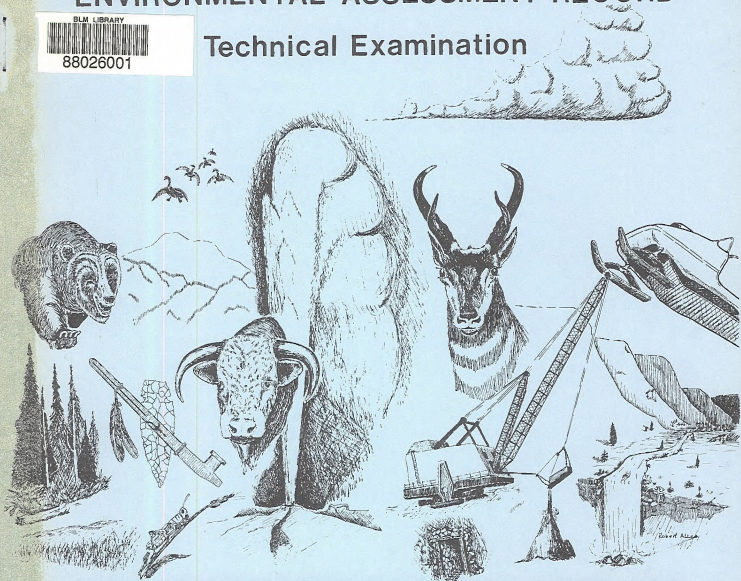


LAND USE ANALYSIS

ENVIRONMENTAL ASSESSMENT RECORD



Technical Examination



BAUKOL-NOONAN Coal Lease Application



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LAND USE ANALYSIS/TECHNICAL EXAMINATION/ENVIRONMENTAL ASSESSMENT RECORD

BAUKOL-NOONAN COAL LEASE APPLICATION M-34985 (ND)

February 1978

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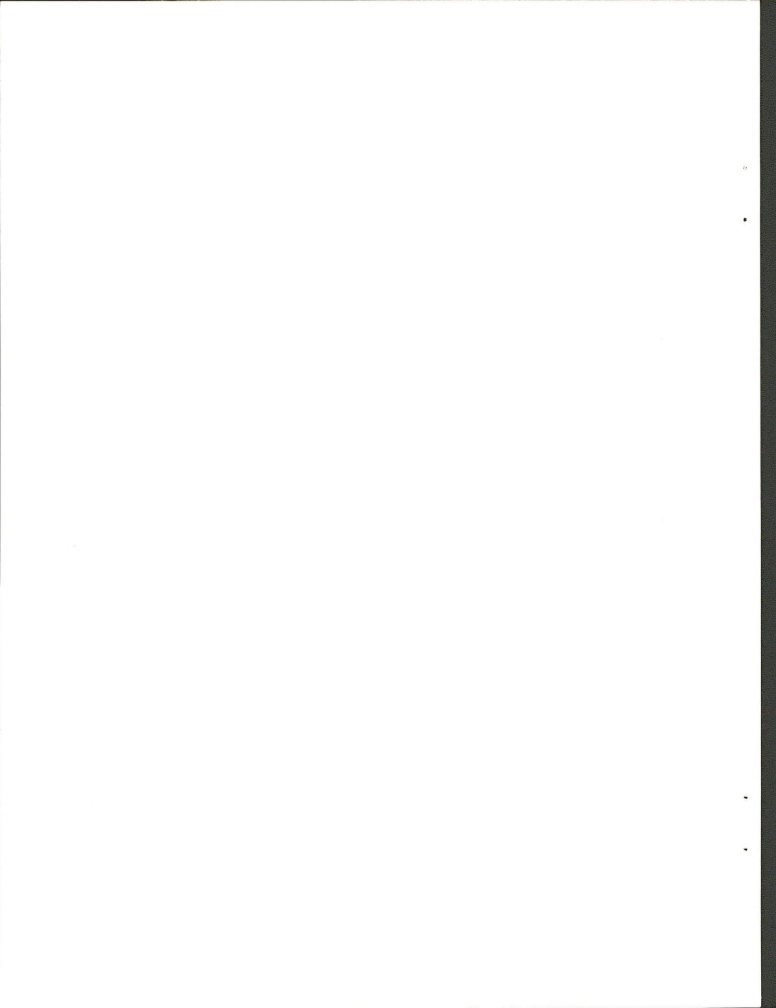
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PREFACE

The Bureau of Land Management, U.S. Department of Interior is the federal agency responsible for the management of the federal coal reserves in North Dakota and other states. As the managing agency, the Bureau of Land Management (BLM) pursues the coal development objectives established by the Executive, Congress, and Secretary of Interior. Through laws, policy, and directives the BLM is pursuing a program that will make coal available to help meet the energy needs of the nation.

At present the BLM is being constrained from doing any major leasing. This has resulted from the Secretary of Interior's decision to reassess the Department of Interior's coal leasing procedures. Also, a Federal Court Order has required BLM to cease leasing activities until a new Coal Programmatic Environmental Impact Statement is prepared and the Secretary reviews the leasing procedures in light of the findings of the impact statement. Both the Secretary and the Court, however, recognized the need for providing federal coal to maintain existing operations and to allow companies to meet contractual commitments. To provide for these "short term" needs some exceptions to the delay were made. Standards for short term leasing were set out by the Court which were modifications of criteria which the Secretary had earlier developed. The Department of Interior, through the BLM, is attempting to respond to critical industry needs where individual coal leasing actions conform with the Court directed criteria.

In August 1976, Baukol-Noonan Inc. applied for a lease on 80 acres of federal coal to supplement its ongoing Larson coal operation near Larson and Noonan, North Dakota. The company is mining private coal adjacent to this 80 acre tract. They desired the federal coal as it would be efficient and economical to mine. The BLM felt it necessary to act on this application to prevent the coal from being "by-passed" as the company completed their mining in the area and moved to another

location. It was determined that the application met the Secretary of Interior's short term criteria existing at that time and processing of the application was started in the summer of 1977.

Following the Court ruling of September 27, 1977, the Baukol-Noonan application was reviewed to see whether or not it met the Court's short term standards. A determination was made that this situation does meet the Court's criteria and that processing of the application should continue.

Before being able to make recommendations to the Secretary of Interior for leasing federal coal, three environmental processes must be accomplished by BLM. These are comprehensive land use planning, an environmental assessment of the action, and a technical examination of the area involved in the proposed action.

In the subject area the BLM has not done comprehensive land use planning, and will most likely not do any in the future. The absence of federal surface ownership and the small amount and scattered ownership of federal coal makes the cost of detailed planning unwarranted. However, this situation was provided for in the Federal Coal Leasing Amendment Act of 1975 (Sec. 3-(3)(A)(i). This Act provides that where the Department of Interior finds that non-federal surface or insufficient federal coal resources do not justify the cost of a comprehensive land use plan, lease sales may be held if the State has prepared a land use plan or if Interior (BLM) prepares a "land use analysis." For the Baukol-Noonan application area, the BLM elected to prepare a land use analysis because the State does not have a plan.

An "Environmental Assessment Record" (EAR) is the documentation of environmental assessments BLM makes on proposed actions. A "Technical Examination" (TE) is documentation of environmental and other technical analyses made on mineral disposal actions. Since there are only minor differences between the two processes, the TE can be easily merged with the EAR. Such has been done in this analysis.

TECHNICAL EXAMINATION/ENVIRONMENTAL ASSESSMENT RECORD

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INTRODUCTION

This Technical Examination and Environmental Assessment Record documents the technical and environmental assessments required in the processing of a coal lease application (described in Chapter 1). The primary purpose of the document is to describe the proposed action, describe the existing environment (physical, social, and economic), discuss the impacts of the action on the environment, and to propose actions to mitigate adverse impacts. It is used to aid the resource manager in making his or her decision.

The relationship of the Technical Examination and Environmental Assessment Record to the total Land Use Analysis is discussed in the Preface of this report.

The analysis of the physical environment in this report is primarily centered on the specific tract requested for lease. The area of influence away from the tract is quite small, requiring little extension of analysis.

Normally, social and economic analyses take in a much larger area than just the specific action site. The influence of an action on the social and economic environments are often a considerable distance away. However, in this particular case where the action is ongoing, social and economic impacts do not occur or are nearly negligible and are, therefore, not analyzed in great detail.

Although all chapters of this document are important, the first five are the more significant. Chapter one describes the proposed action in enough detail to allow the impact analyzer (professional or citizen) to have a full picture of the action. Chapter two then describes to the analyzer the existing environment by components. Chapter three then discusses the impacts (beneficial or adverse) of the action on the existing environment, and in chapter four recommendations are made for mitigation of the identified impacts. Chapter five lists the residual adverse impacts that will accompany the project.

Contents of the remaining chapters are well reflected by the chapter titles.

To meet the requirement of a Land Use Analysis, the environmental assessment record and technical examination have been supplemented with the following:

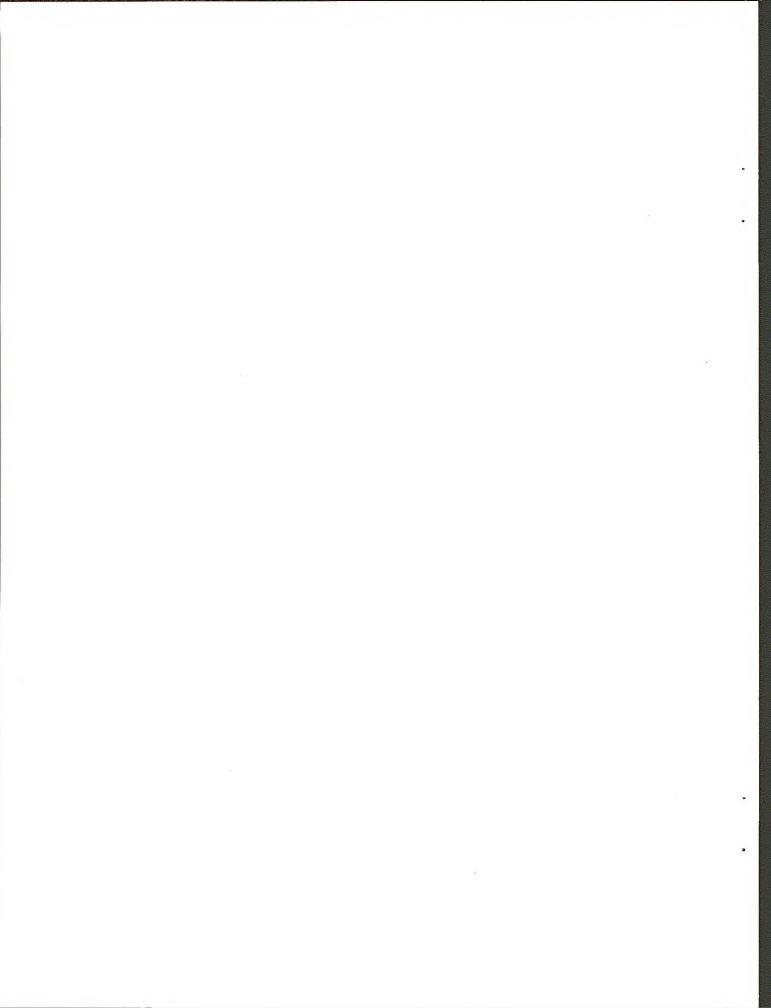
1. An analysis and statement of "suitability for reclamation"
2. Development of "initial land use conclusions"
 - a. Lease or not to lease recommendation (with criteria)
 - b. Statement on surface owner consent and opinion on reclamation and post mining use
 - c. Discussion on relationships to state and local planning
 - d. Discussion of special stipulations which may go into a lease

Following public review (including State and local governments) of the EAR, TE, and initial conclusions, a "decision statement" will complete the land use analysis. This statement will include the final recommendation to lease or not lease, a review and discussion of use of public input, reiteration of criteria from initial conclusions, and a negative or positive declaration for an environmental impact statement.

