APPENDIX I
GENERIC END-USE FACILITY

The purpose of this appendix is to present the major probable impacts of facility development. Many of the analyses presented here are based on the detailed analysis presented in the Fort Union Regional Coal DEIS and related logical mine size tract site-specific analyses (USDI 1981b, 1982).

The generic end-use facility would produce 1,000 mw of electricity over 289 days of operation.

The uncertainty of end-use facility location and size will limit this analysis to a general treatment. This analysis is not meant to substitute for detailed site specific analyses, EISs, or analyses that come later when facility projects are actually proposed. Nor will it preclude any federal, state, local, or private decisions concerning actual end-use, facility siting, or end-use restrictions.

This analysis is based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are best estimates. Others are based on existing literature, facilities, and input from industry sources.

The low energy value and high water content of lignite coal constrains transportation of lignite. Therefore, it is assumed that an end-use facility would be near the mine.

DESCRIPTION OF THE FACILITY

A generic coal-fired electric power generation plant would consist of two 500 mw (gross) units located near a lignite coal source. The facility has an average operation factor of 0.90 and a load factor of 0.85. It would be capable of delivering a maximum of approximately 900 mw to the existing transmission system. The facility would consist of the following units: (1) coal preparation, storage, and handling; (2) power generation; (3) pollution control and waste disposal; and (4) utility and transportation corridors. The total land area dedicated to the facility would be approximately 600 acres.

1. Coal Preparation, Storage, and Handling

Lignite coal would be transported from a nearby mine to a three-day storage pile or a sixty-day storage pile. From the 3-day storage pile, the coal would be sent by conveyor to be crushed before being transferred to the plant silos for intermediate storage. Finally, coal would be reconditioned before introduced into the furnace for ignition. A generic plant would burn approximately 800 tons of coal per hour or about 5.5 MM tons per year.

2. Power Generation

The crushed coal is combined with air supplied by forced-draft fans and then ignited and burned in the boiler furnaces. The combustion in the boiler furnace produces heat that creates steam from feed water entering the boiler heat-exchange system. After releasing energy through expansion in the high-pressure section of the turbine, steam is returned to the boiler for reheating. After being reheated, steam is returned to the intermediate section and subsequently to the low-pressure section of the turbine. Spent steam passes through the condenser where waste heat is removed, and the condensed liquid is returned to the boiler feed water system. Combustion gases from the furnace are exhausted to the atmosphere through the pollution control devices. Steam energy is converted to mechanical energy by the turbine and subsequently transformed into electrical energy by the generator. Generated power is routed through the main transformer for voltage step-up and then to a switchyard and transmission line system for distribution.

The water for the power plant systems would come from a nearby river or impounded water source. Demineralization of the filtered water for boiler makeup will be necessary to provide water of the required quality for the steam generation system. The treated water would then be stored for use. There will be several holding ponds included at the facility to store recoverable water.

The cooling system for the electric power facility would be mechanically induced draft wet-type cooling towers. Cooling tower blowdown would be sent to a holding pond to be used for ash sluicing, scrubbers or coal dust suppression.

3. Pollution Control and Waste Disposal

Burning lignite in the boiler produces gaseous emissions, fly ash, and bottom ash. The gas from the boiler passes through a fabric filter baghouse and an SO_2 dry scrubber, and is dispersed by a 600-foot stack.

Bottom ash from the main boiler, pyrite rejected from the pulverizer, and ash discharged from the hoppers will be hydraulically conveyed to dewatering bins. The ash will then be loaded into trucks and transported to the adjacent mine for disposal.

The plant will include a dry scrubbing system to absorb SO_2 from the flue gas. The scrubber product will be treated prior to disposal with dry fly ash. The fly-ash/scrubber product would likely be blended with water for dust control and stabilization. Emission of nitrogen oxides will be controlled by designing the boiler for proper mixing and flame quenching. The quantity of wastes produced by the power facility would be approximately 80 tons per hour of fly-ash/scrubber product and 10 tons per hour of bottom ash.

The air emissions will depend primarily on: (1) the conversion process, the emission control technology used at the facility, and the level of control used, (2) the sulfur, ash, and water content of the lignite, (3) whether or not the facility produces it own electric power. For this analysis it will be assumed that the facility will produce its electric power with coal-fired boilers and steam turbines.

