soils, vegetation, etc.) and the proposed management practices (application rates, soil amendments, treatment, etc.).

Industrial Uses

Other water management options for CBM produced water include the supply of CBM water to other industries for use in operational activities. A variety of existing industries could benefit from this water supply including: coal mines, animal feeding operations, cooling tower water for various industrial applications, car wash facilities, commercial fisheries, enhanced oil recovery, and fire protection. Industrial applications which may be less commonly considered but would still have the potential for the use of CBM produced water include: sod farming, bottled drinking water, brewery water, and solution mining of minerals. Each of the existing industries and emerging industrial applications would use produced water of varying quantities and quality.

Alternative 1 - Coal Mine Use

Coal mining in the United States is generally at or near the land surface. Mining related activities that require water include: dust suppression, slurry activities, and post mining restoration efforts.

Alternative 2 - Animal Feeding Operations

CBM produced water could be supplied to Animal Feeding Operations (AFOs) and Concentrated Animal Feeding Operations (CAFOs) for livestock watering and the management of animal wastes. Livestock watering applications in a CAFO would be similar to that previously discussed in the Agricultural Use. In addition to livestock watering at CAFOs, produced water could be used to assist in waste management activities. The EPA, as defined in 40 CFR 122.23, Appendix B, regulates NPDES permitted discharges from CAFO's for animal waste.

Alternative 3 - Cooling Tower Water

Numerous industrial activities and chemical plants use water as a cooling agent. Towers are a common means of removing heat from cooling water that has been heated through thermal exchange. Cold water enters the plant's heat exchanger that causes a thermal exchange of heat from within the plant to the water in the cooling loop; this water is then sent to the cooling tower where it flows over fill surfaces. As the water flows over the fill surfaces, air is passed through the tower either by natural flow or by electric fans, cooling the water by contact with the air. Once the water is cooled, it is recycled through the system; make-up water is usually added due to losses from evaporation. High quality CBM produced water can be used as make-up water in a cooling tower system. The produced water would need to be low TDS water because mineralization generally leads to clogging of the cooling system.

Alternative 4 - Field and Car Wash Facilities

Construction activities and other land disturbing activities are a concern because vehicles accessing land with noxious plants can cause them to spread. The problems associated with spreading noxious weeds include making site reclamation more difficult, as well as impacts to ecosystems, farmland and grazing land. One way to reduce the spread of

noxious weeds is to wash vehicles and equipment before and after entering these areas. The construction of field equipment wash facilities and rural car washes supplied with produced water reduces the potential for distribution of noxious weeds by vehicles and equipment. These temporary wash facilities constructed near CBM development could be supplied with produced water. The field wash facilities are temporary and used to clean vehicles and equipment entering and leaving construction sites, recreational off road vehicles, farm and ranch equipment, and oil and gas equipment. Many state and federal agencies (for instance USFS, BLM) recommend these facilities as part of their BMPs for controlling the spread of noxious weeds.

Alternative 5 - Enhanced Oil Recovery

Another management option of CBM produced water is to inject the water into a secondary or enhanced recovery well into conventional oil producing horizons. Primary recovery of oil is driven by the natural energy of the reservoir and can be supplemented by pumping. When primary recovery ends, secondary recovery begins and may be followed by enhanced recovery. Secondary and enhanced recovery is the process of injecting a fluid into a reservoir creating a waterflood that displaces the oil causing it to flow to the producing well (Collins and Carroll, 1987). Water is the fluid most commonly used in secondary and enhanced recovery of oil in non-CBM fields; CBM produced water could, therefore, be of beneficial use in secondary and enhanced oil recovery.

Alternative 6 - Fisheries

Commercial fisheries in the western United States could also benefit from available CBM produced water supplies. These fisheries have to obtain water rights to divert water into their operational ponds for surface waters; therefore, CBM produced water could be used in place of diverted surface water or groundwater. Produced water could also be used during dry summer months or droughts to supply water when traditional surface supplies have been drained or are dry.

Alternative 7 - Fire Protection

In municipal areas, fire hydrants and sprinkler systems are supplied with drinking quality water from municipal supply systems. In areas where CBM development is near a municipality, produced water could be used to supply both fire hydrants and sprinkler systems. Fighting fires does not require high quality water and could benefit from the use of produced water by not depleting drinking water supplies. Wildfires in the western United States are becoming larger and more dangerous during the current drought conditions that exist in many states. The normal supplies of water that are used for fighting fires are also being depleted by the drought. The supplies of CBM produced water stored in impoundments or stored in tanks at disposal wells could provide an accessible option for fighting fires in remote areas in states such as Colorado, Wyoming, New Mexico, Montana, and Utah.

Alternative 8 - Other Industrial Uses

Aside from those uses listed above which are either currently in practice or have been researched to show potential as a use for produced water, other options which have been

considered, but not analyzed in detail. Some of these potential uses include options that have the potential to use large quantities of produced water. The potential industrial uses which are being mentioned here include: sod farming, solution mining for minerals, bottled drinking water, and brewery water.

Domestic and Municipal Water Use

Produced water associated with CBM development can be a valuable commodity, especially for arid regions in the western United States. CBM produced water is of greater value when it meets drinking water standards, or is near drinking water quality, because of the broad variety of uses high quality water provides. This water management alternative includes the use of CBM produced water for domestic (e.g., public or residential) and municipal (e.g., city or county) water use and supply. Alternatives under this water management group include: the supply of high quality water from CBM production areas to rural landowners and municipalities; the use of lesser quality CBM produced water for recharge water systems; make-up water; and other residential non-potable water uses.

Alternative 1 - Domestic Use

Because of its overall high quality in many areas, produced water from CBM wells has the potential to be used by residences for potable and non-potable uses. Descriptions of these uses are provided below:

Potable Water Use: High-quality produced water that meets drinking water standards can be used for human consumption, although limited treatment may be required (e.g., chlorination). Depending on the circumstances, quality of the produced water, treatment requirements, and other factors, it may be feasible to use produced water as a sole source for residential or domestic use. It may likewise be feasible for use in supplementing existing supplies continuously or on a periodic basis.

Non-Potable Water Use: Non-potable produced water could be supplied to individual homes, perhaps using a dual water system, for uses such as lawn and garden irrigation, bathing, dishwasher and washing machine uses, vehicle washing, residential maintenance, and toilet flushing.

Alternative 2 - Municipal Water Use

In addition to supplying water to rural landowners, CBM produced water could be used to augment municipal water supplies both for potable and for non-potable uses, including:

Potable Water Use: Similar to domestic supply, high-quality produced water that meets drinking water standards could be used for human consumption. High quality water could be supplied upstream of the existing water treatment facilities and distributed through the existing infrastructure with some modifications (such as gas separators). Depending on the circumstances such as quality of the produced water, treatment requirements, and other factors, using produced water as a sole source may be feasible for a certain portion of the municipality, in mixed distribution with the existing supply, or as a seasonal or period augmentation of over appropriated supplies.

Non-Potable Water Use: The potential for the distribution of lesser quality produced water for non-potable uses within a municipality may be greater than potable use. The potential non-potable use for produced water in a municipality includes a dual water system for household uses as described in the previous section: showering, bathing, lawn and garden watering, and washing clothes and cars. In addition, municipalities could use produced water to supply water to fire hydrants, street cleaning equipment, and certain industries including commercial car washes. It may also be used to recharge depleted aquifers.

APPENDIX F

WATER TREATMENT TECHNOLOGIES

There are a variety of potential beneficial uses for CBM produced water that can be implemented by CBM operators to manage this resource but the quality of the produced water can be a deciding criterion for what option is chosen. The potential also exists for this water to be treated by a variety of technologies to improve the quality of this water and allow for increased beneficial use. However, there are cases, particularly in the Powder River Basin where no advantage relative to permit requirements is gained in treating the water. This should be carefully assessed when evaluating treatment.

To design an effective system for treating or disposing produced water it is necessary to know the following: likely quality of produced water; estimated water production rates at various phases of the project; nature of any proposed receiving waters in terms of seasonal flow rates, existing water quality, and aquatic flora and fauna; and current or proposed permitting and regulatory restrictions.

The following section presents a discussion of some of the treatment options that may be utilized. However, this list is not all-inclusive nor is it intended to show preferred treatment methods. Instead, this section is intended to provide a description of several treatment technologies that are currently being evaluated or utilized for the treatment of CBM produced water prior to beneficial use.

Freeze-Thaw/Evaporation

The Freeze-Thaw/Evaporation (FTE) process involves lowering the freezing point of water containing salts or other constituents below the freezing point of pure water (32°F). Partial freezing of the solution results in the formation of higher quality ice crystals than the water from which it was derived, and the concentration of the higher density dissolved solids and other constituents in the unfrozen liquid. The ice crystals can then be collected and thawed, providing a source of high quality water with more management options, or in appropriate regions, the crystals can be allowed to evaporate. This process can be repeated until the more concentrated effluent is of a manageable volume. The smaller volume of effluent, though more concentrated, can be more easily disposed of and/or discharged with an appropriate NPDES permit, if necessary.

Reverse Osmosis

Reverse Osmosis (RO), or hyperfiltration, is a proven treatment process for the removal of TDS and other constituents such as arsenic. RO water treatment has been used extensively to convert brackish water/seawater or brine to drinking water, reclaim wastewater, and recover dissolved salts from various industrial processes. The RO treatment process separates dissolved solids or other constituents from water by passing the water solution through a semi-permeable cellophane-like membrane. Most RO technologies utilize a cross-flow process to allow the membrane to continually clean

itself. As some of the solution passes through the membrane, the remaining fluid is flushed down stream to remove constituents away from the membrane.

Ultraviolet Light

Ultraviolet (UV) sterilization is a proven technology for the treatment of water and the removal of unwanted free-floating constituents. UV light is a form of energy located in the electromagnetic spectrum region of shorter wavelength, high-energy light. UV light exists in a region between visible light and x-rays, occupying a spatial spectrum between 1 to 400 nanometers (1 nm = 10^{-9} meters). UV energy absorbed by bacteria, viruses, fungi, algae, and protozoa disrupts nucleic acids found in their cells preventing the cell's ability to multiply (Muskoka-Parry South Health Unit, 2002). The amount of UV light necessary to kill microbes depends on the type of microbe, but the minimum recommended dosage considered acceptable for treatment is 16,000 microwatts per second at a wavelength of 253.7 nm at maximum flow (Muskoka-Parry Sound Health Unit, 2002).

Chemical Treatment

Chlorination – Chlorine has been the principal water disinfectant of public water supplies, sewage, and industrial effluent for several decades. The active form of chlorine present in treated water is a hydrolysis product, hypochlorous acid (HOCL), which is formed when chlorine and water molecules interact (Committee on Groundwater Recharge, National Research Council. 1994). Chlorination effectively removes disease-causing bacteria, viruses, protozoa, and other organisms, and can be used to oxidize iron, manganese and hydrogen sulfide so these minerals can be filtered from the water. Other treatment technologies, such as UV light and RO, are often used in tandem with the chlorination process.

Iodine – Iodine water treatment is commonly used to remove pathogens, with the exception of cryptsporida, from water. Iodine is less sensitive to pH and the organic content of water, is safe for long-term exposure, and is considered effective in lower doses. Experts however, are reluctant to recommend iodine for long-term use because the range of the average American iodine intake (0.24 to 0.74 mg/day) includes levels higher than the recommended daily allowance (0.4 mg/day) (Turner, 2002).

Silver – The use of silver to kill water pathogens has been considered, but because of the EPA's establishment of 50 ppb MCL limit on silver, its use for water treatment has been very limited. The MCL was established to prevent argyrosis, a silver specific disease characterized by staining of the eyes, skin, and mucous membranes.

Additional chemicals used to treat water include potassium permanganate, hydrogen peroxide, and coagulation/flocculation agents. Historically these reagents have been used on a very limited basis because of potential health concerns and/or cost efficiency. For the purpose of this study, as with iodine and silver, these chemicals are not considered a practical solution for treating produced water for beneficial uses.

Ion Exchange (Resin Extraction)

The process of ion exchange historically has been used to soften water for residential purposes by replacing hardness ions such as calcium and magnesium with Na+ and Cl-

ions (Filters, Water & Instrumentation, Inc., 2002). Ion exchange is also commonly used to deionize water by replacing ions, such as conductive salts (desalination), with H+ and OH- when extremely pure water is required. The ion exchange process works by charging resins with the replacement ions, e.g., Na+, Cl-, H+ or OH-. Ions in the water are attracted to the resin and attach themselves to the resin, replacing the ions that are already attached. Once the replacement ions are exhausted, the resin is regenerated with a concentrated solution of the replacement ions. This process removes the ions concentrated in the water and effectively regenerates the resin (Osmonics, 2002b).

A residual brine containing the ions removed by this process is formed by this method. This brine is typically 1-5% of the original produced water volume. The management of this brine must be considered in advance if this technology is to be used.

Capacitive Desalination (CD) or Deionization

According to the inventor, Joe Farmer, this relatively new high water recovery treatment process has the potential to use one-thousandth to one-hundredth the energy required by typical distillation methods. Water with concentrations of salts, heavy metals, and/or radioactive isotopes is pumped through thin sheets of carbon aerogel. Each porous aerogel sheet is 3 in^2 with the effective surface area of a football field (600 to 900 m^2/g) (Envirosense, 1996). Non-polluting electricity is applied to the aerogel sheets (electrodes) trapping ions and allowing pure water to pass through. Since the capacitive deionization process does not require the regeneration of ion exchangers with acids and bases, as with the conventional ion exchange process, any associated secondary waste would be eliminated (Lawrence Livermore National Laboratory, 1994b).

Electrodialysis Reversal (EDR)

Traditionally, electrodialysis treatment of water has been used to desalt brackish water to produce higher quality water (Damien (Solarweb), 1998). The basic principles of this treatment process are similar to ion exchange in that ions will dissolve in water and will posses either a positive charge (cation) or negative charge (anion) and will be attracted to electrodes of an opposite electrical charge. Electrodialysis differs from a normal ion exchange process by utilizing both cation and anion selective membranes to segregate charged ions from a water solution (AWWA, 1996). These membranes are arranged alternatively (cation and anion) to selectively collect charged ions. The arrangement of two membranes creates spaces of concentrated and diluted solutions and collectively is referred to as a cell (Shuler and Kargi, 1992). A typical dialysis system consists of hundreds of adjacent cells with electrodes on the outside and is referred to as a membrane stack (Damien (Solarweb), 1998). As with RO, energy, such as a small pump, is required to move the water through the membranes.

