APPENDIX 10

CHIPPEWA-CREE TRIBE

ROCKY BOYS RESERVATION

MUNICIPAL, RURAL, & INDUSTRIAL (MR & i)

WATER SUPPLY SYSTEM NEEDS ASSESSMENT

CHIPPEWA CREE TRIBE
ROCKY BOY'S INDIAN RESERVATION

MUNICIPAL, RURAL AND INDUSTRIAL (MR&I) WATER SUPPLY SYSTEM NEEDS ASSESSMENT

Prepared for the

BUREAU OF RECLAMATION
U.S. DEPARTMENT OF THE INTERIOR

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ROCKY BOY'S MUNICIPAL, RURAL AND INDUSTRIAL WATER SUPPLY SYSTEM NEEDS ASSESSMENT

EXECUTIVE SUMMARY

This water supply needs assessment for the Rocky Boy's Reservation addresses present and future municipal, rural and industrial (MR&I) water supply needs and evaluates the resources available to meet these needs. This study has been prepared by the Chippewa Cree Tribe, hereby referred to as "Tribe" and MSE-HKM, Inc., Tribal technical partners, under a contract with the Bureau of Reclamation (BOR). The needs assessment has sufficient detail for the Tribal government to seek congressional authority to conduct a feasibility study of a MR&I water supply project on the Rocky Boy's Reservation, hereby referred to as "Reservation".

The Reservation, near the Bear Paw Mountains of north central Montana, was created as a homeland for the Tribe from land reserved for Indians in 1874. The present population on the Reservation is 3,673, and is expected to increase at an average annual growth rate of 3%.

A dependable supply of high quality water is essential to current and future economic development on the Reservation. The current water supply systems were designed by the Indian Health Service (IHS) with an average day rate of use of 60 gallons per capita per day (gpcpd), well below the Montana average domestic water use rate of 170 gpcpd. Many homes in the area have wells which provide poor quality water in insufficient amounts. The IHS has recognized the need for a better and more reliable MR&I water supply on the Reservation. In addition, based on current needs, population growth on the Reservation and the difficulty in developing reliable sources of water from the groundwater aquifers, IHS supports the concept of bringing high quality surface water from off-reservation sources to meet the future water needs.

The existing water systems serving the Reservation are a mixture of smaller systems built over the past 35 years. Figure 4 shows an overall view of the existing systems. The primary sources of water for the systems are the wells located in Newtown and Agency. Water storage throughout the systems is provided by 11 reservoirs ranging in size from 12,000 to 100,000 gallons. The total storage capacity of the systems is 339,000 gallons. The water systems are inadequate to meet the current and future growth of the Tribe.

The water resources of the Reservation consist of both surface and groundwater. The surface water resources are shown in Figure 2. The major streams are Beaver Creek, Box Elder Creek and Big Sandy Creek, all of which are a part of the Milk River system. The majority of streamflow for Reservation streams, with their headwaters in the Bear Paw Mountains, results from spring snow melt. Typically, there are major recessions in streamflow July through September. The Reservation is in a water short area, with the water in most streams fully appropriated.

Existing groundwater use on the Reservation consists of several hundred low-capacity wells. The main aquifer systems underlying the Reservation are the shallow alluvial aquifers, shallow bedrock aquifers, ancestral channel of the Missouri River and deep bedrock aquifers. The groundwater resources within the study area are shown in Figure 3. Water from the shallow alluvial and bedrock aquifers is of insufficient quantity for sustained domestic use. The quality of water from the ancestral channel deposits of the Missouri River is considered to be unsuitable for domestic use. Water from the deep bedrock aquifers is not appropriate for domestic use, but may have some utility in the future for certain industrial uses that do not require high quality water.

The domestic water needs of the Reservation have been estimated for the following conditions: 1) the current population, 2) the 30-year population of 8,915, and 3) the 50-year population of 16,102. A per capita water use rate of 160 gpcpd is used based on typical rural and residential water use rates used for other systems in the region and state. However, a water conservation program is planned for the service area. The water conservation program should reduce the demand by at least 16 gpcpd (10%) with the resulting water demand of 144 gpcpd.

The Tribe is faced with a young, rapidly growing population and corresponding need for economic development. Both of these require an improved and more reliable Reservation-wide domestic water supply system. Based on the Reservation water needs, the development of a Reservation-wide water supply system should be designed to serve the water demands of currently held trust lands, with the capacity to serve lands within the secondary service area. Areas within the secondary service area will be served as they are acquired and placed in trust by the Tribe. The concept of bringing surface water to the Reservation is viable considering the inadequate groundwater supplies and shortage of dependable surface water supplies. The Chippewa Cree Tribe Municipal, Rural and Industrial Water Supply System Needs Assessment for the Rocky Boy's Indian Reservation clearly identifies the need for the development of a safe and reliable Reservation-wide water supply system.

ROCKY BOY'S MUNICIPAL, RURAL AND INDUSTRIAL WATER SUPPLY SYSTEM NEEDS ASSESSMENT

I. INTRODUCTION

This water supply needs assessment for the Reservation assesses present and future needs for MR&I water supplies on the Reservation and evaluates the resources available to meet these needs. This study has been prepared by the Tribe and MSE-HKM, Inc., Tribal technical partners, under a contract with the BOR. The Tribal Council asked the BOR for assistance with assessing and documenting MR&I water problems and needs on the Reservation and to identify opportunities for addressing them. This needs assessment has sufficient detail for the Tribal government to seek congressional authority to conduct a feasibility study of a MR&I water supply project on the Reservation.

The Tribe has a need for strong current and long-term economic development to provide an adequate standard of living for Tribal members. This is especially true given the young, fast growing Tribal population. A dependable supply of high quality water is essential to current and future economic development. The current IHS water supply systems were designed with an average day rate of use of 60 gallons gpcpd, well below the Montana statewide average use of 170 gpcpd. Many homes in the area have wells which provide poor quality water in insufficient amounts. Consequently, this effects the benefits derived from water use. The Tribal Council is also pursuing commercial and industrial development to provide long-term economic development for present and future Reservation residents. The Tribe has a critical need to improve and expand the water supply available to allow long-term economic development success.[1]

II. SERVICE AREA DESCRIPTION

A. INTRODUCTION

The boundaries of the study area for this needs assessment are shown in Figure 1. The service area reflects the area within the exterior boundaries of the Reservation. These lands are recognized as the boundaries of the Reservation due to a series of executive orders and congressional acts which reserved this land as a homeland for the Tribe. As such, a brief review of the historical development of the Reservation is necessary.

B. HISTORICAL DEVELOPMENT OF ROCKY BOY'S RESERVATION

The Reservation took its name from the leader of a wandering band of Chippewa Indians. Translated from Chippewa, his name meant "Stone Child", however, this was mistranslated by non-Indians into "Rocky Boy". Rocky Boy's people were among a number of Chippewa and Cree Indians who originated in the Great Lakes region. For unknown reasons, they had severed their ties with their original neighbor tribes and migrated to the northern plains region. They had not settled in one area, preferring to roam from place to place in present-day Montana and Canada.

The rootless bands drifted for many years between Montana cities such as Butte, Helena, Great Falls, Havre, Choteau and Chinook, and often traveled into Canada. Montanans tended to regard them as "Canadian Indians" and congress appropriated $5,000 in 1896 to finance their deportation to Canada. The various bands were gathered together to be escorted to the northern Montana border and deported as Canadian Indians. The deportation attempt failed when the Indians returned ahead of the deportation troops.

SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)

PRIMARY SERVICE AREA BOUNDARY

LAREDO

BROWN RESERVOIR

BONNEAU RESERVOIR

WILLIAMSON RESERVOIR

ROCKY BOY AGENCY

BOX ELDER

BIG SANDY

US HWY 87

Lower Beaver Creek Reservoir

Bear Paw Lake

East Fork Reservoir

Sage Creek

Gravel Coulee

Packer Canyon

Bozeider Creek

Gorman Creek

Big Sandy Creek

Dry Fork Duck Creek

Camp Creek

Sandy Creek

T 32 N

T 31 N

T 30 N

T 29 N

R 6 E

R 7 E

R 8 E

R 9 E

R 10 E

R 11 E

N

6000 0 6000 12000
scale feet

LEGEND

- ROADS
- TRUST LANDS BOUNDARY
- SECONDARY SEVICE AREA BOUNDARY (1939 ACT BOUNDARY)
- RIVERS AND STREAMS
- RESERVOIR LOCATIONS
- FEE LANDS
- TRUST LANDS

ROCKY BOY INDIAN RESERVATION
NEEDS ASSESSMENT PROJECT

PROJECT SERVICE AREA

FIGURE 1

MSE-HKM ENGINEERING

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BASECOLR.DWG

Some of the present Reservation was within the original Fort Assinaboine Military Reservation, which itself was created out of lands set aside for Indians in 1874. The military reservation was created by executive order on March 4, 1880. The boundaries of the military reservation were modified in General Order #8, June 28, 1881 and by General Order #28, May 4, 1888. In 1915, the Secretary of the Interior was authorized by congress to survey the lands of the Reservation and open the lands for settlement (Public Law 244).

Congress modified Public Law 244 by withdrawing approximately 55,000 acres of the previous Fort Assinaboine Reservation from the settlement for occupation by the Rocky Boy's band of Chippewas and other homeless Indians within the state of Montana (see Act of Congress, September 7, 1916). About 450 Chippewa and Cree Indians, about half the number eligible, chose to settle within this area.

The Indians living on the Rocky Boy's Reservation elected to organize under the Indian Reorganization Act in 1935 as the Chippewa Cree Tribe. Subsequent to the 1916 withdrawal, a number of other congressional acts added to the Tribe's land base.

Congress added approximately 557 acres of public domain land to the Reservation in May 1935 (see Act of Congress, May 14, 1935). Likewise in 1939, congress added to the Reservation 2,000 acres of public domain land within a specified maximum purchase area of 156,000 acres (see Act of Congress, March 28, 1939, Public Law No. 13).

By proclamation, the Assistant Secretary of the Interior added other purchased lands, within the 1939 boundary, to the Reservation (F.R. Doc. 48-2629; filed March 24, 1948). These lands had been purchased, on authority contained within Section 5 of the Indian Reorganization Act and added to the Reservation pursuant to Section 7 of the Indian Reorganization Act (25 U.S.C. §461, et seq.). In 1958, congress designated that those acquired lands added to the Reservation by the 1948 proclamation be held for the exclusive use of the members of the Tribe (Public Law 85-773).

The Tribe has a long history of acquiring additional land within the 1939 Act boundary. Within the last two decades, the Tribe has purchased approximately 20,000 acres of land within the 1939 Act boundary utilizing Tribal financial resources. The Tribe utilizes the 1939 Act Boundary as the boundary for provision of services to Tribal members. All of the land added to the Reservation is within the area originally set aside for Indians in 1874. The Tribe intends to continue to acquire land as offered for sale within this boundary and place it in trust status.

The above withdrawals, additions and purchases bring the present area of the trust lands within the Reservation to approximately 120,000 acres. Unlike other reservations, the Rocky Boy's Reservation has never been allotted. The entire land base remains in Tribal ownership with individual Tribal members eligible for assignments of up to 160 acres each. Tribal members may live on and improve their assignments, which remains Tribal land held in trust by the United States Government.

The service area has been divided into primary and secondary areas. The primary area refers to the presently held contiguous trust lands along with the fee lands within that area. The secondary area is the area outside the primary area, but within the 1939 Act boundary. The entire service area, with the primary and secondary areas delineated, is shown in Figure 1. The system will be designed to serve the currently held trust lands, with the capacity to serve lands within the secondary service area. Areas within the secondary service area will be served as they are acquired and placed in trust by the Tribe.

C. PHYSICAL RESOURCES

This section of the study discusses the physical resources of the study area. Relevant information pertaining to the geology, soils, topography and water resources of the study area is provided.

1. Geology

The Reservation lies on the central western flank of the Bearpaw Mountains which are part of an isolated group of mountains that have upheaved into and through the western portion of the Great Plains. They are not part of the Rocky Mountain system. The Bearpaw Mountains evolved from more recent Tertiary volcanic activity and have become an erosional remnant approximately 35 miles in diameter.

The general geology of the area is unique in that it displays evidence of nearly every major type of geologic mountain building phenomena that exists. A brief summary of the Bearpaw Mountains orogeny (mountain building process) starts about 36 million years ago in Tertiary Eocene time.

Previous to Eocene time, the whole region was several thousand feet lower than it is at present. A subtropical or humid climate prevailed. Sediments were being deposited in the area by large marine and freshwater seas which were only slightly above present sea level. The cessation of deposition by the marine and fresh water sea environments is represented by the Wasatch formation which is composed of channel boulders derived from the Rocky Mountain region to the southwest.

Deposition ceased due to an uplifting of the land which was caused when molten rock from deep in the earth had pushed up through the surrounding sedimentary formations. This formed a dome structure originating in the Cambrian (oldest known rocks in the area - 500 million years old) upward into the Tertiary Wasatch formation. Inclusions of Precambrian (oldest rocks on earth - 2,700 million years old) materials have been found in some of the volcanic formations.

The molten volcanic rocks broke through to the surface creating numerous faults which tilted and exposed the underlying older sedimentary rocks, dating from Mississippian through late Cretaceous time. Also exposed along the crest of the dome were an array of volcanic formations including stocks or chimney-like remnants of areas where lava emerged from the earth, composite dikes which resemble walls or thick fences and sills, and laccoliths which were

subsurface horizontal flow structures. Molten materials were also extruded up through many other faults and virtually covered and created mountains on much of the surface of this dome. Eruptions continued to surge and ebb through time adding to the enlarging volcanic pile. Volcanism subsided during late Eocene time which lasted a total of about six million years.

The crest of the dome is a belt four to six miles wide which trends east-northeast through the center of the mountains. This belt, which tends to divide the volcanic fields, is located approximately six miles south of the Rocky Boy's agency.

Doming of the region reversed the process of deposition, causing erosion to start. Further doming took place during mid-Tertiary times. Much of the volcanic surfaces eroded away from the mountain area and washed into the Missouri River, which at that time flowed north through Havre, then east toward Malta. A well defined, slightly inclined pediment formed, which is a relatively flat eroded bedrock surface with well dissected stream drainages. This erosion period also created a "badlands" topography in the west half of the Reservation near Box Elder during mid-Tertiary time.

Pleistocene glaciation, the ice age which started about one million years ago and lasted until roughly 14,000 years ago, further dissected the mountain valleys. It left glacial drift covering the pediment and filling its stream cuts. Post glacial erosion has partially dissected the glacial drift in the mountain valleys as well as on the pediment and parts of the old stream cuts.

One of the major changes made by glaciation was the redirecting of the course of the Missouri River. Prior to the last glacial stage (Wisconsin), the Missouri River flowed north from Great Falls through the Laredo Flats on the west side of the study area, around the north side of Havre, then eastward through Malta. As the Wisconsin stage glacier advanced southeastward across the Reservation, a warming trend in the climate caused it to halt at the confluence of what was likely the preglacial drainage from the Arrow River.

The glacier had piled up a large terminal moraine before receding northward. This moraine became an impenetrable wall which deflected the Missouri River waters toward the southeast,

thereby reversing the Arrow River flow for approximately 20 miles. At the present confluence of the Missouri and Judith Rivers, a new eastward path was cut transversely through a low drainage divide located between the Bearpaw and Judith Mountains.

Big Sandy Creek now occupies the ancestral Missouri River channel in the Laredo Flats. At Havre, Big Sandy Creek joins the Milk River which has similarly captured the ancestral Missouri River channel eastward.[2]

2. Soils

Soils throughout the Reservation are generally deep, well-drained, and on nearly level to moderately steep slopes. Soils in the study area are mainly derived from alluvial and glacial deposits. They are highly variable in depth to bedrock, texture, structure, and content of soluble salts and exchangeable sodium.

Typically, arable alluvial soils encountered in the area include Kremlin, Ethridge, Evanston, Chinook and Glendive. Nonarable alluvial soils include Absher, Creed and Gerdrum. Glendive soils are found on low terraces and floodplains, and are subject to rare periods of flooding in some years. The other alluvial soils are on terraces and alluvial fans, and are generally free of flooding. Absher, Creed and Gerdrum soils occupy an extensive salt and sodium affected terrace west and north of Box Elder.

Typically, arable glacial till derived soils in the area are Telstad, Scobey, Bearpaw, Kevin and Joplin. Thoeny, Elloam and Phillips are typical nonarable soils forming on glacial till. They generally are in salt and sodium affected areas. The till soils are mainly east of the valley occupied by Big Sandy Creek. They are on undulating to gently rolling topography.[2]

3. Topography

Aside from the volcanic landforms described in the geology section above, glacial landforms make up the remaining features that form the topography of the study area. There are three

types of glacial deposits found in the study area. The first is moraine which is an unstratified mixture of clay, silt, sand, gravel, cobbles and boulders. Moraine resembles a blanket covering the ground and may be from five to two hundred feet thick, and can be piled into hills several hundred feet high where a glacier terminated and receded northward ("terminal moraine"). The second type is deposited material which is stratified or sorted into various sizes. Stratified material is generally found on wide, flat terraces cut by streams, or in oblong hills consisting mainly of gravels or cobbles. The third type of deposited materials are those that have been reworked. These consist of alluvial materials which have been deposited by modern stream hydraulics or colluvial materials which have been deposited by gravity.

The present land surface of the service area is a result of glaciation below 4200 feet elevation and erosion in the higher elevations. The continental Keewatin ice sheet of the Pleistocene ice age advanced southeasterly across the northeastern portion of the Reservation. It abutted against the high terrain of the Bearpaw Mountains (Number One Mountain and Wild Horse Ridge) and filled the lower existing valleys with a mixture of unstratified deposits. The remaining lower lands are covered with ground moraine.[2]

4. Water Resources

a) Surface Water. The water resources of the Reservation consist of both surface and groundwater. The surface water resources are shown in Figure 2. The major streams are Beaver Creek, Box Elder Creek and Big Sandy Creek, all of which are a part of the Milk River system. Beaver Creek drains the eastern half of the Reservation, however, the portion of the watershed on the Reservation is relatively small. The largest stream which principally arises within and flows through the Reservation is Box Elder Creek. Box Elder Creek rises on the western flank of the Bearpaws and flows west through the central portion of the Reservation until joining Big Sandy Creek. Big Sandy Creek rises high in the Bearpaws and flows westerly until leaving the Reservation in the southwest corner. Big Sandy Creek then turns northeasterly and again crosses Tribal land before reaching its confluence with the Milk River. Minor Reservation streams draining the western flank of the Bearpaws and tributary to Big Sandy Creek include Camp Creek, Duck Creek, Gorman Creek and Gravel Coulee.

SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)

PRIMARY SERVICE AREA BOUNDARY

STONEMAN PONDS

LAREDO

Lower Beaver Creek Reservoir 6,270 A.F.

Bear Paw Lake 616 A.F.

BROWN RESERVOIR 26 A.F.

BONNEAU RESERVOIR 998 A.F.

BOX ELDER

BITZ RESERVOIR 110 A.F.

COWEN RESERVOIR 130 A.F.

WILLIAMSON RESERVOIR 230 A.F.

DRY FORK RESERVOIR 44 A.F.

ROCKY BOY AGENCY

BIG SANDY

East Fork Reservoir 54 A.F.

Sage Creek

Sandy Creek

Big Sandy Creek

Dry Fork

Duck Creek

Camp Creek

Gorman Creek

Coulee

Beaver

Parker Canyon

Box Elder Creek

T 36 N

T 35 N

R 19 E

R 20 E

R 21 E

R 22 E

N

6000 0 6000 12000

scale feet

LEGEND

- ROADS
- PRIMARY SERVICE AREA BOUNDARY
- SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)
- RESERVOIR LOCATIONS
- RIVERS AND STREAMS

ROCKY BOY INDIAN RESERVATION
NEEDS ASSESSMENT PROJECT

SURFACE WATER RESOURCES

FIGURE # 2

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Streamflow measurements have been made at U.S. Geological Survey (USGS) gaging stations on Reservation streams. The Soil Conservation Service collects seasonal data on Beaver Creek downstream of the Reservation. The data shows a considerable annual variation in Reservation streamflow. For the years 1976-1991 at the USGS gage, Box Elder Creek near Rocky Boy, the average annual streamflow was 6610 acre-feet/year. The lowest annual streamflow was 1974 acre-feet in 1988. The highest annual streamflow was 16,118 acre-feet in 1986.

The majority of streamflow, generated by Reservation streams with their headwaters in the Bearpaws, results from spring snowmelt. For Box Elder Creek, the largest flows during the years 1976-1991 occurred in May and June. This two month period accounted for 42 percent of the average annual streamflow. Typically, there are major recessions in streamflows during the late irrigation season (July-September).

Information on surface water quality is limited for the study area. Three samples taken ranged from 344 to 855 milligrams per liter (mg/l) total dissolved solids (TDS) and from 1.8 to 7.0 sodium adsorption ratio (SAR)[3]. In addition, specific conductance has ranged from 190-359 μS/cm (microsiemens per centimeter at 25°C) in Big Sandy Creek at the Reservation boundary to 405-554 μS/cm in Boxelder Creek near the town of Rocky Boy.[4] These measures of water quality are within federal Safe Drinking Water Act guidelines (see Appendix C). The federal guidelines apply on the Reservation as the Tribe has not sought Environmental Protection Agency approval to enact Tribal safe drinking water standards.

Estimates of natural streamflow have been modeled for key locations on the Reservation using historic data and statistical techniques. Natural flows reflect the quantity of water available before man-made facilities such as reservoirs and irrigation diversions altered the water supply.

Beaver Creek at the Reservation boundary . . . . . 5,200 AFY

Box Elder Creek

- at Rocky Boy . . . . . 1,100 AFY
- at Bonneau Reservoir . . . . . 6,800 AFY
- at Reservation boundary . . . . . 7,800 AFY

Big Sandy Creek

at Reservation boundary . . . . . 5,700 AFY

at Town of Big Sandy . . . . . 11,300 AFY

Minor Streams

Duck Creek at Reservation boundary . . . . . 640 AFY

Gravel Coulee at confluence with

Big Sandy Creek . . . . . 1,700 AFY

The quantities of natural streamflow above are based on limited USGS gaging information and hydrologic modeling techniques to fill in information gaps. Available data for study area streamflows were input into the Corps of Engineers HEC-4 computer program to fill in any missing data to arrive at a complete record of annual flows. The HEC-4 program uses a series of correlation and regression analyses to analyze and extrapolate data.

There are a number of reservoirs that store water within or near the service area. These reservoirs are listed below with their associated storage capacities and are shown in Figure 2.