Upon completion of the land use analysis with a recommendation for leasing, the case file will be forwarded through channels to the Secretary of Interior for approval. The Secretary will confer with the Governor of the State prior to making a decision to lease.

The foregoing discussion explains the process being used for the Baukol-Noonan application. The following text is the documentation of the process. This publication of the text will not include the decision statement. The statement will be done as a supplement to this document. Public comment received will be used in making the final decision and will be discussed in the decision statement.

There are requirements other than those discussed here that must be met before a lease can be issued. They are primarily adjudicative in nature and not part of this record.



SUMMARY

The finding of this assessment is that the impacts are not significantly adverse. Those that exist are confined to the physical environmental elements at the proposed lease site. Social impacts are absent, and economic impacts are very minor.

Primary concerns are soils and hydrology. Reclamation potential is not high due to shallow soils. However, with a redistribution of all the soil found on the entire 80 acre tract and the development of a reservoir on the site, the reclamation potential will be appreciably enhanced and the quality of surface water will not deteriorate.

Other physical components will be impacted for a short time (3-5 years) until reclamation has been achieved.

CHAPTER 1
DESCRIPTION OF PROPOSED ACTION

The proposed action to be analyzed is a pending federal coal lease application from Baukol-Noonan Incorporated to lease, under short term criteria, 80 acres of federal coal. The coal is located in Burke County, North Dakota, near the community of Larson. The area consists of the following tract.

W $\frac{1}{2}$ NE $\frac{1}{4}$, Section 14, T162N, R94W, 5th P.M. 80 acres

Baukol-Noonan has been mining coal in the vicinity for 47 years. Most of the mine production (455,000 short tons or 412,776 metric tons per year) is contracted by the American Crystal Sugar Company for use in their Drayton, North Dakota and East Grand Forks, Minnesota sugar beet processing plants. Smaller amounts of lignite are sold for space heating requirements both locally and to state institutions.

The federal government does not own any of the surface rights in the lease application. Baukol-Noonan is the surface owner and the coal is administered by the Bureau of Land Management (BLM).

The Baukol-Noonan Larson mine tippie (see map on page I-5) is located approximately 5.5 miles (8.85 km) east of the town of Noonan and approximately 8 miles (12.87km) south of the United States-Canadian border in Burke County. The following communities are located in the mine vicinity:

Noonan	5.5 miles or 8.85 km	West
Larson	1.5 miles or 2.41 km	East
Columbus	4.5 miles or 7.24 km	East
Kincaid	4.5 miles or 7.24 km	East

The planned life of the total mining operation is 15 years. The total area of the operation will be approximately 2,600 acres including past and future mining. At the current rate of production, 35 to 40 acres per year will be disturbed.

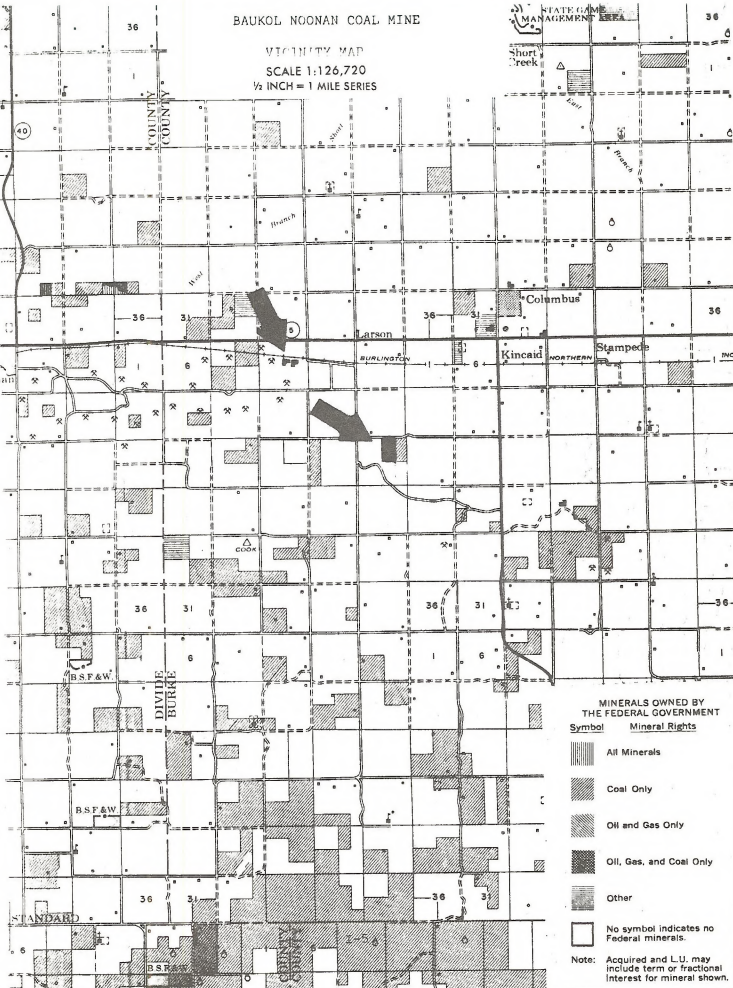
BAUKOL NOONAN COAL MINE

VICINITY MAP

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1/2 INCH = 1 MILE SERIES

STATE OF IOWA
LAND MANAGEMENT



MINERALS OWNED BY THE FEDERAL GOVERNMENT

Symbol	Mineral Rights
	All Minerals
	Coal Only
	Oil and Gas Only
	Oil, Gas, and Coal Only
	Other
	No symbol indicates no Federal minerals.

Note: Acquired and L.U. may include term or fractional interest for mineral shown.

BAUKOL-NOONAN INC.

LARSON MINE

APRIL 6, 1977

SCALE: 1"=1000'



Present
Mine



Lease
Application
Area



Estimates based on USGS provided acreage (45 acres strippable) and coal thickness (average 9 feet) indicates 1.6 years of mining on the application area given a recovery factor of 85 percent. The reserves calculated by USGS are 587,000 short tons. The tract is on the easternmost limit of the deposit and the mine operation will move westward after mining this tract if leased. (When Company data was used to make the short term determination, they provided a map which indicated the next lease tract for future mining was about 1½ miles (west) away and that the mining operation would move there when federal coal was mined out of the "80.")

Current technology and economics dictate that the lease area be developed by strip mining techniques. The operation at the Larson mine is now at the point where, within the immediate future, the federal coal in the proposed lease must either be leased, or bypassed. If leased, the coal would be mined immediately, if bypassed the likelihood of it ever being mined is remote. The cost of returning to this federal tract of coal within a mined area is currently prohibitive.

Reclamation of the lease area should be completed within three years after termination of the mining permit term according to North Dakota State law. The company must be given two one-year extensions by the State upon request. Further extensions, on a year-to-year basis, may be made at the discretion of the State. This means that if leased immediately, the time frame for the action would begin next year and could be completed, including reclamation, by 1983. It would be realistic to assume some delays in reclamation and this would require extensions.

The mining takes place in two stages of implementation. Each will be discussed in detail. Because the mine is presently in existence, new construction of roads and facilities will not occur. The two stages that will be analyzed are mining and reclamation. These stages contain several discrete operations which, even when described separately, may occur simultaneously.

Mining

Removal and Stockpile of Soils

Following classification and mapping by a state registered soils classifier, the soils are removed in two steps. Step one is removal of topsoil by heavy equipment. The topsoil is either stockpiled in a specified area for later use during reclamation, or spread on reshaped spoil piles and subsoil for reclamation. The second step is removal of subsoil. The subsoil is stockpiled separately from the topsoil in order to prevent mixing of topsoil and subsoil, then respread during reclamation or placed directly on reshaped spoil piles.

Wind and water erosion of the stockpiles is controlled by proper positioning and accepted erosion control procedures. The erosion control procedures must be approved by the BLM District Manager and the North Dakota Public Service Commission.

Removal of Remaining Overburden

The remaining overburden (all materials between subsoil and coal seam) is removed with an electric powered, Bucyrus-Monighan Model 9W, 11 cubic yard dragline. The 11 yard dragline is capable of removing overburden to a depth of 50 feet. The overburden is piled adjacent to the cut. Each succeeding cut's overburden is placed in the immediately preceding trench. This operation will continue 24 hours a day during peak summer production with dragline availability of 18 hours per day. A scraper will follow the dragline and remove loose clay from the top of the coal seam.

Blasting, Excavation, and Loading

No drilling or blasting is involved in removing the exposed coal. A 13 yard (992 cat) or a backup 8 yard (988 cat) front end loader excavates the coal and loads it into 70 ton diesel powered caterpillar 768 coal haulers.

Transportation, Delivery, and Crushing

The coal is transported from the pit up a 5 percent maximum grade ramp road, to unpaved haul roads joining the mine to coal preparation facilities. At the preparation facilities, it is dumped, crushed to less than two inches, and loaded on a conveyor belt for movement to the tipple. It is then loaded and transported by train approximately 400 miles to the consuming centers.

Reclamation

Reclamation is accomplished according to State and federal law which requires the following:

Regrading

During reclamation, the overburden piles are reshaped to a level or gently rolling form. This includes the final highwall, or last cut, which normally has little overburden put back into it. The highwall is cut back and graded to blend with the adjacent terrain. Two D-9 caterpillars, one D-500 International Harvester, and two 30 yard scrapers are normally used in this process. Reshaping is usually done two to three spoil piles behind the mining operation, depending on weather and working conditions.

Topsoiling

Following the reshaping process, subsoil is spread on the graded overburden. Topsoil is then replaced and spread over the subsoil. The topsoiling operation is normally performed by the 30 yard tractor-scrappers during dry seasons of the year.

Revegetation

The seeding operation involves site preparation (such as contour plowing) and seeding with appropriate vegetation. This may include the use of a bulldozer, but is normally limited to farm tractors and implements.

If the project proceeds as proposed, all existing federal and state laws and regulations pertaining to coal strip mining and its associated effects on the environment would apply.

All federal leases will be subject to stipulations or performance standards included in 30 CFR 211 and 43 CFR 3000 at the time of lease issuance (CFR is Code of Federal Regulations). The 30 CFR 700 regulations issued on December 13, 1977 will apply to all surface mining, but it is unsure at this time how they will be specifically included in future federal leases, but they will be applied as appropriate.

Technical Examination Addendum

The following subjects and comments are required in a Technical Examination (43 CFR 23.5 and 43 CFR 3041.2), but are not covered elsewhere in the text.

Planning and Zoning Data From Local Governments

There is currently no county planning or zoning. No action is necessary for mining.

Fire and Fire Hazards

There would be no additional fire hazards if the subject tract is leased and mined.

Toxic Materials

It is assumed that no toxic materials will be used during mining. If any toxic material is used or encountered, State and federal law dictates that it be isolated and buried several feet below the rooting zone so as not to interfere with the establishment of vegetation.

Landslide Potential

The highwall would provide the only landslide problem in this area. The high moisture content of the unconsolidated or poorly consolidated sediments does cause slumping. The company has encountered this problem in the adjacent mining area. The problem is minimized or solved by sloping the highwall.

Hazardous Exploration or Mine Workings

There are no known hazards.

Bonding Requirements

The amount of bonding as required in 43 CFR 3041.3 and 3504.2-1(b) will be determined by the authorized officer in consultation with USGS. The minimum bond in 3504.2-1(b) is \$1,000 for coal leases. State bonding is also required.

CHAPTER 2
DESCRIPTION OF THE ENVIRONMENT

CLIMATE

Burke County is near the geographical center of North America, and has a typical continental climate. The climate is characterized by large, annual, and day to day changes in temperature and precipitation. The Rocky Mountains to the west affectively modify the temperature and moisture characteristics of Pacific air masses. There are no obstacles to air masses coming from the north or south. Summers are usually dry and warm with occasional hot periods. Winters are usually cold with temperatures varying widely. The period of frost free days on an average is 115 days. Weather data is from the records of the Crosby, North Dakota weather station which is approximately 20 miles west of the proposed mining area.