Distillation

The distillation process is capable of removing 99.5% of the impurities concentrated in raw water (Derickson, et al 1992). The distillation process is commonly used to remove nitrates, bacteria, sodium, hardness, dissolved solids, many organics, heavy metals, and in some cases, radioneucleides. Distillation involves boiling water into steam, which is then passed through a cooling chamber and subsequently condensed into a purified form. The boiling process segregates water impurities from the purified product for collection and

disposal. Constituents having similar boiling points of water are not effectively removed during the distillation process. Such impurities include many volatile organic contaminants, certain pesticides, and volatile solvents (Derickson, et al, 1992).

Artificial Wetlands

Constructed wetlands were developed approximately 40 years ago to exploit the biodegradation ability of plants (Shutes, 2001). The advantage of these systems includes low construction and operation costs (Cooper, et al., 1996), approximately 1 to 2 cents/bbl, although relative to other wastewater treatment technologies these systems have a slow rate of operation and require a large area.

Table
Treatment Technologies and their Effectiveness on Reducing Certain Constituent Types Present in CBM Produced Water

Treatment Technology	Heavy Metals	SAR	TDS	Ba	Fe	EC	Organics	Na	HCO_3	Bio
FTE	√		√	√	√	√		√		
RO	√	√ [2]	√	√	√	√		√	√ [1]	
UV Light							√ [3]			√
Chemical										√
Ion Exchange	√	√	√	√	√	√		√	√ [1]	
CD	√	√ [2]	√	√	√	√		√	√ [1]	
EDR	√	√ [2]	√	√	√	√		√	√ [1]	
Distillation	√		√	√	√	√	√ [3]	√		√
Wetlands	√		√	√	√	√				√

Source: ALL Consulting
√ - indicates treatment process can reduce constituent type.
1 - pH adjustment would be required prior to treatment
2 - water adjustment by addition of calcium and magnesium would be required.
3 – limited to certain organics based on volatility, boiling point, chemical composition, etc.

APPENDIX G

IMPOUNDMENT ALTERNATIVES

Alternative 1 - Wildlife and Livestock Watering Impoundments

Wildlife watering ponds are typically small reservoirs that are used to help supplement wildlife or livestock water demands in semi-arid to arid regions. There are many types of watering facility designs available. Choosing the correct one would depend on proper evaluation of the situation to ensure landowner needs are satisfied. Watering facilities can have simple designs, such as PVC pipe facilities capable of holding four gallons, or relatively complex designs like asphalt impregnated fabric catchment systems capable of supporting large herds or wildlife species. The Natural Resource Conservation Service (NRCS) provides nationwide standards and technical guidelines for wildlife watering facilities (Ponds – Planning, Design, Construction, Agriculture Handbook 590) to help facilitate the decision process and assure proper recommendations are presented to land owners. State NRCS offices in some cases have customized these standards to meet the demands or requirements for their particular region.

Alternative 2 - Fisheries

Constructed fisheries are water catchment systems designed to sustain healthy fish and other aquatic organism populations. Fishponds are typically small to medium sized privately owned reservoirs that are stocked by state agencies or individual landowners for recreational use. Designs for such ponds are simple and often depend on the water source and volume, topography (Missouri Department of Conservation, 1995), climate (temperature), and specific use. Commercial fisheries are, in general, large, complex aquaculture facilities designed to sustain large fish or other aquatic organism populations for resale and consumption. The operation of a commercial fishery requires significant investment capital, time, and management skills.

Alternative 3 - Recharge Ponds

Recharge ponds, also known as storm water ponds, retention ponds, or wet extended detention ponds, are constructed reservoirs typically containing a permanent pool of water, especially during regional wet seasons (Stormwatercenter.net, 2002). Recharge ponds are traditionally used to restore depleted groundwater sources by water infiltration into subsurface aquifers, whereas retention ponds are permanent pools constructed to improve water quality, attenuate peak flows, and minimize flooding (Kantrowitz and Woodham, 1995). Recharge ponds also have some treatment function to lower TDS by a settling removal mechanism (Stormwatercenter.net, 2002) or by water infiltration through a pre-fabricated pond liner. Nutrient uptake is also possible through various biological processes that could facilitate additional uses.

The infiltration of water in areas that had historically little infiltration of water will cause the soluble salts that have accumulated over time to be dissolved and moved down through the soil and bedrock. These may change the chemistry of the underlying groundwater, or, if intercepted by an impermeable layer, result in the formation of saline seeps.

Alternative 4 - Recreation

Traditionally, artificial lakes have been created to augment urban and industrial water supplies; uses for recreation have been considered a secondary benefit (Bennett, 1962). The conceptual use of artificial lakes has changed through the years, however, and is now commonly used in the Midwest for fishing, swimming, and boating. CBM produced water could be used to supply artificially constructed surface impoundments for recreational use. Depending on the quality of water, size of the production facility, and subsequent volume of pumped water, available lands could be converted into large artificial lakes and used for boating or canoeing. The lakes could also be stocked with native warm and possibly cold-water fish to increase local populations and/or used to accentuate camping grounds by providing swimming areas for local residents.

Alternative 5 - Evaporation Ponds

Evaporation ponds are usually off-channel; constructed impoundments designed to store water at the surface so that natural evaporative processes can move the water from the land surface into the atmosphere. They are either lined or placed on impermeable soils. These basins may include nebulizers or other technology to enhance the evaporation process. As evaporation occurs water is removed from the pond while the salts are left behind. This results in an increase in the TDS for the remaining water. Over time as more water is lost to the atmosphere, the water remaining in the pond can become a concentrated brine and eventual salt precipitation will occur. The disposal of this residual salt must be considered in advance if evaporation processes are to be used.

Alternative 6 - Constructed Wetlands

The U.S. Army Corps of Engineers (USACE) and the EPA define wetlands as areas that are inundated or saturated by surface or groundwater at a frequency and duration to support vegetation adapted for life in saturated soil conditions. According to USACE (1987), wetlands are characterized by three criteria: vegetation, soils, and hydrology.

APPENDIX H

EMERGING TECHNOLOGIES AND PRACTICES

The technologies and practices described in this section offer potential, but have not yet been tested sufficiently or utilized broadly and successfully enough to be characterized as best management practices. They may, however, become BMPs in the future.

Microhole Drilling Technology. Microhole drilling technology allows the drilling of wells using smaller diameter drill holes than are generally used for oil and gas wells. A hole diameter of 2-3/8 inch is characteristic. The technology involves coiled tubing, which spools from the drilling unit into the drill hole. The relatively small and light drilling unit can be hauled with a light truck. Accordingly, microhole drilling offers the potential of decreased drilling costs as well as restricting disturbed environments to a smaller area during drilling. Collateral benefits include reduced impacts due to lighter equipment moving on access roads. Current investigations are focusing on drilling to relatively shallow formations (less than approximately 5,000 ft depth), however DOE considers deeper drilling to be achievable.

APPENDIX I

TOPIC INDEX

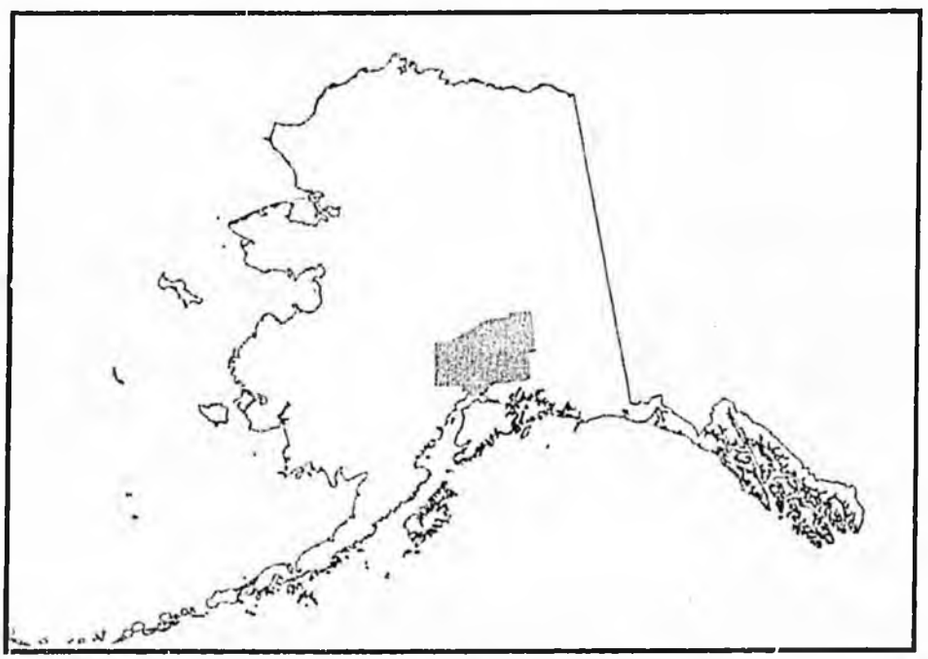
[Insert once the document is finalized]

Public Review Draft

Enforceable Standards for Coalbed Methane Development Of State Owned Resources in the Matanuska-Susitna Borough

April 2004

Volume 1



Alaska Department of Natural Resources
Division of Oil and Gas
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Volume 1

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List of Acronyms

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AOGCC	Alaska Oil and Gas Conservation Commission
CBM	Coalbed Methane
DGC	Division of Governmental Coordination
DO&G	ADNR, Division of Oil and Gas
DOT/PF	Alaska Department of Transportation and Public Facilities
EPA	U.S. Environmental Protection Agency
Mat-Su	Matanuska-Susitna
MSDS	Material Safety Data Sheet
OHMP	Office of Habitat Management and Permitting
OPMP	Office of Project Management and Permitting
SHPO	State Historic Preservation Office
USDA	U.S. Department of Agriculture

SECTION 1

INTRODUCTION

SECTION 1 INTRODUCTION

Summary of Purpose

Enforceable standards for coalbed methane development in the Mat-Su Borough are necessary to establish public confidence in the management of public lands in the affected area. These standards will be implemented by ADNR when making decisions related to coalbed methane development in the Mat-Su Borough. These decisions may include issuing oil and gas leases or licenses, reviewing proposed plans of operations, or reviewing applications for the formation or alteration of oil and gas units. In addition to the enforceable standards, this document includes recommendations for similar standards to be considered by the Matanuska-Susitna Borough, and the Alaska Oil and Gas Conservation Commission.

How This Document Is Organized

To present the coalbed methane standards, this document is organized into four sections, which are supported by extensive appendices.

Section 1 provides a brief explanation of why enforceable standards are necessary for coalbed methane development in the Mat-Su Borough, and provides a brief history of the events that preceded the public process to establish these standards. It also includes a discussion of how these standards will be implemented, and how they can be modified in the future.

Section 2 presents a report from the workshops held in the Mat-Su Borough in January and February 2004.

Section 3 presents the enforceable standards for coalbed methane development on public lands in the Mat-Su Borough.

Section 4 presents the recommendations for the Matanuska-Susitna Borough, and the Alaska Oil and Gas Conservation Commission.

Appendices. These include detailed responses to the comments and suggestions received by ADNR throughout the process of developing these enforceable standards, and extensive information on the coalbed methane workshops.

Why Adopt Enforceable Standards for Coalbed Methane Development in the Mat-Su Borough?

The potential development of coalbed methane in the Mat-Su Borough has been the source of tremendous public debate since the summer of 2003 when ADNR announced that applications had been received for Shallow Natural Gas leases in the area. The public discussion of these applications led to a discussion of the extensive oil and gas leases already in existence in the valley. This was new information for many area residents. A series of public information meetings sponsored by the borough raised additional issues regarding the shallow gas leasing program and the regulations governing coalbed methane development in Alaska. In October 2003, ADNR Commissioner Tom Irwin announced that ADNR was initiating a public process to establish enforceable standards for coalbed methane development in the Mat-Su Borough. Commissioner Irwin said that ADNR has an obligation to take public concern into consideration before proceeding with further decisions associated with full coalbed methane development. The adoption of enforceable standards will provide the public with confidence that future decisions regarding coalbed methane development are being made with an understanding of what is required to protect the interests of the residents of the state.

What Lands are Affected by The Enforceable Standards?

These enforceable standards will apply to decisions made by ADNR, and therefore will apply to lands subject to a state oil and gas lease or contained within an oil and gas unit. State oil and gas leases are issued only when the state owns the oil and gas resources for the land. The remainder of the estate (i.e. everything other than oil and gas and other minerals) may be owned by a private party (i.e. the "surface owner"). These standards apply to state leases regardless of whether there is a private surface owner or not. ADNR will also apply these standards when making decisions related to oil and gas units. A unit is a large area containing many leases that are collected together to manage a field in an efficient manner. A unit may include lands not covered by a state oil and gas lease, but ADNR will apply these standards to all activities occurring within the unit.

History of Coalbed Methane in the Mat-Su Borough

Since the early 1950s, some 30 wells have been drilled in the Mat-Su Borough in search of oil and gas. The current oil and gas leases in the Mat-Su Borough date back to 1991. These conventional oil and gas leases may contain traditional oil and gas resources as well as coal bed methane resources. The Pioneer Unit was formed in the Mat-Su Borough in 1998, and includes only conventional oil and gas leases although exploration of coal bed methane is the primary intent of the unit operator. The oil and gas resources in the Pioneer Unit are owned by many different entities; with only about 50% of the oil and gas in the unit owned by the State of Alaska. Evergreen is the current operator in the Pioneer Unit. Two four-well pilot productions sites were developed in the unit area by Evergreen in 2002; three separate exploratory wells were drilled earlier by Ocean Energy the previous unit operator along Vine Road; and one well that was drilled even prior to formation of the unit along Big Lake Road was re-entered and tested by Ocean. Testing at the pilot production sites in the unit by Evergreen is still underway..

