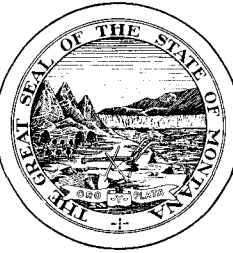


DEPARTMENT OF STATE LANDS

EQC

LA



TED SCHWINDEN, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 449-2074  
(406) 449-4560 RECLAMATION DIVISION

1625 ELEVENTH AVENUE  
HELENA, MONTANA 59620

October 25, 1984

Dear Reader:

Enclosed for your review is a copy of a Preliminary Environmental Review (PER) prepared by the Department on the proposal by the CENEX Corporation, to drill an exploratory oil and gas well on leased state forest land in the Coal Creek State Forest. This PER was designed as a supplement to the Department's July, 1983 PER titled: Oil and Gas Leasing, Coal Creek State Forest, Flathead County, Montana. The intent is for this PER to be used in conjunction with the leasing PER in order to more fully understand the Department's overall, phase-by-phase review and approval process.

This PER concludes that the action of approving the CENEX Annual Operating Plan for the exploratory oil and gas well, with the proposed conditions, does not constitute a major action of state government significantly affecting the quality of the human environment. Preparation of an Environmental Impact Statement (EIS) prior to approval of the Operating Plan is therefore not required. Further, approval of the plan will not jeopardize the environmental quality of adjacent lands, including the Scenic North Fork of the Flathead River and Glacier National Park. The reader is referred to pages 73 to 75 of the PER for special conditions recommended as requirements for approval of the CENEX Operating Plan.

A 30-day public review period is being provided for this PER. If you have questions or comments regarding this PER, please contact either Don Artley, Chief, Planning Bureau, Division of Forestry, 2705 Spurgin Road, Missoula, Montana 59801, 728-4300 or James Gragg, Area Manager, Northwestern Land Office, 2250 Highway 93 North, P.O. Box 490, Kalispell, Montana 59901, 755-6575, on or before November 26, 1984.

Following the end of the comment period, a final decision regarding the approval of the CENEX Operating Plan will be made.

A handwritten signature in cursive script, reading "Dennis Hemmer".

Dennis Hemmer, Commissioner  
Department of State Lands

DH:DKA:jeb

PRELIMINARY ENVIRONMENTAL  
REVIEW

Proposed Oil and Gas Exploration  
CENEX Well #13-11 State  
Coal Creek State Forest  
Flathead County, Montana

October 25, 1984

Montana Department of State Lands

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## INTRODUCTION

### Purpose and Scope

This Preliminary Environmental Review (PER) was prepared in accordance with the Montana Environmental Policy Act (MEPA) (Chapter 1, Title 75, MCA), and Title 26, Chapter 2, Sub-Chapter 6, Administrative Rules of Montana (ARM). (Rules implementing MEPA). It is designed as a supplement to the Department's July 1983 PER titled: Oil and Gas Leasing, Coal Creek State Forest, Flathead County, Montana. The intent is for this PER to be used in conjunction with the Leasing PER so that the reader can gain a better perspective and understanding of the Department's overall, phase-by-phase review and approval process.

The purposes of this supplemental PER are: (1) to provide a basis for making a recommendation to the Commissioner of State Lands, regarding the request by the Farmer's Union Central Exchange, Inc. (CENEX) to drill an exploratory test well for oil and gas on leased state forest lands in Flathead County; and (2) to determine if the proposed action, as described in the submitted operating plan, will have a significant impact on the quality of the human environment, and thus require the preparation of an Environmental Impact Statement (EIS).

The scope of this PER includes an evaluation of the immediate, secondary, and cumulative impacts of drilling a single well (approximately 12,000 feet deep) on both the physical and biological environment of the proposed site, as well as on adjacent lands. The analysis includes the impacts on the human population in terms of social, economic, and cultural values. Further, the analysis addresses the potential for production from the proposed well, and identifies the possible changes that could occur as a result. The general impacts resulting from a multiple-well situation are also explored. In all cases, the analysis includes the immediate, secondary, and cumulative effects associated with the action.

### Background

On April 29, 1975 the Department of State Lands (DSL) received applications for oil and gas leases on 14 tracts of school trust land within the Coal Creek State Forest in Flathead County. The tracts were deferred from a possible June 3, 1975 sale in order to conduct an environmental analysis of the proposed action. A Draft Environmental Impact Statement was issued by DSL on November 26, 1975. Public comments were used to extend, clarify and otherwise improve many portions, and a Final Environmental Impact Statement was issued on February 15, 1976.

The tracts were offered for bid at the March 2, 1976, oil and gas lease sale, and bids were received on all 14 tracts. At the subsequent meeting of the State Land Board, all bids received were rejected.

In April 1980, applications were again received for oil and gas leases on the same 14 tracts in the Coal Creek State Forest, plus an additional 20 tracts of State Forest Lands along the North Fork of the Flathead River. Lease applications on the 34 tracts were subsequently withdrawn by the applicant before completion of an environmental review by the Department. However, in 1982, the DSL again received applications for oil and gas leases on the same 34 tracts. The Department subsequently deferred the applications from sale while a Preliminary Environmental Review (PER) was completed, examining the environmental consequences of leasing for oil and gas exploration and development. The PER also identified a set of protective stipulations for attachment to all leases.

The Department offered the leases for public sale at its September 1983 competitive oil and gas auction. CENEX purchased the leases on 17 tracts. In December 1983, CENEX announced its intention to drill an exploration test well on its leased properties in the Coal Creek State Forest. The Department opened the initial proposal for public comment and held an informational public meeting in Columbia Falls on December 14, 1983.

Lease stipulations required CENEX to submit to the Department an annual operating plan explaining in detail all planned operations on the site during the exploratory drilling phase of the project. The Department had 30 days to review the plan and either grant approval or extend the deadline to allow for further environmental review.

The Department received the Operating Plan (Volume I) from CENEX on May 4, 1984, and on June 4th announced that it would delay its decision in order to complete a detailed, site-specific environmental review. Work on this PER commenced immediately with the assignment of an interdisciplinary team to the project, and the scheduling of a second public involvement meeting. The purpose of the second public meeting was to solicit input from the public as to the specific issues and concerns that the Department should address in this PER. That meeting was held in Columbia Falls on June 13, 1984. In response to the DSL's request for additional information and correction of deficiencies in the Annual Operating Plan, CENEX submitted an amendment to the Operating Plan on September 14, 1984 (Annual Operating Plan Volume II). This PER considers the modifications to the Operating Plan contained in Volume II, as well as Volume I.

## DESCRIPTION OF PROPOSED ACTION

### Location

The proposed well site is located in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 11, T34N, R21W, within the Coal Creek State Forest boundary (figure 1). The well pad site is within a seed tree harvest unit cut during the Winona Ridge East timber sale in 1979. Drilling access is via a road used for the timber harvest, that ties into the North Fork Road. The site is about 1.5 road miles from the North Fork Road about 5 road miles from Polebridge, and about 30 road miles from Columbia Falls.

The pad will be .8 mile from the North Fork of the Flathead River and .38 mile outside the designated Wild and Scenic River boundary.

### Operating Plan

#### Overview

The Operating Plan (Volumes I and II) submitted by CENEX outlines the next logical step in the development of its oil and gas lease from the state. The plan describes in detail its proposed drilling, completion and restoration procedures as developed after several meetings with DSL staff members and various other interested agencies, such as the U.S. Fish & Wildlife Service; State Department of Fish, Wildlife and Parks; Glacier National Park; USDA Forest Service and others. The plan addresses both the physical process of exploration and the process of proving the existence of oil or gas reserves.

The exact drilling area was chosen by CENEX's exploration staff after geological and geophysical methods had been used to identify a viable prospect. This area is considered by CENEX to have the highest probability for success. The location of the proposed well site within a previously clearcut area with an existing road is coincidental.

CENEX will attempt to confirm their geologists' opinion that: (1) there are source rocks present capable of having generated hydrocarbons in the geologic past, (2) there are reservoir rocks present with sufficient permeability and porosity to both contain and yield hydrocarbons at a practical rate, and (3) there is a trapping mechanism such as a fold or a dome in the rock layers with an oil-tight top that would capture enough oil to make drilling and producing worthwhile. Lack of any one of these three elements would render the prospect unsuccessful. Even if all three are present, a scientific success might produce an economic failure. The reservoir may contain nothing but water, carbon dioxide (CO<sub>2</sub>), hydrogen sulfide (H<sub>2</sub>S), nitrogen or high levels of these constituents mixed into the oil.

#### Road Preparation

A logging road currently provides access to the site from the North Fork Road. (Exhibit B and Exhibit C in Appendix D illustrate the access route.)

# COAL CREEK STATE FOREST

## OIL & GAS LEASE AREA

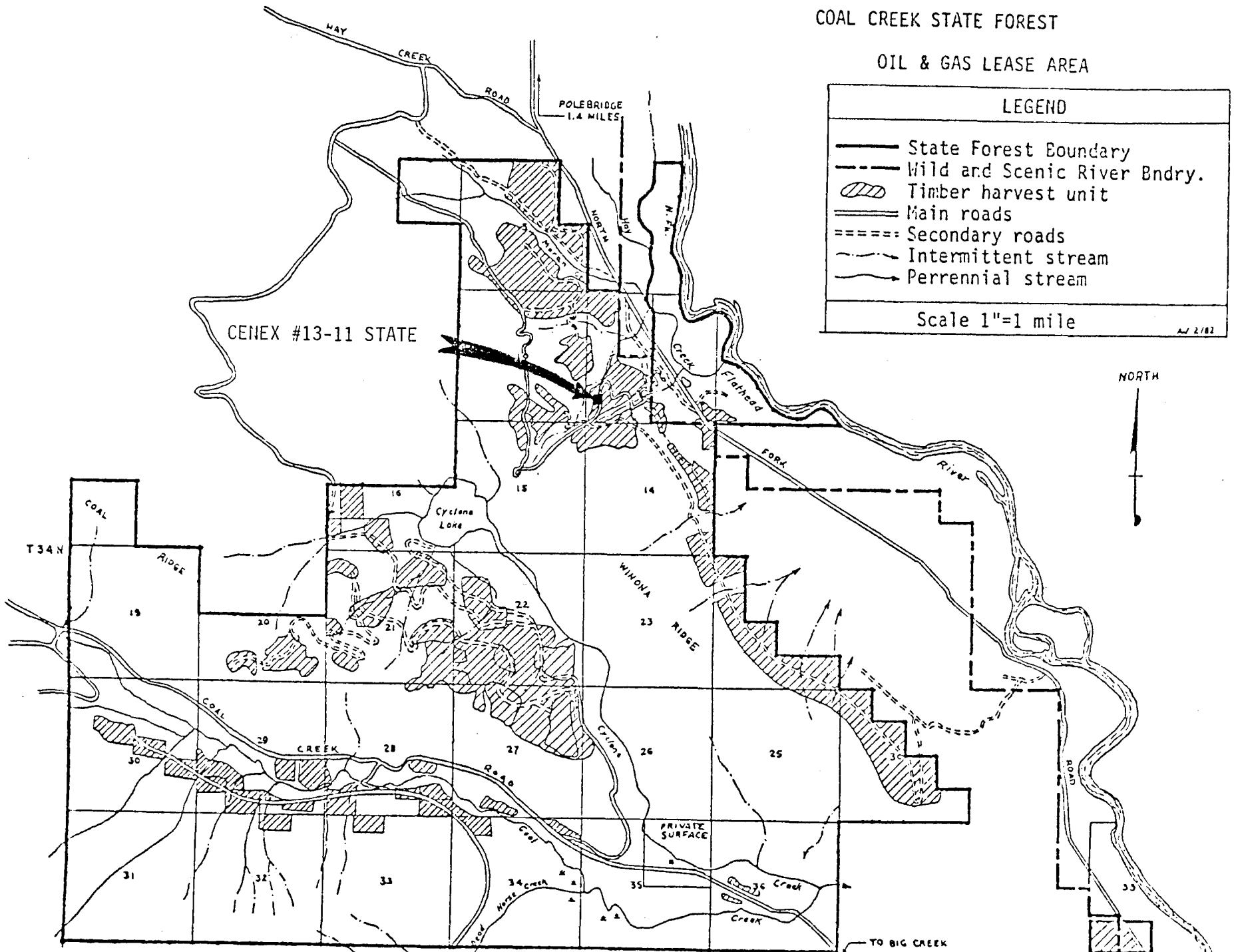


FIGURE 1

The existing access road was built to accommodate a timber sale initiated by the state in 1979. The road varies in width from 12 feet at the narrowest point to 18-20 feet in the widest areas. The road was constructed to accommodate heavy logging trucks that carry a payload similar to oilfield trucks.

Because the road was constructed for temporary use during the timber harvest, it was designed to minimum standards. Since the completion of the timber harvest the road has not been maintained; however, it can be improved sufficiently to handle the drilling project.

CENEX proposes to make the following improvements to the road. (Refer to Appendix D, Exhibit C for reference points and Appendix C-6 for road reconstruction notes).

- At various points along the road construct turnouts large enough to accommodate a bobtail or flatbed load while another truck passes on the main road.
- Stabilize slopes as necessary, with special attention to recent slump areas between Stations 19 and 23. (See road survey notes in Appendix C-6).
- Apply an adequate surfacing material in order to keep the road passable during wet weather.
- During the winter months of operation, remove snow whenever deemed necessary.

With these improvements, the road will accommodate anticipated traffic to and from the drill site. Additional upgrading of the existing road will require DSL approval.

#### Site Preparation

Exhibit D (Appendix D) shows the exact position of the proposed borehole. Exhibit E shows a scale drawing of the proposed use of the site surrounding the borehole, including the drilling rig and associated equipment, the reserve pit, pipe racks, safety devices, toilet facilities, water well, and soil storage. Exhibit F shows the scale drawings of the proposed design of the earth cut and fill to accommodate the project facilities.

The first phase of site construction involves removing about 12 inches of topsoil from the five-acre site to the boundary of the location, where it will be stored for use in reclamation. Next, the subsoil will be graded to create a level, stable surface approximately 450 feet wide by 500 feet long. Finally, an earthen pit approximately 12 feet deep, 125 feet wide, and 225 feet long will be excavated out of the leveled area. This reserve pit provides a place to contain any fluids recovered during drilling which are in excess of the fluids being used, and to hold drill cuttings circulated with the drilling fluid. In order to contain these fluids for the duration of the

drilling operation, the reserve pit will be constructed entirely in subsoil cut. Construction should require about 15 days.

A DSL soil scientist will inspect the soil base in the reserve pit. If the scientist concludes that the soil is too porous to hold fluids, the reserve pit will be lined with a heavy nylon mesh entwined in heavy plastic. A minimum eight mill thickness liner will be used. The liner will be carefully installed to avoid ripping or tearing. All sharp rocks will be removed from the pit area. A trench six inches wide and two feet deep will be dug around the pit. The liner edges will be folded into this trench which will then be backfilled in order to securely hold the edges of the liner.

Water is basic to the project operation. It is used daily as the basic ingredient in the drilling fluids, for cleaning equipment, stored for emergency use, for borehole sample analysis, for dust control and general hygiene. To insure a secure supply of water for the duration of the drilling operation and to reduce the road traffic of hauling water daily to the site by truck, a shallow water well will be drilled on the site. Exhibit E (Appendix D) shows the approximate location of the well.

The water well will be drilled by Liberty Drilling Co. of Kalispell and will conform to resource standards outlined by the Great Lakes-Upper Missouri River Board of State Sanitary Engineers. These standards have been adopted by the Montana Water Quality Bureau for water works other than a single family water supply source. It is estimated that the well will be no deeper than 400 feet.

All bit cuttings and drilling and test fluids will be contained in an earthen pit which will be backfilled and rehabilitated. Produced fluids will be laboratory tested for potability. The Flathead County Sanitarian will inspect the well to insure that all sanitary considerations are met. In addition, a drill-time log will be kept while drilling and formation samples will be retained. From this data a well log will be prepared. The well log will be filed with the State Department of Natural Resources and Conservation, and water rights will be filed in the name of the State Board of Land Commissioners.

If the water well is not required for further CENEX operations it will be plugged with cement for abandonment, unless the DSL requests otherwise.

Prior to moving in the drilling rig, the water well rig will drill a 36 inch hole to a depth of approximately 80 feet at the well site stake. This casing will serve as the conductor casing to be used in the drilling of the main exploratory hole.

The water well driller will also drill a hole 15 inches in diameter, called a mouse hole, a few feet ahead of the conductor casing. This 15 inch hole will be approximately 15 feet deep and will house the mouse hole casing used by the drilling contractor in adding additional joints of drill pipe to the drill string as drilling progresses. In addition to the mouse hole, the water well driller will drill another hole 15 inches in diameter some distance from the conductor casing and mouse hole (perhaps 12 feet, depending on floor

configuration of the rig to be used). A 10-3/4 inch rat hole casing will be housed in this hole to receive the kelly where it is temporarily stored out of the way while changing bits. Both the rat hole casing and mouse hole casing are pulled from their drilled holes after the well is drilled.

The site area will be restricted by a locked gate on the access road connecting from the county road. Security gates will also be placed on the roads coming in from Hay Creek and Coal Creek. A communication post will be established at the gate on the county road so visitors can contact the rig for permission to enter the area. The Department of State Lands and USDA Forest Service will have unlimited access as long as operating conditions are safe. This security is designed to restrict casual access to the project area in the interest of safety for the unguided visitor.

### Moving In

Approximately 20 over-the-road trucks will be involved in moving the drilling rig into the area. Most of these trucks will be loaded to near legal road weight limits. Some trucks designed for highway hauls will not be suitable for travel on the site access road from the North Fork Road. In addition, the highway loads will not necessarily arrive in the proper order for rig assembly. It will be necessary, therefore, to provide a staging area where the highway loads can be unloaded and broken down into approximately 40 smaller loads to accommodate the switchbacks and inclines on the access road.

The staging area will consist of two to three acres of flat terrain, free of trees, boulders, etc., where component rig parts can be set down for selected transport as needed. It will be in service intermittently for five to seven days while move in and rig up takes place. No permanent facilities will be required at the staging area and no one will reside there. Several privately owned tracts near the site access road can serve as a satisfactory staging area with only minimal preparation. No commitment between CENEX and the private landowner has been made, however.

### Housing And Sanitation

No living or dining accommodations will be located on the drill site with the exception of full-time, rig-site technological personnel who will be housed in transportable, self-contained quarters as shown in Exhibit E (Appendix D).

Effluent from these on site quarters and from the drilling rig lavatories will be directed into a sewer system designed to county specifications and approved by the Flathead County Sanitarian. The required engineering for this sewer system has been completed and the data has been submitted to the County Sanitarian for approval. Garbage and trash will be transported from the drill site daily to an approved municipal or county disposal site.

### Well Blowout Prevention

During the drilling of any oil and gas exploration well, there is a potential for encountering high pressure liquids or gases, resulting in an



uncontrolled flow or blowout of gas, oil or other well fluids into the atmosphere.

Two main types of blowout preventers (BOPs) are in general use in all drilling areas, and will be used by CENEX in this project. They are the spherical or annular and the ram type preventers. They are available in various sizes and with various pressure ratings. Selection is based on casing and hole size anticipated as well as pressure containment expected or provided for. They are manufactured or can be adapted to be mounted one atop another as multiples in which case the assemblage is referred to as the BOP stack. The stack or a single BOP is bolted to the well head which in turn is mounted on the cemented string of casing.

After surface casing is set and cemented CENEX will mount, test and employ a BOP stack consisting of two ram type preventers dressed with pipe rams, one ram type preventer dressed with blind rams and one spherical preventer.

The BOPs can be controlled either manually or hydraulically. The manual controls are for backup. The hydraulic controls are activated two different ways, by pressure-effecting hydraulic pump and by backup energy in the form of inert gas under pressure. Normally the pump is employed to close the BOP but in case of pump failure or power failure there is enough available stored energy to close each BOP twice.

BOP control stations on this project will be located at several positions: centrally at the hydraulic pump, remotely near the driller's position and remotely away from all other rig components. All controls will be well identified and thoroughly understood by all drilling personnel. All personnel will be thoroughly schooled and periodically drilled in blowout prevention and control.

A specialist with special equipment for the detection and handling of H<sub>2</sub>S will be on location for all operations after surface casing is set. Equipment and procedures including details on detectors, alarms and chemicals are described in the H<sub>2</sub>S Contingency Plan included in the CENEX Annual Operating Plan.

Preventers will be operated daily to assure that all equipment and controls are in proper working order. Blind rams will be operated every trip. The operating and pressure testing of all blowout equipment and casing will be recorded on daily drilling reports.

Numerous indicators provide advance warning of potential high pressure zones (see Annual Operating Plan - Volume I, pgs. 22-23). Detection of these signs allow time for well control preparation. Crew members will be alerted to recognize these indicators.

#### Contingency Plans For Emergencies

Four types of potential emergencies at the drilling operation are recognized and provided for in the CENEX Annual Operating Plan, Volumes I & II. Contingency Plans for each emergency will be posted at the drilling rig; in the CENEX Billings Office; in the Department of State Lands, Kalispell

Office; in the Department of State Lands, Helena Office; in the USDA Forest Service, Glacier View District Office at Columbia Falls; and in the National Park Service Glacier Park Headquarters in West Glacier. The four potential emergencies are:

Hydrogen Sulfide Gas ( $H_2S$ ): There is a potential for  $H_2S$  production on this project. The  $H_2S$  Contingency Plan prepared by Oilfield Safety, Incorporated, and CENEX drilling and production personnel, sets forth the procedures, equipment and materials to be used in avoiding and responding to an  $H_2S$  emergency, including emergency phone numbers and contacts.

Fire Starting at the Rig: The Contingency Plan for fire starting at the rig contains not only information and instruction on emergency fire suppression, but also addresses rig fire prevention measures and procedures including crew training requirements. Montana State Forest Fire Regulations (Appendix C-10) and applicable statutes will be followed. Emergency phone numbers and contacts are also listed.

Wildfire Overtaking the Rig: The Contingency Plan contains the emergency procedures necessary for fire suppression, evacuation plans, and rig shut down procedures in the event that wildfire threatens to overtake the rig. Emergency phone numbers and contacts are also listed.

Spills: The Spill Prevention Control and Countermeasure Plan was prepared to instruct crew members in spill prevention, and to provide instruction on containment, notification and cleanup in case a spill occurs.

### Services

In addition to contracting with the equipment firm to provide the drilling rig and associated work crews, CENEX will contract with industry specialists to provide equipment and services necessary to the operation.

A basic service to be contracted will be the design and maintenance of the drilling fluids system. The drilling fluid will be a light slurry composed of fresh water and naturally occurring bentonite with additions of organic substances used for fluid loss and rheological control. The mineral barite may be added to increase the fluid density. These materials make up a fresh water mud system.

The purposes of the mud system are:

- Hole cleaning and lubrication.
- Bit cleaning and lubrication.
- Circulation of samples to surface.
- Bit cooling.
- Surface protection.

- Formation protection.

A mud engineer will be responsible for the day-to-day monitoring of the mud system. The company contracted for this service will supply technicians as well as research backup to assist in problem solving.

Attention will be directed toward drilling a straight hole in as short a time as possible. CENEX anticipates formation dips of 40° and greater. These dips are the angles at which the formations lie on top of one another, resisting a 100% vertical borehole. Proper drill bits as well as the proper bottom hole assemblies will be programmed to insure a hole within predetermined vertical limits. A survey machine will monitor the angle and direction of the hole. A sophisticated plumb bob system with a camera and clock inside of a long, heat-resistant and fluid-tight barrel provides an angle reading.

Three bit-manufacturing firms have submitted engineered recommendations from which the bit program will be designed. The basic tool will be the standard tri-cone drilling bit used throughout the industry.

Another independent firm will be contracted to run a complete set of electric logs for each section of the hole.

An independent safety company was contracted to prepare the H<sub>2</sub>S Contingency Plan and to provide daily monitoring of the site for any potential safety hazards as discussed previously.

Rig fuel, propane, lubricants, and many other petroleum supplies will be contracted from the local CENEX dealers.

Local firms will be contracted for site construction, drilling of the water well and setting conductor casing.

#### Dry Hole Plugging Procedure

If the well is a dry hole it will be plugged for abandonment in accordance with Montana Board of Oil & Gas regulations. With the approval of the State Board of Oil & Gas Conservation and the DSL, the liquid contents of the reserve pit will be pumped down hole into a permeable formation existing between the intermediate casing stub and the surface casing shoe (below a depth of 2000 feet). A retainer packer set in the lower part of the surface casing will prevent any back flow of fluids from the formation. A cement plug will be placed below and on top of the cement retainer.

Cement plugs will be displaced into the uncased hole to prevent any migration of formation fluids either up out of the hole or from one permeable formation into another. A cement plug will be "spotted" in and out of the cut-off stub of any intermediate casing which has been salvaged, leaving the cemented lower portion of the casing in the hole.

A final cement plug will be located in the top of the cemented surface casing. Embedded in this top cement plug, by state regulations, will be a dry hole marker consisting of four-inch pipe extending four feet above the surface

of the ground. Location and operator identification will be welded on the body of the marker. The rat hole and mouse hole will be backfilled with soil when the rig is moved off location.

### Reclamation

The drilling rig will be moved off the location and reclamation will begin. Reserve pit contents will be tested for toxicity and disposed of in a manner compatible with the mud chemistry and as approved by the DSL. The reserve pit will be backfilled with subsoil that will be continually packed by machinery to avoid settling. At this stage, the total disturbed area will be recontoured using subsurface material. The topsoil will then be redistributed evenly over the entire disturbed area returning the surface to as near original contour as possible. With the topsoil in place, mixed conifer species will be planted. Disturbed areas on the access road used for the drilling phase will be regraded to near original contours and reseeded with recommended grass, shrubs and/or conifer species. The access road will be re-established.

If the well is capable of producing oil or gas in commercial quantities, location restoration will be modified. The fluid in the reserve pit will remain on location and be allowed to evaporate. During this period, the pit will be fenced on all sides and flagged above the surface of the fluid to keep wildlife from entering the area. After the fluids have evaporated, the pit contents will be subjected to chemical analysis by CENEX. The analytical results will assist in determining whether the pit contents can be covered or will need to be removed to off-site disposal. CENEX may apply for an amendment to lease stipulations to allow on-site disposal. The disturbed area not required for producing facilities will be recontoured and revegetated as outlined earlier. Subject to approval by and in accordance with requirements of the DSL, the road used for the drilling phase will be rehabilitated and plans will be made for the construction of a production road.

## Development of State Oil and Gas Leases

### Legal Provisions

The provisions of law that govern the operation of oil and gas leases are found in 77-3-401 et. seq. MCA. In addition to the statutes, regulations governing oil and gas operations on state lands have been announced publicly (26.3.201 et. seq. ARM). The State Land Board adopted the current regulations on September 15, 1975, and they became effective on November 3, 1975. They were amended in December 1981, and again in March 1983.

### Terms of State Leases

When the State Land Board issues a lease, the lessee is granted the right to explore, drill for, develop, and remove all oil and gas under the leased lands for a primary period of ten years (77-3-421 MCA).

Oil and gas operations on state land leases are subject to:

- terms described in the lease itself, including any special conditions that may be added by the State Land Board (see Appendix A for CENEX lease special conditions),
- regulations governing oil and gas operations on state land leases, and
- regulations of the Montana Board of Oil and Gas Conservation (82-11-111 MCA).<sup>1</sup>

#### Continuance of Leases

The continuance of oil and gas operations is contingent upon the lessee fulfilling all obligations set out in the lease. Briefly, those obligations include:

- complying with all rules and regulations of the Board of Oil and Gas (82-11-123 MCA), and allowing inspectors of the Board of Oil and Gas Conservation to conduct necessary inspections,
- allowing inspections by DSL personnel and carrying out their instructions relative to the terms and conditions of individual leases,
- using the highest degree of care and proper safeguards to prevent pollution of earth, air, or water by hydrocarbons or other pollutants,
- stockpiling any topsoil removed in the drilling operation, restoring the surface contours following the completion of drilling, and reseeding,
- drilling, upon completion of a commercially productive oil and gas well, such additional wells to the depth as may be necessary to economically test, develop, and operate the deposits discovered, and
- making payments to the DSL in the form of lease rentals, royalties, and where applicable, delay drilling penalties.

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<sup>1</sup> Copies of such regulations are available from the Oil and Gas Conservation Division, Department of Natural Resources and Conservation, 25 South Ewing, Helena, Montana 59601.

## DECISION CRITERIA

### Legal Considerations

From a legal perspective, the DSL's decision regarding approval of CENEX's operating plan for exploratory drilling must consider the basic concept and nature of school trust lands. On February 22, 1889, the Congress of the United States passed the Enabling Act (25 Statute 676), which granted to the State of Montana, Sections 16 and 36 in every township within the state for the support of common schools. This act and subsequent acts also granted acreage for other educational and state activities. In accordance with the Enabling Act, the lands comprising the Coal Creek State Forest were obtained under the following grants:

- Common schools,
- State Agricultural College,
- School of Mines,
- Deaf and Blind Asylum,
- State Reform School,
- State Normal School (Eastern Montana College and Western Montana College), and
- public buildings.

As provided by law, state lands that were granted by the federal government are trust lands given for the support of schools and other public institutions. As such, these state lands are not public lands in the same sense that federal lands are. The schools and institutions are the beneficiaries of the trust -- not the people themselves.

The State Land Board, through the Montana Constitution, has the authority to direct, control, lease, exchange, and sell school lands. Land classified as forest land, however, may not be sold. Most decisions, such as the decision to approve or deny the CENEX drilling proposal, involving school lands are made by the Commissioner of State Lands, and are subject to review by the Board.<sup>2</sup>

State lands designated as forest land are managed by the Board of Land Commissioners through the Division of Forestry, Department of State Lands. Major actions concerning the management of State Forests, such as timber sales, easements, and lease requests, are submitted with recommendations by

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<sup>2</sup> Resolution No. 273-6, Minutes of the State Land Board Meeting of February 20, 1973.

the DSL to the State Land Board for the latter's consent or denial. In the case of this drilling proposal, the decision of whether or not to approve the operating plan submitted by CENEX lies with the Commissioner.

The statutory principles that generally guide the actions of the State Land Board and the Department are:

- The Trust Doctrine (77-1-202 MCA)  
"...the guiding rule and principle is that these lands and funds are held in trust for the support of education and for the attainment of other worthy objects helpful to the well-being of the people of this state. The board shall administer this trust to secure the largest measure of legitimate and reasonable advantage to the state."
- The Multiple-Use Concept (77-1-203 MCA)  
"The Board shall manage these lands under the multiple-use concept defined as: the management of all the various resources of the state lands so that they are utilized in that combination best meeting the needs of the people and the beneficiaries of the trust, making the most judicious use of the land for some or all of those resources, . . .without impairment of the productivity of the land, with consideration being given to the relative values of the various resources."

The DSL must recognize that the lease sold to CENEX legally gives CENEX the right to both explore and develop, although only in compliance with the special conditions contained in the lease. Rule 10 of the Rules and Regulations Governing the Issuance of Oil and Gas Leases, (ARM 26.3.210) promulgated by the DSL, however, provides for delay of drilling penalties and requires that drilling operations be pursued with due diligence.

The Department must also comply fully with the Montana Environmental Policy Act (MEPA) (Chapter 1, Title 75 MCA), the purpose of which is ". . .to declare a state policy which will encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the state. . .". Compliance with the DSL's rules regarding the implementation of MEPA (Title 26, Chapter 2, Sub-Chapter 6 ARM), must also be insured.

The DSL, in its decision process, must reconcile the statutory principles guiding the management of trust lands (discussed earlier) with the requirements under MEPA.

#### Management Considerations

Historically, forest product management has been the major factor influencing decision making on the Coal Creek State Forest. All development

activity has been for timber harvesting purposes, in order to produce revenue through forest product sales. The Coal Creek State Forest contains a substantial area of highly productive, commercial forest land. Returns from the sale of forest products have exceeded \$1,608,000 to date. Four grazing leases, one cabin site lease, and an occasional special-purpose lease or permit have also produced a small amount of income.

The DSL must weigh the benefits of the potential short-term rental and royalty income from oil and gas development, against the corresponding possible loss of revenue from forest product sales. Environmental amenities must be considered and any changes resulting from exploration or development identified and evaluated.

In addition, the DSL must consider the management activities of adjacent landowners. The management objectives of private landowners vary considerably, and are affected by both the personal values of the individual landowners and economic conditions. The management objectives of the Flathead National Forest (the other major public landowner west of the North Fork) are currently being defined through the forest planning process, and the draft plan is due out for public review this fall.

Current activities in progress or planned for the North Fork area include: (1) improvement of the North Fork Road by Flathead County; (2) timber sales by the Flathead National Forest; and (3) extensive road building by the Flathead National Forest to access timber stands in the North Fork which have been killed by the mountain pine beetle.

#### Protective Stipulations

Before leasing the lands in the North Fork, the DSL prepared an environmental review that addressed the consequences of the proposed lease offering. As a result, a set of protective stipulations (Appendix A) was developed and attached to each lease. At the time the leases were offered and the environmental review completed, the outcome of the competitive bid lease sale, and hence the successful lessee for each tract of state land, was unknown. One purpose of the stipulations was to preserve the prerogative of conducting an additional detailed environmental analysis should any specific proposal for actual drilling be presented. The requirement for CENEX, and all other successful lessees, to submit a detailed operating plan for each year's activities to the DSL for approval, before any actual surface disturbance, is the key element in this additional review process. This stipulation gives the DSL the authority to conduct a thorough, site-specific environmental analysis of each and every proposed phase, once the successful lessee is known and the details surrounding the lessee's specific proposal are submitted for approval.

The lease stipulations are central to the decision-making process. The approval of an early phase in the oil and gas exploratory process does not irrevocably commit the state to total or even partial oil and gas development in the North Fork.



## AFFECTED ENVIRONMENT

### History

The well site and vicinity are part of a long river terrace cut by the North Fork River. Winona Ridge separates the site from nearby drainages, and forms a high terrace 400 feet above the river level. No development occurred on this terrace until 1977 when timber sales were planned in response to a mountain pine beetle epidemic. A road system was then developed to provide access to lodgepole pine stands infested by beetles. Several temporary spur roads were built off the terrace to the North Fork Road, primarily because of the emergency nature of the salvage sales and because of difficulties encountered in developing a single-access road system. All the temporary roads are scheduled to be closed permanently, but are currently gated and restricted because access is needed for necessary follow-up treatments in the sale area. Eventually, permanent access may be designed, but this will require new road locations and easements.