RESERVOIR	STORAGE (ACRE FEET)
Bitz	110
Cowen	130
Williamson	230
Stoneman Ponds	100
" "	193
" "	153
Bonneau	996
Brown	26
East Fork	54
Dry Fork	44
Bearpaw Lake	616
Lower Beaver Creek	6,270

Water from these reservoirs is used for a variety of purposes including, irrigation, stockwater, recreation, and fish and wildlife uses. The bottom two storage reservoirs listed above, Bearpaw Lake and Lower Beaver Creek, are located outside the service area and are fully appropriated

by current water users. The other reservoirs are also currently used and can not be used as a source of MR&I water due to inadequate storage capacity and reliability concerns.

The above quantities of streamflow and storage water are not entirely available for current and future Tribal MR&I water use. The Tribe, the state of Montana and the federal government are currently negotiating a settlement of the Tribe's reserved water rights claims within the state. The Reservation is in an area of water paucity with the surface flow of most streams fully appropriated.

b) Groundwater. Existing groundwater use on the Reservation consists of several hundred low-capacity wells. Physical and chemical characteristics of these wells are shown in Appendices A and B. Most of these wells are less than 100 feet deep and produce an average of about 10 gallons per minute. Problems have been incurred maintaining water levels in the existing well field at this level of development.

The main aquifer systems underlying the Reservation are the shallow alluvial aquifers, shallow bedrock aquifers, ancestral channel of the Missouri River and deep bedrock aquifers. The groundwater resources within the study area are shown in Figure 3. Each of these aquifer systems will be discussed separately. The groundwater characteristics of the service area are summarized in Table 1, following the discussion of each aquifer.

i. Shallow Alluvial Aquifers

Recent alluvium is an important source of groundwater within the service area. Recent alluvium is extensively deposited along the flood plains of the perennial and intermittent streams in their middle and lower reaches. The recent alluvium is derived primarily from the Judith River Formation, Bearpaw Shale and glacial ground moraine. Therefore, the observable surface outcrops of the recent alluvium consist predominately of discontinuous lenses and beds of fine-grained materials, and lesser amounts of gravels and coarse sand. Yields will be higher in the thicker lenses and beds of coarser materials recharged by perennial surface water sources.[2]

SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)

PRIMARY SERVICE AREA BOUNDARY

ANCESTRAL DRAINAGE BOUNDARY

LAREDO

BOX ELDER

ROCKY BOY AGENCY

BIG SANDY

Lower Beaver Creek Reservoir

Bear Paw Lake

East Fork Reservoir

Sage Creek

Sandy Creek

Big Sandy Creek

Beaver Creek

Coulee

Black Coulee

Camp Creek

Corman Creek

Qal

T 31 N

T 30 N

T 29 N

R 14 E

R 15 E

R 16 E

R 17 E

N

8000 0 6000 12000

scale feet

LEGEND

- ROADS
- PRIMARY SERVICE AREA BOUNDARY
- RIVERS AND STREAMS
- SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)
- Tt — TERTIARY VOLCANICS UNDIFFERENTIATED
- Qal — ALLUVIUM
- ANCESTRAL MISSOURI RIVER DRAINAGE

ROCKY BOY INDIAN RESERVATION
NEEDS ASSESSMENT PROJECT

GROUNDWATER RESOURCES

FIGURE 3

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Shallow alluvial well yields generally are less than 25 gallons per minute (gpm) and average 10 gpm. Long-term well yields between 20 and 50 gpm might be possible in areas with favorable hydrogeologic conditions. Higher yields might be possible from alluvial wells located to induce infiltration from Reservation streams. Shallow alluvium is the major source of domestic and stock water supplies on the Reservation. At favorable locations, it has the potential of serving as a source of water for small community water systems.

Most of the existing water wells on the Reservation are completed in the shallow alluvial aquifers. These aquifers are in close contact with surface streams. The streams are the primary source of recharge to shallow alluvium on the Reservation. Because the surface streams are the primary source of recharge, the sustained yield of these aquifers is limited to the surface yield of the respective watershed.[5] The quantity and quality of surface streamflow available on the Reservation is discussed in (c)(i) above.

ii. Shallow Bedrock Aquifers

The sandstones of the Judith River Formation and volcanic rock aquifers comprise the shallow bedrock aquifers within the study area. These shallow bedrock aquifers are tapped by numerous wells in the study area and constitute the other major source of groundwater besides the alluvial aquifers.

Most existing wells in the shallow bedrock aquifers are in the Tertiary igneous rock (volcanics) system. Typically, this aquifer system produces from a zone of broken and weathered rock or volcanic ash near the bedrock system. Groundwater is stored and transmitted through fractures and joints in the volcanic rocks. Although yields exceeding 25 gpm may be obtained for short periods of time, the limited storage capacity of these aquifers restricts long-term pumping to less than 10 gpm. This limits these aquifers to stock and domestic use. Approximately 100 acre-feet of water per year is withdrawn from this system for municipal water use on the Reservation. Recently, there have been problems with declining water levels in local wells, as recharge to these aquifers is small.

There is some potential for small capacity development from the sandstone of the Judith River Formation aquifer systems in the Reservation area. Little current use is made from these sources. The groundwater in these aquifers is stored in the pore spaces between grains in the sandstone. Discontinuous cementing by calcite and irregularly distributed silt content in the sandstone reduces yield in the unit from 15 gpm or more, to nearly no yield. The distribution of cementation and silt content is unpredictable.

Water from several wells in the shallow bedrock aquifers exceed primary water quality standards criteria for nitrate under the Safe Drinking Water Act (SDWA). Primary standards establish Maximum Contaminant Levels (MCLs) that have been set at levels intended to ensure that the general population is not adversely affected by the ingestion of water. Water from the shallow bedrock aquifers also exceeds secondary standards set under the SDWA. These secondary standards affect the aesthetics or public attitude toward drinking water and are not federally enforceable. Many of the wells in the study area significantly exceed the recommended secondary standards, particularly for levels of iron, sulfate and manganese (see Appendices A and B). Water with more than 500 mg/l of dissolved solids is usually unsatisfactory for domestic use without treatment. The dissolved solids concentrations of several of the wells in the shallow bedrock aquifers are outside the range of acceptability without treatment. The low water quality and low well production capacity in the shallow bedrock aquifers results in little development potential in these aquifers.[6]

iii. Ancestral Channel Aquifer

Groundwater quantity in the ancestral channel of the Missouri River is unknown. Information is insufficient to allow a quantitative evaluation to be made of the groundwater development potential of the ancestral channel. Recharge to the aquifer is likely from a combination of percolation through overlying glacial sediments, subsurface inflow from the Judith River sandstone and underflow from Box Elder and other creek tributaries to Big Sandy Creek (Shaffer, 1985). If this is the case, there is the potential for moderately high well yields. There are eleven wells currently producing water from the ancestral channel of the Missouri River.

Water from the ancestral channel deposits of the Missouri River is considered to be unsuitable for domestic use. Water from the ancestral Missouri River channel is generally a sodium bicarbonate type. Total dissolved solids concentrations range from 726 mg/l to 1530 mg/l. Sulfate concentrations range from 206 to 496 mg/l and nitrate plus nitrite as nitrogen concentrations were less than 0.05 mg/l. Specific conductance and pH varied from 1210 to 2500 μ/S and 7.8 to 8.0, respectively. Except for excessive chromium in the sample from one well, none of the samples had concentrations that exceeded the MCLs of the SDWA. The sample from one well had a relatively high gross alpha particle concentration. Further testing indicated that the combined concentration of Radium-226 and Radium-228 were below the MCL of the SDWA. The high total dissolved solids concentrations in all the samples and the high sulfate concentrations in many of the samples make the water undesirable as a potable supply to individuals unaccustomed to the water.[7]

iv. Deep Bedrock Aquifers

Several potential aquifers are present at depth below the Reservation. These potential deep aquifers include the sandstones of the lower Eagle formation (Virgelle Sandstone), the Dakota or Fall River Sandstone (First Cat Creek), the lower Kootenai Formation (Lakota or Third Cat Creek), the Swift and Sawtooth Formation of the Ellis Group, and the cavernous and fractured limestones of the Madison group (Mission Canyon and Lodgepole Limestone). The Bow Island and Muddy units of the Colorado Shale may also contain small amounts of saline water.

With the exception of the Madison limestones, yields from any of these potential aquifers is not likely to be more than 50 gpm and will be less than 15 gpm in most cases. The limited number of logs available from oil and gas test holes in the area indicate the aquifers contain brackish to saline waters in most areas. Water in the Virgelle Sandstone Member of the Kootenai Formation often is mixed with natural gas. Therefore, the limited potential well capacities and poor water quality of these aquifers make their use undesirable where shallower sources of better quality groundwater are available. The Madison Group limestones remain an attractive potential source

of groundwater production because of the high well capacities achieved in wells producing water from this formation in other areas.[2]

Groundwater quantity in the Madison limestone aquifers is likely abundant beneath most of the Reservation, but is of doubtful chemical quality. Wells in this aquifer will have an extremely high development cost due to the depth of these aquifers. Existing data are derived from petroleum test well data, as there has been no development of this groundwater source. Potential yields were estimated to be greatest in the Big Sandy Creek area, with diminishing yields eastward. Drilling depths for wells in the bottom land between Box Elder and Laredo were estimated to be about 3000 to 3600 feet deep, increasing northward. The artesian head above ground surface on the wells is estimated to be equivalent to 700 to 800 feet of water. After proper well development, a natural flow water yield of 500 to 1000 gpm is estimated. Well yields could potentially be doubled or tripled with pumping.

As natural recharge rates are likely very low, the Madison limestone aquifers would be depleted over time. Aquifer depletion would be reflected by declining well yields and/or increasing pump lifts. The rate of depletion could not be accurately predicted from available data. A reasonable planning assumption for flow-rate declines would be about 10 to 20 percent in the first year of sustained production, 1 to 2 percent per year for the following 5 years, and less than 1 percent per year thereafter.[2]

Besides the high cost of developing wells at these depths, this water resource also has water quality constraints. The TDS content of water from the deep bedrock aquifer is estimated to average 4000 mg/l on the Reservation. Although direct data are limited, high concentrations of chloride, sodium and sulfate appear likely. This data suggests relative stagnation of groundwater in the Reservation area and also indicates that some recharge occurs in the Bearpaw Mountains, probably percolating through sodium-rich rocks. Water from this source would not be appropriate for domestic use, but may have some utility in the future for certain industrial uses that do not require high quality water.[5]

TABLE 1 GROUNDWATER CHARACTERISTICS		
AQUIFER	QUALITY	QUANTITY
Shallow Alluvial	Within SDWA Criteria	Surface Water Constraints
Shallow Bedrock	Exceeds 1° + 2° SDWA Criteria	≤15 - 25 gpm
Ancestral Channel	High TDS + Sulfate Concentrations	Large Quantity but high dev. cost
Deep Bedrock	High TDS, chloride, sodium + sulfate	≤15-50 gpm

D. BIOLOGICAL RESOURCES

The native vegetation in the study area includes: bluebunch wheatgrass; green needle grass; American manna grass; wild rye; box elder; chokecherry; Western snowberry; wild rose; and serviceberry. Woody plants in the project area includes: Lodgepole pine, Ponderosa pine, Douglas fir, Subalpine fir, Engelmann Spruce, Cottonwood, Willow, Boxelder and Hawthorne. Native wetland vegetation in the study area includes: marsh smartweed; bulrush; longspike spikerush; sedges; Nuttail alkaligrass; foxtail barley; cattails; willow; water birch; Hawthorne; and sage pondweed.

A review of the Montana Natural Heritage Program database revealed no known plant species of special concern in the study area. Plant species of special concern with potential to occur in this area include: Desert groundsel; many-headed sedge; Torrey's sedge; chaffweed; creeping spike-rush; long sheath waterweed; dwarf woolly-heads; and persistent sepal yellowcress.

Game fish species present on the Reservation include: rainbow trout; brook trout; brown trout; and cutthroat trout. Nongame species include: northern redbelly dace; lake chub; brassy minnow; silvery minnow; flathead minnow; longnose dace; and emerald shiner. Reservation streams are used for irrigation after the streamcourse leaves the mountains and foothills. This intense use dewaters sections of streams on a seasonal basis, annually destroying the fishery in the lower reaches of area streams. The study area has both stocked and natural trout populations.

Wildlife in the study area includes: Rocky Mountain elk; whitetail deer; mule deer; pronghorn antelope; coyote; red fox; raccoon; muskrat; bobcat; badger; longtail weasel; mink; porcupine; beaver; striped skunk; and many species of small mammals. Bird species include: Canada goose; canvasback; gadwall; mallard; pintail; lesser scaup; shoveller; blue-winged teal; green-winged teal; American widgeon; bufflehead; blue grouse; ruffled grouse; sharp-tailed grouse; sage grouse; ring-necked pheasant; gray partridge; Merriam's turkey; prairie falcon; peregrine falcon; great horned owl; and burrowing owl. Reptiles and amphibians include western rattlesnake; garter snake; bull snake; and painted turtles. Numerous other small mammals, songbirds, amphibians and reptiles are present. Populations of game species on the Reservation have traditionally been below the carrying capacity of the habitat due to unrestricted harvesting. The adoption of a Tribal game code is providing protection and populations are presently increasing on the Reservation. Nongame species are generally not disturbed on the Reservation.[8]

Threatened, endangered and candidate species which may be found in the vicinity of the study area include: bald eagle; peregrine falcon; black-footed ferret; and pallid sturgeon. Bald eagles may occur as migrants or winter residents. There are no known nesting bald eagles within the study area. Peregrine falcons are known to occur only as migrants in the project area. Black-footed ferrets are potential residents of black-tailed prairie dog colonies, but have not been recorded in the project area. Pallid sturgeon occur in the Missouri River and may occur in major tributaries, but have not been recorded in the project area. There is no critical habitat of federally listed threatened or endangered species near the project area (see Attachment D, August 29, 1995, letter from Kemper McMaster, Field Supervisor, U.S. Fish and Wildlife Service).

E. HUMAN RESOURCES

1. Population

a) Introduction. Water demands and needs are generally quantified on a gallons per capita basis. The current service area population and projected future population are, therefore, critical factors in quantifying present and future water needs. Data from several sources exist to

determine the present population level as well as the population growth rate. These data sources include: the Bureau of the Census; the Indian Health Service; the Bureau of Indian Affairs and Tribe; and the local public schools. In addition, estimates from local individuals were used to estimate the population in the secondary service area.

For this study, several sources of information have been used to document the historic and current population of the service area. Historic trends in population growth can be used in conjunction with information on the current population to estimate a future population. Information on the historic population, current population and design population is provided in the following section.

b) Base Population. Information is available pertaining to the population of the Reservation going back to 1916. Information from the 1980 and 1990 census reports has also been utilized in the preparation of Table 2.

Table 2 provides information on the number of enrolled Tribal members and other Indians living on the Reservation.

TABLE 2
INDIAN POPULATION ON THE ROCKY BOY'S RESERVATION 1/ 2/

Population Segment	1916	1935	1936	1943	1949	1961	1970	1980	1990
Enrolled Members	—	712	—	738	1132	1510	—	—	—
Enrolled Members On Res.	417	—	598	—	566	876	—	—	—
Other Indians On Res.	33	—	250	—	—	165	—	—	—
Indian Population On Res.	450	—	848	—	—	1040	1237	1549	1882
ANNUAL RATES OF GROWTH FOR INDIAN POPULATION									
1916 To 1936	3.2%	—	Enrolled Members - 1943 to 1961					4.1%	—
1936 To 1961	0.8%	—	Enrolled Members - 1961 to 1990					3.6%	—
1961 To 1990	2.1%	—	Enrolled Members - 1943 to 1990					3.9%	—
1916 To 1990	2.0%	—	—	—	—	—	—	—	—

1/ Population estimates for years 1916 to 1970 from Water Resources Investigations, Present and Future Water Requirements - Phase II, Morrison-Mairele, Inc., 1979.
2/ Population estimates for 1980 and 1990 from U.S. Census Bureau.

It should be noted that information shown in Table 2 is primarily from Bureau of the Census reports. The Bureau of the Census acknowledges that undercounts of certain segments of the population occur. In a press release in April 1991, the Bureau of the Census estimated that the undercount of American Indians may have been as high as 8% on a nationwide basis. In addition, the Tribe has formally disputed the results of the 1990 census.

Other estimates of the historic population of the Reservation generally exceed the census estimates.

The IHS data for the American Indian population within the Rocky Boy's service area for the period 1980-1990 are shown in Table 3. The Rocky Boy's service area for the IHS consists of the trust land presently owned by the Tribe.

TABLE 3
AMERICAN INDIAN POPULATION
IHS DATA

Year	Population
1980	2,509
1981	2,558
1982	2,607
1983	2,656
1984	2,705
1985	2,754
1986	2,803
1987	2,851
1988	2,899
1989	2,946
1990	2,992

The IHS data above exhibits a 2% annual growth rate in the population from 1980 to 1990. This information is derived from census numbers and the number of patients at the local IHS hospital in Rocky Boy.[9]

The Bureau of Indian Affairs (BIA) data for the resident Indian population on the Reservation is shown in Table 4:

TABLE 4
RESIDENT INDIAN POPULATION
BIA DATA

Year	Population
1989	2,682
1991	2,848
1993	2,992

The BIA data shown in Table 4 demonstrates a 3% annual growth rate in the population from 1989 to 1993. This data are derived from the BIA, IHS, 1990 census data and local community programs.[10]

Another source of population data on the Reservation is the enrollment numbers from the public school system. While not indicative of the overall population, this source of data gives an indication of the growth in the number of young people in the local population. It should be noted that this information is derived from actual enrollment numbers, not on estimates or on sampling techniques. This information covers the age groups from daycare (age 4) through junior college (grade 14). From 1980-1987, the number of school age people grew by 3.2%. From 1987-1993, the number of school age people grew by 7.8%. This leads to an average growth rate from 1980-1993 of 5% (see Appendix E, March 1, 1994 letter from Dr. Robert J. Swan, Rocky Boy Schools).

The present population used as a baseline is 3,673 within the study area as of 1995. This includes the present population of 3,478 persons residing within the primary service area as of

1995. This is based on the 1990 IHS estimate of 2,992 Indians residing within the primary service area, and rounding this number to 3,000 reflects the non-Indians also residing within the primary service area. In addition, the proposed number reflects a 3% annual growth rate from 1990 to 1995. The secondary service area has an estimated present population level of 195 residents (personal communication with Jay Eaglemen and Lana Turner, Tribal employees, July 19, 1995). This leads to a total population in both primary and secondary service areas of 3,673 residents as of 1995.

c) Rate Of Population Growth. Estimating the future water needs of the service area requires that the future population of the service area be estimated. For this study, the future population will be derived based on the current population compounded by an annual percentage rate of growth. Because of the compounding process, small differences in the percentage rate can result in large differences over time.

Table 5 indicates that the percentage of the population in the younger and older age groups has remained fairly constant between 1970 and 1990. However, there has been a noticeable change in the age distribution in this twenty-year period. There is a pronounced shift from the adolescent group to the middle age group during this time period.

TABLE 5
AGE DISTRIBUTION OF INDIAN POPULATION

Year	Age Categories 1/				Total (%)	(#)
	Less Than 5	5 to 19	20 to 64	65 And Over		
1970	15.0%	46.2%	35.0%	3.9%	100.0%	1237
	Less Than 5	5 to 17	18 to 64	65 And Over		
1980	13.8%	37.1%	44.9%	4.3%	100.0%	1549
1990 2/	13.8%	31.4%	50.8%	3.9%	99.9%	1882

1/ Age group categories vary by Census.

2/ 1990 Census report given in percentages. In other years the information presented numerically.

The growth rate demonstrated by the other sources of data varies widely, as shown in Table 6:

TABLE 6
POPULATION GROWTH RATES

Source	Growth Rates
Labor Force Reports	2%
Indian Health Service	2%
Public School Data	5%

From the information available, it is not possible within the scope of this study to accurately project at what rate the population will grow through the design period. From the review of the data, an annual growth rate of 3% will be utilized. A 3% growth rate is within the range of variation exhibited by the Census Bureau, BIA and IHS data, and is less than the growth rate shown by the public school data. A 3% growth rate is realistic given that, of the Indian households in the study area, 65.6% include a child under the age of 18. This is the highest of any reservation in Montana. The fertility rate of the female segment of the population is also an indicator of future growth. The fertility rate for various age groups is shown in Table 7.

TABLE 7
FERTILITY RATES AT ROCKY BOY'S INDIAN RESERVATION, MONTANA AND UNITED STATES

Geographic Area	Age Group		
	15 to 24	25 to 34	35 to 44
Rocky Boy's	890/1000	2520/1000	3991/1000
Montana	296/1000	1564/1000	1770/1000
National	305/1000	1330/1000	1960/1000

Note: Rates are for all women in specified age group

Given the historic growth rates of the population within the service area and the youthful demographics of the present population, a 3% annual growth rate will be used.

d) Planning Population. MR&I water supply systems typically have a design life of 50 years. Therefore, a planning period of 50 years will be used. For economical reasons it is more beneficial and less costly to pursue a phased approach to this planning period. A phased approach will lead to a lower life-cycle cost for the project. This phased approach will use a 30-year interim milepost population and a 50-year final design population. Table 8 shows the projected population from 1995 onward using a 3% growth rate.

TABLE 8
PROJECTED SERVICE AREA POPULATION

Year	Population
1995	3,673
2005	4,936
2015	6,634
2025	8,915
2035	11,982
2045	16,102

2. Socioeconomics

This section of the needs assessment provides a background on selected social and economic conditions on the Reservation. The information is based primarily on reports from the Bureau of the Census.

a) Education. Educational attainment of the American Indians on the Reservation and trust land lags behind national levels. Of persons 25 years of age and older, 64.3% have a high school degree or higher. Only 6.1% of the population have a bachelor's degree or higher. On a national basis, the figures are 75.2% and 20.3%, respectively. Based on the 1990 Census, it

appears that as the current high school and college age population matures, educational attainment will also increase. This is based on the fact that only 16.4% of the population between 16 and 19 years of age is neither in school or a high school graduate. In addition, of the people between 18 and 24 years of age, 26.9% are enrolled in college (Bureau of Census, Montana Social and Economic Characteristics, 1990).

b) Employment. Of the American Indians on the Reservation and trust land in 1990, the Bureau of the Census reports that 55.2% are in the labor force. The civilian labor force unemployment rate is 32.8% for Indians on the Reservation. The relationship between the two percentages needs to be considered. The 55.2% of people in the labor force is a relatively low percentage. On a national basis, 65.3% of the population over the age of 16 is in the labor force and only 6.3% of the labor force is unemployed. While the unemployment rate is high, the actual number of unemployed people may be even higher because the percentage of people in the work force is low relative to the nation as a whole.