4. Utility and Transportation Corridors

Water will be pumped from the water source to a surge pond. The water pipelines will require a rights-of-way probably consisting of a 100-foot-wide construction easement and a 50-foot-wide permanent easement. The surge pond would have a water surface area of approximately 42 acres and would contain 1,050 acre-feet of water. Transportation corridors would be required for roads and a railspur. The transmission line leaving an electric power facility would be a 500 KV line with a right-of-way 150 feet wide connecting with an existing system.

IMPACTS

Air Quality

Air emissions produced by burning of lignite are expected to be about 375 pounds per hour (lbs/hr) of particulates, 7530 lbs/hr of sulfur dioxide, and 5640 lbs/hr of nitrogen oxide.

The impacts resulting from air contaminants emitted by the facility are deduced by using established air quality standards. When these standards are exceeded deleterious effects of the contaminants are implied to occur. A facility that meets air quality standards presumably would not adversely affect human, animal, or vegetation health. Such an assumption is the subject of continuing discussion and is disputed by certain research studies. USDI — ND (1978) pages 37-94, presents a detailed discussion of this issue. The facilities could also emit certain pollutants for which there are no standards. The anticipated levels of air quality concentrations of contaminants are obtained by measuring existing levels of air quality and adding computer simulation of the atmosphere loading resulting from the end use facility.

The Clean Air Act Amendments of 1977 designated three levels of allowable deterioration of air quality in regions where air quality was better than the National AAQSs. All of North Dakota was defined as a Class II area with exception of four smaller areas which were defined as Class I areas. These Class I areas are the Theodore Roosevelt National Park north unit, south unit, and Elkhorn Ranch, and Lostwood National Wildlife Refuge.

The assessment analysis of proposed air quality impacts (deterioration) by proposed new sources is achieved with computer models. These models simulate the physical processes of atmospheric transport, dispersion, chemical transformation, and removal of air contaminants with resulting levels of concentrations of the contaminants. Modeling has been and remains the only tool available to determine air quality impacts of proposed sources or source modifications, since these new sources are not yet producing air contaminant emissions.

This modeling led the NDSDH to declare in 1979 that the increment of allowable Class I area air quality deterioration for SO_2 had been consumed and was allocated to the new sources that had been granted construction permits from 1975. This decision further implied that no additional sources could construct and operate within the geographic corridor bounded by the units of the Theodore Roosevelt National Park and the sources located eastward.

However, several applications for permits to construct new facilities which would be additional air pollution sources were submitted to the NDSDH. The applications were acted upon by the NDSDH with requests to the Federal Land Manager (NPS) for a variance based on no effect shown to the Air Quality Related Values (AQRV). Since the limiting case is the increment consumption over the Theodore Roosevelt National Park, the NPS is required to investigate the effects of the proposed actions on the AQRVs. The NPS issued variances on several permit applications and also issued a warning that further permits would be scrutinized very closely. The levels of SO_2 were at the point of showing effect to the AQRVs. Applicants may also decide to pursue an offset mechanism that would best suit their situation.

Given the above existing new source situation, the quantification of air quality impacts resulting from additional facilities associated with certain coal lease tracts is impossible. Discussion of site-specific impacts without addressing the interactive and cumulative impacts would have little decision value.

Soils, Vegetation and Agriculture

Agricultural land consists of approximately 66 percent cropland, 7 percent hayland, and 27 percent rangeland throughout the planning area. Based on 1978-1979 county averages determined from Agricultural Stabilization and Conservation Service (ASCS) data and BLM grazing files, annual production would be 27 bushels of wheat per acre, 1.3 tons of hay per acre, and 0.5 AUMs per acre of rangeland. Assuming a 600-acre disturbance from the facility, 10,692 bushels of wheat would be lost annually for the life of the facility.

An undetermined length of water pipeline, roadways, and railroad spur would be constructed. A disruption of 12 acres per mile of pipeline, 14.5 acres per mile of roadway, and 18 acres per mile of railroad spur would be expected.

Erosion losses due to wind and water from ground disturbed during the construction phase of the facility, given state permitting stipulations, would not be significant. Regionally, the agricultural production lost on the facility site also would not be significant.

Water

Water requirements for an electric power generating facility are approximately 9,000 gallons per minute or 13,000 acre-feet per year. The likely source of water for industrial use is Lake Sakakawea. Withdrawal of water would have no significant impact upon the reservoir.