The North Fork valley has been the site of continuous, but sporadic, human activity since the early history of man of the Flathead Valley. Coal was discovered near Coal Creek in the 1800s and was produced for a short time. Oil and gas exploration occurred near Trail Creek in Glacier Park for a short period and then died out. Mineral prospecting and placer mining was noted as early as 1892 when the area was first surveyed. The Forest Service began road and trail systems for forest fire protection following large fires in 1910, 1919, 1922 and 1926. Major road systems were developed in response to spruce bark beetle outbreaks in the 1950s and 1960s. Several permanent residences and seasonal cabins have been built since these early activities, and a small population center exists at Polebridge, but the area remains sparsely populated and retains a semi-primitive nature.

Activities have increased in the North Fork over the last 5-10 years due to several events. In 1976 the North Fork was designated a "Scenic" River, a part of the National Wild and Scenic Rivers system. At the same time, large-scale timber harvests were begun to salvage bark beetle-killed trees on private, state and federal lands. The North Fork also received attention as occupied grizzly bear and wolf habitat following endangered species legislation. New residents moved to the area partly because of this new notoriety and also because properties and land became available for sale in small tracts. Proposed Canadian coal development and the nearness of Glacier National Park also focused attention on the North Fork area. Recent attempts to pave large portions of the North Fork Road and consolidate maintenance were blocked by wildlife concerns and some citizens' groups.

### Climate

The Coal Creek State Forest is primarily affected by Pacific maritime weather systems that characteristically result in large winter accumulations of snow and high stream flows in the spring. Precipitation occurs throughout the year, although there are great variations by season and elevation. The

higher elevations on the west side of the forest receive more precipitation than do the lower elevations along the eastern boundary near the drill site.

Precipitation regimes are similar to Polebridge, which is at 3,600 feet elevation and 3.3 miles north of the well site. Yearly precipitation averages 23.6 inches, while monthly precipitation ranges from a low of 1.17 inches in July to a high of 2.91 inches during January. Snowfall averages 122.4 inches per year (USDA Forest Service 1973). Over 90 percent of the snowfall and 50 percent of the precipitation occurs during the five-month period from November through March. The frost-free season at low elevations in the State Forest has been estimated to be no longer than 40 days.

## Natural Environment

### Air Quality

Ambient air quality in the area of the proposed well site is considered good. The only pollutant of concern is particulate matter, primarily road dust. Road dust emissions can be extensive during dry conditions due to truck and small vehicle traffic from residents, tourists, and commercial activities along the North Fork road. This is a localized and intermittent influence and is not generally considered to degrade the air quality of the overall area. Another existing source of particulate matter is wood burning. Total Suspended Particulate (TSP) was monitored at the Polebridge Ranger Station in Glacier National Park in 1981-82. Measured concentrations were well below the federal and state ambient air quality standards, and would be considered typical of background conditions in areas without significant particulate sources (Montana Air Quality Bureau 1983a).

The topography of the North Fork Valley allows air temperature inversions to occur, characterized by low wind speeds and little air movement. These are most common in the fall and winter months, and tend to trap pollutants in the valley. This situation is typical of western Montana valleys.

No air quality monitoring of gaseous pollutants, such as nitrogen oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>) has been performed in the area. Because there are no major nearby sources of gaseous pollutants, concentrations of these pollutants can be expected to be negligible. Minor existing sources include oil and propane fired electric generators, vehicle exhaust and wood burning emissions.

Glacier National Park has been designated as a Class I area under the Prevention of Significant Deterioration (PSD) air quality regulations (ARM 16.8.920 - 16.8.943). Essentially all other non-wilderness and non-national park areas in Montana, including the proposed well site, are designated Class II. Through the air quality permitting process, less degradation of air quality from particulate matter and SO<sub>2</sub> is allowed in Class I areas than in Class II areas. In no event are ambient concentrations allowed to exceed the ambient air quality standards. Ambient air quality standards are included in Appendix C-2 with a synopsis of the pollutants noted.

## Hydrology and Water Quality

The pad site lies in the Hay Creek watershed on terrain sloping 10-15% to the east. A three-acre marsh lies 480 feet south of the pad. This marsh is drained by an intermittent stream 3/4 mile in length that runs generally along the south edge of the access road. This stream channel ceases to exist between the North Fork Road and Hay Creek. No water from this stream enters Hay Creek by surface flow.

An unnamed perennial stream lies about 500 feet west of the pad, 125 feet in elevation below the pad site. This stream flows northeast and reaches Hay Creek about one mile above the confluence of Hay Creek and the North Fork.

Areas with a seasonally high water table occur near the pad site. These areas are recharged by local snowmelt and spring rain, held at or near the surface by dense glacial deposits that restrict downward groundwater movement from the site (see Appendix B-4).

Lateral groundwater movement in the unconfined aquifer system of the area generally follows surface topography. This water apparently surfaces in the spring and early summer along the old North Fork road (SE $\frac{1}{4}$ NW $\frac{1}{4}$  Section 11 T34N R21W), where it sub-irrigates a hay field.

The water table at the pad site may be similar to a nearby pond to the south, which at full pool, lies about 11 feet below the natural elevation of the southwest corner of the pad. The pond is full only during the snowmelt period, after which the level drops to nearly dry. Groundwater levels, sub-surface geology and their effects on groundwater movement can only be speculated on until excavation and water well development are completed.

Surface water in the area is generally of good quality. Limited baseline data, not including biological parameters, substantiate this (see Appendix C-4). High suspended-solid levels during spring runoff is virtually the only parameter that would limit the use of the water for beneficial purposes.

The Department of Health and Environmental Sciences (DHES) has given the North Fork and its tributaries a "B-1" Surface Water Use Classification. The B-1 classification standards require that the waters remain suitable for bathing, swimming, recreation for humans and growth and propagation of salmonid fishes, among other uses and specific criteria.

No surface discharge is planned for this operation, therefore DHES requires no permit to discharge.

The Montana Groundwater Pollution Control System (MGWPCS) classifies and regulates groundwater and groundwater pollution in the state. This proposed operation is exempt from the MGWPCS permitting related sections (ARM 16.20.1012). MGWPCS does not pertain to activities regulated by the Oil and Gas Conservation Division.

The drilling operation is subject to regulations of the Oil and Gas Conservation Division, Montana Department of Natural Resources and

Conservation, which include protective measures concerning groundwater (ARM 36.22.1005, ARM 36.22.1226 through 36.22.1234, and ARM 16.20.916). The rules include casing requirements, construction requirements for storage pits and evaporation ponds, report of oil leaks, disposal of salt water, plugging of wells, and reclamation.

Surface and groundwater is used in the North Fork valley 0.6 to 0.75 miles northeast of the pad site. Water Rights Bureau records show domestic, livestock, irrigation and commercial uses (see Table 1).

There is a diversion on the stream that flows northeast from the pad area at the crossing of the old North Fork road (NW $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$  Section 11). Water from this stream is diverted to a pond that was once used to raise fish and is now piped to two homesites and a campground.<sup>3</sup> Other water use downstream in Section 11 includes three wells for domestic use, one of which supplements the campground. The water wells are on the alluvium of the North Fork valley floor and are apparently recharged by the river system.

### GEOLOGY

Coal Creek State Forest is located in the Whitefish Mountains which form a portion of the Overthrust Belt geologic zone. Oil and gas reserves have been discovered from the Overthrust Belt in Wyoming, Utah, and British Columbia, north of Polebridge. The North Fork Flathead River Valley is geologically known as the Kishenehn basin. Exploratory oil drilling of Montana first began in 1901 in the Kishenehn basin at Kintla Lake where surface oil seeps occur.

Commercial reserves of oil have been developed in the Cretaceous, Jurassic, Pennsylvanian, Mississippian, Devonian and Silurian rock strata of Eastern Montana (see Table 2). Potential oil and gas deposits are expected to occur below the Overthrust Precambrian strata, although reserves could be discovered at lesser depths. The larger commercial reserves of natural gas in Montana have occurred in Cretaceous age rocks. Natural gas may commonly, but not always, contain some hydrogen sulfide in the Mississippian Strata (Perry 1959).

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<sup>3</sup> Personal communication with Lee Downes, local resident.

TABLE 1.  
WATER USE IN VICINITY OF PROPOSED  
DRILLING OPERATION

<u>SOURCE</u>	<u>OWNER</u>	<u>USE</u>	<u>POINT OF DIVERSION</u>	<u>DOCUMENTATION</u>
Hay Creek	Harker	Irrigation	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 11 T34N R21W	Permit #16007-s76LJ
Unnamed tributary of Hay Creek	Sonnenberg	Domestic Fish Pond	NW $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 11 T34N R21W	Permit #15986-s76LJ
Groundwater Well	Harker	Domestic	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 11 T34N R 21W	Certificate #21793-G76LJ
Groundwater Well	Greene	Domestic	NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 11 T34N R21W	Certificate #18423-G76LJ
Groundwater Well	Pittman	Commercial Domestic Stock	SW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 11 T34N R21W	Certificate #34736-G76LJ
Groundwater Well	Sonnenberg	Domestic	NW $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 11 T34N R21W	Personal communication with Charles Ritter, renter.
Groundwater Well	Ladenburg	Domestic	NE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 13 T34N R21W	SB76 #148964-76LJ

TABLE 2  
GEOLOGIC PROGNOSIS

PROJECTED ROCK DEPTHS	GEOLOGIC TIME ERA	UNITS PERIOD	PROBABLE FORMATIONS
0 - 400'	CENEZOIC	Tertiary	Kishenehn
400 - 1950'	MESOZOIC	Cretaceous Jurassic Triassic	Kootenai Fernie Spray River
1950 - 5010'		Mississippian	Rundle Group Banff Limestone Exshaw Shale
5010 - 6990'	PALEOZOIC	Devonian	
6990 -			Thrust Fault
6990 - 9490'		Devonian	Undifferentiated
9490 - 10410'		Cambrian	Undifferentiated
10410 -	PRECAMBRIAN	Belt supergroup	
12000 - Bottom of well			

CENEX's proposed drilling site is located on an upland terrace of deep glacial till over Tertiary Age, Kishenehn Formation valley fill deposits (Johns 1970). The Kishenehn formation includes strata of weakly consolidated siltstones, sandstones, shale, and conglomerate (cemented) gravels. Weak siltstone is the dominant material exposed along the access road and is expected to form the sub-surface at the drill site to about 400 feet. The siltstone is fine-textured with few gravels and a low bearing strength for equipment. (See Appendix C-7 for detailed analysis.)

#### Soils

The drilling site is on a slightly convex glacial terrain. Soils are deep and somewhat poorly drained. Local surface ponding occurs in the area, but not on the drill site.

Surface soils at the drill site are 10-14 inches of medium acid, reddish brown, silt loam texture. Surface water infiltration is rapid. Subsurface soils are deep silty glacial tills over a substratum of weakly consolidated

siltstones of the Kishenehn formation. The subsoil is quite dense below three feet depth which restricts downward root growth, water movement and aeration. Actual subsoil composition (below five feet) and geology will not be known until excavated.

These forest soils have typically moderate to low fertility and are non-saline. Soil fertility and moisture-holding capacity are highest in the topsoil. Soil samples gathered from the drill site were analyzed for baseline chemical and physical properties important to plant growth (Appendix C-9).

Soil coarse fragment content is higher in the till subsoil on the upland terrace at the drill site and decreases toward the toe of the terrace (east of the drill site) as does soil-bearing capacity.

### Fire, Insects and Disease

Insect problems have been major determining factors in planning forest management activities. Mountain pine beetle infestations were responsible for development and harvesting activities in the forest stands near the drill site. Until stands are converted from old growth to younger, more vigorous stands, insect and disease management will influence harvest practices.

A fire-insect cycle has been the predominant force in lodgepole pine forest development in the North Fork drainage. This 100- to 150-year cycle has been replayed for centuries. Even-aged lodgepole stands begin with catastrophic wildfires and grow to maturity in about 80 years. At this stage, the trees become more susceptible to mountain pine beetle attack, and infestations may build to epidemic levels, killing extensive acreages of trees. Dead trees create a heavy fuel loading, preparing the site for another catastrophic wildfire, and the cycle begins again. Fires in the early decades of this century initiated the current forest stands, and the beetle epidemic starting in 1976 is the current step in the cycle. Managers have substituted timber salvage for the wildfire stage in the local area, but inaccessible areas will have a high fuel load for several years and large fires will be a continuing possibility.

The bark beetle epidemic has subsided in this area due to a lack of beetle habitat. Lodgepole pine has either been killed by beetles or harvested. The immediate vicinity of the drill pad has been harvested and currently has extremely low forest fire potential or insect and disease susceptibility. A steep canyon to the west of the site has a heavy buildup of dead lodgepole that is rotting and falling over, creating a heavy fuel loading with extreme fire potential. Steep, unharvested slopes on Winona Ridge also have heavy fuels. Small, intense fires are possible but fires covering large acreages are unlikely due to the many harvest units in the North Fork valley.

### Vegetation

The proposed well site is heavily regenerated with western larch, lodgepole pine, subalpine fir, spruce, and Douglas-fir. A 1/50-acre plot sample taken in July, 1984, indicates overstocking with about 7,000 trees/acre. These trees are primarily three-four years old, but new seedlings

were also noted. Ten residual seed trees that average 16 inches in diameter and that contain four 16-foot logs each are within the staked pad area.

Timber harvest units shown on the Coal Creek State Forest map (figure 1) are similar to the unit described above. Most of the units are clear-cuts in varying stages of regrowth. Some units in Coal Creek and Cyclone Basin have trees as old as 25 years. Most sites topographically suitable for drilling pad locations within the forest already have timber harvest units and access roads. The primary undeveloped flat spots are the tops of Winona Ridge and Coal Ridge.

Comprehensive descriptions of timber types and conditions on the Coal Creek State Forest can be found in silvicultural prescriptions for the Winona East/Moran creek and the Coal Ridge timber sales (Montana Division of Forestry, Northwestern Land Office 1977).

### Wildlife

Species of wildlife that may occur naturally in the general area of the proposed exploratory drilling include most wildlife native to the North Fork. Big game species common to the area are white-tailed deer, mule deer, elk and moose. Black bears, grizzly bears, mountain lions, pine martens, coyotes, snowshoe hares, weasels, pine squirrels and many small mammals are common, relative to the available habitat for these species in the area. Less common mammals that may occasionally use the area include bobcat, lynx, wolverine, gray wolf and mountain caribou. Bird species include the bald eagle and other birds of prey, spruce and ruffed grouse, woodpeckers, jays, flycatchers, numerous small song birds and others. The rare peregrine falcon is also occasionally seen.

Of the above species the following are listed as threatened or endangered under the Endangered Species Act of 1973:

Grizzly bear	(threatened)
Gray wolf	(endangered)
Bald eagle	(endangered)
Peregrine Falcon	(endangered)

The Act prohibits actions on federal lands that would destroy or adversely affect habitat considered critical to these species, or that would be expected to encourage the decline, or prevent the reasonable expansion of, populations of these species (USFS Oil & Gas Guide, 1979). Because of the mixed ownership pattern of state and federal lands, and in keeping with the State Multiple Use Concept (77-1-203 MCA), the DSL has historically cooperated with federal agencies on resource management decisions affecting these species.

Grizzly bear -- The immediate area of the proposed well is within the forest habitat type Abies lasiocarpa/Clintonia uniflora, Clintonia uniflora phase (Subalpine fir/queencup beadlily, queencup beadlily phase). Habitat types are good predictors of vegetative communities at various stages of natural succession. The existing stand is in a pioneer stage, well-regenerated with mixed conifer seedlings two-five years old and forbs,



grasses, and shrubs, but important bear foods are lacking. During the next 10-20 years Vaccinium globulare (blue huckleberry) should become well represented (5-10% area coverage) and improved summer forage opportunities for bears will exist. However, this habitat type does not produce an abundance of seasonal food requirements for grizzly bears, and is therefore not considered critical foraging habitat during any season.

Despite the lack of importance for foraging, the area around the drill site is considered to be important as a seasonal travel corridor. Grizzlies use the nearby (one-half mile distant) North Fork flood plain extensively in the spring and early summer. Border Grizzly Project (BGP) studies show that wet areas of the flood plain are essential spring habitat specifically selected by grizzlies. Radio tracking by the BGP shows that some females reside in the flood plain for the entire growing season, although such use has not been documented in the Hay Creek area.

Grizzlies are known to travel through the general project area when descending from high-elevation dens in spring and when returning to subalpine summer habitats to forage for berries (May 1 to June 30). Similar migrations probably occur in the fall (September 15 to November 1) when the river bottoms may again become important feeding areas just before denning. The Moran Creek bottoms (one mile north of the site) and the Coal Creek bottoms (four miles south of the site) are known travel and feeding areas during spring. Undisturbed, timbered ravines and small perennial stream channels in the immediate vicinity of the site were specifically deferred from harvest in the late 1970s by the DSL to maintain possible use by grizzlies. Road closures reinforced the protective measures. Proximate travel cover at the drill site consists of a 600-foot-wide, timbered ravine on the northwest side of the existing 60-acre cutting unit. On the south, another cutting unit of about 75 acres is located almost contiguously and without significant intervening cover. However, a 2,000-foot corridor of mature larch and spruce forest lies beyond this point, and extends down to the timbered river bottoms.

Although no captured bears have been tracked by radio in the Hay Creek area, local residents occasionally see grizzlies crossing the North Fork road in this vicinity -- offering evidence that the bears use the area as a travel corridor. Protection of the travel corridor not only allows seasonal use of the river bottoms, but also serves to prevent geographic isolation from Glacier Park's grizzlies, thereby encouraging desirable genetic exchange within a larger contiguous population.

At 3,920 feet of elevation, the proposed drill site is not in or near grizzly denning habitat. Grizzly dens in the North Fork are typically located at or above 6,000 feet.

Gray Wolf -- Significant gray wolf activity has been documented in the North Fork during the past year, including the first confirmed evidence of resident pack activity in recent decades (Boyd and Ream, 1984). Most sightings and reports of sign have come from the area north of Polebridge, but reports have come from as far south as Camas Creek. Of the 177 validated wolf occurrences between July 1983 and April 1984, one came from an area within one

mile of the proposed drill site, and four others came from areas south of the site.

This recent activity has apparently resulted from a litter of seven pups born just across the British Columbia border in spring 1982. These young wolves dispersed into the Montana portion of the North Fork in the fall of 1983. Further southward dispersion is clearly possible.

Wolves prey on big game animals, particularly during the winter months, and on small mammals such as hares and rodents. Since the recent increase in wolf activity began, no known predation of domestic livestock or pets has occurred in the North Fork. Most observed winter-killed big game animals were elk and white-tailed deer, and these occurred on river bottom winter ranges both in Glacier Park and west of the North Fork River.

The reports of sightings and sign indicate that these wolves show no apparent preference for the relatively undisturbed land in Glacier Park compared with developed National Forest, state and private lands west of the river. Many of the sightings involved wolves that displayed rather bold behavior; that is, they are not readily frightened away by humans or they were observed near human developments. This is consistent with studies of wolves in other areas, which have shown that wolves are more selective of a suitable prey base than a particular environment or cover condition.<sup>4</sup>

Dens and rendezvous sites are considered critical wolf habitat that should not be disturbed by human activities. Wolves breed in mid-February and dig dens in early April. They may dig several dens within a half-mile radius. Pups are born in the selected den by mid-April. To date, no dens have been located in the North Fork. However, the current observation reports and the known location of a recently used rendezvous site just across the British Columbia border would suggest that denning to date has occurred north of Polebridge.<sup>5</sup> However, there is potential in the near future for denning to occur on or near the Coal Creek State Forest, as evidenced by the general southward dispersion of the population.

Maintaining the integrity and use of big game winter ranges and calving/-fawning areas is considered an important element of wolf recovery in occupied habitat. These areas are important from approximately December 1 to June 15.

Bald eagle -- A bald eagle nest is located 1.6 miles southwest of the proposed drill site near the northwest shore of Cyclone Lake (NE $\frac{1}{4}$ SE $\frac{1}{4}$  Section 16, T34N, R21W). A mating pair occupied this nest in the springs of 1983 and 1984, but abandoned it for unknown reasons, and no young were hatched or reared in either year. The mating pair is expected to occupy the nest again

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<sup>4</sup> Personal communication with Bob Ream, Wolf Ecology Project, University of Montana, Missoula, Montana.

<sup>5</sup> Personal communication with Bob Ream, Wolf Ecology Project, University of Montana, Missoula, Montana.

in the spring of 1985.<sup>6</sup> This is one of three known nests in the North Fork. The others are located near Logging and Quartz Lakes in Glacier Park.

The Cyclone Lake nest site is considered to be in marginal feeding habitat; the lake may remain frozen into early spring (April), and the eagles are thought to fly through the low saddle between Cyclone Peak and Winona Ridge to fish on the river or feed on carrion on the river bottom big game winter ranges. An alternative early spring feeding area may be the long and shallow outlet of the lake.

Line of sight between the nest and the proposed top of the drilling tower is obstructed by timber surrounding the nest tree and a spur ridge, rising 200 feet in elevation above the line of sight.

Big game species -- The area surrounding the drill site is considered potential spring range for big game species. Some animals may move through the saddle between Winona Ridge and Cyclone Peak as they migrate between winter range and summer ranges at higher elevations. During early-summer inspections of the proposed drill site, white-tailed deer and elk were observed foraging in recent timber harvest units in the vicinity.

The closest big game winter range is along the lower reach of Hay Creek, 0.5 to 1.0 miles to the northeast of, and 400 feet in elevation below, the drill site. This area is used primarily by wintering elk. Available winter range for elk, white-tailed deer, and mule deer is small in comparison to the abundant spring, summer and fall ranges of the North Fork. Therefore, winter range is considered an important limiting factor for populations of these species.

Mountain caribou -- Last winter, caribou tracks were observed and confirmed in the northern portion of the west slope of the Whitefish Range (approximately 33 air miles northwest of the proposed drill site). The extent of the population size, habitat use, and movements are unknown.

Historically, caribou have been extremely rare in Montana, and their recent occurrence near Eureka has sparked considerable local interest from biologists, land managers, and some sectors of the public. The Montana Department of Fish, Wildlife, and Parks (DFWP), in cooperation with the USDA Forest Service (FS), is planning intensive aerial searches in the spring of 1985. Their goal is to determine the size of the population, and where these animals move to or from. The mountain caribou is not listed as a threatened or endangered species in Montana. However, the Kootenai National Forest is treating the caribou as a sensitive species in its operational programs, thereby giving it roughly equivalent consideration as threatened or endangered species.

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<sup>6</sup> Personal communication with B. Riley McClelland, Research Biologist, Glacier National Park.

<sup>7</sup> Personal communication with Al Christensen, USDA Forest Service, Kootenai National Forest.

Traditionally, caribou have been thought to use mature and old-growth spruce/true fir stands in higher elevation sites, particularly during the winter. Recently, however, caribou in the Selkirk (Idaho) herd have been observed in timber harvest units. The drill site, at about 4,000 feet elevation, may be too low to expect caribou use. The drill site and surrounding area do not have significant (extensive) stands of mature timber. This is true of the lower and mid-elevation zones in the North Fork drainage generally, due to its fire history. The lack of preferred habitat<sup>8</sup> may explain why caribou have been, and are, considered rare in the North Fork.

The occurrence of caribou in the vicinity of the drill site is a remote possibility. If it occurs, the affected area would probably be a travel route between habitat situations providing preferred cover and forage.

Peregrine falcon -- Peregrines are thought to be infrequent spring and fall migrants through the North Fork, but no recent sightings have been documented. No nesting is known to occur in the North Fork or adjacent parts of the Whitefish Range or Glacier National Park (U.S. Department of Transportation 1983).

### Fisheries

The North Fork of the Flathead River, along with its tributary streams, provides an estimated 40% of the spawning and nursery habitat for migratory west-slope cutthroat and bull trout inhabiting Flathead Lake. The cutthroat and bull trout fishery of Flathead Lake is dependent on the successful spawning, recruitment and return to the lake from the upper drainage system. These native species have been designated as species of "special concern" by the Montana Department Fish, Wildlife and Parks (DFWP).

The proposed drill site is located in the Hay Creek drainage, about one-half mile from Hay Creek. Hay Creek supports an excellent population of both resident and migratory cutthroat. Bull trout spawning habitat does not occur in the same density as other North Fork tributaries, but a limited population of migratory bull trout uses this stream as spawning and nursery habitat. Resident bull trout may occur in the lower reach, which is the portion receiving drainage from the area around the drill site.

Moran Creek drains into Hay Creek's lower reach. Migratory fish in Moran Creek therefore also use the lower reach of Hay Creek. The presence of juvenile bulls in Moran Creek's lower reach suggests that migratory bull trout may use the area for spawning. This lower reach of Moran Creek is also important for cutthroat rearing.

Hay Creek, like most North Fork tributaries, has a very low buffering capacity to counter the introduction of acidic materials.

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<sup>8</sup> Personal communication with Jim Cross, Wildlife Biologist, MT Dept. of Fish, Wildlife and Parks.

## Visual Resource

Visual resources were recorded and will be discussed using the terminology of the USDA, Forest Service visual management system (USDA, Forest Service 1974).

The area to the east of the North Fork county road (#486) falls into the "distinctive" variety class; that is, features of landform, vegetative patterns, water forms and rock formations are of unusual or outstanding visual quality. This area is represented by the North Fork of the Flathead "Scenic" River and Glacier National Park.

The area to the west of the road is in the "common" or "minimal" variety class. Features here contain some variety in form, line, color and texture; but are not of outstanding visual quality. The landform consists of rounded hills with 30 to 60 percent slopes, broken by periodic benches of 0 to 30 percent slopes. Vegetation consists mainly of lodgepole pine mosaics regenerated from fires in the early 1900s. Vegetative patterns were created by the fires and a number of manmade timber management activities (seed tree and clearcuts) on both private and state lands from the late 1970s to the early 1980s to salvage merchantable lodgepole pine under attack by the mountain pine beetle. The only water forms present are intermittent or small drainages with common meandering flow patterns. This general area is represented by Winona Ridge and Cyclone Peak.

The existing visual situation will be described looking west toward the proposed activity from the North Fork county road, because it is the major access into the drainage. In the foreground viewing zone (up to about 1/4 mile), conditions vary from little or no activity all the way to undesirable activity depending on the landowner and his management objectives. Within both the foreground and the middleground viewing zones there are a number of private landholdings.

In the middleground viewing zone (from 1/4 mile to about three miles, T34N, R21W) existing conditions approach the maximum modification category because of the extensive road building and harvesting on both state and private timberlands.

There is very little background viewing zone present (beyond about three miles). Looking through the pass where Winona Ridge joins Cyclone Peak presents a background view into Cyclone Basin. Existing visual situation here ranges from modification to maximum modification because of the roads and harvesting completed on state lands in the late 1960s in response to the spruce beetle epidemic.

Sensitivity levels are a measure of users' concern for scenic quality. A high sensitivity level was applied to both the "Scenic" North Fork River and the North Fork access road in Glacier National Park due to the prevalent recreation use they receive. However, a low to moderate sensitivity level was assigned to the North Fork county road because of its year-round predominantly logging related uses. This includes not only the forest industry and private segments, but also state and federal administrative traffic. The highest use period and thus visual impact to the public is from July to September each year.

## Noise Pollution

Existing levels of noise pollution in the North Fork area emanate from federal (forest service and park service), private and state lands. Sources are both domestic and commercial.

Most recreationists perceive technology-related noise as an intrusion into wilderness areas; however, there are no classified wilderness areas along the North Fork of the Flathead River. There is potential for wilderness classification for two areas near the Canadian border<sup>9</sup>. An area from the Canadian border to Starvation Creek (east of Mt. Hefty) is presently managed as defacto wilderness by the Park Service. All three of these areas lie 15 miles north of the proposed CENEX drill site.

Private lands in the North Fork area are under varying levels of management, ranging from no activity, to conversion from timberland to grazing or agriculture status. There are approximately 20,000 acres of private land held by about 250 owners. Parcels range in size from less than an acre to more than 100 acres (U.S. Department of Transportation 1982).

There are numerous structures and improvements (both inside and outside of the Scenic North Fork River Corridor) on private, state, forest service and park service lands. These include homes, camping sites, ranger stations, work centers, roads, bridges, etc.

The predominant, year-round use of the North Fork County Road (#486) and hence the feeder roads on state and national forest lands is logging related<sup>10</sup>. This is derived from: 1) industry activities (road building, timber products harvest, timber stand improvement, hazard reduction, etc.) occurring on private, state and federal lands west of the river; 2) the influx of Canadian timber hauled down the road; and 3) state and forest service administration of forest and fire management activities. With the exception of spring breakup (generally March to mid-May), noise throughout the west side of the North Fork Flathead drainage consists of chain saws, feller bunchers, dozers, skidders, loaders, truck tractors and lowboys,

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<sup>9</sup> In the Spring of 1984, Montana's Governor Ted Schwinden announced his recommendation that the Tuchuk roadless area be classified as wilderness. In July, 1984, Montana's Congressional Delegation announced that both Tuchuk and Mt. Hefty roadless areas were selected for wilderness classification in the Montana Wilderness Bill.

<sup>10</sup> Based on personal communication with: John Livingston, Area Director Customs, U.S. Customs Service, Roosville, Montana; Charles Phillips, Road Superintendent, Flathead County Road Department; Robert Hurd, Recreation and Trails Forest Technician, Glacier View Ranger District, Flathead National Forest; Clarence Tabor, Supervisory Civil Engineering Technician (Transportation Systems) Glacier View Ranger District, Flathead National Forest.

logging trucks (with Jacob's engine brake) and a variety of service and private vehicles. From July to September recreation use increases in the North Fork. About 70% of the river floater use occurs from July 10 to August 20<sup>11</sup>. Recreational vehicles use private, county, state and federal (forest service and park service) roads, all contributing varying levels of noise.

Neither Montana, Flathead County nor the North Fork have specific ambient noise statutes or regulations. The only existing environmental noise statutes are:

- Montana Department of Fish, Wildlife & Parks regarding snow-mobile noise and dry stack boat motors;
- Montana Department of Justice (Highway Patrol) regarding motor vehicle noise; and
- Local community ordinances.

The federal government has "...no nationwide noise regulations for construction or other powered outdoor equipment...."(EPA 1971). The Environmental Protection Agency has, however, published direction/ information for state and local governments to establish their particular regulations. These guidelines on noise levels are contained in a publication titled Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA 1974). (See Appendix C-16 for a summary of these noise levels.) The EPA points out that these levels are not to be construed as standards because they do not take into account cost or feasibility. It is EPA's judgement that the maintenance of environmental noise levels at or below those specified are required to protect the public from adverse health and welfare effects.

## Social/Economic Environment

### Social Setting

The proposed drilling site in the Coal Creek State Forest is in a remote and sparsely populated area of Flathead County. Most residents of the North Fork are without phone service and rely on individual generators for power. Primary access to the Coal Creek area is provided by the North Fork Road (Montana Forest Highway Route 61/Flathead County Route 486). The road is used by recreationists interested in river floating, hunting, fishing, berry-picking, etc., and is an alternative route into Glacier National Park via the Camas Creek Road or the Polebridge entrance. The North Fork Road is also used by those involved in timber-related activities.

There are both gravelled and paved sections of the North Fork Road. A gravelled portion from Canyon Creek to Camas Creek is scheduled for repair and

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<sup>11</sup> Personal communication with Robert Hurd, Recreation and Trails Forest Technician, Glacier View Ranger District, Flathead National Forest.

improvement work beginning in late 1984 or early 1985. The project is expected to last for approximately two years and will involve intermittent road closures. The contractor will be permitted to close the road from 9 p.m. to 6 a.m. daily during the week with no weekend closures (U.S. Dept. of Transportation 1984). On weekdays the contractor will be permitted to close the road for two hour periods, at which time all traffic must be allowed to clear before the road may again be closed for another two hour period. The road will remain open from 7 to 8 a.m. and 4 to 5 p.m. on weekdays for the convenience of North Fork area commuters. Any additional road closures will require approval by the Federal Highways Administration project engineer and a posted notice of closure at least 48 hours in advance.

Services closest to the drill site are found in Polebridge where a small market with gas, groceries and telephone service is located. Columbia Falls, about 30 miles south of the drill site, provides the nearest access to most social services, such as schools, police and fire protection. The other two major population centers in Flathead County, Kalispell and Whitefish, are about 45 miles south and west of the drill site.

Housing in the North Fork area is limited. Most residents live in houses built on their private lands for personal use. Private lands comprise 7% of the North Fork Valley with 88% of the remaining land in federal ownership and 5% in state ownership (MT Dept. of Natural Resources and Conservation (DNRC) 1977). The eastern half of the valley lies in Glacier National Park.

About 60 families live in the North Fork area and 80 additional families maintain seasonal residences in the area (USDA Forest Service 1981). The North Fork population has been described as a distinct but non-homogeneous group (USDA Forest Service 1981). Several unique community groups reflect different personal values and interests. A general distinction between these groups is that some welcome change and development in the North Fork area, while others would rather preserve the area in its present state.

### Economic Setting

The earliest notable economic activity in the North Fork area included placer mining and coal development. Both of these activities failed because neither proved to be profitable ventures. The North Fork economy now revolves around timber-related and recreation activities. All three ownership groups (federal, state and private) manage portions of their land for timber production. Sawlog and post and pole harvesting, as well as thinning contracts and subdivision of private land, are all potential sources of income for local residents. Over 3600 acres have been sold since 1960, primarily for development of seasonal or vacation residences (Montana DNRC 1977). Recreational activity and cattle production provide some additional income to the North Fork area. Most of the economic benefits from recreation are realized by the Polebridge Mercantile, tavern, cabin rentals, and by outfitters or river guides.

The North Fork economy is closely linked to the larger Flathead County economy. For example, timber harvested in the North Fork may be shipped to Columbia Falls for further processing. Three industries--wood products, primary metals manufacturing and tourism--have been suggested as the most



important basic industries in the County economy (Polzin 1980 and 1981; MT Dept. of Administration 1982).

Wood products have long been considered the major force in the Flathead economy. Polzin (1981) estimates that forest resources account for over 40% of the economic base. However, there has been very little growth in the wood products industry in the 1970s and 1980s. Predictions for the near future forecast no significant growth in the wood products sector of the Flathead economy (Polzin 1980 and 1981, MT Dept. of Administration 1982).

Activity in the tourism industry is difficult to quantify, but its importance to the Flathead economy is demonstrated by employment figures from 1970-1979 showing 1300 newly created jobs linked to tourism (MT Dept. of Administration 1982). The diversity and quality of recreational opportunities in Flathead County should continue to sustain a healthy tourism industry. However, future fuel costs and the distance of Flathead County from major population centers leaves the future of tourism for the county uncertain. A recent projection was for tourism to generate half as many new jobs in the 1980s as it did in the 1970s (MT Dept. of Administration 1982).

Primary metals manufacturing grew in the 1970s because of the expansion of the ARCO aluminum plant in Columbia Falls. Employment at the plant peaked at over 1300 personnel in 1980 (MT Dept. of Administration 1982) and has since declined to the current employment level of 1,013.<sup>12</sup> The recently proposed sale of the ARCO plant makes future employment at the plant uncertain.