Table 9 shows that various categories of government provide most employment opportunities available. It should be noted that since the 1990's census the Tribe has entered into a P.L. 93-638 self-governance compact with the federal government. As a result, more people are now employed by the Tribal government than the federal government. Therefore, it should be noted that many of the employees in the federal government category actually are now Tribal employees.

TABLE 9
CATEGORIES OF EMPLOYERS

Government Sector				Private Sector		
Local	State	Federal	Subtotal	Private	Self	Subtotal
19.9%	16.4%	23.9%	61.2%	37.8%	2.0%	39.8

Note: Bureau of Census Report does not include a category for Tribal government. Local government is synonymous with Tribal government in this situation.

The type of work performed reflects the dominance of government in the employment of Tribal members. Table 10 provides information on the occupation of employed American Indians 16 years of age and older on the Reservation and trust land.

TABLE 10
PERCENTAGE OF WORK FORCE BY OCCUPATION

Managers & Professionals	Tech., Sales & Admin.	Service	Farming & Forestry	Craft & Repair	Operators and Laborers
19.2%	33.6%	18.7%	3.0%	9.7%	15.9%

Note: Occupations listed total 80.9% of work force. No other occupations listed for balance of 19.1%.

c) Income and Poverty. The median household income, as reported in 1989 dollars, for the Indian population on the Reservation and trust land was $16,655. This is equivalent to an annual per capita income of $4,278. Based on national criteria, the Bureau of the Census has determined that 48.9% of the Indian population on the Reservation and trust land lives below poverty level. For the nation as a whole, only 13.2% of the population is below the poverty level and the annual per capita income is $14,420.

3. Health Conditions

Most Tribal members seek health care at the IHS Clinic in Rocky Boy Agency. As pointed out in previous sections of this report, the American Indian population on the Reservation is young, growing and poorer than the overall United States population. The Indian mortality rates reflect these facts. Table 11 illustrates that of the eight leading causes of mortality, Rocky Boy exceeds the national mortality rates for all categories with the exception of one.

TABLE 11
INDIAN MORTALITY RATES
(RATE PER 100,000)
1987-1989

Cause of Death	Rocky Boy IHS Unit	U.S. All Races
1. Suicide	24.5	11.7
2. Accident	50.4	33.5
3. Alcoholism	15.5	6
4. Liver Disease & Cirrhosis	34.6	8.7
5. Malignant Neoplasm	201.5	133.7
6. Diabetes Mellitus	35.3	11.3
7. Heart Disease	192.6	155.9
8. Cerebrovascular Disease	-0-	28.5

Note: Source, 1990, Profile of the Montana Native American, Montana Office of Indian Affairs.

While these high mortality rates are not directly related to poor quality water, a dependable source of high quality water is a foundation of economic development. Adequate jobs for Reservation residents will likely cause many of the extremely high mortality rates to decline as people improve their standard of life.

F. LAND OWNERSHIP

There are 126,280 acres of land within the primary service area. Of this acreage, 109,620 acres within the primary service area are held in trust by the United States government for the exclusive benefit of the Tribe. The remaining 16,660 acres within the primary service area are held in fee by a variety of individual owners and the state of Montana. Unlike most reservations, the Rocky Boy's Reservation has not been allotted. As a result, all the trust land on the Reservation is owned by the Tribe. Individual Tribal members are eligible for land assignments of up to 160 acres, which they can then occupy and improve. However, the

ownership of land assigned to a Tribal member remains in trust for the Tribe (see Article IX, Chippewa Cree Constitution, 1935).

There are 89,460 acres of land within the secondary service area. The land within the secondary service area is predominately fee land, with 89,340 acres held in fee. The Tribe owns 120 acres within the secondary service area which is held in trust by the United States government for the exclusive benefit of the Tribe.

Overall, the total acreage within both primary and secondary service areas for the study is 215,740 acres. 109,740 acres are held in trust by the United States government for the exclusive benefit of the Tribe. 106,000 acres are held in fee. Table 12 summarizes the land status within the service area.

TABLE 12
LAND STATUS OF SERVICE AREA

Area	Trust Land	Fee Land
Primary Service Area	109,620	16,660
Secondary Service Area	120	89,340
Total Land Area	109,740	106,000
Combined Land Area	215,740 acres	

III. SUMMARY OF EXISTING SYSTEM

A. MUNICIPAL SYSTEMS

The existing water systems serving the Reservation are a mixture of smaller systems built over the past 35 years connected by a 6-inch water main from Agency to Box Elder. Figure 4 shows an overall view of the existing system.

The primary sources of water for the systems are the wells located in Newtown and Agency. Newtown has three wells that produce from 25 to 40 gpm and Agency has three wells that produce from 20 to 40 gpm each. These wells supply water to the primary water main consisting of a 6-inch PVC line from Agency through Newtown, Sangrey and to Box Elder. There is also a 6-inch PVC line from Agency around Haystack Loop area through Azure and back to Sangrey.

Water storage throughout the system is provided by 11 storage tanks ranging in size from 12,000 to 100,000 gallons each. The total combined storage capacity of the system is 339,000 gallons. The remainder of this section will discuss the different subsystems serving the Reservation.

Throughout the history of the Tribal water systems, wells have been developed, used and abandoned due to decreasing yields and/or poor water quality. The different distribution subsystems have been tied together to meet existing needs with limited concern for future needs. Many of the subsystems are 30 to 35 years old and are constructed of 2 or 4 inch mains. These lines are inadequate to meet the future growth of the Tribe, or to meet fire fighting requirements. Some of the subsystems rely on the Newtown wells for their water source. However, when shortages occur due to high demand or mechanical problems, these communities are shut off so the needs of the core system can be met. When this happens, these communities must rely on the storage facilities to meet their needs. The next few paragraphs discuss the different subsystems, their components, and some of the identified deficiencies.

SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)

PRIMARY SERVICE AREA BOUNDARY

LAREDO

Lower Beaver Creek Reservoir

Sage Creek

BOX ELDER

BOX ELDER WATER STORAGE RESERVOIR

6" (PVC)

AZURE WATER STORAGE RESERVOIR 4" (PVC)

HAYSTACK WATER MAIN

UPPER SANGREY WATER STORAGE RESERVOIR

NEWTOWN WATER STORAGE RESERVOIR 5--10,000 gal. (BURIED)

EAGLEMAN WATER STORAGE RESERVOIR 12,000 gal. FIBERGLASS (BURIED)

ROCKY BOY AGENCY

PARKER SCHOOL WATER STORAGE RESERVOIR 12,000 gal. (BURIED)

ROCKY BOY WATER STORAGE RESERVOIR

Beaver Creek

Parker Canyon Creek

Bear Paw Lake

Dry Fork

Big Sandy Creek

Duck Creek

Camp Creek

Cormier Creek

BIG SANDY

East Fork Reservoir

T 33 N
T 32 N
T 31 N
T 30 N

R 11 E
R 12 E
R 13 E
R 14 E
R 15 E

-N-

6000 0 6000 12000
scale feet

LEGEND

- ROADS
- PRIMARY SERVICE AREA BOUNDARY
- SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)
- 6" (PVC) EXISTING WATER MAIN, SIZE AND TYPE
- RIVERS AND STREAMS
- RESERVOIR LOCATIONS

ROCKY BOY INDIAN RESERVATION
NEEDS ASSESSMENT PROJECT

EXISTING RESERVATION WATER SYSTEM

FIGURE 4

HKM ENGINEERING

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1. Newtown

The three wells in the Newtown system are the primary production wells for the Rocky Boy's municipal system. Well No. 1 is an 8-inch well drilled in 1978 to a depth of 72 feet. This well is equipped with a 10 HP pump and has a capacity of 40 gpm. Well No. 2 is a 6-inch well drilled in 1989 to a depth of 280 feet and has a capacity of 40 gpm. Well No. 3 is also a 6-inch well drilled in 1989 to a depth of 300 feet and has a capacity of 25 gpm.

Water from the wells is chlorinated and fluoridated. Storage is provided by a 100,000 gallon storage tank. The water main from the tank is a 6-inch main installed in 1965. Laterals from the main consist of 2 and 4-inch lines serving a current population of approximately 140 through 28 service connections.

Several deficiencies of the Newtown water system have been noted.

- The wells of the Newtown system supply the bulk of the water for the Reservation system. Whenever shortages occur from breakdowns or over use, Azure and Sangrey are cut off from the Reservation system.
- The existing Newtown wells are only 12 inches above ground level and not in compliance with the state well protection program.
- There is insufficient fire flow to the existing hydrants and there are not enough fire hydrants in the system.
- Currently, Newtown has one 100,000 gallon storage tank. The Tribe has identified a storage deficiency and is planning on installing five additional 10,000 gallon tanks.
- The pumphouse controls are currently on a timer rather than on water level in the tank, leading to overflows and shortages.
- Air locks occur in the line between the wells and the storage tanks, air relief valves are needed.
- There are no pumping or usage records available.
- There are no accurate drawings of the system.

- Additional water analyses, including the full range of organics and inorganics, are needed.

2. Agency

Water for the Agency system is supplied from three wells. In addition to these wells, the system is also interconnected to the Newtown system. Well No. 1 consists of a 6-inch well drilled to 96 feet deep in 1990. This well has a capacity of 30 gpm but is not in service at this time. Well No. 3 is a 6-inch well drilled to 100 feet in 1986. This well is equipped with a 3 HP pump and has a capacity of 20 gpm. Well No. 4 is a 6-inch well drilled to 98 feet in 1986. This well is also equipped with a 3 HP pump and has a capacity of 40 gpm. There does not appear to be any well log or record of a Well No. 2.

Water from these wells is fluoridated and stored in four buried storage tanks. Three of these tanks are 12,000 gallons each and the fourth is a 20,000 gallon tank for a combined storage capacity of 56,000 gallons. The distribution system within Agency consists of 4 and 6-inch lines. The service area of the Agency system includes 22 residences with a population of approximately 110 people. In addition to the residential units, Agency is the center of Tribal government and community services. Table 13 summarizes the government and community services buildings in Agency and the number of employees.

TABLE 13
EXISTING EMPLOYMENT IN AGENCY

Facility	Employees
Senior Citizens	4
Tribal Office	33
Alcohol Center	11
TERO/EDA	10
Commodities Warehouse	5
Youth Center	1
Natural Resources	25
R C's	7
Day Care Center (50 students & 5 employees)	55

TABLE 13 EXISTING EMPLOYMENT IN AGENCY	
Facility	Employees
Stone Child College (200 students & 43 employees)	243
Pastime	3
CC Housing	13
Rocky Boy Clinic	42
Social Service/ICWA	5
Tribal Housing	10
Law & Order	10
Tribal Courts	5
R.B. Child Project	2
ICW/Title IVE	7
Emergency Shelter (10 employees & 6 children)	16
Admin. for Native Americans	4
JTPA (Trailer)	3
Village Grocery	4
R.B. School Admin. Building	10
C.C. HA Satellite Building	5
BIA Admin. Building	14
BIA Admin. Building, Forestry	4
BIA Admin. Building, Range	3
BIA Maintenance Shop	2
BIA Roads Office	6
Health Board	19
Health Board Finance Office	4
Tribal Resource Office	3
Tribal Office Building	33
TOTAL EMPLOYEES	621

The deficiencies noted in the Agency water system include the following:

- The valve in the bypass line from the pumphouse does not operate.
- Fire hydrants near the clinic and senior center do not operate properly.
- Well No. 4 failed Bac-T-tests in March 1995.

- There are no pumping or usage records available.
- There are no accurate drawings of the system available.
- Additional water analyses that include the full range of inorganics and organics are needed on the Agency wells.

3. Rocky Boy's Elementary School Water System

The Rocky Boy's elementary school water system is supplied by a 6-inch well drilled to a depth of 100 feet in 1974. The water from the well is chlorinated and fluoridated and storage is provided by a 10,000 gallon tank. This system is a "stand alone" system and is not connected into the Reservation system.

This system supplies water to the elementary school and day care center that have a combined population of approximately 615 students and 100 employees; the Rocky Boy's high school with 151 students and 20 employees, and the Rocky Boy's Headstart with 92 students and 12 employees. In addition to these facilities, this system also serves water to 29 private homes, 10 senior citizen homes, and irrigates the 10 acre high school and football field area.

The identified deficiencies of the Rocky Boy's elementary school water system include the following:

- Coliform contamination was detected in the system in April of 1995. Coliform contamination is an indicator of a health risk.
- There is no concrete slab under the storage tank and the tank is settling. The tank has structural damage, is collapsing and is currently leaking.
- There are no pumpage or usage records available.
- There are no accurate system drawings available.
- Additional water analyses that include the full range of organics and inorganics are needed.

4. Parker School Community Water System

The Parker School community is supplied with water from a 6-inch well drilled to a depth of 85 feet. This well has a capacity of 10 gpm. The water is fluoridated and stored in a 12,000 gallon buried fiberglass tank. The distribution system consists of 2 and 4-inch PVC pipe and serves 7 houses and two trailers with a population of 45.

The identified deficiencies with this system include the following:

- Existing water supply is considered marginal as a primary community water source.
- The existing drawings of the system are not accurate.
- There are no accurate pumping records.
- The pump controls are not working properly leading to daily tank overflows.
- Storage tank has a crack in the seam.
- Additional water analyses including the full range of organics and inorganics are needed.

5. Sangrey Water System

The Sangrey water system is supplied by the Reservation water system and, therefore, relies on the wells in Newtown as the water source. Until 1988, Sangrey was served by two 6-inch wells. These wells have been abandoned due to their low quality and decreasing yields. The water in the Sangrey system is chlorinated and fluoridated at the Newtown pumphouse.

The service area covered by the Sangrey system includes two subsystems, the Upper Sangrey and the Buttercap or Lower Sangrey area. The Upper Sangrey area includes 16 homes and the Lower Sangrey includes 26 houses and one trailer. The total Sangrey system serves an estimated population of 215 people.

The identified deficiencies of the Sangrey water system include the following:

- The system wells are not in use due to the high hydrogen sulfide and decreasing yields. The high level of hydrogen sulfide causes a bad odor and taste in the water.
- Air locks occur in the main along St. Pierre ridge. Air locks will cause flow restrictions in the line.
- Valve boxes are not plumbed.
- Fire hydrant in Lower Sangrey is missing.
- As-built drawings of the system are not available.
- There are no pumpage or water usage records.
- Additional water analyses that include the full range of organics and inorganics are needed in the Sangrey wells.

6. Azure Community Water System

The Azure water system is supplied by the Reservation system. Azure originally had three wells. Currently, Well No. 2 is connected to the system to supplement demand during shortages. Well No. 1 is not in use and Well No. 3 has been abandoned. Well No. 2 is a 6-inch well drilled to 58 feet deep and has a test capacity of 30 gpm.

Water entering the Azure system is chlorinated and fluoridated at the Newtown pump station. Storage for the Azure system is supplied by a 40,000 gallon tank that was installed in 1984. A 4-inch PVC distribution system built in 1971 serves the Azure community. Currently, the Azure system serves 42 homes with a total population of approximately 225.

The identified deficiencies of the Azure water system include the following:

- Accurate drawings of the system do not exist.
- Some of the valve risers are bent and inoperable. Should a leak in the system occur, the entire system may need to be shut down.

- Fire hydrants are not in use due to inadequate flows.
- Storage tank vent screen is missing. This can lead to water contamination.
- There are no water usage records.

7. Eagleman Community Water System

The Eagleman water system is supplied by a 120 feet deep well that was drilled in 1988. This well is equipped with a .75 HP pump and has a capacity of 21 gpm. The system is also connected to the Reservation system as a backup. Water storage for the Eagleman community is supplied by a 12,000 gallon tank. A distribution system consisting of 2 and 4-inch pipe supplies water to 11 homes and an estimated population of 65 people.

The identified deficiencies in the Eagleman water system include the following:

- The distribution lines consist of 2 and 4 inch lines installed in 1961. These small lines restrict flows and reduce line pressure.
- System is not capable of fire flows.
- Accurate system drawings do not exist.
- Pumping and/or usage records do not exist.
- Additional water analyses including the full range of organics and inorganics are needed.

8. Box Elder Community Water System

The Box Elder water system serves the trust land to the east and southeast of the town of Box Elder. This area is rapidly developing and has been identified by the Tribe as a primary area of growth. The Box Elder water system is supplied by the Reservation system and is supplemented by two 6-inch wells. Well No. 1 is 44 feet deep, equipped with a 1.5 HP pump and has a capacity of 30 gpm. Well No. 2 is 48 feet deep, equipped with a 2 HP pump and has a capacity of 33 gpm. Both of these wells pump into the 69,000 gallon storage tank after fluoride addition.

The existing system serves approximately 129 homes and an estimated population of 945 people.

The identified deficiencies in the Box Elder community water system include the following:

- Some of the gate valves in the system were improperly installed and are leaking. Should the main develop a leak, the entire system may need to be shut down.
- The system has no re-chlorination facilities. Residual chlorine in the system is needed to ensure safety. A re-chlorination system should be considered.
- No accurate system drawings are available.
- No pumping or water usage records are available.
- Additional water analyses including the full range of organics and inorganics are needed for the Box Elder wells.

9. Haystack Loop Area

The Haystack Loop area includes scattered home sites along Haystack Loop road from the Azure cluster to the Parker School area. The Haystack Loop has a 6-inch waterline running the length of the loop. However, most of the existing homes pre-date the waterline and of the approximately 103 homes, 101 are on individual wells and only 2 homes are on the Reservation system. The Tribe is currently in the process of installing five, 10,000 gallon storage tanks along the Haystack Loop.

The majority of the residents along Haystack Loop are not connected to the community water system. The Tribe is in the process of adding more storage to help make this a more reliable source. Currently, more residents are on wells that produce water high in hydrogen sulfide. These wells are shallow and lack sufficient yield. Some of the residents depend on springs and experience contamination during the spring runoff.

10. Parker School and Parker Canyon Areas

The Parker School and Parker Canyon areas have a combined population of approximately 450 people in some 90 homes. The homes in these areas are supplied water from individual wells and/or developed springs.

B. AS-BUILT DRAWINGS

Available "as-built" drawings have been collected and reviewed as part of this needs assessment. Drawings are available for the newer cluster sites and/or developments, along with segments of the Haystack Loop area. However, the remainder of the system and subsystems do not have corresponding drawings available. The Tribe should attempt to have an accurate system map developed that would tie down the water mains with both horizontal and vertical controls.

C. OPERATION AND MAINTENANCE RECORDS

Operation and maintenance records are very limited for the Reservation system or any of the subsystems. A limited supply of tank level records exist, however, these records have no real value. There are no pumpage records or usage records available. There should be an effort made to meter the water entering the community system to better quantify the water usage.

As previously noted, the Tribe does not maintain pumping and/or usage records for the water system. This lack of information makes it difficult to quantify the current usage and project future requirements. A limited amount of usage or related information was available.

The Tribe indicated that twice in the past attempts were made to identify water consumption rates. Based on information provided by the Tribe, in June of 1988 the Eaglemen community had an average consumption of 128 gpcd and also in 1988, the Azure community had an average consumption of 111 gpcd. Based on the conclusions from the pump power records and the 1988 consumption rates, it is concluded that the current average consumption rate within the service is approximately 110 to 130 gpcd.

Along with average consumption rates, peaking factors for peak day and peak month are typically determined for existing systems. Because there are no daily pumping records, it is not possible to determine an actual peak day peaking factor for the existing system. Typically, this peak day factor is in the range of 2 to 3 times the average day demand. Based on past experience, normal industry practice, and lack of actual records, a peak day peaking factor of 2.5 is recommended.

Another useful factor is the peak month to average a monthly peaking factor. A review of the storage tank level records for 1993 indicated a peak month peaking factor of 1.16 for Newtown and 1.29 for Box Elder with an average of 1.2. Even though these records do not reflect the actual water usage, they do indicate trends in the system. For this report, a peak month peaking factor of 1.2 is recommended.

D. RURAL SYSTEMS

Throughout the primary and secondary service areas, individual rural water systems, typically wells, serve the rural residents. Wells are also used for rural stockwatering.

At this time, the Bear Paw Ski Bowl is the only recreation facility on the Reservation. As of this time, there is no water system associated with the ski area.

IV. MR&I WATER NEEDS ANALYSIS

A. DESIGN YEAR

As discussed and developed in Section II-E of this needs assessment, this report will evaluate both a 30-year interim planning and a 50-year planning period for this project. The interim design year is 2025 and the design year is 2045. The interim design population is estimated to be 8916 and the 50-year design population is estimated to be 16,102.

B. POPULATION AND DEMOGRAPHICS

This needs assessment evaluates the water needs for the interim planning year 2025 and the planning year 2045. Each of these design years have been evaluated to determine the needs within the primary service area as well as within the secondary service area as shown on Figure 5. The design population used in this report is presented in Table 14. These population projections are based on the 3% growth rate within the primary service area and the 2% growth rate within the secondary service area.

TABLE 14
DESIGN YEAR POPULATIONS

SERVICE AREA	DESIGN YEAR	
	2025	2045
Primary	8443	15247
Secondary	473	855
TOTAL	8916	16102

Based on data collected from the Tribe and on field investigations, Figure 5 shows the current population distribution in the primary and secondary service areas. Table 15 summarizes the population distribution shown on Figure 5 and indicates the anticipated population distribution for the 30 and 50 year planning periods.

SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)

PRIMARY SERVICE AREA BOUNDARY

NORTH FEE LANDS

LAREDO

NORTHERN TRUST LANDS

NORTHEAST FEE LANDS

WEST FEE LANDS

NOR-TRUST SECTION PRIMARY AREA

LAREDO ROAD AREA

U.S. HWY 87 AREA

BOXELDER CREEK AREA

BOXELDER AREA

BOX ELDER

(P) PROPOSED CLUSTER – 120 UNITS

AZURE

HAYSTACK LOOP AREA

EAST DRY FORK AREA

DUCK CREEK AREA

SANGREY SOUTH AREA

SANGREY

EAGLEMAN

NEWTOWN

SOUTHEAST FEE LANDS

DRY CREEK AREA

ROCKY BOY AGENCY

PARKER SCHOOL

PARKER CANYON/ PARKER SCHOOL AREA

BIG SANDY

SOUTHERN TRUST LANDS

SOUTH FEE LANDS

Lower Beaver Creek Reservoir

Rear Par Lake

East Fork Reservoir

Sage Creek

Big Sandy Creek

Duck Creek

Camp Creek

Corman Creek

Parker Canyon Creek

Beaver Creek

Box Elder Creek

Dry Fork

East Dry Fork

T 32 N

T 31 N

T 30 N

T 29 N

R 24 E

R 25 E

R 26 E

R 27 E

N

6000 0 6000 12000

scale feet

LEGEND

- ROADS
- PRIMARY SERVICE AREA BOUNDARY
- SECONDARY SERVICE AREA BOUNDARY (1939 ACT BOUNDARY)
- RIVERS AND STREAMS
- RESERVOIR LOCATIONS
- NORTHERN TRUST LANDS POPULATION CONCENTRATIONS
- SOUTHERN TRUST LANDS POPULATION CONCENTRATIONS
- PARKER SCHOOL — NAME OF COMMUNITY (TYPICAL)
- RURAL POPULATION CONCENTRATIONS
- SINGLE FAMILY RESIDENCE
- (2) — LOCATION OF HOUSING CLUSTER (NUMBER OF HOMES PER CLUSTER)

ROCKY BOY INDIAN RESERVATION
NEEDS ASSESSMENT PROJECT

POPULATION DISTRIBUTION

FIGURE 5

MES-HKM ENGINEERING

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TABLE 15
EXISTING POPULATION DISTRIBUTION

	EXISTING POPULATION	PROJECTED POPULATION	
PRIMARY SERVICE AREA		30 YEAR	50 YEAR
Box Elder Community	645	1566	2828
Sangrey	215	522	943
Newtown	140	340	614
Rocky Boy/Agency (Includes Rocky Boy Elementary School System)	360	874	1578
Eagleman	65	158	285
Azure	225	546	986
Parker School	45	109	197
Box Elder Creek Area	203	493	890
Dry Creek Road Area	320	777	1403
Duck Creek Road Area	194	471	850
U.S. 87 Area	8	19	35
Laredo Road Area	78	189	342
Haystack Loop Area	435	1056	1907
Parker Canyon/Parker School Area	410	995	1797
East Dry Fork Area	135	328	592
PRIMARY AREA TOTAL	3478	8443	15247
SECONDARY SERVICE AREA			
Southern Fee Lands (14)	49	119	215
Western Fee Lands (16)	57	138	250
Northern Fee Lands (10)	35	85	153
Northeastern Fee Lands (10)	36	87	158
Southeastern Fee Lands (5)	18	44	79
SECONDARY AREA TOTAL	195	473	855
TOTAL FOR PRIMARY/SECONDARY AREA	3673	8916	16102

C. DESCRIPTION OF CURRENT AND FUTURE NEEDS

1. Municipal Needs

The water needs of the primary and secondary service areas have been estimated for the current population, the 30-year interim design population of 8916, and the 50-year design population of 16,102 within the service area. In developing the projected population distribution, several assumptions have been made.

1. The 3% growth rate discussed earlier will be used within the primary service area.
2. An assumed 2% growth rate is used in the secondary service area.
3. The communities of Box Elder, Sangrey, Rocky Boy/Agency, Eagleman, Azure and Parker School will grow at the same overall rate of 3%.
4. The increase in population will be distributed proportionally to the current distribution.

The Reservation needs assessment will use a per capita water use rate of 160 gpcpd. This water use rate is developed from typical rural and residential water use rates used for other systems in the region and state. The BOR has recently proposed water use rates of 180 gpcpd for municipal and 135 gpcpd for rural during the planning of a MR&I system on the Fort Peck Reservation. In addition, a water use rate of 160 gpcpd has been accepted on the proposed MR&I pipelines to serve the Hopi and Navajo Tribes in Arizona. The water use rate selected for planning purposes does not include any major industrial use and approximates the average use rate of 170 gpcpd for municipal and rural systems in Montana.

2. Water Conservation

To be consistent with the requirements of Public Law 100-516, a water conservation program is planned for the primary service area. The objective of the program is to provide the most economically efficient project possible for the service area.

The United States Water Resource Council (USWRC) defines water conservation as "means or activities designed to (1) reduce demand for water, (2) improve efficiency in use and reduce losses and waste of water, or (3) improve land management practices to conserve water".[11] Irrigation water is not included in the USWRC project. This leaves methods 1 and 2 as the practical methods for water conservation.

A successfully implemented conservation program will provide the following advantages:

1. Extend the life of all facilities
2. Save energy and operational costs
3. Provide the above 2 advantages for any existing or future wastewater collection and treatment facilities.

Next to charging for water, the single most cost effective water conservation practice is public education. Very few people understand the costs associated with a water supply system. Without being charged for water usage, few people could be expected to care about the cost. The only means of achieving public awareness and concern for the water supply system is through public education and involvement.

The public should be made aware of limited funds for operation and maintenance of the system. In addition, the public should understand that the system has a finite design life that may only be extended by following proper water conservation practices.

Public education should begin in the schools. A workshop for health and/or science teachers regarding water and water conservation should be conducted annually. Educational brochures are available from the American Water Works Association specifically for this purpose. The teachers and schools should be encouraged to set aside one week as water conservation week. This would be most effective if it was near the end of the school year, shortly before the peak demands of summer.

Public involvement should always be encouraged. Decisions made regarding plumbing codes and possible inspection of homes must be made by the people affected by those decisions. Pressure imposed on a user to fix a leaky shower fixture will be much more graciously accepted if administered by neighbors instead of a utility or the federal government.

It is believed that with the implementation of a well planned water conservation program, waste and inefficient use can be minimized. It is estimated these savings will amount to approximately 10% of the daily demand. This results in a reduction of 16 gpcpd with water conservation or a demand of 144 gpcpd.

3. Water Demands

Based on information previously discussed, a per capita demand of 160 gpd has been selected as the average day design demand. The 160 gpcd accounts for typical commercial, recreational, and light industrial demands but not for water conservation measures or stock watering needs. The stock needs are specific to each project and are discussed later in this section. As discussed in Paragraph 2 above, a 10% or 16 gpcd of water conservation can be anticipated for this project. The per capita demand for this project, excluding stock demands, would therefore be 144 gpcd.

4. Rural Domestic Needs

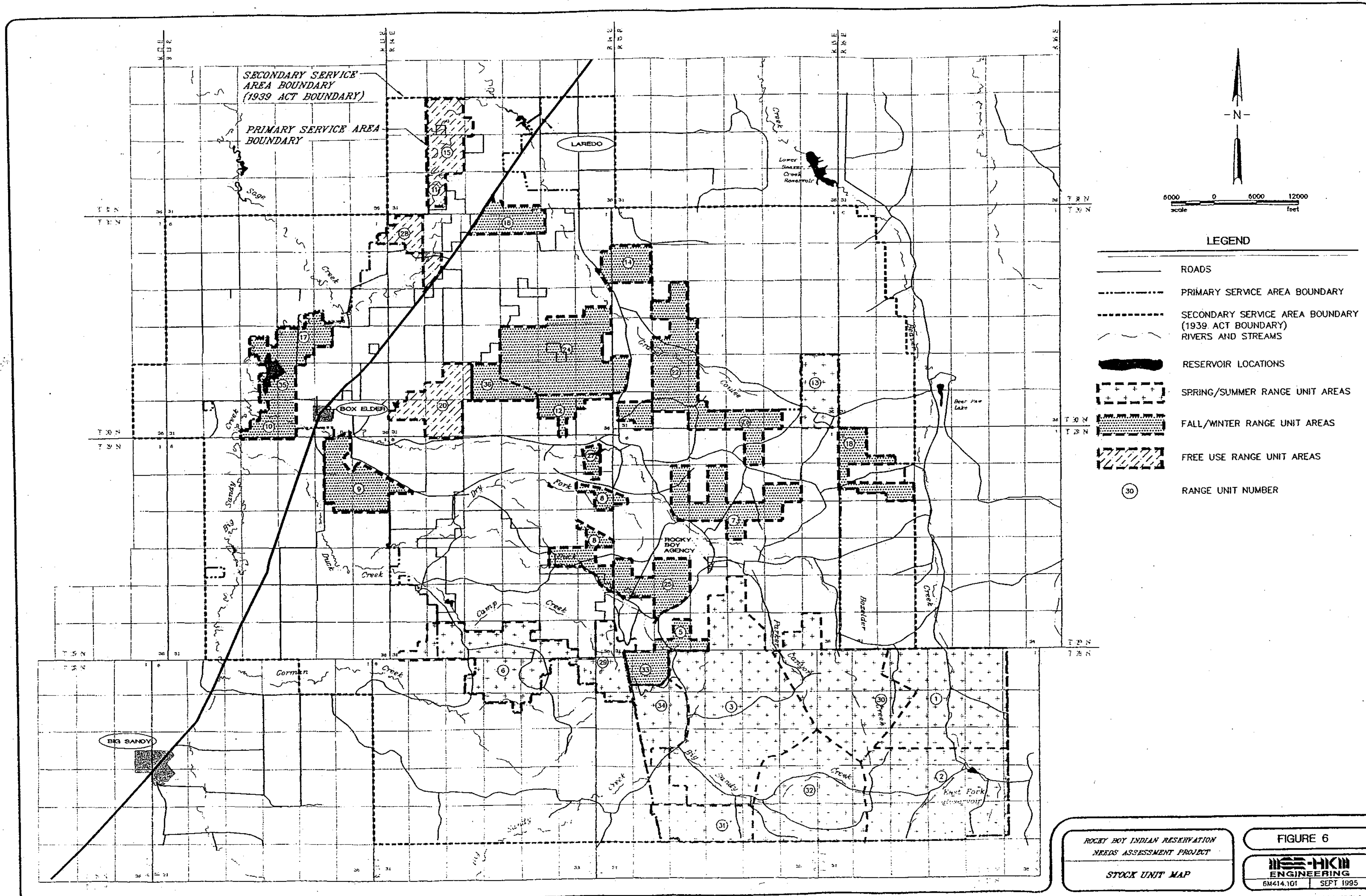
The rural domestic water requirements are similar to the municipal needs. The population growth of 3% has been used for rural systems within the primary area and 2% in the rural secondary system. A water demand of 144 gpcpd has been used for all rural systems as in the municipal system. Table 19, at the end of this chapter, includes the estimated need for the rural system along with the municipal needs.

5. Stockwatering Needs

The existing range units within the service area are shown on Figure 6. For the primary service area, we propose to adopt Dornbusch's estimate of 3,517 animal units (AUs) on the trust land within the primary service area. This number is based on an estimated range unit carrying capacity of the trust land within the primary area of 2,400 AUs, with an additional 1,117 AUs added through a variety of management practices[12]. This leads to an estimated carrying capacity on trust land within the primary service area to 3,517 AUs. In addition, there are currently 16,660 acres of fee lands within the primary service area. The extrapolation of data from Tribal range units adjacent to the fee land within the primary service area leads to an estimated additional 535 AUs on the fee land. Combining the AUs from the trust and fee land within the primary service area, leads to a total of 4,052 AUs within the primary service area.

For the secondary service area, 2,636 AUs are estimated. This number was derived based on data from range units within the primary service area selected as representative of areas within the secondary service area. This information was then extrapolated from the existing range units to the secondary service area. Dornbusch's assumptions were used, namely that livestock will be grazed for 7.5 months and fed 4.5 months of the year.

Combining the AUs from the primary and secondary service areas leads to a total of 6,688 AUs within the service area (4,052 + 2,636). Using an average stockwater demand of 12 gallons per day (gpd) per AU, we estimate a total stockwater demand of 80,256 gpd for the service area. Table 16 summarizes this data.



ROCKY BOY INDIAN RESERVATION NEEDS ASSESSMENT PROJECT

STOCK UNIT MAP

FIGURE 6

HKM ENGINEERING

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TABLE 16 STOCKWATER DEMAND	
Service Area	AUs
Primary	4,052
Secondary	2,636
Total AUs	6,688
Total Demand: 6,688 AUs x 12 gpd/AU =	80,256 gpd

6. Recreational Needs

The Tribe owns a ski area within the service area which currently operates from January through April. Presently, the ski area is operated only on Saturdays and Sundays during the ski season. Recent patterns of use show the average number of skiers per day to range from 98/day (1993) to 150/day (1980). The Tribe is planning an expansion of the area into a full-time ski area with more ski lifts, a lodge, and a hotel and restaurant to be added. The ski area suffers from lack of sufficient snow during many years. The Tribe would like to add snow making equipment to the present facilities. This would enable the Tribe to expand the ski season to extend from late November through middle May. In addition, the snow making capability would allow the area to continue operations during periods of low snow fall[13].

Plans for a nine-hole golf course were discussed in A Plan For Our People, the Tribal development plan[14]. The course would be located in the Tribal recreational area in the Beaver Creek drainage adjacent to Hill County's Beaver Creek Park. The Tribal government has asked that any future water use plan consider the construction of all-year recreational facilities in this area including the golf course, ski area, lodging, water slide, pool, saunas, jaccuzis and offices.

The Tribe also has an interest in building a swimming pool. This pool would be built in the Rocky Boy's area and would serve the Reservation community. Plans also include expansion of recreational opportunities at Bonneau and East Fork Reservoirs. Plans include acquiring

rafts, canoes and paddle boats for rent to recreationalists. Facilities will also be built to support ice skating at both reservoirs.

Table 17 summarizes the identified potential recreation facilities and quantifies the possible water demand for each.

7. Commercial Needs

Currently, the commercial needs of the Reservation water system include the Tribal office and a limited number of other facilities. Table 18 summarizes the Tribal offices and commercial facilities along with the estimated current water demand.

The Tribe has also identified future Tribal and commercial needs. Table 18 also summarizes the estimated water needs for these future facilities.

Based on the existing commercial and Tribal facilities, the current commercial water needs are estimated at 19,415 gpd. Based on the anticipated future commercial and Tribal facilities, the additional commercial needs would be 42,995 gpd for a total future commercial demand of 62,410 gpd.

8. Industrial Needs

As of this time, the Tribe has not identified any plans for industrial development. However, in order to provide the opportunity for economic development within the Reservation, an allotment of water supply should be developed and maintained for future industrial uses. This report proposes that a reserve industrial demand, equal to half of the future commercial needs, be included into the total water requirements of the community. For the purpose of this needs assessment, a future industrial demand of 31,000 gpd will be used.

TABLE 17
POTENTIAL RECREATIONAL FACILITIES AND WATER DEMAND

	AVERAGE DAILY DEMAND gal/day	
	Current	Future
Ski Area[1,2]		
Skier Days[3] (currently) 1,800 10 gpd	49	
Skier Days (Future) 1,800 10 gpd		1,000
Lodge with Sauna, Jacuzzis, Pool 13 gpd/person		1,300
Hotel (75 rooms) 78gpd/room		5,850
Restaurant (50 seats) 47 gpd/seat		2,350
Bar (30 seats) 39 gpd/seat		1,170
Offices 10 employees 13 gallons per day per employee		130
Golf Course, Club House (25 seats, 39 gpd/seat, 120 days)		975
Water Slide (200/day, 10 gpd/person, 45 days/yr)		2,000
Swimming Pool (200/day, 10 gpd/person, 45 days/yr)		2,000
Skating/Boat Rentals		
Bonneau (100/day, 10 gpd/person, 90 days/yr)		1,000
Fast Fork (100/day, 10 gpd/person, 90 days/yr)		1,000
TOTAL	49	18,775
1) Assumes an average of 100 skiers per day		
2) Assumes 165 days per year, December 1 - May 15		
3) Current use is 8 to 12 days per year, 150 skiers per day		
	365	

TABLE 18
EXISTING COMMERCIAL FACILITIES AND WATER NEEDS

Facility	People	Unit Demand gpd	Demand gpd
Senior Citizens	4	15	60
Tribal Office	33	15	495
Alcohol Center	11	50	550
TERO/EDA	10	15	150
Laundry Mat	6	525	3,150
Commodities Warehouse	5	15	75
Youth Center			1,000
Natural Resources	25	15	375
4 C's Restaurant (25 seats)	25	40	1,000
Day Care Center (50 students & 5 employees)	55	20	1,100
Stone Child College (200 students & 43 employees)	243	15	3,645
Pastime	3	15	45
Catholic Church			200
CC Housing	13	15	195
Rocky Boy Clinic	42	15	630
IHS Housing Units	20	144	2,880
Social Services/ICWA	5	15	75
Tribal Housing	10	15	150
Law & Order	10	15	150
Tribal Courts	5	15	75
R.B. Child Project	2	15	30
ICW/Title IVE	7	15	105
Emergency Shelter (10 employees & 6 children)	16	100	1,600
Admin. for Native Americans	4	15	60
JTPA (Trailer)	3	15	45
Village Grocery			525
R.B. School Admin. Building	10	15	150
C.C. HA Satellite Building	5	15	75
BIA Admin. Building	14	15	210
BIA Admin. Building Forestry	4	15	60
BIA Admin. Building Range	3	15	45
BIA Maintenance Shop	2	15	30
BIA Roads Office	6	15	90
Health Board	19	15	285
Health Board Finance Office	4	15	60
Tribal Resource Office	3	15	45
TOTAL			19,415

D. SUMMARY OF CURRENT AND FUTURE WATER NEEDS

The previous sections have discussed the types of demands and how the demands were determined. As a summary, the municipal and rural water demands for both the primary and secondary service areas, stockwatering needs, existing and planned commercial facility needs, potential recreational water needs, and a proposed industrial water reserve for future economic growth are presented here. Using the demand of 144 gpcpd, Table 19 summarizes residential demands for the current population, the 30-year interim design, and the 50-year design life of the project for both the primary and secondary service areas.

TABLE 19
EXISTING AND FUTURE WATER NEEDS

AREA	PRIMARY SERVICE AREA						SECONDARY SERVICE AREA					
	Current		30-Year		50-Year		Current		30-Year		50-Year	
	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd
RESIDENTIAL NEEDS												
(Municipal Systems)												
Box Elder	645	92,880	1,566	225,504	2,828	407,232		0	0	0	0	0
Sangrey	215	30,960	522	75,168	943	135,792		0	0	0	0	0
Newtown	140	20,160	340	48,960	614	88,416		0	0	0	0	0
Rocky Boy/Agency	360	51,840	874	125,856	1,578	227,232		0	0	0	0	0
Eagleman	65	9,360	158	22,752	285	41,040		0	0	0	0	0
Azure	225	32,400	546	78,624	986	141,984		0	0	0	0	0
Parker School	45	6,480	109	15,696	197	28,368		0	0	0	0	0
(Rural Systems)												
Box Elder Creek Area	203	29,232	493	70,992	890	128,160		0	0	0	0	0
Dry Creek Road Area	320	46,080	777	111,888	1,403	202,032		0	0	0	0	0
Duck Creek Road Area	194	27,936	471	67,824	850	122,400		0	0	0	0	0
U.S. 87 Area	8	1,152	19	2,736	35	5,040		0	0	0	0	0
Laredo Road Area	78	11,232	189	27,216	342	49,248		0	0	0	0	0
Haystack Loop Area	435	62,640	1,056	152,064	1,907	274,608		0	0	0	0	0
Parker Canyon/Parker School Area	410	59,040	995	143,280	1,797	258,768		0	0	0	0	0
East Dry Fork Area	135	19,440	328	47,232	592	85,248		0	0	0	0	0
PRIMARY SERVICE AREA SUBTOTAL	3,478	500,832	8,443	1,215,792	15,247	2,195,568	0	0	0	0	0	0
Southern Fee Lands		0	0	0	0	0	49	7,056	119	17,136	215	30,960
Western Fee Lands		0	0	0	0	0	57	8,208	138	19,872	250	36,000
Northern Fee Lands		0	0	0	0	0	35	5,040	85	12,240	153	22,032
Northeastern Fee Lands		0	0	0	0	0	36	5,184	87	12,528	158	22,752
Southeastern Fee Lands		0	0	0	0	0	18	2,592	44	6,336	79	11,376
SECONDARY SERVICE AREA SUBTOTAL	0	0	0	0	0	0	195	28,080	473	68,112	855	123,120

TABLE 19
EXISTING AND FUTURE WATER NEEDS

AREA	PRIMARY SERVICE AREA						SECONDARY SERVICE AREA					
	Current		30-Year		50-Year		Current		30-Year		50-Year	
	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd	POPULATION	NEED gpd
COMMERCIAL NEEDS		19,415		62,410		62,410						
INDUSTRIAL NEEDS		0		31000		31000						
STOCKWATERING NEEDS		48,624		48,624		48,624		31,632		31,632		31,632
RECREATIONAL NEEDS				4,000		4,000				14,775		14,775
TOTAL SERVICE AREAS	3,478	568,871	8,443	1,330,826	15,247	2,310,602	195	59,712	473	114,519	855	169,527

V. WATER RESOURCE CONSTRAINTS

A. WATER QUANTITY

Based on limited available water quality information, the surface water resources within the study area are generally of high quality but of low quantity (see Section II(c)). Current surface water availability is problematical given that most of the area streams are over appropriated. There are disputes over which rights are senior.

The Tribe is currently in the process of expanding Bonneau Reservoir to allow increased irrigation, fish and wildlife, and recreational uses on the Reservation.

The Tribe is seeking to secure the importation of water for MR&I uses from outside the service area. As such, without imported water from outside the study area, water from an enlarged Bonneau Reservoir will need to be used for municipal uses. Even with this additional storage water, the supply will only be sufficient for an additional 30 years given the population and demand projections.

With water imported from outside the study area pursuant to water settlement negotiations with the state of Montana, the enlarged storage water in Bonneau will be used for additional agricultural development, recreation, and fish and wildlife uses. This will allow a much higher level of long-term economic development within the study area.

The groundwater resources within the study area are constrained by water quantity, quality and development cost. Only the ancestral channel and deep bedrock aquifers have sufficient capacity for large scale development. Water from the ancestral channel would require treatment by a desalinization process to be accepted by the general public for MR&I use. This source may have some utility for stockwater. The deep bedrock aquifers may be useful for certain industrial uses that can use low quality water, but extreme depth of the aquifers makes this impractical.

B. WATER QUALITY

The surface water within the study area meets or exceeds the federal SDWA standards and criteria (see Section II(c)). However, many of the potential groundwater sources within the study area are constrained by water quality problems that limit possible uses. These water quality constraints are summarized in Table 20.

TABLE 20
GROUNDWATER QUALITY

Aquifer	Groundwater Quality Constraints
Shallow Alluvial	High quality, but availability is constrained by surface water availability.
Shallow Bedrock	High saline content and low yields restrict use to small scale stockwater and domestic use.
Ancestral Channel	High TDS and sulfate concentrations make undesirable for domestic use; generally acceptable for stockwater.
Deep Bedrock	High TDS concentrations and high saline content make unacceptable for domestic use. Source may be acceptable for industrial use, but extreme development cost and low recharge make impractical.