Land Use

The optimum site conditions for facilities are the same as for agriculture; that is, gentle topography and soils with good drainage. The increase in population of nearby communities results in a demand for new housing, additional commercial development, and expanded public use facilities. The area of this development likely will be on off-site agricultural land. Thus, facilities are most likely to displace agricultural use.

Recreation

Recreation throughout the CSAs consists of seasonal hunting of big and small game, sight-seeing, and other dispersed activities. The development of a mine facility would impact recreation by placing additional pressure for these uses on surrounding lands. However, with development of a mine, the population of the area would increase, resulting in the probable creation of new indoor recreational facilities. Outdoor recreational facilities at Lake Sakakawea and Theodore Roosevelt National Park would experience increased demand.

Wildlife/Fisheries

Impacts of an electric power facility on wildlife would occur in two areas: (1) impacts from destruction of habitat and

(2) direct and indirect impacts from the increase in human population.

The removal of vegetation for the facility and the expansion of urban areas, highways, and railroads would prevent or greatly reduce the use of an area by wildlife regardless of the type of vegetation removed. Thus, careful siting of the facility is necessary to limit the destruction of areas that contain important habitats or migration corridors.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat could occur, depending on the magnitude of development. Wildlife-oriented recreation such as hunting and observation would have to be sought elsewhere. Wildlife would be impacted by electrocutions and collisions with powerlines, road kills along transportation routes, and other factors discussed in Appendix H.

The impact to wildlife could be mitigated by: (1) siting the electric power plant and associated facilities with regard for essential wildlife areas, (2) adjusting work shifts so that employees are not traveling when deer or pronghorn are crossing roads, (3) providing mass transportation for employees, (4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and (5) adopting a poaching clause in union contracts.

Taking water from shallow bays in Lake Sakakawea could have significant adverse impacts. These areas are prime nursery and spawning areas for sport, commercial, and forage fish. Taking water from deeper noncritical areas of the reservoir could reduce or eliminate the significant impacts to fisheries. The cumulative increases in industrial, urban, and other water uses would dictate the severity of the impacts on fisheries.

Cultural Resources

There are two types of impacts to cultural resources anticipated for a power generation facility: (1) Direct adverse impacts are those that result from ground disturbance that can damage or destroy sites, artifacts, their environmental context, and the data they contain. (2) Indirect adverse impacts are uncontrollable but predictable and include vandalism increased by improved access, loss as a result of erosion, or degradation resulting from disruption of natural settling.

In the event of a facility site selection, stipulations covering cultural resources would be developed. These stipulations would require the identification and evaluation of cultural resources which may be adversely impacted by mine development.

Preservation is the preferred form of mitigation for sites determined eligible and subject to direct impacts; however, if preservation is not possible, the adverse impacts to significant cultural resources would be reduced by data recovery methods. It is estimated that construction of an end use facility would directly impact five sites. Additional impacts to cultural resources would occur by construction of utility and transportation corridors. It is not possible to estimate the number of sites which would be impacted by corridor construction until a specific proposal is received. In general direct adverse impacts to expected site types within a typical facility area could be mitigated successfully through existing data recovery methods.

Visual Impacts

Most of the planning area has a high but common visual quality. The landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform, so views alternate between nearby lack of features at low points and panoramas of up to 30 miles at high points. The landscape is seen in terms of these short vistas of landscape elements that would not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the regional landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond initial responses, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 600-foot stack could potentially be seen 30 or more miles away. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the 40 years of the facility's expected life.

Paleontological Resources

Direct adverse impacts to paleontological resources may occur within a typical power generation facility. Current data indicates that common and rare fossil sites are located within the boundaries of some CSAs. Indirect adverse impacts to paleontological resources may also occur due to an increase in population in the mine area and improved access to fossil resources near the facility.

Direct adverse impacts would be mitigated through avoidance or a data recovery program. In most cases the loss of data would be minimal. Indirect adverse impacts are uncontrollable and it is anticipated that some loss of data would occur.