Flathead County experienced high unemployment during the recent recession with a 1979-1983 average unemployment rate of 9.7 percent and a peak of 12.9 percent in 1982 (Table 3). Unemployment in Flathead County has been higher than both State and National averages (Table 3). This difference is explained in part by substantial population growth and by the seasonality of much of the employment in Flathead County.

TABLE 3  
NATIONAL, STATE OF MONTANA AND FLATHEAD COUNTY UNEMPLOYMENT

Rates(%) 1979-1983<sup>13</sup>

	<u>U.S.</u>	<u>MONTANA</u>	<u>FLATHEAD COUNTY</u>
1979	5.8	5.1	6.6
1980	7.0	6.1	8.3
1981	7.5	6.9	10.1
1982	9.5	8.6	12.9
1983	N/A	8.8	10.8
Average	7.5	7.1	9.7

<sup>12</sup> Personal communication with Jack Canavan, ARCO aluminum.

<sup>13</sup> Sources: Montana Dept. of Labor and Industry 1980, U.S. Bureau of Labor Statistics 1983.

## Cultural Resources

Much of the information on this region is derived from work associated with the construction of the Libby Dam and its auxiliary facilities. The drill site falls within Malouf's Montana Western Region (Malouf 1956) or the Barrier Falls sub area (Roll 1982). The region is unique in its topographic and climatic variability, which affects the way plant and animal resources are distributed within the area. Culturally, it exhibits traits from the Plains Indian culture area to the east, the Plateau Indian cultures to the west and the Great Basin Indian cultures to the south.

The results of these studies show that the older sites are situated in the higher elevations on or above the older river terraces (Malouf 1956).<sup>14</sup> As the glacial waters receded, evidence indicates that people began to use the lower elevations. Euro-Americans arrived after the lakes and rivers had reached their current levels; evidence of their homesteads and early farming and ranching ventures tend to be found in the valley bottoms. Sites associated with early logging activities may be found anywhere in the timber areas.

Ethnographically, Native American groups known to have used the area include the Stoney of Canada, Kootenai, Upper Pondera, Flathead and Blackfeet (Malouf 1956).<sup>15</sup> Due to the sporadic availability and distribution of food resources, this region seems to have been used mainly as an intermediate stop between the Plains with its bison resources and the Columbia Plateau with its salmon and camas food resources. The sites found are generally small occupations or special use areas. The drill site area appears to be along a possible travel route between the Flathead River and Cyclone Lake, used perhaps for hunting or fishing.

Cultural resources at the drill site are possible because areas of similar elevation in this region were used for travel, small scale occupations, food-acquiring activities, etc. However, the probability of cultural sites being found in the area remains low.

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<sup>14</sup> Personal communication with Mary Collins, Archaeologist, Kootenai National Forest, and Gary McLean, Archaeologist, Flathead National Forest.

<sup>15</sup> Personal communication with Cynthia Manning-Hamlet, Archaeologist, Lewis and Clark National Forest.

## ENVIRONMENTAL CONSEQUENCES OF EXPLORATION

### Overview

The DSL's Preliminary Environmental Review (PER), prepared before the September 1983 oil and gas lease sale, was prepared with the knowledge that the action of leasing the lands in the Coal Creek State Forest could directly lead to exploration and development of oil and gas resources on these lands. While the 1983 leasing PER contained an evaluation of the type and potential significance of a broad range of impacts related to future oil and gas exploration and development, the DSL recognized the need to conduct additional environmental reviews at such time that specific exploration or development plans were available. The following text addresses these additional proposal-specific environmental evaluations as they relate to the need to consider primary, secondary, and cumulative impacts in compliance with the Montana Environmental Policy Act (MEPA), as well as the need to develop environmentally sound operating requirements for the life of the proposed CENEX exploration proposal.

The impacts and environmental concerns addressed in the following sections were identified through staff specialist evaluations, a public scoping process, and consultation with various appropriate state, federal, and local agencies and organizations. In addition to the primary impact evaluations of the specific CENEX exploration proposal, where possible, the authors have also addressed concerns of a broader scope, related to the potential influence of a successful exploration project by CENEX. This includes a consideration of impacts to State-owned lands and adjacent lands from additional drilling projects, from the development of a single production well at the proposed exploration well site, and the development of additional production wells in the Coal Creek State Forest and other adjacent lands.

The consideration of these expanded concerns supplements the discussion of exploration- and production-related impacts in the 1983 PER with information derived from consultation with CENEX officials and others. The development of this information, and the framework for the evaluation of further exploration- and production-related concerns, represents an effort to define these future possibilities to the best of the DSL's ability. The reader must recognize, however, the special difficulty in deriving these evaluations in an area with no comparable oil or gas exploration or development information with which to add certainty to the range of possibilities.

The following section discusses and identifies the additional development-related information used by the authors as they considered the most likely schedule and sequence of development-related events and associated impact potential.

## Oil and Gas Development

### Introduction

The completion of a successful commercial oil well as a result of the proposed exploration drilling project by CENEX would possibly set in motion events related to future exploration for, and development of oil or gas resources on the remainder of the Coal Creek State Forest, including adjacent federal and private lands. Recognizing this, the DSL has sought to define, to the extent possible with limited existing information, the most likely components that would influence the character, schedule, and magnitude of possible future development-related activities. These items form an important part of the relationship between the DSL's ability to adequately control such future activities, and the scope of the environmental analysis required for approval of the proposed exploration project.

The following items represent information developed pursuant to the question of future oil and gas development in the North Fork area since the preparation of the DSL's 1983 oil and gas leasing PER for the Coal Creek State Forest. It supplements the information presented on pages 3 through 7 of the 1983 PER.

### Potential for a Successful Well

The geologic structure defined by CENEX is in line with other similar structures that trend northwest-southeast along a series of near-vertical faults heavily influenced below the surface by the Lewis Thrust fault. These other geologic structures have the same basic characteristics as the Coal Creek Prospect and have similar potential for drilling and development. The structures are separated by about 20 miles with the northernmost located near the Canadian Border on federal land, and the southernmost near Columbia Falls on mainly private land. There has been a proposal to drill the private land but the federal lands have not received serious interest by the industry.

The state forest target structure is about three miles wide by six miles long with drilling targets in the center mile-wide zone. Maximum drilling density on this structure could produce up to 12 well locations if the initial well is successful. This is based on Montana law which limits well spacing to a maximum of two wells per section of land, if the oil is found below 11,000 feet (as anticipated).

All wells drilled on this structure would require road access, storage facilities that can hold four times the daily production, heater treaters and basic plumbing. An aggressive drilling schedule could complete one well every 1-1½ years until the field is fully developed. The chances of a successful first well in this frontier area are greater than 100 to one against success, but the chances for additional wells after the initial discovery improve greatly. Dry holes may be plugged and abandoned as the field is drilled and developed, and the actual field limits are defined.

### Production Level (one well only, oil)

Industry officials have stated that a production rate of 250 to 300 barrels per day (BPD) is considered necessary to justify production status for

the proposed well. A production rate less than this would probably result in plugging and abandoning the well. For purposes of evaluation, however, CENEX has suggested that a production rate of 300-500 BPD be used. Although this figure exceeds expectations, it is possible. On the upper range, a production rate of 1000 BPD cannot be completely ruled out, although it is extremely unlikely. By comparison, 1982 average daily production rates per single oil well in Montana ranged from 44.2 BPD in the Williston Basin, to 4.1 BPD in Northern Montana. Statewide average daily production per well in 1982 was 19.2 BPD (Montana DNRC 1982). Flathead County currently has no producing oil wells.

#### Product Transport (one well only, oil)

Oil would be loaded from storage tanks located on the lease site into tanker trucks for transport, most likely to Cut Bank for access to the Glacier Pipeline. The most likely destination would be the CENEX refinery at Laurel, Montana, although the destination could change.

At a production rate of 500 BPD, three trucks/day would be needed to transport the oil; truck capacity is approximately 150 barrels. Railcar transport is a possible alternative to truck transport over Marias Pass during hazardous winter driving conditions. To accomplish this, the trucks would transport the oil from the lease site to a rail siding in either Whitefish or Columbia Falls for loading directly into railcars. Railcar capacity is about 1000 to 2000 barrels.

The construction of a petroleum pipeline to transport the oil from the North Fork area is not economically feasible for a single well, regardless of the possible production range. If other producing wells are developed by other lessees on adjacent lands, a "shared" transportation system is possible. This could involve a petroleum pipeline if combined oil quantity is sufficient.

#### Product Storage (one well only, oil)

To insure that the state has adequate control over the amount of oil removed from its lands, the current state oil and gas lease regulations require the location of any oil storage facilities "on-lease." However, the producer may apply for an exception from these regulations. Standard storage tanks are approximately 16 feet in diameter and 22 feet high with a capacity of about 1000 barrels. Storage needs would be about four times the daily production rate, or two tanks if 500 BPD. In addition to the storage tanks an eight-foot diameter by 22-foot high "heater-treater" tank would be required to separate the oil, gas, and water from the raw petroleum product.

State law requires a dike around the storage area capable of containing the entire capacity of the storage tanks. Additional storage tanks could be added if it is determined that severe weather conditions during winter months will hamper product transport beyond the four-day safety storage capacity.

CENEX has indicated that one permanent employee can operate the production site and storage facilities.

## Sweetening Plant

A sweetening plant is used to remove sulfur from  $H_2S$  gas present in the raw petroleum product. The plant converts "sour" gas into "sweet" gas as required before sale of the gas, or disposal by flaring (burning). However, a sweetening plant is only necessary if gas is present with the oil, and the gas contains  $H_2S$  (sour). State law limits the maximum amount of sweet gas that can be flared to 100,000 cubic feet per day. If the CENEX well produced more than this amount, a buyer for the gas would need to be found, or the well would need to be capped.

A sweetening plant would be necessary for the treatment of gases associated with the production of oil from the proposed CENEX well if (1) it is assumed that the oil would contain gases (probable), and (2) the gases are sour (unknown, and difficult to predict).

A typical small portable sweetening plant (four feet by 14 feet) is commonly used to treat gas from single oil wells. This plant is known as an "iron sponge," and is capable of treating about 1,000,000 cubic feet per day of sour gas at a 0.5 to 1.0 percent concentration of  $H_2S$ . If higher concentrations of  $H_2S$  are present, additional units of the iron sponge can be added to the facility. As the filtering units of the facility become contaminated, they are replaced with fresh contents and the contaminated parts are returned to the manufacturer for restoration.

## Additional Well Considerations

If CENEX's exploration well is successful in producing commercial quantities of oil, the company would consider drilling an additional well or wells on the lease or adjacent leased lands. CENEX officials have indicated that the production information obtained from the first well would have to demonstrate a recoverable reserve of about 1,000,000 barrels of oil (if oil is found at a depth of 12,000 feet) to justify the expense of drilling a second well. Production information necessary to demonstrate a reserve would require a minimum of six months to one year of production data from the first well. If oil is found at shallower depths in the first well, a smaller reserve could justify a second well. In addition to production information, the final cost of drilling the first well would be a factor in deciding whether or not to drill a second well. Montana law limits the well spacing to a maximum of two wells per section of land, if the oil is found below 11,000 feet (as anticipated).

A second well would have about the same facilities as the first well, although experience gained from drilling the first well could modify the proposal somewhat. Assuming that the second well is located nearby, it could share production facilities with the first well, with the addition of storage and pipeline facilities. If the second well is located off the first well-lease tract, the co-mingling of production facilities is prohibited, although an exception is possible by application to the DSL. The drilling of "multiple" wells from the proposed well site is not considered feasible by CENEX because of the steep dip in the subsurface formations.

A second well would probably not be adjacent to the first well. After the first well is completed for production, it is standard industry preference

to locate the next well, or wells, on the periphery of the deposit to gain additional valuable information on the extent of the reserves present. In addition, the topographic and environmental concerns present in the Coal Creek State Forest and adjacent areas would limit both the number and location of acceptable drilling sites.

#### Additional Exploration

If the proposed exploration well is not successful, CENEX officials have indicated that testing is completed on that "feature." The target feature for the proposed exploration well is thought to be about six miles long and three miles wide. Although no more drilling of that feature would be planned, negative results could be encouraging, but only as they relate to the exploration of other features in the region.

#### Petroleum Pipeline Considerations

The construction of a petroleum pipeline to transport oil out of the North Fork area is a long-term financial commitment. CENEX officials predict that about 10,000 BPD of product would be necessary from the Coal Creek area to justify a petroleum pipeline. This equals the daily production of approximately 20 oil wells if a production rate of 500 BPD is used, or 33-40 oil wells if the target rate of 250-300 BPD is used. In addition, the pipeline length, and the cost necessary in constructing a pipeline in environmentally sensitive areas would influence the decision regarding the pipeline's feasibility. The capacity of a petroleum pipeline is approximately the square of the diameter multiplied by 1,000. A three-inch diameter pipeline has a capacity of 9,000 BPD, and an eight-inch diameter pipeline has a capacity of 64,000 BPD. Proven reserves of at least 1,000,000 barrels would also be required, to ensure the required daily flow over a time period long enough to justify the expense.

#### Possible Development Time Frames

If CENEX is successful in finding oil in commercial quantities and additional production wells are planned, the following time frame for additional development is possible, although it is considered very optimistic.

Assuming that:

- Environmental Review documents required for each proposal could be completed in six months each,
- site preparation and drilling could be completed in 180 days each,
- 30 days would be required to convert each well to production, and
- a minimum of six-months to one-year production data would be necessary from each well before the decision to drill an additional well;

CENEX could complete one new well every 19 months, or a total of seven wells during the primary 10-year lease term. (The lease term can be extended if production is reached prior to the expiration of the primary 10-year lease term.) Factors that could reduce the number of wells include seasonal delays, and the possibility that an Environmental Impact Statement could be required at some point to address cumulative impact concerns related to the proposals

for development of more than one well.

Lessees other than CENEX may at some time propose parallel development on adjacent state, federal, or private lands. Unless the proposals involve private lands, it is not likely that development at an accelerated rate would occur. Development in addition to the possible CENEX wells by other lessees would, however, encourage a joint agency review of possible cumulative impact potential as the number of well proposals increased.

### Production of Gas

Gas production will probably be associated with the raw petroleum product. The amount or quality of the gas is unknown. If the quantity of gas exceeds 100 MCF (thousand cubic feet) per day (flaring limit), CENEX would either find a buyer or cap the well. CENEX officials have indicated that approximately 4-5 million cubic feet per day (CFD) would be required to make sale of the gas possible as an oil well by-product.

If the well proves to be primarily a gas well, approximately 5-7 million cubic feet of gas would be necessary to make gas production economical, since a pipeline would be required. In addition, the quality of the gas would be an important factor in deciding its marketability. By comparison, gas production in 1982 from Montana gas wells was approximately 44.2 billion cubic feet, while production of gas as a by-product from oil wells was approximately 6.6 billion cubic feet.

If the gas is found in commercial quantities and quality, a pipeline would be required to transport the gas to the nearest market. This pipeline would be similar to that described earlier for a petroleum pipeline. A gas pipeline is designed to deliver a certain volume of gas over a given distance against a known back-pressure. For example, the nearest point of sale for gas is the Montana Power Company's gas pipeline in Columbia Falls, which is about 550 pounds per square inch at the point where connection would be made. This would require a flow pressure of about 600 psi at the end of a pipeline coming from the Coal Creek area. A pipeline must have sufficient diameter so as not to restrict the flow of gas over the designed distance unnecessarily, nor to require excessive pressure to maintain adequate volume. A maximum drop of ten psi per mile of pipeline is considered a good rule of thumb for diameter design. Table 4 shows the range of diameters for a 25 mile branch pipeline assuming a minimum volume of 5 million cubic feet (MMCF) of gas per day and a median volume of 20 million cubic feet. The table also assumes a 600 psi pressure at the output end and lists the input pressure required to maintain the given volume.

As an example, Table 4 shows that 20 MMCF would overstress a 4 inch line by requiring an impractically high pressure at the wellhead end (2100 psi), and would lose 60 psi per mile to frictional flow resistance. A 10 inch line on the other hand would be too large for a volume of 5 MMCF per day.



TABLE 4  
GAS PIPELINE DIAMETER  
VOLUME AND PRESSURE RELATIONSHIPS

PIPE DIAMETER	VOLUME PER DAY	INPUT PRESSURE	PRESSURE DROP PER MILE
4 inch	5 MCF	816 psi	8.6 psi
4 inch	20 MCF	2100 psi	60.0 psi
6 inch	5 MCF	632 psi	1.3 psi
6 inch	20 MCF	939 psi	13.5 psi
8 inch	5 MCF	608 psi	.3 psi
8 inch	20 MCF	695 psi	3.8 psi
10 inch	5 MCF	*TSTM	*TSTM
10 inch	20 MCF	633 psi	1.3 psi

\* TSTM = Too small to measure, pressure difference negligible.

If gas becomes the primary well product, the required spacing limitations of state law would decrease to one well per section of land (and hence one well per state lease tract). This would reduce the number of gas wells possible in the Coal Creek State Forest. As discussed for oil wells, however, the same limitations would apply to the number of wells actually possible to complete within the primary 10-year term of the state leases.

#### Natural Environment

##### Air Quality

CENEX is not required to obtain an air quality permit for the proposed well drilling operation. The Montana Air Quality Regulations require that any source with the potential to emit more than 25 tons per year of any pollutant obtain an air quality permit. As shown in Table 5, emissions of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO) exceed this level. However, drilling rigs of the size proposed by CENEX are specifically excluded from the permit requirements because of the temporary nature of the operation (ARM 16.8.1102). Although an air quality permit is not required, some aspects of the Prevention of Significant Deterioration (PSD) regulations are applicable. Most notably, extra protection against SO<sub>2</sub> emissions is given to Glacier National Park. Estimated SO<sub>2</sub> emissions from the proposed single well source, however, are well below amounts capable of adversely affecting the Park or other adjacent areas. Ambient (off-site) air quality monitoring during the drilling operation is not considered necessary because of the small amount of emissions anticipated, and the temporary nature of the drilling operation. H<sub>2</sub>S monitors with alarm systems, however, will be operated on the drilling rig as a safety precaution. These will also be useful as an indicator of off-site H<sub>2</sub>S concentrations.

The proposed well drilling operation is not anticipated to exceed state and federal ambient air quality standards. Under normal operating conditions, short-term increases in NO<sub>x</sub>, particulate matter, SO<sub>2</sub>, CO and hydrocarbons (HC)

TABLE 5  
EMISSION INVENTORY  
DIESEL ENGINES EXHAUST EMISSIONS

	<u>Total Emissions (tons/200 days)</u>
Nitrogen Oxides (NO <sub>x</sub> )	100
Sulfur Dioxide (SO <sub>2</sub> )	12
Carbon Monoxide (CO)	36
Hydrocarbons (HC)	3
Particulate Matter	10

Emission factors obtained from EPA, Compilation of Air Pollutant Emission Factors (AP-42 Supplement 15 Section 3.3.4-1), January 1984.

will occur; however, the impact to the immediate area and to Glacier National Park will be negligible. At the anticipated level of emissions, no adverse air quality impact to wildlife or vegetation would be expected. The potential for acid deposition in the immediate area or in Glacier National Park is remote. No degradation of visibility in the area would be expected.

Air emission sources from oil and gas exploratory drilling operations can be grouped into three general categories: (1) potential sulfur compounds; (2) diesel exhaust; and (3) fugitive dust. The following discussion addresses potential impacts and air quality concerns with respect to these emissions.

Sulfur Compounds -- During the drilling operation there is the potential that gas bearing zones may be encountered. This gas may contain sulfur compounds, particularly hydrogen sulfide (H<sub>2</sub>S). Hydrogen sulfide is extremely hazardous to normal oil field operations because of its capability of: (1) threatening life, and (2) causing instantaneous failure of high-strength metals. Drilling and producing operations of hydrocarbons containing toxic gases can, however, be performed safely and without incident when the necessary precautions are taken and appropriate safety procedures are followed. It is imperative that sulfide-resistant materials are used, that the proper safety equipment is used, that this equipment is properly maintained, and that all safety regulations are complied with.

Before drilling it is impossible to determine the amount of gas present or, more importantly, its H<sub>2</sub>S content. H<sub>2</sub>S presents a serious air quality concern because it is extremely toxic at concentrations of 500 parts per million (ppm), and has an offensive "rotten egg" odor detectable by most people at concentrations between 0.0015 and 0.0075 ppm (Air Quality Bureau 1980). Adverse health responses, such as headaches, nausea, and shortness of breath have been detected at concentrations of 0.1 ppm. Several researchers have observed the onset of damage to conifers in the range of 0.03 to 0.10 ppm over very long periods, as well as damage to agricultural crops at

0.3 ppm for one month. The Montana ambient air quality standard for  $H_2S$  is 0.05 ppm, one hour average, not to be exceeded more than once per year<sup>2</sup> (ARM 16.8.814). (Montana Air Quality Bureau 1980).

Under normal operating conditions, the amount of  $H_2S$  reaching the surface at the well site would be minimal. If zones containing gas or fluids under pressure are encountered during drilling, the drilling mud system is adjusted to seal these zones. Drilling is discontinued until the pressure is stabilized and there is essentially no gas entering the hole. The small amount of gas that does reach the surface is vented from the system by use of a de-gasser unit and flared (burned). In this way, the small amount of  $H_2S$  is converted to less harmful sulfur dioxide ( $SO_2$ ). The possibility and extent of  $H_2S$  odor is dependent on the nature of the material encountered during drilling and on meteorological conditions (wind speed and direction). The extent of odors should be limited to the immediate drill site area, and would not be expected for prolonged periods.

Hydrogen sulfide ( $H_2S$ ) dissolves in water to form a weak acid that can cause some pitting, particularly in the presence of oxygen and/or carbon dioxide. However, the most significant action of  $H_2S$  is its contribution to a form of hydrogen embrittlement known as sulfide stress cracking. Sulfide stress cracking results when metals are subjected to high stress levels in a corrosive environment where  $H_2S$  is present. The metal will often fail catastrophically in a brittle manner. Sulfide stress cracking of steel is dependent on and determined by:

- Strength (hardness) of the steel - the higher the strength, the greater the susceptibility to sulfide stress cracking. Steels with yield strengths up to 95,000 pounds per square inch and hardness up to Rc22 are generally resistant to sulfide stress cracking. These limitations can be extended slightly higher for properly quenched and tempered metals.
- Total member stress (load) - the higher the stress level (load) the greater the susceptibility to sulfide stress cracking.
- Corrosive environment - corrosive reactions, acids, bacterial action, thermal degradation, or low pH fluid environment.

$SO_2$  is also an air pollutant but is not as toxic or odorous as  $H_2S$ .  $SO_2$  may irritate the throat and lungs and aggravate existing respiratory disease. The growth and yield of timber and agricultural crops is also reduced by exposure to  $SO_2$ . Numerous health and welfare studies have been undertaken on the effects of  $SO_2$  exposure. These studies are detailed in the Final Environmental Impact Statement on the Montana Ambient Air Quality Standards (Air Quality Bureau 1980).

Since very little  $H_2S$  would reach the surface under normal drilling conditions,  $SO_2$  concentrations from flaring and diesel exhaust (discussed below) should be well below the air quality standards for  $SO_2$  (ARM 16.8.820 and Appendix C-2) and levels associated with adverse health and vegetation effects. Another concern with  $SO_2$  emissions is the potential for acid production.  $SO_2$  can combine with moisture in the air to form acid. This is

commonly referred to as acid rain. Because of the small amount of  $\text{SO}_2$  emitted during the drilling process, the potential for acid formation and deposition should be negligible.

A major concern with respect to  $\text{H}_2\text{S}$  and  $\text{SO}_2$  emissions is the possibility of a well blowout, where there is an uncontrolled flow of gas, oil, or other well fluids into the atmosphere. Initially, there could be a flow of gas with  $\text{H}_2\text{S}$  to surface in a blowout situation. The amount of  $\text{H}_2\text{S}$  would be dependent on the volume of gas and its  $\text{H}_2\text{S}$  content. If the well was ignited, the  $\text{H}_2\text{S}$  would be converted to  $\text{SO}_2$ .

Air quality impacts of a well blowout could be severe, including the endangerment of human life and health in the area. During summer months, westerly winds pass through the saddle between Cyclone Peak and Winona Ridge, shifting the air flow southeastward through the drill site area. This increases the risk for downwind residents in the event of a well blowout with  $\text{H}_2\text{S}$  gas release to the atmosphere. In addition, heavy lodgepole pine timber in the area can cause winds to swirl, creating "dead spots" of calm air. Escaping  $\text{H}_2\text{S}$  gas can accumulate to dangerous levels in these areas. As a requirement of the Operating Plan, CENEX has prepared a detailed  $\text{H}_2\text{S}$  gas contingency plan. If an emergency should develop or if an evacuation is necessary, CENEX will notify all residents within a two-mile radius. These names are listed in the contingency plan. Although emergency evacuation is planned for a two-mile radius, the probability of lethal concentrations extending beyond one mile is highly unlikely.

A well blowout is recognized as a remote possibility because of the extensive preventative measures designed into the entire drilling operation proposal.

Since the mid-1960s, in excess of 290,000 feet wildcat oil and gas exploration has been drilled in the Montana portion of the disturbed overthrust belt without a well blowout, or serious situation indicating blowout potential.<sup>16</sup> To date CENEX has drilled in excess of 8,000,000 feet of oil and gas wells nationwide without a single well blowout. Blowout preventative and safety measures are described in detail in CENEX's Operating Plan and are summarized below:

- Specific written procedures are required for all drill site personnel regarding responsibilities and duties, including extensive training and safety awareness,
- consideration of prevailing wind direction in the positioning of drill equipment is required, including the use of wind socks or streamers to make sure that wind direction is easily apparent,
- well-designed and tested blowout prevention equipment,
- extensive monitoring of the drilling mud system,

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<sup>16</sup> Personal communication with Ken Feyhl, CENEX.

- H<sub>2</sub>S monitors with alarm systems,
- strict access control to the area, and
- prompt notification of local residents and government units in the event of an emergency.

Implementation of these measures will significantly reduce the possibility of serious threat to human health and safety as a result of a well blowout.

Diesel Exhaust Emissions -- Large diesel engines are used to power the rig, pumps and auxiliary equipment. The primary pollutants of concern from these engines are NO<sub>x</sub> compounds. They are formed in the high temperature, pressure and excess-air environment of combustion in diesel engines. Lesser amounts of CO and HC are also emitted. A brief description of these pollutants is included in Appendix C-2. Sulfur dioxide (SO<sub>2</sub>) emissions are usually low because of the negligible sulfur content of diesel fuels (Environmental Protection Agency 1982).

Table 5 lists estimated emissions from the CENEX operation based on a daily maximum diesel use of 2000 gallons per day over a 200-day operating period. CENEX's Operating Plan calls for 150 days, however, a 200-day period was used in case drilling time is extended. Overall diesel use, however, should be significantly less than 2000 gallons per day.

At these emission levels, no detectable air quality impacts are anticipated. The expected amount of emissions would be similar to a small oil-fired boiler (10 million BTU per hour heat input) of the type commonly used for space heat at schools or moderately sized commercial buildings.

Fugitive Dust -- Fugitive dust emissions would primarily result from increased vehicle traffic on the North Fork Road and the access road into the drill site. Short-term construction activities at the site would also generate some dust. CENEX intends to lower on-site dust emissions by watering the road and work area. The increased use of the North Fork Road as a result of the drilling operation would be short-term and is not considered significant in comparison to existing traffic use levels.

Effects of Production from a Single CENEX Well -- In the event of success at the CENEX well, the major air pollutant concern would be SO<sub>2</sub>. Under the various scenarios of oil and/or gas production, there is the possibility of flaring H<sub>2</sub>S gas, which produces SO<sub>2</sub>. If oil is produced, there would most likely be some quantity of gas associated with it. If the gas is not marketable, it would be flared (well-head flare), provided the amount does not exceed the limitation of 100,000 cubic feet per day. If commercial production of gas is feasible, either in conjunction with oil production or as gas production alone, the H<sub>2</sub>S would be removed (gas sweetening) before pipeline shipment. For SO<sub>2</sub> emissions there are two distinct types of sweetening plants. One type, the iron sponge unit, chemically removes the sulfur compounds with no flaring and therefore no SO<sub>2</sub> emissions result. In the other type, the amine process, H<sub>2</sub>S is separated from the sweet gas into an acid gas stream which is then flared. In this way, essentially all the H<sub>2</sub>S is converted to SO<sub>2</sub> and emitted to the atmosphere.

The limiting factor with respect to SO<sub>2</sub> emissions would be the air quality permitting process. As noted above, any source with the potential to emit more than 25 tons per year of a pollutant is required to obtain an air quality permit from the Montana Department of Health and Environmental Sciences. While the exploration project is exempt from the permit requirements, there is no exemption for production facilities. Through this process the application of Best Available Control Technology (BACT) would be required and the stringent SO<sub>2</sub> provisions of the PSD regulations for both Class I and Class II areas would be applied. BACT is defined as an emission limitation based on the maximum achievable degree of reduction of a pollutant taking into account energy, environmental, and economic impacts. If SO<sub>2</sub> emissions from flaring (well-head or acid gas from sweetening plant) would exceed limits set with respect to these provisions, then the use of alternative sulfur removal or recovery equipment that does not flare the H<sub>2</sub>S would be required before production could begin. A high level of protection from any SO<sub>2</sub> emission source is afforded the general area due to the PSD and BACT requirements.

As part of the Flathead River Basin Study, the SO<sub>2</sub> impact of two hypothetical gas flares in the Polebridge area was analyzed through computer simulation modeling (Air Quality Bureau 1983b). Since the SO<sub>2</sub> emissions from production of the CENEX well cannot be quantified at this time, a direct comparison to the hypothetical flares cannot be made. However, the document provides a good example of the type of analysis that would be required. It also indicated that only a small amount of H<sub>2</sub>S flaring could be allowed in the area because of the PSD limitations.

Another air quality concern from production facilities is fugitive hydrocarbon emissions from valves, flanges, pipe fittings, pump and compressor seals, etc. These can be minimized through the use of well-sealed storage and transport equipment and proper maintenance. Air quality impacts from these emissions would be minimal; however, some localized and intermittent odor may result. These types of emissions would also be reviewed through the air quality permitting process and the application of BACT would be required.

Effect of Multiple Well Drilling and Production -- In the event of multiple well drilling in the area, the air quality impacts for each additional well would be similar to the proposed well. The potential for significant cumulative adverse effects, however, would be reduced because of well spacing requirements and the relatively small amount of emissions anticipated from each well. Traffic-related emissions would increase, but because of the rate of additional development, would not be significant in comparison to current levels.

Oil and/or gas production from multiple wells in the area would be regulated by BACT and PSD requirements as described in the single well analysis. The PSD regulations, in particular, take into account cumulative impacts. Each successive production facility would be required to demonstrate compliance with SO<sub>2</sub> limitations, including its own emissions as well as the emissions of other sources in the area. In most cases this would entail computer simulation modeling of the emissions to determine resulting ambient air concentrations. Air quality monitoring could also be required to further verify compliance. No significant air quality impacts would be expected from

the various oil and/or gas production possibilities because of the application of regulatory requirements described above.

### Hydrology And Water Quality

Based on the physical characteristics of the site, implementation of the recommended changes to the road reconstruction plan, and the protective stipulations of the lease, the normal operation of the proposed exploration facility will not have significant impacts on the surface and subsurface water resources of the area.

The major factors leading to this conclusion are:

- No defined surface drainage leaves the immediate pad area; the potential for delivery of sediment or other pollutants from the pad area is reduced.
- Downward groundwater movement is expected to be restricted by dense glacial material.
- The reserve pit will be impermeable.
- The solid contents of the reserve pit will be removed from the site if they contain deleterious substances that may degrade water quality. The liquid contents will be allowed to evaporate, pumped down hole, or be trucked from the site. They will not be spread on the road for dust abatement.
- The intermittent stream in the vicinity of the access road does not have surface flow to a perennial stream. This reduces the potential for spills along the road to reach a perennial stream, thus allowing more time to contain spills before damage is done.
- Diligent implementation of adequate contingency plans, with basic materials on the site, will reduce the potential for impacts from a spill.
- Significant salt-bearing formations should not be encountered at this location<sup>17</sup> (Johns 1970). Therefore, the salt concentration of produced water should be quite low.
- CENEX has indicated they will not use chromium-based additives. (See Appendix C-3 for a more complete listing of mitigating measures.)

The activities associated with drilling an oil well may add foreign substances to surface and groundwater. The potential pollutants include sediment, sewage, petroleum products, produced water, drilling mud, drilling additives, and completion fluids.

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<sup>17</sup> Personal communication with Ken Feyhl, CENEX.

Sediment may originate from ground disturbance, such as road or pad construction. Sewage results from disposal of human wastes. Petroleum products will be used on the site and may be produced in varying quantities. The well may produce water with chemical composition significantly different from surface water or near-surface groundwater. The composition may vary considerably depending on well depth, geographic location and geologic formation. Drilling muds are circulated through the well bore during drilling to remove solids from the bottom of the hole, lubricate and cool the drill pipe and bit, control downhole pressure, and seal formations. The muds are generally mixtures of clay and weighting materials. Additives can be a wide range of materials used to yield the proper fluid properties for the drilling mud. They sometimes contain heavy metals. Drilling mud additives and produced water are, however, contained in the reserve pit and are recirculated.

The potential for impacts from the reserve pit and its contents are highly variable depending on the site, the contents and the reclamation procedures. On many of the study sites discussed below the impermeable membrane of the pit was broken and the contents mixed with the soil as part of the reclamation procedures. This will not be allowed on the North Fork CENEX site, as stated in the lease stipulations.

The potential for leaching of mud contaminants from reserve pits is considered slight because muds are by design an impermeable slurry suspension of clays. Produced water, however, has greater potential for leaching from an unlined pit because of the hydrostatic pressure of the pit contents and osmotic potential (Moseley 1983).

Sodium (Na) and chloride (Cl) are the most mobile constituents of the reserve pit. Heavy metals tend to stay in the immediate area due to attenuation in soils and formation of insoluble complexes (Henderson 1982 and Moseley 1983).

Drilling muds and produced water do not constitute a hazard to human health or the environment when handled according to modern industry practices (Moseley 1983). Studies completed in eastern Montana indicate isolated contamination of surface and groundwater associated with improper reserve pit reclamation procedures and improper disposal of produced water (Dewey 1982a, Dewey 1982b).

Another study in the Overthrust Belt found that levels of chloride in groundwater returned to levels that meet Secondary Drinking Water Standards within a matter of several hundred feet at most facilities, and did not constitute a health hazard or water potability problem (Henderson 1982).

The drilling operation will require substantial quantities of fresh water, up to 1.5 million gallons for the entire drilling operation, pumped at a rate of about 50 gallons per minute.<sup>18</sup> This will be provided by a water well drilled at the site, and is not anticipated to adversely affect other water users in the area (Table 1, Page 20).