The average maximum temperature during the summer averaged 79 degrees F. from 1907-1965. On an average there are 14 days when the temperatures reach 90 degrees or more. The highest temperature recorded was 111 degrees F. on July 5, 1937. The evenings are usually cool. The lowest temperature recorded was -47 degrees F. in February of 1936. The mean annual monthly temperature is 38.7 degrees F.

The average annual precipitation is 14.22 inches, of which 80 percent falls during the growing season from April through September. Annual precipitation has ranged from a high of 24.60 inches in 1963 to a low of 5.39 inches in 1934. June is usually the wettest month. Most of the precipitation is received from April through September. Approximately 28 inches of snowfall can be expected on the average. The average wind speed is about 10 miles per hour and the prevailing wind direction is from the southwest. Average relative humidity is 65 percent.

AIR QUALITY

Air sampling stations have been established throughout the State of North Dakota by the Department of Health. The station at Williston is approximately 93 miles southwest of the proposed site and the station at Foxholm is approximately 70 miles to the southeast.

Pollutants monitored are suspended particulates, sulfation rate, sulfur dioxide (SO₂), nitrogen dioxide (NO₂), nitric oxide, coefficient of haze, dustfall, suspended sulfate, suspended nitrates, suspended fluorides, pH and Beta radiation.

The State of North Dakota has established ambient air quality standards. Based on available information dust is the biggest contributor to air pollution. There is a slight effect on the air quality from a generating plant located at Estevan, Saskatchewan, Canada some 25 to 30 miles to the north, however there is no available data on this.

The State Health Department indicated that the State of North Dakota will be establishing monitoring sites in this area at a later date.

GEOLOGY

Stratigraphy

Geologic formations ranging in age from Precambrian basement to Holocene reworked glacial materials are present at varying depths in the sub-surface of the lease application. Mining would only affect the materials from the base of the coal bed upwards and any discussion of underlying materials would be irrelevant.

The glacial materials of the Coleharbor Formation and the alluvium of Holocene Age which is reworked glacial materials make up the surface in the application area. The Sentinel Butte Formation of Paleocene Age underlies the Coleharbor Formation and contains the lignite deposit.

The Sentinel Butte Formation was deposited in a flat and swampy environment. Rivers transported and deposited sand, silt, and clay along their shifting courses. Dense vegetation and trees grew in the swampy areas away from the rivers. This vegetation accumulated in the swamps and was converted to lignite coal. The Sentinel Butte Formation consists of alternating layers of varying thickness and lithology. There are four main lithologic groups which change laterally and horizontally: (1) silt and clay; (2) sand and sandstone; (3) lignite; and (4) limestone.

The Coleharbor Formation overlies the Sentinel Butte and is glacial in origin. It is of variable thickness, but is a relatively thin veneer over Sentinel Butte in the application area. Its composition is of the following sediment types or facies:

1. The boulder clay facies is dominant and is a mixture of varying amounts of sand, silt, and clay and a few percent of pebbles and boulders.
2. The sand and gravel facies is less widespread and is found as lenses or layers composed of various mixtures of sand and gravel. There are relatively few pure sand or gravel deposits.
3. The remaining facies of the Coleharbor Formation is composed of the silt and clay type which is similar to the silt and clay contained in the boulder clay facies.

The sediments of the Coleharbor Formation were deposited directly from a glacier or by streams flowing from the glacier. The landform of the Coleharbor in the application area is termed Ground Moraine. It is defined as glacial materials deposited directly from a moving glacier behind its margin. There are low knobs and shallow depressions resulting from collapse of a thin layer of superglacial debris.

Post glacial (Holocene) alluvium overlies the Coleharbor in the application area and is composed of layers of sorted sand, silt, clay, and some gravel. It is the result of surface water reworking glacial materials. This alluvium is the surface material of much of the application area.

Structure

The application area is in the Central Williston Basin and is underlain by Paleozoic, Mesozoic, and Cenozoic rocks approximately 11,000 feet in thickness. The Sentinel Butte dips gently to the southwest at about 3 degrees in most places.

Coal Beds

The Noonan bed of the Sentinel Butte Formation is the major commercial lignite bed in this area. This bed is approximately 9 feet thick and is overlain by a maximum of 47 feet of overburden in the application area (information from USGS).

The lateral continuity of the Noonan Bed in this area has been broken by glacial and fluvial (water) erosion and deposition. The coal deposits are isolated tracts which limit the areal extent of mining operations in any given area. This characteristic necessitates movement of mining operations as reserves in an area are exhausted. The lignite reserves within the lease application are essentially the last mineable reserves in the present area of operations.

The coal currently being mined in the area averages 7,260 BTU, 0.3 percent sulfur, 37.6 percent moisture, 26.1 percent volatile, 32.9 percent fixed carbon, and 5.5 percent ash. The reserves of federal coal in the lease application are listed below:

80	Total Acres in Application
45	Strippable Acres
690,000	S.T. Strippable Reserves *
587,000	S.T. Recoverable Reserves **

* Calculated by: Multiplying the average lignite thickness of 8.77 feet by 1,750 tons/acre foot (the average weight of lignite coal - Averitt, 1974). The result is the tons of lignite per acre. This figure is multiplied by the strippable acres to give total reserve tonnage.

** This tonnage is obtained by multiplying the total strippable reserves by a recovery factor of 85 percent.

The overburden in the mine area is largely clay and silty clay with some sand and minor gravel (from logs supplied by Baukol-Noonan). The overburden is composed of the Sentinel Butte Formation, Coleharbor Formation, and reworked glacial material. Secondary minerals sometimes found in the glacial materials are as follows: calcite, gypsum, limonite, manganese dioxide, and dolomite.

Paleontology

There are no fossil sites known in the application area. Some fossils are found in glacial material (primarily lake deposits) but none are located within the application area. Fossils enclosed in the Sentinel Butte are both scarce and insignificant in most cases.

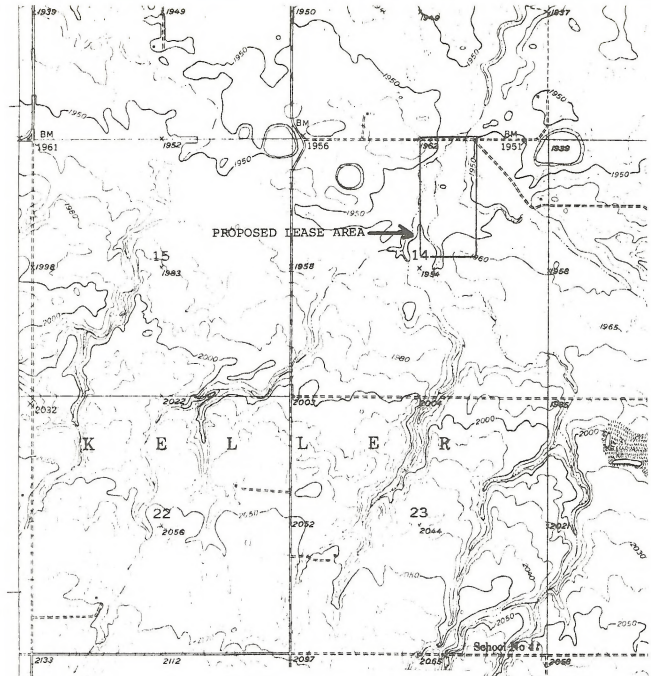
TOPOGRAPHY

The topography of the proposed lease area is described as the Central Lowlands. The Central Lowlands are a gently undulating glaciated plain with low relief. The proposed mine area is gently rolling grassland dissected by two small drainages. The elevation varies from 1,950 to 1,962 feet. The main direction of drainage is northerly. The topographic map on the following page shows the relief of the area.

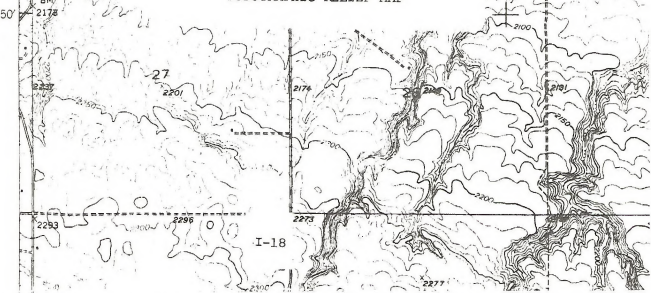
SOILS

Soils of the lease application area are derived from an unsorted mixture of clay, silt, sand, cobbles, and boulders (till). The topography is nearly level to gently rolling. It is referred to as "ground moraine" which is glacial sediment deposited directly by the glacier in sufficient amounts to mask pre-existing topographic features.

The soils were mapped by the Soil Conservation Service (SCS) in July, 1974. Four mapping units comprised of five major soil series were identified and described within the 80 acre tract. One mapping unit, the Harriet complex, is found over about 60 acres of the area. It is under this unit that most all the coal is lying. The unit is a deep, moderately fine textured, poorly drained, saline-alkali soil complex on level bottomland. A water table is at depths of less than 3 to 5 feet part of the time in most years. The soil typically contains excess sodium and salts in the B and C horizons. The thickness of an A horizon on the surface varies. There are "scabspots" where the topsoil is missing and the saline-alkali B horizon is exposed. The "scabspots" along with water covered areas in the drainage channels and small depressions comprise about 30 to 40 percent of the mapping unit area. There is usually a 3 to 10 inch rise from the "scabspots" to grassed "highspots." These areas have a layer of topsoil from 3 to 4 inches thick which is not as saline-alkali as the B horizon.



TOPOGRAPHIC RELIEF MAP



The remaining mapping units are on slightly higher positions of the landscape than the Harriet complex.

The Noonan-Miranda soils comprise a 3 to 4 acre mapping unit along the eastern edge of the tract. Noonan loam makes up 50 percent and Miranda loam or clay loam 50 percent of the mapping unit. The Noonan loam has 6 to 8 inches of topsoil over a sodic claypan. The Miranda loam or clay loam has about 4 inches of topsoil over a dense saline-alkali claypan.

The Niobell-Noonan loams, 0 to 3 percent slopes, is a 5 acre mapping unit of in the northeast corner of the tract. Niobell loam comprises 75 percent and Noonan loam 25 percent of the unit. Niobell typically has about 9 inches of topsoil material. The subsoil contains excess sodium and the substratum is salty. Noonan soil has 6 to 8 inches of topsoil as mentioned above.

The remaining 11 to 12 acres is comprised of Flaxton fine sandy loam, 1 to 6 percent slopes. The Flaxton typically has a profile free of excess sodium and salts to a depth of 5 feet. About 2 acres is located in the northwest corner and 9 to 10 acres in the southeast corner of the tract. The 2 acre unit has been covered by spoil material. A borrow pit has disturbed 1 to 2 acres in the southeast corner and material to a 4 to 5 foot depth has been removed.

None of the mapping units fall into the prime farmland category nor are there any alluvial valley floors within the tract. For detailed soils information see Appendix 1.

WATER

The Baukol-Noonan mine is located in the Souris River Basin. Water enters the Souris River from the proposed lease area through a series of intermittent streams to Short Creek and then on to the Souris River in Canada. The average annual precipitation in this area is about 14 inches. This part of North Dakota has been subjected to multiple glaciations. The proposed coal lease area lies in a ground moraine plain and there are no buried glacial meltwater channels which cross the eighty acres. The area has very little relief and slopes average less than one percent toward the north.

The surface drainage pattern on the ground moraine is very poorly developed and is characterized by numerous potholes and sloughs. Although topographic maps indicate an intermittent stream drains the proposed lease area, in reality the stream channel here acts more like a pothole pond. A dirt road built across the north side with no culvert under it has impounded water along a good deal of the channel within the area. It appears that very little water leaves this area as surface runoff. Water will leave these ponded areas by seepage into the ground, evapotranspiration, free surface evaporation, and some surface runoff during the snow melting period. This results in a concentration of dissolved solids as occurs in potholes. The stream channel bottoms seem to be wet most of the year. Soils data show that the soils which occupy the channel bottoms are subject to water tables near the surface most of the year. During the dry spells in the fall groundwater will be drawn to the dryer surface and evaporate, further concentrating the salt at the surface.