Economic and Social Conditions

Economic

Direct employment would peak at approximately 1,550 people during the third year of the project (Table I-1). Long-term operation employment would total approximately

TABLE I-1

MINE AND COAL-FIRED ELECTRIC POWER GENERATION PLANT

Construction and Operation Work Force Requirements 1990-2000[1]

Year	Const. and Oper.	Total		Mine[2]		Plant[3]	
		Const	Oper	Const	Oper	Const	Oper
1	500	450	50	150	50	300	0
2	1,300	1,200	100	50	100	1,150	0
3	1,550	1,400	150	150	150	1,250	0
4	1,100	850	250	50	200	800	50
5	1,000	650	350	0	250	650	100
6	950	600	350	0	250	600	100
7	1,050	700	350	0	250	700	100
8	600	150	450	0	250	150	200
9	450	0	450	0	250	0	200
10-40	450	0	450	0	250	0	200

[1]Assuming a 4-year construction period for the mine and 8 years for the facility with periods overlapping. Numbers rounded to the nearest 50.

[2]Nokota Company Mine No. 1, (McLean County), West-Central North Dakota Regional EIS, Bureau of Land Management — State of North Dakota. 1978.

[3]Basin Electric Power Cooperative Antelope Valley Station, Bureau of Land Management: Werner Tract; Site Specific Analysis; preliminary facility evaluation report. Montana State Office, Billings, Montana. 1981.

450. Direct annual payroll would peak at approximately $50 MM in the third year of construction (Table I-2). Payroll during the operation phase would total about $16 MM annually for the life of the project.

Indirect employment would peak at about 900 and decrease to 700 in the operations phase (Table I-3). Payroll to indirect workers (in 1984 dollars) would peak at approximately $13 MM and decrease to $10 MM in the long run.

The proportion of workers hired locally depends upon a variety of factors including community size, the distance between the project and the communities, the size of the project, the presence of other projects in the area, the number of unemployed or underemployed workers in the area, skill types available, and area wage levels (Weiland et al. 1977). Local workers may be willing to commute as far as 60 miles or more for temporary construction work (Murdock et al. 1979). The figures used in this analysis to determine the proportion of local workers hired have been taken from studies of existing mine and facility work forces.

Local hires would peak at about 1,400 during construction (Table I-4). Long-term local hires would total approximately 700 and most would be engaged in employment indirectly related to the mine and facility.

Total population in-migration would peak at approximately 2,050 during the third year (Table I-5). This figure would decline to about 1,100 during the long-term operation of the project. (Detailed calculations and information for population in-migration is on file at the Dickinson District Office.)

The population size of existing communities and the distance between the project and communities are major determining factors for where people settle. Population size is important because it is closely associated with the service structure of communities; different size cities generally can support different levels and types of community services (Murdock et al. 1979). In previous studies of North Dakota, areas over 30 miles from the project appeared to be relatively unattractive to in-migrants. Construction workers hired for a fixed duration of time were more likely to commute longer distances than those hired for the lifetime of the project (Murdock et al. 1979).

The impact of in-migrating population on services and infrastructure will not be analyzed in detail, because site specific development proposals are necessary before service/infrastructure analysis becomes meaningful. The distribution and type of incoming population and the current community service and infrastructure capacity are both critical in determining how in-migrants affect services and infrastructure.

TABLE I-2

DIRECT PERSONAL INCOME (PAYROLL) GENERATED BY THE MINE AND FACILITY[1]

Year	Direct Construction Income (Payroll)	Direct Operations Income (Payroll)	Total Direct Income (Payroll)
1	$14,353	$1,855	$16,208
2	$38,274	$3,711	$41,985
3	$44,653	$5,566	$50,219
4	$27,111	$9,103	$36,214
5	$20,732	$12,641	$33,373
6	$19,137	$12,641	$31,778
7	$22,327	$12,641	$34,968
8	$4,784	$16,005	$20,788
9	0	$16,005	$16,005
10-40	0	$16,005	$16,005

[1]Source: North Dakota Labor Market Advisor, December 1975, Volume 1, No. 11. All figures are in thousands of 1984 dollars.

TABLE I-3

INDIRECT EMPLOYMENT AND INCOME FOR THE MINE AND FACILITY[1]

Year	Number of Indirect Employees	Payroll to Indirect Employees[2]
1	300[3]	$4,260[4]
2	750	$10,650
3	900	$12,780
4	800	$11,360
5	850	$12,070
6	800	$11,360
7	900	$12,780
8	750	$10,650
9	700	$9,940
10-40	700	$9,940

[1]See Table I-5 for an explanation of how these figures were calculated.

[2]Source: North Dakota Labor Market Advisor, December 1975, Volume 1, No. 11.

[3]Employment is rounded to the nearest 50.

[4]All figures are in thousands of 1984 dollars.