C. WATER RIGHTS

Water rights on behalf of the Tribe will be necessary to whatever water source is selected to supply the Rocky Boy's MR&I water system. The Tribe, state of Montana and the federal government are currently negotiating a settlement of the Tribe's reserved water rights. It is through this process that the Tribe will obtain sufficient water supplies to ensure that the Reservation is able to serve as a homeland for present and future Tribal members.

The surface water sources within the study area are of sufficient quality for most potential uses. The surface water resources are primarily constrained by availability issues related to the Tribe's relatively late priority date.

Many of the groundwater sources within the service area are constrained by low water quality. As discussed above, some of the groundwater sources are constrained by high development costs and low yield capacity.

D. WATER RELATED HEALTH ISSUES

The following data in Table 21 are indicative of the conditions that exist. The IHS believes that a large number of these diseases may be attributed to adverse environmental conditions that exist on the Reservation.[15]

TABLE 21
WATER RELATED HEALTH PROBLEMS

Diseases	FY 1986	FY 1990
Bacillary Dysentery	0	0
Gastroenteritis Diarrhea	283	108
Hepatitis	3	1
Salmonellosis	0	0
Scarlet Fever	0	0
Influenza	37	10

A boil order was imposed in September, 1991 on water from the Rocky Boy Rural Water System due to contamination of one of its wells. The boil order continued until March, 1992 when a chlorination unit was added to the system. Many of the wells within the study area are in close proximity to septic tanks and areas heavily grazed by cattle. This results in a continuing threat to the area water supply from bacterial and viral contamination.

E. WASTEWATER

As discussed in other sections of this needs assessment, wastewater treatment in the service area is provided by either individual septic systems or community lagoon systems. Without getting

into a detailed analysis of each system, it is felt that most community systems are currently at capacity and some are already stressed. As additional population growth come into these communities, these wastewater systems will be undersized and will require enlargement and/or replacement. Some of the individual systems are not functioning properly and should be looked at in more detail. As areas of the service area increase in population, a wastewater collection system that is tied into a central treatment facility should be considered.

VI. WASTEWATER SYSTEMS

A. WASTEWATER SYSTEMS OVERVIEW

Wastewater collection, treatment and disposal vary throughout the Reservation from individual septic systems to community lagoon systems. Table 22 summarizes the type of systems in the different areas of the Reservation.

TABLE 22
EXISTING WASTEWATER SYSTEMS

Community or Area	Type of System
Agency	Four celled aerated lagoon
Rocky Boys School	To Agency sewer system
Parker School	Individual septic systems
Sangrey	Septic tanks and a two celled stabilization pond
Azure	Three celled lagoon and 3 homes on septic systems
Eagleman Box Elder	Three celled facultative lagoon system and 35 homes on individual septic systems
Haystack Loop	Individual septic systems
Parker Canyon	Individual septic systems
Dry Fork Village	Lagoon system

B. WASTEWATER SYSTEM DEFICIENCIES

Based on information provided by the Tribe, the Agency lagoon system has several identified deficiencies. These include the following:

- Tree roots have penetrated the lagoon lining on the east lagoon. Leakage from the lagoon can contaminate ground water supplies and cause potential health risks.

- There are some areas along the dike that have eroded. If this erosion goes uncorrected, a dike failure may occur causing ground water contamination.

- An area near the effluent structure shows signs of leakage. Leakage of this sort could cause structural damage and lead to a major leak and contamination.

- In 1993 all lagoons overflowed. Overflows cause ground water contamination and health risks.

The following deficiencies have been identified for the Sangrey wastewater system:

- High BOD in effluent. This indicates incomplete treatment of the wastewater.

- The IHS has identified the Sangrey lagoon system as needing repairs.

- The lift station prior to the lagoon fails 3 or more times each year. Failures cause system back-up and possible groundwater contamination.

- The lagoon is reported to be leaking and the lagoon is 1000' from a supply well. Untreated wastewater, leaking into the groundwater, can contaminate the water source and present a health risk.

- Two homes north of the upper approach road show evidence of sewage rising to the surface. Sewage on the surface can cause a serious health risk and odor problems.

The Azure lagoon system has the following identified deficiencies:

- Wind and wave action has caused erosion in lagoon No. 1.
- Lagoon No. 2 is unlined.
- Lagoon No. 2 leaks through the dike.
- Lagoon No. 1 discharges without a permit.

C. WASTEWATER NEEDS

The Reservation currently relies on individual septic systems or community lagoon systems to meet the wastewater treatment needs. Based on discussions with the Tribe, some of the existing facilities are only marginal for the current conditions.

As the population increases throughout the Reservation, improvements to the wastewater collection and treatment facilities will be needed. As the population increases in the rural areas, consideration should be given to developing a wastewater collection system and a central wastewater treatment facility. Adequate wastewater treatment is essential to the protection of existing ground and surface water resources.

VII. POLICY ISSUES

A. OWNERSHIP

In a system that presently serves only the primary service area, with the capability to serve areas in the secondary service area as acquired and placed in trust, ownership of the system is not complex. The system will be held in trust for the benefit of the Tribe. Likely, the Tribe will operate and maintain the system pursuant to a contract under the Indian Self Determination Act (Public Law 93-638).

If the potential regional system (discussed below) becomes a reality, the main ownership issue will revolve around the extent of federal ownership of the intake, water treatment facility and treated water transmission pipeline. The individual off-Reservation systems will continue to be owned by the organizations listed below. These individual organizations will be responsible for operation, maintenance and repair of their individual systems. However, the individual off-Reservation organizations may also seek an ownership interest in the intake, water treatment plant and transmission pipeline. Assuming shared ownership of the pipeline, the BOR may not be able to contract for 100% of the operation, maintenance, and repair (OM&R) on the shared components. This would prove to be cumbersome and awkward. For this reason, it may be desirable for the Tribe to have a 100% ownership interest in all shared components. This would allow one entity to be responsible for OM&R of shared components, while continuing to allow individual organizations to be responsible for OM&R on their individual system.

B. REGIONALIZATION

The possibility of incorporating the potential Rocky Boy's MR&I system with a north central Montana regional MR&I water supply system currently exists. There are a number of small rural water systems in the area that have the need for a dependable supply of high quality domestic water. The potential regional system would consist of a water intake and treatment plant at Tiber Reservoir, with a treated water transmission pipeline running east approximately 50 miles to the town of Box Elder. Existing and future water systems, serving individual

communities and rural areas, would branch off from the main trunk water transmission line or at the treatment plant. Potential project sponsors, at this time, include:

1. Rocky Boy Rural Water System;
2. Chester Water System;
3. Chinook Municipal System;
4. Devon Water Users Association;
5. Eagle Creek Colony;
6. Flat Coulee System;
7. Galata Water District;
8. Gildford Colony System;
9. Havre Municipal System;
10. Hay Coulee Water System;
11. Hill County Water District;
12. Hilldale Colony System;
13. Kevin Water System;
14. Loma Rural Water System;
15. North Havre County Water District;
16. Oilmont Water District;
17. Riverview Colony System;
18. Big Sandy Water System;
19. Sage Creek Colony System;
20. Sage Creek Water System;
21. Shelby Water System;
22. South Chester Water Users Association;
23. Sunburst Water System;
24. Sweet Grass Water System; and
25. Tiber County Water District.

The potential regional system would help address several problems common to many of the small community and rural systems listed above: lack of reliable groundwater and surface water

supplies; poor quality of available water; and high cost of individual system compliance with Environmental Protection Agency mandates. The feasibility of the north central Montana regional MR&I water supply system is currently being studied. The feasibility report is scheduled to be completed in 1996. The Tribe, state of Montana, BOR, Environmental Protection Agency and others are participating in the feasibility study.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The Tribe is faced with a young, rapidly growing population and a corresponding need for economic development, while in an area of water paucity. Current surface water availability is problematical given that most of the area streams are overappropriated. There are disputes over which rights are senior. Much of the groundwater within the Reservation is of low quality, inadequate quantity or has extremely high development costs.

The current water system on the Reservation is designed to deliver water at rates well below the average usage rates in the surrounding area, the state of Montana and the United States in general. Clearly, a dependable source of high quality water is needed to enable Tribal members and other Reservation residents to achieve an adequate standard of living and quality of life. An adequate supply of water is a cornerstone of economic development. The assurance of an adequate supply of municipal, rural and industrial water will enable the Tribe to pursue current and future economic development. In addition, current and future Reservation residents will enjoy a higher quality of life through improved health conditions, more employment opportunities, and an overall increased level of economic development.

IV. REFERENCES CITED

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13. Snow Dance Ski Association. 1993. Bearpaw Ski Area Management Plan.

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APPENDIX A & B

EXPLANATION

LOCATION:	Wells are listed in order of location (Township, Range, Section), with unlocated wells listed first. The letter code indicates location within section using Montana Bureau of Mines and Geology system.
MAJOR AQUIFER:	Kc=Claggett shale; Ke=Eagle River Formation; Kj=Judith River Formation; TFU=Fort Union Formation; Tw=Wasatch Formation; Ti=Tertiary igneous rocks (mainly volcanics); UNC=Unconsolidated (mainly alluvium).
WATER BEARING MATERIAL:	(Descriptions as reported on driller's logs): BRK RK=broken rock; CL=clay; GR=gravel; RK=rock; SA=sand; SI=silt; SH=shale; SS=sandstone; VOLC RK=volcanic rock.
AVAILABLE DATA:	Expressed as Y or N (for yes or no) for the following:
QUALITY ANALYSIS:	Chemical analysis or other quality analysis data
LOG:	Drillers' or lithologic log
PUMP TEST:	Pump test performed and time-drawdown data available.
SPECIFIC GRAVITY:	Yield of well in feet of drawdown per gallon/minute of pumping. NA=not available.
CASING DIAMETER:	Diameter is for smallest section.
COMPLETION INTERVAL:	The water bearing zone of the well.
OPEN END?:	Y or N for yes or no.

YIELD:	Flow available as claimed on drillers' logs, reports, water rights applications, or correspondence.
USE:	A=abandoned; D=domestic; I=irrigation; M=community (municipal); O=observation; S=stock.
DATA SOURCE:	B=Bureau of Indian Affairs (B-G=original data from Montana Bureau of Mines and Geology; B-U=original data from US Geological Survey); C=Chippewa Cree Tribe/Indian Health Service; G=Montana Bureau of Mines and Geology; M=Morrison Maierle, Inc. (1974); U=US Geological Survey; D=Driller/Owner.
NOTE:	"L" in data means less than the indicated value.

APPENDIX A

GROUNDWATER BASIC DATA

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	PUMP TEST DATA: SWL DEPTH (FT)	PUMP TEST DATA: RATE (GPM)	PUMP TEST DATA: PUMPING LEVEL (FT)	PUMP TEST DATA: DURATION (HR)	PUMP TEST DATA: SPECIFIC CAPACITY (GPM/FT)	CASING: DIAMETER (IN)	COMPLETION INTERVAL: DEPTH (FT)	COMPLETION INTERVAL: TOP DEPTH (FT)	COMPLETION INTERVAL: BOTTOM DEPTH (FT)	COMPLETION INTERVAL: OPEN END	YIELD (GPM)	USE
	137	UNC		74.0	10	82	0.5	1.3	6	137	?	?		10	
	43		BRK RK	30.0	3		3	NA	7.875	43	35	43			D
								NA							
	41		GR	14.0	20	27	2.5	1.5		417	33	39	Y		D
				15	15.6	24.9	2	1.6	6						D
	75			56	5	71.25	5 MIN	0.3	6	70	75	80	N		D
	146		VOLC RK	56.1	11	66.2	3	1.1	4.5	146					D
	60		RK	35.0	4	50	4	0.3	6	60	50	60	Y		D
	150		SS					NA							A
	200		SS	40.0		100	3	NA	6.625	200	87	145	Y	5	D
271225 C				40.0	6			NA	6	47.5					S
281301 DC		UNC		30.0				NA	8	102				5	D
281302 AD	60	UNC	SA	7.0	5	54	3	0.1	6	60	34	40	Y		D
281303 ABB	113	UNC	GR,SA	40.0	14	55	3	0.9	6	113	102	106	Y		S
281305 DD		UNC		7.3				NA	48						O
281310 AB		UNC						NA	6	187				30	D
281312 BC		UNC			10	50		NA	6	65				10	D
281312 CB	95	KJ	SH,SS	30.0	8	65	24	0.2	6	95	30	95			S
281313 DCD	205	UNC	GR	60.0	24	80	4	1.2	6.625	205	203	205	Y		S
281320 B		UNC		6.0				NA	3	12				10	S
281406 C	103	KJ	SH,SA	5.5	12	100	3	0.1	5.625	103	34	103	Y		
281420 ACC	120			70.0				NA	6	120				6	S
281420 DBB	167			98.0				NA	4.5	167				3	D/S
281420 DDD	174			140.0				NA	6	174				1	D
281421 CBC	222	TFU	SS,SH	152.0	2		4	NA	5	222	98	222			S
281421 CCB	154			85.0				NA	6	154				1.5	S/D
281423 DAA	145.5	TFU	SS	70.0	16	99	2	0.6	5.5	145.5	96	145	Y		S
281423 DCB	83.5	TFU	SS,GR	64.0	18	77	0.5	1.4	5.563	83.5	64	78	Y	19	S
281516 C	60							NA							A
281517 CAA	102	TI	VOLC RK	0.0	10	0		NA	5.5	100	21	97		10	D
281518 AAA	117	TI	VOLC RK	0.0				NA	6	96	95?	117?		15	C
281520 AB	40	UNC	GR	12.0	20	30	3.5	1.1	6	36	30	35	Y		D
281520 AB	60							NA							A
281525 DDC	100	TI	VOLC RK	15.0	8	55	2	0.2	6.75	46	40	45	Y		D
281528 BAA	101	TI		0.0	15	0		NA	6	94			Y	15	M
281623 B	100							NA						3.5	
291201 A		KE		187.0				NA	4	864				50	D
291301 AB								NA							
291301 AB								NA							
291301 AB	20	UNC	GR	10.0	4	12	0.25	2.0	6	20	18	18		13	
291303 CAA	201	UNC	GR	8.0	15	25	3	0.9	7	201	199	201	Y		S
291305 AA	113	UNC	GR,SA	8.0	15	25	2	0.9	7	113	108	113			S
291305 BBB	152	KJ		60.0				NA	6	152				5	D/S/I
291311 BB		UNC		12.0				NA	60					30	D
291314 AC	50	UNC						NA	6					3	D,S
291316 CD	137	KC	GR	15.0	24	40	1	1.0			134	137			D/S
291320	33							NA						DRY	A
291320 BCA	100	UNC	GR,SA	21.0	6	90	3	0.1	6	100	97	100			D
291321 A		UNC			10	131		NA	5.5	131					D
291321 AA	188.5	KC	SA,GR	16.0				NA	6.625	188.5	169	183			S/I
291321 AA1	30	UNC		24.1				NA	48						D,S,I
291321 AA2	210	UNC	GR,CL,SH	16.4				NA	2	167?					A
291321 DD	26.6	UNC		24.5				NA	48						D,S
291322 AB1	48.8	UNC		32.1				NA	48						O
291322 AB2	248	UNC	SA,GR	60.0				NA	5.5						D,S,I
291322 CCB		UNC			400	202		NA	6	202				400	
291322 D		UNC		114.0				NA	8	204				450	I
291326 BB	30.2	UNC						NA	36					DRY	A
291327 DC	235	UNC		40.0				NA						50	
291332 BCA	46	UNC	GR	32.0	20	32	2	ND	6.75	46	44	46	Y		S
291332 CA		UNC			20	40		NA		40				20	D
291334 BB		UNC		25.0				NA	4	237				200	
291335 BAD	30	UNC	GR	12.0	35	1	25	NA	6	29	23	28	Y		D
291335 CAC	38	UNC	GR	14.0	6	27	1	0.5	6	28	22	27	Y		D
291401 AA	111	UNC	GR	35.0	10		1	NA	7.875	111	101	111			D
291401 ABB	156	KJ	RK	60.0	20	60	1	ND	6.625	128	155	156	Y		D
291401 ABC	114	UNC	GR	70.0	17	5.1	2	NA	6	109	109	114	N		D
291401 BA	100	UNC	GR					NA	7.875		?	?			D
291401 BCA	110							NA							A
291401 BCA	129	UNC	ASH	76.0	6	110	1	0.2	6	129	128	128			
291401 BCA	120							NA							A
291401 BCA	167							NA							A
291401 BDD	32			11.0				NA	6						D
291401 CDD	28	UNC	ASH	16.0	8	21	0.25	1.6	6		26	28			D

Information from Reconnaissance Ground Water Study (HKM Associates, 1990).

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A -- GROUNDWATER BASIC DATA

LOCATION	WELL DEPTH -FT-	MAJOR AQUIFER	WATER BEARING MATERIAL	PUMP TEST DATA: SWL DEPTH (FT)	PUMP TEST DATA: RATE (GPM)	PUMP TEST DATA: PUMPING LEVEL (FT)	PUMP TEST DATA: DURATION (HR)	PUMP TEST DATA: SPECIFIC CAPACITY (GPM/FT)	CASING: DIAMETER (IN)	COMPLETION INTERVAL: DEPTH (FT)	COMPLETION INTERVAL: TOP DEPTH (FT)	COMPLETION INTERVAL: BOTTOM DEPTH (FT)	COMPLETION INTERVAL: OPEN END	YIELD (GPM)	U
291401 CDD	34	UNC	GR,SA	11.0	12	23	3.5	1.0	6	34	26	?			
291402 AA	108	UNC	SA	30.0	10	95	3	0.2	6.625	101	95	100			
291402 AB	115							NA							
291402 BB	41	KJ	SS	8.0	2.5	36		0.1	6						A
291402 BB	36	UNC	GR	11.0	6	15.5	0.33	1.3	6	23	18	18		2.5	
291402 BB	65	UNC	GR,SA	16.0	10	17	1	10.0	6.625	58	55	58			
291402 BBD	60							NA							
291402 BBD	100							NA							
291402 BDA	65	KJ	SS,CL	8.0	3.5	53	4	0.1	6	56	50	55	Y		A
291403 ACA	60							NA							D
291403 ACA	140							NA							
291403 ACD	23	KJ	RK,SS	5.0	12	10	5	2.4	6.625	20	20	23	Y		
291403 BBA	46							NA							U
291403 BBA	47							NA							A
291403 BBA	65	UNC	GR	18.0	6	58	2	0.2	6.625	40	40	43	Y		A
291404	28	UNC	GR	17.7	7	19.6	0.66	3.7	6	28	27	28		7	
291404	40	UNC	GR,SA	15.0	20	20	2	4.0	6.625	34	29	33			U
291404	46	UNC	GR	22.4	10	29.2	0.5	1.5	6	46	41	41		18	
291404 AA								NA	6						
291404 AAB	30	UNC	GR		30		2	NA	6	21.5	20.5	25.5	N		
291404 AB	40	UNC						NA						6	
291404 AB	113	KJ	SS					NA	5.625	113	90	113			D
291404 B	75							NA						20	D
291404 BB	34	UNC						NA						20	
291404 DDA	150							NA	6						
291405 AAA	160			8.0	3.5	160	1	0.0	7	160					
291405 AAA	20	UNC	GR	7.0	10	17	2	1.0	7	19	13	19	Y		D
291405 AC	70							NA							A
291405 AC	94							NA							
291405 AC	102	UNC	SA	20.5	5	23.5	0.5	1.7	6	51	46	46		6	
291405 AC		UNC	GR	15.0				NA	7.875	22	?	?			
291405 BAC	100							NA							A
291405 BB	76							NA							A
291405 BB	19	UNC	ASH	8.0				NA		19	19	19			
291405 BB	19			14.0	8	18	0.33	2.0	6		?	?			
291405 BB								NA							
291405 BB	24	UNC	GR	11.7	11	12.5	0.25	13.8	6	24	19	19		20	
291405 BCA	17	UNC	GR	6.8	15.6	3.7	2	NA	6	12	12	17	N		D
291405 BCA	80							NA	6	40				DRY	
291405 CBD	57	KJ	VOLC RK	20.0	4	45	4	0.2	6	52	43	50	Y		
291405 DAC	120	UNC	CL		7	100	4	NA	6	100	93	98	Y		
291406 AA	19	UNC						NA						8	D
291406 AB	30	UNC	GR	9.0	10	10	0.25	10.0	6	25	19	19		14	
291406 ADA	51	UNC	GR	19.0	15	20	35	15.0	7	51	48	51	Y		
291406 BA	42	UNC	SA,GR	18.0	5	30	3.5	0.4	6	42	37	42	Y		
291406 BA	65	UNC	GR	8.0	20	15	2	2.9	6.625	65	58	62			
291406 BAB	52	UNC	GR	10.0	15	15	1	3.0	6.625	52	47	52			D
291406 BB	24	UNC						NA						20	D
291406 BBD	56	KJ	RK	15.0	9	23.5	2.1	1.1	6	52	52	56		15	
291406 BC								NA							
291406 BC								NA							
291406 BC	20	UNC	GR	13.0	5	14	0.25	5.0	6	20	17	17		8	
291406 BC	130	KJ	SS					NA	7.875	130	110	130			D
291406 BC8	44	UNC	SA,GR	8.5	4	14	0.33	0.7	6	19.5	15	15			
291406 BC8	115	KJ	SH,SS	17.0	5	40	1	0.2	6.625	105	100	105	Y		
291407								NA							
291407								NA							
291407 BCC?	160	UNC	SA	10.0	7	140	2	0.1	6	160	120	160	Y		S
291407 BD?	179	KJ	SS	119.0	26	124	2	5.2	6.625	145	146	170	Y	30	
291409 CAA	51							NA							
291409 CAA	120	UNC	GR	75.0	5	115	2	0.1	6.625	120	118	120	Y		D
291409 CAA	160	UNC	GR	75.0	5	140	5	0.1	6.625	148	136	147			D
291409 CAA	41	UNC	GR	25.0	10	35	3	1.0	7	40	35	39			
291409 CAD	150	UNC	CL	14.0	8	80	2	0.1	6.625	136	131	136			
291413	150							NA							
291413	160							NA							A
291413	100	TW	RK	12.0		80	4	NA	7.875	100	90	100	Y		D
291417 AB	100			30.0				NA	6						
291417 ABD	26			22.0				NA	30						S
291417 ADC	41	KJ	VOLC RK	15.0	6	27	1	0.5	6.875	34	28	33	Y		
291419	80							NA						DRY	A
291419	96	UNC	SA,GR	12.0	6	19	6	0.9	6	33	27	33	Y		D
291419 AC	101		RK,SA,GR					NA	6	101	90	101	Y		
291419 CB								NA							

Information from Reconnaissance Ground Water Study (HKM Associates, 1990).