In addition to the activities within the Pioneer Unit, several core holes have been drilled in recent years in the Borough to evaluate coal bed methane resources. One core hole was drilled by the State near Wasilla in 1994, and several core holes have been drilled this year by Evergreen. Also, GRI, Inc. drilled three coalbed methane wells in the Borough and production tested one of them in the Houston area in the 1990s.

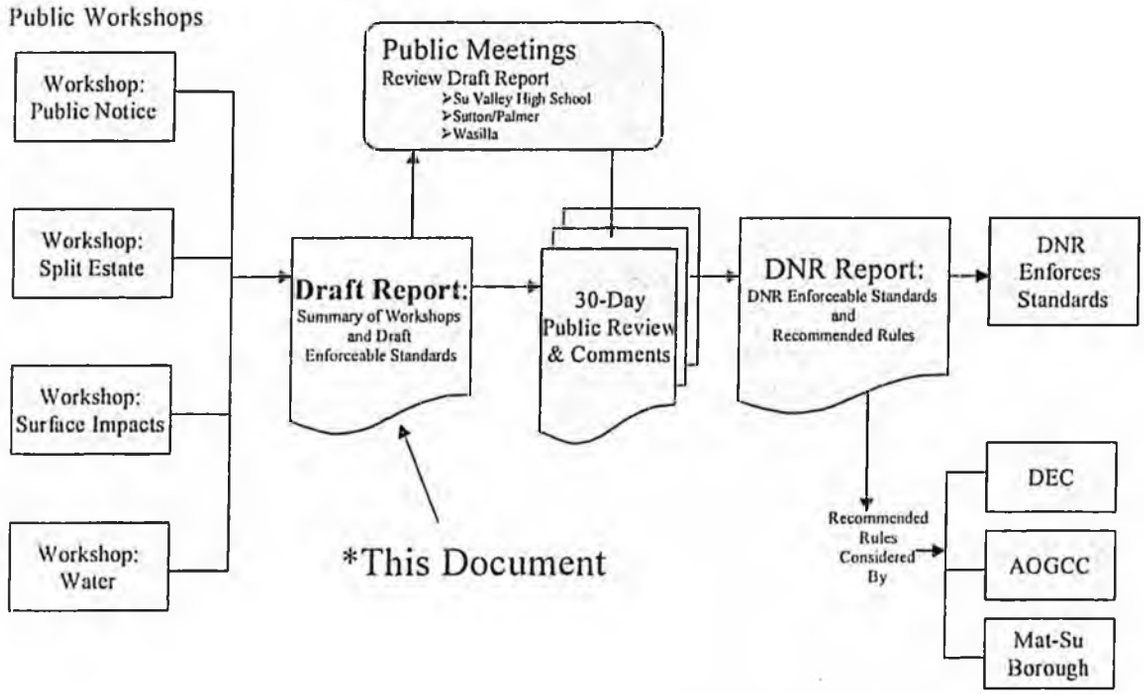
In 1996, the Alaska Legislature passed legislation authorizing a shallow natural gas leasing program (AS 38.05.177). The shallow gas leasing program is non-competitive. ADNR is mandated to issue the leases if "the discover of a local source of natural gas would benefit the residents of an area." In September of 1999, the Commissioner of ADNR issued a decision authorizing the Division of Oil and Gas to accept shallow natural gas lease applications for all eligible state land.

After issuing public notice and mailing application materials to parties that had expressed interest, the Division began accepting shallow natural gas lease applications on February 29, 2000. Thirty-six applicants applied for a total of 270 leases in various regions of the state during the first two weeks of opening. A total of 162 applications were submitted for the Mat-Su Borough. Among the applications received on February 29, 2000, many overlapped with each other. In order to determine priority among the applications, ADNR drew lots and assigned a control number to each lease application such that an application had precedence over applications with a lower control number.

The legislature enacted revisions to the shallow natural gas leasing statute in 2002, resulting in applications pending at that time being adjudicated and issued under the revised program. In February 2004, a decision was issued regarding the Mat-Su applications. Of the 162 applications 60 were issued. The other applications were denied because of overlap with approved applications having a higher control number, no available state land in the application area, or denied for other reasons.

Public Participation

The process to establish the enforceable standards contained in this document involves tremendous public participation, as indicated in the following diagram of the process:



A series of public workshops were held in the Mat-Su Borough in January and February 2004. A report from those workshops can be found in Section 2, below. Hundreds of area residents participated in the workshops. The information from the workshops was used to develop this draft document.

This document will be distributed for public comment with a minimum of 30 days to comment. At least three public meetings will be held in the Mat-Su Borough to review this draft document. The public comments received will be used to develop the final enforceable standards.

Implementation of the Enforceable Standards

This document will be signed by the Commissioner of the Department of Natural Resources and will be state policy for the management of state lands within the Mat-Su Borough as it relates to coalbed methane development. All ADNR decisions related to coalbed methane development shall comply with the standards contained in this document. Possible decisions controlled by these standards include whether to issue oil and gas leases or licenses, and whether to approve proposed plans of operations. Two

important methods of implementation will be imposing mitigation measures on leases and licenses to require compliance with these standards, and to impose conditions on plan of operations approvals.

Modification of the Enforceable Standards

Standards can never be so comprehensive and visionary as to provide solutions to all possible future conflicts, nor should they be inflexible. Therefore, the standards in this document may be changed if conditions warrant. The standards will be reviewed periodically as new data become available and as changing social and economic conditions place different demands on public lands. The periodic review will include meetings with all interested groups and the general public.

Amendments

The standards may be amended. An amendment adds to or modifies the basic intent of a standard. Amendments must be approved by the Commissioner of ADNR. Amendments require public notice and consultation with affected agencies and may require public hearings if the Commissioner decides the level of controversy warrants. Agencies, municipalities, or members of the public may propose amendments.

Minor Changes

A minor change is one that does not modify or add to the basic intent of a standard. Minor changes may be necessary for clarification, consistency, or to facilitate implementation of the standards. Minor changes are made at the discretion of the Director of the Division of Oil and Gas. Agencies, municipalities, or members of the public may propose minor changes. The Director will provide notice and opportunity to comment on any proposed minor changes.

SECTION 2

REPORT ON COALBED METHANE WORKSHOPS

SECTION 2 REPORT ON COALBED METHANE WORKSHOPS

The public workshops were held as follows:

January 28, 2004	Public Notice and Public Information	Teeland Middle School, Wasilla
February 4, 2004	Private Property Rights	Teeland Middle School, Wasilla
February 18, 2004	Surface Impacts, Part 1	Teeland Middle School, Wasilla
February 25, 2004	Surface Impacts, Part 2	Cottonwood Creek Elementary, Wasilla
February 28, 2004	Water Management and Water Protection	Willow Community Center, Willow

Workshop Format

Attendance at the workshops ranged from approximately 80 to 140 people, with the first two workshops being the most heavily attended. The format of the workshops was intended to facilitate discussion and provide greater opportunity for involvement by all participants. This was done by breaking into small groups, mostly consisting of less than twelve people.

For each workshop, materials were provided to assist the groups in their discussion (see appendices). Materials consisted of an issue paper and a questionnaire. The issue papers were presented in a matrix format intended to break down the issues and facilitate comparisons. The questionnaires, one for each group, had spaces for them to write their consensus response. The questions were intended to ensure that all relevant topics were covered during the discussions, but also included space for "other comments" on the workshop's topic. In addition to the questionnaires given to the groups, all individuals were provided similar forms so that they would have an opportunity to express their own preferences.

The materials for each workshop were made available on the Division of Oil and Gas web site prior to each respective workshop and remained there for the rest of the workshop process. This enabled persons that didn't attend the workshops to review them and provide comments, either by filling out the questionnaire and mailing it in, or sending their comments in any manner they preferred.

During each workshop, the small groups discussed the issues for approximately two hours, and prepared written recommendations using the questionnaires. The groups were given the option of using state agency staff as moderators or moderating their own

discussions. Most groups chose to moderate their own discussions. In addition, representatives from various agencies were available to answer questions. After discussion, each group submitted their written recommendations, and provided an oral summary of their recommendations to the large group. Individuals were given the option of either submitting their forms at the workshop or mailing them in later.

Following are brief summaries of the discussions and recommendations from each workshop. These summaries are not intended to be a comprehensive representation of the recommendations, but rather to provide an overview. For a complete list of comments, see Appendices A through F. Many of the recommendations and comments reflected those that had been made by the public prior to initiation of the public workshop process.

Overall Impression From Workshops

* important note to go back to

The overwhelming majority of workshop participants were opposed to any coalbed methane development in the Mat-Su Borough. They expressed frustration that the workshops did not address such topics as buying back all shallow gas leases and requiring a best interest finding prior to issuing additional shallow gas leases. Most participants expressed distrust toward ADNR and skepticism that the process would result in legitimate standards. The participants in the first two workshops, in particular, devoted many of their responses to calls for bans on coalbed methane in residential areas and non-developed areas of the Mat-Su Borough, repeated calls for lease buybacks, and complaints that the current shallow gas leases were issued without proper public notice. At subsequent workshops, participants freely stated their general opposition to coalbed methane development, and their reluctant participation in the process of developing standards for that development, preferring an outright ban on coalbed methane activities.

January 28 Workshop - Public Notice and Public Information

Generally, participants felt that more should be done to provide public notice, especially for leasing. It was recommended that notice be distributed to a larger area or on a watershed basis, more advance notice to allow additional time for review and comment, and that better information be included. There was strong sentiment that public notice requirements be the same for all subsurface owners and managing entities, and there were recommendations that ADNR be responsible for notice on all subsurface. Recommendations were also provided on how public comments should be reviewed, and how leasing and permitting decisions should be made based on those comments.

Regarding public information, many expressed the opinion that better information should be provided about the leasing and permitting process, and that there should be full public disclosure of all information, including proprietary data. There were also recommendations that if proprietary information could not be released, that an independent body review it. Many commenters stressed the importance of making sure that information about hazardous materials, fire hazard, and other safety concerns is available to the public and appropriate agencies.

February 4 Workshop - Private Property Rights

During this workshop, many participants stated that the surface estate should be dominant over subsurface estate. It was strongly recommended that laws be changed so that persons that acquired their surface estate from the State of Alaska could also acquire the subsurface estate.

Many recommendations were made regarding negotiations between the surface owner and developer, bonding and damages. Included were standards for how contact should be made by the developer, and what kind of information should be provided. Commenters felt that other parties should be involved in the initial contact, and that more information should be submitted to the surface owner.

Regarding surface use agreements, there was strong consensus that there should be a standard form for this purpose, and that it should come out of a collaborative effort among agencies and citizen organizations. It was also recommended that in negotiation of surface use agreements, the surface owner should have the ability to deny access, and that negotiations should be done collectively with multiple surface owners. Some commenters stated that the developer should bear the cost of the surface owner's legal services and creation of a citizens' advocacy group.

There was a great deal of discussion on the bonding process and how bond amounts and damages are determined. It was recommended that adjacent surface owners be involved in the bonding process, and that a third party determine whether adequate time and good faith effort had gone into negotiations prior to bond hearings. Recommendations were made for factors that should be included in determination of bond amounts, such as neighboring water wells, health impacts, quality of life, economic return on property, and the surface owner's legal costs. Specific amounts in relation to property value were also recommended. Similar recommendations were made regarding the determination of damages. For resolution of disputes, it was recommended that mediation be done by an independent third party, and that legal expenditures be capped in order to ensure equity.

* can't define quality of life.

Most everyone was in agreement with the need to develop an information packet or pamphlet on property rights, split estate issues and coalbed methane development, and that it should be produced jointly by agencies and citizen groups. It was also recommended that a citizen advisory group and citizen advocacy group be formed.

February 18 Workshop - Surface Impacts, Part 1

For drill pads and compressor stations, participants recommended requiring a visual mitigation plan, facility siting requirements, setbacks, and measures to minimize visual impacts of buildings and vegetation removal. Standards were also recommended for minimizing erosion and sedimentation, including erosion control plans, temporary and permanent erosion control measures and setbacks from streams. Recommendations for noise mitigation included requirements for enclosures for motors, decibel limits, limits

on hours of operation, setbacks and electric motors. Other recommendations for drill pads and compressor stations included prohibiting them from residential areas (subdivisions containing lots below a certain size) and requiring directional drilling.

Recommendations for temporary storage and permanent disposal of solid waste from drilling operations mostly involved modification of existing regulations, adding requirements for independent testing and monitoring, public notification and prohibition of open pits.

A number of standards were recommended for use of hazardous materials, including secondary containment and setbacks from waterbodies. Participants also stressed the importance of requiring emergency preparedness plans, and ensuring that spill response equipment, procedures and training be in place prior to development.

February 25 Workshop - Surface Impacts, Part 2

Many recommendations were made regarding roads and public access. These included requiring the use of existing infrastructure as much as possible, and that any expansion of infrastructure be part of a phased road and pipeline plan. It was recommended that roads meet Borough and DOT/PF standards, that approval of new roads involve a public process, and that erosion and sedimentation, habitat fragmentation, dust abatement, traffic safety, road congestion, emergency access, and maintenance be addressed. It was strongly recommended that public access not be restricted, and if any road closures do become necessary, public notice be required.

Recommendations for addressing the impacts of routing and construction of pipelines were similar to those for roads. Other recommendations included the need to combine routing with roads as much as possible, assuring integrity against climatic conditions and geophysical hazards, and emergency preparedness for leaks.

Well spacing and field development planning was also discussed during this workshop. Participants expressed concern with the potential for increasing well density to be allowed over time. It was recommended that an absolute limit be placed on well density, such as one or two wells per section. Other recommendations addressed how requests for increased density are processed. These included notice to all surface owners within the section, interagency review, a public hearing and minimum waiting periods. There were also recommendations on the information that should be submitted with such requests.

Recommendations related to air quality included requirements for motors that operate on natural gas or electricity, and that baseline air quality studies be conducted. For geologic hazards, recommendations were made for geologic studies and modeling, methane seepage studies, and minimum setbacks from faults.

February 28 Workshop - Water Management and Water Protection

There was strong consensus that a groundwater resource study be conducted to determine hydrologic connections between surface and groundwater, and between shallow and deep aquifers. It was also recommended that baseline data be established for methane seeps and water wells, and that a cumulative impact study be completed.