TABLE I-4

LOCAL EMPLOYMENT GENERATED BY THE MINE AND FACILITY[1]

Year	Local Construction Employment	Local Operations Employment	Local Indirect Employment	Total Local Employment
1	250	50	200	500
2	600	50	500	1150
3	700	100	600	1400
4	400	100	550	1050
5	300	200	550	1050
6	300	200	550	1050
7	350	200	600	1150
8	100	250	500	750
9	0	250	450	700
10-40	0	250	450	700

[1]Based on assumptions detailed in Table I-5. (Employment is rounded to the nearest 50.)

TABLE I-5

POPULATION IN-MIGRATION ASSOCIATED WITH THE MINE AND FACILITY[1]

Year	Population Associated with Direct Employment		Population Associated with Indirect Employment[2]	Total Incoming Population
	Construct.	Oper.		
1	350[2]	50	250	650
2	1000	100	600	1700
3	1150	200	700	2050
4	700	250	650	1600
5	550	400	650	1600
6	500	400	650	1550
7	600	400	700	1700
8	150	550	600	1300
9	0	550	550	1100
10-40	0	550	550	1100

[1]Population is rounded to the nearest 50.

[2]There would be a 6-month lag period between direct construction and operation employment and associated indirect employment.

Assumptions[1]:

	Construction Work Force	Operation Work Force	Indirect Work Force
% Local Hires	50	60	70
% Incoming Unmarried	15	8	12
% Incoming Married, Family Absent	10	0	0
% Incoming, Family Present	25	32	18
Average Family Size, Incoming Families	2.3	3.5	3.6

[1]Sources: Murdock & Leistritz 1979, Leistritz & et al. 1982, USDI 1984e, Halstead & Leistritz 1983.

During the initial construction period of large-scale energy projects, considerable stress may be placed on local services and infrastructures such as housing, schools, police, sewage, etc. Unless specific plans are made to avoid the situation (see mitigation discussion), there is a lag period between the time the service and infrastructure demands increase and when monies such as coal conversion and coal severance taxes are available to deal with the increased demand.

This section discusses revenues generated by the electric power generation plant and expenditures needed to meet the increased service demand. The analysis focuses on services that are provided by local governments: schools, water treatment and distribution, sewage collection and treatment, police and sheriff protection and fire protection. The taxes examined are the major ones directly related to mine and facility development: coal severance, coal conversion, and mine property taxes. (The coal conversion facilities tax replaces property taxes on the plant itself.) With minor exceptions, these taxes are distributed to the county in which the mine and facility are located to be distributed to the county, city, and schools. (Other sources of revenue for local entities that will not be considered here include local property taxes, federal revenue sharing, user fees, special assessments, highway funds, cigarette and tobacco taxes, and education transfers. These would accrue both to the counties where the development occurred and to surrounding counties.)

The expenditure and revenue data presented here cannot be directly compared. This is because some revenues are specific to the producing county, whereas expenditures cover all in-migrating populations that would probably locate in a multi-county area.

Tables I-6, I-7, and I-8 present estimated revenues to coal development counties and expenditures for incoming population. The tables show the types and magnitudes of expenditures required by incoming population (if services were to be provided) and the types of revenues that would be received. Expansion costs of schools (Table I-7) and waste water systems and water distribution and treatment facilities (Table I-8) would be some of the largest expenses incurred. Local governments would have to decide whether to develop for peak or long-term populations. A lag period usually occurs at the beginning of development, where expenditures have increased but revenues have not.

Those communities that experience significant long-term fiscal deficits could have problems in providing an adequate overall level of services. Additional funding, over that which would legislatively flow to the community as a result of economic development and/or population increases, would be necessary if the incoming population is to be provided with adequate public services.

Social

The type and magnitude of social impacts are based on the ability of the community to adapt to change and the change itself (BLM *Guide to Social Assessment*, USDI 1982a). In general, communities that have a large diverse population base, experience with development, ties to outside organizations, a diverse labor force, adequate services and facilities, experienced leadership and a positive attitude toward growth will be able to deal well with population growth. Small communities with no historical experience with development, few linkages to nonlocal organizations, a fairly uniform population, an inadequate service base, and inexperienced leadership are more likely to have problems dealing with population growth.