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<sup>18</sup> Personal communication with Ken Feyhl, CENEX.



The only new road construction planned will be at the pad site. An existing access road will be used. CENEX's plan for reconstruction of this road is documented in the road notes (Appendix C-6). The erosion potential of this road will be reduced through reconstruction, which will include additional drainage features and surfacing material.

Transport of drilling fluids, fuel, and other liquid or soluble substances offers the opportunity for accidents that may impact water quality. In most areas, the impacts of these spills would be localized. In other locations, such as where the North Fork Road borders on the river or where streams are crossed, the impacts could be more extensive. The situation would be similar to existing fuel hauling for other industrial activities, such as logging. Local emergency services agencies should be alerted.

A contingency plan for spills under the drilling and producing phase is included in the Annual Operating Plan submitted by CENEX. The plan has been reviewed by the DSL and is considered adequate to insure the protection of the water resource. It includes basic instructions for situations involving spills of materials proposed for use, as well as a description of containment and cleanup items that will be available on the site.

The hydrology of the site has been altered by timber harvesting. The recovery to pre-logging levels of evapotranspiration and snow melt timing will be delayed for several years by the disturbance required for the pad. However, this is not a significant impact.

The perennial stream, west of the pad site, that flows to the northeast is used for a domestic water supply and is tributary to Hay Creek near its confluence with the North Fork of the Flathead River. This stream will be protected from potential impact by the impermeable reserve pit and the low hydraulic conductivity of the glacial deposits in the area. In addition, shallow groundwater movement at the site will be away from this creek. Surface spills at the site will not enter this area because of the proposed large cut between the pad and the creek. A spill that leaves the site uncontained would most likely follow the band of cottonwood and brush that extends east and north of the pad site. This subsurface drainage, denoted by the cottonwood and brush, apparently surfaces one-half mile away where it sub-irrigates a hay field. Movement would be very slow at times other than during the snowmelt period, when dilution and distance would significantly reduce the potential for impact.

The level of the local seasonal groundwater table at the site will not be known until construction of the pad site and possibly the water well is completed. Local, perched water will likely be adequately drained from the pad site by a ditch at the base of the cut slope along the pad. The area around the drill rig should be sloped and/or ditched so that wash water, produced water or spilled fluids will flow directly to the reserve pit. The remainder of the pad will be drained to the gently sloping areas lying off the northeast, east, and southeast portions of the pad. Materials eroded from the site will be deposited on these areas.

A catastrophic situation, such as a blowout that results in a high-volume, unrestricted flow of petroleum products or produced water from the well, may adversely impact downstream water quality.

Monitoring of surface water quality during the drilling phase is necessary to assure that no adverse impacts go unnoticed (even though none is anticipated) as well as to acquire valuable baseline information in the event the exploration well is successful. Appendix C-5 contains a recommended monitoring program, that will provide the early detection necessary to ensure that unanticipated adverse impacts can be fully mitigated.

Effects of Production -- Production from this well will involve new road construction to provide reliable, long-term, year-around access. Some erosion is unavoidable during construction and use.

Production may require construction of storage tanks, separation equipment, or other facilities. They will be located on the pad and minimal new disturbance will be required. The operating plan and state law requires that all tanks and storage facilities have earthen dikes to confine spills. Dikes, ditches, flow lines and production water disposal facilities must be examined daily for evidence of leaks or spills.

Transport of the product from the site offers the opportunity for accidents, such as tanker truck rollovers that may impact water quality. In most areas, the impacts of these spills would be localized. In other locations, such as where the North Fork road borders on the river or where streams are crossed, the impacts could be more extensive.

If production is determined feasible, a detailed review of possible operational alternatives should be undertaken to minimize the potential for impacts to water resources.

Effects of Multiple Well Production -- Potential for impact to water resources will increase progressively with the amount of activity associated with multiple well production. Future proposed sites may have higher potential for impact than the proposed CENEX well. Slopes may be steeper, sites may be closer to stream channels, and additional road construction may be required. Other landowners will probably be involved. Significant additional oil and gas development will likely contribute to the potential for cumulative impacts on the water quality of the Flathead Basin--a sensitive subject due to proposed mining developments in Canada, timber harvest, and increased residential and recreational development.

If significant additional oil and gas development appears feasible, a detailed, interagency review of possible alternatives and impact analysis should be undertaken before approval of additional wells and/or production facilities.

Interagency planning and adherence to operating plans and applicable laws will likely lessen impacts, although minor, local, short-term impacts are nearly inevitable.

## Geology

No significant geologic impacts are expected with the proposed drilling. The Kishenehn siltstone exposed in the access road may, however, be subject to instability. Slope stability is mainly dependent on slope steepness, depth of excavation, cutslope ratios and occurrence of groundwater. Portions of the existing access road must be realigned to avoid a road fill failure and cutslope excavation minimized as noted in the road reconstruction log (Appendix C-6).

A drilling mud program will be engineered to contain expected downhole formation pressures without causing undue formation breakdown and resultant loss of circulation. The lessee is directed to protect oil- and gas-bearing strata from contamination or waste in accordance with regulations of the Oil and Gas Conservation Division (ARM 36.22.1729-1232).

## Soils

Drill site development offers the potential for accelerated erosion, soil compaction, loss or reduction of soil productivity and spillage of toxic materials or petroleum products.

Topsoils (10-12 inches deep) will be stockpiled for final reclamation regrading to maintain soil productivity, speed reforestation and reduce erosion in accordance with ARM 36.22.1307. Soil compaction from heavy equipment operation on wet soils can result in decreased infiltration, increased runoff and rooting difficulty. The silty soils of the drill area are susceptible to compaction. Topsoil stockpiling, drill pad construction and regrading for reclamation must be done when soils are relatively dry (July 1-November 1) to minimize soil impacts.

Potential erosion rates are low to moderate at the drill site. Some erosion will occur on the drill site cut and fill slopes and along the access road. Drill site cut slopes should be backsloped at a suitable angle (3/4:1 to 1:1 ratio) to maintain slope stability.

Ditching at the base of the drill site cut slope to reduce runoff onto the drill pad is necessary. Collected sediments and runoff should then be ditched to disperse on gentle ground and not enter water courses.

The proposed reserve pit will occupy 0.65 acres. Following excavation of the reserve pit, a percolation test is necessary to determine if a pit liner is needed to make the reserve pit impermeable. Depending on the drilling mud program the reserve pit may contain high pH, saline or toxic chemicals that restrict or inhibit plant growth. High-chromium mud additives are not planned for use in the proposed drilling program. However, some trace heavy metals may occur in drilling mud additives, such as barite which is used for increasing drill mud weight.

The temporary drilling operation requires an all-season access road. A road fill failure which occurred recently is related to the past construction of an oversteepened fill slope and poor drainage of surface water.

Extensive excavation could cause future slope instability. A modified road reconstruction survey with details on drainage, grading and aggregate needs was completed by the DSL and adopted by CENEX (Appendix C-6). The road survey identifies portions of the road where the existing road width must be used and cutslope excavation minimized, in order to maintain stability. CENEX will relocate around the existing fill failure. Turnouts will not be constructed close to creeks or marginally stable soils. Additional drainage features should be installed to control runoff and sediment.

The low bearing capacity of the soils will require gravel surfacing to provide traction, prevent rutting and reduce surface erosion. Gravel will also abate road dust which is common from traffic on native material roads during dry periods. Winter access to the site will require plowing, drainage and sanding as needed for traction and safety.

Spills -- Spills of petroleum products, drilling mud constituents or chemicals may occur, which have the potential to affect soil productivity. Traffic control, road upgrading and improved alignment are planned to reduce the potential for vehicle accident-related spills. If a spill occurs, the appropriate county, state and federal agencies must be promptly notified to aid in cleanup efforts. Also, spill materials must be contained and disposed of in a manner suitable for the type and extent of the spillage.

Reclamation -- In the event the well does not prove to be commercially feasible, the well will be plugged, all equipment removed and the site reclaimed. A representative sample of reserve pit fluids and solids will be tested by the drilling operators for toxicity prior to pit reclamation. Reserve pit contents must be disposed of in a manner compatible with the mud chemistry, as approved by the DSL. Following exploratory drilling, the reserve pit and portions of the drill site not in use will be reclaimed.

To reduce subsidence and vertical groundwater movement, the drill site and reserve pit should be compactly backfilled in 6-8 inch layers to within about three feet of the final surface grade. Layer compaction will be minimized in the uppermost three feet of subsoil to allow tree rooting. Scarification of the subsoil may be needed to break up heavily compacted areas and improve soil properties for plant growth. Surface soils should be regraded when relatively dry and planted with preferred tree species and site adapted grasses where appropriate.

A steep portion of the existing road will be closed after exploratory drilling. Cut and fill slopes will be recontoured to more stable angles and surface drainage provided. Slopes will then be revegetated with seeded grasses and conifer species to maintain slope stability and control long-term erosion. Reclamation practices, when properly implemented, are expected to quickly re-establish conifer species with little or no loss of soil productivity.

No significant soil-related impacts are expected with the normal operation of this exploratory well as proposed in CENEX's operating plan. The rules of the Oil and Gas Conservation Division, the lease stipulations, and adherence to recommendations made in this analysis should mitigate all foreseeable situations.

Production of CENEX Well -- If the well is successful and is proposed for completion, all subsequent production phase plans must be approved by the DSL. All potential soil impacts will be evaluated and mitigation measures prescribed (if necessary). For example, production facilities such as storage tanks, oil/gas separators, and pipelines, may require a special location, or special engineering or construction standards in order to protect the soil.

In a production phase, oil truck traffic will need higher road standards, therefore, the existing road would require relocation in order to provide a long-term, year-round access road. Relocation of the road could provide a more favorable grade and road alignment to maximize safety and minimize potential impacts due to truck accidents.

Multiple Well Development -- Drilling and development of multiple wells will result in increased surface disturbance, potential erosion, additional roads and production facilities and the possibility of spills. Soil-related limitations can be primarily mitigated by careful location of activities, proper construction techniques and the judicious administration of the applicable laws and lease stipulations. Multiple well development may require a comprehensive plan with the Forest Service and adjacent landowners to jointly identify impacts, develop mitigation measures, and integrate transportation and production facilities.

#### Fire, Insects and Disease

Fire effects on the proposed well site should be minimal due to the location of the pad and the normal constraints placed on woods operations by the Montana Forest Fire Regulations (Appendix C-10). Probable ignition sources include equipment operation, smoking, a rig fire resulting from a blowout and wildfire. The risk of fire from equipment operation is low since most well-related operations occur on bare soil during road and pad construction. Smoking will also be confined primarily to roads and the drill pad. Twenty-four hour occupancy of the site will allow rapid discovery and suppression of any fire in the area. A fire caused by a blowout could be serious due to its high intensity. However, the location of the pad in a clearcut area will reduce the possibility of spread to the adjacent forest. Because oil industry standards are designed to prevent blowouts, and because a serious wildfire risk only exists for a few weeks during a normal summer, the chance of a significant forest fire starting from a blowout is considered remote.

A forest fire started by another source and spreading to the oil rig is a potential danger. The same factors that reduce the danger of fire spreading from the rig, also will reduce the risk of a wildfire spreading to the rig. Bare soil and the location of the pad in a clearcut will protect the rig from anything but a catastrophic event. Complete abandonment of the site would only be necessary if a life-endangering wildfire directly threatened the rig.

An oil discovery and additional subsequent drilling would not significantly increase the fire danger. Increased risk may occur if new access roads are built or drill pads are constructed requiring the clearing of timber. This situation would be similar to road construction connected with

logging, and the same restrictions would be applied. Well spacing requirements and the fact that additional drilling would be spread over several years will minimize exposure at any given time.

Contingency plans to deal with rig-caused fires or wildfires overtaking the rig are a part of the Operating Plan. They include all necessary contacts with protection agencies and local residents, as well as all procedures to be followed in case of either type of wildfire situation.

Insect and disease effects will be insignificant related to oil and gas development. The CENEX project will have no effect as proposed.

With additional development, insect populations may be affected by improper harvest timing or by the location of slash accumulations when clearing drill sites and constructing roads, allowing bark beetles or other pest species to build above endemic levels. These problems can be minimized by evaluation of additional annual operating plans for proper slash management. Techniques could include prompt removal of sawtimber, burial or burning of slash, or restriction of cutting during critical periods. Any evaluation of the annual operating plan must consider seasons, present insect levels, and the potential effect of the planned operation. Due to the extent of clearing, and the size and type of operation, effects would be minor.

#### Vegetation

Approximately five acres will be removed from forest production while the well is being drilled. This will result in lost growth of the three- to four-year-old trees on the site plus an additional one year for drilling to take place. Regardless of the outcome of the drilling, the size of the site will be reduced following completion. If the well is a dry hole, the site will be backfilled, recontoured and trees planted in the replaced topsoil. If the well goes to production, the pad size would be reduced to one to two acres and the remaining area planted after treatments similar to the above. The one- to two-acre site would be removed from forest production until well abandonment.

An oil discovery would probably result in additional effects on vegetation other than those already mentioned. Oil in recoverable quantities would require development of a permanent access road system for hauling. This would remove about five acres of timber per mile cleared, depending on road location and topography. Large portions of the existing road system could be used, thus minimizing this effect.

A large discovery would probably initiate drilling of additional wells, up to as many as 12 total within the local geologic structure underlying the Coal Creek State Forest. Similar acreages would be required to be cleared for each well, as well as for spur roads for access to the sites. Full development of 12 wells would require about 24 acres of site facilities and possibly 10 miles of roads. This would result in a vegetation loss of about 74 acres out of roughly 11,500 acres thought to be within the local geologically favorable structure.

The tree growth lost to well drilling is insignificant when compared with economic returns to the school trust resulting from oil and gas leasing exploration, and development. In environmental terms, the loss of vegetation is minor compared to the total available resource in the area. In addition, most sites could be reclaimed and revegetated following abandonment.

Vegetation could be affected by leaks or spills resulting from oil production, as well as by any SO<sub>2</sub> emitted into the atmosphere. Leaks or spills of petroleum based substances would only affect a small area, and rehabilitation to restore vegetation losses would be possible. Even with a major well blowout vegetation losses would be temporary.

In oil production activities, the possibility of SO<sub>2</sub> emissions is always present. The probability increases as the number of wells increases, and as the amount of sour gas (H<sub>2</sub>S) increases. Under normal operating conditions the risk of SO<sub>2</sub> damage to surrounding vegetation is expected to be minimal. (See section on air quality for further information).

Potential impacts to vegetation resulting from a discovery of commercial quantities of gas would be similar to those identified for an oil discovery, with the addition of acreage required for pipeline facilities.

### Wildlife

Potential effects and recommended mitigation measures for individual species or species groups:

Grizzly Bear -- The proposed activity would not modify or destroy preferred vegetative habitat components of the North Fork grizzly population, due to the lack of important foraging habitat on the site. Nor should grizzly bears be displaced from their seasonally critical habitat as a result of exploration, if exploration activity is scheduled to avoid such effects.

There are two categories of potential adverse effects from the proposed exploration:

- Grizzly/human interactions associated with the temporarily increased human presence in occupied grizzly habitat.
- Temporary interrupted use of a known travel corridor between preferred seasonal habitats and possibly Glacier National Park.

Grizzly/human interactions are of primary concern because they have the greatest potential to result in unnecessary killing or removal of a bear from its natural habitat, thus adversely affecting the important, viable grizzly population of the North Fork. Adverse effects occur when bears are attracted to activity centers by stored foods or inadequate garbage and waste disposal. Once attracted, bears become a nuisance or a threat to human safety and are normally relocated out of the area or illegally shot. Relocation of problem bears is only marginally successful, and very often results in illegal shooting or necessary control actions by wildlife authorities. The recent history of the North Fork includes several examples of this course of events, including a "nuisance" bear from Polebridge that was relocated in the Swan

Valley and subsequently shot for raiding a chicken coop on private property (June 1984).

CENEX's Operating Plan contains the following elements that serve to reduce the risk of grizzly/human interactions:

- No camps, crew residences, or crew dining facilities on site.
- Access security gates, no unauthorized public access.
- Daily garbage and trash removal to an approved municipal or county disposal site.
- Sewer system engineering exhibit submitted to Flathead County Sanitarian for approval.

In addition, CENEX will house its contracting/subcontracting crews in commercial accommodations in the Flathead Valley. CENEX does not intend to establish any crew residences in the North Fork environment.<sup>19</sup>

The following is a summary of additional measures for preventing bear/human interactions which should be incorporated into CENEX's Operating Plan before approval by DSL:

- No firearms may be carried by crews or individuals on the site or in transit to and from the site.
- No domestic pets are allowed on the site.
- All garbage, trash, or other waste materials will be deposited in trash containers. No garbage, trash or other waste materials will be disposed of in the reserve pit.
- Garbage and trash containers outside buildings will be covered and secured. Containers used to haul garbage/trash will be securely covered or hauled in a covered vehicle.
- Crews will be bussed or vehicle-pooled to the extent feasible, in order to limit vehicle traffic.
- Intentional feeding or baiting of bears by any individual is strictly prohibited.
- The essential on-site trailer accommodations for the mud engineer and geologist will be kept clean and free of food odors from improperly stored foods. Crew lunches will be stored in secure, non-odor-producing locations.

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<sup>19</sup> Personal communication with Dennis Campbell, CENEX Corp.



- A bear contingency plan is necessary to deal with problem animals (see Appendix C-11 for suggested outline).

The potential of the drilling operation to temporarily interrupt use of the Hay Creek travel corridor and flood plain habitat is related to the season of operations and the level of other activities in the surrounding area. The lack of need for a new access road and the closeness of the site and staging area to the North Fork Road are positive features of the proposal. Also, dense cover exists in draws, on ridges and heavily timbered slopes in the vicinity of the site to provide concealment of bears while traveling through the area. In order to protect the existing situation and prevent the drilling activity from having an effect that could interrupt the use of the travel corridor, DSL has taken the following actions in cooperation with the USFS, Glacier View Ranger District (see correspondence in Appendix B):

- Scheduled thinning operations on Moran Creek and post harvesting on Coal Creek will be conducted only between July 1 to September 15, or winter, when grizzlies are normally at higher elevations.
- Plans to harvest additional timber in the vicinity of the site (Winona East #2 Timber Sale) have been deferred indefinitely pending the results of the proposed oil exploration.

In addition, exploration activity should not be approved for the period April 15-June 30, in order to allow undisturbed bear travel through the area and use of the nearby flood plain during the critical spring months.

Drilling activity during the fall has the potential to temporarily interrupt use of the travel corridor or flood plain habitat; however, the preserved cover in the vicinity would tend to mitigate this effect. Also, protection of corridor use in the fall, is not as critical as spring. Spring is more critical because bears are nutritionally depleted and susceptible to stress if displaced. This may result in inadequate weight gain and/or detrimental interactions with other bears or humans.

There is a possibility that the drilling, if approved, would coincide with the federal Highway Administration's reconstruction of the North Fork Road from Canyon Creek to the Camas Road junction. Reconstruction is expected to begin in spring 1985 and continue for about two years. Although road reconstruction would occur no closer than nine miles to CENEX's proposed operation, the project passes through a separate, important travel corridor for grizzlies. This represents a possible cumulative effect on the grizzly population, if exploratory drilling is active at the same time. Mitigations include the measures cited above to maintain the integrity of the Hay Creek corridor. In addition, the reconstruction activities will be performed in a manner to cause the least temporary disturbance to grizzly bears (Department of Transportation 1983). Finally, this potential conflict must be viewed in the context of reconstruction objectives. The road design itself (safety-improved, low speed, gravel surface) is the result of years of comprehensive analysis by the USDA Forest Service, the federal Highways Administration, and the U.S. Fish and Wildlife Service. Their objective is to maintain the existing habitat use of grizzly bears in the North Fork.

Possible production from the site and its associated disturbance effects (mainly year-round truck traffic) is part of the basis for rescheduling or deferring DSL's planned forest management activities. If production is approved, a more desirable road location to the south will probably be used. The maintenance of cover, short sight intervals, and vehicle use restrictions on this road would be important mitigations that could be applied. Positive features of production from the site would be the close proximity to the North Fork Road, and, compared to the exploration stage, a much reduced level of human activity. Undesirable features would be the year-round hauling and possibly a long-term duration. At this stage, however, there is no reason to believe that production from the site could not be designed to accommodate the existing use of the area by grizzly bears. Protection of the travel corridor could be accomplished by deferring, rescheduling, or abandoning other management activities.

Although DSL makes a concerted effort to accommodate grizzly bear habitat requirements in the conduct of its land management activities, controlling cumulative effects on grizzlies is not within the power of one agency or landowner. The accelerating subdivision and seasonal or year-round human habitation of private lands in the North Fork is beyond the control of state or federal land managers. Human occupation of critical spring foraging habitat is a potentially serious impact which may destroy habitat or prevent its use, and has directly and indirectly caused grizzly bear mortality in recent years. The restrictions recommended to be imposed on the proposed exploratory drilling are necessary in part because of existing pressures on grizzly habitat from subdivision, timber harvesting, recreation, and ranching. If the proposed exploration is successful and additional applications to develop oil and gas leases on state or other lands are received, long-term planning cooperation between DSL, the USDA Forest Service, and private landowners will be imperative. In the event that the exploration is unsuccessful and no further activity is proposed by the lessees, cumulative effects resulting from the current proposal would be negligible for the grizzly (see correspondence Appendix B).

Gray Wolf -- No significant effect on wolf habitat use is expected from the proposed exploration. This conclusion is based on evidence that wolves in the North Fork (and elsewhere) are mainly associated with the habitat and seasonal movements of their prey, and significant effects on big game and small mammal populations should not occur as a result of the proposed activity. Also, there are no known den or rendezvous sites near the drill site. If dens are developed near the site, the operating season restrictions imposed for protection of grizzly bear travel would serve to prevent adverse effects on wolf denning habitat.

The greatest potential threat to wolves would be intentional or accidental (due to mistaken identity) shooting. This potential is largely mitigated by the fact that workers will not be housed in the North Fork, and firearms and pets will be prohibited. The measures imposed for avoiding grizzly/human interactions will generally serve to prevent interactions with wolves.

DSL will provide CENEX with written material to educate exploration workers on wolf identification, their protected status, and lawful penalties

for killing a wolf. DSL will require that this material be distributed to all contractors and employees, and also be posted at the site.

Production from the site would likely pose less of a threat than exploration, due mainly to the decreased human presence, and lack of interference with big game winter range.

If multiple applications for wildcat drilling should result from a successful well, interagency planning is recommended to protect wolf habitat and populations.

Bald Eagle -- Bald eagles are generally sensitive to disturbances within 400 meters (.65 miles) of their nest sites during the early portion of the nesting period (before eggs are hatched -- March 1-April 30). Unless the disturbance effect is direct, however, it is difficult to predict if nest abandonment will occur. For instance, a nest on the Stillwater State Forest successfully produced young in 1984 while forest products harvesting operations were being conducted immediately beyond a one-half mile buffer zone. If the disturbance effect occurs after the young are hatched, abandonment becomes much less likely. No harvesting activity is planned for the Cyclone Lake area during the current planning period (six years). Occasional individual tree salvage is a possibility, although this would be designed and scheduled to avoid disturbance effects on the nest.

Although there is no line of sight between the nest and the proposed well tower, soaring eagles on Cyclone Lake may sometimes be in sight of the top of the tower. Also, the well site lies within the assumed spring flight corridor to the river. Under certain atmospheric conditions, noise from the drilling operation would be audible at the nest. Therefore, during the nesting, incubation, and early nest-rearing period, the combined effects of the project could conceivably cause abandonment of the nest. Because the potential for abandonment would be inconsistent with DSL's commitment to mitigate effects on endangered species, drilling activities should not be approved for the period March 1 to May 15. The seasonal restriction required for protection of the Hay Creek grizzly bear travel corridor (no activity until after June 30), will serve to further guarantee no adverse disturbance of eagle nesting habitat.

As with wolves, the most direct threat to eagles would be illegal shooting. As an extra precaution, DSL will provide CENEX with written material on eagle identification, protection, and lawful penalties, to be distributed to workers and posted on the site.

An adverse secondary effect to bald eagles would occur if water quality and fisheries habitat in Hay Creek or the Flathead River were degraded at either the exploration or production phase of the proposed well. If these effects are avoided, as detailed in the water quality, air quality, soils and fisheries discussions, the adverse secondary effects on bald eagles will also be prevented.

SO<sub>2</sub> emissions from flared gas would not pose a direct threat to eagles at Cyclone Lake (upwind) or at Logging/Quartz Lakes (downwind more than six miles) if the project does not violate the stringent Class I airshed designation of Glacier Park (see air quality discussion).

A well blowout would probably cause direct mortality of wildlife in the immediate vicinity and possibly downwind. The only mitigating factor is the low probability of such an occurrence. (See correspondence from B. Riley McClelland, Glacier National Park, Appendix B.)

Big Game -- White-tailed deer, mule deer, elk, and moose should not be affected by the proposed exploration, primarily because the operation will not occupy, modify, or directly disturb winter range for these species. Diesel engines operating during winter would undoubtedly be audible to wintering elk or other big game on the flood plain, but the noise itself would not displace these animals; noisy traffic is already common on the North Fork Road, and visual security (important to elk in particular) would not be degraded. It is probable that some elk calve on the winter range because of the dense security provided by the river bottom habitats. Seasonal restrictions recommended for grizzlies and eagles would prevent disturbances during this period (May and June) (see correspondence from B. Riley McClelland, Glacier National Park, Appendix B).

Production of the well would not significantly alter the current patterns of use of the area by big game. Road use restrictions would continue to protect the existing security against easy hunting access and vehicle traffic on the lease area.

Multiple well sites and production by trucks hauling from several locations could seriously degrade big game habitat and populations if not carefully planned and controlled. (See also correspondence from Jim Cross, DFWP, Appendix B).

Mountain Caribou -- Caribou occurrence in the vicinity of the project is considered very remote, and suitable habitat is apparently lacking. Therefore, exploration and possible production from this site should produce no adverse effects on this species now, or in the foreseeable future. However, DSL will continue to monitor the efforts of wildlife biologists to identify populations and habitat requirements of caribou. DSL intends to actively cooperate with other state or federal agencies in the protection and management of this species, consistent with its present posture toward threatened and endangered wildlife. (See also correspondence from Jim Cross, DFWP, Appendix B).

Peregrine Falcon -- No adverse effects on peregrine falcons should occur from exploration or production on this site, because the proposed operations will not interfere with nesting, feeding, or migration.

Other Species -- Populations of other mammals and birds in the area should suffer no significant adverse effects from exploration or development of the site. This is due to either lack of use of the area by these species, or the viability of their current populations. Protection measures recommended for threatened, endangered, and big game species are considered beneficial and sufficient for the total wildlife resource of the area.

### Fisheries

DFWP has identified three types of potential impacts on fisheries in

relation to exploratory drilling on this site (see also correspondence from Bob Domrose, Appendix B):

- Road reconstruction/site development sediments being transported off-site and delivered to Hay Creek and the North Fork. This could degrade spawning gravels and increase mortality of eggs and fry (baby fish).
- Toxic substances entering water courses from spills of hauled diesel fuel, "mud" components, or well stimulation fluids; or from leaks/spills of the reserve pit contents.
- Increased acidity (lower pH) of streams by  $H_2S$  or  $SO_2$  gas combining with atmospheric moisture (acid rain).

Due to the hydrology of the site and in-place measures to prevent erosion and sediment transport, there is little chance that sediments would be delivered from construction sites to fish-bearing waters (see water quality and soils discussions for details).

The potential impact of leaks from the reserve pit should be totally avoided by the combined effects of the impermeable pit and the ground water hydrology of the site. CENEX's spill contingency plan contains sufficient detail to demonstrate adequate containment and clean up of accidental spills from the reserve pit. As an added precaution to protect fisheries, DFWP recommends strategic placement of straw bales or other absorbent material near water courses draining the area, to be used in the event of an on-site spill with potential to reach stream channels.

Mud components which may be used are primarily organic or mineral materials. Some of them can be lethal to fish, but only in high concentrations and/or for long periods of exposure. Lethal concentrations that will kill 50% of an experimental population of rainbow trout after 96 hours of exposure range from 27 to 10,000 parts per million (NL Baroid/NL Industries, Inc.). Although these substances would be hauled in concentrated form to the site, the access route and its drainage features offer only one realistic possibility for introduction of these materials into fish-bearing waters -- an accidental spill directly into the North Fork of the Flathead River from the North Fork Road. In this situation, the volume and velocity of the river would quickly dilute and transport the material, preventing prolonged exposure of high concentrations to fish.

Diesel fuel spills could cause significant fish mortality and short-term damage to fisheries habitat if a truck accident occurred on one of several dangerous segments of the North Fork Road. To help prevent such an impact, fuel loads should be hauled only in small delivery trucks (2,300-gallon farm delivery type). Such vehicles would also be better for safely negotiating the low-standard access road to the site.

Well stimulation fluids (acid washes) could directly kill fish and cause temporary damage to fisheries habitat if introduced into fish-bearing waters.

These fluids typically contain 15-28% concentrations of hydrochloric acid and 0.3% concentrations of arsenic salts. If needed, these fluids would be delivered in one to three tanker loads of up to 2,000 gallons each. The probability of this temporary impact on fisheries is considered very low, due to the limited loads needed, and the unlikelihood that one of these loads would be spilled along the North Fork road in close proximity to the river.

The Department of Fish, Wildlife, and Parks should be notified in the event of a spill of any kind, and the CENEX operating plan should be amended to so state.

Altered streamwater pH from "acid rain" or condensation could depress aquatic insect populations, thus damaging trout habitat, or in sufficient concentrations, kill fish directly in the immediate area. The potential for these effects from combined  $H_2S$  and water is considered remote, due to the elaborate control measures and contingency plan already in place to eliminate  $H_2S$  hazards to human safety. In the event of a well blowout, significant temporary damage to the fisheries resource would be likely. The only mitigating factors are the low probability of such an occurrence, and the temporary nature of the damage.

The potential for flared gas (containing  $SO_2$ ) to combine with atmospheric moisture to form a weak sulphuric acid is also a concern. However, because  $H_2S$  gas would be flared only infrequently during the drilling process, it is considered minor. If flaring is required, it is in response to improper drilling fluid density or other factors allowing gas to rise in the well. This indicates a dangerous situation that interrupts drilling, and is therefore normally avoided by maintaining proper drilling fluid density and control of the well.  $SO_2$  emissions, if required, would be occasional and of a short duration. No "acid rain" impacts to fisheries or fisheries habitat should be expected during the drilling operation.

If oil production is proposed, fisheries concerns would again include sedimentation, spills, and flared gas. The road that would probably be improved for hauling does not cross any perennial streams that could deliver sediment to fish-bearing waters. On-site spills could be abated by adequate containment/monitoring plans. Off-site spills, such as oil tanker accidents, are the major hazard. Oil production from this well would probably involve two to four tanker loads per day on a year-round basis. An accidental spill into the North Fork is a real possibility that could cause at least temporary serious damage to the fishery. If the proposed safety improvements to the North Fork Road are completed by the production stage, the chance for accidents would be reduced. Production approval should not be made without firm evidence that spill hazards could be lessened through road improvements or extreme-weather contingency plans (extra storage capacity on site), plus adequate spill containment/clean-up plans. CENEX has indicated that spill hazards due to winter conditions on U.S. Highway 2 (to Glacier Pipeline) could be reduced by using rail transport.

The proposed exploration and possible production would represent only a small increase to cumulative effects presently pressuring the fisheries resource. Timber harvest, road construction, flood plain subdivision

(sewage), and increased fishing pressure are some past and current activities affecting fisheries. Timber harvest, road construction, and fishing pressure can be regulated by governing agencies to achieve common objectives. Subdivision and large energy developments in Canada (such as the Cabin Creek coal mine) are more difficult to control. The activities associated with oil/gas field development also have a real potential to contribute to adverse cumulative effects on fisheries; however, interagency cooperation and careful design of individual projects can prevent serious increases in cumulative effects. If the proposed well is successful, the prospect of future development can be more accurately estimated, and necessary interagency planning can be implemented. If the exploration is unsuccessful and no further drilling applications are received, concerns for cumulative effects on fisheries from oil and gas would be diminished.

### Visual Resource

A series of fluorescent panel markers were erected on the proposed drill pad location and balloons were flown at 143 feet to depict the drill mast height (see Appendix C-12). An extensive survey of the visual resource was conducted from the North Fork Road, the North Fork Flathead River and Glacier National Park.

The entire North Fork Road segment was driven and assessed with reference points established at the residences of Downs, Ladenburg, Sonnenberg, the Pitman Campground and Polebridge. The excavation for the drill pad and rig cannot be seen from the road system. The only point from which the drill mast will be visible is the community of Polebridge (looking south-southeast). Trees screen the pad and the base of the mast at four separate locations (refer to Appendix C-13 "seen area" cross section diagram for locations). It is unlikely these tree screens would be removed to expose additional view of the mast. Even though the mast of the drill rig will be visible from Polebridge, because of the distance involved (greater than 3-1/4 miles) it will be subordinate to the visual landscape. Most people would have a hard time distinguishing it with the naked eye during daylight hours. At night, however, the lights on the mast will be highly visible. The largest number of potential viewers will be in Polebridge. However, the maximum duration the drill rig is expected to be on location is about 8 months. In the event of oil production, the two required 22-foot-high storage tanks and auxiliary equipment could not be seen from Polebridge.

A visual assessment of the drill pad was completed by floating the North Fork "Scenic" River segment from Polebridge to Coal Creek. There is a 1-1/4 mile segment of the river in portions of Sections 2, 11 and 12, T34N, R21W where four locations offer quick glimpses of the entire drill pad (cuts and fills) and drill rig (refer to Appendix C-14 aerial photo for locations). There may be other minor vistas visible from the river showing portions of the pad and/or rig. These floater viewing points offered only a fleeting glimpse because of dense riverside vegetation. The raft was unable to land close enough to these viewpoints for telephoto camera documentation.

As outlined in the Wild and Scenic Rivers Act, the Montana Department of State Lands has entered into a written cooperative agreement (see Appendix C-15 titled Memorandum of Understanding Flathead Wild and Scenic River) with

the Flathead National Forest regarding the administration of state lands within and adjacent to the river corridor. CENEX's proposed 13-11 State Well lies outside the legally described Scenic River corridor (.38 miles from the nearest corridor boundary). Viewing of the proposed pad, drill rig, production facilities, etc., from the North Fork Scenic River is not a violation of the Wild and Scenic Rivers Act. If the Department used visual quality objectives (VQO), this site would be considered maximum modification<sup>20</sup>, in order to be consistent with past land management.

The Glacier National Park gravel road was driven from Polebridge to Fish Creek to determine if the drilling location was visible. Reference points were established at Polebridge Ranger Station, Lone Pine Prairie, Mud Lake, Quartz Creek Campground and Logging Creek Ranger Station/Campground. The drill site could not be seen from any of these locations. However, .3 mile south of Polebridge Ranger Station road junction, the balloons (which represented the top of the drilling mast) could be seen. If pad construction was completed, it would be visible.