Recommendations made for surface casing included requirements for cement bond logs and double casing to an appropriate depth based on hydrogeologic data. There were many recommendations that fracturing fluids be limited only to water or other non-toxic material, and that their composition be fully disclosed to the public. It was also recommended that no hydraulic fracturing occur within a certain distance of a water well, and that monitoring be conducted of all fracturing operations.

The majority of participants said that reinjection should be required at all times, but some recommended that a private surface owner should have the option of discharging on surface if the water meets DEC and CWA standards. Various depths for reinjection were recommended, and many recommended that water quality testing be done by a third party.

Participants said that water quantity should be monitored with hydraulic impact (static level) prior to testing or drilling, and that there be no drilling in recharge zones. It was also recommended that watershed management plans be developed, and that industry should bear the costs of such a study.

Surface water issues were also discussed. It was recommended that produced water should be disposed of as toxic waste and that no mixing zones be allowed. Various setbacks from streams were recommended.

For all water management issues, it was recommended that testing and monitoring be done by a third party, and also that testing be done at least one year prior to any development. Recommendations were made to test for specific factors and substances such as pH, salinity, hydrocarbons, heavy metals and methane. Various radii and time intervals were recommended for monitoring. Participants said that the state should design and implement a complete enforcement and monitoring program.

Commenters recommended that contingency plans be developed, but that much effort needs to be put into both prevention and response. They also said that developers need to be held responsible, and that private individuals shouldn't bear the burden of proof that contamination has occured. There were recommendations that criminal charges be brought against negligent developers and operators, and that proceeds from development be used to establish funds for legal costs, compensation and creation of a citizens' oversight group.

SECTION 3

ENFORCEABLE STANDARDS

SECTION 3. ENFORCEABLE STANDARDS

Based on the results of the workshops, ADNR has developed the following list of enforceable standards for coalbed methane activities in the Mat-Su Borough. These standards are divided into two groups, enforceable standards for activities on state-managed lands to be implemented by DNR, and recommended standards for other state agencies and the Mat-Su Borough to implement through their respective authorities.

Public Notice

1. **Public Notice For Oil and Gas Leasing.** In addition to the public notice required by AS 38.05.945[1], ADNR will provide public notice of a shallow gas lease application or initiation of a best interest finding review of an oil and gas license or lease sale by the following methods, with a comment period of at least 90 days:
    a. Display ads in both the Anchorage Daily News and the Frontiersman with maps clearly identifying the proposed lease area;
    b. Public service announcements on radio stations within or adjacent to the proposed lease area;
    c. Public notice distributed to libraries and post offices within or adjacent to the proposed lease area;
    d. Public notice distributed to any community councils whose boundaries are within or adjacent to the proposed lease area; and
    e. All residents and organizations that have submitted a written request for notice of proposed leases in that area will be notified electronically or, if requested, by regular mail.

2. **Public Notice For Oil and Gas at the Exploration, Development and Transportation Phases.** ADNR will provide at least a 30-day public notice and review/comment period for each phase of CBM development requiring a plan of operation (exploration, development and transportation) by the following methods:
    a. ADNR will require the applicant to provide notice by certified mail or personal delivery to all owners of surface lands within ½-mile of the proposed activity who can be reasonably identified and located based on records at the state Recorder's office and the borough tax records;
    b. Legal notice in the Anchorage Daily News and the Frontiersman;
    c. Public notice distributed to municipalities, regional and village corporations, libraries, and post offices within or adjacent to the proposed activity area;
    d. Public notice distributed to any community councils whose boundaries are within or adjacent to the proposed activity area; and

[1] AS 38.05.945 requires, among other things, for notice to be given to an affected municipality and regional and village corporation, and any affected community council or nonprofit community organization that has requested notice in writing and provided a map of its boundaries.

e. All residents and organizations that have submitted a written request for notice of proposed coalbed methane activities within the area of the proposed activity will be notified electronically or, if requested, by regular mail.

The plan of operation, which requires ADNR approval prior to the operator performing any activity on a state oil and gas lease or exploration license, is referenced throughout this document. The operator submits an application to ADNR that must include statements and maps or drawings setting out the following:

- *the sequence and schedule of the operations to be conducted in the lease area, including the date operations are proposed to begin and their proposed duration;*
- *projected use requirements directly associated with the proposed operations, including but not limited to the location and design of well sites, material sites, water supplies, solid waste sites, buildings, roads, utilities, airstrips, and all facilities and equipment necessary to conduct the proposed operations;*
- *plans for rehabilitation of the affected area after completion of operations or phases of those operations; and*
- *a description of operating procedures designed to prevent or minimize adverse effects on other natural resources and other uses of the lease area and adjacent areas, including fish and wildlife habitats, historic and archeological sites, and public use areas. 11 AAC 83.158(d).*

ADNR often requires other stipulations, in addition to those necessary to meet the mitigation measures developed for the lease. These stipulations address site-specific concerns directly associated with the proposed project and/or issues raised in public comment on the proposed plan. The mitigation measures are part of the terms and conditions of the lease and are attached to the plan of operations approval and are binding on the operator. Activities are field-monitored by ADNR to ensure compliance with the terms of plan approval. The lease contract requires that the operator keep the lease area open for inspection by authorized state officials.

Public Information

3. **Disclosure of Fracturing Materials.** A plan of operations will include a general disclosure of the components in any hydraulic fracturing materials to be used, the volume and depths at which such fluids will be used, and the volume capacity of the vessels to be used to store such materials.

4. **Information on Hazardous Materials.** The operator will post Material Safety Data Sheet (MSDS) information at each drill site of all hazardous substances currently on the site. The operator will ensure local emergency response teams are provided specific information concerning the use or transport of any

hazardous substances associated with CBM exploration and development. The operator will post information at each drill site of possible safety hazards located at the site.

5. **Emergency Planning.** The operator will provide a written emergency preparedness and response plan for potential emergencies that may be associated with the operation of facilities. This may include explosions, fires, gas or water pipeline leaks or ruptures, earthquake or flood events, or hazardous material spills. The operator will conduct annual or periodic training/drills for response personnel.

6. **As-Built Survey Required.** ADNR will require as-built surveys upon completion of any permanent CBM facility.

Setbacks

7. **Setbacks.**
   a. The operator will construct drill pads at least 500 feet and compressor stations at least 1,500 feet from any residential structure or public facility. Residential structure means a building used regularly as a residence. Public facility means a hospital, school, public library, rest home, or court building;
   b. An exception may be granted from this requirement if the operator obtains the consent of the owner of the residential structure, or demonstrates that the drill pad and/or compressor station will be substantially hidden from view from the public facility, and that the noise levels experienced by the public facility will not exceed ambient noise levels.

8. **Subdivisions.** The operator will not construct drill pads or compressor stations in any subdivision containing lots predominantly sized at five acres or less.

Surface Impacts

9. **Noise Mitigation.** The plan of operations will include the measures to be used to mitigate potential noise impacts associated with facilities and compressor stations. The operator will provide an analysis of the noise impacts on residential, commercial, and recreational users of the proposed project area. Measures to mitigate noise impacts will include but are not limited to:
   a. Venting exhaust in a direction away from the closest existing residences of platted subdivision;
   b. Using quiet design mufflers on non-electric motors;
   c. Limiting the hours of noise-generating operation to daytime hours;
   d. Using sound insulating enclosures where facilities would otherwise create noise impacts because of proximity, population density, other adjacent land uses sensitive to adverse impacts from noise; and

e. Siting facilities and compressor stations in locations that use geographic features to buffer noise.

10. **Visual Mitigation.** A plan of operations will include the measures to be used to mitigate visual impacts associated with drill pads, buildings and compressor stations. Measures to mitigate visual impacts include:
    - Minimizing the size of structures;
    - Minimizing damage to vegetation and the use of vegetation to buffer visual impacts;
    - Minimizing the work pad size to only that area necessary to provide a safe work area;
    - Locating facilities away from prominent features and hills and ridges;
    - Locating facilities at the base of slopes;
    - Matching paint schemes of buildings to local landscape;
    - Applying one or more of the following landscape practices for permanent facilities:
        a. Establishing berms, ground covers, shrubs and trees;
        b. Placing vegetation clusters 10-15 feet apart along the edge of the permanent pad site in residential areas;
        c. Shaping cuts and fills to appear as natural forms;
        d. Cutting rock areas to appear as natural forms;
        e. Designing the facility to utilize natural screens; and
        f. Constructing fences, such as woven wood or rock, for use with or instead of landscaping.

11. **Light Shielding.** The operator will direct exterior lighting, when required, away from residential areas, or effectively shield the light from such areas.

12. **Solid Waste Storage - Temporary.** Temporary storage of waste will not be permitted for longer than six months. Open pit solid waste storage is not allowed in residential areas. In these areas, solid waste must be stored in a closed container.

13. **Solid Waste Storage – Fencing.** The operator will exclude people, livestock, and wildlife from solid waste disposal areas using fencing or other barriers approved by DO&G.

14. **Erosion Control Plan.** A plan of operations will include measures to be used to mitigate soil erosion and sedimentation during all activities associated with exploration and development.

15. **Permanent Erosion Control.** The operator, after construction of a permanent facility, will replace temporary erosion control structures with permanent structures within 30 days of project completion or, if seasonal conditions dictate timing constraints, within 30 days after seasonal conditions permit the activity.

16. **Timber Harvesting.** Timber harvested as part of exploration and development activities (including right-of-way and pad clearing slash) will be processed and disposed of in a manner approved by the Division of Forestry to avoid spruce bark beetle infestation.

17. **Weed Control.** The operator will conduct weed/vegetation control. Techniques and materials to be used will be reviewed in consultation with ADEC, the Plant Materials Center, local Soil Conservation District, and Mat-Su Borough.

Split Estate

18. **Good Faith Negotiations.** Operators are required to make contact with the surface owner of lands upon which activities are proposed, and make good-faith efforts to negotiate a surface use agreement. If agreement cannot be reached, ADNR will initiate bond proceedings pursuant to AS 38.05.130 only if 60 days has passed from the initial contact between the surface owner and operator.

19. **Split Estate Brochure.** ADNR will develop an informational brochure describing split estate issues. The brochure will include a discussion on the right of access to the subsurface estate, surface owner rights, and general provisions of a surface use agreement.

20. **Bond Amount.** When determining the damage bond amount under AS 38.05.130, ADNR shall consider the current market value of the property, the potential duration of operations, the potential future value of the property, the loss of use of the property during operations, potential cost of damage to existing surface improvements, crops, and timber.

Water Management

21. **Baseline Water Quantity Information.** Where ADNR determines that water withdrawal has significant potential to unduly affect waters currently used by others, such as an individual owner's well or a drinking water aquifer, ADNR will require a CBM applicant for a temporary water use authorization or water right to provide baseline information concerning water quantity. The information will be designed to document the pre-withdrawal conditions in case the withdrawal causes a change in water availability to current users. The baseline information may include one or more measurements of water table depth or piezometric head. It may also include testing individual wells or other information as appropriate.

22. **Surface Disposal of Produced Waters.** Surface disposal of produced water will not be allowed unless ADEC determines that the discharge will meet state water quality standards and the discharge will result in no negative environmental impacts.

23. **Water Quantity Monitoring**. Where ADNR determines that water withdrawal has significant potential to unduly affect waters currently used by others, such as an individual owner's well or a drinking water aquifer, the Department will condition temporary water use authorizations or water rights with the requirement to monitor the water availability in the area of concern. The conditions may include the requirement to establish a monitoring well, monitor existing wells, or other measures as appropriate.

Hydraulic Fracturing

24. **Diesel-Based Fracturing Materials**. The operator will not use diesel-based fracturing materials.

Roads and Pipelines

25. **Transportation Plan**. A plan of operations will include an analysis of road and access issues associated with site development. All aspects of transportation related to the proposed activity and possible effects to existing uses and mitigation measures will be considered. The plan will address, at minimum:
    a. The adequacy of existing roads and access to the site. Operator activities must utilize existing road systems, if available;
    b. The operator's measures to minimize damage to the surface for approved off-road access;
    c. The operator's measures to ensure that road improvements meet state Department of Transportation and Public Facilities and Mat-Su Borough standards;
    d. The operator's measures to ensure that new roads are constructed to allow for emergency access and egress for residents, occupants, and emergency equipment;
    e. The operator measures to avoid use of residential roads; and
    f. The operator's consideration of public access granted under RS 2477, recreational trails, section lines, and other established rights-of-way.

26. **Consolidate Infrastructure**. Exploration activities must utilize existing road systems, ice roads, air or boat service, or vehicles that do not cause significant damage to the ground surface or vegetation. Construction of temporary roads may be allowed. Construction of permanent roads will be prohibited during the exploration phase.

27. **Disturbance Along Right-of-Way**. The operator will minimize disturbance of vegetation within rights-of-way during construction, maintenance and operational activities.

28. **Pipelines and Fishstreams**. The operator will construct pipelines beneath fish streams using directional drilling techniques, unless the Director approves an alternative method, in consultation with OHMP.

29. **Buried Pipelines.** The operator will bury pipelines unless safety, seismic, or other conditions dictate otherwise. The operator must minimize duplication of existing transportation corridors when planning a pipeline route.

30. **Public Access.** The operator will not restrict public access within a pipeline right-of-way on public land unless approved by ADNR to avoid unreasonable conflict with construction, maintenance, operation or termination of the pipeline.

Monitoring

31. **Monitoring.** Plan of operations approvals will include monitoring requirements. The monitoring requirements will be tailored to the specific situation and potential impacts. In approving a monitoring plan, ADNR will consider the following factors: potential impacts to water quality and quantity, potential noise and/or visual impacts to adjacent users, magnitude of proposed ground disturbance, and proximity to sensitive habitat or use areas.

Well Spacing

32. **Well Spacing.** Well spacing will be reviewed and approved as part of a Unit plan of development. The decision whether to allow a well spacing proposal will be based upon a balancing of the gas pool management needs and the anticipated surface impact and surface conflicts.