TABLE I-6

SELECTED COUNTY REVENUES AND EXPENDITURES DUE TO THE MINE AND FACILITY[1]

	Revenues[2]			Expenditures[2]
				Operating Expenses
Year	Coal Conversion Tax	Coal Severance Tax	Share of Local Property Tax on Mine	Law Enforcement
1	0	0	9	5
2	0	115	18	12
3	0	229	27	15
4	87	344	36	12
5	175	458	36	12
6	175	458	36	11
7	175	458	36	12
8	351	458	36	10
9	351	458	36	8
10-40	351	458	36	8

[1]Source: Leistritz et al., 1982 (Per capita annual operating expenses were estimated to be $7 for county law enforcement). (All figures in thousands of 1985 dollars. These figures assume no current excess capacity.)

[2]Revenues and expenditures are not directly comparable because revenues would accrue only to the county in which the project was located while expenditures would be divided among the counties where the in-migrants settle.

TABLE I-7

SELECTED SCHOOL DISTRICT REVENUES AND EXPENDITURES DUE TO THE MINE AND FACILITY[1]

	Revenues			Expenditures[2]
Year	Coal Conversion Tax	Coal Severance Tax	Share of Local Property Tax on Mine	Operating Expenses
1	0	0	14	226
2	0	86	29	657
3	0	172	43	818
4	66	257	57	524
5	132	343	57	816
6	132	343	57	804
7	132	343	57	821
8	263	343	57	578
9	263	343	57	714
10-40	263	343	57	714

Total expansion costs of school facilities

To Meet Peak Population	$1,951
To Meet Long-term Population	$1,700

[1]Revenues and expenditures are not directly comparable because revenues would accrue only to the county in which the project was located while expenditures would be divided among the counties where the in-migrants settle. (All figures in thousands of 1985 dollars. These figures assume no current excess capacity.)

[2]Source: Leistritz et al. 1982 (Per capita operating expenses were estimated to be $2,832 per student. Per capita expansion expenses were estimated to be $5,873 for primary students and $9,208 for secondary students.)

TABLE I-8

SELECTED CITY REVENUES AND EXPENDITURES DUE TO THE MINE AND FACILITY[1]

	Revenues			Expenditures[2]	
				Operating Expenses	
Year	Coal Conversion Tax	Coal Severance Tax	Share of Local Property Tax on Mine	Police Prot.	Fire Prot.
1	0	0	13	27	21
2	0	86	25	70	54
3	0	172	38	84	65
4	66	257	50	66	51
5	132	343	50	66	51
6	132	343	50	64	49
7	132	343	50	70	54
8	263	343	50	53	41
9	263	343	50	45	35
10-40	263	343	50	45	35

Total expansion costs of waste water systems and treatment facilities

To Meet Peak Population	$640
To Meet Long-term Population	$344

Total expansion costs of water distribution and treatment facilities[3]

To Meet Peak Population	$6,004
To Meet Long-term Population	$3,221

[1]Revenues and expenditures are not directly comparable because revenues would accrue only to the county in which the project was located while expenditures would be divided among the counties where the in-migrants settle. (All figures in thousands of 1985 dollars. These figures assume no current of excess capacity.)

[2]Source: Leistritz et al. 1982 (Per capita annual operating expenses were estimated to be $41 for city police protection and $32 for city fire protection. Per capita expansion costs were estimated to be $312 for wastewater collection and treatment and $2,929 for water treatment and distribution.)

Social impacts may include changes to social organization and social well-being. Social organization refers to the way in which the people in the community relate to each other. Social well-being refers to the way individuals feel about their community and the quality of life that it offers. The following paragraphs describe the types of changes that could occur to community social organization and social well-being given the development scenario.

Potential changes in social organization include residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. In extreme cases, change might be so great that long-time residents would feel like strangers in their own community. The severity of these impacts would depend on the predevelopment social organization of the community (i.e., whether the community is a relatively informal agricultural area or whether it has become more formal/urbanized) and the size and character of incoming populations. Change would be greatest in situations where the predevelopment community social organization was very informal, the population influx was large, and the types of in-migrants were different than current residents. Social organization impacts due to coal development in western North Dakota are discussed in detail in the Fort Union Coal Region Draft EIS (USDI 1982, pages 143-152).

At this level of planning, it is impossible to determine if in-migration would occur on the Fort Berthold or Standing Rock Indian Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in Reservation towns and the relative location of other towns outside the Reservations. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics could be impacted. This would be addressed in subsequent planning efforts when mine and facility locations are available.