South of the Polebridge Ranger Station road junction by 13-8/10 miles (south of Anaconda Creek near the ridge top) there was a short vista where Cyclone Peak and Lookout, Winona Ridge and various timber harvest units could be seen. The panel markers or balloons could not be seen.

Possible viewing points along certain trails in Glacier expose the drilling site. Segments of Logging Ridge, Quartz Creek and Logging Creek Trails were hiked. There are two points from the Logging Ridge Fire Trail where, with the aid of 7x35 binoculars, the panel markers and the balloons could be seen. Once site construction is completed, it would be visible to the naked eye (the viewer is three plus air miles from the site). This fire trail is not maintained, is poorly marked, and consequently receives minimal use by the public. The drill site could not be seen from either the Quartz Creek or Logging Creek Trails.

It is assumed that there are also many opportunities to view the proposed CENEX site from Glacier National Park backcountry locations. However, a low sensitivity level is assigned to these areas due to their infrequent recreation use.

Visual Resource Recommendations -- Because all views of the proposed CENEX well from Polebridge and Glacier National Park are from greater than three miles, visual impacts are minimal. However, because of the proximity of the pad to the North Fork "Scenic" River (.8 mile away), the 28-foot-high by 500-foot-wide cut and fill slopes may be visually objectionable. Floaters

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<sup>20</sup> Management activities of vegetative and landform alterations may dominate the characteristic landscape. When viewed as middleground, they may not appear to completely borrow from naturally established form, line, color and texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in the middleground. Reduction of contrast should be accomplished within five years.



routinely float past natural, higher and raw eroding river cutbanks. Cuts and fills should be treated or covered with a suitable material such as colored hydromulch, slurry, or camouflage net to reduce the brightness, glare and sun's reflection off the banks. As soon as any phase (drilling, production, abandonment) is completed, prompt recontouring of a portion or the entire site should be undertaken including topsoil replacement, fertilization and revegetation (planting) with native grasses and conifers.

Most industry drill masts are painted either white or silver. White represents the most reflective surface possible. If drilling takes place during the predominant recreation use period (June to September), painting of the drill mast in either forest/earth tones or a flat black is preferable to reduce visual impacts. Should drilling miss most or all of the high recreation use period, the need for painting would be reduced.

Because the total site is visible from the North Fork Scenic River, the two proposed storage tanks, pumper jack and auxiliary facilities should be painted forest tones to repeat the color of the surrounding vegetation, if production is approved. This will assist in making them visually subordinate to the landscape.

The existing Winona Ridge access road has left modifications on the landscape because of the color contrast and glare created by the road cuts and fills. Therefore, it should not be significantly upgraded because of the increased road width (and subsequent increased cuts and fills) necessary. In the event that an oil or gas well is successful and the production phase entered, a new road system accessing the site should be designed. A feasible location that lies low on the ridge presents the least visual impact.

CENEX has stated that the greatest limitation on well density is topography. Because of the DSL's environmental concerns, the locations of future approvable drill sites would generally be on the benchlands or bottomlands. There is no surface occupancy allowed in those portions of the lease tracts located within the designated "Scenic" North Fork Flathead River corridor. Benchlands within the Coal Creek State Forest lie one to two miles from the river and park boundary, are presently roaded, and are intensively managed for timber. There are only minor amounts of bottomlands and these have been entered by skid trails and have been salvage logged. A number of wells could be drilled in these locations within the visual quality objective (VQO) of "maximum modification." The secondary impact of upgrading the existing roads or constructing new roads sufficient for production could also be accomplished within a VQO of "maximum modification."

The visual impact on the recreating public by drilling this one well during the highest visitor use period (June through September) will be low because of the short duration of the drilling phase, the limited viewing opportunities, and the specified mitigation measures.

#### Noise Pollution

There is considerable data on noise pertaining to the equipment operator and his close surroundings (up to 50 feet); but the availability of noise data radiated by equipment to the surrounding areas is very limited. This is further complicated by the influences on sound energy by spherical spreading

loss, terrain or topography, vegetation, and meteorological parameters (temperature gradients, wind direction and speed, absorption of sound by the atmosphere, etc.)

Table 6 describes the short-term noise effects anticipated from each drilling phase.

TABLE 6  
SHORT-TERM NOISE EFFECTS

<u>Activity</u>	<u>Projected Duration (Days)</u>	<u>Predominant Sound Sources</u>
Drill site construction	15	Heavy construction equipment: 2 diesel tractors with lowboys, 2 dozers and 3 scrapers
Move in/rig up	5 to 7	Motocarriers: 20 tandem-axle diesel trucks with flatbed trailers, five 20-ton flatbed trucks, one 70-ton crane
Drilling process	150	Drilling rig (EMSCO D-3 Type II Diesel Electric) and associated equipment: 3 Cat D-398 engines, 900 HP (the predominant noise source <sup>21</sup> ) 3 Kato 800 KW, 100 KVA generators 2 GE-752 D.C. electric motors (1000 HP) 2 mud pumps (1000 HP) Draw works Various service vehicles Other minor noise-producing equipment
Completion process	10 to 15	1 work-over rig (1 Cat D-3403 engine approximately 200 HP). - Various service vehicles and equipment - Other minor noise producing equipment

The projected duration is approximately six months. CENEX has stated that the actual drilling of the well is anticipated to last approximately four to eight months, depending upon drilling rates and contingencies.

<sup>21</sup> Personal communications with Don Cecil, Vice President Operations, Cardinal Drilling; and Cory Welter, Drilling Supervisor, Exploration and Production, CENEX.

The major effect of drilling noise will be annoyance. Because annoyance depends on the hearer's attitude, responses will vary. Individuals involved with or sympathetic to current logging industry noise may perceive this operation as acceptable. To recreationists using either the "Scenic" North Fork River Corridor or Glacier National Park seeking solitude, the noise from the drilling operation may be unacceptable. These differences reflect personal values and expectations. Visitors at national park campgrounds enjoy natural sounds, and dislike technology-related sounds, which they consider to be intrusions into the environment (Kariel 1980).

Noise levels around a drilling rig, depending on type and size, range from 70-90 decibels (dBA)(Rush 1984). Noise created by the proposed oil exploration activities would be audible to nearby residences, the North Fork County Road, the "Scenic" North Fork River and portions of the western edge of Glacier National Park.

The closest habitation is the Pitman Campground, .7 miles down slope from the drill site. The sound level from logging trucks passing by the campground on the county road (within a few hundred feet of the campground) would be higher than that produced by the drilling activities. However, drilling would continue on a round-the-clock basis, and may annoy campers in the late evening, night and early morning hours.

It is doubtful that anyone driving either the North Fork County Road or the Glacier Park road would hear drilling noise.

There are two Park Service Campgrounds (Quartz Creek and Logging Creek) and nearby hiking trails where the proposed drilling operations could be heard. However, because of the distance from the drill site to Quartz Creek (2.4 miles) and Logging Creek (4.1 miles) the sound will decrease to levels well below those which are considered compatible with outdoor activity ( $L_{dn}$  55, refer to Appendix C-16 for table).

While floating the river, users would probably not hear the drilling operations over the rushing sounds of the water<sup>22</sup>. Persons camping overnight adjacent to the scenic river (closest point .8 mile) will be able to hear the drilling operations. However, McLaughlin and Krumpe (1980) showed that only 16% of river floaters stayed overnight along the entire length of the North Fork River.

Noise Pollution Mitigation -- The use of residential mufflers on the three D-398 Caterpillar engines used in the drilling operation will reduce exhaust noise decibel output from 97 dBA to 61 dBA, measured at seven meters (23 feet). (See Appendix C-17 chart titled "Decibel Ratings of Some Common

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<sup>22</sup> Personal communication on recreation use with Robert Hurd, Recreation and Trails Forest Technician, Glacier View Ranger District, Flathead National Forest.

Noises.") There will still be mechanical noise radiated from the diesel engines, generators, electric motors, mud pumps, etc. All these components, however, are housed in vans, thereby further reducing these noise levels.

A high-pitched squeal emitted when<sup>23</sup> the draw works is braked can be nearly eliminated by using an auxiliary brake<sup>23</sup>. This would limit an annoying noise intrusion. To limit other sources of mechanical noise, the drilling contractor could operate the entire drilling period with a sound barrier or a winter blanket. A winter blanket is a heavy tarp-like covering that goes over the entire substructure including the area above the drill floor. This blanket or other sound barrier would further deaden sounds emitted from the rig itself. Lastly, orientation of the three Cat D-398 van housed engines should be north/south, with the doors opening to the south. Glacier Park and the North Fork River are to the east, Polebridge is located to the north, and there is an active eagle nest (see wildlife portion of the PER) to the southwest. This orientation should further reduce potential noise-related impacts.

By the use of these mitigation measures, drilling-related noise pollution will be below the current operation-related noise levels of the forest products industry. Drilling-related noise, however, may still be detectable in the North Fork River Corridor and the west edge of Glacier Park.

The cumulative noise-related impacts of additional wells on the river and the park could likely be mitigated in a similar fashion as the proposed well. However, because of the complex nature of sound, a site specific evaluation would be necessary. Further evaluation could entail mathematically determining the effects on sounds created by topography, vegetation, and meteorological parameters, etc., and then predicting the levels of audibility of proposed operations reaching predetermined points of concern.

Less is known regarding the effects of sound levels on wildlife. However, the EPA (1974) states "the most simple approach is to assume that animals will be at least partially protected by application of maximum levels identified for human exposure". For this proposed well, sound levels should be well below the maximum levels.

## Social/Economic Environment

Most of the critical social and economic impacts are summarized in Table 7 where they are compared for the exploration, single and multiple well production scenarios. Fiscal impacts are more favorable moving from exploration to single and then multiple well production while potential social impacts worsen. These trends are consistent with Murdock and Leistritz's (1979) conclusion that the economic impacts of energy development are usually perceived as being positive and the social impacts as negative.

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<sup>23</sup> Personal communications requesting information on noise levels of drilling rigs with Don Cecil, Vice President Operations, Cardinal Drilling.

Exploration Impacts - An immediate impact of exploration will be the creation of about 20 new jobs. Some of these jobs will be filled locally but most will not. Those jobs filled locally will probably last only for the duration of the exploratory drilling. Given the expected number of jobs to be filled locally and the temporary nature of those jobs, unemployment in Flathead County will not be significantly affected by the proposed exploration well. While there is little doubt that additional local spending resulting from an estimated \$275,000 increase in local payroll will be a benefit to the local economy, and may even lead to short-term employment changes in some derivative sectors, no long-term changes in county employment are expected.

TABLE 7  
SUMMARY OF POTENTIAL SOCIAL/ECONOMIC IMPACTS FOR VARIOUS COAL  
CREEK DEVELOPMENT SCENARIOS

Impact	Development Scenario		
	Exploration Only	Single Well Production	Significant Multiple Well Production
Employment	+19-21 temporary jobs (approx. 6 mos.)	+3-5 oil and gas jobs, and potential for +2-4 jobs in derivative industries	More than single well but dependent on total # of wells
County Fiscal	Property tax of approx. \$150,000 annually	Property tax, net proceeds tax	Property tax, net proceeds tax greater than single well
State Fiscal	Increase in income tax receipts	Income tax, conservation tax, severance tax, resource indemnity trust tax	Same taxes as single well and proportionately greater based on production
School Trust Receipts	None in addition to annual rental fee	Royalties based on production level plus annual rental fee	Greater total royalties than single well plus annual rental fee
Transportation	20 trucks to haul in rig and 20 to haul out	2-4 trucks per day on No. Fork Rd.	2-4 trucks per day expanded by # of wells
Social Services	No significant impact	No significant impact	Slight impact
Quality of Life	Possible minor impacts for some community groups	Possible minor impacts for some community groups	Possible major impacts for some community groups

Flathead County's personal property tax receipts could be substantial from the taxation of the facilities and equipment used in exploration. The amount of the tax is dependent on the current mill levy and the depreciated value of the personal property. The personal property tax paid on ARCO's exploration well in Pleasant Valley was approximately \$150,000.<sup>24</sup> The scale of the ARCO drilling operation and the proposed exploratory drilling are similar enough to accept the \$150,000 figure as a reasonable estimate of county tax receipts from the proposed exploration.

The only possible additional tax receipts the state may receive as a result of exploration will come from the state income tax. If any of the workers hired for the exploration were formerly unemployed, the state will realize a net gain in tax receipts.

The State School and other trusts will not receive any additional funds because of the exploration project. The standard \$1.50 per acre rental fee will be paid regardless of exploration. If exploration is permitted and a dry hole is found, it is possible CENEX may then terminate the tract lease. Upon lease termination, the school trust will no longer receive about \$900 in annual rental fees. The only cost to the trusts resulting from exploration is the opportunity cost associated with a delay in the scheduled future timber harvest. The maximum time delay caused by exploration will be two years. This delay will decrease the value of the timber growing opportunity by about \$18 per acre or by a total of \$90.00 for the 5.0 acre drilling site.

The proposed exploration is expected to have no significant impact on the tourism sector of the local economy. Any net decline in recreational activity associated with drilling is difficult to quantify and estimating any income loss is equally difficult. Exploratory drilling would probably have no greater impact on recreational activity than the timber-related activities that may occur in lieu of the proposed drilling.

The drilling crew would likely be housed in Columbia Falls, Whitefish, or Kalispell. It is unlikely workers would move their families to the area for such a short stay and thus the impact on social services caused by the temporary population increase of 20 workers should be minimal.

Traffic on the North Fork Road would increase slightly with three to four crew vehicles travelling the road daily. Truck traffic would also be relatively heavy during assembly and disassembly of the drilling rig (that is, 20 truck loads required to move rig). Neither increased commuting traffic nor the movement of equipment on the North Fork Road will require paving of the road.

The traffic increase caused by the proposed exploration should not significantly aggravate the expected traffic problems associated with the scheduled repairs and improvements on the North Fork Road.

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<sup>24</sup> Personal communication with Monte Long, Flathead County Tax Assessor.

Those North Fork community groups opposed to change and development of the area may perceive a decline in their quality of life, while those groups who welcome development may view exploration as a potential means to improve their quality of life. Generally, it does not appear that exploration would cause any major changes in the quality of life of either North Fork residents or residents of nearby communities.

Single Well Impacts - The employment impacts of single well development will be fairly minor. Only one person is needed to maintain a single well and a small number of truck drivers will be needed for transport. If the oil and gas multiplier of 1.77 (Governor's Office of Commerce and Development, 1980) is applied to a projection of three to five new semi-permanent oil and gas related jobs, then five to nine jobs is the total expected employment increase caused by single well development.

A major benefit of production would be increased tax revenues. The county would collect personal property tax, as in the case of exploration, on all equipment and facilities maintained at the well for the life of the well. The county would also collect a net proceeds tax assessed against a property's net earnings according to the current county mill levy.

The state will collect three taxes on gross sales: a conservation tax (.08%), a severance tax (6.0%-oil, 2.65%-gas), and the resource indemnity trust tax (.5%). State income tax receipts will also increase with single well production. The federal government will collect an excise tax on "windfall profits."

The State School Trust would benefit greatly from oil and gas production. The royalties paid to the state on gas production are 12-1/2%. The same rate is paid on oil production at less than 3,000 barrels per month (BPM), with a 17-1/2% royalty paid on 3,000-6,000 BPM, and at 6,000+ BPM the royalty is 25%. In addition to the royalty payments the school trust would continue to receive the annual rental fee of over \$900 per year.

Single well production is anticipated to result in transport of oil by truck. Two to four trucks per day, depending on the well's production rate, is the expected increase in traffic on the North Fork Road. This increased traffic should be similar to what is experienced during a typical logging operation in the North Fork. Production traffic should not exacerbate the expected traffic problems associated with scheduled road repairs and improvements.

A single production well may have a slight effect on recreation and tourism. Perceived changes in the quality of life in the North Fork would be similar to what was described for exploration. Single well production may influence nearby private (fee) land values, although market conditions, private land management objectives, and additional well locations would ultimately determine the magnitude of the influence, either positive or negative.

Multiple Well Production - There would not be a proportional increase in employment as the number of wells increased. One person can maintain several wells depending on distance and access. There would be an increase in the

number of truck drivers needed as oil production increases. A small field office (two to four people) might also be necessary in Columbia Falls if multiple well production occurs.

All county, state and federal tax revenues will increase proportionately with increased production. Greater tax revenues with only a small increase in population may lead to improved county-provided services, and a possible reduction in future mill levies. Returns to the school trust would increase with greater production according to the royalty rates listed previously.

The possible adverse effect of oil production on recreation and tourism could worsen with more wells, as could the quality of life for some residents of the North Fork. Traffic on the North Fork Road could increase with the potential for increased urbanization. Scheduled road repairs and improvements should be completed by the time any potential multiple well development occurs. It is possible many of the characteristics that originally attracted some North Fork residents to the area (that is, "primitive" facilities and lifestyles, solitude, etc.) will be unfavorably altered by multiple well development. Social services in nearby communities could require increased funding to meet increased demands.

Multiple well production would potentially influence nearby private land values to a greater extent than single well production.

Wood products, primary metals manufacturing and tourism have been described as the three most important basic sectors in the Flathead County economy; of those three only tourism is expected to be a source of economic growth in the near future. If multiple well production occurs in the North Fork it could provide a needed boost to the Flathead economy in increased oil and gas employment and income, but it could also adversely affect the expected growth in the tourism sector. It is uncertain if multiple well production could improve Flathead County's unemployment situation. In-migration comes with economic growth and if multiple well production provides more jobs than it stimulates in population growth, then it may help to reduce Flathead County unemployment.

### Cultural Resources

A cultural resources survey, including random shovel tests, was conducted at the site (see survey report in Appendix C-18). No cultural resources were located during the investigation. The single drill site appears to have no impact on cultural resources during either the exploration or production phase.

If this operation expands into multiple well production, then the additional areas of anticipated surface or subsurface disturbance should be inventoried before commencing disturbance activities. Increasing the number of wells increases the possibility of disturbing cultural materials. Mitigation measures will have to be developed on a site-by-site basis after assessing the significance of the sites that might be found.



## CONCLUSIONS

This Preliminary Environmental Review (PER) indicates that the action of approving the CENEX Operating Plan for the drilling of an exploratory oil and gas well, with the proposed conditions, does not constitute a major action of state government significantly affecting the quality of the human environment. Preparation of an Environmental Impact Statement (EIS) prior to approval of the Plan is therefore not required.

Throughout preparation of the CENEX Operating Plan PER, the Department has sought consultation with potentially affected federal, state, and local officials regarding land-use related concerns. In addition, the Department held two public meetings in Columbia Falls, Montana at which public concerns were received. These concerns have been addressed in the preparation of this PER, and include the evaluation of the potential for immediate, secondary, and cumulative impacts.

Approval of the Plan will not jeopardize the environmental quality of adjacent lands, including the Scenic North Fork of the Flathead River, and Glacier National Park. Approval is not considered likely to result in an exploration or development "rush" to the North Fork area by other oil and gas developers. Regardless, future projects will require approval by the appropriate regulatory agencies prior to commencement.

Should the CENEX well, or other wells, prove successful to the extent that additional multiple drilling and significant production facilities are possible in the North Fork area, the Department will support the development of a formal plan for an effective joint federal, state, and local planning and evaluation effort. The plan would develop further siting and environmental safeguards necessary for minimizing future impact potential from major oil and gas development in this sensitive area.

As with the present drilling proposal by CENEX, each additional proposal for exploration drilling or production facilities in the Coal Creek Forest will be evaluated for environmental impact potential. A decision will be made at that time regarding the necessity of preparing an EIS prior to approval of each facility. The preparation of an EIS, to examine in greater detail environmental impacts possible from future oil and gas exploration or development related activities, is considered most appropriate when: (1) exploration activities have confirmed the nature of the oil and gas resource, and (2) future development or additional exploration proposals have been made. Without specific information regarding the oil and gas resource, and the type of facilities necessary for recovery, production, and product transport, detailed impact projections at this time related to the future resource development possibilities would be unnecessarily complex, and of limited value for planning efforts.

Based on the analysis of the potential immediate, secondary, and cumulative impacts of the proposed CENEX oil and gas well on both the natural and human environment, it is the conclusion of this study that CENEX's Annual Operating Plan can be approved with conditions. These conditions, authorized by the stipulations attached to the lease, would have to be agreed to by CENEX

and incorporated into a revised Annual Operating Plan, prior to final Department approval of the project.

Therefore, it is recommended that approval of the proposed CENEX Annual Operating Plan be contingent upon the following changes or additions to the plan:

1. Adequate measures must be taken during access road reconstruction and drill site preparation to protect the productivity of the soil and prevent erosion, including:
  - a. All topsoil stockpiling, drill pad construction, regrading, and road reconstruction activities are limited to the period of July 1 through November 1, when the soils are relatively dry. An exception to this limitation may be granted if soil conditions warrant.
  - b. Drill pad cut slopes must be backsloped at suitable angle of 3/4:1 to 1:1 ratio dependent upon excavated material stability.
  - c. A diversion ditch shall be constructed at the base of drill pad cut slopes to divert surface water away from the drill site.
  - d. All road reconstruction work, including installation of culverts, turnouts, ditching, and surfacing with gravel, must conform to the Department's road survey notes (Appendix C-6).
  - e. During reclamation procedures, the drill site shall be compactly backfilled in six- to eight-inch layers to within three feet of the final surface grade to reduce subsidence. Topsoil shall then be evenly regraded onto the surface and seeded with site adapted grasses, fertilized as needed, and planted with native conifer species to a stocking level approved by the DSL.
2. Additional measures must be taken to ensure the maintenance of existing high surface and ground water quality in the area, including:
  - a. The drilling fluid (mud) shall not contain any chromium based additives.
  - b. Water from the reserve pit shall not be spread upon the road for dust abatement or any other purpose.
  - c. Records of drilling mud chemistry and the dates when that chemistry is significantly altered shall be maintained.
  - d. Prior to reserve pit reclamation, a representative sample of reserve pit fluids and solids will be tested for toxicity by CENEX and the results submitted to the DSL (Northwestern Land Office) for approval

prior to reclamation activities. The chemical analysis by CENEX shall include:

pH  
Conductivity (mmhos/cm)  
Extractable acidity  
Exchangeable ions: Calcium, Magnesium, Sodium, Potassium,  
(meq/100gms)  
Base Saturation %  
Carbonate, Bicarbonate (meq/l)  
Sulfate (meg/l)  
Chloride (meg/l)  
Trace metals: Barium, Total Chromium, Arsenic, Cadmium  
Sodium adsorption ratio

Laboratory tests shall be conducted by a DSL approved soil laboratory using standard soil analysis methods.

- e. Diesel fuel shall be hauled to the site in trucks with a capacity of no larger than approximately 2,300 gallons, the standard size used to make farm and ranch deliveries.
  - f. Absorbent material, such as bales of straw, shall be placed at appropriate points along all water courses draining the drill site area for use in case of spills.
  - g. If the reserve pit is in danger of overflowing, or if leakage is discovered outside of the pit, the DSL shall be notified immediately and CENEX shall take appropriate remedial action to prevent environmental damages.
  - h. A surface water monitoring program approved by the DSL shall be implemented by CENEX to ensure that no adverse water quality impacts go unnoticed and unremedied. A recommended monitoring program is outlined in Appendix C-5. The approved program shall be initiated by CENEX prior to commencement of any exploratory drilling activity.
- 3. Adequate measures, such as using sulfide resistant materials, must be taken to prevent corrosion of construction materials by corrosive gases that may be encountered by the exploration drilling project.
  - 4. In order to reduce the risk of grizzly bear and human interactions in a known grizzly travel corridor, the following policies must be implemented:
    - a. No firearms shall be carried by crew members or individuals on the drill site.
    - b. No domestic pets shall be allowed on the drill site.
    - c. All garbage, trash, or other waste materials shall be deposited in suitable containers and hauled daily to an appropriate disposal site. Under no circumstances shall garbage or trash be disposed of in the reserve pit.

- d. All garbage and trash containers shall be covered and secured. Containers used to haul garbage and trash shall also be securely covered or hauled in a covered vehicle.
  - e. Crews shall be bussed or will vehicle-pool to the extent feasible, in order to limit vehicle traffic.
  - f. The intentional feeding or baiting of bears by any individual is strictly prohibited.
  - g. The essential on-site trailer accommodations for the mud engineer and geologist must be kept clean and free of food odors. Crew lunches must be stored in secure locations and kept odor free.
  - h. A contingency plan for dealing with problem animals shall be developed by CENEX and approved by the DSL prior to the commencement of exploration activities. See Appendix C-11 for guidelines.
5. In order to protect the integrity of the grizzly bear travel corridor through the area to the nearby flood plain and the Glacier National Park, as well as to avoid unnecessary disturbances to the bald eagle nest at Cyclone Lake during the critical nesting, incubation, and early nest-rearing period, all exploration-related activity including road construction, is prohibited from March 1 through June 30.
6. Additional measures must be taken to minimize adverse visual impacts and unnecessary noise from the drilling operation, including the following:
- a. Drill pad cuts and fills must be treated or covered with a suitable material, such as colored hydromulch, slurry or camouflage netting to reduce the brightness, glare and sun's reflection of the banks.
  - b. As soon as the exploration phase is completed, prompt recontouring of all portions of the site (not utilized in future phases) shall be undertaken, with topsoil replacement, fertilization, and revegetation with approved native grasses and conifers.
  - c. If drilling takes place during the period July 1 through September 30, the drill mast shall be painted in either forest tones or a flat black.
  - d. Residential mufflers meeting the DSL's approval shall be installed on the three Caterpillar D-398 engines.
  - e. An auxiliary brake (electric/magnetic) shall be installed and used on the draw works.
  - f. The three Caterpillar D-398 engines shall be oriented north-south with the doors opening to the south.
  - g. Sound reduction measures shall be implemented during the entire drilling period, which shall include the use of a sound barrier such as a winter blanket on the drill rig.

## PUBLIC PARTICIPATION

The DSL actively sought input from the public in regard to the CENEX proposal. Two public meetings were held in Columbia Falls; the first on December 14, 1983, and the second on June 13, 1984. The purpose of both meetings was to provide information regarding the proposed well, and to solicit input. Written comments were also received after each meeting.

The following questions were specifically addressed to the DSL, either orally at one of the public meetings, or in writing. The DSL wants to ensure that all questions raised are addressed, and therefore, has decided to use this format. Many of the questions are clearly answered in the text of this PER. In this case the DSL's response simply references the page number(s) where the answer can be found. If the question is not clearly answered in the text, a specific response was drafted.

Question: "What will be the impacts on schools and communities in the North Fork Area?"

Answer: See page 69.

Question: "Will the proposal result in an influx of job seekers?"

Answer: It is unknown whether exploratory drilling will cause an influx of job seekers. The 19 to 21 temporary jobs associated with exploratory drilling would not appear to be a major employment attraction.

Question: "Will the drilling operation result in an increased tax base for Flathead County?"

Answer: See page 69.

Question: "It is important to retain the unique primitive values in the North Fork. Will the proposed drilling operation result in changes in the 'quality of life' and 'way of life' in the North Fork?"

Answer: See page 70.

Question: "What are the potential visual and noise pollution impacts on visitors to Glacier National Park and the North Fork River?"

Answer: See pp. 62-67.

Question: "What are the potential impacts on the Class I airshed over Glacier National Park?"

Answer: See pp. 40-41.

Question: "Is the view of the drilling rig from the North Fork River a violation of the Wild and Scenic Rivers Act?"

Answer: No, see page 63.

Question: "What are the potential effects on endangered or threatened species?"

Answer: Insignificant, see pp. 54-59.

- Question: "What will be the cumulative effects of the proposed action on the Coal Creek State Forest as a natural corridor for wildlife genetic exchange and population dispersal, between Glacier National Park and the Whitefish range?"  
 Answer: Insignificant, see pp. 24 and 56-57.
- Question: "What will be the impact on the area's sport fishery?"  
 Answer: Insignificant, see pp. 59-62.
- Question: "Will the project affect the ground water in the area, including local residents and campgrounds?"  
 Answer: No, see pp. 46 and 48.
- Question: "What will be the cumulative effects of air pollution, especially acid rain?"  
 Answer: See page 41.
- Question: "What is the potential for H<sub>2</sub>S gas from the drilling operation?"  
 Answer: See pp. 41-44.
- Question: "What is the potential for full field development?"  
 Answer: See pp. 37-38.
- Question: "If oil or gas development were to occur, what would be the requirements for additional facilities and product transport?"  
 Answer: See pp. 35-40.
- Question: "What are the requirements for flaring gas?"  
 Answer: See page 37.
- Question: "Will the DSL ensure proper monitoring both before and after the project is initiated?"  
 Answer: The DSL agrees that monitoring is a necessary requirement for this project. Site specific baseline data was gathered for various components of the natural ecosystem, and are discussed in Chapter IV (Affected Environment). Post drilling monitoring requirements are discussed in Chapter V (Environmental Consequences of Exploration).
- Question: "Is the proposed well planned as a production well or a test well?"  
 Answer: It is planned as a production well, and will be drilled and equipped in a manner to reduce modifications necessary to begin production if commercial quantities of oil or gas are found.
- Question: "What type of review would the state do if CENEX dropped their plans to drill on state land and negotiated to drill on private land?"  
 Answer: The DSL has no authority regarding oil and gas exploration on private lands, and therefore, cannot require any type of environmental review.
- Question: "Where will CENEX locate its proposed staging area, and what are the potential impacts?"  
 Answer: The staging area will not be on state land. The DSL anticipates that it will be located on private land along the North Fork Road near the drill site. The impacts should all be temporary and of

short duration. They would include dust, noise, visual impacts, some surface disturbance, and traffic. No significant or long-term impacts are anticipated. See page 7.

Question: "Will the DSL do a worst case analysis of the potential damages from the drilling operation?"

Answer: The environmental review contained in the PER includes the consideration of reasonable worst case situations involving the proposed exploratory drilling operations.

Question: "Can the DSL accept CENEX's Operating Plan and still fulfill its constitutional obligation to maintain a clean and healthful environment for present and future generations?"

Answer: Yes. This is confirmed by both the PER completed prior to the leasing of the tract for oil and gas exploration and development, and the review of the CENEX Operating Plan. This is further re-enforced by the environmentally protective stipulations developed and implemented by the DSL at both phases.

Question: "To what extent can income from school trust lands be derived from less fragile state lands in other areas of the state?"

Answer: Potential mineral-related income can be derived from other less sensitive lands to the extent that these lands have oil and gas, or other economically recoverable mineral resources present. Regardless of the environmentally sensitive characteristics of its lands, the DSL is committed to resource development only if it can be done in an environmentally acceptable manner, and without jeopardy to the other tract resources capable of providing a sustained income source to the school trust fund.

Question: "Because of the location of the drill site and the depth to which the proposed well is to be drilled, does the potential exist for the drainage of the subsurface water or mineral estate of Glacier National Park, and if so, does that constitute an illegal appropriation of the Park's resources?"

Answer: The location of the proposed well is physically down dip from Glacier Park and separated from the Park's subsurface rock formations by a major thrust fault. Therefore, it appears unlikely that movement of reservoir fluids would drain water or minerals from federal land within the Park. The correlative rights of the federal government would not be adversely affected.

Question: "Has CENEX entered into a dry hole letter of agreement with any other company or companies? If not, are they contemplating it?"

Answer: It is common in the oil and gas business to seek partners to share expenses for high cost projects such as the CENEX project, and there are many forms of agreements that accomplish that goal. The DSL does not require any of its lessees to disclose the source or sources of their financing, nor is the DSL inclined to consider such action. A signed dry hole agreement is more a vote of confidence in CENEX's ability to develop viable prospects by its peers in the oil business, than a "second opinion" by a knowledgeable source.

Question: "In the event of a dry hole, will the value of nearby private mineral leases be diminished?"

Answer: A dry hole is an economic concept rather than a physical object or situation. This is because a test well might discover non-commercial amounts of hydrocarbons that would make a paying producible well elsewhere in an area where well costs were less. An economic dry hole for CENEX, then, might increase as easily as decrease interest in fee lands near the proposed well on state land. However, since the fee land nearby is already leased, the negotiation for lease terms is finished and data from the drilling of this well would not enhance either party's bargaining position. The true value of nearby leases at this point, remains physically related to the presence or absence of hydrocarbons below the surface and cannot be affected by any exploration activity on state land. The inherent value of nearby tracts is far more susceptible to general market conditions, such as the price of oil and contracted services.

Question: "Can the DSL allow CENEX to make such a large investment in exploration, without allowing them to produce the well?"

Answer: The DSL recognizes that approval given at the exploration well phase should acknowledge the reasonable ability of CENEX to then propose development of the well if exploration is successful. The evaluation of the exploration proposal includes information similar to that which would be necessary to evaluate a production proposal from the well site. Because of this, it is highly unlikely that a review of the production proposal would identify a potential impact capable of entirely preventing development not identified at the previous exploration evaluation stage. In other words, a "fatal flaw" (environmental) capable of preventing production, regardless of the application of mitigation, is not likely to remain unidentified at the exploration phase, and would be expected to likewise prevent exploration activities. It must also be recognized, however, that regardless of the extent of review conducted at the exploration phase, it is not possible to entirely rule out a denial for a production stage at the well site if proposed. Such a denial would most likely result from an environmental impact potential entirely unanticipated or unknown at the exploration phase evaluation.

Question: "Will granting approval to drill this well affect U.S.-Canadian relations in regard to the proposed Cabin Creek Mine?"

Answer: Approval of the proposed CENEX exploration well is not anticipated to adversely effect the State of Montana's comments to the Canadian government regarding the current environmental quality of the North Fork area, and the proposed Cabin Creek Coal Mine in Canada. The analysis contained in this PER concludes that if the CENEX exploration project is approved with protective stipulations identified, and is operated in compliance with existing regulations, the potential for significant impact to the environmental quality of the North Fork area will be minimal. In addition, the requirement on each State of Montana oil and gas lease in the North Fork area that a detailed environmental review be completed for each proposal for exploration or development, will help to assure that the potential for future impacts will remain minimal.



Question: "Are there other alternative drill sites?"

Answer: Yes, see page 35.

Question: "Why is the DSL writing another PER, can't the previous one simply be amended?"

Answer: The DSL, in compliance with MEPA, must identify the potential for significant impacts resulting from the specific CENEX exploration proposal. This was not possible to accomplish at the 1983 leasing stage as the successful bidder for the lease tract was not known, and hence, the specific plans for the location and description of the exploration project were not known. This PER is intended for use as a substantive "supplement" to the 1983 leasing PER. In this way, the reader can gain a better understanding of the DSL's overall review of impact potential related to oil and gas development in the North Fork area. A PER "amendment" is normally reserved for those situations when the conclusions or conditions contained in the original PER have significantly changed.