Geophysical Hazards

33. **Geophysical Hazards.** A plan of operations will identify any geophysical hazards in the area of operations. A plan of operations for proposed development in the vicinity of a geophysical hazard must include siting, design, and construction measures for minimizing property damage and protecting against loss of life.

Relation with Other State Requirements

34. **Compliance with Use Area Plans.** Operators must comply with all current or future ADNR area plans and recreation rivers plans; and ADF&G game refuge plans, critical habitat area plans, and sanctuary area plans within which operations are located.

35. **Prehistoric, Historic and Archeological Sites.** Operators will comply with ADNR's standard stipulations concerning protection of prehistoric, historic and archeological sites. (See sample mitigation measures in Appendix B).

36. **Local Hire, Communication and Training.** Operators will comply with ADNR's standard stipulations concerning local hire, working with local

constituencies, and cultural sensitivity. (See sample mitigation measures in Appendix B).

37. **Fish and Wildlife Resources.** The operator will comply with all standard mitigation measures designed to protect fish and wildlife and their habitat. (See sample mitigation measures in Appendix B).

38. **Hazardous Substances.** The operator will comply with ADNR's standard stipulations for handling hazardous substances (See sample mitigation measures in Appendix B).

39. **Definitions.** In this document

a. "Facilities" means any structure, equipment, or improvement to the surface, whether temporary or permanent, including, but not limited to, roads, pads, pits, pipelines, power lines, generators, utilities, airstrips, wells, compressors, drill rigs, camps and buildings;
b. "Feasible and prudent" means consistent with sound engineering practice and not causing environmental, social, or economic costs that outweigh the public benefit to be derived from compliance with the standard;
c. "Minimize" means to reduce adverse impacts to the smallest amount, extent, duration, size, or degree reasonable in light of the environmental, social, or economic costs of further reduction; and
d. "Plan of operations" means a license plan of operations under 11 AAC 83.158 and a unit plan of operations under 11 AAC 83.346.

SECTION 4

RECOMMENDATIONS TO OTHER AGENCIES

SECTION 4. RECOMMENDATIONS TO OTHER AGENCIES

ADNR recommends that Alaska Oil and Gas Conservation Commission and the Mat-Su Borough consider the following actions:

1. The Mat-Su Borough adopt an ordinance to establish standards similar to those adopted here by ADNR to be applied by the borough on non-state managed lands.

2. AOGCC adopt regulations to prevent the production of CBM from coal seams that serve as a current source of drinking water.

3. AOGCC continue its efforts to develop a public notice procedure for permits to drill CBM wells.

4. AOGCC continue its efforts to develop requirements for proposed CBM wells of baseline testing and on-going monitoring for water quality of any existing drinking water well that may be negatively affected by the CBM production. The testing to include methane content to identify any potential risk of methane seepage.

APPENDIX A. RESPONSE TO COMMENTS AND SUGGESTIONS

	COMMENT OR SUGGESTION	RESPONSE
	PUBLIC NOTICE- General Recommendations	
1	Notice requirements should be the same for both ADNR and non-ADNR managed subsurface.	As a public land manager, ADNR's notice requirements are significantly greater than those for private landowners. Transactions such as mineral leases or land transfers between private parties regarding private lands are generally not subject to any public notice, while activities on private lands that require local permitting approval will generally require public notice. The establishment of public notice requirements on non-ADNR lands would have to come from the AOGCC or from a borough ordinance, since ADNR does not have authority to require such notice on non-ADNR lands. AOGCC is currently considering a public notice requirement as part of their permit to drill approval process. However, it must be noted that AOGCC's authority is generally limited to belowground drilling operation procedures. AOGCC will not consider public comments related to potential conflicts occurring on the surface with other users. If the borough considers such a public notice requirement, ADNR recommends notice requirements be comparable to those requirements on ADNR managed lands.
2	Should have consistent notice (same amount of time) throughout the leasing and permitting process.	The length of time for a comment period is established in statutes or regulations and may vary based on a number of factors such as magnitude of the potential impact from the decision, complexity of the issues involved, and level of public interest in the decision. Also, these required comment periods establish the minimum periods allowed. When a proposed decision involves issues or raises concerns the cannot be adequately addressed during the standard comment period, the period will be extended to provide an appropriate period for comment.

bought length of time extended

	COMMENT OR SUGGESTION	RESPONSE
3	All notification requirements should apply to transfers of leases.	The review and approval of transfers of oil and gas lease is generally an administrative function with little policy or discretionary input. ADNR receives hundreds of lease assignments per year. Requiring public notice and input for these assignments would be expensive with little increase in the public's involvement in oil and gas resource management, and would likely mislead the public regarding the significance of the decision to be made. Also, it should be noted that the public is primarily interested in who will be operating on the state leases, and not as much with who owns the lease. For example, the shallow gas leases in the Mat-Su are held by many individuals, but these leaseholders have contracted with Evergreen Resources to explore for coalbed methane on their lease. ADNR will likely not be aware of who will operate on a specific lease until it receives an application for approval of a plan of operation, or an application to form an exploration or development unit. Either one of these processes will involve a public notice and comment period.
	PUBLIC NOTICE - Area of Notification	
4	At the leasing stage, notice should be given to all surface owners within the boundary of the lease application, and also within an established distance from that boundary. Distance recommendations included: ½-mile, 1-mile, 1.5-miles, 5-miles and 25-miles.	ADNR agrees that public notification related to CBM lease activities should have broad distribution within the affected area, however ADNR does not believe that individual notice to surface owners is necessary. ADNR has engaged in oil and gas leasing of inhabited areas for decades, including Kenai and Anchorage. The public notice procedures throughout this time have not caused the level of concern that we now see in the Mat-Su. ADNR believes that most of the discontent over the notice procedures used in the Mat-Su is primarily due to the lack of a best interest finding and its associated public evaluation of whether to issue leases in the Mat-Su. ADNR supports legislation to restore a best interest finding to all oil and gas leasing, and that doing so will significantly reduce the public discontent over the notice procedures.

	COMMENT OR SUGGESTION	RESPONSE
		However, ADNR also recognizes that additional steps much be taken to restore public confidence in the desires of ADNR to fully engage the public in the leasing decisions ADNR makes. Therefore, Standard #1 represents significant additional notice requirements that ADNR will employ in future leasing decisions involving CBM in the Mat-Su. Finally, the cost associated with individual notice is significant, and a change in ADNR policy that would significantly increase the cost of the leasing program should be initiated by the legislature.
5	For exploration and development stages, notify all surface owners within a defined area. Recommended areas of notice included: • Within the entire lease area. • Within a specific radius from the well - ½ mile, 1 mile, 5 miles, 25 miles. • Within 1 mile from well and corridor, but ½ mile from corridor may be adequate depending on definition of "corridor." • Along right of way of road used to access project. • Within area defined by watershed, bioregion, or aquifer. • Within 5 miles until further data on aquifers and other baseline data has been developed that suggest a larger area of notification.	Standard #2 addresses this comment for ADNR managed lands and requires direct notice to landowners within ½-mile of operations. The Mat-Su Borough or AOGCC may have the ability to require the same public notice standards on non-state managed lands. ADNR recommends that these entities investigate a mechanism to adopt public notice requirements.
	PUBLIC NOTICE - Methods	
6	Notice should be provided by mail. Recommendations included regular mail and certified mail.	At the leasing stage, organizations and individuals will be notified if they have requested it in writing. When activities are proposed, landowners within ½-mile will be notified by certified mail or personal delivery.

	COMMENT OR SUGGESTION	RESPONSE
7	Notice should be given in local and weekly newspapers a minimum of two times per week over one month, and should consist of display ads, not just legal notices. Should also print names of all surface owners in newspaper notice.	At the leasing stage, ADNR will place display ads in both the Anchorage Daily News and Frontiersman. The ads will include a map of the proposed lease boundaries. ADNR believes this is sufficient, and that including the names of property owners would be unnecessary. When activities are proposed, legal ads will be used, and landowners within ½-mile will be notified by certified mail or personal delivery.
8	Notice should be provided by radio, television, and posting of signs.	The public notification process is addressed in Standard #1 and 2. It includes public service announcements and posting notices in libraries and post offices.
9	Flyers should be posted in gas stations, grocery stores, post offices and other public places.	See response # 8.
10	Provide a database on the website of all permits from all involved agencies (on one website).	ADNR supports the advancement of information technology in permitting decisions. Many efforts are underway to better use information technology to integrate permitting information between agencies and make it more accessible to the public. These efforts will continue and will include CBM activities in their products.
	PUBLIC NOTICE - Responsibility	
11	Require the lease applicant to be responsible for making (after ADNR review) and distributing accurate maps of leased area to all property owners.	For leasing, ADNR is responsible for creating maps of the proposed lease areas. An applicant for a plan of operations approval is responsible for providing an accurate map of the project area, such a map would be included in the notice of the operations provided to landowners.

	COMMENT OR SUGGESTION	RESPONSE
12	To address leasing on non-ADNR managed subsurface, the applicant should be required to register with ADNR. ADNR would then be responsible for notification of property owners within 5-mile radius AND Borough permit for subsurface development with Borough notification (public notice) to property owners. Comments would go to ADNR and the Borough.	This request is beyond ADNR's current statutory authority. ADNR recommends that the notification process used for state managed land be applied to private land through borough authorities.
13	All agencies should work together to get public notices out. ADNR should be the coordinator of the information that needs to go to the public. Reinstate the Division of Governmental Coordination.	ADNR, AOGCC, ADEC and the Mat-Su Borough have cooperated throughout the Mat-Su Coalbed Methane Standards process and will continue to coordinate on CBM activities. The Division of Governmental Coordination (DGC) functions were transferred to the Office of Project Management and Permitting (OPMP) within ADNR. Like DGC, OPMP is responsible for coordination among state agencies for certain activities. However, OPMP's method of coordinating the permitting activities is through the Alaska Coastal Management Program. CBM activities are exempt from ACMP review by statute.
	PUBLIC NOTICE - Review of Public Comments	
14	Individuals with scientific background and/or an interagency panel should review comments. Create a panel to address comments and review permits, with citizens on the panel.	ADNR, AOGCC, ADEC and the Mat-Su Borough house technical expertise in the fields of geology, hydrology, engineering, biology, planning, and other disciplines associated with land and resource management. Where required, these staff will be asked to review public comments and participate in developing a response.
15	Web response to comments is not sufficient. Letter should be sent to all providing comments. Written comments summary should be mailed to those who comment.	Copies of final decision documents are mailed to those who commented.

	COMMENT OR SUGGESTION	RESPONSE
	PUBLIC NOTICE - Effect of Public Comments on Decisions regarding Lease Applications, Permits to Drill and Plans of Operation	
16	A public hearing should be required under certain circumstances. Recommendations included: • More than 25 percent of the population comment. • Level of development changes. • After every comment period for every decision. • Prior to any lease, on state or private subsurface.	At the leasing stage, there is an opportunity for a public hearing (AS 38.05.946). Requests for public hearings are reviewed on a case-by-case basis. If there is significant public interest or concern expressed regarding a pending ADNR decision, there is ordinarily a public hearing to hear those concerns.
17	A lease application, well permit, or plan of operations should be denied under certain circumstances. Recommendations included: • The majority of comments received are opposed (if opposed, allow surface owner option to lease subsurface at current rate). • Numerically tally comments, give weight to comment volume.	Lease applications and plans of operations are denied when they do not meet the decisional requirements (i.e. in the best interest of the state). Although local concerns are considered and can affect the decision, resource decisions by ADNR are based on the state's interests.
	PUBLIC INFORMATION - Information that Should be Available to the Public	
18	Information regarding the leasing and permitting process should be presented in a clear, easier to understand format.	ADNR provides information to the public at the leasing, exploration, development, production, and transportation phases of CBM activities. ADNR continually strives to improve the quality of the information we provide to the public. One of the motivations to initiate this standards process was the frustration with the lack of public understanding of what ADNR does and how we protect the public's interests. We will continue to look for ways to make the information we provide more easily understood.

	COMMENT OR SUGGESTION	RESPONSE
19	Non-proprietary information specific to permits and plans of operation should be available to the public: • Surface and bottom hole locations, prior to permitting. • Surface cement casings, cement bond logs. • Content and disposition of drilling mud. • Ingredients (not formulas or proportions) of materials used in hydraulic fracturing. • Other chemicals or materials used for surface and subsurface operations. • Results of water testing before, during and after operations. • Monitoring well data.	These concerns are addressed in Standards #3, 4, 5, 6, 12, and 21.
20	Proprietary information specific to permits and plans of operation: • Core sample data. • Drill logs. • Complete information on hydraulic fracturing fluids.	See Standard #3 regarding fracturing fluids. State statutes require the confidentiality of certain information. All other information is available for public review.
21	Haz-Mat response teams need to know what materials are being transported and used (for spill occurrences).	See Standards #3 - 6.
	PROPERTY RIGHTS / SPLIT ESTATE **General Recommendations**	
22	Surface owner should have dominant estate, not the subsurface owner. Landowners should be allowed to say no. No access without surface owner's approval. Using Surface Mining and Coal Reclamation Act as an example, state should work to establish parity between the estates to give balance to all values.	The relationship between the surface and subsurface has been established through a process of legal precedence. ADNR has no control over this process.

	COMMENT OR SUGGESTION	RESPONSE
23	Federal law should be changed to allow state transfer of subsurface to surface owners. Otherwise, give property owner the right to lease or purchase the state's mineral estate under their property. Surface owners should have right of first refusal for property owner before lease happens. Surface owners should be able to get "best deal" before subsurface party exists.	ADNR cannot change federal law. Section 6(i) of the Alaska Statehood Act specifically requires the State to retain the mineral interests when conveying the surface estate. If Alaska conveyed its mineral estate contrary to the Act, that estate would be forfeited to the federal government
	PROPERTY RIGHTS - Information that Developer should provide to Surface Owner in Addition to Plan of Operations	
24	Flow chart for the process of reaching agreement, conflict resolution, and legal recourse if unsatisfactory contract.	During negotiations, the surface owner can request this information from the developer. In addition, see Standard #19 for a description of the brochure ADNR will prepare regarding surface owner rights.
25	Driller (company) should provide qualifications, bonding, and performance and work history (including violations, etc.).	During negotiations, the surface owner can request this information from the operator.
26	Area-wide "development plan."	The existence of such a plan would depend on whether unitization has occurred To address issues on a broader scale, a unit could be formed by lessees in an area, if determined and certified by the commissioner to be necessary and advisable in the public interest (AS 38.05.180 (p)). Decisions would be guided by a plan of development specific to that unit. The plan must adequately protect all parties in interest, including the state.