Due to the low slope and high density of vegetation on the site sedimentation is negligible under present conditions. This plot of land has been used for pasture in the past. The salinity level of the wet areas makes the surface water here undesirable for domestic purposes and marginal for stock water.

The ground moraine in this area is generally less than 25 feet thick and consists of pleistocene Coleharbor Group till. This till forms a shallow aquifer which will generally yield 0-25 gpm and locally may yield a little more. Below this lies the Paleocene Sentinel Butte Formation. There are two lignite beds within this formation which serve as aquifers. Water yields from lignite beds are extremely variable and depend upon the degree of fracturing. The upper of these two lignite beds is the lignite which is the object of this proposed lease. The major deep aquifer systems that are continuous over most of North Dakota underlie the Sentinel Butte Formation here.

Sample drilling in surrounding areas done by the Baukol-Noonan Mining Corporation show that the piezometric surface declines in elevation to the north and also from the upper to the lower lignite bed. This suggests that recharge to the aquifer system is through precipitation and ponded water infiltrating down from the surface. The water in the lignite is under artesian pressure and moves down through the Sentinel Butte Formation and to the north. There are no wells located in Section 14, but four water wells located in neighboring sections are used for domestic and in one case stock purposes. Two of these wells tap coal or sand lenses within the Fort Union Group and two tap the shallow ground moraine aquifer.

VEGETATION

Harriet Complex - 60 Acres.

Most of the application area is classified as a saline lowland range site. This portion is still covered with the original native vegetations. The primary plant cover is grasses with some rushes along the edge of water pockets in the drainage channel. There are no shrubs, trees, or woody plants on this tract nor on the surrounding landscape.

Plant composition consists of western wheatgrass, nuttall alkaligrass, slender wheatgrass, inland saltgrass, and alkali cordgrass. Each of these species will tolerate varying degrees of salt and alkalinity. In years of favorable moisture this range site will produce 2,200 pounds per acre of air-dry forage. The present range condition is in high good and improving. This site would make poor farm land due to the high water table and the saline condition of the soil; however, it does make good summer and fall pasture.

Clayey and Claypan Site

In the northeast corner there are 8.4 acres of surface that range from a clayey to thin claypan range site. The vegetation on this site consists of smooth brome, fringe sagewart, crested wheat and other native species. Evidently, this site had been farmed at one time. Crop suitability is moderate to marginal. This site is located outside of the known coal area.

Flaxton Type - 11.2 Acres

Is a sandy range site located in the northwest and southeast corners of the acreage. Both locations have been recently disturbed. Spoil piles cover one to two acres of the northwestern corner. Vegetation on the balance of the northwest Flaxton type consist mostly of annual weeds. A gravel pit takes up two acres of the Flaxton soil type in the southeast corner. The balance is covered with native grasses.



A VIEW OF THE TRACT LOOKING WEST. NOTE THE PONDS
ALONG THE TWO STREAMS, THE SALT-TOLERANT GRASSES,
AND THE MINING ACTIVITIES ON THE WEST BOUNDARY.



A VIEW OF THE TRACT LOOKING TO THE SOUTHEAST CORNER.
NOTE THE EXTREME FLAT TOPOGRAPHY AND THE OLD SPOIL
PILES IN THE DISTANCE.

There are no endangered or threatened plants listed for North Dakota. Bill Parker, Plant Taxonomist at North Dakota State University, maintains a list of rare and unique plants for North Dakota. In a conversation with Dr. Parker, he indicated that it was very remote that any of the plants on the State list would be found on this tract of land. None were found during the field examination.

ANIMALS

The tract is located in a ground moraine area which is nearly flat. There are two intermittent small drainages which flow northward through the tract. Because the area has high soil alkalinity, water quality is very poor. Consequently, habitat value of the streams for aquatic organisms and drinking value of the water for wild and domestic animals are extremely low. The dominance of salt-tolerant grasses and absence of trees, shrubs, and forbs further reduces the value of the tract to wildlife. Essential habitat components for food, shelter, water, cover, and free-space which are all needed for survival are in limited qualitative quantitative supply.

Little or no site-specific information exists for wildlife on the 80-acre tract and immediate vicinity. On October 13 and 14, 1977, observers from the BLM Dickinson District Office observed a white-tailed jackrabbit, tracks of white-tailed deer, tracks of a canine (probably a red fox), horned larks, a Marsh hawk, meadowlarks, Vesper sparrows, and tracks of an unknown shorebird on the tract. These species are probably the major ones utilizing the tract. Horned larks, Marsh hawks, meadowlarks, and Vesper sparrows use the tract for resting, some feeding, and nesting which are undoubtedly in low densities. As there is little food and cover available, the deer and canines apparently just pass through the tract. There were no signs of waterfowl use. A flight of Sandhill Cranes were heard calling over the tract, but Sandhill cranes would

rarely use the habitat available on the tract. No evidence of fishes, frogs, and other aquatic vertebrate use could be found in any water pools. No endangered/threatened wildlife species have been known to occur or use habitat on the tract.

Wildlife use has restrictions in areas to the immediate north, west, and south of the tract. The area immediately north is currently being reclaimed. On the west boundary there is an active coal strip mine where wildlife use is remote. To the south there is a large area of barren spoil piles left from a previous coal mining operation. These spoil piles may provide escape cover and shelter from wind and other climatic elements, but do not provide any vegetation for food, nesting, and cover. Farm and range lands to the east provide habitat for a variety of wildlife, such as golden eagle and three antelope which were seen two miles from the tract.

Although the tract has not been grazed for several years, it was traditionally grazed by cattle. There are about 60 acres of forage available with a yield of about 42 animal unit months (AUM), based on Soil Conservation Service initial stocking recommendation of .7 AUM per acre for excellent condition drift prairie vegetation in saline ground wash range sites (Shaver 1977).

CULTURAL RESOURCES

The entire NE $\frac{1}{4}$ of Section 14 was surveyed for cultural resources by an archaeologist. Much of the quarter section has undergone cultivation in the past. No cultural resources were identified on the lease application tract. The area had previously been surveyed by the North Dakota State Historical Society (Chris Dill, personal communication), and no cultural resources were identified in that study.

The site files of the North Dakota State Historical Society list some 21 sites within T162N, R94W. Of these, only two, the Souther Coal Mine (32 Bk. 103, Sec. 17) and a farm building (32 Bk. 104) have been professionally recorded. The other 19 are vague site leads, mostly for historic coal mines like Souther. Of this latter group, nine possible prehistoric occupation sites have been noted, in Sec. 5, 9, 10, 26, 30, and 36.

Thus, the archaeological and historical significance of the immediate region is not understood, because little work has been conducted in the area. Meanwhile, the lease tract in question does not appear to contain any archaeological or historical material. However, it is possible, though unlikely, that vegetation and overburden may cover surface remains, and cultivation may have obscured sites.

AESTHETICS

The proposed 80-acre tract lies in the northwest drift plain of the prairie pothole region. The drift plain, formed from heavy glaciation, is a gently rolling plain where the native prairie has been mostly replaced by extensive acreages of cropland. Shallow basin wetlands occur throughout and considerably enhances the scenery. To the south and west, the Missouri Coteau (which has "knob and kettle" topography) forms the distant landscape.

The tract is in a shallow, basin with two intermittent streams running northward. Several small ponds lie along both stream beds whose gradient is less than one percent. There are no shelterbelts, trees, and other shrubby vegetation to break the monotonous stands of grasses, dominated by salt tolerant species. A few saline seeps occur near the stream beds.

The scenic and aesthetic quality of the tract was rated as low moderate according to the procedures and criteria described in BLM Visual Resource Management Manual Release 6310 (see Appendix 2). Since there is current coal strip mining, reclamation activities, and old spoil piles on three sides of the tract, scenic quality of the landscape surrounding the 80-acre tract was not incorporated into an overall evaluation.

RECREATION

The 80-acre tract proposed for leasing federal coal minerals does not have any developed recreational sites. It could provide some upland game and white-tailed deer hunting. Because the tract does not have any shelterbelts, shrubby vegetation, permanent wetlands, and hills, very little wildlife use would be expected; consequently, hunting demand would be low.

SOCIAL CONDITIONS

Initial analysis indicated that there would be no impact on the social environment from this action. Since there will be no increase in the rate of production there will be no change in the social state. Therefore, a detailed description of the social environment, i.e., schools, hospitals, housing, etc., was not done.

ECONOMIC CONDITION

Burke County, the site of the proposed action, is a rural county in northwestern North Dakota which had only 4.7 persons per square mile in 1970. This figure is slightly more than one-half of North Dakota's 1970 population density of 8.9 persons per square mile. The county's population declined during the 1960's from 5,886 in 1960 to 4,739 in 1970, a 19.5 percent reduction. Bowbells, the county's largest community in 1970, experienced a similar decline in population during the same period; from 687 to 584. The county had no urban areas in 1970; the entire population lived in rural farm or rural non-farm residences in that year. Population estimates (Ludtke, 1975) through the year 1995 indicate that Burke County will continue to lose population due primarily, to out-migration of the area's young adults to other areas of the state and nation which can provide better employment and educational opportunities.

Income and employment in Burke County are primarily generated by agricultural activity. Approximately 58 percent of all personal income (excluding dividends and transfer payments) in Burke County in 1974 was a direct result of agricultural sector activities. Similarly, 38 percent of all employment in Burke County in 1974 was on-farm employment. Total agricultural employment remained fairly constant from 1970 through 1974, while personal income in the farm sector increased by a factor of five during this period.

LAND USE

Baukol-Noonan acquired the surface estate of the proposed lease area in 1960. Prior to their acquisition, the land was used for pasture. Since then most of the land has lain idle. Most of the site is too wet and rough to farm.

A small portion, probably less than three acres, in the northwest corner is currently being used for stockpiling spoils from adjacent mining. In the southeast corner a gravel pit has been developed. This disturbance is approximately one acre in size. The remainder of the tract is open grassland used by wildlife.

The area immediately to the north and southwest has been mined for coal in the past. Baukol-Noonan is currently mining on the adjacent 160 acres west of this tract. The area to the east is currently used for livestock grazing. Generally, the surrounding area is agricultural in nature. Grass production and crop rotation of small grains are the predominant uses of the lands.

Access to the area is good. A well maintained county road system traverses the general area. One of the county roads borders the subject tract on the north. North Dakota Highway No. 5 is located two miles north and BN Railroad is located one and one-half miles to the north. Baukol-Noonan's tipple is approximately two and one-half miles to the northwest.

The county road along the north edge is the only improvement on the tract.

The proposed tract is not large enough to be classified as a wilderness area nor is it located adjacent to an area which could be classified a wilderness area.

CHAPTER 3
ENVIRONMENTAL IMPACTS

CLIMATE

Removal of topsoil would destroy all vegetative cover and remove the cooling effect provided by vegetation. The air temperature would increase, and changes in land form created by stockpiling of overburden would alter air flow. Impacts would alter only the micro-climate.

AIR QUALITY

Although mining operations result in increasing the amount of particulate matter and fugitive dust, the mining of this particular site will not increase amounts because it will, in effect, be replacing a neighboring operation.

The ambient air standards at the mine could be exceeded during periods of high winds. State air quality standards must be met in order to continue operations.

Exhaust emissions from heavy equipment would not be increased in the general area as the mining operation would be utilizing the same equipment that is being used in the present operation.

GEOLOGY

The primary impact of strip mining on the geologic component of the environment would occur during overburden and coal removal. The integrity of the coal bed and the overlying strata is completely destroyed during these operations. The paleontological values, which are negligible, would also be destroyed.

