowns with the impacts of this alternative that may be realized if chosen. The open-ended commitment of the SRF and KNWR in this manner would increase the complexity and controversy of the proposed action requiring additional environmental review, mitigation actions, and public review and comment. It also would raise significant concerns of compatibility with KNWR purposes and the National Wildlife Refuge System mission.

Alternative E (Preferred Alternative) – Gas Storage (Limited Footprint and Life)

Alternative E meets the immediate social, domestic, and industrial need of gas storage but limits impacts to those that are not significantly different than activities currently permitted within SRF. No new roads, pipeline corridors, or gravel pads may be developed; all gas storage facilities would be constructed on currently developed sites. Additionally, the surface occupation of the area would not be extended beyond currently authorized production activities. Alternative E has been deemed compatible with KNWR purposes and the National Wildlife Refuge System mission (See Compatibility Determination) and meets the purpose and need of the proposed project.

Impacts Common to All Action Alternatives (Alt. B – E)

There are impacts associated with all alternatives that would authorize gas storage within the SRF. The construction phase of the proposed project would generate localized short-term increase in noise levels from equipment and human operators. These levels, however, would be less than past peak exploration and operational activity within the area and no significant impacts are expected to wildlife.

New facilities to accommodate gas storage will include an individual line heater to be installed at each storage well. The heaters are gas-fired vessels that warm produced gas in order to prevent moisture in the gas from freezing. The footprint for the typical line

heater is approximately 8'X12'. Under the preferred alternative line heaters must be constructed on existing gravel pads and may not impact additional wildlife habitat.

Gas metering buildings will also be required and installed on existing pads near storage wells. The footprint of a typical gas metering building is approximately 12'X24'.

There are currently two active gas storage wells within SRF. The number of wells will be increased to meet deliverability requirements; however, the number of wells cannot be predicted with certainty because of reservoir reliability, changes in demand, and other factors. There are nearly 60 existing pads developed in the area which could serve to facilitate gas storage during the life of the project; however, it is unlikely more than 5 to 7 would be employed at any one time. Existing well bores will be converted to storage wells whenever possible and existing gathering and distribution pipelines will be used where possible also. Under Alternative E if new pipelines are required they must be placed within existing road or pipeline corridors without additional damage to wildlife habitat.

Gas storage within SRF should not create any additional risks to personnel safety or environmental contaminant concerns. There will be no new pressure regimes introduced. Field operators will be operating the same compressors for storage that are presently operated for oil and gas production. The risks of leaks may be reduced with gas storage since stored gas contains fewer liquids than natural gas produced from conventional wells. Because of this, less corrosion may result and failure of pipes, valves, and fittings may be reduced over time. Additionally, while existing well bores will be utilized where possible, if the operator cannot verify its structural integrity, a new well will be drilled to minimize risks of blowouts or surface leakage.

No additional personnel are required for gas storage operations. Existing gas storage wells are equipped with telemetry that allows them to be operated remotely from the SRF Control Room; any new wells will be operated similarly. Because of this, no new vehicular traffic will be required to monitor wells than currently exists within SRF.

Gas recovery of the stored gas is expected to be nearly 100 percent. The existing storage reservoir in the SRF has proven very reliable in predicting, given a certain pressure, how much gas remains in the reservoir. Having a reservoir act like a "volume bottle" is critical to selecting new storage reservoirs. Additionally, gas storage requires careful monitoring of injected and recovered volumes and the operator, to fulfill obligations to royalty owners and permit conditions, must accurately measure the amount of gas injected into and withdrawn from each storage reservoir.

Public Comments

A legal notice published on February 20 and 23, 2005 in the Anchorage Daily News, and the Kenai Peninsula Clarion on February 23 and 27, 2005 announced that KNWR was

conducting a compatibility determination on proposed gas storage within the Swanson River Field, and invited public comment. Seven sets of comments were received and were summarized in the Refuge Compatibility Determination. Four members of the public, and the State of Alaska, voiced support for the proposed project. A joint letter from two environmental organizations raised concerns about environmental impacts, procedural issues, and suggested that other alternatives existed to the proposed action. Marathon Oil Company expressed concerns that the proposed action may impede their ability to use and profit fully from the proposed East Swanson River Satellite Natural Gas Project, because of capacity and timing of use issues with a common pipeline. All comments were considered in the finalization of the Refuge Compatibility Determination, have been forwarded to the BLM for consideration in development of the proposed gas storage agreement, and are also attached in their entirety to this EA.