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

LOCATION	WELL DEPTH -FT-	MAJOR AQUIFER	WATER BEARING MATERIAL	PUMP TEST DATA: SWL DEPTH (FT)	PUMP TEST DATA: PUMPING RATE (GPM)	PUMP TEST DATA: PUMPING LEVEL (FT)	PUMP TEST DATA: DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	CASING: DIAMETER (IN)	CASING: DEPTH (FT)	COMPLETION INTERVAL: TOP DEPTH (FT)	COMPLETION INTERVAL: BOTTOM DEPTH (FT)	COMPLETION INTERVAL: OPEN END	YIELD (GPM)	USE
291420	26		BRK RK	12.0	60		1	NA	7.875	26	23	26			D
291420 DB								NA							
291420 DD	100							NA							
291423 AAC?	55	UNC	GR	10.0	12	45	4	0.3	6	55	40	55?	Y		A
291423 AC	66							NA							D
291423 AC	66	UNC	GR,CL	10.5	6	14	0.75	1.7	6		15	15			A
291423 AC	75	TW	RK	12.0	10	22	2	1.0	6.625	71	70	75?	Y		D
291423 BD								NA							
291423 CB	105	TW	CL,RK	25.0	1.5			NA	6.625?	99	95	99			D
291423 CB	47							NA							A
291424	90							NA							A
291424 ABA	120							NA						DRY	A
291424 ACA	150							NA							A
291424 BC	171	TW	RK	15.0	20	36	2	1.0	6	123	122	171	Y		A
291424 DBC	158	TI	RK	87.0	11	135	2	0.2	6	153	153	158	N		D
291424 DDD	140							NA							D
291425 CDC	120	TI	RK	18.0	15	35	4	0.9	6	120	110?	120?	Y		A
291425 DA	63							NA							D
291425 DA	36	TW	CL,RK	8.0	5	25	4	0.3	6.625	36	30	35			A
291427 CDB	150	UNC	GR,SA	12.0	30	42	3	1.0	6						D
291429 BB								NA							D
291429 CCA	70							NA							D
291429 DD	12							NA	36						D
291429 DD	16			6.0				NA	36						
291429 DDD	150	TFU	SS	130				NA	4	150	145	150		10	S
291501 AB	200							NA							A
291501 AB	202	TI	SS	170.0		170	1	NA	6.875?	202	170?	220?			D
291502	65							NA						3.5	D
291503	72		VOLC RK	40.0	5	65	1	0.2	7.875	72	64	72			D
291503 ABB	110	UNC	GR,SA	20.0	15	50	6	0.5	7	105	96	101	Y		D
291503 ABB	200							NA							A
291503 CA	72							NA						5	D
291503 CB	240	TI	VOLC RK	60.0	8	200	1	0.1	7.875	116	224?	240?	Y		D
291503 CBC	215	TI	RK	45.0	6	96	2	0.1	6.625	108	213	215	Y		D
291503 CD	10							NA						DRY	
291503 CD	31							NA						DRY	
291504	34							NA						DRY	A
291504	36	UNC		23.3	10	28.8	0.3	1.8	6	36				6	
291504	81	TI	BRK RK	10.0	10	15	6	2.0	6.833	81	75	81	Y		D
291504 BAD	130	UNC	CL		40	78	1	NA	7.5	97	88	96	Y		D
291504 BB	180	TI	VOLC RK	40.0		85		NA	5.875	95	95	?			D
291504 BBA	135							NA							A
291504 CAA	57		RK	12.0	5.5	40	3.5	0.2	6.625	57	45?	50?			D
291504 CBB	91	TI	SH	15.0	10	32	0.66	0.6	6	86					
291504 DA	84	TI	VOLC RK	31.0	6	60	1	0.2	7.875	84	72	82			D
291504 DAA	47	UNC	ASH	35.0	5	39	0.33	1.3	6.625	47	44	47?			
291504 DAA	153	UNC	CL,GR	30.0	6	80	6	0.1	6.625	138	130	136			D
291504 DAA	132	TI	RK,SH	75.0	7	110	2	0.2	6.625	132	128	132			D
291504 DDA	150							NA							A
291505	56							NA							A
291505	27							NA							A
291505	70	UNC	GR	30.0	10	60	1	0.3	7.875	70	60	70			D
291505	40	UNC	GR	15.0	12	30	3	0.8	6	14	34	39	Y		D
291505 AA	52	TI	SA,CL,RK	0.0	15		2	NA	6.625	52	26	52			D
291505 ADA	135				8	120		NA							
291505 DAA	100	TI	RK					NA	6	39	20?	41?			D
291506	47		GR	-1.3	11	-0.25	0.2	11.0	6	47				5	
291506	46							NA							A
291506								NA							
291506 BB								NA							
291506 BB	123	KJ	RK	55.0		90	1	NA	7.875	123	118	123			D
291506 BCC	142		RK	20.0	6	68	36	0.1	7	92	86	90	Y		D
291506 BCC	93							NA							A
291506 BDC	100							NA							A
291506 BDD	135	TI	SA	85.0	8	120	4	0.2	6.625	135	125	135			D
291506 CAB	36.5	KJ	RK	26.7	5	33.7	2	0.7	6	32.5	31.5	36.5	N	20	D
291506 CBB	73							NA							A
291506 CBB	72							NA							A
291506 CC	39	UNC	ASH,CL	32.0	9	33	0.33	9.0	6	39					
291506 CC	59	UNC	CL	25.0	18	29	5	4.5	6.625	55	47	55			D
291506 CCA	60							NA							A
291506 DC								NA							
291507 AAC	89			67.0	11.5	81.4	2	0.8	6	84	84	89	N		D

Information from Reconnaissance Ground Water Study (HKM Associates, 1990).

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

				PUMP TEST DATA					CASING	COMPLETION INTERVAL				
LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	SWL DEPTH (FT)	RATE (GPM)	PUMPING LEVEL (FT)	DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	DIAMETER (IN)	DEPTH (FT)	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	OPEN END	YIELD (GPM)
291507 ACA	100							NA						DRY
291507 ACD	40	KJ	RK	26.0	10	28.2	1.9	4.5	6	38.5	38.5	40	Y	30
291507 ADD	161							NA						
291507 ADD	41	UNC	SA,GR	12.0	20	30	3	1.1	6.625	41	35	41	Y	
291507 CAB	160							NA						
291507 CAB	71	UNC	GR	40.0	12			NA	7	71	65	70	Y	
291507 DA	72							NA						
291507 DA	31	UNC	ASH	20.0	10	26	0.6	1.7	6	31	29?	31?		8
291507 DB	48	UNC	ASH	13.0	10	18	0.33	2.0	6	48	47	47		20
291507 DD	61		GR,RK	40.0	15	36	6	NA	7.875	61	52	61	Y	
291508	33							NA						DRY
291508 C	39	TI	RK	26.0	6	30	0.25	1.5	6.625	39	37	37		6
291508 CAC	68	KJ	RK	18.0	25	40	3	1.1	6		53	55?	Y	
291508 CC	38							NA						
291508 CC	38			13.0	10	23	0.4	1.0	6	38				
291508 CC	70							NA	6					
291508 CC	54							NA						
291508 CC	54	TI	RK	26.0	30	49		1.3	8	49				
291508 CC	62		VOLC RK,CL	18.0	20	40	4	0.9	8.625	35	35	42		
291508 CDB	47		ASH,CL	36.0	6	43	0.75	0.9	6.625	47				
291508 CDB	201	KJ	SS	50.0	12	60	1	1.2	5.5	201	180	201		
291508 DD	75		GR	9.0	5	17	0.75	0.6	6.625		75	75		
291510 AB	76		SA,CL	40.0	10	60	4	0.5	6.625	76	70	75		
291510 AB	87			20.0	3	50	0.8	0.1	4					
291510 AB								NA						
291510 AB	73		CL	10.0	10	12	2	5.0	6.625	68	63	68		
291510 AB	80	TI	VOLC RK					NA	7.875					
291510 BA	135	TI	RK	25.0	10	60	1	0.3	7.875	135	130	135		
291510 BD	47			18.0	2	35	1	0.1						5
291510 BD	51	TI	ASH		10			NA	6	51				10
291510 BD	48							NA						
291510 BD	143		CL,RK	45.0	15	47	2	7.5	6	143	132	138		
291510 BD	48							NA						
291510 BD	32							NA						
291510 CA	81		GR,SA,SS		4.5			NA	10	81	76	78		
291510 DDC	100	TI	CL,RK	9.0	12	48	40	0.3	7.5	73	65	72	Y	
291511 AA	74		ASH,RK,CL	20.0	4	35	1	0.3	4	74	69	74		
291511 AA	18	UNC	ASH					NA		18	16	17		4
291511 AA	60	UNC	ASH	0.0	3	14.5	1	NA	4	60	55	58		
291511 AA	76	UNC	ASH					NA		76	73	76		40
291511 AA	56	TI	RK	40.0	10	42	4	5.0	6.625	52	45	51		
291511 AB	60	UNC	ASH	0.0	3	14.5	1	NA	4	60	55	60		3.5
291511 AB	18	UNC	ASH	13.0	7	14	0.8	7.0	4	18	13	18		10
291511 ADA	60	TI	ASH					NA	4	60	55	58		3.5
291511 ADA	95	TI	RK,ASH		6	50	2	NA	5.875	95	79	95	Y	
291511 BB	100							NA						
291511 BB	118	TI	RK	25.0	10	60	1	0.3	7.875	118	108	118		
291511 C	57	TI	RK	12.0	5.5	40	3.5	0.2	6	57	18?	45?	Y	5.5
291511 CBA	70	TI	RK	21.0	2.5	68	3.5	0.1	6	70	60	70	Y	
291511 CBA	90	TI	RK	18.0	7	65	3	0.1	6	85	78	84	Y	
291512 ACC	57	TI	VOLC RK,CL	19.0	8	45	2	0.3	7.5	56	50	55	Y	
291512 BCB	79	TI	GR	10.0	20	13	2	6.7	6.625	49	43	48		
291512 BCC	65	TI	CL,RK,SS		4		6?	NA	6.25	57	48	56	Y	
291512 BD								NA						
291512 BD	76	UNC	ASH,CL	18.0	7	18	1	ND	4	76	71	76		
291512 BD	56	TI	RK	20.0	15	27	5	2.1	6.625	56	52	56		
291512 BD								NA						
291512 CAA	80	UNC	GR,SA	7.0	80	20	3	6.2	6.75	80	75	80	Y	
291512 CAD	46	TI	RK,CL	4.0	20	35	2	0.6	6.625	47	44	47		
291512 CBB	47	TI	SA	20.0	15	23	3	5.0	16	47	38	45		
291512 CCB	75	TI	RK	0.0	10	6	2	NA	6.625	51	49	51		
291512 CCD	98				2	95	2	NA	6	98				
291512 DAB	57	TI	VOLC RK	19.0	8	45	2	0.3	7.5	56	51	57	Y	
291512 DC	45	UNC	ASH	16.0	5	17	0.9	5.0	10	42	21	26	Y	15
291512 DC	36	UNC	ASH,GR	11.0	5	29	0.75	0.3	6	36	32	36		7
291512 DDB	50	TI	RK,CL	15.0	20	20	10	4.0	16	50	43	49		
291513	92							NA						
291513 BC	29							NA	4					1
291513 BC	25							NA						
291513 BC	22	UNC	ASH					NA	4					1
291513 BC	32							NA						
291513 CB	11							NA						
291513 CB	28							NA						
291513 CB	42							NA						

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

					PUMP TEST DATA				CASING	COMPLETION INTERVAL				
LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	SWL DEPTH (FT)	RATE (GPM)	PUMPING LEVEL (FT)	DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	DIAMETER (IN)	DEPTH (FT)	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	OPEN END	YIELD (GPM)	USE
291513 CB	55	TI	GR	12.0	20	28	2	1.3	6	28	22	28			D
291513 CBC	41	TI	RK					NA	6	36	36	41	N		D
291513 DC	29	TI	RK	11.0	3	19	1	0.4	4	30	25	30			D
291514	98							NA						DRY	A
291514	110		SH,CL					NA						4	A
291514	180	TI	SH	21.0	49	64	4	1.1	6	79	72	78	Y	1.5	D
291514 AD	64	TI	ASH	28.0	5	32	1.75	1.3	4	64	59	63		11	D
291514 CAB	140	TI	RK	22.0	10	30	1	1.3	6.625	34	30	140	Y		D
291514 CBD	97							NA							A
291514 CC	80	TI	RK	3.0		60	4	NA	5.625	80	55	76	Y		D
291514 CC				6.0	9	6.5	1	18.0							
291514 CC	59	TI	ASH	6.5	32	25.9	3	1.6	4	59	55	58		50	D
291514 CDB	41	TI	RK	26.9	17	34	2	2.4	6	36	36	41	N		D
291514 DAB	35	UNC	SA,CL	15.0	12	15	2	ND	16	35	26	35			D
291514 DB	40							NA							A
291514 DB	30							NA							A
291514 DB	51	TI	ASH,CL	15.0	5	32	0.8	0.3	4	51	44	49		10	D
291515	27							NA							A
291515 ADD	80	UNC	GR,CL,SA	17.0	30	60	3	0.7	6	80	69	75			A?
291516	100							NA							A
291516 CAD	60	TFU	RK,SS	15.0	17	25	3	1.7	6.625	38	26	38	Y		D
291516 CC	50							NA							A
291516 CC	52							NA							A
291516 CC	47							NA							A
291516 CC	76	TI	RK,CL	6.0	10	10	1	2.5	?	76	64	76			D
291516 CDA	123	UNC	GR,VOLC SA	54.0	9	119	2.5	0.1	6.625	123	121	123	Y		SHOI
291517	62			25.0				NA	6	61				8	
291517								NA							
291517 AD	53	TI	RK,CL	0.0	10	8	0.25	NA	6.625	52	52?	53?		10	
291517 ADC	153	TI	RK	67.5	11	72.8	3	2.1	6	75	80	147	Y		D
291517 ADC	28	UNC	GR	22.0	5	25	0.33	1.7	6.625	28	24?	28?		6	
291517 ADC	150	TI	RK	64.0	11	77.8	3	0.8	6	80	80	147	Y		D
291517 B	75	KJ	RK	30.0	10	60	1	0.3	7.875	75	73	75			D
291517 BB	201							NA						12	D
291517 BDD	220							NA						DRY	A
291517 CC	141.5		1 SS	63.7	17	88.1	3	0.7	6	142	130	142	N		D
291517 CD	140	TI	RK	20.0	10	60	5	0.3	5.5	60	60	140	Y		D
291517 D	40							NA						20	D
291517 DA	35		CL,RK	10.0	10	25	1	0.7	6	33	23	33			D
291517 DBB	170	TW	SS		1	170	1	NA	6.625	74	105	115	Y		D
291517 DBB	84	TW	RK	30.0		80	10	NA	6.625	83	27	83	Y		D
291518 CA								NA							
291518 DAD	100	TW						NA							
291519 AA	131.5	TW	SS	91.5				NA	6	116.5	116.5	131.5	N	15	D
291519 AAA	150							NA							A
291519 AAA	80	UNC	CL,GR,SA	55.0	9	23	1	NA	6.625	75	66	74	Y		D
291519 AAA	160							NA							
291519 BBD	80							NA							A
291519 BBD	120							NA							A
291520	120		BRK RK	30.0	8?	100	4	NA	7.875	120	81	101			D
291521	160							NA						0	A
291521	100	TI	VOLC RK	30.0	10	60	1	0.3	7.875	70	70	100	Y		D
291521	38	UNC	ASH	11.8	10	14.6	0.33	3.6	6.625	38	37	38		20	
291521	103	TI	RK	12.0	60	68?	4	NA	8	79	100	103	Y		M
291521	103	TI	RK,CL	12.0	60	68	4	1.1	8	103	72	78	Y		M
291521	100		CL,ASH	(–1)	7		1	NA	4	100				ARTESIAN	D
291521 AAA	100	TI	VOLC RK	10.0	3.5	45	2	0.1	6	39	20?	100?			D
291521 ABC	30	UNC	SA,GR,CL	12.0	5	16	1.1	1.3	12	30	20	25		6	
291521 ABC	180							NA							A
291521 ABC	100	TI	RK	30.0	8	70	17	0.2	7	100	60	100	Y		D
291521 ACB	126	TI	GR	31.0	10	34	2	3.3	6.625	94	81	84			D
291521 ACD	104	UNC	GR	43.0	10	20	2	NA	7	104	92	104	Y		D
291521 C	84	UNC	ASH,GR	34.0	3	53	2	0.2	4.5	84	79	83		4	
291521 C	114	UNC	CL	21.0	10	50	2.1	0.3	4.5	111	101	106		12	
291521 C	91							NA							A
291521 C	150				1	50	1	NA							A
291521 CA	46							NA							A
291521 CA	92	UNC	ASH	29.0	4	86	4.2	0.1	6.625	90				12.5	
291521 CAC	100	TI	RK	42.0	5	87	8	0.1	7.875	78	61	77			D
291521 CB	38							NA	6						
291521 CB								NA							
291521 CC	85	UNC	SA,SI		3		9	NA	4.5	84	70	75			
291521 CC	30	UNC	CL,ASH,GR	14.0	7.5	19	0.15	1.5	4.5	30	18	25			
291521 CC	85	UNC	ASH	30.0	5	68	1.5	0.1	6	85	80	85			

ROCKY BOY'S MR&I NEEDS ASSESSMENT
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LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	PUMP TEST DATA: SWL DEPTH (FT)	PUMP TEST DATA: RATE (GPM)	PUMP TEST DATA: PUMPING LEVEL (FT)	PUMP TEST DATA: DURATION (HR)	PUMP TEST DATA: SPECIFIC CAPACITY (GPM/FT)	CASING: DIAMETER (IN)	COMPLETION INTERVAL: DEPTH (FT)	COMPLETION INTERVAL: TOP DEPTH (FT)	COMPLETION INTERVAL: BOTTOM DEPTH (FT)	COMPLETION INTERVAL: OPEN END	YIELD (GPM)	
291521 CCD	38	TI	RK	12.0	20	30	1	1.1	7	35	31	35	Y		
291521 CD	150							NA							
291521 CD	110	TI	VOLC RK	10.0	10	25	1	0.7	7.875	80	80	110	Y		D
291521 DA	120	UNC	VOLC GR,SA	15.0	40	61	5	0.9	6.625	114	114	120			SCH
291521 DB	46	UNC	GR	16.0	10	35	2	0.5	6.625	46	41	45	Y		
291521 DB	67	TI	VOLC RK	25.0	10	50	1	0.4	7.875	67	60	67			
291521 DBA	73	UNC	GR,VOLC SA	6.0	50	72	3.5	0.8	5.563	73	67	73			
291521 DC	90							NA	6					50	
291521 DC								NA							
291521 DC								NA							
291521 DC								NA							
291521 DC								NA							
291522 AA	90	UNC	GR,SA	10.0	10	20	2	1.0	6.625	85	80	85			D
291522 AB	84	TI	VOLC RK	31.0	6		1	NA	7.875	84	72	84			D
291522 AB	65	TI	VOLC RK	20.0	10	45	1	0.4	7.875	65	55	65			
291522 BBD	75	TI	RK	50.2	8	70.6	2	0.4	6	70	70	75	N		
291522 C	31	UNC	GR	14.0	10	14	0.33	ND	6	20	19	19			
291522 C	97	TI	RK	25.0	10	60	3	0.3	7.875	97	95	97			D
291522 C	90	TI	RK	30.0	10	56	1	0.4	7.875	90	88	90			
291522 C	35	UNC	GR	17.0	12	19	2.3	6.0	4.5	35	17	22		8	
291522 C	35			17.0	13	21	2.1	3.3	12	35	26	31			
291522 C	25	UNC	SA,GR	7.0	4	14	35	0.6	4.5	25	12	20		8	
291522 C	25			7.0	5	9	2	2.5	12	25	11	19		8	
291522 CAD	96	TI	RK	46.0	8	83.9	2	0.2	6	91	91	96	N		
291522 CAD								NA							
291522 CBA	74	UNC	GR	30.0	10	35	1.75	2.0	4	74	69	74		15	
291522 CBA	80	TI	RK	12.0	6	56	12.5	0.1	7	58	48	58	Y		D
291522 DAB	95	TI	RK	10.0	15	15	3	3.0	6.625	83	83	95	Y		D
291522 DAB	96	TI	ASH					NA	4	96	89	94	Y	15	
291522 DCD	40		RK	20.0	8	34	1	0.6	7	35	23	35	Y		
291522 DCD	97	TI	RK	35.0	10		10	NA	7	88	68	88	Y		
291522 DD	51	UNC	GR,ASH	10.0	5	35	1.5	0.2	6	37	35	35		10	
291522 DD	90	TI	SH,RK,SS					NA		67	30	67			D
291522 DDD	83	TI	RK	59.0	14.2	69.1	2	1.4	6	78	78	83	N		
291523 AC	100							NA						20	
291523 AC	70	UNC	ASH	16.0	7	21	2	1.4	4	70	65	70		30	
291523 AD	50	TI	RK,CL	5.0	20	10	2	4.0	6.625	47	44	47			D
291523 AD	47	UNC	GR,CL	7.0	4	28	2	0.2	4	47	40	45			D
291523 BC	73	UNC	GR	–1.0	12	32	1.1	0.4	4	73	70	75?		30	
291523 BC	65	TI	ASH,CL	14.0	2.5	48	18	0.1	4		60	65?		4	
291523 BC	140	TI	VOLC RK	10.0	5	120	1	0.0	7.875	82	78	140	Y		L
291523 BC	72	UNC	ASH	8.0	8	18	4	0.8	4	72	68	72			D
291523 CB	27	TI	RK	20.0	12	27	1	1.7	7	27	20	27	Y		D
291523 CBB	70	TI	RK	3.0	30	60	3	0.5	7	70	58	70	Y		
291523 CD	50	TI	RK	5.0	20	10	2	4.0	6.625	40	40	50	Y		
291524								NA							
291524 AC	29	TI	VOLC RK	10.0	5	19	1	0.6	4	29	24	29			D
291524 AC	110	TI	RK	1.0		8	1	NA	7.875	110	95	110			D
291524 AD								NA							
291524 AD	40							NA	6						
291524 ADA	32							NA							
291524 ADA	20	UNC	ASH	7.0	9	7	1	ND	4	20	15	20		10	A
291524 ADD	55							NA	6						D
291524 BB	100	TI	RK	10.0	20	20	2	2.0	6.625	89	89	100	Y		
291524 BC	20	UNC	ASH	9.0	9	10	1	9.0	4	20	15	20			
291524 BC	26	UNC	ASH					NA	4	26	22	26			
291524 BC	32							NA							D
291524 BC	20	UNC	ASH	7.0	9	7	1	ND	4	20	15	20		10	A
291524 BC	25	UNC	CL	7.0	5	10	0.5	1.7	6	20	15	15		6	D
291524 CA	48	TI	RK	19.0	6	19	1	ND	4	48	43	48		10	D
291524 CAB	51	TI	RK	31.0	15	35	1	3.8	7.875	51	46	51			D
291524 CAB	25		RK,CL	11.0	12	22	5	1.1	6.625	25	19	24	Y		D
291524 CC	50	TI	VOLC RK,CL	12.0	10	20	22.5	1.3	6.625	47	25	33			D
291524 CC	67	TI	RK	25.0	10	50	1	0.4	7.875	67	60	67			D
291524 DAB	30	UNC	GR	12.7	12	16.1	2	3.5	6	25	25	30	N		D
291524 DAB	150							NA	6	40				DRY	A
291524 DB	25	TI	ASH,RK	15.0	3.5	20	1	0.7	4	25	21	25			D
291524 DB	33			5.0	5	8	0.33	1.7	6	33				10	
291524 DB	61	TI	RK					NA	4	61	23	61			D
291524 DC								NA				?			?
291524 DC	7							NA							A
291524 DC	23							NA							A
291525	56	TI	RK	31.0	10	50	1	0.5	7.875	56	50	56			D
291525 AAA	73		RK	19.0	25	40	3	1.2	6	56	50	56	Y		D

Information from Reconnaissance Ground Water Study (HKM Associates, 1990).