	COMMENT OR SUGGESTION	RESPONSE
27	Plan of operations, which should include: • As-built type of plan for development that graphically defines placement of structures. • Standards for road and pad construction • Oversight and enforcement protocols, which should stipulate having compliance official on-site. • Provisions for plan amendments and protocol for evaluating any changes.	Applications for plan of operations approval are already required to include a graphic depiction of where facilities will be located, how they will be constructed, etc. Modifications of the plan of operations require ADNR approval, and unless the modification is minor, the modification would require a public notice and comment period. See Standard #31 regarding monitoring requirements.
28	Require an impact statement for public comment. Detailed plan with timeline and environmental impact statement approved by local government. 90-day public notice period for Environmental Impact Statement.	An Environmental Impact Statement is a federal document. The state develops Best Interest Findings, but these are not allowed for shallow natural gas leasing.
29	Every new driller should be required to submit a new plan of operation.	A plan of operation is required for all drilling activity on state managed lands.
	PROPERTY RIGHTS - Standard Surface Use Agreement	
30	Experienced land use attorneys should craft a third party agreement to be used as a template.	ADNR would support an effort by attorneys to draft a template surface use agreement.
31	Establish a citizen advisory group or a task force to include government, property owners, and private companies that will provide expertise for different topics (example water quality, property law issues, agriculture).	ADNR intends to monitor the implementation success of these Standards, and assess the need for this suggestion if CBM exploration is successful and development is proposed.

	COMMENT OR SUGGESTION	RESPONSE
	PROPERTY RIGHTS - Negotiation of Surface Use Agreement	
32	Surface owner should be paid fair market value for the land if they do not want to be a participant in the program.	ADNR does not have the authority to address this suggestion. It would require new legislation.
33	Need a pre-determined bond value before negotiations start.	Standard #20 addresses bond valuation. There will be no need for a bond determination if negotiations on a surface use agreement are successful.
34	Remove limitations on confidentiality. User agreements on state subsurface must be public.	Agreements between private surface owners and operators are private contracts and not public documents.
35	Terms of agreement should transfer to subsequent developers.	The terms of the private surface use agreement will establish whether the agreement can be assigned to a new operator without the other party's consent.
36	A watershed unit should be established and that unit should negotiate the "agreement" and have the same rights as above.	Watershed planning groups have been established in other areas of Alaska. They meet and discuss issues affecting the watershed and make recommendations on proposed activities. Watershed planning groups can be a valuable resource for landowners; however, they do not have the legal standing to accomplish what is being proposed. Watershed planning groups typically work through local municipalities, a state agency or federal agency to implement planning objectives.
37	State foots the bill for the agreement.	The cost associated with development of a surface-use agreement is the responsibility of the participants. Standards # 18 - 20 are intended to assist the landowner in surface-use negotiations.

	COMMENT OR SUGGESTION	RESPONSE
38	Subsurface lessee and/or state should pay for: • All legal costs incurred by surface owner, including legal assistance to draft any agreements. • A citizens advocacy group (e.g., Prince William Sound) • A group of attorneys, from which citizens should be able to pick (the state should include this cost when figuring out royalties). • A fund to compensate for decreased property values. • Complete water testing before, during and after operations, done by a third party (to be chosen by surface owner).	These suggestions would require legislation to accomplish, and are beyond ADNR's authority to consider.
39	There should be a law to require a driller to comply with a standard agreement made by the group negotiations between private owners and the state.	These suggestions would require legislation to accomplish, and are beyond ADNR's authority to consider.
40	For non-ADNR managed subsurface, the same requirements should apply.	ADNR supports legislation to bring similar split-estate requirements to non-ADNR managed lands as are required on ADNR managed lands.
	PROPERTY RIGHTS - Bonding Process	
41	Adjacent property owners should have right to bond hearings.	A bond is intended to ensure there are funds available to dismantle and remove equipment, and rehabilitate lands at the termination of activities. Adjacent lands will not require such funds.

	COMMENT OR SUGGESTION	RESPONSE
42	If negotiations of a Surface Use Agreement are not working out and it is necessary to establish a bond, a minimum period of time should elapse and the developer should demonstrate good faith efforts to reach agreement with the surface owner prior to a bond hearing. • For ADNR managed subsurface, "Good faith" is needed regarding terms of abandonment of facility per company; must be set prior to commencement. • Third party must evaluate these "good-faith efforts." • Establish, define and agree on what determines whether there have been adequate negotiations prior to driller going to the state for a bond. • Recommendations for time period included: 30, 90, 180 days, one year.	See Standard #18.
	PROPERTY RIGHTS - Bond Amounts	
43	Recommendations for bond amounts included: • 60% of property value. • Full property value, plus any and all reclamation. • Two times the fair market value. • In order to make the negotiation more fair and even, the driller could have a choice of the following: buy out surface owner at 2 times the fair market value, or purchase at the owner's named price.	Ordinarily the surface use agreement will establish the bond amount, if any, and the surface owner is able to negotiate that amount. If a surface use agreement cannot be negotiated, then state statutes give this authority to ADNR. See Standard #20 regarding the calculation of potential damages.
44	Bond should cover neighbors' water wells.	See response # 41.

	COMMENT OR SUGGESTION	RESPONSE
45	Bond should pay for all damages to public resources, such as public water or spills on rights of way, and maintenance and repair of public roads (if they are using infrastructure, they should pay for it).	See response # 41.
46	Bonds should include total "actual" value of property, not just portion used by driller, and should be based on replacement or resale values.	See Standard #20.
47	Bonds held by "driller" to include compensation differences in property taxes.	See Standard #20.
48	Two percent of property value should be added to the bond amount annually.	See Standard #20.
	PROPERTY RIGHTS - Other Recommendations regarding Determination of Bond Amounts	
49	Surface owner should determine the bond amount.	See Response #43.
50	Address health impacts, quality of life, economic return, trees and soil (value of physical assets), and incorporate these into a "trespass fee/access surcharge."	See Standard #20.
51	Statewide bond of $5 million for 50 years with bond held in interest bearing account.	In addition to the bond that may be established to protect the surface owner, ADNR requires a bond to protect state land and resources from damage. Typically operators will put up a statewide bond of $500,000.
52	The state should have ultimate responsibility if bond proves to be insufficient.	This suggestion would require legislation, and is beyond ADNR's authority to consider.

	COMMENT OR SUGGESTION	RESPONSE
	PROPERTY RIGHTS - Factors that should be accounted for in Determination of Damages	
53	Need to factor and quantify any impact that the landowner deems negative, including: degradation of air quality, degradation of water quality and quantity, noise, visual impacts, impacts to vegetation and soil, produced water damages, subsurface impacts, roads, weeds, wildlife poaching, damage to soil, vegetation, fences and roads, livestock and agricultural losses, temporary loss of use of surface, loss or impairment of access, loss of recreational values in surrounding land, decreased property value, short-term and long-term damages, damage to surface improvements, any harm to property, loss of wages, increased price of heating fuel, loss of business (tourism, etc.), reduced economic return on property (present and projected), loss of property taxes to the community, possible increases in property taxes if assessment rises because of road building, loss of privacy, diminished quality of life, pain and suffering, right of quiet enjoyment, health and well-being, infliction of emotional distress.	See Standard #20.
	PROPERTY RIGHTS - Other Recommendations regarding Determination of Damages	
54	Burden of proof should not fall on the damaged.	If a landowner is not satisfied by the actions of an operator, state statutes require the landowner to go to court to establish damages. Once damages have been assessed by the court, if the operator is unable or unwilling to pay the damages, then the bond is available to the landowner to recover the damages. Any change in the burden to prove damages would require a change in state statutes through legislation.

	COMMENT OR SUGGESTION	RESPONSE
55	ADNR should develop regulations that define "damage."	See Standard #20
56	Compensation should be to all affected, not just the landowner.	See Responses #41 and 54.
57	The surface owner should determine price.	See Response # 43.
58	Intentional misconduct and damage to property should be subject to criminal penalties.	To the extent that the intentional misconduct violates state law, the guilty party may be liable for either criminal or civil penalties. Intentional misconduct associated with violation with conditions of the lease may result in lease termination.
59	Professional appraisers selected by the surface owner should establish values. Driller/subsurface developer to cover costs of pre-access appraisal and after access drilling appraisals (no MAI appraisals).	See Response #54. When the landowner goes to court to establish damages, the suggested methods could be used to establish the amount of damages.
60	Roads and pipelines deemed reasonable for production are not currently considered "damage." This needs to be reversed.	This is not an accurate statement. Any change to the property that is not desired by the property owner could be considered damage. Ordinarily a surface use agreement will establish what will remain after operations are complete, such as roads or driveways; anything else would likely be considered damage if it were not removed. Ultimately, it is up to the court to determine what is damage.

	COMMENT OR SUGGESTION	RESPONSE
	PROPERTY RIGHTS - Mediation / Dispute Resolution	
61	• ADNR is not impartial. Instead of ADNR being involved in mediation, it should be an independent commission. State and industry should pay for citizen's CBM commission. • Establish a mediator or ombudsman to provide assistant to surface owner to avoid having courts being the only recourse. • The developer should pay for an independent landsman/attorney picked by the surface owner. • Cap legal expenditures to ensure equity between driller and property owner. • Adjacent surface owners should have the same rights to have an attorney represent them and paid for by lessee. • For non-ADNR managed subsurface, the same requirements should apply.	These suggestions would require legislation to accomplish and are beyond ADNR's authority to consider.
	PROPERTY RIGHTS - Information Packet or Pamphlet / Advisory Group	
62	Collaborative team of public and private individuals (community councils, ADNR, DEC, AOGCC, borough, etc.) should provide a packet to all owners that may be affected by CBM impacts – include (in layman terms) descriptions of rights and make people aware of timelines, buffer areas (distance from structures, setbacks, etc).	See Standard #19.
63	Citizen advocacy office should be established to give surface owners information and advice.	This suggestion would require legislation to accomplish and is beyond ADNR's authority to consider.

	COMMENT OR SUGGESTION	RESPONSE
64	Standard form should be given to landowners at real estate closings and a warning that an attorney should be contacted. The form should include information of possible adverse impacts of CBM development.	This suggestion would require legislation to accomplish and is beyond ADNR's authority to consider.
	SURFACE IMPACTS - Recommended Standards for Drill Pads, Compressor Stations and Buildings	
65	A visual mitigation plan must be submitted and approved by all impacted landowners, landscape architects and authorizing agencies prior to approval of a plan of operations. The plan must include specific requirements related to surface and vegetation impacts and approved by the surface owner.	See Standard # 10.
66	The applicant shall use structures of minimal size, and only as described, to satisfy present and future functional requirements. Design of structures must be approved by the surface owner, citizen's board, and the Borough Public Works Department, Legal Department, and Planning Commission.	For state managed land, ADNR will require the lessee to address facility and structure design through the plan of operation process. Interested parties will be able to review and comment during the public process. ADNR recommends that the borough adopt similar provisions and can determine who should review and approve the plan.
67	If clearing trees and vegetation for construction of facilities, the applicant shall feather and thin edges of vegetation, and comply with a reclamation plan that has been approved by the landowner and is consistent with habitat preservation and current wildlife uses.	See Standards #14, 15, 16, and 37.
68	Facilities shall be located no closer than ¼-mile from prominent natural features such as distinctive rock and landforms, wetlands, all waterways, culturally sensitive features, and other landmarks.	See Standards # 7, 8, 10, 35 and 37.

Local input

	COMMENT OR SUGGESTION	RESPONSE
69	Facilities shall be located to avoid crossing hills and ridges or silhouetting.	See Standard # 10.
70	The applicant shall locate facilities, as soil conditions allow, at the base of slopes to provide a background of topography and/or natural cover.	See Standard # 10.
71	No structures within viewshed of scenic byway or highway.	See Standard # 10.
72	A stormwater prevention plan and soil erosion and sedimentation control plan shall be prepared by a registered professional soils engineer or the DEC. Best practices, DEC standards or soil conservation district standards are to be used in preparing the soil erosion and sedimentation control plan. Plan must be approved by the surface owner, reviewed by ADNR/DEC prior to start and inspected by ADNR/DEC during operations.	Disturbances of greater than one acre (roads, pads, staging areas, etc.) are subject to the EPA stormwater program. In this situation, EPA issues a National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharge from Large and Small Construction Activities (General Construction Permit or GCP). This permit requires a Stormwater Pollution Prevention Plan (SWPPP), which includes methods to prevent stormwater run-off and site monitoring. ADEC must certify that this permit meets state water quality standards. The permit is not subject to landowner approval. In addition, see Standards # 14 and 15.
73	In addition to permanent provisions, temporary erosion and sediment control measures are also required during construction operations. Construction schedules are to be programmed to permit installation of required permanent sediment and erosion control structures as soon as possible.	See response to # 72.
74	Sediment shall not reach drainage structures. Implement best management practices under the Clean Water Act to prevent sedimentation.	See response to # 72.

	COMMENT OR SUGGESTION	RESPONSE
75	Data available through the local National Resource Conservation Service, stormwater pollution prevention plan (1 acre or more), DEC, Mat-Su Borough, ADNR, Corp of Engineers and EPA shall be used as a supplemental guideline for soil and water conservation practices pending USDA review. Consult with the Plant Materials Center.	See response to # 72.
76	Applicant must process cut spruce material to avoid bark beetle infestation (per landowner's desires).	See Standard # 16.
77	A 200-foot minimum buffer from flowing waterways to minimize impacts.	Standard #37 incorporates the Fish and Wildlife protection measures on oil and gas leases, including either a 300 or 500-foot setback from fishbearing waters.
78	Exhaust from all motors shall be vented in a direction away from all existing residences or platted subdivision lots.	See Standard # 9.
79	Electric motors should be used for all pumps and other stationary equipment. All facilities with motors that are not electrically operated shall be equipped with quiet design mufflers (hospital grade) or better.	See Standard # 9.
80	Construction of soundproof buildings or other enclosures shall be required where facilities create noise and visual impacts non-mitigatable because of proximity, density, and/or intensity of adjacent land use.	See Standard # 9.
81	Noise levels are not to exceed 50 decibels (day or night) at 50 feet.	ADNR has decided to use a noise mitigation plan standard, rather than a decibel level standard. See Standard #9.