References Used

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U.S. Fish and Wildlife Service. 1985. Final Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review, Kenai National Wildlife Refuge. 195 pp.

U.S. Fish and Wildlife Service. 1999. Compatibility Determination for Oil and Gas Exploration and Development, Kenai National Wildlife Refuge. 7 pp.

U.S. Fish and Wildlife Service. 2000. Refuge Compatibility Policy, 603 FW 2. 13 pp.

Appendices

Figure 1. Oil and Gas Lease Areas – Project Location Map

Figure 2. Swanson River Oil and Gas Field Map – Gas Storage Vision

ANILCA 810 Subsistence Evaluation

Kenai National Wildlife Refuge Compatibility Determination

Copies of Public Comments

Figure 1

Oil and Gas Lease Areas

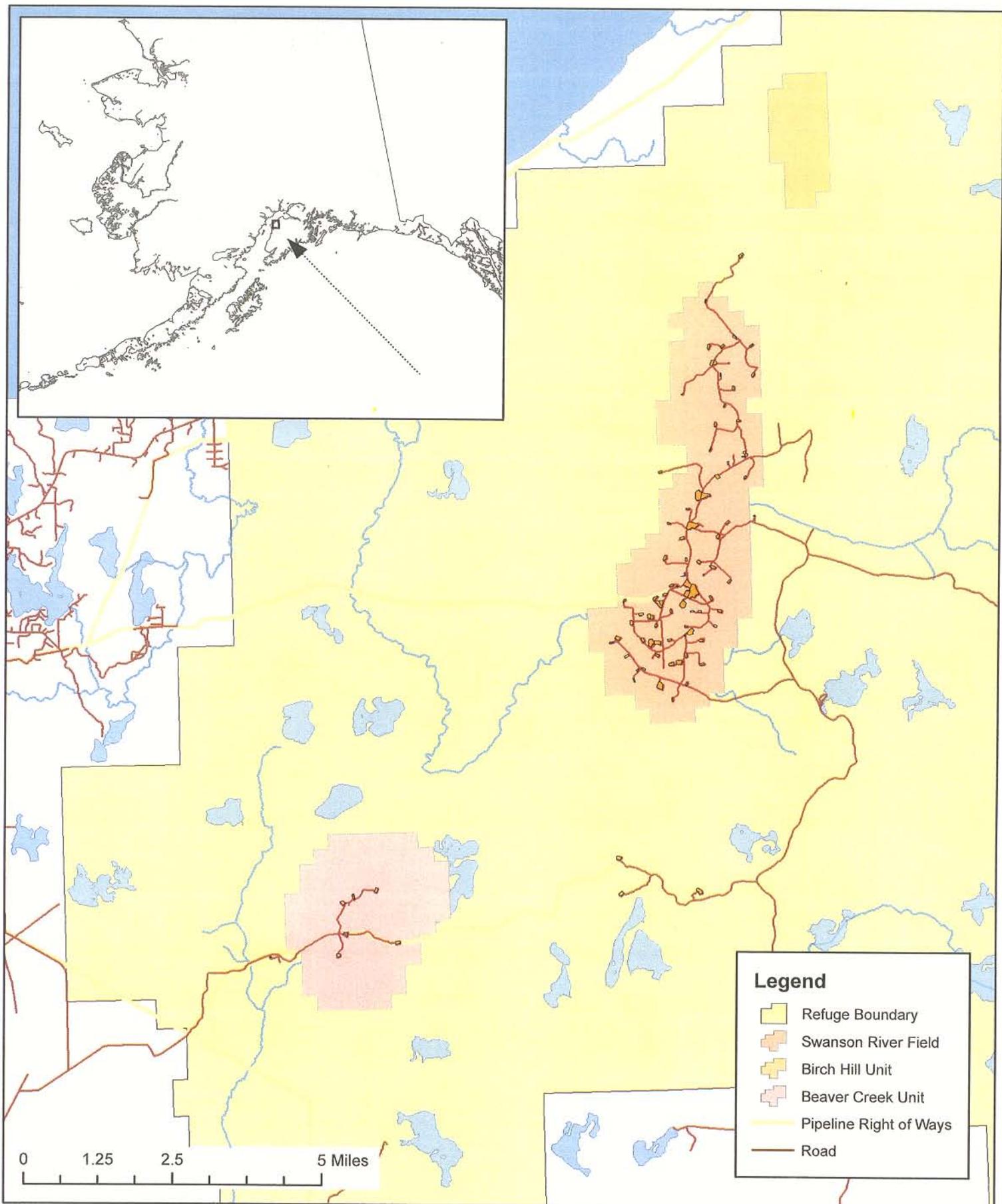
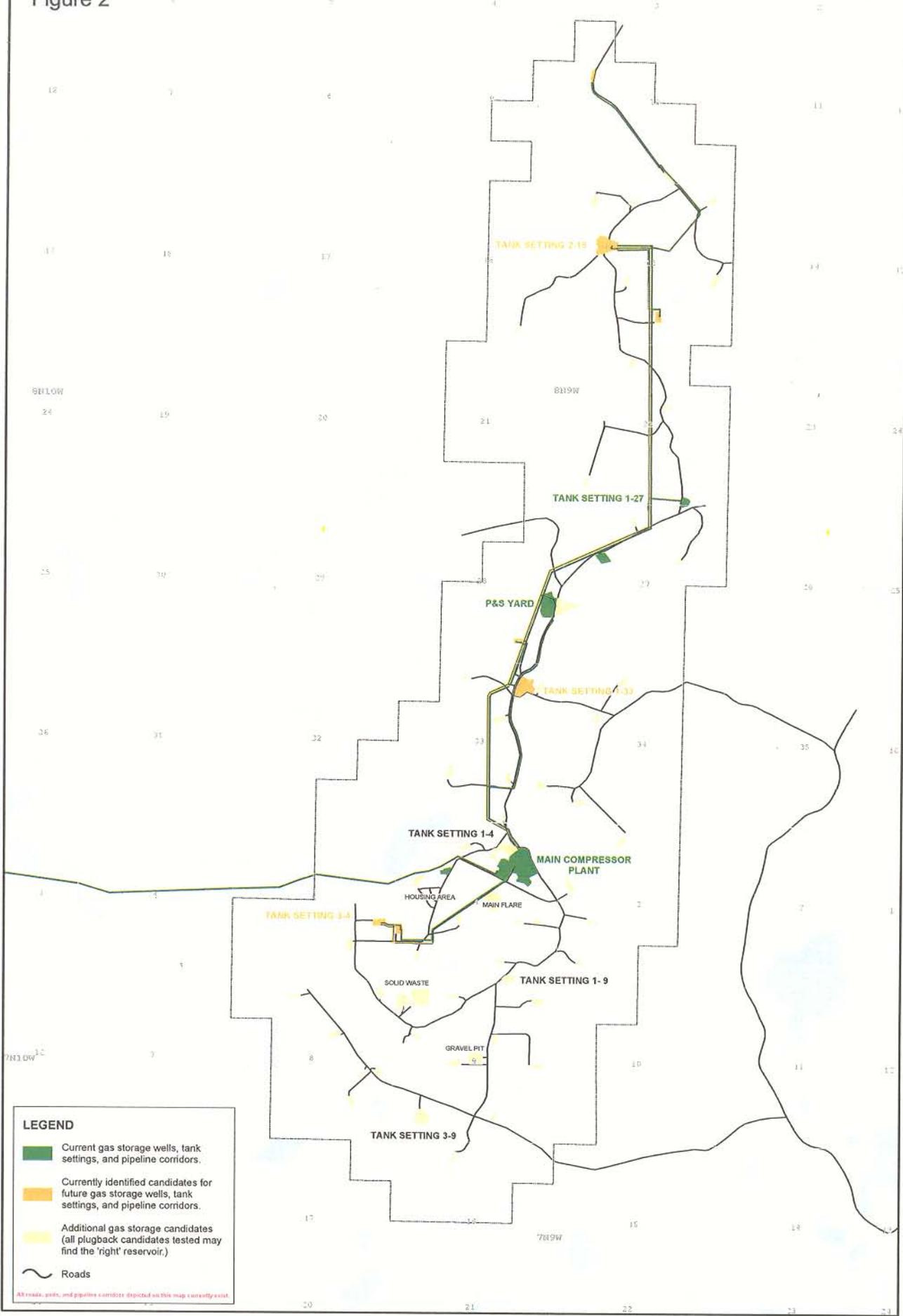


Figure 2



**SWANSON RIVER FIELD
CURRENT GAS STORAGE VISION**

0 0.25 0.5 1
Miles
Alaska State Plane Zone 4, NAD83
Phil Ayer/Larry Greenstein
O'Gas CFT Gas Storage/KOSIP/Vision_2-15-2005 February 15, 2005