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

				PUMP TEST DATA					CASING	COMPLETION INTERVAL					
LOCATION	WELL DEPTH -FT-	MAJOR AQUIFER	WATER BEARING MATERIAL	SWL DEPTH (FT)	RATE (GPM)	PUMPING LEVEL (FT)	DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	DIAMETER (IN)	DEPTH (FT)	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	OPEN END	YIELD (GPM)	USE
291525 AD	30	TI	RK	9.0	10	10	1	10.0	6.625	24	19	24			D
291525 AD	100	TI	RK	15.0	10	51	2	0.3	7.875	100	83	94			D
291525 BA	100			17.0	12	27		1.2	4						
291525 BA	100							NA	6						
291525 BA	35		RK	21.0	26	28	4	3.7	7	34	27	33	Y		C
291525 DAA	30	UNC	SA,GR	4.0	20	15	2	1.8	16	29	19	26			D
291525 DCB	100	TI	VOLC RK	15.0	8	55	2	0.2	6.75	46	40	45	Y		D
291526 BB	50	TI	RK	13.0	3	35	2	0.1	6.625	38	20	25			D
291526 BB	25	TI	RK	8.0	8	14	0.5	1.3	6	25	16	24		8	
291526 BB	40	TI	RK	23.0	10	25	1	5.0	5.625	40	34	40			D
291526 BCD	40	TFU	RK	5.0	4	30	11	0.2	7	37	26	37	Y		D
291526 CB	40							NA							A
291526 CB	40							NA							A
291526 CBC	50	TFU	VOLC RK	4.0	7	35	10	0.2	7.25	40	38	42	Y		D
291526 CDA	150							NA							A
291526 CDA	100							NA							A
291527 AA	27	TI	RK	12.0	8.5	20	1.1	1.1	4.5	27	22	27	Y	7	
291527 AA	50	UNC	ASH	12.0	10	26	1	0.7	7.875	44	22	32			D
291527 AA	63	UNC	GR,CL	12.0	12	21	1.5	1.3	4.5	63	57	63		15	
291527 DD	65							NA							A
291527 DD	46		GR,CL,RK	23.0	7.5	36	1.33	0.6	4.5	46	30	46		15	
291528 AB	67	TI	RK	8.0	20	13	4.5	4.0	6.625	65	60	65			D
291528 AB	70	TI	VOLC RK	20.0	5	50	1	0.2	7.875	70	50	70			D
291528 BA	100		VOLC RK					NA							A
291528 BA	150		VOLC RK					NA						0	A
291528 BA	160		VOLC RK	15.0	10	90	1	0.1	7.875	83	83	160	Y	0	A
291528 BB	107	UNC	SA,GR	5.0	5	41	3	0.1	4.5	107	97?	107?			D
291528 BB	80	UNC	GR	40.0	10	50	1	1.0	7.875	80	74	80		7	
291528 BBB	110	TI	RK	34.0	10	40	2	1.7	6.625	65	64	110	Y		D
291528 CAC	57	TI	RK	18.2	5	29.8	2	0.4	6	51.5	51.5	56.5	N	10	D
291528 CCB	57	UNC	GR,CL	12.0	12	25	1	0.9	4	33	23	28			D
291529 DA	22	TI	GR,ASH	9.0	13	10.5	1	8.7	4	22	17	22		15	
291529 DA	35	TI	RK	12.0	15	24	4	1.3	6	35	25	35	Y		D
291529 DA	24							NA							A
291530	100	TI	VOLC RK	30.0	8	55	1	0.3	6.625	72	70	100	Y		D
291530 BCC	53	UNC	ASH,CL	11.0	8	20	0.5	0.9	10	33	20	25		8	
291530 CAC	50	UNC	GR,RK	9.0	8	40	3	0.3	6	45	40	44	Y		D
291530 CCA	40	TFU	RK	7.0	6	25	1	0.3	7	26	18	25?	Y		
291530 CCA	106							NA							A
291530 CD	37	UNC	GR	6.0	5	14	0.35	0.6	6	37	33	33		8	
291530 DC								NA							
291530 DCB	115		RK	8.0	10	25	2	0.6	6.625	89	87	112	Y		D
291531	31							NA						DRY	A
291531	56	UNC	ASH	13.0	4	28	1.5	0.3	6	56	54	54		8	
291531 AAB	54.5	TFU	RK					NA	6	50.5	49.5	54.5	N		D
291531 AAB	80		RK					NA		75				DRY	A
291531 AAB	86	TFU	RK	48.0	8	56.5	2	0.9	6	81.5	81.5	86	N		D
291531 BBB	135	TFU	RK	10.0	10	12	2	5.0	6.625	68	109	111	Y		D
291531 CAA?	100							NA							A
291532 BB	75							NA							A
291532 BB	90							NA							A
291532 BB	60	TW	RK	23.0	20	24	2	20.0	6.625	59	33	59			D
291532 BB	70	TW	RK	20.0	20	25	2	4.0	16	70	33	70			D
291532 BBB	160		RK					NA							A
291532 BBD	40							NA						DRY	A
291532 BBD	120	TI	RK					NA						3	D
291532 BBD	145		RK					NA							A
291534 AA	46							NA						10	D
291535	33			11.0	5.5	20	1.9	0.6	4	25					
291535	44	UNC	GR,SI,CL	16.5	7.5	18.5	1.33	3.8	4.5	44	27	37		10	
291535 AB	150							NA							A
291535 AB	38		RK	25.0	10	32	1	1.4	7.875	38	33	38			D
291535 ABA	32	TI	RK	15.0	10	17	2	5.0	6.625	30	25	30			D
291535 ABA	35	TI	RK	9.0	25	20	2	2.3	6.625	35	30	35			D
291535 ACA	100							NA							A
291535 B?	20							NA						DRY	A
291535 B?	35	TI	CL,GR,VOLC RK	10.7	5.5	19.8	3	0.6	4.5	25	19	24		5	
291535 BB	32							NA	6						
291535 BB	41	TI	RK	27.0	10	35	1	1.3	7.875	41	36	41			D
291535 BDB	100							NA							A
291535 BDB	50	TI	RK	8.0	8	35	2	0.3	7	50	45	50	Y		D
291535 CA								NA							
291535 CAB	69	TI	RK	8.0	10	30	2	0.5	6.625	51	67	69	Y		D
291535 CAB	60			12.0	1	45	3	0.0					Y		A

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ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

					PUMP TEST DATA				CASING		COMPLETION INTERVAL				
LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	SWL DEPTH (FT)	RATE (GPM)	PUMPING LEVEL (FT)	DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	DIAMETER (IN)	DEPTH (FT)	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	OPEN END	YIELD (GPM)	
291535 CAB	60							NA						2	
291535 CCA	80	TI	VOLC RK	27.0	4	60	4	0.1	6	60	50	59	Y		
291535 CDA	60	TI	SA,CL	16.0	4.5	35	4	0.2	6	45	47	127	Y		D
291536								NA							
291536 ADD	85	TI	RK	52.1	15.6	80	1.7	0.6	6	80	80	85	N		
291536 D	100							NA							
291536 DA	24							NA						10	
291536 DD	30	UNC						NA						20	D
291609 BA	57	UNC	SA	18.0	20	22	2	5.0	4.5	57	55	57			D
291613								NA							
301236 AAA	738	KE	SS	31.2				NA	6	728				100	
301300 AA	49	UNC	GR	26.0	10	21	1	NA	7.875	31	34	49?			
301312 CDA	35	UNC	SA,GR	6.0	15	12	3	2.5	7	35	34	35		30	S
301313 CBC	41	UNC	SA,GR	16.0	12	33	1	0.7	6.625	43	35	41	Y		D
301315		UNC		6.0	3.5	12	3	0.6	6	35					
301316 BD	115	UNC	SA,GR	9.0	15	90	3	0.2	6.625	115	113	115	Y	20	
301322 DC	11.8			10.6				NA	2X5FT						A
301323 BBC	40	UNC	GR	13.5	14.2	14.8	2	10.9	6	35	35	40	N		D
301325 AA	90			44.89				NA	6						D
301326 CCC	36.5	UNC	GR,SA	13.0	16	21	3	2.0	6.625	36.5	35	36.5	Y	25	
301326 CD	120							NA	16	103					
301326 DBD		UNC		40.0				NA	48	48				20	
301326 DC	30	UNC	SA,GR	15.0	12	23	2	1.5	6.625	30	28	30	Y	15	D
301326 DC	13.7			9.4				NA	54						S
301326 DD	59.5	UNC	SA	14.0	34	30	5	2.1	5.563	59.5	42	54	Y	25	
301326 DDD	30	UNC	GR	12.0	35	25	1	2.7	6	30	23	28	Y		
301327 CD	29	UNC	SA	11.0	15	22	1	1.4	7.875	29	26	29			D
301327 CDB	100							NA	6	70					A
301327 DAA	173	UNC	SA,GR	11.0	16	23	6	1.3	5.563	173	166	169	Y	20	
301327 DC	16			12.0				NA							
301327 DD	18.8	UNC		9.7				NA	8						
301327 DDD	34	UNC	SA,GR	17.0	15	24	5	2.1	6.625	34	33	34	Y	18	S
301328 AA	90			44.0				NA							D
301329 AAD		UNC		50.0				NA	6	93				30	
301329 ABC		UNC		6.0				NA		11				500	
301329 BD	204	KJ						NA	6						
301329 D					15	140		NA	6	142				15	S
301329 DC1	141	UNC	SA,GR	4.5				NA	6					15	S
301329 DC2	20.2	UNC		17.8				NA	48						D
301330 C		UNC		8.0				NA	72	14				10	
301332 DBB	52	UNC	GR	10.0	4	48	3	0.1	7	52	51	52	Y	5.5	
301334 DA	43			10.0	10	30	1	0.5	7.875?	43	31	43			D
301334 DA	29	UNC	SA	11.0	15	22	1	1.4	7.875	29	24	29			D
301334 DDB	36.5	UNC	SA,GR	16.0	4.5	19	6	1.5	7	31	31	36.5	Y	15	D
301335	56	UNC	GR	18.0			20	NA	6	56	52	56			S
301335	46	UNC	SA,GR	12.0	43	24	4	3.6	6.625	46	40	45	Y	15	D
301335		UNC		16.5	17.5			NA		48.5					
301335	48	UNC	GR,SA	48.0	20			NA	6	48				12	D
301335	55	UNC	GR,SA	18.0	20			NA	6	55	43	48			
301335		UNC		20.0	12			NA		57					
301335		UNC		22.0	11			NA		45					
301335		UNC		30.0				NA		45				150	
301335		UNC		45.0				NA		49				9	
301335	45	UNC	GR,SA	22.0	11	40	3	0.6	7	45	44	45	Y	13	
301335	35	UNC	GR,SA	17.0	11	31	8	0.8	6.625	35	32	35	Y	13	
301335	51	UNC	GR	17.0			6	NA	6	51	50	51			
301335		UNC		16.0	17.5			NA		49.5					
301335	49	UNC	GR	20.0	20	29	4	2.2	6	49	45	49	Y		
301335		UNC	GR	86.0				NA						60	
301335 AA	27	UNC	SA	12.0	57	20	1	NA	7.875	27	23	27			
301335 AA	25	UNC	GR	10.0	10	20	1	1.0	7.875	25	20	25			
301335 AAA	38	UNC	GR	14.0	6	27	1	0.5	6	28	22	27	Y		D
301335 AAA	51							NA							
301335 AC	31	UNC	GR	14.0	20	25	2	1.8	6.625	31	24	31			
301335 AC	200							NA							
301335 AC	39	UNC	GR					NA	8	29	23	29	Y		
301335 B	43	UNC	SA,GR	13.0	26	27	1	1.9	6.625	43	42	43	Y	25	D/S
301335 BA1	42							NA	6						
301335 BA2	28			18.0				NA	6						
301335 BA3	35							NA	6						
301335 BA4	32							NA	7						D
301335 BAB	68	UNC	GR	18.0	25	25	1	3.6	6.625	66	60	66			D
301335 BAC	57	UNC	SA,GR	20.0	12	37	2	0.7	6.75	57	46	57	Y		
301335 BAD	47	UNC	GR,SA	18.0	12	28	8	1.2	6.625	47	44	47	Y	20	

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

					PUMP TEST DATA				CASING		COMPLETION INTERVAL				
LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	SWL DEPTH (FT)	RATE (GPM)	PUMPING LEVEL (FT)	DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	DIAMETER (IN)	DEPTH (FT)	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	OPEN END	YIELD (GPM)	USE
301335 BB	49	UNC	GR,SA	17.0	22	29	6	1.8	6.625	49	48	49	Y	30	D
301335 BB1	45.7	UNC		13.9				NA	6						A
301335 BB2	46							NA							D
301335 BB3	44.4	UNC		14.8				NA	5.5					50	A
301335 BB4	46.8	UNC		15.5				NA	4					30	D,S,I
301335 BBB	51	UNC	GR	18.0	20	46	4	0.7	6	51	45	51	Y		D
301335 BBD	41	UNC	GR	18.0	10	26	6	1.3	6.625	41	40	41	Y	30	D
301335 BBD	48.5	UNC	GR,SA	16.0	17	25	3	1.9	6.625	48.5	46	48.5	Y	20	D
301335 BC	42	UNC	SA,GR,CL	12.0	15	23	8	1.4	5.563	42	38	41			D
301335 BC	50	UNC	SA,GR	50				NA			48	50		14	D
301335 BC1	21	UNC		17.2				NA	48						D,I,O
301335 BC2	38			18.0				NA	4X5FT						D
301335 BC3	42							NA	6						D
301335 BC4	40							NA	48						
301335 BC5	25							NA	60						D,S,I
301335 BD	43.5	UNC	GR,SA	16.0	22	22	2	3.7	6.625	43.5	38	43.5	Y	25	D/SHP
301335 BD	48	UNC	GR,SA	18.0	10	26		1.3	5.75	48	44	48			D
301335 BD	49.5	UNC	SA,GR	16.0	17	24	3	2.1	6.625	49.5	48	49.5	Y	20	D
301335 BD1	26			18.0				NA	6						D
301335 BD2	26			18.0				NA	36						D
301335 BD3	30			18.0				NA	36						D
301335 BD4	25			18.0				NA	48						D
301335 BD5	30	UNC		18.0				NA	42						D
301335 BD6	35							NA	36						D
301335 DAC	137	UNC	GR	86.0	5	114	1	0.2	6	130	124	125		30	D
301335 DAC	40	UNC	GR	16.0	10	25	1	1.1	6	36	29	36	Y	6	
301336	46	UNC	GR	20.0				NA	6		41	46		18	D
301336 BCA	35	UNC	GR,SA	12.0	20	32	4	1.0	6	35	30?	35?	Y		
301336 CAC	40	UNC	GR	16.0	10	25	1	1.1	6	36	29	36	Y		D
301336 DCB	100							NA							D
301336 DCB	100	KJ	SH,CL	50.0	5	95	1.5	0.1	6		?	?			A
301336 DCB	100							NA							D
301401 BBD	100							NA							A
301401 CB	74	UNC	SA,VOLC GR	8.0	17	24	2.5	1.1	6.625	74	72	74	Y	20	A
301401 CBD	87	KJ	RK	35.0	15	37	5	7.5	6.625	71	75	87	Y		S
301406 AAC	60	UNC	GR	30.0	7.5	50	4	0.4	6	60	50	60	Y		D
301407 CDA	40	UNC	GR	9.0	50	35	3	1.9	6	40	30	40	Y		D
301408 BAB	180	KJ						NA							D
301408 BD	37	UNC		33.0				NA	48						
301412 ADC	120							NA							D,S
301412 ADC	216	KJ	RK	30.0				NA	6	202	197	206	N		A
301412 ADD	105							NA							D
301412 ADD	120	KJ	RK	–1.5				NA	6	109	107	117	Y	DRY	A
301412 BAD	93	KJ	RK	17.0	10	40	8	0.4	6.625	84	84	88	Y	6	D
301412 CAA	85	KJ	RK	14.0				NA	6	84			Y	100	D
301412 CDD	200							NA							D
301412 DB	90	KJ	RK	30.0	10	70	1	0.3	7.875	90	74	90			D
301412 DB	100							NA							A
301412 DB	27		RK,GR	16.0	2.5	17	1.5	2.5		26	20	20		2.5	
301412 DB	160							NA							A?
301417 BA	65	UNC		39.5				NA	48						D,S
301515 C	80							NA						30	D
301519 BC?	70	TI	RK	?		21	1	NA	7.875	70	60	70			D
301519 D								NA							
301530	21	UNC	ASH	5.0	5	15	0.5	0.5	6	21	20	21		10	
301530	130	TI	RK	20.0	6	90	1	0.1	6.625	107	107	130	Y		D
301530	160			–3.0	4	60	1	0.1						2	A
301530	180	TI	SH		3.5	180	2	NA							A
301530 CB	66							NA						10	D
301530 CB	135							NA						10	D
301530 CB	154	TI	RK	40.0	20	48	2	2.5	6.625	99	97	154	Y		D
301530 CC	46							NA						10	D
301530 CC	108							NA						10	D
301530 CCA	60	UNC	SA,CL	12.0	6	40	2	0.2	16	60	50	56			D
301530 CDB	140							NA							A
301530 DCA	77	UNC	GR	9.0	20	24	1	1.3	6.625	77	70	75			D
301531	100							NA							A
301531	150							NA							A
301531	100	TI	VOLC RK	50.0	5	60	1	0.5	7.875	100	80	100			D
301531 BB	66	TI	RK	40.0	10	55	2	0.7	6.625	57	52	55			D
301531 BB	250							NA							A
301531 BB	160	TI	SS	35.0	10	65	1	0.3	7.875	120	120	160	Y		D
301531 BBA	200		RK					NA						3	
301531 BBA	150							NA						DRY	A

Information from Reconnaissance Ground Water Study (HKM Associates, 1990).