TOPOGRAPHY

The major impact to the topography would occur during the removal of overburden in the mining operation. Overburden removal by dragline to depths often exceeding 40 to 50 feet, would radically modify the natural topography.

SOILS

The soils would be impacted in various ways by the mining process. Present soil structure would be destroyed. This may have a negative affect on soil drainage, infiltration, and permeability.

Present soil fertility would be impacted since organic matter, micro-organisms, and the mineral fraction would be disturbed and mixed, causing a disruption of the present nutrient cycle. Alternations in chemical properties would occur due to the mixing.

Stripping off the vegetative cover and stockpiling the surface layers of soil would have the affect of increasing wind and water erosion. This would be true of both the stockpiles and the surface area being worked on.

Soil depth would be impacted. Presently there is some variation in depth of the topsoil. Removal would be in response to this variation. However, when the material is respread there would be a much more uniform condition existing in regard to depth. The effects of this would be positive on areas that had no topsoil previous to mining, but negative in comparison to those areas that had the thicker, better topsoil previous to mining.

Reclaiming the area would cause some compaction of the new soil due to the use of heavy equipment. Compaction usually has a negative affect on soil drainage and permeability.

WATER

Impacts on the water resource will be made during most of the mining and reclamation phases. During the topsoil and overburden stripping and piling, the vegetation, rooting system and soil structure will be destroyed. Loose soil and overburden will be exposed at the surface. This will reduce soil erosion resistance and increase sheet wash causing an increase in erosion and sedimentation. Exposure at the surface of the highly saline Sentinel Butte Formation will increase the dissolved solids. Stripping of soil and overburden will also alter the drainage pattern and will destroy a waterway. Due to the low relief in the area sedimentation of surface waters will be negligible.

Access to the area will have to be provided for the various pieces of equipment used in the mining operation. This area will be highly compacted by the heavy vehicles and will add to the sedimentation impact.

Once the pit is there, some water will flow into it by means of the lignite bed as well as from precipitation and surface sources. This water, will have to be pumped from the pit occasionally and discharged. The lignite which would be mined is a shallow aquifer. If the lignite is removed, part of the aquifer will be permanently destroyed.

When the area has been regraded, topsoiled, and revegetated, sedimentation should be quickly stabilized. From a hydrology standpoint, the type of vegetation established on the reclaimed site will not be important as long as it provides a good rooting system. If fertilizer, herbicides or pesticides are used during revegetation, some toxicants may be introduced into groundwater or surface water bodies.

The area is presently wet and will be wet following reclamation. The extent of area affected by wet conditions will depend upon how the topography can be reconstructed. The overburden depth is very shallow and the ratio of overburden depth to coal depth is small. This, together with the very low relief in the area may make it difficult to avoid creating a depression in the area. If this occurs a larger portion of the area will be influenced by wet conditions.

If sufficient fill material can be found, the drainage pattern could be improved upon and the wet area would be reduced in size.

VEGETATION

All overlying plant material will be destroyed in the stripping operation. The area will be out of production for approximately five years (two years of mining plus three years for full reclamation).

ANIMALS

Removal of topsoil will eliminate opportunities for domestic livestock and wildlife to occupy the surface and to utilize the forage. About 42 AUMs of cattle grazing will be lost during the mining and reclamation phases. Virtually all wildlife value will be lost during mining and reclamation phases. Mobile animals (deer, grouse, songbirds, etc.) will be able to physically relocate to other habitat and occupy a niche if available, but few will be successful. Sedentary animals (invertebrates, mice, perhaps ground squirrels, etc.) will be physically destroyed as the surface soils are removed. Since little aquatic habitat exists on the tract, impacts on aquatic animals will be minor.

CULTURAL RESOURCES

No cultural resources were identified in the lease tract. Therefore, adverse impacts to cultural resources are very unlikely.

AESTHETICS

During the mining and reclamation phases, impacts upon scenic and aesthetic values will be high. Spoil piles, draglines, mining facilities, and reclamation equipment will dominate the otherwise flat landscape. The noise resulting from mining and reclamation operations will be continued for a longer period of time because noise from similar mining and reclamation activities on adjoining land will have ceased.

After reclamation is completed, the landscape of the tract will be returned to approximately its original landform except the removal of the coal resource will result in a general lowering of the surface. The large stands of salt-tolerant grasses and ponds along the stream beds, removed during mining will be replaced by resulting saline seeps and large patches of alkali.

RECREATION

Since the tract has no recreational sites and little hunting demand, direct impact on recreation will be low. Present mining activities have already affected the surface of the tract at the southern end where about five acres of vegetation have been removed and consequently lost to hunting opportunity.

Since no increase in the labor force is expected, off-site and other indirect impacts would be negligible.

SOCIAL CONDITIONS

No significant social impacts are anticipated should the proposed action take place. Included are effects on local housing, educational institutions, social services, public safety, and public health conditions. The reason for this scarcity of significant impacts attributable to the proposed action is that the operation is on-going and community changes generated by the operation have transpired in the past. No population increases are anticipated which would alter the existing social environment.

ECONOMIC CONDITIONS

The proposed action would not result in any significant economic impacts within Burke County. No changes in population, employment, or income would occur as a result of the leasing of federal coal.

If the coal is leased, the State would receive one-half of the federal coal royalty paid by the mining company for the right to mine the federal coal. This value has not been determined as yet.

LAND USE

The wildlife use of this area will temporarily be interrupted during the mining and reclamation period. This impact will be insignificant because of the relatively small area involved. Mining will not occur in the area that has been developed for gravel.

CHAPTER 4
MITIGATING OR ENHANCING MEASURES

CLIMATE

Since impacts on climate are very minimal, no mitigations are recommended.

AIR QUALITY

Keep mining equipment properly maintained to minimize the level of exhaust emission. Water or oil haul roads to reduce the amount of particulate matter.

GEOLOGY

There are no feasible mitigating or enhancing measures applicable to geologic component of the environment.

TOPOGRAPHY

Slope and blend the final highwall to conform with the recreated topography. Grade spoils to create a drainage pattern and a water impoundment or reservoir. Except for the reservoir, distribute topsoil over the entire area and seed to native grasses. Species to be selected at the time of reclamation.

SOILS

Remove and stockpile usable soil material and handle overburden in accordance to State standards. Use surface material from the entire 80 acre tract to obtain a deeper average depth of soil on the total area.

Construct a water impoundment in the mined area. This will reduce the area needing good top dressing and at the same time enhance the aquatic plant and animal life.

Use the proper types and amounts of fertilizers to induce and enhance plant growth.

Use equipment which will keep compaction of new soil to a minimum (e.g. wide tread tires and track equipment).

WATER

During the period that the overburden and topsoils are stockpiled, provide culverts, drainage ditches, settling ponds, water bars, etc. as needed to control erosion from stockpiles and roads.

Provide a temporary channel to detour water flowing through the disrupted stream channels. Keep all outside surface water from entering the mine area. Build a berm around the mine pit to minimize the flow of surface water entering the pit. Impound water which is pumped from the mine pit and hold or treat it until it meets State and federal standards.

Bury toxic or other undesirable overburden material. Do not over apply pesticides, herbicides, and insecticides such that the excess will contaminate surface or subsurface water.

Return the topography to the present conditions and if possible, improve upon the present drainage pattern and reduce the size of the wet areas by making the channel better defined. Preliminary soils and overburden data show that there may not be enough material to replace the area to present topography. If this is the case, and a depression would be created, then it would be best to landscape a pond into the area. A man-made pond would have better controlled dimensions, while a depression would likely create a shallow pond with a large surface area and be more likely to have saline conditions.

Place a culvert through the road fill where the channel leaves the lease area so water can pass through the area. During snow melt or spring rain storms enough water should be available to flush the pond to keep salinity levels at a minimum.

VEGETATION

A grass cover can be restored on the site. Western wheatgrass, slender wheatgrass, tall wheatgrass, alkali sacaton, and nuttall alkaligrass are the grasses that should be seeded on the reclaimed area. Because this is a tough site to reclaim, it is important that a good job of planting be done. Most of the plants suggested above are available from commercial sources. Run soil analysis on the reclaimed area after the topsoil has been replaced. This information is needed to make proper seeding and fertilization selections. If water pockets develop on the completed site, some aquatic species would be considered.

Use a herbicide during the seeding year to prevent an invasion of Kochia and other weeds. The area north of the proposed lease has a plant cover composed mostly of annual weeds.

ANIMALS

Reclamation could provide greater grazing potential and could benefit wildlife habitats and populations. Return most of the tract to grassland of mixed species which include tall wheatgrass. The grazeable acreage will be increased by 20 acres which will result in an additional 14 animal unit months of forage. Construct a reservoir with resting islands and revegetated with aquatic species to provide habitat for many aquatic species (ducks, wading birds, turtle, etc.) which presently are not using the tract. Islands are important in providing diversity, i.e., nesting areas, protection, resting areas. Aquatic vegetation planted around the reservoirs and on the islands will be fenced to protect them from damage by domestic animals. Plantings of ash, elm, Russian olive, and buffaloberry (alkaline tolerant woody species) both around the reservoirs and on drier sites will greatly enhance habitat values. These woody species will provide food sources, protection from weather and predators, and nesting habitats for new as well as present upland species.

CULTURAL RESOURCES

No cultural resources were identified in the lease tract, and no immediate mitigating measures are necessary. In the unlikely event that preliminary removal of topsoil and overburden uncovers archaeological remains, cease mining activities until an archaeologist has had an opportunity to examine the remains. If the remains are determined to be significant, further mitigating measures would be necessitated.

AESTHETICS

Return most of the tract to grassland of mixed species. Replace the small ponds with a reservoir and plant aquatic vegetation on its banks. Plant shrubby vegetation (buffaloberry) and trees in small stands and shelterbelts on desirable sites.

RECREATION

Since recreational demand will be affected very little from this lease, there is no basis for the generation of any mitigation and enhancement measures.

SOCIAL CONDITIONS

Since no significant impacts have been identified which can be attributed to the proposed action, no exercise of mitigative measures are necessary to respond to potential adverse impacts.

ECONOMIC CONDITIONS

No mitigation would be required with respect to economic conditions as a result of the proposed action.

LAND USE

The applicant is committed to full compliance with federal, state, and local laws and permit regulations including:

1. Code of Federal Regulations (43 CFR 3041.2-2) or North Dakota Century Code (NDCC 38-14) requirements that disturbed mining land be reclaimed to a condition equal to or better than that existing before mining operations.
2. State law (NDCC 38-14) authorizing the PSC to delete from mining plans areas not suitable for reclamation and areas which, when mined, would contribute to substantial water quality deterioration or constitute a hazard to dwellings, buildings, cemeteries, roads, streams, or other public or private property.
3. County zoning laws (NDCC 11-33) which require conditional use permits for mining operations.
4. The 43 CFR 3041.2-1 excludes from federal leasing areas which, when mined, would contribute to substantial water quality deterioration or constitute a hazard to dwellings, buildings, cemeteries, roads, streams, or other public property.
5. The 43 CFR 3041.0-7 requires mining plans which minimize, to the greatest extent possible, the amount of land disturbed and removed from production for haul roads, topsoil banks, overburden piles, or other mining purposes.
6. County Boards of Commissioners could attach permit conditions requiring that mining applicants be liable for any valid claim of damage due to disrupted or diminished water supplies or deterioration of water quality resulting from their mining operations, including claims of adjacent or nearby property owners so affected (NDCC 11-33).

7. The PSC or County Boards of Commissioners could attach permit conditions requiring prompt repair and/or replacement of gates, fences, cattleguards, roads, trails, and pipelines damaged as a result of the proposed actions (NDCC 38-14, 11-33).
8. County Boards of Commissioners could attach conditions to mining permits requiring submission of erosion control plans, approved by the local soil conservation district (NDCC 11-33).
9. The PSC or County Boards of Commissioners could attach permit conditions requiring placement of topsoil banks in a manner which would separate residences from mining operations, thereby reducing noise, blasting, dust, vehicle emission, and sight impacts (NDCC 38-14, 11-33).