Question: "What monitoring will be done to protect the air quality?"

Answer: It is not considered necessary, see page 40.

Question: "Will the DSL investigate joint federal/state/private land use planning for production, multiple site drilling, and field development in the North Fork?"

Answer: Throughout preparation of the CENEX Operating Plan PER, the DSL has sought consultation with potentially affected federal, state, and local officials regarding land-use related concerns. In addition, the DSL has been an active member of the North Fork Interagency Coordination Group since 1982. The group's major purpose has been to identify planning-related needs in the North Fork area that are common to the participants, which include the Supervisor, Flathead National Forest, Superintendent, Glacier National Park, Flathead County Commissioners, and the Montana Department of Fish, Wildlife, and Parks. Officials from Canada have also been invited to participate.

Should the CENEX well, or other wells prove successful to the extent that additional multiple drilling and significant production facilities are possible in the North Fork area, the DSL will support the development of a formal plan for an effective joint federal/-state/local planning and evaluation effort. The plan would develop further siting and environmental safeguards necessary for minimizing future impact potential from major oil and gas development in this sensitive area. Regardless of the cooperative nature of the plan, however, no agency could exceed or ignore its individual regulatory responsibilities regarding oil and gas exploration and development.

Question: "Will the proposed project adversely affect the Waterton-Glacier International Biosphere Reserve?"

Answer: No. Operation of the exploration project within the special conditions recommended for the project will not significantly effect the natural environment, and therefore, is not considered to threaten key elements essential to maintenance of the biosphere reserve.

Question: "Will full field development lead to the condemnation of private land?"

Answer: Probably not. Condemnation is the legal process of taking property from a private owner without his consent for public use upon payment of just compensation. Common examples of condemnation are taking land for interstate highways, and for municipal buildings and parking lots. While not considered condemnation, it is possible that if the private landowner does not control the mineral estate under his land surface, an oil and gas developer may obtain these rights and gain use of the surface for oil and gas exploration or extraction activities. An exception may be condemnation of private lands for large oil or gas pipeline facilities.

Question: "If the DSL denies the CENEX proposal and oil is subsequently discovered on adjacent private land, who is liable for the loss of revenue to the school trust?"

Answer: The DSL. However, DSL's constitutional mandate to receive full market value for trust lands must be read in harmony with other statutes and rules and regulations. The duty to generate and collect revenue for the trusts presupposes doing so in compliance with applicable laws. Normally, if oil were found on adjacent private lands, the DSL could require the lessee of the state land to drill a well and extract the oil on the state land. If the DSL had previously denied such a drilling request from CENEX, such action would not be consistent. In such a situation, however, it is still possible that the DSL could receive compensation for the draining of its oil by the adjacent private land owner. Current regulations do not specifically consider this somewhat "unique" situation.

Question: "Is an environmental damage bond required? If so, how much is it, and will it cover a "worst case" situation?"

Answer: Under state law and the applicable rules and regulations of DSL and DNRC, Board of Oil and Gas Conservation, a Plugging and Restoration Bond in the amount of \$5,000 per well, or a state-wide blanket bond in the amount of \$10,000 is required from any lessee who proposes to drill a well. CENEX has a state-wide blanket bond. Additionally, DSL rules require CENEX to avoid waste, preserve property, and prevent pollution using a high degree of care and proper safeguards. Furthermore, CENEX is liable for all pollution damage and hence a "worst case" damage situation is considered covered. In the event of CENEX's failure to properly conduct operations on state land, the DSL can cancel its oil and gas lease as well as take other corrective action.

Question: "What is the state's royalty percentage and how does this compare to private contract holders?"

Answer: The state requires a 13 percent royalty payment for oil produced from a state-owned tract, and a 12.5 percent royalty for gas. It is the DSL's understanding that the private fee land royalty rate for oil and gas in the North Fork area is predominantly 12.5 percent.

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## AGENCIES OR GROUPS CONSULTED

ARCO Aluminum  
Border Grizzly Project, School of Forestry, University of Montana  
Bureau of Business and Economic Research, School of Business Administration,  
University of Montana  
Cardinal Drilling  
CENEX Corporation  
Columbia Falls Chamber of Commerce  
Custer National Forest  
Environmental Protection Agency (EPA)  
Flathead County Assessor's Office  
Flathead County Commissioners  
Flathead County Overall Economic Development Planning Committee  
Flathead County Road Department  
Flathead National Forest  
Glacier National Park  
Kalispell Chamber of Commerce  
Kootenai National Forest  
Lewis and Clark National Forest  
Montana Bureau of Mines and Geology  
Montana Department of Commerce  
Montana Department of Fish, Wildlife and Parks  
Montana Department of Health and Environmental Sciences  
Montana Department of Natural Resources and Conservation  
Montana Environmental Quality Council  
Montana Historic Preservation Office  
Montana Petroleum Association  
Region 1, USDA Forest Service  
Rocky Mountain Oil and Gas Association  
U.S. Customs Service  
U.S. Fish and Wildlife Service  
Whitefish Chamber of Commerce  
Wolf Ecology Project, School of Forestry, University of Montana

## APPENDICES

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APPENDIX A  
STIPULATIONS

## STIPULATIONS

1. If the lessee intends to conduct any activities on the leased premises, it shall submit to the Department of State Lands two copies of an Annual Operating Plan or Amendment to an existing Operating Plan, describing its proposed activities for the coming year. No activities shall occur on the tract until an Annual Operating Plan or Amendments have been approved in writing by the Commissioner of State Lands or his designated representative. A separate Plan or Amendment shall be submitted for each year's activities that are planned. The Plan or Amendment shall include the following:
  - a. A complete description of each activity planned, locations of each activity, scheduled starting date, and expected duration of each.
  - b. Maps (1:24,000 scale or larger) showing use and/or reconstruction of existing access routes, the location of proposed new road construction, seismic shot holes, drill sites, pipelines, utilities and other uses and improvements.
  - c. Drawings showing road construction plans including width, drainage, cut/fill slopes and other details, as well as detailed topographic drawings showing drill site development and layout, and water supply and disposal system.
  - d. Plans, to include resource protection measures for drilling, waste disposal, sanitation, wildfire prevention, soil erosion and air and water pollution; emergency actions covering oil, salt water, and drilling mud spills, as well as oil and forest fires; and land reclamation procedures.
  - e. Other information necessary for the Department to assess probable impacts upon surface and other resources.

The Department shall review the Plan or Amendment and notify the lessee within 30 days whether the Plan or Amendment is approved or disapproved. The Department may extend the 30-day review period by an additional 90 days if weather conditions prevent adequate access to the site, or by an additional 300 days if the Department determines that a detailed environmental analysis is necessary. The lessee shall be notified in writing of the extension within the original 30-day review period.

The Department shall not approve the Plan until the lessee has met reasonable requirements to prevent soil erosion, air and water pollution, and to prevent unacceptable impacts to vegetation, wildlife, wildlife habitat, fisheries, visual qualities and other resources and to reclaim any land disturbed by the activities. No work will be conducted without written approval of the Operating Plan.

2. Surface activity may be denied on all or portions of any tract if the Commissioner determines in writing, after an opportunity for an informal

hearing with the lessee, that the proposed surface activity will be detrimental to trust resources and is therefore not in the best interests of the School Trust.

3. The Department reserves the right to restrict surface activity during certain time periods, in order to prevent accelerated erosion, extreme wildfire risk, disruption of seasonal wildlife use, or other adverse resource impacts.
4. No waste water, oil or other substance shall be discharged into any water course or spread upon the land. Unless otherwise approved in an Annual Operating Plan, all oil and gas activities, with the exception of road creek crossings, shall be restricted to at least 300 feet from all streams, wells and springs, at least 500 feet from all reservoirs and lakes, and at least one-quarter ( $\frac{1}{4}$ ) mile from all rivers. All pits shall be impermeable and shall be located at least 500 feet from stream channels, wells, springs or lakes and one-quarter ( $\frac{1}{4}$ ) mile from all rivers. Upon completion of drilling activities, all pit liners and pit contents shall be removed from the tract prior to reclamation.
5. Food storage at any work site within the lease area will be strictly controlled. All garbage will be removed daily from the work sites and disposed of at public land fills or collection points.
6. Human habitation for seismic, drilling, or maintenance crews and other personnel associated with oil and gas activity, including camps, cook shacks, and mobile homes will be strictly controlled within the lease area.
7. The lease tract may contain items of archeologic, historic, or paleontological value and may require special protection to prevent damage to these resources. If such resources are found during any phase of exploration or development activity, the resource shall be protected and the Department notified immediately. Approval of the Annual Operating Plan may require the completion of a Cultural Resources Survey by the lessee to determine if cultural resources are present and to develop specific mitigation measures.
8. No oil refinery, gas processing facility, or gas sweetening plant shall be built within the lease area without the written approval of the Board of Land Commissioners.
9. (Special stipulation for Sec. 2, 10, and 11, T34N-R21W, Sec. 16, T35N-R21W, and Sec. 36, T37N-R22W). No surface occupancy will be allowed in those portions of the lease tract that are located within the federally designated Scenic River Corridor of the North Fork of the Flathead River.

APPENDIX B  
CORRESPONDENCE





5613 DTC Parkway  
Englewood, Colorado 80111  
Telephone (303) 694-4100

J.A. RUSH  
Environmental & Safety Affairs  
Coordinator

August 15, 1984

Mr. Ted Gieseey  
Montana Department of State Lands  
P. O. Box 490  
Kalispell, Montana 59901

Dear Mr. Gieseey,

Per our conversation regarding noise levels around drilling rigs, enclosed is a summary with general information which has been compiled over the past several years.

1. In areas where electric power is available, and noise levels immediately adjacent to the rig location need to be minimized, direct use of electricity for power is suggested.
2. Noise levels on the location around a drilling rig, depending upon the type and size, range from 70 to 90 dBA.
3. Low frequency sounds (engines etc.) dissipates quickly. It does not carry very far off of a location. High frequency noises, however, do carry for greater distances. An example of this would be "metal to metal" clanging, such as drilling string.
4. Vegetation, such as trees, etc., readily absorb noise so that it does not carry far. Other structures (fences, etc.), would also absorb noise.
5. In one instance the noise level at 700 feet of the location was only 60 to 68 dBA. This would be comparable to the sound of a car traveling at 65 mph located 25 feet from the source.

If you need additional information, please contact either Van at MPA, or myself. Attached is a table which may be helpful to you.

A handwritten signature in cursive script, appearing to read "J.A. Rush".

J. A. Rush

JAR/kw

cc: D. Van De Graaff



# MONTANA HISTORICAL SOCIETY

## HISTORIC PRESERVATION OFFICE

225 NORTH ROBERTS STREET • (406) 444-4584 • HELENA, MONTANA 59620

June 13, 1984

Ms. Dori Passmann  
Land Use Specialist  
Department of State Lands  
1625 Eleventh Avenue  
Helena, MT 59620

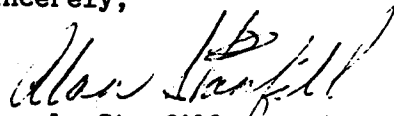
RE: Coal Creek Oil and Gas Leases, cultural resource information request,  
T34N, R21W, Section 11.

Dear Dori:

We have no additional information about the project area cited above since the original June, 1983, request. No sites and no intensive surveys have been recorded for this area. Although not indicated in our files, homesteading was likely an important historic activity in this area. The area may also have served as a travel route for the Kutenai Indians in prehistoric and early historic times. Gary McLean, Flathead National Forest Archaeologist, is probably most familiar with this area. And, of course, Cynthia Hamlett, Lewis & Clark National Forest archaeologist, did her thesis on the Kutenai in Northwest Montana. These people would probably be of greatest help in providing you with some background and a feel for what to expect in your area of concern.

Thank you for consulting with this office. Please call if we may be of further assistance.

Sincerely,

  
Alan L. Stanfill,  
Archaeologist/Anthropologist

RECEIVED

JUN 28 1984

DIVISION OF FORESTRY  
Missoula, Montana



MONTANA BUREAU OF MINES AND GEOLOGY

MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY

BUTTE, MONTANA 59701

(406) 496-4180

FOR DEPOSIT ONLY  
TO THE DEMAND ACCOUNT  
OF THE MONTANA STATE TREASURY  
AGENCY 5501  
DEPARTMENT OF STATE LANDS  
DIVISION OF FORESTRY

June 26, 1984

Mr. Bill Shultz  
Forestry Division - Department of State Lands  
2705 Spurgin Road  
Missoula, MT 59801

Dear Bill:

This letter is in reference to our field review of June 20, 1984 to the proposed Cenex exploration site located in the SW $\frac{1}{4}$  of Section 11, Township 34 North and Range 21 West. As you requested, I am making a couple of recommendations the State may deem relevant concerning the hydrogeology of the area in the preparation of the Preliminary Environmental Review. I believe the three main topics which you wished to have addressed were:

- (1) Leakage from the reserve pit and well;
- (2) Ground-water flow, movement and direction; and
- (3) Ground-water and surface-water interaction.

Because all the topics are interrelated to some extent, I shall not address each topic singly, but rather present an assessment of the conditions and make any recommendations that may be pertinent.

The site is located on a lateral moraine composed of glacial till. Field inspection showed the till is composed of dense, fine grained silt and clay with randomly scattered cobbles. According to Freeze and Cherry (1979), these deposits have very low intergranular hydraulic conductivities with values typically in the range of  $10^{-3}$  to  $10^{-6}$  gal/day/Ft<sup>2</sup>. Conductivities with this low of a value are often considered to represent aquitards because ground-water movement is so slow. It is therefore unlikely that contamination to the stream and pond would occur via the shallow ground-water system.

However, two areas which may have slightly higher values of hydraulic conductivity were the green linear swaths which were apparent on the color air photos. Field inspection determined a row of cottonwood trees followed these narrow bands. Although reserve-pit leakage is unlikely because it will be lined, a small monitoring program might be recommended. This could observe any

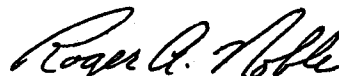
Mr. Bill Shultz  
June 26, 1984  
Page Two

effects to the shallow aquifer from pit leakage as we discussed, which would include these swaths. On the other hand, the potential for contamination from the exploration well is virtually negligible because the surface casing is set and cemented in place prohibiting drilling fluid loss.

As far as obtaining background or baseline conditions on the water quality and potentiometric surface, this could be easily achieved during the drilling of the water-supply well, the mouse hole and the rat hole. These holes could be sampled and their initial static water levels triangulated to determine the flow direction of the shallow-unconfined aquifer. I believe you will find this coincides to the local topographic gradient which is to the northeast.

If you have any further questions, please feel free to contact me.

Sincerely,



Roger A. Noble  
Hydrogeologist



United States  
Department of  
Agriculture

Forest Service  
Glacier View Ranger District  
P.O. Box W  
Columbia Falls, MT 59912

Reply to 3210 Cooperative Programs

Date January 16, 1984

Subject Cumulative Effects: Oil & Gas Exploration, Coal Creek  
State Forest

To Tom Vars  
Field Supervisor, Stillwater Unit  
Stillwater State Forest  
Box 164  
Olney, MT 59927

Review of proposed drilling activity, in conjunction with other State and Forest Service activities (time and space) indicates that the drill site will not seriously effect grizzly bear use provided other activities are tempered.

The floodplain valley bottom is primarily used as spring/fall habitat by the grizzly bear. Thy Cyclone Lake saddle is most likely a major travel corridor to Coal Ridge/Whitefish Divide summer/fall ranges from the North Fork of the Flathead River; as is Coal Creek and Moran Creek areas.

Bear use is also known to occur in the Cyclone Lake area during summer months, however, bears are able to disperse better during this season due to the large amount of area available for foraging.

Therefore, viewing your proposed activities from a cumulative effect standpoint, we would recommend:

1. Thinning proposed for Moran Creek and post permits for Coal and Cyclone Creek areas (Ref. your letter of 12/13/83) should be scheduled to occur during the summer period <sup>July 1 to Sept 30 or winter period</sup> December 1 to March 31, to allow for bear movement.

2. We agree with and support your proposal to drop or delay the Winona East #2 Timber Sale; however, it could be scheduled for winter harvest and not effect bear use.

3. We would recommend that drilling activities not be allowed prior to July 1.

4. We would also suggest that cover should be maintained over some of the areas suitable for bear movement between Moran Creek and Coal Creek to allow for security needs during travel.

5. The riparian/wetland area near the drill pad should be protected from possible contamination during drilling operations.


6. We also agree with your proposal to close vehicle access through Cyclone saddle during the drilling operation.

phone call  
correction  
from Dick Coll  
HSD



CC: Bruce  
antley, D 1/26/84

Thank you for the opportunity allowing us to comment on the drilling proposal and cumulative effects. We stand ready to assist in any way we can.

A handwritten signature in cursive script, appearing to read "Richard J. Call". The signature is written in dark ink and is positioned above the printed name.

RICHARD J. CALL  
District Ranger



United States Department of the Interior  
NATIONAL PARK SERVICE  
GLACIER NATIONAL PARK  
WEST GLACIER, MONTANA 59936

IN REPLY REFER TO:

L76

July 12, 1984

Mr. James Gragg  
Area Manager  
Department of State Lands  
Box 490  
Kalispell, Montana 59901

Dear Mr. Gragg:

This letter adds to our earlier response concerning the proposed CENEX exploratory drilling near Cyclone Lake on the Coal Creek State Forest.

The bald eagle, an endangered species, already has been identified as a concern in relation to this project, but we believe the following information is important in considering the potential impact of the proposed drill site:

1. The bald eagle nest at Cyclone Lake is the only known recently active nest in the North Fork Flathead drainage outside of Glacier National Park.
2. Although little is known about the ecology of the pair of eagles that occupies this territory, we do know that adults from this nest fly to the North Fork Flathead River to feed. They probably feed within Glacier National Park adjacent to the North Fork. Adult bald eagle flights from the nest area to the North Fork occur via the area in which the drill site is proposed.
3. Eagles flying over the drill site would be vulnerable to shooting. Young eagles from the Cyclone nest may be subject to collision with the drilling rig. The time of greatest jeopardy for young eagles would be August and September. Adults would be most vulnerable during the nesting season, late March through early August.



4. Two of the four known bald eagle territories in Glacier National Park are at tributary lakes of the North Fork Flathead downwind from the well site. These nesting territories would be subject to air contamination problems originating at the well.

If one evaluates the proposed drilling site in relation to the bald eagle, the site east of Cyclone Lake is in one of the most critical locations possible in terms of potential impact on this endangered species. We believe this issue needs to receive prominent consideration in an environmental impact statement.

Sincerely,

A handwritten signature in dark ink, appearing to read 'R. C. Haraden', with a long horizontal stroke extending to the right.

Acting for Robert C. Haraden  
Superintendent



**Montana Department  
of  
Fish, Wildlife & Parks**



Region One  
P.O. Box 67  
Kalispell, MT 59901  
June 28, 1984

Mr. Jim Gragg  
Area Supervisor  
Department of State Lands  
P.O. Box 490  
Kalispell, MT 59901

Attention: Paul Klug

Dear Paul:

During your visit to our office on June 15th to discuss the proposed exploratory drilling in the SW1/4 of Section 11, T34N R21W, I agreed to provide you with a brief narrative on key wildlife species that could be potentially affected by the proposed operation.

Big game (Mule deer, white-tailed deer, elk, moose) - The proposed drill site is not situated on lands or habitat recognized as winter range for deer or elk. Big game species do use the area seasonally for spring foraging purposes and some animals may move through the lower elevation pass between Winona Ridge and Cyclone Peak as they migrate between winter and summer ranges. Moose are capable of and do utilize a wider variety of habitat and environmental situations during the winter period and would use the proposed drill site if forage production and availability are favorable. I don't foresee any real concerns for big game related to the proposed drilling site and length of operating period as long as consideration is made for secure areas nearby to accomodate existing uses patterns.

Grizzly bear - The proposed drill site is within the occupied range of grizzly bear and, more specifically, may be within a travel corridor. The Border Grizzly Project has conducted research on grizzly bears in the North Fork and Dr. Charles Jonkel, Director of the Project, indicates that the southern extent of the Hay Creek travel corridor includes the drill site. The travel corridor is thought to be used by bears of both Whitefish Range and Glacier National Park as they moved to and through the riverine environment of the North Fork of the Flathead River.

Maintaining the integrity of the travel corridor would require consideration for uninterrupted coniferous cover along ridges, creek bottoms and other probable travel routes connecting the North Fork and the higher country in the Whitefish Range. If drilling should occur, other activities in the travel corridor in the vicinity of the drilling should be deferred to allow more secure

Mr. Jim Gragg  
Area Supervisor  
Department of State Lands  
Page -2-

movement by bears using the corridor.

Gray wolf - The wolf in the North Fork has been the subject of studies and reports in recent years. Boyd and Ream (report enclosed) indicate that sightings were made around Polebridge in January and February of 1984, and that wolves moved as far south as Camas Creek. Wolves in the upper North Fork have shown seasonal habitat preferences. Denning sites and rendezvous areas seem to be the more sensitive habitat needs of wolves. At this time wolf habitat needs in the vicinity of the drill site have not been identified. It would appear that the drill site could be located in seasonally used habitat for the wolf.

Caribou - Caribou tracks have been observed and confirmed in the northern portion of the Whitefish Range. The extent of the population size, habitat use, and movements are unknown. Traditionally, caribou have been thought to use mature and old growth stands in higher elevation sites. Recently however, caribou in the Selkirk herd have been noted to use habitats in which timber entry had occurred. The drill site, at about 4,000 feet in elevation, may be too low to expect caribou use. The drill site and surrounding area does not have any significant stands of mature timber. The potential of encountering caribou on the drill site would appear, although rather remote, to be a possibility. As with grizzly bear, the primary value of the affected area could be as a travel route between habitat situations providing cover and forage needs for the caribou.

Bald eagle - The drill site is situated east and below the Cyclone Lake nest location. Line-of-sight disturbance is not point of concern. During the early nesting period in March and April, Cyclone Lake could be frozen to the degree that the eagles would travel to the North Fork for feeding purposes. In this case, the eagles could fly directly over the drill site going and coming. This would be a concern.

Respectfully,

*Jim Cross*

Jim Cross  
Wildlife Biologist

JC:sp

enclosure

THE FISHERY - NORTH FORK FLATHEAD RIVER & HAY CREEK

The North Fork of the Flathead River along with its tributary streams provide an estimated 40% of the spawning & nursery streams for migratory Westslope Cutthroat & Bull Trout inhabiting Flathead Lake. The Cutthroat & Bull Trout Fishery of Flathead Lake is dependant on the successful spawning, recruitment and return to the lake from the upper drainage system. These native species have been designated as species of "special concern" by the Montana Department Fish, Wildlife and Parks.

The maintenance of high water quality standards in the drainage to provide optimal habitat conditions for these species of utmost concern. The proposed Cabin Creek Coal Development in British Columbia, state and federal land leases for oil and gas exploration and development and continued logging operation all present a serious threat to the water quality and the existance of those species in the river and lake ecosystems.

Of immediate concern is the Hay Creek drainage. Hay Creek supports an excellent population of both resident and migratory Westslope Cutthroat trout. A limited population of migratory Bull Trout utilize this stream as spawning and nursery habitat. Hay Creek, like most North Fork tributary streams has a very low buffering capacity to counter potential toxic materials. A slight change in lower PH values could trigger metallic ions to go into solution there by depressing aquatic insect populations and seriously lowering the carrying capacity of trout populations.

COMMENTS & PROPOSED MITIGATION

Our concerns with the Cen-Ex oil & gas operational procedures for the drilling of a wildcat well in North Fork drainage south of Pollbridge are as follows:

1. Topsoil Removal and Storage (page 4)  
The topsoil removed from the 5.5 acre construction site and the material from the excavation pit which is to be stored at the outer boundaries of the site, should be covered or seeded to reduce wind or water erosion during the duration of the drilling period. I also question the need for the removal of topsoil from the entire 5.5 acre site.
2. Lining of the Reserve Pit (page 5)  
I would recommend that a liner be installed in the reserve pit as a safeguard to prevent leaching regardless of the soils test analysis.

3. Well Water Agreement After Operational Ceases (page 7)  
Well water could be used to irrigate the pad site to facilitate revegetation after abandonment of the drilling operation.
4. Spill Preventative Control and Counter Measure (exhibit K-2, #5)  
The Fish, Wildlife and Parks should be included as one of the governing bodies notified.

#### In Case of a Spill

A storage area of straw bales on some other absorbent material should be available at strategic locations for emergency control of accidental spills of oil fluids. The straw bales could be used for mulching for the re-establishment of vegetation at the pad site.

5. Effects on the Escapement of Hydrogen Sulphide Gas (H-21)  
Because  $H_2S$  is soluble in water to form a weak acid there is potential of altering the PH of water courses in the adjacent and downstream watershed. This condition could pose an immediate threat to the fishery and associated aquatic life.
6. Fuel Capacity of Diesel Trucks Supplying the Drilling Operation  
Maximum capacity of delivery trucks supplying diesel fuel to the rig should be limited to 2000 gallons. Trucks with small payloads can better negotiate the narrow access road on this site. In the event of an accidental spill, the magnitude of impact would be lessened.
7. Time Scheduling-Construction of Site and Drilling Time  
I would suggest the construction phase take place between June 15th and Sept. 15th, after runoff and during the drier months of the year. Drilling should commence no earlier than June 15th and no later than Aug. 1st. Later than Aug. 1st would extend the drilling time through late winter and early spring, thereby increasing the risk of oil spills and creating erosion from wear and tear on the road system.

### PRODUCTION PHASE

#### Spill Preventative Measures

1. In the event of a spill at the production site, earth moving equipment and absorbent materials should be at the site and be made readily available to contain oil from moving into the water courses.
2. An alternative high standard road system should be constructed to the North Fork road (probably to the south) to transport oil from holding tanks.

3. Of major concern are the hazards involved of transporting crude oil to the refinery in Cut Bank. (I'm assuming this is where the crude will go for refining). The North Fork and Middle Fork roads are sub-standard for transporting large tandem oil tankers, particularly on snow packed roads in the winter. Frequent major oil tanker accidents.

These concerns are general in nature. Specific concerns will be addressed in the event the production phase occurs.



United States  
Department of  
Agriculture

Forest  
Service

Glacier View Ranger District  
Box W  
Columbia Falls, Montana 59912

Reply to: 2370 Other Areas

Date: July 26, 1984

Subject: Proposed Cenex Oil Well

To: Ted Gieseey  
Dept. of State Lands  
P.O. Box 490  
Kalispell, MT. 59901

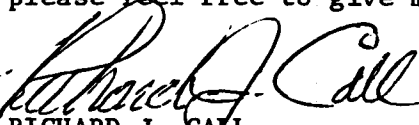
In response to your proposed Cenex well location, I would like to offer the following comments.

As you are aware, the North Fork of the Flathead river is classified as a Wild and Scenic River. A drilling tower at its proposed location would be visible from the river. A drilling tower is substantially taller than the tree canopy; during daylight hours the tower will be a silhouette against Winona Ridge. To minimize the visual obtrusion, I would suggest that the tower be painted an earth tone of some color that would help blend it into the background. Lighting of the area for night work is anticipated. However, unless required by F.A.A. for aircraft safety, strobe or blinking lights should not be used as they would cause a visual attractant and further reduce the attempt to make the area unobtrusive.

It is my understanding that large diesel engines through a diesel electric system drive the drilling apparatus. These engines will produce loud audio sounds. This noise disturbance can be minimized by requiring a sound deadening building, "winter blanket".

The location of the site is close to Cyclone Creek, which flows into the North Fork of the Flathead River. Water quality of the North Fork is a concern. The use of pit liners or a closed system would reduce the potential of water degradation significantly.

Thank you for this opportunity to address our concerns on this project. Should you desire further information on these concerns or on our mitigation suggestions, please feel free to give me a call.

  
RICHARD J. CALL  
District Ranger



December 5, 1983

P.O. Box 490  
Kalispell, Montana 59901

Mr. John Emerson  
Flathead National Forest Supervisor  
Box 147  
Kalispell, Montana 59901

589

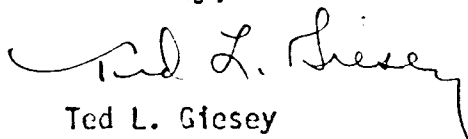
Dear John:

Jim Gragg has briefed you on the Cenex proposal to drill an exploratory oil well on leased state trust lands in the Coal Creek State Forest. Also, we have met and discussed with Dick Call, Glacier View District Ranger, various aspects of the proposal.

As agreed to in our joint Memorandum of Understanding on the Flathead Wild and Scenic River, we are requesting your comments on Cenex's proposal (see attached outline). Also, any concerns about the fire protection responsibilities on these state lands could be included in your reply.

If you have further questions, please telephone either myself, Tom Vars or Jim Gragg.

Sincerely,



Ted L. Giesey  
Deputy Area Manager  
Northwestern Land Office

Attachments

TLG:1fg

cc: cal files  
Stillwater Unit (Tom Vars)  
589

July 12, 1984

Box 366  
West Glacier, Montana 59936

Mr. James F. Gragg, Attn: Paul Klug  
Area Manager, Department of State Lands  
Box 490  
Kalispell, Montana 59901

Dear Mr. Gragg:

After visiting the site of the proposed CENEX well on the Coal Creek State Forest and reviewing documents relating to leasing the state lands and CENEX's operating plan, I submit the following comments:

1) Site-specific comments

The proposed drilling site poses numerous environmental risks identified in various documents. The site is of further special concern because it is located between the Cyclone Lake bald eagle nest and the North Fork Flathead River, along which the eagles commonly feed. The impact of human activities on bald eagle reproduction has been discussed by Murphy (1966), Mathisen (1968), Grier (1969), Juenemann (1973), Grubb (1976), McEwan and Hirth (1979) and Fraser (1980). Although the drilling site is about 1 mile from the Cyclone Lake nest, farther than is usually considered within a critical zone, it intrudes directly into the eagles' flight corridor. This corridor is the shortest route from the nest to the North Fork where we believe these eagles find much of their prey. The frequency of flights over the well site is unknown and needs to be determined before a detailed appraisal of the site's development impact could be made.

The bald eagle nest at Cyclone Lake was not specifically identified or discussed in the Final Environmental Impact Statement for Proposed Oil and Gas Leases, Coal Creek State Forest, released in 1976, nor in the Preliminary Environmental Review for Oil and Gas Leasing on the Coal Creek State Forest released in 1982. It is the only known, currently used bald eagle nest in the North Fork Flathead drainage outside Glacier National Park. There are only two nests in the North Fork drainage in Glacier. One is directly west of Cyclone Lake in the Logging drainage and the other is in the Quartz drainage north of Logging.

Every species and every pair of birds react to human activities in their own unique way. Some pairs of eagles are extremely sensitive to disturbance; others are more tolerant. The level of sensitivity of the Cyclone Lake eagles is unknown. The nest has been active but unsuccessful the past two years. It is reasonable to generalize that eagles are most easily disturbed (their normal behavior is disrupted) during the early portion of the nesting season. The nest building and incubation periods are the times during which adult eagles are most apt to abandon a nest as a result of human disturbance.



Nesting chronology at Cyclone Lake would be approximately as follows:

February	adults frequenting nest vicinity
March	nest building or refurbishment
April	incubation (35 days)
May } June } July }	nestling period; eagles in nest and unable to fly, fed and brooded by the adults
August 1	( $\pm$ 10 days) fledging (eaglets fly from nest)
Aug.-Sept.	young eagles moving locally within Cyclone Lake/North Fork Flathead feeding territory, learning flying and prey capturing skills

Therefore, nest area disturbance would be most critical in March and April. The potential impact from the CENEX site is difficult to evaluate because of the distance (1 mile) from the nest. While this distance might indicate a safe buffer if the activity involved logging or cabin building, activities associated with oil and gas drilling are of a different magnitude. Apparently the top of the drilling rig will not be visible from the nest, but the noise from the rig, especially loud firearm-like reports, could affect nesting activity or flight patterns to and from the nest. The risk of workers at the site shooting at eagles flying over the site or of young eagles colliding with the rig also should be considered.

One cannot say with certainty that drilling and associated activity at this site will negatively impact the Cyclone Lake bald eagles. However, one cannot say with any confidence that it will not negatively impact them. Because the bald eagle is an endangered species and because the Cyclone Lake nest is the only nest on the North Fork Flathead west of the river, a very conservative approach, avoiding risk to the birds, is the logical way in which to proceed. In my opinion there is sufficient concern about the adverse impact to bald eagles and other natural resources to deny the permit application without the need for a full E.I.S. If that option is not adopted, preparation of a full E.I.S. seems essential to safeguard bald eagles and all other resources on Montana State Forest land and adjacent federal lands that are of international significance.


## 2) General comments

It is not logical to consider the potential impact of this one site nor the exploratory phase of this one site out of context. Most of the major potential environmental risks attendant at this site exist at other potential sites in the North Fork Flathead River whether on state, federal or private land. These risks are well documented and include gas blowout with environmental contamination by H<sub>2</sub>S and/or SO<sub>2</sub>, water pollution from spills and the cumulative, long-term effects of roads and transient populations. While such environmental risks may be offset by the monetary benefits to be derived in some areas of the state, it is my belief that such risks are unjustifiable in the North Fork Flathead. The North Fork is an integral part of the Glacier Ecosystem.

The health of the Glacier Ecosystem is dependent in part on sensitive management of all lands, including the Coal Creek State Forest. It seems to me that the long-term benefits to Montana, the nation and the world would best be served by managing the North Fork with a degree of sensitivity which may require foregoing some opportunities for financial gain. I believe oil and gas exploration and production, based on the technology currently available, is incompatible with the wisest course of resource use and protection in the North Fork. I suggest that the state of Montana, in this first question of oil and gas drilling on state lands in the North Fork, set a bold and fully defensible precedent by denying not only this permit for the Cyclone Lake area, but all other applications on the Coal Creek State Forest. Perhaps the state of the art will progress in the future so that risks attendant to drilling and production can be more accurately evaluated and then ameliorated during drilling and production. At this time the risks are too great.

Thank you for the opportunity to comment.

Sincerely,

A handwritten signature in cursive script, reading "B. Riley McClelland". The signature is fluid and stylized, with the first letters of each word being capitalized and prominent.

B. Riley McClelland  
Research Biologist

APPENDIX C  
SUPPLEMENTARY INFORMATION

## MONTANA AND NATIONAL AIR QUALITY STANDARDS

Air quality standards have been developed at the national level for six classes of air pollutants and at the state level for nine pollutants plus visibility. Below is a synopsis of each of the pollutants.

Sulfur Dioxide - Sulfur dioxide originates from the burning of fossil fuels such as coal or oil. The pollutant is known for causing significant loss in crop yield, rusting metals, reducing visibility and irritation of eyes, nose, throat and lungs.