	COMMENT OR SUGGESTION	RESPONSE
82	Activity at the drill pad should only occur during business hours, Monday through Friday (8 am to 5 pm).	ADNR has decided to use a noise mitigation plan standard, rather than an operating hours standard. See Standard #9.
83	Determine effect of noise on wildlife.	Many wildlife species have shown surprising tolerance for noise associated with human behavior. Disturbances of habitat or from people would likely have more impact than equipment noise.
84	Require a minimum setback from the site perimeter, any lot line, and any residential structure. Recommendations included 2000 feet. ½ mile, 2 miles, and ½ mile for wells, 2 miles for compressor stations.	See Standard # 7 for setback requirements.
85	Require a minimum setback from any school, hospital, institution of learning, court, or rest home. Recommendations included ½-mile, 2 miles, and 2 miles from compressor stations.	See Standard # 7 for setback requirements.
86	Require that facilities not be located in subdivisions that contain any lots smaller than certain acreage, or on parcels of land smaller than certain acreage. Recommendations included 10 acres, 20 acres, 40 acres, 50 acres, 160 acres, 500 acres.	See Standard # 8.
87	Setbacks from sensitive habitat (nesting, calving, bear denning, etc.) of a minimum of ½-mile as approved by ADF&G.	Standard #37 incorporates the Fish and Wildlife protection measures on oil and gas leases, including numerous setbacks from fish, bird, and wildlife habitat.
88	Require directional drilling to avoid impacts to streams.	See Standard #28 and 37.

	COMMENT OR SUGGESTION	RESPONSE
89	All disturbed areas are to be restored to original or better condition with indigenous plant species to the satisfaction of the landowner (both surface and subsurface) and per the visual mitigation plan submitted and approved during the initial permit.	State leases require the land to be restored to the satisfaction of the ADNR Commissioner. A surface use agreement will usually establish the surface owner's standards for restoration. Restoration to the original condition is usually not possible, nor preferable. There are usually improvements that can be made to the property in the scope of restoration.
90	The permitting authority for shallow natural gas leasing and other development for the entire region shall develop an overall master plan prioritizing preservation of large tracts to avoid fragmentation (patchwork) disturbance of habitat. This plan shall comply with existing forest and park management plans.	ADNR intends to meet this suggestion through a variety of means. First, any full-scale development will be done after the leases to be developed have been formed into a production unit. The production unit will require a plan of development. This plan will serve as a "master plan" for evaluating the cumulative impact of the proposed development. Further, Standards #25 –30, and 32 will minimize habitat fragmentation and other negative impacts of roads and pipelines.
91	Facilities shall be painted as follows: • Uniform, noncontrasting, non-reflective color tones, similar to Munsell Soil Color coding system. • Color matched to land, not sky, slightly darker than adjacent landscape.	See Standard #10.
92	All of the following landscape practices shall be applied, consistent with natural and existing habitat, on a site specific basis: a. Establishment of berms, ground covers, shrubs and trees. Landscaping shall follow the guidelines as established in this code. Vegetation clusters shall be placed 10-15 feet apart along the edge of the permanent pad site. b. Shaping cuts and fills to appear as natural forms. c. Cutting rock areas to appear as natural forms. d. Designing the facility to utilize natural screens. e. Construction of fences such as woven wood or rock for use with or instead of landscaping.	See Standard #10.

	COMMENT OR SUGGESTION	RESPONSE
	SURFACE IMPACTS - Recommended Standards for Lighting	
93	Exterior lighting, when required, shall be directed away from residential areas, or effectively shielded from such areas and shall only be on from 8 am to 5 pm. Light generators will be turned off one hour before dusk or 7 pm in the winter. Where possible, lighting should be switched so they can be turned off when not needed.	See Standards #10 and 11.
	SURFACE IMPACTS - Recommended Standards for Solid Waste - Temporary Storage	
94	Temporary storage plans must be submitted and approved by DEC. DEC will approve temporary storage of drilling waste for up to one to two months. Require independent testing and monitoring by third party. Require public notification, how, when and where.	ADEC regulates wastewater and solid waste disposal of CBM drilling by products. In addition, see Standards 12 and 13.
95	Open pits can be used for temporary storage. Open pits are required to be lined and meet strict construction and operational standards. This may include steps to mitigate any odors that might emanate from the stored materials.	See response # 94.

	COMMENT OR SUGGESTION	RESPONSE
	SURFACE IMPACTS - Recommended Standards for Solid Waste - Permanent Disposal	
96	Drilling waste generators shall submit an engineered plan to DEC Solid Waste that describes how they will perform the on-site disposal or reuse. The generator shall not perform any disposal or reuse activities until DEC approves the plan. At minimum, the plan shall include the following elements: • Landowner letter of acceptance that disposal can occur on their land; Design drawings that show how the on-site disposal cell will be constructed or how the drilling waste will be reused on the site following testing and determination of non-contaminants; • A description of the characteristics of the waste that will be disposed or reused, including a list of drilling fluid additives that will be used; and, • An estimate of the quantity of waste that will be disposed or reused.	See response # 94.
97	After completing the disposal or reuse activity, DEC needs a proof that a deed notice has been filed with the appropriate state or municipal agency and engineered as-built drawings for each site that include the following information: • Whether the cells have a top liner, and if so, how it was installed; The thickness of the waste cover and what type of material used for covering the cell; • The type(s) of waste are disposed in each cell; and, • Surveyed coordinates that show the location of each disposal site. At minimum, this should include the coordinates of the four corners of each cell.	See response # 94.

	COMMENT OR SUGGESTION	RESPONSE
98	There should be requirements for transport of waste, including limitations on hours.	See Standard # 9 which includes consideration of hour of operation for noise mitigation.
	SURFACE IMPACTS - Recommended Standards for Solid Waste - Hazard to wildlife and livestock	
99	Adequate fencing or other barriers must be provided around pits to exclude livestock and wildlife.	See Standard # 13.
	SURFACE IMPACTS - Recommended Standards for Use of Hazardous Materials	
100	Secondary containment shall be provided for the storage of fuel or hazardous substances.	Standard #38 incorporates the Hazardous Substance measures on oil and gas leases, including the requirement for secondary containment.
101	Operator must prepare an emergency preparedness and response plan that must be approved by DEC and the Borough. A copy of the plan must be provided to the surface owner and local emergency response managers.	See Standard #5.
102	Sufficient personnel onsite to handle worse case accident by developer. Mock drills must be performed monthly.	See Standard #5.
103	Surface owner should be empowered to initiate private enforcement actions regarding violation of rules or regulations and, if successful, receive reimbursement of all legal expenses plus three times value of actual damages.	This suggestion would require legislation to accomplish and is beyond ADNR's authority to consider. The surface owner may notify the jurisdictional agency regarding the violation of lease conditions or laws. It will then be the responsibility of that agency to take further action.

	COMMENT OR SUGGESTION	RESPONSE
104	Every affected landowner and property owner shall go through the following process: 1. Each property plan shall include a comprehensive plan submitted by the drilling company to be received by and approved by a local citizens board, the property owner, the borough, and the state; 2. Development shall only be allowed if approved by all parties; 3. If the plan is not strictly adhered to, the permit shall be revoked and the bond given to the property owner for reclamation; 4. The plan shall identify long-term funding sources for monitoring and enforcement; 5. If the permit is sold, the new permit holder must adhere to the previously approved comprehensive plan as outlined above.	A plan of operation is required for drilling on state managed land. The plan is subject to all local and state laws and the conditions of the lease. The plan is subject to a 30-day public review period during which time all parties may comment. The plan is approved by ADNR.
105	MSDS must be posted on site for review by property owner and adjoining property owners.	See Standard # 4.
	SURFACE IMPACTS - Recommended Standards for Roads and Public Access	
106	CBM activities must utilize existing road systems or air or boat service. Any approved off-road access for exploration or development activities, including the use of gravel, shall be part of a phased road and pipeline plan designed to minimize and mitigate damage and impacts to private property and public resources.	See Standards # 25 – 30.

	COMMENT OR SUGGESTION	RESPONSE
107	Existing roads shall be used to minimize land disturbance unless traffic safety, visual or noise concerns, or other adverse surface impacts clearly dictate otherwise.	See Standard # 26.
108	If new roads are necessary, they shall be designed to Borough or DOT/PF standards, and arranged with appropriate regard for private and public resources, including wetlands, fish, wildlife, sensitive areas, topography, creeks, wooded areas, and other natural features which would enhance attractive development.	See Standards # 25.
109	Production water should not be used for dust control, unless it passes CWA standards.	Using produced water for dust control would require a permit from ADEC (18 AAC 72.500), and would have to meet state water quality standards.
110	The state has no means to address non-point source pollution.	See Response #72.
111	The applicant shall be responsible for ongoing weed control during construction and operation of an access road or facility, through completion of the approved reclamation plan. The appropriate weed control methods and species to be controlled shall be determined through review and recommendation by the Plant Materials Center, the Soil and Water Conservation District, NRCS and the Borough. Develop plan for proper chemical use.	See Standard #17.
112	Public access to, or use of, the leased area on public land may not be restricted except within the immediate vicinity of drill sites, buildings, and other related facilities.	See Standard #30.

	COMMENT OR SUGGESTION	RESPONSE
	SURFACE IMPACTS - Recommended Standards for Pipelines	
113	Pipelines must utilize existing transportation corridors and be buried, unless seismic or other concerns prohibit burial.	See Standard # 29.
	SURFACE IMPACTS - Recommended Standards for Well Spacing	
114	There must be a limit to well density, and if a temporary or permanent exception is requested, all surface owners in the section must receive written notice, with local and interagency review, a public hearing and minimum waiting period prior to approval. Density recommendations included one well per section and two wells per section. Waiting period recommendations included 30, 60, 90, 180 days.	See Standard # 32.
	SURFACE IMPACTS - Recommended Standards for Air Quality	
115	Pumps, compressor stations and vehicles shall be operated on natural gas. Require a catalytic converter on natural gas powered engines.	Air quality is regulated by ADEC. At this time, ADEC does not anticipate air quality issues associated with CBM development in the Mat-Su Valley.
116	Pumps and compressor stations shall be operated on electric power from the grid, or electricity generated from renewable energy resources. Use electric pump motors within one mile of a power line.	See Response # 115.

	COMMENT OR SUGGESTION	RESPONSE
117	Baseline air quality must be determined and annually or periodically monitored by DEC. Effects of dust and other air pollutants must be studied and monitored.	See response # 115
	SURFACE IMPACTS - Recommended Standards for Geologic Hazards	
118	Baseline study on methane seepage must be conducted and monitored annually throughout the lease period. This needs to be accomplished prior to exploration and development and paid for by the developer.	The standards do not include measures to monitor or test for methane seepage. This is an area regulated by AOGCC. ADNR defers to AOGCC's expertise on this matter. AOGCC is considering a monitoring program for proposed drilling activities that will include the methane content of drinking water wells near the proposed CBM well.
119	Geologic studies and models must be conducted to determine subsidence potential, paid for by developer.	There are no documented instances of subsidence associated with CBM development. ADNR does not find that this is an issue that requires additional standards.
120	Establish non-development perimeter near geologic hazards. For example, no drilling within ½-mile of a fault.	See Standard #33.
121	Industry established compensatory fund for seep damaged property owners.	See Response # 118.
	WATER MANAGEMENT - Baseline Studies	
122	Conduct a groundwater resource study using existing data available, gather all this data, determine gaps in information and perform the necessary baseline studies to fill the gaps. The study should investigate hydrologic connections between surface water and groundwater, and between shallow and deep aquifers.	See Standard #21, and Recommendation # 4.

	COMMENT OR SUGGESTION	RESPONSE
123	Prior to approval of specific exploration or development activities, require certain baseline data for the affected area. Recommendations included: • Baseline surface and groundwater testing within one mile of any well. • Test quality and quantity of all wells within a certain distance of potential CBM wells for baseline chemical (including hydrocarbons, metals, etc.) and flow/depth characteristics.	See Standard #21, and Recommendation # 4. Also, water quality is regulated by AOGCC and ADEC. ADNR defers to their expertise on these issues. ADEC has developed environmental quality standards and discharge authorization procedures through the state's regulatory rulemaking process. ADEC has established water quality sampling and testing protocols for drinking water wells.
	WATER MANAGEMENT - Cumulative Effects	
124	Must initiate a cumulative effects and impact study prior to further exploration and development. A multidisciplinary team would address social, cultural, economic and other issues.	The review of any proposed plan of operation will address the impacts associate with the proposed activity. If development is proposed, then the cumulative impacts can be reviewed in association with the plan of development review.
	WATER MANAGEMENT - Recommended Standards for Water Quality and Quantity	
125	Recommendations for fracturing fluids: • All fluids used for fracturing in Alaska should be standardized and a part of the public record (including MSDS sheets). • Use only water for fracturing, or only non-toxic material. • Hydraulic fracturing fluids must meet water quality standards. • Require a cement well bond log.	See Standards # 3, 4, and 24.

	COMMENT OR SUGGESTION	RESPONSE
126	Recommendations for produced water and reinjection: When: • Reinjection should be required at all times. • On privately owned surface lands, owner may apply to have water discharged on surface if water meets DEC and CWA standards. Must notify neighbors within one-mile radius of this action. Where: • Water produced from coal seam dewatering must be reinjected below known impermeable subsurface strata, effectively segregating reinjected water from known surface and subsurface waters used by humans and wildlife. • No injection wells in aquifer recharge zones. • Reinjection in all cases to a Class II well. • Inject to 4,000 feet. • At or below original level. Water Quality • Third party will test and report on each well bi-monthly. • Reinjected (produced) water should be tested for chemical characteristics. All standards should be required for reinjected water, same quality or better. • Conduct a reinjection study prior to development to determine if the aquifer can accept it and if it cannot, their production stops and the permit period is stopped at that point and all activity terminated. • Use closed loop systems.	See Standard #22. ADNR does not find that a strict prohibition of surface discharge is appropriate. There may be instances where the produced water meets state water quality standards, and surface discharge will cause no negative surface impacts. As for the re-injection of produced water, it is required to be disposed of in an injection well approved by AOGCC. AOGCC will ensure that the re-injected produced water does not contaminate a source of drinking water.