CHAPTER 5
RESIDUAL ADVERSE IMPACTS

CLIMATE

There are no residual adverse impacts.

AIR QUALITY

There are no residual adverse impacts.

GEOLOGY

The impacts to the geology component (Chapter 3) cannot be mitigated. These impacts are therefore carried over as residual adverse impacts. The integrity of the coal bed, the overlying strata, and enclosed paleontological value are destroyed by mining. Lignite is a non-renewable resource.

TOPOGRAPHY

There are no residual adverse impacts.

SOILS

Some residual adverse impacts on the soil would be expected by the mining process. Some small soil loss could be expected during handling operations. There would be mixing of soil textures and chemical properties associated with specific soils. This would be desirable in some cases and detrimental in others. Soil structure would be destroyed. This may have some benefit such as the breaking up of the claypan in those soils with this feature. Some negative aspects of the destruction of soil structure might occur in such soils as the Harriet and Flaxton where permeability, infiltration, and drainage might be worsened. Soil structure will return but takes many years to develop. Some mixing of the topsoil and its organic matter with the subsoil would occur. Since all the soils have a sodic subsoil except the Flaxton this would be a negative impact on the topsoil. Careful removal of the surface layers would keep this impact to a minimum. Mining would disrupt the present nutrient cycle. Proper fertilization during the reclamation process would largely mitigate this problem. Soil micro and macro organism activity would be disrupted. This would continue in the soil stockpiles, however, and return with soil during reclamation. To what degree or extent is difficult to know or measure.

Despite mitigating measures to stop wind and water erosion of stockpiles and mine spoils, an insignificant amount would occur until the mined area is vegetated and stabilized.

WATER

Removal of the coal will eliminate one possible aquifer (See Chapter 2) in the area, but water will still be available from other aquifers.

VEGETATION

Plant composition will be changed. A saline low land range site will still be present on the reclaimed area; however, once the ground has stabilized and stopped settling, low spots will appear that do not drain completely. This condition is present on the existing site, but it could be more prevalent on the reclaimed area. This condition causes salts to rise in the soil profile and can hinder plant growth. Rate of recovery is unknown.

ANIMALS

Since domestic livestock grazing and wildlife use can be expected to resume after reclamation is completed, there will not be any residual impacts upon wild and domestic animals.

CULTURAL RESOURCES

If mitigating measures are observed, no residual impacts would occur.

AESTHETICS

If the recommended reservoir is not constructed, scenic and aesthetic quality will be adversely impacted by saline seeps and large patches of alkali, particularly along the stream beds.

RECREATION

Since the vegetation on the tract will be reclaimed, the residual adverse impacts to recreation, mainly hunting, will be nil.

SOCIAL CONDITIONS

No residual adverse social impacts have been identified relative to the proposed action.

ECONOMIC CONDITIONS

There are no residual adverse economic impacts resulting from the proposed action.

LAND USE

Once the land has been rehabilitated there will be no residual adverse impacts.

CHAPTER 6

SHORT TERM USES VS. LONG TERM PRODUCTIVITY

Coal strip mining on this site will extend the Baukol-Noonan Mine life in this area by about 1.2 years. Including premining tests, production, and reclamation the short term use of this area will be about five to ten years. This would contribute to an extended economic viability of the area in terms of employment and income from the operation of the mine.

During this short term use time frame, the overburden above the coal, the soil composition and structure, the opportunity to develop water, the vegetation, wild and domestic animal habitat and use, any cultural resource remains not otherwise observable from the surface, aesthetics and any recreational, grazing or farming opportunities will be unavailable for use.

In the long term the coal bed will be lost to future mining, however, the coal may also be lost even though not mined. The overburden and soils will have been separately mixed and have altered characteristics. It will take many years for the soils to redevelop their premining productivity. Any buried cultural resources not recovered or documented during mining will be lost. Mining would remove a local and presently untapped aquifer and thus remove the opportunity to develop a well in the aquifer. There are however, other aquifers, both shallow and deep, which will still be available. The remaining environmental components (geology below the mined coal, vegetation, wild and domestic animal habitat and use, aesthetics, surface water patterns and recreation, grazing and farming opportunities) will return and the land will again be productive for the future.

CHAPTER 7

IRRETRIEVABLE RESOURCE COMMITMENTS

The purpose of this chapter is to identify project impacts that will cause irreparable damage or permanent (or exceptionally long term) changes to the environment.

There are several permanent or long term changes that will be sustained by the environment due to mining. The coal is a non-renewable resource and once mined is not replaced. Land surface which becomes water surface with the construction of a pond is no longer available for forage production. The removal of the coal seam will destroy it as an aquifer. Landscaping and seeding during reclamation will change the appearance of the land, i.e., general topography and vegetation.

The soil and vegetation components are irretrievable as they now exist, but will return in a new form with reclamation. From an economic standpoint, there will be an irretrievable resource commitment of energy required to mine and reclaim the tract. Also labor and capital will be committed to the project.

There will be no irretrievable resource commitments of animals, recreation, cultural resources and social conditions.

CHAPTER 8

ALTERNATIVES TO THE PROPOSED ACTION

The only viable alternative to leasing the coal is to not lease. Since the tract is relatively small, mining only a portion of it would not be at all practical. Analysis of different energy conversion, i.e., solar, wind, etc., is not within the scope of this analysis, nor could such a conversion take place in the time frame in which the subject coal is required.

Not mining the coal would not have any serious adverse impacts. The existing physical environment would not change. Impacts to the environment on this tract would be from mining occurring on adjacent land. Since the company would just move to another site in the immediate area, there would be no change in employment and payroll. Therefore, there would be no change in the local social and economic environment.

Adverse economic impact would be felt by the company which purchased the surface acres in anticipation of mining the federal coal. Also, royalties from the sale of the coal would be lost to the federal and State treasuries.

If not leased at this time the coal in all likelihood would never be mined and utilized.

CHAPTER 9
CONSULTATION AND COORDINATION

The following persons and organizations were contacted during the preparation of this report.

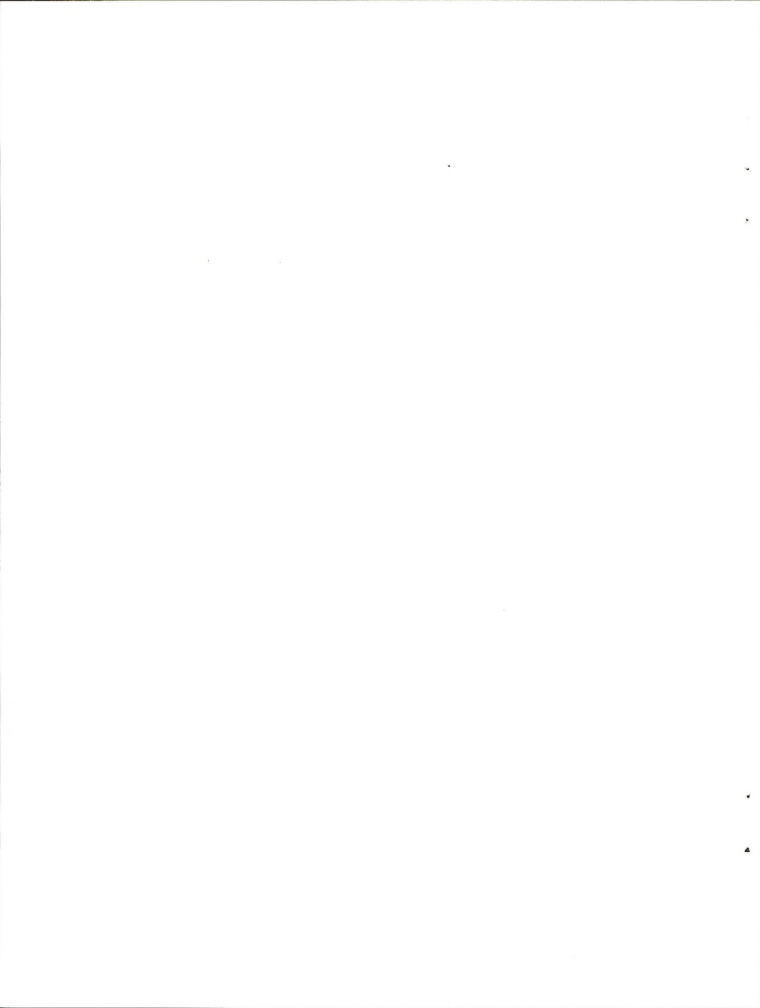
- USGS District Geologist, Area Mining Supervisor, Technical guidance
- SCS Erling Jacobson, Plant Material Center, Bismarck, seed sources
 Jim Kramer, Area Range Conservationist, Dickinson, discussed
 range site
 Dennis Mayer, District Conservationist, Bowbells
 Sylvester Ekart, State Soil Scientist, Dickinson, discussed
 soils
- ARS Fred Sandoval, Soil Scientist, Mandan, discussed reclamation
 potential

State of North Dakota

- State Historical Society
Chris Dill, Historical Society, archaeological clearance
Bruce Renhowe, Game & Fish Dept., wildlife & recreation values
Robert Morgan, Game & Fish Dept., wildlife & recreation values
Karen Thompson, N.D. Outdoor Recreation Agency, Bismarck
Jim Deutsch, PSC, Bismarck, reclamation potential
Dean Peterson, PSC, Bismarck
Dana Mount, Health Dept., Bismarck, discussed air quality
William Parker, NDSU, Taxonomist, Fargo, discussed rare and
 endangered plants

Baukol-Noonan, Inc.

- Dwaine Dihle, Mine Superintendent of the Larson Mine, discussed
 the mine operation
Harland Fawcett, Staff Engineer, Minot, discussed geology and
 hydrology
Harold Joraanstad, post mining use

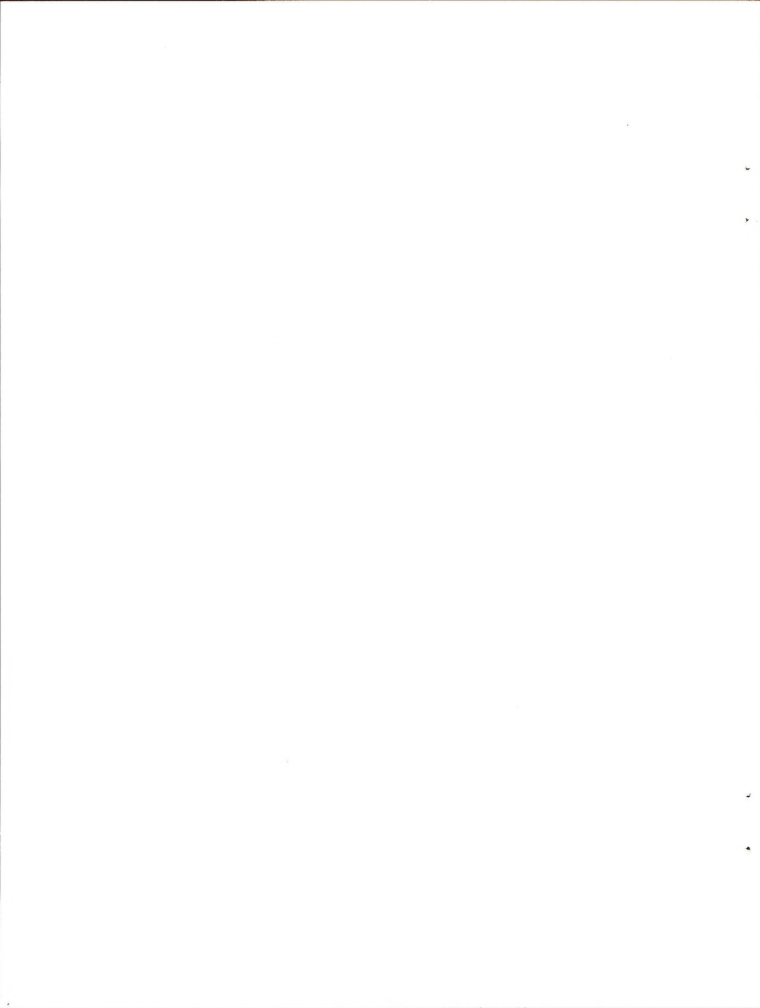


APPENDICES

(TE/EAR)