With an increase in regionwide population, more non-Indians may travel onto Fort Berthold Reservation lands for recreation, which could lead to an increase in jurisdictional disputes on the Reservation. However, because the area around the Reservation has been the scene of intense energy development activity in the past, many of the processes necessary for dealing with such impacts should be in place.

Impacts to social well-being depend upon the pre-existing level of community social well-being and the size and type of the incoming population. Negative impacts to social well-being would be greatest in situations where predevelopment services and infrastructure were inadequate, the town is small relative to the population increase, and the types of in-migrants are different than the current residents. These impacts may be mostly of a short-term nature, noticeable primarily during periods of peak construction.

Beneficial changes in social well-being would accrue to those people who were able to acquire employment or who benefited from business expansion as a result of the increased income in the community. The availability of local employment may allow some younger people to remain in their communities to work if they desire, reversing youth out-migration trends which currently characterize many rural areas.

The increase in income which would accompany the increase in employment would enhance the well-being and possibly raise the standard of living of those positively affected. It could also create disparity in groups or between individuals who did not benefit.

Population growth would cause increased demand for public and private services of all types. In some cases the capacity of towns to respond would be overwhelmed, especially if services were currently inadequate or providers were not used to handling the types of problems which they would be encountering. This strain on services would reduce the availability or distribution of resources to long-time users and newcomers alike.

An increase in the number of strangers passing through town, noise, crowds, traffic, and other stresses would also occur. These disturbances could be particularly distressing for those residents who had never had to deal with such problems before. Although people would likely adapt to these changes, which would be most intense during peak construction phases, they might regret the loss of the quiet, slow-paced small town atmosphere they previously enjoyed.

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character.

Some area ranchers and farmers have organized in opposition to development because of their concern over regional impacts to air and water resources which they feel could affect their economic and social welfare and ultimately limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed.

Impacts to social well-being on the Fort Berthold and Standing Rock Reservations depend on population in-migration to the Reservations. This is discussed in preceding paragraphs. Services and facilities would be negatively impacted if significant in-migration were to occur. In addition, because of regionwide impacts to service and facility provision, Indians may find themselves negatively impacted if they travel off the Reservation for shopping, medical services, etc. The increased traffic, crowded conditions, and other stressful situations they could encounter could make such trips unpleasant. These conditions would be most noticeable during the peak construction periods.

Positive impacts to social well-being would be most apparent if members of the Tribes were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations to look for work may find they are able to stay in the area.

Impacts on social well-being are also discussed in detail in the Fort Union Coal Region Draft EIS cited above.

Mitigation

Coal mine and facility development would eventually help to diversify the economy of western North Dakota. Secondary and tertiary expansion, due to new energy growth, would result in a sectoral change from an agricultural to a construction-trade oriented economy. At the community level this would translate into a broader range of goods and services being offered and greater employment opportunities; however, in the short run, public service costs incurred with energy growth might well exceed base tax revenues.

Short-term, energy-related impacts may have an adverse effect on baseline municipal services in some of the communities identified. Adequate planning and management capabilities are essential in developing mitigation strategies. The lack of adequate planning may result in fiscal problems, inadequate or excessive investment in community infrastructure, and a decrease in the quality of life.

There appear to be five critical factors that must be present to mitigate some of the adverse economic or social impacts that could result from rapid energy growth. These factors are: accurate information, adequate lead time, planning expertise, adequate financial resources, political leadership. If any of these five factors are missing, it is likely that a community will not be able to significantly alleviate the adverse effects of energy related growth. These factors are discussed in detail in the Fort Union Coal Region Draft EIS (USDI 1982) on pages A25-A31.

Agricultural Economics

The economic impacts of the mine and facility on farm and ranch operations can be assessed by expressing in dollar terms, the agricultural production lost. Agricultural production is examined using the average value for production for all counties in the study area containing CSAs. The average per acre value of agriculture in the counties with CSAs was $33 per acre in 1982 (USDC 1982c). In the long term, based on a 12-year reclamation period, 4,200 acres would be out of production each year. This would result in an annual reduction of $138,600 in the value of agricultural production. This represents about 0.5 percent of the average value of the annual agricultural production of the counties containing KRCRAs and about 0.006 percent of the value of the annual agricultural production for the State.

Impact of strip mining on the operation and management of livestock ranches could be more severe than on dry land farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution, and in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease all the land that is removed from production; no compensation would be made for lost leases.