Particulate Matter - Particulate matter may originate from natural sources such as forest fires and erosion, or result from automobiles, industrial processes, unpaved roads, agriculture, construction and other human activities. These tiny particles can damage paint, reduce visibility, and carry poisonous chemicals into the lungs causing cellular damage.

Carbon Monoxide - Carbon monoxide is a by-product of the incomplete combustion of organic fuels. The most notorious source is the automobile. This odorless gas can, in small amounts, cause headaches, dizziness, fatigue and slow reactions. It can be especially dangerous for people with heart disease. In larger amounts it can cause death.

Photochemical Oxidants (Ozone) - Photochemical oxidants are produced in the atmosphere when hydrocarbons and nitrogen oxides, combustion wastes from gasoline and other fuels, are exposed to sunlight. Oxidants irritate the eyes, nose, and throat, make breathing difficult, reduce visibility, and damage vegetation.

Hydrocarbons - Hydrocarbons are the unburned chemicals from the combustion or evaporation of organic compounds. Automobile exhaust and uncontained storage of petroleum products are common sources of hydrocarbons. They have been known to cause vegetative damage and contribute to photochemical oxidants.

Nitrogen Oxides - Nitrogen oxides usually originate in high-temperature combustion processes including diesel engines. It is not only a component of photochemical oxidants, but causes an unpleasant smelling brown haze, and is irritating to the nose and throat.

Fluoride - Sources of fluorides include the aluminum, glass, brick, fertilizer and, to a smaller degree, the oil industries. In excessive amounts, fluorides can cause bone deformities and damage vegetation.

Lead - Lead in the air is generally the result of automobiles and ore smelters. Physical problems of high lead content include gastrointestinal cramps, central nervous system effects, kidney disease and anemia.

Hydrogen Sulfide - Sources of hydrogen sulfide, the "rotten egg" pollutant include sewage treatment, kraft pulp and oil industries. The pollutant can damage paint, tarnish copper, injure vegetation, produce a loss of the sense of smell, cause severe respiratory tract irritation and in large doses, cause death.

Visibility - Visibility reductions are due to the amounts of TSP, aerosols and gases present in the atmosphere.

# MONTANA AND NATIONAL AIR QUALITY STANDARDS

<u>POLLUTANT</u>	<u>MONTANA STANDARD</u>	<u>FEDERAL PRIMARY STANDARD</u>	<u>FEDERAL SECONDARY STANDARD</u>
Total Suspended Particulates	75 ug/m <sup>3</sup> annual average 200 ug/m <sup>3</sup> 24-hr average*	75 ug/m <sup>3</sup> annual geometric mean 260 ug/m <sup>3</sup> 24-hr average*	60 ug/m <sup>3</sup> annual geometric mean 150 ug/m <sup>3</sup> 24-hr average*
Sulfur Dioxide	0.002 ppm annual average 0.10 ppm 24-hr average* 0.50 ppm 1-hr average**	0.03 ppm annual average 0.14 ppm 24-hr average*	0.5 ppm 3-24 average*
Carbon Monoxide	9 ppm 8-hr average* 23 ppm hourly average*	9 ppm 8-hr average* 35 ppm 1-hr average*	9 ppm 8-hr average*
Nitrogen Dioxide	0.05 ppm annual average	0.05 ppm annual average	0.05 ppm annual average
Photochemical Oxidants (ozone)	0.10 hourly average*	0.12 ppm 1-hour average*	0.12 ppm 1-hr average*
Lead	1.5 ug/m <sup>3</sup> 90-day average	1.5 ug/m <sup>3</sup> calendar quarter average	None
Foliar Fluoride	35 ug/g grazing season average 50 ug/g monthly average	None	None
Hydrogen Sulfide	0.05 ppm hourly average*	None	None
Settled Particulate (Dustfall)	10 gm/m <sup>2</sup> 30-day average	None	None
Visibility	Particle scattering coefficient of $3 \times 10^{-5}$ per meter annual average***	None	None

\*Not<sub>3</sub> to be exceeded more than once per year  
 ug/m<sup>3</sup> = micrograms pollutant per cubic meter of sampled air  
 ppm = parts pollutant per million parts of sampled air  
 \*\*Not to be exceeded more than 18 times per year  
 \*\*\*Applies to PSD Class I areas

POTENTIAL WATER QUALITY DEGRADATION AND MITIGATING MEASURES ASSOCIATED WITH  
PROPOSED CENEX #13-11 STATE

<u>SITUATION</u>	<u>POLLUTANT</u>	<u>MITIGATING MEASURES</u>
1. Erosion on access road	Sediment	An existing access road will be used. Erosion potential will be reduced from present by the addition of drainage features and surfacing materials, and if reconstructed according to the road notes (Appendix C-6a).
2. Erosion from pad site	Sediment	<p>No defined surface drainage leaves the pad area, mitigating the potential for sediment delivery.</p> <p>Locate, design and construct the reserve pit so that surface water will not enter it, with the exception of runoff from the drillsite.</p> <p>A diversion ditch (3:1) will be constructed at the base of all cut slopes to divert surface water from flowing onto the site.</p>
3. Human waste disposal	Sewage	A septic system will be used for sewage disposal. The system will be pumped as needed and the entire system removed from the site upon completion of the operation.
4. Spill along access road	Petroleum Products Drilling Additives Reserve Pit Contents Completion Fluids	<p>Traffic will be controlled to avoid vehicles meeting on the narrow road.</p> <p>The road will be gravelled where needed to improve traction.</p> <p>The stream channel lying along the access road is intermittent. Surface drainage from this stream does not reach a perennial stream.</p> <p>Water from the reserve pit will not be spread on the road for dust abatement.</p>

<u>SITUATION</u>	<u>POLLUTANT</u>	<u>MITIGATING MEASURES</u>
4. Spill along access road (cont.)		For primary roads the situation would be similar to fuel hauling for other industrial activities, such as logging. Local emergency services agencies would be alerted.
5. Overflow of reserve pit, spill on pad site	Drilling fluids Drilling additives Produced water Petroleum products Completion fluids	<p>If the reserve pit is in danger of overflowing, the DSL will be notified immediately and CENEX will take appropriate remedial action to prevent environmental damages. A minimum of two feet of free board should be maintained at all times.</p> <p>The low permeability of the dense glacial deposits will limit downward movement of spilled fluids.</p> <p>Shallow groundwater contamination on the site will be protected by cementing the casing 20 feet or deeper to the surface.</p>
6. Seepage from reserve pit	Drilling fluids Drilling additives Produced water	<p>The reserve pit shall be constructed so as to be impervious.</p> <p>If it is judged that a pit liner is necessary, the liner shall be a weather resistant, heavy nylon mesh entwined in heavy plastic (minimum thickness 8 mil).</p> <p>The bedding for the liner shall be cleared of debris and rock to insure the liner will not be punctured.</p> <p>The liner will be inspected and approved by DSL prior to filling.</p> <p>If leakage is discovered outside of the pit, the DSL will be notified immediately and CENEX will take appropriate remedial action to prevent environmental damages.</p>

SITUATION

POLLUTANT

MITIGATING MEASURES

7. Reclamation of  
reserve pit

Drilling  
fluids  
Drilling  
additives  
Produced  
water  
Petroleum  
products

If well is a non-producer -  
Upon approval of the Oil and Gas  
Conservation Division, the liquid  
contents of the reserve pit shall  
be pumped down the hole to a  
level where produced water  
originated.

If the solid contents of the pit  
contain deleterious substances  
that may impair water quality,  
the solid contents of the pit and  
the liner shall be removed from  
the tract and responsibly  
disposed of at an appropriate  
landfill.

If well is a producer -  
The liquid contents will be  
allowed to evaporate or hauled  
from the site to a suitable,  
approved disposal site. The  
solid contents would be disposed  
of as above.

8. Blowout

Petroleum  
products  
Produced  
water

Blowout protection will be  
installed when installation of  
the surface pipe is completed.

In case of blowout, the spill  
contingency plan will be  
implemented.

9. Reclamation of the  
pad site

Sediment

If the well is a non-producer -  
The entire site will be  
recontoured to near natural grade  
and topsoil spread. Some local  
erosion is anticipated prior to  
establishment of plant cover.

The surface of the pad should be  
ripped prior to recontouring to  
eliminate the slip plane.

Fill should be compacted in six  
to eight inch lifts.

The ephemeral draw in the  
southeast corner of the pad will  
be reshaped.

If the well is a producer -  
A portion of the site will be  
reclaimed as stated above.



# Baseline Surface Water Quality Data - Streams in the Vicinity of Cenex #13-11 State

Surface water samples were collected on June 19, 1984 at five sites on two streams draining the vicinity of the proposed oil well (see map for sample locations) The lab analysis was completed by Dr. Richard Juday, Chemistry Department, University of Montana. The physical parameters indicate high quality water with low levels of dissolved and suspended solids. These values are consistant with other data from the area, based on unpublished data collected by DSL on Coal Creek and Stillwater State Forests.

## FIELD MEASUREMENTS

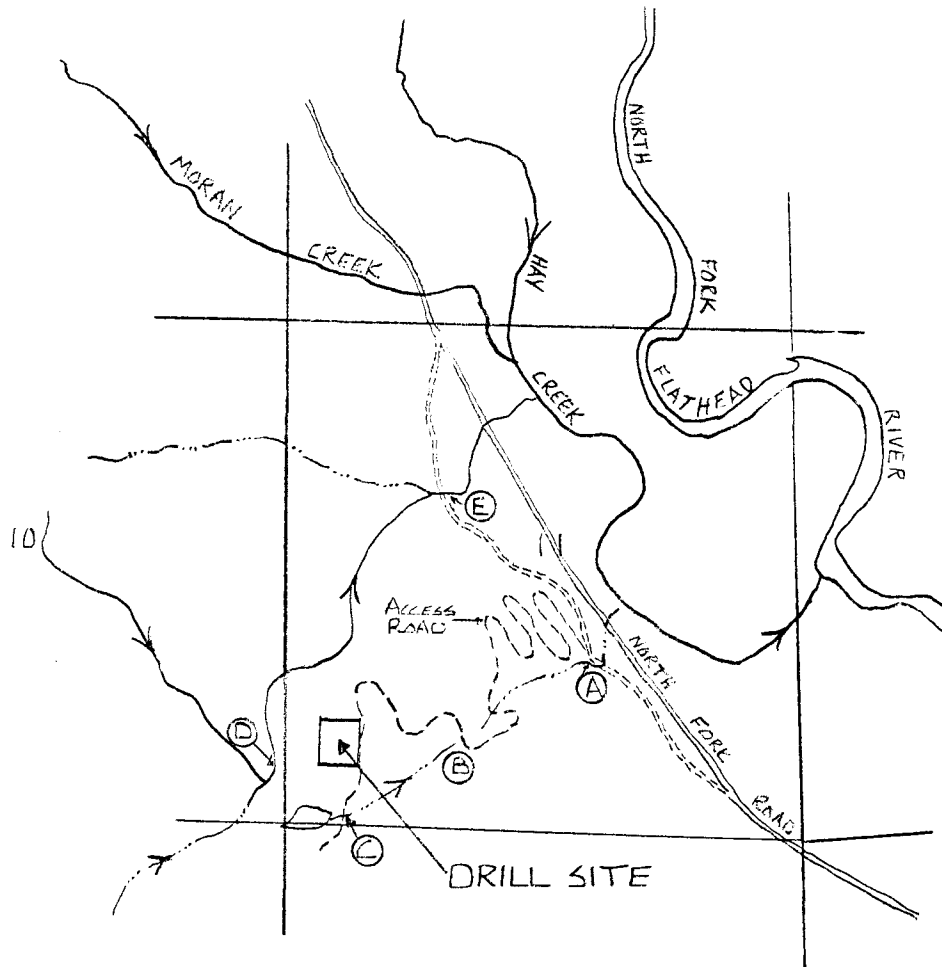
	Discharge (cfs)	Conductivity (umhos/cm)	Hardness (mg/l)	Alkalinty (mg/l)
CENEX A	<.1	128	68	86
CENEX B	<.1	70	34	51
CENEX C	<.1	50	34	51
CENEX D	0.5	142	68	86
CENEX E	0.75	160	86	103

## LABORATORY MEASUREMENTS

Sample	(mg/l)												
	pH	BICARBONATE measured	BICARBONATE calculated	CHLORIDE	SULFATE	NITRATE-N	PHOSPHATE-P	CALCIUM	MAGNESIUM	SODIUM	POTASSIUM	TOTAL DISSOLVED SOLIDS	TOTAL SUSPENDED SOLIDS
CENEX A	8.0	76.8	75.9	0.27	2.0	0.017	0.006	14.0	5.7	2.2	0.9	101.9	9.7
CENEX B	7.6	40.8	41.3	0.58	<1	0.009	0.018	6.2	3.5	1.7	0.7	53.5	9.9
CENEX C	7.0	29.0	31.5	0.30	<1	0.005	0.040	5.2	2.6	1.2	0.2	38.5	8.7
CENEX D	8.0	79.8	78.2	0.28	5.4	0.018	0.006	15.1	6.8	1.6	0.4	109.4	3.0
CENEX E	8.1	91.6	91.1	0.12	7.0	0.011	0.006	17.6	7.8	2.3	0.5	126.9	4.9

# SURFACE WATER SAMPLE LOCATIONS

SECTION 10&11 T34N R21W



①----- MONITORING SITE

## WATER QUALITY MONITORING PLAN

DSL should require water quality to be monitored by CENEX as described below to substantiate whether or not impacts occur, thereby triggering prompt action in case of contamination.

### Surface water monitoring:

Locations: A, B, D, E (see map accompanying baseline data).  
Frequency: Monthly during drilling except at snowmelt runoff, then once every 2 weeks.  
Parameters: Discharge (cubic feet per second)  
Total suspended solids  
pH  
Conductivity (umhos/cm)  
Calcium (Ca)  
Magnesium (Mg)  
Sodium (Na)  
Potassium (K)  
Bicarbonate ( $\text{HCO}_3$ )  
Carbonate ( $\text{CO}_3$ )  
Chloride ( $\text{Cl}$ )  
Sulfate ( $\text{SO}_4$ )  
Hardness (mg/l- $\text{CaCO}_3$ )  
Alkalinity (mg/l- $\text{CaCO}_3$ )  
Total dissolved solids  
Trace metals - As, Cd, Pb, Hg, Zn, Cu, Fe  
Oil and grease

All parameters reported in milligrams per liter, unless otherwise noted.

Sampling and measurement techniques will be according to standard methods. Laboratory work will be completed by an EPA approved laboratory.

A minimum of 2 baseline samples from each station prior to the start of oil well drilling is required. The results of monitoring should be forwarded immediately to the Department of State Lands, Northwestern Land Office. A maximum two week time period is suggested for obtaining the results.

ROAD CONSTRUCTION NOTES  
CENEX OIL AND GAS EXPLORATORY WELL 13-11

P I	STATION	NOTES
1		
2		
3	13+19 <sup>5</sup> 14+40	-Install 18"x30' CMP -12" gravel lift 50' either side of corregate metal pipe (CMP) -This is the seep that drains from the south edge of the operating pad.
4		
5		
6		
7	19+22 <sup>5</sup>	-Remove trees 5-8' back from top of cutslopes greater than 5 ft. high from P.I.7 to P.I.8
8	21+57 <sup>2</sup> 21+70	-Existing 18" CMP - ok
9	23+95 <sup>5</sup>	-Existing 36" CMP - ok -Proposed turnout location - Unacceptable Widening will encroach on creek channel.
10		
11		

P I	STATION	NOTES
12	29+03 <sup>8</sup>	-Straighten road alignment (P.I. 11-12) and widen road to improve turnout (P.I. 12-13).
13	30+01 <sup>9</sup>	-Existing turnout location - ok -Remove trees 5'-8' back from top of cut from P.I. 13-15.
14		
15	33+35 <sup>6</sup>	-Existing CMP - ok -Remove woody debris above and below CMP. Rock CMP outlet with approximately 1 cu. yard 1'-2' rock. -Proposed turnout location - Unacceptable Widening will infringe on creek channel.
	33+50	-Start cutslope failure. -Do not widen road in this segment, clean out ditch. Cut trees (greater than 4" DBH) 5-8' above cutslope failure.
	33+55	-End cutslope failure.
16		
17	38+00	
	39+25	-Install 18"x26' CMP (skew) with catch basin
18	39+91 <sup>1</sup>	
	41+00	-Approximate start of reconstruction to avoid road failure.
19	42+21 <sup>8</sup>	-Proposed turnout location - No widening allowed. -Switchback will be reconstructed to avoid slump. -Route ditch drainage as far north and west as possible to avoid draining water onto slumps above lower road.

P I	STATION	NOTES
	41+50	-Start of road fill failure. Begin full bench road with ditch, do not sidecast material. Blade excavated material to inside of switchback at P.I.21.
	42+32	-End of road fill failure.
20	45+13 <sup>5</sup>	-Reconstruction to avoid failure ends approximately here.
21	46+70 <sup>0</sup>	-Existing turnout - ok. Grade ditch and road prior to gravelling. Aggregate surfacing required sta. 46+70 to 98+92. Prefer to apply a minimum of 9" (compact depth) of crushed or angular fractured rock of 3" minus size. Application of pit-run, subrounded gravels will require a 12" (compact depth) of 3" minus size material. Aggregate will not contain over 15% oversize rock and material will be suitable with the DSL. Additional gravel application may be required. Road materials are to be compacted to 90% of optimum.
22 to 26		-Maintain existing road width. Minimize bank cutting when blading ditch due to marginal slope stability.
23	52+59 <sup>2</sup>	-Proposed turnout - No excavation of cutslope allowed. Will have to haul material in if needed.
24		
25		
26	60+11 <sup>7</sup>	-Proposed turnout location - Unacceptable Widening will infringe on creek channel.
27		

P I	STATION	NOTES
28	66+36 <sup>8</sup>	-Existing turnout - ok Minimize road cut due to potential instability.
29	71+35 <sup>2</sup> 71+50	-Install 18"x34' CMP with catchbasin.
30	72+35 <sup>2</sup>	-Cut ridge on cutslope back to 1:1.
31	75+50 <sup>5</sup> 76+25 78+13	-Existing CMP (damaged), remove and install 18"x30' CMP with catchbasin. -Install 18"x34' CMP with catchbasin.
32	78+90 <sup>2</sup> 79+64	-Install 18"x30' CMP with catchbasin.
33		
39		-End aggregate surfacing. -End Reconstruction Project.

## ROAD MATERIAL ANALYSIS

Location: NW $\frac{1}{4}$  SE $\frac{1}{4}$  Section 11, T34N, R21W

Road Station: 72+35

Sample description: Fine grained soil with few coarse fragments formed in Kishenehn siltstone. Typical soil material from sta. 42+2 to 86+09

Sieve analysis:	<u>Sieve Size</u>	<u>Percent Passing</u>
Coarse gravel	1"	100
Coarse & medium sands	4M	99
Fine sands	40M	96
Fines, silt & clay	200M	93.2

Gravel factor = 1

Traffic index = 5.6

R-value at equil = 45

Unified Soil Classification: ML, inorganic silts, non-plastic

Poor subgrade material requires proper drainage and aggregate surfacing.

Engineering analysis by Montana Dept. of Highways, Helena



# CLIMATIC DATA AT POLEBRIDGE

Beginning Year 1933  
Ending Year 1976

POLEBRIDGE  
Station Number 6615  
Elevation: 3,690 Feet

Lat. N. Long. W.  
48° 47' 114° 16'

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov frost	Dec
Ave Mean Monthly Temp.	17.19	22.88	28.50	38.75	48.29	54.81	(60.89	59.34	50.67	40.49)	28.78	21.75
Ave Total Precip.	3.11	2.11	1.59	1.42	1.69	2.29	( 1.18	1.34	1.35	1.95)	2.35	2.92
Ave Total Snowfall	36.55	22.60	13.31	3.99	0.54	0.38	0.00	0.00	0.36	3.86	16.83	27.10

Snowplowing needed November through April

Low precip., high temp.  
months preferred for top-  
soil stockpiling and road  
construction.

# Base-Line Analysis of soils at proposed drill site

Padon: 84-MT-1524 (Coal Creek)

Particle Size Date: August 1984

Sample No.	Horizon	Depth		pH paste	EC*10 <sup>3</sup>	% Water at Saturation	Water Content		Available		Distribution (aa)			Gravel & Stone	
							1/3	15	Water	TS	TSi	TC	>2 aa	Textural	
							Bar	Bar	Capacity	2-0.05	0.05-0.002	<0.002	wt.	Classes	
		in.	cm.	mhos/cm		%		%		%		%			
JC-19	B2	0-10	0-25	5.90	0.06	71.3	38.3	17.0	21.3	34.0	55.0	11.0	32	Gr. silt loam	
JC-20	IIA2	10-19	25-48	5.75	0.24	22.8	17.3	4.9	12.4	34.0	47.0	19.0	51	Gr. loam	
JC-21	II B2tx	25-37	63-94	5.95	0.10	29.6	13.7	10.2	3.5	28.0	42.0	30.0	76	V. gr. clay loam	
				Medium Acid Soil	Very low salinity	Moisture retention greatest in topsoil				Percent clay & gravel increase with depth					

Inherent fertility is low

Moderate base status      Organic matter high in topsoil      very low nitrogen

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	Available
	Ca	Mg	Na	K	H		Saturation					Fraction	NaF pH
	meq/100 gas						%		%		ratio		ppm
JC-19	1.63	0.56	0.04	0.39	23.46	20.0	10	4.04	2.35	0.125	19	0.68	10.94
JC-20	1.80	0.63	0.02	0.08	2.12	3.9	54	0.26	0.15	0.014	11	0.49	8.13
JC-21	5.48	2.11	0.05	0.15	3.45	9.3	69	0.39	0.23	0.021	11	0.24	8.58

Remarks: CEC's were leached with 10% acidified NaCl.  
CEC's and TKN's were run on the Technicon Autoanalyzer.  
Cations were run on the ICP.  
Sum of cations/sum of cations + H = BSP.

Analysis by: Mike Fritts

Analysis by: A. Falen

Samples are in the process of analysis for Barium, Total Chromium, and Chloride

# FOREST FIRE REGULATIONS

Applicable To All Operations, Including Camping, On Forested Lands Within Montana

Violation of any Montana forestry law or of any rule promulgated by the Montana Department of State Lands, Division of Forestry, under authority of Section 76-13-109 MCA, is an offense punishable by fine or imprisonment, or both.

**RULE I FIREFIGHTING EQUIPMENT REQUIRED.** (1) Except when in designated improved campgrounds or when traveling as a pedestrian, all persons or parties igniting campfires or warming fires on forested lands shall be equipped with a serviceable shovel and bucket as follows:

(a) a shovel 24 inches (60.96 centimeters) in length, blade width 6 inches (15.24 centimeters); and

(b) a bucket, capacity 1 gallon (3.785 liters) (motorcycle crash helmets qualify).

(2) The requirement of subsections (1) (a) and (1) (b) apply to all operators of motorcycles, trail bikes, and similar type vehicles and persons traveling with pack animals.

(3) Other mobile or stationary power equipment, including trucks of 23,000 GVW or greater, engaged in commercial activities must be equipped with one operable fire extinguisher of a dry chemical type of not less than 2½ pound (1.125 kilogram) capacity with 4BC or higher rating.

(4) Power saw operators shall maintain in their immediate possession a fully charged operable fire extinguisher and a serviceable round pointed No. 0 shovel or larger. The extinguisher shall be a liquid chemical type of at least 8 ounces (224 grams) capacity or a dry chemical type of at least 1 pound (0.454 kilograms) capacity.

**RULE II VEHICLE EXHAUST AND SPARK ARRESTER REQUIREMENTS.**

(1) All internal combustion engines operated on forested lands must be equipped with an approved and effective spark arresting device.

(2) Motorbikes, trail cycles, scooters and other vehicles of this type, all stationary and mobile power equipment, and heavy duty trucks of 23,000 GVW or greater must be equipped with spark arresting devices listed as approved in the U.S. Forest Service Spark Arrester Guide. Spark arresting devices must be plainly marked with the manufacturer's name and model number and must be properly installed and maintained in accordance with the guide. Heavy duty trucks may have a vertical stack exhaust system and muffler, provided the exhaust stack extends above the cab of the vehicle.

(3) Power saws must be equipped with a muffler and screen type spark arrester in accordance with the standards set forth in the U.S. Forest Service Spark Arrester Guide. Power saws used in commercial activities and purchased after December 31, 1980, must also be equipped with a muffler system conforming to the Society of Automotive Engineers Standard J-335b, as set forth in the U.S. Forest Service Spark Arrester Guide.

(4) Exhaust driven turbochargers qualify as efficient spark arresters provided all exhaust gases pass through the turbine impeller. The turbine impeller must be turning at all times and there may be no exhaust bypass. A straight-mechanical-driven supercharger does not qualify.

(5) Automobiles and light trucks of GVW less than 23,000 with complete standard exhaust systems properly mounted and maintained, including a baffle-type muffler and tailpipe through which all exhaust gases pass, also qualify.

**RULE III FIRE TOOLS.** All persons, firms, or corporations engaged in any forest product harvesting operation on forest lands shall have hand tools available for firefighting purposes. There shall be at least one shovel (round pointed No. 0 or larger) and one pulaski tool for each two persons employed at the site of the activity. Each vehicle used in a commercial activity shall carry a shovel (round pointed No. 0 or larger) and either an axe or a pulaski tool. All tools shall be in good condition and immediately accessible for firefighting purposes. Substitution of other types of hand tools to provide increased efficiency or effectiveness may be made by mutual written agreement between a person, firm, or corporation and the recognized fire protection agency having jurisdiction.

**RULE IV CORRECTION OF HAZARDS AND PATROLLING.** (1) Whenever in the judgment of a recognized agency as defined in 76-13-102(11), MCA, a dangerous fire hazard or risk exists, the agency may require that any industrial operation, burning, outdoor welding, blasting, or other activity known to cause fires be halted until such hazard or risk is removed, abated or corrected.

(2) The recognized agency during periods of high fire danger may require any party engaged in activities within the forest lands to designate an able individual in their employment as a patrolman whose duties shall be to patrol the operation as specified by the recognized agency, extinguish small fires, and report immediately all fires to the recognized agency.

**RULE V FIRE CREW.** On all crew operations of 10 or more employees on forest lands, all persons, firms, or corporations responsible for the operations shall designate, train, and equip a fire crew and crew boss to take immediate initial action to suppress any fire starting on the operation area, and to report immediately all fires to the recognized agency. The designated crew boss shall have the power to act for his employer during fire suppression activities.

**RULE VI SMOKING AND LUNCH FIRES.** (1) Smoking is prohibited on all operations on forest lands except at safe places free of flammable material, e.g., a cleared area such as a road or skid trail. Smoking while walking, riding horses, motorbikes or bicycles, or other unenclosed equipment and conveyances is prohibited.

(2) Lunch and warming fires shall be limited to cleared or bare areas, and such fires may not be allowed to spread or be left unattended until completely extinguished.

**RULE VII DEBRIS DISPOSAL.** (1) The operator, owner, or resident of any camp, wood processing plant, establishment, or residence located upon or within forested lands shall dispose of any accumulation of flammable debris that in the judgment of recognized agency constitutes a fire hazard.

(2) Operators of sawmills or other wood processing plants erected or operated during the fire season on or immediately adjacent to forest lands may not begin sawing or other utilization operations until the recognized agency is satisfied that conditions surrounding the mill are such or have been made such that sparks from the operation will not set fires in the adjacent forest areas.

(3) Prior to each fire season, all persons, firms, or corporations creating or responsible for sawmill waste within the forest areas will treat, dispose of, remove, or reduce the hazard created until the recognized agency is satisfied that such accumulation of sawmilling waste does not constitute a fire hazard.

(4) In the event that burning is the disposal method selected, the piles shall be prepared for burning by cribbing the base with slabs. The recognized agency shall determine when and how the piles will be burned.

(5) During the fire season, flammable material and debris may not be burned, except under a written fire permit issued by the recognized agency for that forested land. All burning must be carried out in accordance with the Department of Health and Environmental Sciences' open burning restrictions.

**RULE VIII POWERLINE INSPECTIONS.** All persons, firms, or corporations who own, control, operate, or maintain electrical transmission or distribution lines shall, prior to the beginning of the fire season each year, inspect said powerlines for fire hazards and risks, correct the fire hazards and risks found, and inform the recognized agency that necessary remedial actions have been accomplished.

**RULE IX FOREST ACTIVITY RESTRICTIONS.** In areas designated by public proclamation by the Administrator, Division of Forestry, as areas of high fire hazard, the Administrator may request all persons, firms, or corporations present or engaged in any activity in the areas to voluntarily cease operations or to adjust working hours to less critical periods of the day. In the event such a request is refused, the Administrator may issue a written order directing compliance.

**RULE X FOREST CLOSURE.** (1) During periods of dangerous fire conditions, no person may enter or be upon those forest lands designated by public proclamation by the Governor of the State of Montana as areas of dangerous fire hazard except under written permit issued by a recognized agency.

(2) Permits to enter upon such areas during the closure may be issued by the recognized agency upon a showing of real need by the applicant. Permits may be issued to those persons having actual residence as a permanent or principal place of abode in the forest lands designated or to persons engaged in non-fire hazardous employment.

(3) However, no permit may be required of persons engaged in either fire-fighting, fire prevention, or law enforcement who are engaged in official business.

**RULE XI REQUEST FOR REVIEW.** If any operator believes that in his case any requirement of a recognized agency is excessive, the operator may request the Administrator, Division of Forestry, to review the requirements. If in the opinion of the Administrator any or all are not necessary in the interest of public safety, he may make such changes as he considers advisable.

**RULE XII APPLICABILITY.** The forest fire rules, Rule I through Rule XI, are in effect each year during the forest fire season May 1st to September 30th inclusive, or any legal extension thereof. Requirements pertaining to motor vehicles do not apply to those being operated solely on roads that are a part of federal or State maintained highway systems or on any paved public road.

AS REVISED JANUARY 1983

## WARNING

These regulations have been established by the Department of State Lands, Division of Forestry for your own protection and your benefit.

Carelessness or negligence may also make you liable for damages to the owners of land and timber damaged or destroyed.

Protect your forests—protect your pocketbook—be cautious! Prevent Fire!

F203

C-10

DEPARTMENT OF STATE LANDS,  
DIVISION OF FORESTRY

FORM NO. 1008

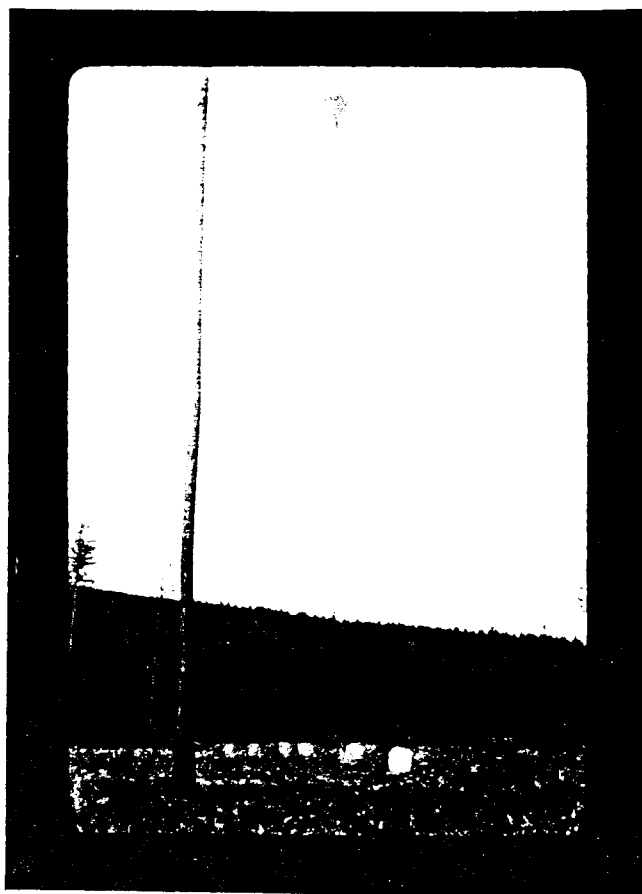
ELEMENTS TO BE INCLUDED IN BEAR CONFLICT CONTINGENCY PLAN  
(PROPOSED EXHIBIT L OF CENEX #13-11 STATE-ANNUAL OPERATING PLAN).

1. Responsibilities and Duties - (CENEX will define which individuals at the project site are responsible for each or all elements of the plan, unless stated).
2. DSL will provide CENEX written material to educate exploration workers on grizzly bear and black bear identification, behavior, precautions to avoid conflicts, appropriate actions, and lawful penalties for illegal killing of grizzly bears. CENEX will distribute this information to all contractors and employees associated with the project, and also post it at the site.
3. All observed bear activity on or near the site will be immediately reported to:
  - a. Department of Fish, Wildlife and Parks Regional Headquarters - Biologist Jim Cross - 755-5505.
  - b. DFWP Game Warden Dave Wedum - 862-5201 (res.)  
or Warden Captain Louis Kis - 257-2951 (res.)
4. Bear reporting will include:
  - a. Type of observation - sighting, sign, disturbance activity.
  - b. Species - grizzly or black (if known).
  - c. Time of day or night.
  - d. Behavior - what bear was (is) doing.
  - e. Action taken, if any.
5. In case of human injury:

FIRST AID - Polebridge Ranger Station, Glacier National Park - 888-5416

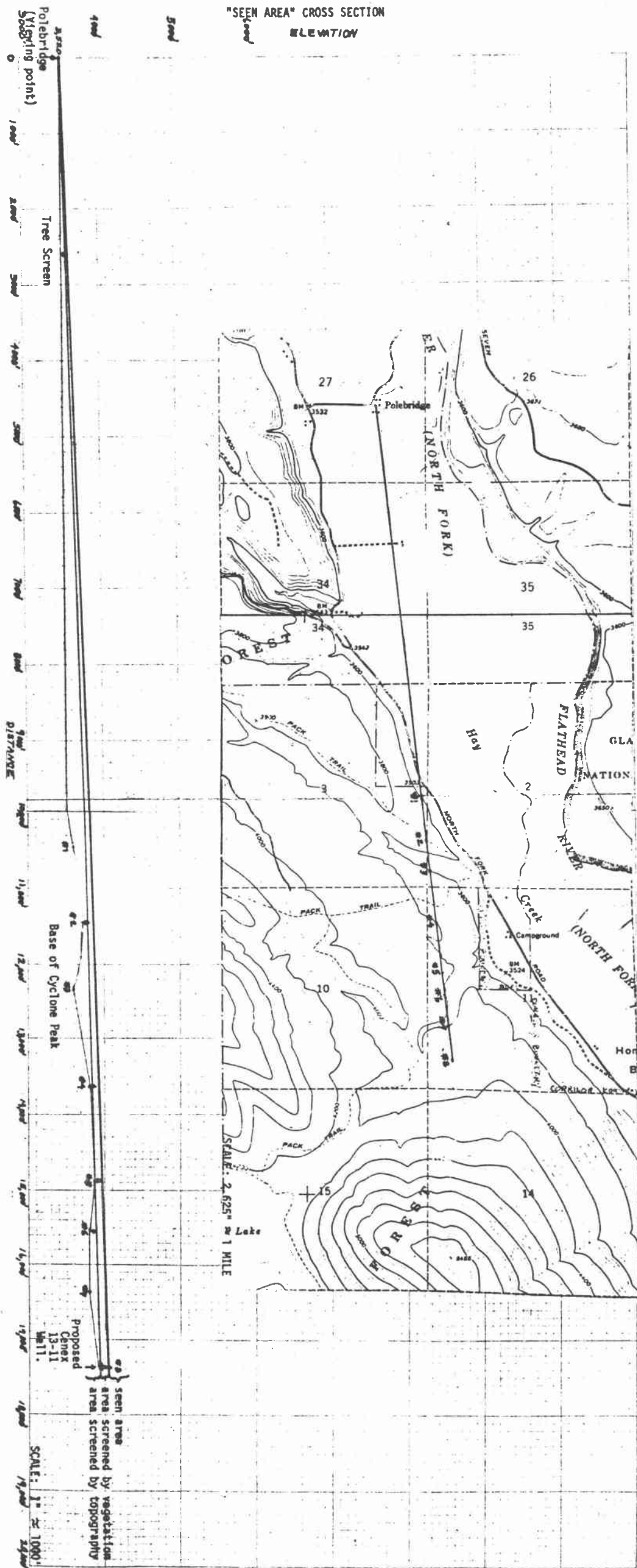
ALERT AIR AMBULANCE - Kalispell - 257-8989

## PROPOSED WELL SITE



Proposed Cenex 13-11 well site located in existing seed tree timber harvest unit. Note the placement of seven 44" x 30" flourescent panel markers depicting the pad and a 143' high helium balloon to depict drill mast height,

"SEEN AREA" CROSS SECTION  
ELEVATION





Drill site

General viewing locations

General North Fork Flathead River locations offering short duration viewing of the proposed Cenex drill pad and rig.