APPENDIX I - SOILS INFORMATION

APPENDIX II - VISUAL RESOURCES INFORMATION



APPENDIX 1

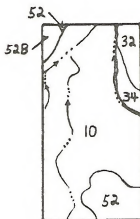
BRIEF MAPPING UNIT DESCRIPTION

<u>Symbol</u>	<u>Name and Description</u>
10	<p>Harriet Complex. This poorly drained saline-alkali soil complex is on level bottomland. It is nontillable.</p>
32	<p>Niobell-Noonan Loams, 0-3% Slopes. This moderately well drained, alkali soil complex is comprised of 75 percent Niobell loam and 25 percent Noonan loam. Both soils have fine textured, slowly permeable subsoils and salty substrata which limits root development and plant growth.</p>
34	<p>Noonan-Miranda Soils. This saline-alkali soil complex is on level till plains. It consists of about 50 percent Noonan loam with a 6 to 8 inch surface layer over the claypan and 50 percent Miranda loam or clay loam with a very thin surface layer over dense claypan. Salts occur within 16 inches of the surface on the Miranda soil.</p>
52 & 52B	<p>Flaxton Fine Sandy Loam, 1-6% Slopes. (Parshall fine sandy loam <15%) The deep, well drained fine sandy loam of this soil has 15 to 30 inches of sandier material in the upper profile. It is on gently undulating sand mantled till plains.</p>

SOILS MAP

Section 14, W¹/₂NE¹/₄, T162N, R94W, 5th P.M.

Burke County, North Dakota - 80 Acres



Scale

1:15,840

4.0" = 1 Mile

Legend

32

Soil Mapping Unit

----- Intermittent Stream

<u>Map Symbol</u>	<u>Mapping Unit</u>	<u>Acres*</u>	<u>% Of Area</u>
10	Harriet Complex, Level	60	75
32	Niobell-Noonan Loams 0-3% Slopes	5	6
34	Noonan-Miranda Soils, Level	4	5
52 & 52B	Flaxton Fine Sandy Loam, 1-6% Slopes	<u>11</u> 80	<u>14</u> 100

*Acreage calculated by dot-grid method

CAPABILITY UNIT IIIe

This unit consists of deep, level to undulating, well drained soils. They are moderately coarse textured soils on sandy glacial outwash plains and high terraces along river valleys.

These soils are moderate or high in organic matter content, have moderate or high available water capacity, and medium fertility. They have moderately rapid or moderate permeability. These soils have a high wind erosion hazard.

The major management practices needed are those that control wind erosion and maintain organic matter content and fertility.

These soils are moderately well suited to cropland use.

Mapping Units Included

<u>Symbol</u>	<u>Name</u>
52 & 52B	Flaxton fine sandy loam, 1-6% slopes

CAPABILITY UNIT IIIs

This unit consists of deep, level and nearly level, moderately well drained soils. They are medium textured soils on glacial till plains.

These soils are moderate in organic matter content, have moderate available water capacity, and medium or high fertility. They have slow permeability. These soils have a claypan subsoil that limits rooting depth and moisture use. These soils have a low wind erosion hazard.

The major management practices needed are those that maintain organic matter content and fertility.

These soils are moderately well suited to cropland use.

Mapping Units Included

<u>Symbol</u>	<u>Name</u>
32	Niobell-Noonan loams, 0-3% slopes

CAPABILITY UNIT VIa

This unit consists of deep, level, moderately well and somewhat poorly drained soils. They are medium textured soils on glacial till plains.

These soils are moderate in organic matter content, have low and moderate available water capacity, and medium fertility. They have slow and very slow permeability. These soils have a claypan subsoil which limits rooting depth and moisture use. These soils have a low wind erosion hazard.

The major management practices needed are those that maintain organic matter content and fertility and maintain desirable native plant species when grazed.

These soils are unsuited to cropland use. They are best suited to pasture or hayland.

Mapping Units Included

<u>Symbol</u>	<u>Name</u>
34	Noonan-Miranda soils

CAPABILITY UNIT VIb

This unit consists of deep, level, poorly drained soils. They are moderately fine textured soils on low terraces and bottomlands along streams and in low areas on glacial lake plains.

These soils are moderate in organic matter content, moderate available water capacity, and medium fertility. They have slow permeability. They have a low wind erosion hazard.

The major management practices needed are those that maintain desirable native plant species when grazed and remove excess water.

These soils are unsuited to cropland use. They are best suited to pasture or hayland.

Mapping Units Included

<u>Symbol</u>	<u>Name</u>
10	Harriet complex

CAPABILITY CLASSIFICATION EXPLANATION

1. Land Capability Classes

These capability classes express a relative degree of limitation and erosional hazards of our soil resources.

a. Land suitable for cultivation and other uses:

- Class I - Soils with few limitations that restrict their use. Class I land occurs in North Dakota, only on irrigated land with adequate water supply.
- Class II - Soils with some limitations that reduce choice of crops or require moderate conservation treatments.
- Class III - Soils with severe limitations for cropland use that reduce choice of crops and require special conservation treatments, particularly for erosion control.
- Class IV - Soils with very severe limitations for cropland use which limit choice of crops and require very careful management, particularly in controlling erosion.

b. Land with limitations that make them unsuitable for cultivation but suited for grassland or other uses:

- Class V - Soils with natural limitations, such as wetness, which limit their use to grassland, wildlife, or recreation.
- Class VI - Soils with severe limitations which limit their use largely to grassland, wildlife, or recreation.
- Class VII - Soils with very severe limitations and restricted to carefully managed range, wildlife, or recreational uses.

c. Soils and land forms with limitations that make them unsuitable for commercial plant production:

- Class VIII - Soil areas which have value only for wildlife, recreation, or esthetic use.

2. Land Capability Subclasses

These capability subclasses express the dominant kind of limitation. Land classes may have more than one kind of subclass listed. A subclass may also be divided to express different degrees of limitation. The following subclasses and symbols are recognized nationwide:

- e - Dominant limitation is susceptibility to water erosion or wind erosion.
- w - Dominant limitation is excess water, such as seepage, high water table, or flood hazard
- s - Dominant limitation is an unfavorable soil characteristic, within rooting zone, such as low moisture capacity, very high density, gravel, stone, shallow effective depth, salinity, etc.
- c - Dominant limitation is climate, chiefly low precipitation or limiting temperature. In North Dakota 'c' is used only on deep level heavy loam and light clay loam soils in Class II which do not have other more significant limitations.

Scenery Quality Inventory Chart

KEY FACTORS	RATING CRITERIA AND SCORE		
① LAND FORM	Vertical or near vertical cliffs, spires, highly eroded formations, massive rock outcrops, severe surface variation. 4	Steep canyon walls, mesas, interesting erosional patterns, variety in size & shape of land forms. 2	Rolling hills, foothills, flat valley bottoms. 1
② COLOR	Rich color combinations, variety or vivid contrasts in the color of soil, rocks, vegetation or water. 4	Some variety in colors and contrast of the soil, rocks & vegetation, but not dominant. 2	Subtle color variations, little contrast, generally muted tones. Nothing really eye-catching. 1
③ WATER	Still, chance for reflections or cascading white water, a dominant factor in the landscape. 4	Moving and in view or still but not dominant. 2	Absent, or present but seldom seen. 1
④ VEGETATION	A harmonious variation in form, texture, pattern, and type. 4	Some variation in pattern and texture, but only one or two major types. 2	Little or no vegetation, contrast lacking. 1
⑤ UNIQUENESS	One of a kind or very rare within region. 5	Unusual but similar to others within the region. 2	Interesting in its setting, but fairly common within the region. 1
⑥ INTRUSIONS	Free from aesthetically undesirable or discordant sights and influences. 2	Scenic quality is somewhat depreciated by inharmonious intrusions but not so extensive that the scenic qualities are entirely negated. 1	Intrusions are so extensive that scenic qualities are for the most part nullified. -4
Scenery A - 15-24			
Scenery B - 10-14			
Scenery C - 1-9			

EXPLANATION OF RATING CRITERIA

- Land Form** or topography becomes more interesting as it gets steeper and more massive. Examples of outstanding land forms are found in the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, and the Rocky Mountain National Park.
- Color.** Consider the overall color of the basic components of the landscape (i.e., soil, rocks, vegetation, etc.) as they appear during the high-use season. Key factors to consider in rating "color" are variety, contrast, and harmony.
- Water** is the ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
- Vegetation.** Give primary consideration to the variety of patterns, forms, and textures created by the vegetation.
- Uniqueness.** This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique within any one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing scenery - the uniqueness factor can be used to recognize this type of area and give it the added emphasis it needs.
- Intrusions.** Consider the impact of man-made improvements on the aesthetic quality. These intrusions can have a positive or negative aesthetic impact. Rate accordingly.

INSTRUCTIONS (See 1 for general procedures.)

Purpose: To rate the aesthetic quality of the scenic resource on all BLM lands.

How to Identify Scenery Value: All Bureau lands have scenic value.

How to Determine Minimum Suitability: All BLM lands are rated for scenic values. Also rate adjacent or intermingling non-BLM lands.

How to Delineate Rating Areas: Consider the following factors when delineating rating areas:

- Like physiographic characteristics (i.e., land form, vegetation, etc.)
- Similar visual patterns, texture, color, variety, etc.
- Areas which have a similar impact from intrusions (i.e., roads, structures, mining operations, or other surface disturbances).

The following is a brief description of the four basic elements of landscape character and how they are perceived in the landscape (BLM Visual Resources Management Manual 6310):

- Form Form is generally considered as the mass or shape of an object. It is most strongly expressed in the shape of the land surface, usually the result of some type of erosion, but may also be reflected on the shape of the openings or changes in vegetation, or in the structures placed on the landscape.
- Line Lines found in the natural landscape are usually the result of an abrupt contrast in form, texture, or color. Lines may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.
- Color A phenomenon of light or visual perception that enables one to distinguish between otherwise identical objects. A hue, as contrasted with black, white, or gray. Color as perceived in the landscape is usually most prominent in the vegetation, but may be expressed in the soil, rocks, water, etc., and may vary with the time of day, time of year, and the weather.
- Texture Texture is the result of the size, shape, and placement of parts, their uniformity, and the distance from which they are being observed. Texture, as it is perceived in the landscape, is usually the result of the vegetation or vegetative patterns on the landscape. Texture may also be the result of the erosive patterns in rocks or soil.