	COMMENT OR SUGGESTION	RESPONSE
127	No drilling or dewatering in recharge zones.	AOGCC regulations require casing and cementing to protect sources of drinking water (20 AAC 25.030). These requirements will protect recharge zones.
128	Water quantity shall be monitored with hydraulic impact (static level) one year prior to testing or any drilling and continuously throughout drilling and 20-25 years after completion of drilling.	ADNR believes that the Standards #21 – 23, in conjunction with AOGCC permitting requirements properly protect water, and that this recommendation is unnecessary.
129	Develop a penalty for drillers who fail to submit well logs.	Penalties are imposed on oil and gas drillers who do not provide this information. ADNR does not have the statutory authority to impose such penalties on water well drillers who fail to provide drill logs.
130	No hydraulic fracturing within a certain distance of wells. Ensure adequate core samples taken so the subsurface hydrology is well understood. Needs to be overseen by the state and a certified hydrologist.	AOGCC regulates hydraulic fracturing and must ensure that such activities will not ne tively affect drinking water sources. Standard #21 requires baseline information on water wells in the area.
131	AOGCC must monitor any fracturing operations and determine safety of water quantity.	AOGCC does this, and ADNR will also determine safety of water quantity. See Standard # 21.
	WATER MANAGEMENT - Recommended Standards for Surface Water	
132	Setbacks. Assuming waterbodies are defined as any lake, river, stream, marsh, wetland, floodplain or spring, setbacks should be consistent across all ownership types. Should take into consideration watershed characteristics. Distance recommendations included ½ mile, ¾ mile, 1 mile, 5 miles.	The setbacks from waterbodies are contained in the typical Fish and Wildlife and Hazardous Substance mitigation measures referenced in Standards #37 and 38.

Lack of power

	COMMENT OR SUGGESTION	RESPONSE
	WATER MANAGEMENT - Recommended Standards for Monitoring and Enforcement	
133	Recommendations for monitoring and enforcement: Responsibility: • All testing on wells should be conducted by an independent third party and paid for by the operator. Area of Monitoring: • Within one mile of any wellhead prior to drilling. • Within the CBM vicinity (five miles). Timing: • At least one year prior to any testing or dri ling. • Prior to any development, on a prescribed basis for five years, then after startup using best management practices. • Continuously • Once a month. • Semi-annually and upon special request. • Require random sampling for all four seasons. Substances to monitor for: • Static water level and contaminants (such as heavy metals and total dissolved solids) • pH, salinity, hydrocarbons, heavy metals, methane, and any substance used in CBM development. • Conventional/non-conventional and toxic parameters	See Standard # 23 and Recommendation #4 regarding water monitoring. Water quality protection is within the expertise of AOGCC and ADEC. See Response #123.

	COMMENT OR SUGGESTION	RESPONSE
	WATER MANAGEMENT - Recommended Standards for Contingency Plans	
134	Contingency plans for produced water and hazardous chemical spill must include both prevention and response. They should be formulated at state and local levels with deference to the more restrictive plan. The following should be required of the developer: • Emergency containment plan or hazardous materials plan. • Provide emergency response equipment and staff, money to train and perform drills once a month for every area they operate in. • Local EMS should be appraised of this and trained also. • Must consider context and environment of the area, such as snowmelt, icing, runoff, flooding, etc. • If contaminated, the well must be shut down until the problem is fixed/cleaned up.	See Standard #5 regarding Emergency Planning. There is no state statutory requirement for a contingency spill plan associated with produced water. With oil spill contingency planning, the primary concern is with uncontrolled blowout situations. There is no risk of a similar event regarding CBM produced water. It must be pumped to the surface, and if the pumps are shut down, the water stops.
	WATER MANAGEMENT - Recommended Standards for Penalties and Rectifying Damage	
135	Developer should be financially responsible for all damages, and restore, repair and rectify all damages done.	Operators are responsible for damages they cause.

	COMMENT OR SUGGESTION	RESPONSE
136	Create a presumption of liability for water degradation within five miles of a CBM well.	If a holder of a water right believes that an operator has damaged that water right by either contaminating the water or depleting the water, then the water right holder must go to court to establish the damage. ADNR does not have the authority to alter the burden placed on the water right holder to prove damage to the water right, such a change in state law would require legislation.
137	Permit and leases revoked in perpetuity within Alaska.	Specific action associated with non-compliance of a permit, authorization, ordinance, lease, license or other provision of law is within the purview of the administering agency. ADNR is not recommending any changes to existing conditions.
138	Set up legal and compensation funds to pay for litigation, and a reclamation fund for rectifying a contaminated water supply.	This suggestion would require legislation to accomplish and is beyond ADNR's authority to consider.
139	Developer should supply potable water to replace needed water and then provide a long-term supply of water to the areas. If this is not possible, developer should purchase property at prior to drilling values adjusted for inflation.	If damage to a water right have been established, the court will determine the appropriate remedy. ADNR has no authority to require the developer to purchase the property.
140	In the event that the company cannot monetarily recompense the injured parties, it defaults to the responsibility of the State of Alaska.	This suggestion would require legislation to accomplish and is beyond ADNR's authority to consider.
141	Create a citizens watchdog group to be funded by a deposit from the initial license and then as a percentage of the gross revenue during development to ensure this group will be properly funded to ensure the function it is intended to serve.	This suggestion would require legislation to accomplish and is beyond ADNR's authority to consider.

Sample Oil and Gas Lease Mitigation Measures

(Taken from Shallow Gas Leases and Susitna Exploration Licenses)

Abbreviations mean: Alaska Department of Environmental Conservation (ADEC), Alaska Department of Fish and Game (ADF&G), Alaska Department of Natural Resources (ADNR), Alaska Oil and Gas Conservation Commission (AOGCC), Director (Director, Division of Oil and Gas), Division of Oil and Gas (DO&G), Office of Habitat Management and Permitting (OHMP), Matanuska-Susitna Borough (MSB), and State Historic Preservation Officer (SHPO).

Fish and Wildlife Habitat

1. The siting of facilities, other than docks, or road, utility, or pipeline crossings, will be prohibited within 500 feet of all fish bearing waterbodies *(Note: For Shallow Gas Leases, it is 300 feet)*. Additionally, siting of facilities will be prohibited within one-half mile of the banks of Alexander, Lake, Peters, and Cache Creeks, and the Susitna, Deshka, Kahiltna, Talachulitna, and Yentna rivers. Facilities may be sited within these buffers if the operator demonstrates to the satisfaction of the Director, after consultation with OHMP, that site locations outside these buffers are not feasible or 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.

2. 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.

3. Facilities and operations shall avoid unreasonable conflicts with subsistence harvests. When reviewing a proposed plan of operations, the Director will work with other agencies and the public to assure that unreasonable conflicts with subsistence harvests are identified and avoided.

Fishbearing Streams

4. Detonation of explosives within or in close proximity to fishbearing waters must not produce instantaneous pressure changes that exceed 2.7 pounds per square inch in the swim bladder of a fish. Detonation of explosives within or in close proximity to a fish spawning bed during the early stages of egg incubation must not produce a peak particle velocity greater than 0.5 inches per second. Blasting criteria have been developed by ADF&G and are available upon request along with the location of fishbearing waters within the project area.

5. Compaction or removal of snow cover overlying fishbearing waterbodies is prohibited except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, ice or snow bridges may be required.

6. Water intake pipes used to remove water from fishbearing waterbodies must be surrounded by a screened enclosure to prevent fish entrainment and impingement. Screen mesh size shall be no greater than 0.1 inches unless another size has been approved by OHMP. The maximum water velocity at the surface of the screen enclosure may be no greater than 0.2 feet per second.

Bear Habitat

8. Before commencement of any activities, operators shall consult data provided by the ADF&G identifying the locations of bear den sites that are actually occupied in the season of the proposed activities. Exploration and development activities begun between October 15 and April 31, may not be conducted within ½-mile of occupied brown bear dens, unless alternative mitigation measures are approved by ADF&G. An operator who encounters an occupied bear den not previously identified in the data provided by ADF&G must report it to the Division of Wildlife Conservation, ADF&G, within 24 hours. Mobile activities shall avoid such discovered occupied dens by ½-mile unless alternative mitigation measures are approved by DO&G with concurrence from ADF&G. Non-mobile facilities will not be required to be relocated.

Bald Eagle and Trumpeter Swan Habitats

12. Permanent facilities may be prohibited within ¼-mile and will be prohibited within 330 feet of bald eagle nests, active or inactive. Temporary activities within 330 feet of nesting sites may be allowed between September 1 and March 31 if they will not alter bald eagle habitat. Surface entry will be prohibited within 330 feet of active nests between April 1 and August 31. Maps identifying documented nest sites will be made available by ADF&G upon request.

13. If the operator discovers a previously unreported active or inactive bald eagle nest, the operator must report the nest location to the Director as soon as possible. Operators are advised that activities likely to disturb nesting eagles are subject to the provisions of the Bald Eagle Act of 1940, as amended.

14. Surface entry will be prohibited within ¼-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 are prohibited within ¼-mile of known nesting sites. ADF&G will identify trumpeter swan nesting sites at the request of the operator.

Tule Goose Habitat

15. The special measures listed below will be imposed to preserve Tule white-fronted goose habitat along the Kahiltna and Yentna rivers. Mitigation measure 15 shall

apply to activities within the "Tule Goose Habitat Area." Mitigation measure 16 shall apply to activities within the "Tule Goose Core Nesting and Molting Area."

a. The two locations that comprise the "Tule Goose Habitat Area" are identified in Figure 3.1 in the final best interest finding and are described as:

   i. All of T19N R8W, T19N R9W, and T20N R9W; and the west half of T20N 8W, Seward Meridian.
   ii. The western third of T23N R8W and T24N R8W; all of T23N R9W and T24N R9W; and the east half of T23N R10W and T24N R10W, Seward Meridian.

b. The location that comprises the "Tule Goose Core Nesting and Molting Area" is identified in Figure 3.1 and is described as:

   T25N R9W
   Section 4, 5, 6, 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 32, 33, 34;

   T25N R10W
   Section 1, 2, 3, 11, 12, 13, 24;

   T26N R9W
   Section 19, 29, 30, 31, 32;

   T26N R10W
   Section 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36; and

   T26N R11W
   Section 1, Seward Meridian.

16. Within the "Tule Goose Habitat Area":
   a. exploratory drilling, development, and major maintenance will be allowed only between August 16 and March 31, unless an extension is approved by the Director, in consultation with OHMP;
   b. during the production phase, routine maintenance and emergency repairs on a year-round basis will be permitted within this area, following approval of a detailed plan describing routine maintenance activities to be conducted between April 1 and August 15;
   c. the director will approve a routine maintenance plan following consultation with OHMP;
   d. gravel pads, wellheads, pipelines and drillsite-related facilities are the only permanent aboveground structures that will be allowed;
   e. temporary roads may be allowed as provided in Measure 17; and

1. permanent roads connecting pads may be allowed if the Director determines, in consultation with OHMP, that the road will have no significant impact on Tule geese during nesting and molting.

17. Within the "Tule Goose Core Nesting and Molting Area":
    a. surface entry for drilling, and above ground lease-related facilities and structures, with the exception of pipelines, will be prohibited;
    b. seismic exploration will be allowed only between August 16 and March 31;
    c. geologic fieldwork may be conducted year round;
    d. helicopter landings within this area during the nesting and molting season may be restricted; and
    e. pipelines may be sited within this area only if the Director determines, in consultation with OHMP, that the proposed pipeline will have no significant impact on Tule geese (buried pipelines are preferred).

Fuel and Hazardous Substances

1. Secondary containment shall be provided for the storage of fuel or hazardous substances.

2. Containers with a total storage capacity of greater than 55 gallons which contain fuel or hazardous substances shall not be stored within 100 feet of a waterbody.

3. 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.

4. 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. Transfer operations shall be attended by trained personnel at all times.

5. Vehicle refueling shall not occur within the annual floodplain. This measure does not apply to water-borne vessels, provided no more than 30 gallons of fuel is transferred at any give time.

6. All independent fuel and hazardous substance containers shall be marked with the contents and the operator's name using paint or a permanent label.

Prehistoric, Historic and Archeological Sites

1. Before commencing construction or placement of a road, structure, or facility, the operator must conduct an inventory of prehistoric, historic, and archeological sites within the area affected by the activity. The inventory must include consideration of literature provided by the MSB 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 include an analysis of the effects on any prehistoric, historic, and archeological site that might result from the proposed activity.

2. The inventory of prehistoric, historic, and archeological sites must be submitted to the Director and SHPO for review and comment. If a prehistoric, historic, or archeological site or area could be adversely affected by a lease activity, the Director, after consultation with SHPO and the MSB, will direct the operator as to the course of action to take to avoid or minimize adverse effects.

3. If a site, structure, or object of prehistoric, historic, or archaeological significance is discovered during lease operations, the operator must report the discovery to the Director as soon as possible. The operator must make reasonable efforts to preserve and protect the discovered site, structure, or object from damage until the Director, after consultation with the SHPO, has directed the operator as to the course of action to take for its preservation.

Local Hire, Communication and Training

1. To the extent available and qualified, the operator is encouraged to employ local and Alaska residents and contractors for work performed on the leased area. Operators shall submit, as part of a plan of operations application, a proposal detailing the means by which the operator will comply with this 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 operator 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.

2. A plan of operations application must describe the operator's past and prospective efforts to communicate with local communities and interested local community groups.

3. A plan of operations application must include a training program for all personnel, including contractors and subcontractors. The program must be designed to inform each person working on the project of environmental, social, and cultural concerns that relate to that person's job. The program must use methods to ensure that personnel understand and use techniques necessary to