## MEMORANDUM OF UNDERSTANDING FLATHEAD WILD AND SCENIC RIVER

WHEREAS, Public Law 94-486, October 12, 1976, amended Public Law 9-542 ("The Wild and Scenic River Act"), October 2, 1968 designating the Flathead River as part of the National Wild and Scenic River System; and

WHEREAS, the Flathead Wild and Scenic River Management Zone managed by the Forest Service, United States Department of Agriculture contains approximately 1,100 acres of state school trust land, classified as timber land, managed by the Montana Department of State Lands under the supervision of the Board of Land Commissioners; and

WHEREAS, the purpose of state school trust land is to provide income for support of Montana's Schools (Enabling Act, Section 10, Constitution of Montana, Article X) under the multiple-use management concept (77-1-203-MCA); and

WHEREAS, the Forest Service and the National Park Service have management responsibilities for federal lands within the classified Flathead Wild and Scenic River; and

WHEREAS, the above parties have previously agreed to develop a memorandum of understanding to attempt to provide for coordinated management of Flathead Wild and Scenic River resources.

NOW, THEREFORE, IT IS MUTUALLY AGREED AS FOLLOWS:

1. The parties agree that within the designated River Corridor the Montana Department of State Lands shall:
  1. Recognize the Forest Service role in the management of the Flathead Wild and Scenic River System, but shall retain complete management jurisdiction of State lands.
  2. Review Department of State Lands management plans or projects with the designated Forest Service Ranger District prior to action.
  3. Recognize that management activities may be evident in the foreground area as viewed from the river itself and to the extent possible, blend such activities into the landscape in a manner so as not to draw attention to the activity.
  4. Meet with appropriate Forest Service representatives to attempt to solve problems concerning adverse impacts upon State lands.



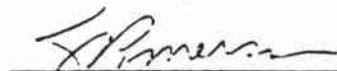
5. Comply with State laws and objectives governing resource management activities and endeavor to minimize impacts to the resource to the extent possible, consistent with income production objectives.
  6. Meet with the Forest Service and other interested agencies to review existing problems and activities in the river corridor as the need arises.
- II. It is mutually agreed that outside the designated river corridor (North Fork Flathead River) and within the area viewed by the river user the Montana Department of State Lands will consider visual quality on a project basis if consistent with School Trust Land management objectives.
- III. The Forest Service recognizes the management authority and objectives of the Montana Department of State Lands and agrees to consult the Department concerning action in the river corridor which may affect State land. It is recognized that recreational use of State land is unauthorized and may be prohibited.

BE IT FURTHER RESOLVED, that the Montana Department of State Lands and the Forest Service agree to periodically review this memorandum and make mutually agreed upon revisions. Either party may terminate its participation under this Memorandum of Understanding by giving at least 90 days prior written notice.

DATE 10 - 7 - 82

  
\_\_\_\_\_  
Commissioner, Department of State Lands

DATE 10/19/82

  
\_\_\_\_\_  
Supervisor, Flathead National Forest

SUMMARY OF NOISE LEVELS IDENTIFIED AS REQUISITE TO PROTECT PUBLIC HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY.

<u>Effect</u>	<u>Level</u>	<u>Area</u>
Hearing loss	$L_{eq} \geq 70$ dBA	All areas.
Outdoor activity, interference and annoyance	$L_{dn} \geq 55$ dBA	Outdoors in residential areas, farms, and other areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq} \geq 55$ dBA	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \geq 45$ dBA	Indoor residential areas.
	$L_{eq} \geq 45$ dBA	Other indoor areas with human activities, such as schools, etc.

\*In this appendix,  $L_{eq}$  refers to a 24-hour equivalent sound level; this is the constant sound level that has the same sound energy as a time-varying sound would over a 24-hour period.  $L_{dn}$  is a 24-hour equivalent sound level in which the nighttime (10:00 p.m. to 7:00 a.m.) sound levels are increased by 10 decibels to account for the added annoyance due to sleep interference.

# DECIBEL RATINGS OF SOME COMMON NOISES

## TYPICAL DECIBEL

## DANGEROUS TIME EXPOSURE



0 Lowest sound audible to human ear.

30 Quiet library, soft whisper

40 Quiet office, living room, bedroom away from traffic



50 Light traffic at a distance, refrigerator, gentle breeze

60 Air conditioner at 20 feet, conversation, sewing machine.

70 Busy traffic, office tabulator, noisy restaurant. *At this level, noise may begin to affect hearing if you are constantly exposed*

Critical level begins.



80 Subway, heavy city traffic, alarm clock at two feet

More than 8 hours.

90 Truck traffic, noisy home appliances, shop tools, lawn mower. *As loudness increases, the safe time exposure decreases.*

Less than 8 hours.



100 Chain saw, boiler shop, pneumatic drill. *Exposure may be dangerous at 100 dB, and with every 5 dB increase, the "safe time" is cut in half.*

2 hours.

120 Rock band concert in front of speakers, sandblasting, thunderclap. *At 120 dB, exposure can injure the ear.*

Immediate danger.

140 Gunshot blast, jet plane. *Noise at 140 dB may cause actual pain in the ear.*

Any length of exposure time is dangerous.



180 Rocket pad during launch. *Without ear protection, noise at this level causes irreversible damage.*

Hearing loss inevitable.

Decibels are not measured in normal linear arithmetic, in which the values simply add together. In a linear distance scale, for instance, 20 feet is twice as long as 10 feet, and 30 feet is three times 10 feet. Because the range of human hearing is so great—chain saw noise, for instance, has 10 million times the sound intensity of a whisper—a linear scale would be cumbersome. To get around this problem, decibels are measured logarithmically. The mathematical formula is complex, but simply stated it means that each increase of 10 dB indicates a tenfold increase in sound intensity. Thus, 30 dB has 10 times the intensity of 20 dB, 40 dB has 100 times the intensity of 20 dB, and so forth. In this compressed scale, a whisper would be measured at about 30 dB, while a chainsaw would be about 100 dB.

Even though a 10-dB increase means the sound intensity has increased 10 times, our ears don't hear it that way, explains industrial hygienist Julian Olishifski. "If you introduce a tone, then start turning up the volume, an ordinary person would require a 10-decibel increase before he'll say it's twice as loud," Olishifski says. "In other words, to the average person, 40 dB would sound twice as loud as 30 dB, and 110 would sound twice as loud as 100 dB." ■

Chart courtesy of American Academy of Otolaryngology—Head and Neck Surgery, Inc.

**"A" WEIGHTED SOUND LEVELS OF VARIOUS NOISES FOUND IN DIFFERENT ENVIRONMENTS**

Sound Level, dBA	Industrial (& Military)	Community (or Outdoor)	Home (or Indoor)
- 130 -	Armored Personnel Carrier (123 dB)		
- 120 - Uncomfortably Loud	Oxygen Torch (121 dB) Scraper-Loader (117 dB) Compactor (116 dB)		
- 110 -	Riveting Machine (110 dB) Textile Loom (106 dB)	Jet Flyover @ 1000 ft. (103 dB)	Rock-N-Roll Band (108-114 dB)
- 100 - Very Loud	Electric Furnace Area (100 dB) Farm Tractor (98 dB)	Power Mower (98 dB) Compressor @ 20 ft. (94 dB)	Inside Subway Car-35 mph (95 dB)
- 90 -	Newspaper Press (97 dB) Cockpit-Prop Aircraft (88 dB)	Rock Drill @ 100 ft. (92 dB) Motorcycles @ 25 ft. (90 dB)	Cockpit-Light Aircraft (90 dB)
- 80 - Moderately Loud	Milling Machine (85 dB) Cotton Spinning (83 dB) Lathe (81 dB)	Propeller Aircraft Flyover @ 1000 ft. (88 dBA) Diesel Truck, 40 mph @ 50 ft. (84 dB)	Food Blender (88 dB) Garbage Disposal (80 dB)
- 70 -	Tabulating (80 dB)	Diesel Train, 40-50 mph @ 100 ft. (83 dB)	Clothes Washer (78 dB) Living Room Music (76 dB)
- 60 -		Passenger Car, 65 mph @ 25 ft. (77 dB)	Dishwasher (75 dB)
- 50 - Quiet		Near Freeway-Auto Traffic (64 dB)	TV-Audio (70 dB) Vacuum (70 dB)
- 40 -		Air Conditioning Unit @ 20 ft. (60 dB)	Conversation (60 dB)
- 30 - Very Quiet		Large Transformer @ 200 ft. (53 dB)	
- 20 -		Light Traffic @ 100 ft. (50 dB)	
- 10 - Just Audible			
- 0 - Threshold of Hearing (1000-4000 Hz)			

**Note:** Unless otherwise specified, listed sound levels are measured at typical operator-listener distances from source. Noise readings taken from general acoustical literature and observations by PHS.

# DEPARTMENT OF STATE LANDS

## Survey Report

1. Project Name: CENEX Well near the North Fork of the Flathead River

2. Project Description: CENEX Company proposes to drill a well in the Coal Creek State Forest. This will be the first well drilled in this area. The site is near the border of Glacier National Park. The SW end of the well pad will be lowered 28 feet and the soil used to create a level area for the well pad.

3. Location: (attach photocopy of Quad portion) with survey routes indicated

Flathead County, T34N, R21W, Section 11, SW $\frac{1}{4}$

4. USGS Quad: Cyclone Lake, Mont. 7.5 1966

5. General Environmental Description (topography, flora, fauna):

The site is situated on a flat NE facing slope overlooking the North Fork of the Flathead River. The general area is timber land; however the drill site was clearcut in 1979. Currently, seedling trees, grasses, small bushes, etc. grow on the site area. The North Fork is approximately 1 mile to the NE, Cyclone Lake is about 1 $\frac{1}{4}$  miles to the SW and two unnamed small drainages flow down either side of the drill site.

6. File Search Results:

SHPO file search results were negative.

7. Field Methods & Justification (include why some areas were not covered):

The 5 acre well pad was staked at the time of the survey. Due to the sensitive nature of this project, a very careful survey was conducted. Four (4) transects were made in SW-NE direction, about 50m apart. Three (3) shovel tests were done.

#1 Along the SW edge of proposed pad, about 20 feet to the right of center.

0 - 6 in. disturbed material  
6" - 1'6" light brown silt-clay  
1'6" - light gray silt-clay

No cultural material.

#2 Half way down the proposed pad, just left of center.

0 - 4 in. disturbed material  
4" - 1'4" light brown silt-clay  
1'4" - light gray silt-clay

No cultural Material.

#3 Fairly close to the NE edge, several feet to left of center.

0 - 1.5 in disturbed material  
1½" - 11½" light brown silt-clay  
11½" - light gray silt-clay  
No cultural material.

A test pit several feet deep (dug to test water seepage) repeated the soil sequence in my shovel test units. A small layer of disturbed material, then about 1 foot of lt. brown soil and then the light gray soil which continued to the bottom of this test unit. No cultural materials were noted in the unit or in the fill pile.

The road cut near the NE edge was checked and again no cultural materials were noted.

8. Cultural Resources recorded:

None.

9. Recommendations:

Project cleared to proceed from the cultural resources perspective.

10. Recorder: Dori Passmann

11. Date: 6/28/1984

APPENDIX D  
EXHIBITS FROM CENEX  
ANNUAL OPERATING PLAN



R21W

EXHIBIT "B"

TO ANNUAL OPERATING PLAN

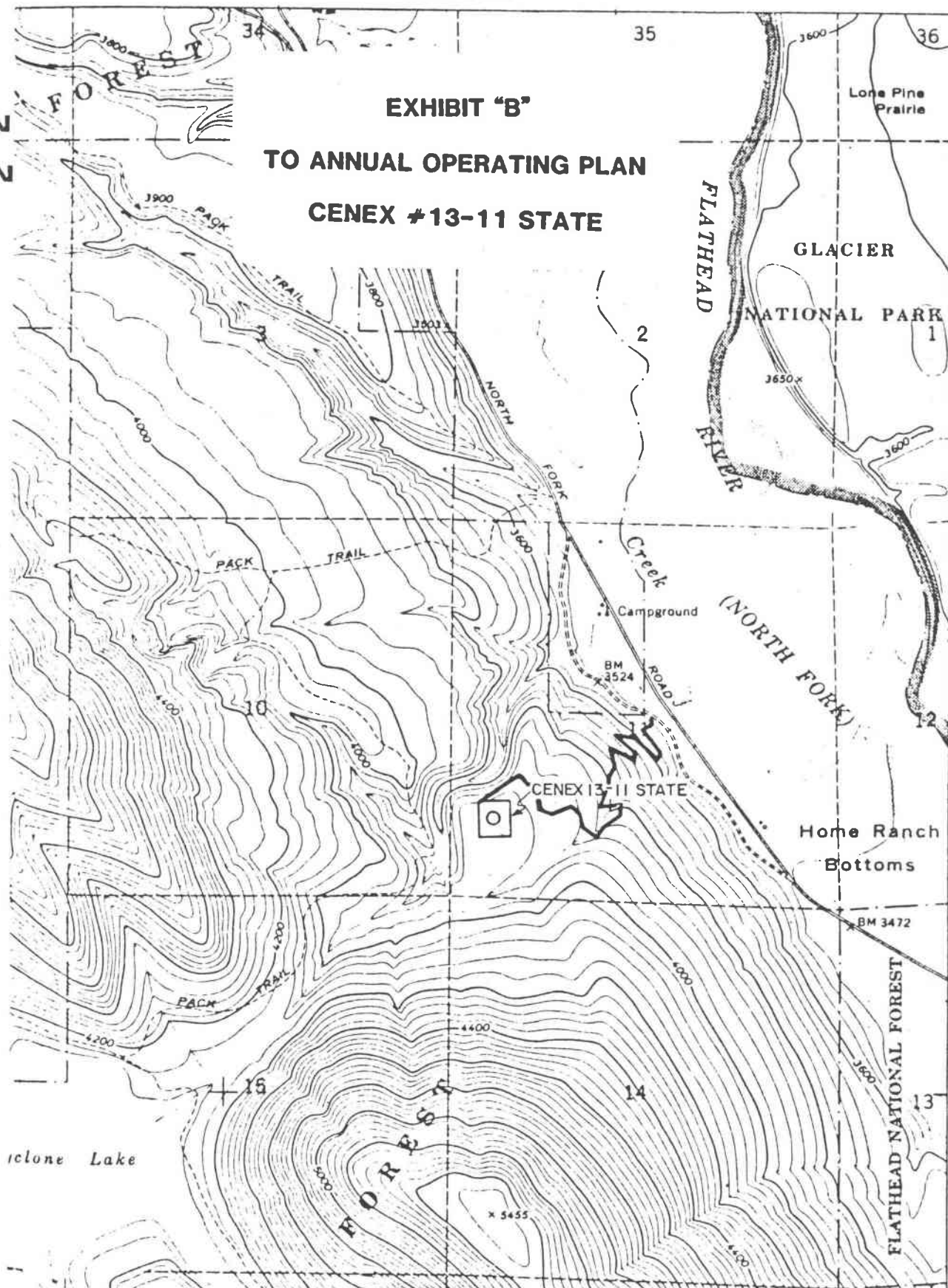
CENEX #13-11 STATE

T35N

T34N

T35N

T34N

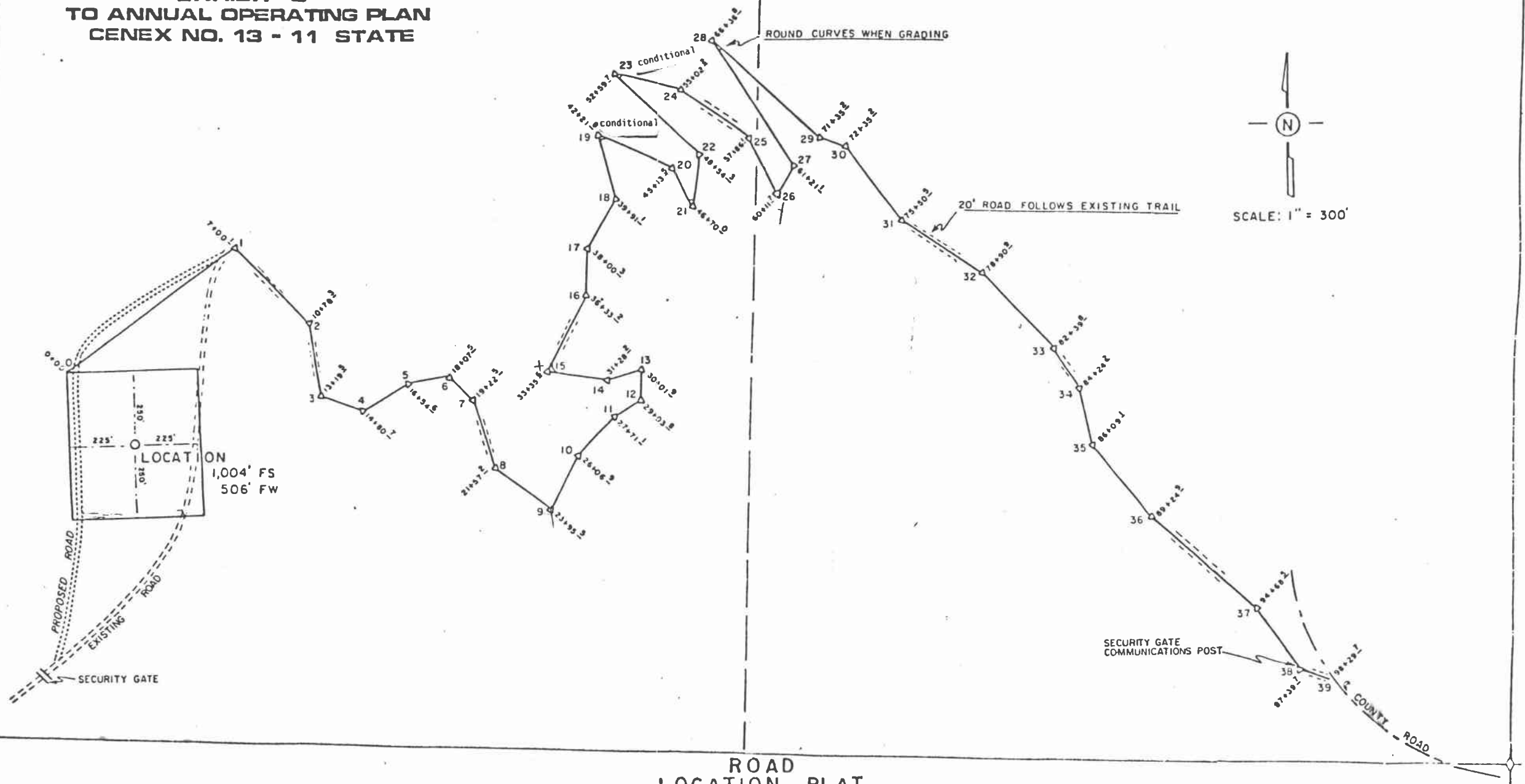


R21W

TOPOGRAPHIC MAP  
CENEX NO. 13-11 STATE  
SCALE: 1" = 2000'

iclone Lake

**EXHIBIT C  
TO ANNUAL OPERATING PLAN  
CENEX NO. 13 - 11 STATE**



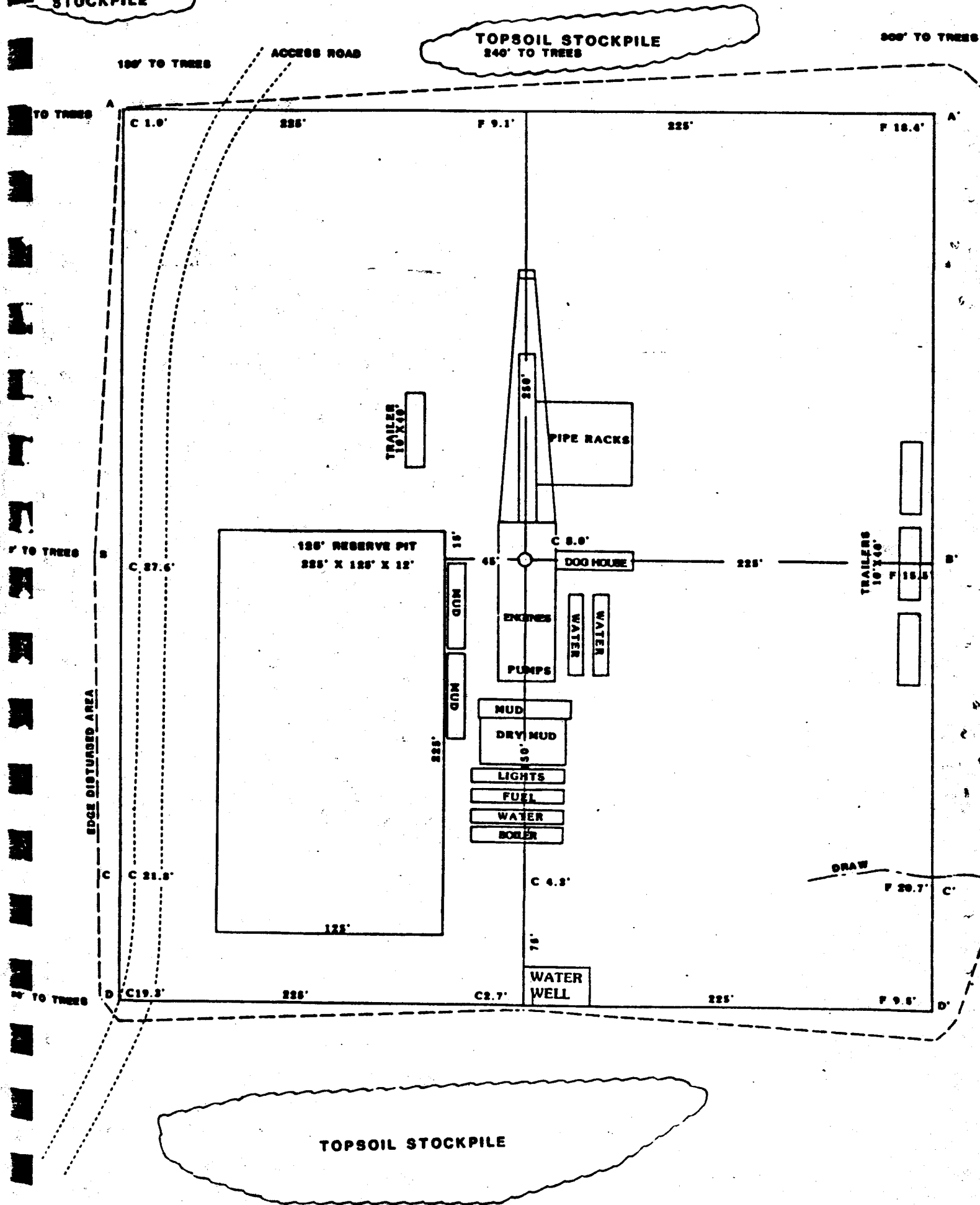
**ROAD  
LOCATION PLAT  
CENEX - #13-11 STATE  
SW SW 11, T34N-R21W  
1,004' FS & 506' FW  
FLATHEAD COUNTY, MONTANA**

P.I.	P.I.	BEARING	DISTANCE	STATION	ELEVATION	GRADE
0	1	N57°06'25"E	700.1'	7+00 <sup>1</sup>	3,916.7'	
1	2	S43°53'20"E	378.2'	10+78 <sup>3</sup>	3,875.1'	-5.9%
2	3	S09°44'40"E	241.2'	13+19 <sup>5</sup>	3,858.3'	-4.4%
3	4	S70°26'55"E	161.2'	14+80 <sup>7</sup>	3,856.4'	-0.8%
4	5	N58°56'54"E	173.9'	16+54 <sup>6</sup>	3,855.1'	-0.8%
5	6	N81°55'14"E	152.9'	18+07 <sup>5</sup>	3,854.5'	-0.3%
6	7	S45°47'31"E	115.0'	19+22 <sup>5</sup>	3,850.2'	-2.8%
7	8	S18°05'44"E	234.7'	21+57 <sup>2</sup>	3,849.5'	-0.6%
8	9	S52°00'46"E	238.3'	23+95 <sup>5</sup>	3,843.7'	-2.5%
9	10	N27°19'49"E	211.4'	26+06 <sup>9</sup>	3,834.6'	-3.8%
10	11	N43°18'14"E	164.2'	27+71 <sup>1</sup>	3,826.4'	-3.9%
11	12	N55°17'39"E	132.7'	29+03 <sup>8</sup>	3,816.2'	-6.2%
12	13	N02°36'34"E	98.1'	30+01 <sup>9</sup>	3,801.9'	-10.9%
13	14	S73°22'49"W	126.3'	31+28 <sup>2</sup>	3,795.7'	-6.1%
14	15	N81°16'56"W	207.4'	33+35 <sup>6</sup>	3,786.4'	-7.4%
15	16	N26°37'34"E	297.6'	36+33 <sup>2</sup>	3,777.0'	-4.5%
16	17	N03°14'54"E	167.1'	38+00 <sup>3</sup>	3,758.3'	-6.3%
17	18	N29°58'04"E	190.8'	39+91 <sup>1</sup>	3,746.6'	-7.0%
18	19	N15°05'31"W	230.7'	42+21 <sup>8</sup>	3,730.7'	-8.3%
19	20	S66°45'41"E	291.7'	45+13 <sup>5</sup>	3,718.5'	-5.3%
20	21	S28°05'41"E	156.5'	46+70 <sup>0</sup>	3,692.0'	-9.1%
21	22	N05°06'29"E	184.3'	48+54 <sup>3</sup>	3,684.7'	-4.7%
22	23	N46°58'28"W	405.4'	52+59 <sup>7</sup>	3,669.9'	-8.0%
23	24	S76°28'08"E	242.5'	55+02 <sup>2</sup>	3,637.3'	-8.0%
24	25	S55°34'23"E	283.9'	57+86 <sup>1</sup>	3,619.6'	-7.3%
25	26	S27°50'13"E	225.6'	60+11 <sup>7</sup>	3,607.6'	-4.2%
26	27	N38°15'47"E	109.4'	61+21 <sup>1</sup>	3,583.9'	-10.5%
27	28	N32°50'53"W	515.7'	66+36 <sup>8</sup>	3,580.0'	-3.5%
28	29	S48°35'03"E	498.4'	71+35 <sup>2</sup>	3,547.3'	-6.3%
29	30	S71°42'13"E	100.0'	72+35 <sup>2</sup>	3,524.0'	-4.7%
30	31	S38°01'33"E	315.3'	75+50 <sup>5</sup>	3,519.5'	-4.5%
31	32	S57°14'53"E	340.4'	78+90 <sup>9</sup>	3,498.4'	-6.7%
32	33	S44°13'10"E	348.9'	82+39 <sup>8</sup>	3,495.1'	-1.0%
33	34	S30°46'40"E	184.4'	84+24 <sup>2</sup>	3,502.0'	+1.8%
34	35	S13°55'00"E	184.9'	86+09 <sup>1</sup>	3,503.1'	+0.6%
35	36	S39°22'20"E	315.8'	89+24 <sup>9</sup>	3,493.2'	-5.4%
36	37	S55°20'40"E	543.6'	94+68 <sup>5</sup>	3,484.4'	-2.8%
37	38	S34°58'30"E	271.2'	97+39 <sup>7</sup>	3,478.9'	-1.0%
38	C.R.	S70°08'00"E	90.0'	98+29 <sup>7</sup>	3,475.3'	-1.3%
		COUNTY ROAD			3,473.9'	-1.6%

LOCATION ROAD IS 9,829.7' OR 1.86 MILES IN LENGTH.

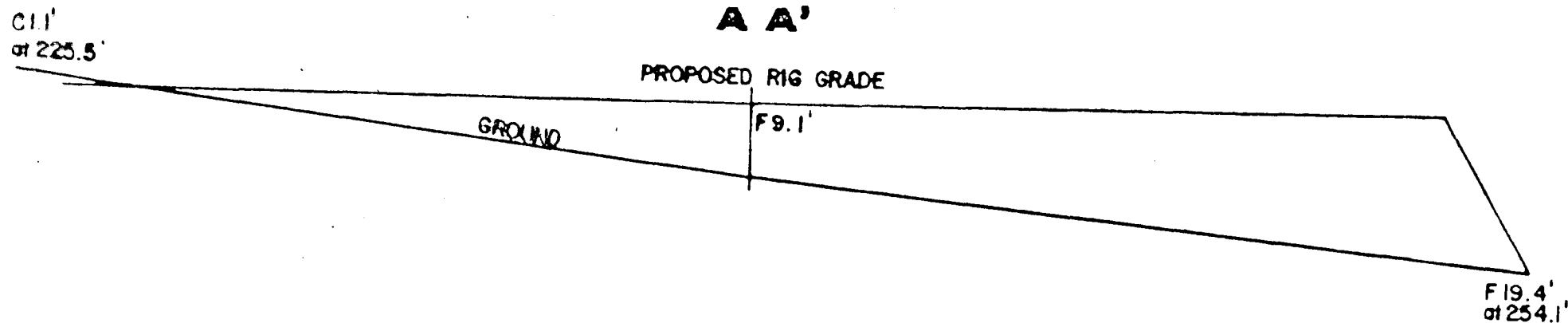
EXHIBIT C

**TOPSOIL  
STOCKPILE**

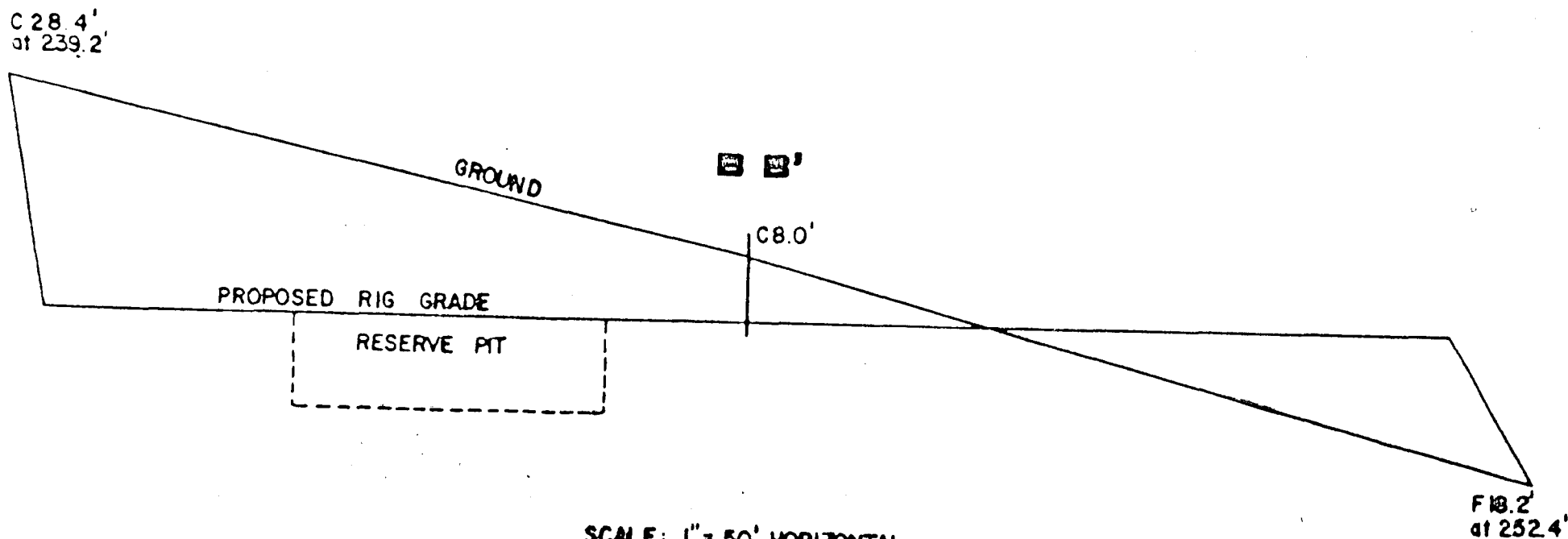


# CROSS SECTIONS

A A'



D-6a



SCALE: 1" = 50' HORIZONTAL  
1" = 20' VERTICAL

FILL SLOPES: 1 1/2 : 1

CUT SLOPES: 1 1/2 : 1

# EXHIBIT 'F' TO ANNUAL OPERATING PLAN CENEX #12-11 STATE

PAGE 2

CUT 22.8'  
at 236.4'

**C C'**

C 4.3'

RESERVE PIT

F 24.6'  
at 261.9'

D-6b

C 20.0'  
at 235.0'

**D D'**

C 2.7'

F 10.2'  
at 240.3'

SCALE: 1" = 50' HORIZONTAL  
1" = 20' VERTICAL  
FILL SLOPES 1 1/2 : 1  
CUT SLOPES 1/2 : 1

## TOTALS

**CUT 54000 CUBIC YARDS**  
**FILL 43500 CUBIC YARDS**