1. Date
OCTOBER 13, 1977
 2. Rater
 3. State
NORTH DAKOTA
 4. District
DICKINSON
 5. Plan Unit
BAUKOL-NOONAN

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF LAND MANAGEMENT

QUALITY EVALUATION SCORESHEET

6. Recreation Activity
BAUKOL-NOONAN MINE
SIGHTSEEING-SCENERY

CLASS	SCORE RANGE
7	
A	15-24
B	10-14
C	01-09

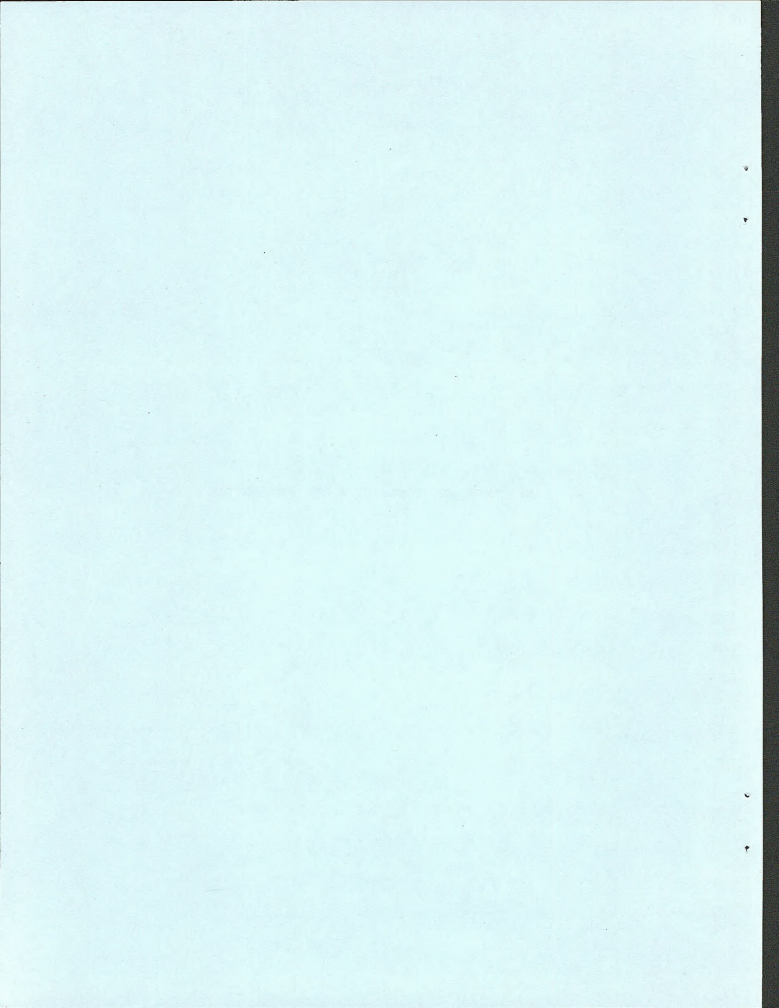
8. KEY FACTORS

9. RATING AREA		10. POINT MAXIMUM							11. TOTAL SCORE	12. CLASS	13. REMARKS
NO. (a)	NAME (b)	LANDFORM	COLOR	WATER	VEGETATION	UNIQUENESS	INTRUSIONS				
		4	4	4	4	6	2				
	RATER NO. 1	1	1	1	1	1	2				
	RATER NO. 2	1	1	1	2	1	2				
	RATER NO. 3	1	1	1	2	1	2				
	RATER NO. 4	1	1	1	1	1	2				
	TOTAL	4	4	4	6	4	8				
	AVERAGE	1	1	1	1.5	1	2				
	SUMMARY RATING	1	1	1	2	1	2	8	C		

REFERENCES

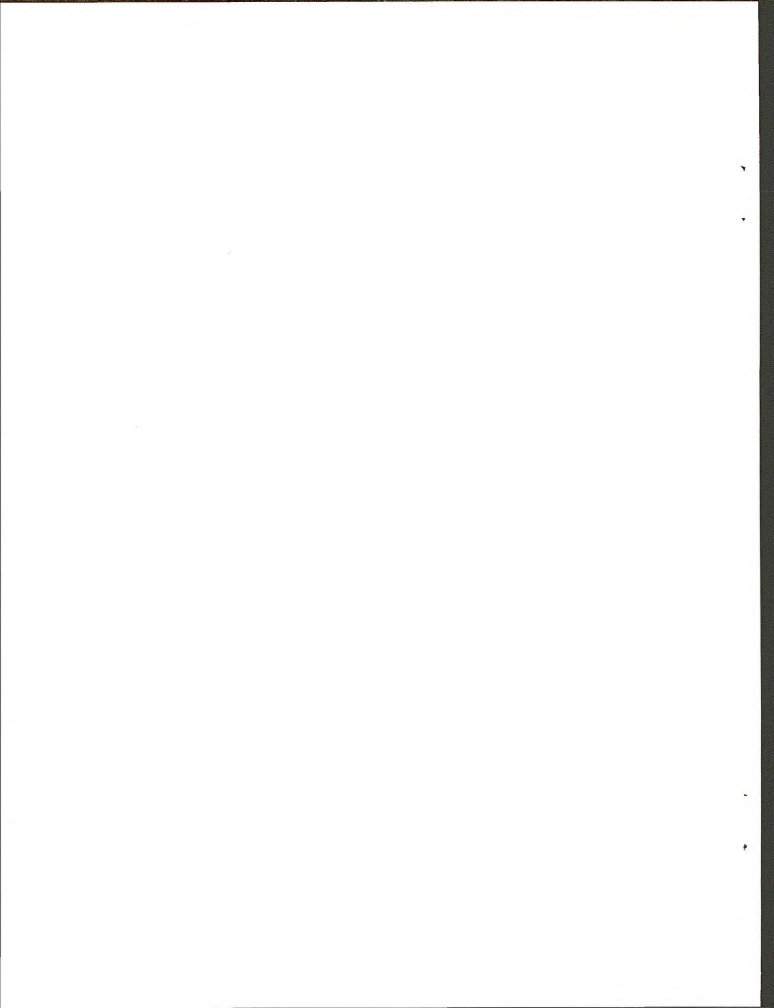
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STATEMENT OF SUITABILITY FOR RECLAMATION

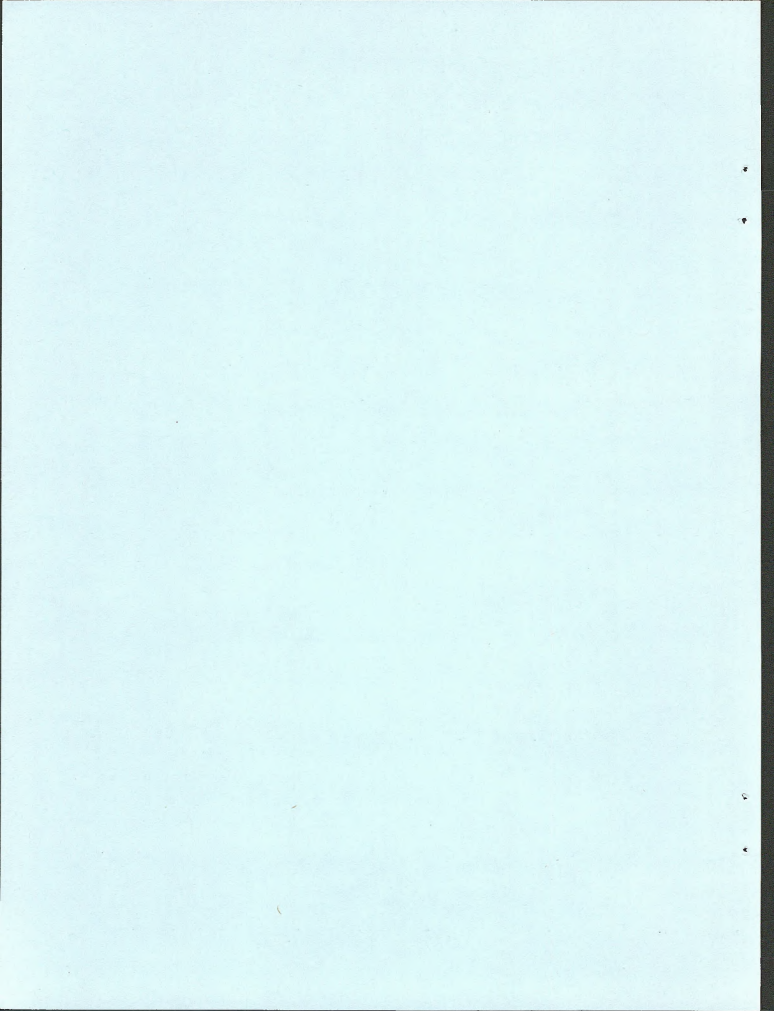


STATEMENT OF SUITABILITY FOR RECLAMATION

The proposed mining area is suitable for reclamation as a wetland range site. Soils data indicates sufficient soil material available to cover the area. Due to the high ratio of coal to overburden thickness, a depression will remain following mining which will increase the wet area on the site. Reclamation should include developing a water impoundment with the remaining area topsoiled and seeded or planted to site tolerant vegetation. Various numbers of native and introduced species could be used.



INITIAL LAND USE CONCLUSIONS



CONCLUSION STATEMENT AND CRITERIA

The initial conclusion to the proposed action is to lease the coal as applied for with stipulations on the lease to insure reclamation of the site and return it to a condition that will provide habitat for wildlife.

This conclusion is based on the following criteria:

1. The coal will contribute to the energy needs of the State and the nation.
2. Beneficial use will be made of the coal.
3. The coal facilitates the continued operation of a long established industry.
4. The applicant meets the legal requirements for leasing.
5. Development of the coal will not have any adverse social impacts.
6. There will be beneficial economic impacts to the State and Federal governments through the collection of taxes, rentals, and royalties.
7. Reclamation can be accomplished; however, it is recognized that a good reclamation plan must be developed and carried out for complete success.
8. Most physical adverse impacts will be of short term and mitigated over time.
9. The area is of low productivity and has a very low intensity of use.
10. Irreversible impacts are not significant.
11. The area is recommended to be returned to a condition to support wildlife because it is the desire of the surface owner and is the most productive use of the land. Site quality is presently low and will be too low for agricultural purposes.
12. If not leased at this time, the resource will be left and not mined as the remaining deposit of coal will be too small to be economically mined.

STATEMENT ON SURFACE OWNER CONSENT AND OPINION ON RECLAMATION

Baukol-Noonan Inc., the applicant for this federal coal, is also the record owner of the surface of the 80 acre parcel in question. Baukol-Noonan, in their application has indicated the coal, if obtained, will be mined by surface mining methods. The application, therefore, is taken as evidence that the surface owner consents to use of his surface for purposes of mining the underlying federal coal.

In a discussion with Baukol-Noonan Coal Company, it was expressed to BLM that the company's desire for reclamation and post mining use was to return the land to a condition that would support wildlife. This would include leaving the last pit for water impoundment, including a drainage outlet, and planting trees, shrubs, and grasses tolerant to the site and conducive to a wildlife habitat.

RELATIONSHIP TO STATE AND LOCAL PLANNING

The proposed lease area is located within the jurisdictional area of the Souris River Basin Regional Council for Development. This organization acts in an advisory capacity to county, city, and township governments. In contacting the regional council, it was found that no planning at state, county, or township level existed that related to the proposed lease action. Planning or zoning boards have not been established in the area.

SPECIAL STIPULATIONS

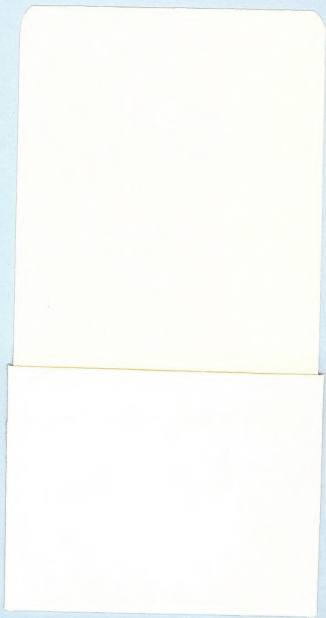
The lessee will be required to comply with all applicable State laws and regulations concerning coal mining. At least two weeks prior to beginning operations on subject lands, the lessee must have in his possession an approved exploration and/or mining and reclamation plan. The plan must be approved by the Area Mining Supervisor, United States Geological Survey and the District Manager, Bureau of Land Management.

The operation shall comply with the reclamation standards as set forth in 43 CFR 3041.2-21, 30 CFR 211, 30 CFR 700, and North Dakota Century Code (NDCC 38-14).

Special stipulations for this lease will be:

1. Developing a pond.
2. Reseeding the area to native grasses.
3. Plant trees and shrubs that will enhance a wildlife habitat.

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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