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX A – GROUNDWATER BASIC DATA

					PUMP TEST DATA				CASING		COMPLETION INTERVAL				
LOCATION	WELL DEPTH –FT–	MAJOR AQUIFER	WATER BEARING MATERIAL	SWL DEPTH (FT)	RATE (GPM)	PUMPING LEVEL (FT)	DURATION (HR)	SPECIFIC CAPACITY (GPM/FT)	DIAMETER (IN)	DEPTH (FT)	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	OPEN END	YIELD (GPM)	
301531 BCB	58							NA							
301531 CBB	45							NA							
301531 CBD	95							NA							
301531 CC	85	UNC	SA	20.0	8	80	2	0.1	6.625	82	62	82		15	A
301531 CC	85	UNC	SA	20.0	60		2	NA	6.375	64	62	72	Y	6	D
301531 CC								NA							
301532	66	TI	VOLC RK	40.0	5	55	2	0.3	6	66	58	66			
301629 AAD	151	UNC	SA,VOLC GR	102.0	14	114	3	1.2	6.625	151	148	151	Y	20	D/S
311323 AAB		KJ		22.0	5	39	3	0.3	24	41					S
311328 DCD	148	UNC	GR,SA	56.0	5	85	3	0.2	7	148	147	148	Y	30	
311331 BB	163		SS,CL	102.0	2.5	155	2	0.0	5.5	157	140	157			
311332 BAB	185.5	UNC	GR,SI,SA	28.0	10	63	3	0.3	6.125	185.5	184	185.5	Y	50	
311333 ADB	207.5	UNC	GR,SA	51.0	16	72	2	0.8	6.625	207.5	204	207.5	Y		S
311333 CBD	176.5		SH,SS	78.0	7	168	2	0.1	8	176.5	135	171	Y		D/S
311412 CBB	160		SH	150.0				NA	6	160				3	
311413 AD	10							NA							
311413 BC	24.5			20.8				NA	48						S
311414 CDB	136		GR,SA,SS	12.0	6			NA	4.5	116	110	135			S
311415 BA	19.5							NA	6						
311415 DD1	18.8			16.9				NA	36						
311417 DDD	121	UNC	SA,GR	8.0	15	15		2.1	4	121	121	121			
311419 CD	210	KJ	SS,SH	82.0	7	185	2	0.1	6.625	210	95	210			D/S
311421 BAD	160	UNC	GR	11.0	300	21	24	30.0	8	160	152	160	Y		I
311422 BDD	150	UNC	GR	22.0	190	138	24	1.6	10	150	144	150	Y		
311422 DC	67							NA						8	
311423 AC	5.4			3.8				NA	18						
311423 BC1	24	UNC		17.0				NA	72						D,S
311423 BC2	24			18.5				NA	48						D,S,
311423 BCC		UNC		20.0				NA	1.25					1	
311423 BCC	77	UNC	SA,GR	21.0	10	40	2	0.5	9	77	75	77			
311423 CBA	70?			55.0				NA	6					13	
311423 CC	25							NA	48						D
311425 BD	40	UNC	CL,SA,GR	24.0	3	39	4	0.2	15	40	24	35			S
311428	67	UNC	GR,SA	33.0	5	44	1	0.5	6	60	54	54		8	
311428 DDD	37			33.0				NA	48						
311432 DC	28	UNC						NA	36						
311433 BC	29.7			26.6				NA	60						D,S
311434 AA	14	UNC		9.0				NA	60						D,S
311534 CCC	397		SH,SA,SS	300.0	2	200	8	NA	6	397	170	397			
311631 BCC	18	UNC	GR	10.0	24	8	12	NA	8	18	10	18			

APPENDIX B

GROUNDWATER QUALITY DATA

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		281520	291301	291301	291305	291321	291322	291401	291401	291401	291402
	QUARTER SECTION:		AB	AB	AB	AA	AA2	AB2	AA	BA	CDD	AB
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	30	922	160		224		128	226	174	176
Arsenic	mg/l	0.05										
Iron	mg/l		4.8	0.09	0.04	0.1	3.8		0	0	11.1	L.02
Sulfate in Water	mg/l		26	1338	177		110	570	138	235	170	192
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		130	630	520				280	380	530	390
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2					0.52	1.5				
Calcium	mg/l		21	8	84		7	31	11	33	79	37
Conductance	UMHOS		420	3278	1240		1100		826	990	1200	1080
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.8	1	0.35		1.2	1.8	0.8	0.7	0.5	0.45
Magnesium	mg/l		7	0.01	51		6.3	15	5	16	32	23
Lead	mg/l	0.015										
Manganese	mg/l											
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			L1	0	7.27		3.2	3.1	0	3.4	1	L.1
pH in Water			7.2	8.3	7.2	8	8.7	8.3	8.3	7.9	7.2	7.7
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION: QUARTER SECTION:		291402 BB	291402 BDA	291403 BBA	291404 AA	291404 AB	291405 BB	291405 BB	291405 BB	291406 AB	291406 BA
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20		98	254		385					
Arsenic	mg/l	0.05										
Iron	mg/l		0.61	0.25	0.07	0.08	L.01	4.15	0.2	1.72	1.19	1.38
Sulfate in Water	mg/l		69.5	52	678	238	19.5	255	0	12.5	37.5	43.5
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		900	382	620	800	556	650		500	425	615
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l			52	173		28		56			
Conductance	UMHOS			680	2200		1325					
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.72	0.18	0.3	0.46	L.1	0.49	0.32	0.28	0.09	0.3
Magnesium	mg/l			26	79		10		29			
Lead	mg/l	0.015										
Manganese	mg/l		0.15	0.06		0.1		0.5		0.45	0.45	0
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			3.4	L.05	7.4	4		4.6	0	3.8	4.5	4.05
pH in Water			8.3	7.6	7.4	7.5	8	7.6		7.3	7.2	7.3
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291406	291406	291406	291407	291407	291419	291420	291420	291423	291423
	QUARTER SECTION:		BC	BC	BC			CB		DB	AC	BD
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20					51	300	166	100		257
Arsenic	mg/l	0.05										
Iron	mg/l		0.22		2.8	0.015	0.09	18.2	0	0.14	0.54	0.26
Sulfate In Water	mg/l		0.5		35	32	27	509	182	36	49	221
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		999		800	200		450	435	185	550	380
Cyanide In Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		100				35	63	44	5		10
Conductance	UMHOS							1800	1058	510		1100
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride In Water	mg/l	4		0.3	0.31		0.2	0.3	0.7	0.44	0.28	1.3
Magnesium	mg/l						15	41	40	3		8
Lead	mg/l	0.015										
Manganese	mg/l		2.56	0.01	0.45						0	
Cadmium	mg/l	0.005										
Mercury In Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			22.2		4		0.1	L1	0	0.45	5.75	L1.
pH In Water			8.65	8.4	7.6	7.1	7.4	7.6	7.7	10.3	7.3	8.2
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291424	291501	291503	291503	291503	291504	291504	291504	291505	291505
	QUARTER SECTION:		BC	AB		ABB	CB		CAA	CBB		
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	310	272	155	56	280	39	28		65	77
Arsenic	mg/l	0.05										
Iron	mg/l		L.01	0	L.01	17.6	L.1	L.03	7.3	0.69	L.01	8.4
Sulfate in Water	mg/l		41.5	192	7.5	57	11.5	23	14	16.4	24.5	67
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		330	390	154	150	274	190	111	360	206	285
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		0.9	4	45	15	20	31	13		25	38
Conductance	UMHOS		1260	1124	625	355	1160	400	250		320	600
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	L.1	1.4	L1	0	L.1	0.28	0.4	0.41	L.1	0.3
Magnesium	mg/l		0.8	2	13	14	22	13	7		16	17
Lead	mg/l	0.015										
Manganese	mg/l							L.02		0.2		
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate				0		0.5		L.70	1	2.9		L1
pH in Water			8.1	8.8	7.9	8.7	8.3	7.9	7.8	7.6	8.7	7.7
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION: QUARTER SECTION:		291505 ADA	291506	291506 BB	291506 BB	291506 BCC	291506 CC	291506 DC	291507 ADD	291507 CAB	291507 DB
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	80	65	45	61	112		179	126	124	
Arsenic	mg/l	0.05										
Iron	mg/l		0	0.22	2.7	0	0.11	2.2	8.7	2.1	0.27	0.04
Sulfate In Water	mg/l		40	50	25	30	7	34.5	17	40	17	21
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		200	350	280	330	310	405	400	225	260	325
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		14	70	54	55	10		9	0.01	6	
Conductance	UMHOS		392	800	476	588	580		800	440	550	
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.4	0.3	0.4	0.4	1.1	0.22	0.3	0	0.55	0.81
Magnesium	mg/l		11	18	20	24	11		4	0	2	
Lead	mg/l	0.015										
Manganese	mg/l						0.1	0				0.1
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			0	L1	0	0	L.05	3.4	1	0.3	0	2.8
pH in Water			8.3	7.2	7.5	7.1	7.9	7.2	8.4	9.4	9.1	9.1
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291507	291508	291508	291508	291508	291508	291508	291508	291508	291510
	QUARTER SECTION:		DD	C	CC	CC	CC	CC	CC	CC	CDB	AB
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	96			128	115	133		23?	150	
Arsenic	mg/l	0.05										
Iron	mg/l		0	0.13	0.2	0	0.17	0.38	7.5	0.25	0.1	0.15
Sulfate in Water	mg/l		48	7.4		25	59	13	65		25	500
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		310	450		290	270	260			310	160
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1							0.38			
Barium	mg/l	2										
Calcium	mg/l		35			8	14	2			8	
Conductance	UMHOS		606			445	650	520			588	
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.5	0.44		0.6	0.8	1.7	0.3	0.85	0.5	
Magnesium	mg/l		18			7	12	1			4	
Lead	mg/l	0.015										
Manganese	mg/l			0.2					0	0		
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												0.005
Nitrate			0	4.1	2.4	0	1	L.1			1.2	0.3
pH in Water			7.8	9.6		9.2	8.2	9.5	8.9	8.8	8.6	4.5
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291510	291510	291510	291510	291511	291511	291511	291511	291512	291512
	QUARTER SECTION:		AB	AB	AB	BA	AA	AA	ADA	BB	BD	BD
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20			275	330	62		46	345		
Arsenic	mg/l	0.05										
Iron	mg/l		0.03	0.4	0.1	L.01	0.08	0.2	0	0.35	0	0.51
Sulfate in Water	mg/l		7	10	14	11	18	210	11	7		12.8
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		275	180	270	582		190	230	190		510
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1		0.03				0.04				
Barium	mg/l	2										
Calcium	mg/l				28	50	26		36	15		
Conductance	UMHOS				1140	1295			445	1200		
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.23		L.1	L.1	0.34		0.35	L.1		0.27
Magnesium	mg/l				15	12	13		13	3		
Lead	mg/l	0.015										
Manganese	mg/l		0.45									0.15
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite								0.01				
Nitrate			4.8	0.05			0.42	0.44	0		0	3
pH in Water			8.5	8.1	8.3	8.2	7.7	7.8	7.8	8		7.6
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291512	291512	291512	291513	291514	291514	291514	291514	291516	291516
	QUARTER SECTION:		BD	CBB	DC	BC	CC	CC	CC	DB	CAD	CC
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20					94			109	131	253
Arsenic	mg/l	0.05										
Iron	mg/l		0.15	0.05	0.01	0.15	3.2	0	0.04	0.16	2.1	L.01
Sulfate In Water	mg/l		75	31	9	45	12	12	8	25	87	8.5
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		280	450	400		250	280	325		360	218
Cyanide In Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1	0.04					0.03				
Barium	mg/l	2										
Calcium	mg/l						17			35	41	25
Conductance	UMHOS						515				725	1000
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride In Water	mg/l	4		0.2	0.21	0.5	0		0.3	0.2	1.35	L.1
Magnesium	mg/l						5			20	18	6
Lead	mg/l	0.015										
Manganese	mg/l			0.18	0.02				0.05			
Cadmium	mg/l	0.005										
Mercury In Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite						0.0075						
Nitrate			0.45	3.3	3.8		0.3	0.3	3.8	0.06	0	
pH In Water			7.9	7.2	9.4	8.6	8.5	8	9	7.8	7.4	7.7
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION: QUARTER SECTION:		291517	291517 AD	291517 B	291517 DA	291518 CA	291519 AAA	291520	291521	291521 ABC	291521 ABC
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	164	247	100	223	112	167	107	48		66
Arsenic	mg/l	0.05										
Iron	mg/l		0	L.01	L.01	L.01	0.4	1.72	0	0	0.56	2.48
Sulfate In Water	mg/l		183	9	31.5	12	65	71	20	23	35	20
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		420	262	260	302	410	460	200	220	650	200
Cyanide In Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		60	60	30	51	46	36	TR	29		22
Conductance	UMHOS		1064	1175	360	1150	890	850	426	400		400
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride In Water	mg/l	4	0.9	L.1	L.1	L.1	0.45	0	0.6	1.6	0.41	0.35
Magnesium	mg/l		28	21	20	29	27	23	TR	18		8
Lead	mg/l	0.015										
Manganese	mg/l										0.1	
Cadmium	mg/l	0.005										
Mercury In Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			0				L.1	7.55	0.6	5	29.9	1.4
pH In Water			7.7	8.1	8.7	7.7	7.5	7.8	10.4	7.4	7.8	7.7
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291521	291521	291521	291521	291521	291521	291521	291521	291521	291521
	QUARTER SECTION:		ACD	C	CA	CB	CB	CC	DC	DC	DC	DC
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	68	52			91			83	1	
Arsenic	mg/l	0.05										
Iron	mg/l		1.92	3.4	0.02	0.05	0.02	0.01	0.03	L.03	L.03	0.03
Sulfate In Water	mg/l		24	16	7	83	16	6.5	27.5	25	L1	90
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		210	230	500	450		300	250	250	0	210
Cyanide In Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										0.04
Barium	mg/l	2										
Calcium	mg/l		20	33			18			21	1	
Conductance	UMHOS		450	500						460	9	
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride In Water	mg/l	4	0.45	0.4	0.15	0.78	0.16	0.13	0.29	0.68	L.1	
Magnesium	mg/l		11	11			9			11	1	
Lead	mg/l	0.015										
Manganese	mg/l				0.15	0.01		0.25	0.05		L.02	
Cadmium	mg/l	0.005										
Mercury In Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			0.05	L1	19.8	3.85	0.09	3	3.5	0.28	L.05	0.25
pH In Water			7.8	7.6	9	8.5	8.2	8.8	8.6	8.4	5.2	5.1
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291521	291522	291522	291522	291522	291522	291522	291522	291522	291522
	QUARTER SECTION:		DC	AA	AB	C	C	CAD	CBA	DAB	DD	DD
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	79		105	90	110	86	63	103		72
Arsenic	mg/l	0.05										
Iron	mg/l		0.1		L.01	L.1	0.01	0.29	0.17	0.14	0.02	8
Sulfate in Water	mg/l		1	7	27.5	27	24	24	38?	0	3.5	24
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		246	50	208	236	236	240	200		460	186
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		11		0.01	20	10	23	22	2		0
Conductance	UMHOS		402		350	350	350	550	395			
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.24		L.1	L.1	L.1	0.3	0.4	0.38	0.27	0.2
Magnesium	mg/l		12		3	16	6	6	18	1		2
Lead	mg/l	0.015										
Manganese	mg/l		L.02								0.1	
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite				TR								
Nitrate			0.06	0				1	2.5	0.04	2.2	
pH in Water			8.1	9.5	8.9	8.5	8.4	7.6	7.8	9.1	9.9	9.1
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291523	291523	291523	291524	291524	291524	291524	291524	291524	291524
	QUARTER SECTION:		AC	CB	CD		AC	AD	AD	ADD	CAB	CC
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	62	43	132	54	114				61	
Arsenic	mg/l	0.05										
Iron	mg/l		0.14	52.8	0.04	3.3	4.2	0.2	0.04	0.03	0.13	0.02
Sulfate in Water	mg/l		0	10	5	16	8	14	9	8.5	13	21.5
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l			200	280	240	290		350	425		395
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		29	36	0.1	33	15	36			34	
Conductance	UMHOS			370	600	500	640				480	
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.12	0	0.16	0.3	0.2	0	0.15	0.24	0.3	0.18
Magnesium	mg/l		14	8	0.1	12	7	22			10	
Lead	mg/l	0.015										
Manganese	mg/l								0.15	0.3		0.05
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			0.04	0	L.01	L1	3.3	0	24.1	4.5	0.1	2.8
pH in Water			7.9	7.9	9.8	7.5	8.2		7.5	7.2	7.6	7.3
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B -- GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291524	291524	291525	291525	291525	291526	291527	291527	291529	291529
	QUARTER SECTION:		DB	DC	AD	BA	BA	CBC	AA	DD	DA	DA
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20		116		47		117	175			58
Arsenic	mg/l	0.05										
Iron	mg/l		0.03	1.3	0.02	0.04	0	1.6	L.01	0.01	2.6	0.25
Sulfate In Water	mg/l		5	16	12.5	12	11.2	30	36.5	12		34
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		325	230	465	235	440	300	294	450		290
Cyanide In Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l			0.1		29		6	0.01			43
Conductance	UMHOS			480		460		530	375			570
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride In Water	mg/l	4	0.27	0.68	0.28	0.1	0.09	0.32	L.1	0.13		0.55
Magnesium	mg/l			2		20		13	5			24
Lead	mg/l	0.015										
Manganese	mg/l		0.1		0.1		0.05			0		
Cadmium	mg/l	0.005										
Mercury In Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			4.2	0.21	3.5	1.6	19.8	0.6		4	0	5.5
pH In Water			7	9.6	7.2	7.4	9.6	8.4	8.8	7.6		?
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION:		291530	291530	291530	291531	291535	291535	291535	291535	291536	291536
	QUARTER SECTION:		CAC	CD	DC	BBB		BB	BB	CA		D
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	78	223	89					82	138	57
Arsenic	mg/l	0.05										
Iron	mg/l		5	L.01	2.35	0.02	0.03	0.06	0.1	2	0	5.7
Sulfate In Water	mg/l		85	17	41	7	20.5	13.5	560	47	11	22
Beryllium	mg/l	0.0004										
Alkalinity In Water	mg/l		280	454	250	375	425	475	150	340	280	150
Cyanide In Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2										
Calcium	mg/l		21	105	20					40	TR	13
Conductance	UMHOS		620	1300	480					700	482	280
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride In Water	mg/l	4	0.5	L.1	L.1	0.91	0.11	0.2		0.4	0	0
Magnesium	mg/l		23	47	12					24	TR	5
Lead	mg/l	0.015										
Manganese	mg/l					0	0.1	0.15				
Cadmium	mg/l	0.005										
Mercury In Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			L1		0.23	3.2	2.4	1.9	0.18	1	1.2	1.7
pH In Water			7.3	8.1	8.4	10	7.5	7.4	7.2	7.2	9.2	8.7
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION									
	RANGE, TWP, SECTION: QUARTER SECTION:		291613	301236 AAA	301300 AA	301313 CBC	301334 DA	301335 AC	301336	301401 CBD	301412 DB	301412 DB
CONTAMINATES	UNIT	MCL										
Sodium	mg/l	20	90	2790		168	326	79		207		
Arsenic	mg/l	0.05										
Iron	mg/l		2.3		0.08	0.81	L.01	0	0.03	3.7	0.03	
Sulfate in Water	mg/l		10	9.5	14	91	15.5	62	7.5	181	6	
Beryllium	mg/l	0.0004										
Alkalinity in Water	mg/l		360		700	390	458	370	550	332	350	
Cyanide in Water--Composite of 5	mg/l	0.2										
Nickel	mg/l	0.1										
Chromium	mg/l	0.1										
Barium	mg/l	2		4.5								
Calcium	mg/l		49	41		36	87	66		14		
Conductance	UMHOS		745	13100		900	1350	709		880		
Antimony	mg/l	0.0006										
Thallium	mg/l	0.002										
Selenium	mg/l	0.05										
Fluoride in Water	mg/l	4	0.45	0.7	0.24	0.6	L.1	0.3	0.34	2	0.33	
Magnesium	mg/l		18	24		12	31	26		9		0.01
Lead	mg/l	0.015										
Manganese	mg/l				0				0.15	0.06	0	
Cadmium	mg/l	0.005										
Mercury in Water--Composite of 5	mg/l	0.002										
Total Hardness as CACO3	mg/l											
Nitrate Plus Nitrite as N	mg/l	11										
Nitrite												
Nitrate			L.1	1.5	3.9	0		0.3	4.2	0.05	3.2	
pH in Water			7.8	8.3	8	7.7	7.9	7.9	6.9	8.6	9.1	
Hardness Grains Per Gallon	G/PG											
Copper	mg/l	1.3										
Asbestos	mg/l	7										

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

			WELL LOCATION						
	RANGE, TWP, SECTION:		301519	301531	301531	301531	301531	311423	311428
	QUARTER SECTION:		D		BB	CC	CC	BC1	
CONTAMINATES	UNIT	MCL							
Sodium	mg/l	20	187	87	230	97	134		336
Arsenic	mg/l	0.05							
Iron	mg/l		3.4	0	L.01	1.66	7.2		L.01
Sulfate in Water	mg/l		2	TR	27.5	35	TR	415	13
Beryllium	mg/l	0.0004							
Alkalinity in Water	mg/l		440	125	260	220	280		348
Cyanide in Water--Composite of 5	mg/l	0.2							
Nickel	mg/l	0.1							
Chromium	mg/l	0.1							
Barium	mg/l	2						0.2	
Calcium	mg/l		14	0.01	0.01	11	0.01	88	100
Conductance	UMHOS		800	375	980	390	475		1300
Antimony	mg/l	0.0006							
Thallium	mg/l	0.002							
Selenium	mg/l	0.05							
Fluoride in Water	mg/l	4	0.4	0.4	L.1	0	0	0.4	L.1
Magnesium	mg/l		6	0.01	0	6	0	51	40
Lead	mg/l	0.015							
Manganese	mg/l								
Cadmium	mg/l	0.005							
Mercury in Water--Composite of 5	mg/l	0.002							
Total Hardness as CACO3	mg/l								
Nitrate Plus Nitrite as N	mg/l	11							
Nitrite									
Nitrate			L1	0		0.8	0	0.5	
pH in Water			8.2	9.8	8.2	8.6	9.7	8	8.2
Hardness Grains Per Gallon	G/PG								
Copper	mg/l	1.3							
Asbestos	mg/l	7							

ROCKY BOY'S MR&I NEEDS ASSESSMENT

APPENDIX B – GROUNDWATER QUALITY DATA

Analyses are in milligrams per liter unless otherwise noted.

LOCATION	B	Ca	CO3	Cl	CrO4	F	HCO3	Fe	K	Mg	Mn	Na	NO2	NO3	PO4	SiO2	SO4	ALKALINITY as CaCO3 (mg/liter)	NON-CARBONATE	TOTAL	SOLIDS (mg/liter) CALC	180C	pH	CONDUCTANCE (micromhos /cm @ 25C)
		77	0	9		0.39	500	0.48	12	60		156		0.14			332	410	441	31	892	853	7.9	13
291520 AB		21	0	5		0.8	159	4.8	10	7		30		L1			26	130	81	0	177	162	7.2	4
291301 AB		8	0	30		1	720	0.09		0.01		922		0			1338	630	19		2653		8.3	32
291301 AB		84	0	36		0.35	634	0.04	7	51		160		7.27			177	520	420	0	827	792	7.2	12
291305 AA								0.1												16			8	
291321 AA2	0.52	7	35	24		1.2	440	3.6	21	6.3		224		3.2		20	110		43	0		701	8.7	11
291322 AB2	1.5	31	0	140		1.8	834			15				3.1			570		139	0		1940	8.3	
291401 AA		11	42	9		0.8	255	0		5		128		0			138	280	48	0	459		8.3	8
291401 BA		33	0	10		0.7	465	0		16		226		3.4			235	380	88	0	749		7.9	9
291401 CDD		79	0	7		0.5	647	11.1	6	32		174		1			170	530	329	0	788	780	7.2	12
291402 AB		37	0	8		0.45	476	L02	7	23		178		L1			192	390	187	0	677	692	7.7	10
291402 BB				67.5		0.72		0.61			0.15			3.4			89.5	900	50	80			8.3	
291402 BDA		52	0	3		0.18	457	0.25	5	26	0.06	96		L05			52	382	234	0	469	498	7.6	6
291403 BBA		173	0	25		0.3	756	0.07	7	78		254		7.4			678	620	759	139	1590	1560	7.4	22
291404 AA				22.5		0.46		0.08			0.1			4			238	800	200				7.5	
291404 AB		28		22		L1		L01		10		365					19.5	556		68	575		8	13
291405 BB				17.5		0.49		4.15			0.5			4.8			255	650	210				7.6	
291405 BB		56	427	10		0.32		0.2		29				0			0		260		410			
291405 BB				10		0.28		1.72			0.45			3.8			12.5	500	125				7.3	
291406 AB				15		0.09		1.19			0.45			4.5			37.5	425	150				7.2	
291406 BA				7.5		0.3		1.36			0			4.05			43.5	615	115				7.3	
291406 BC		100		10100				0.22			2.56			22.2			0.5	999	1000				6.65	
291406 BC						0.3					0.01												6.4	
291406 BC				17.5		0.31		2.8			0.45			4			35	800	130				7.8	
291407				0.05				0.02									32	200	120	30			7.1	
291407		35	0	7		0.2	270	0.09		15		51		0.1			27		8.7gr				7.4	
291418 CB		63	0	20		0.3	549	18.2	9	41		300		L1			509	450	326	0	1212	1236	7.6	16
291420		44	0	8		0.7	530	0		40		166		0			162	435	274	0	701		7.7	10
291420 DB		5	90	7		0.44		0.14	0	3		100		0.45			36	185	24	0	253	303	10.3	5
291423 AC				7.5		0.28		0.54			0			5.75			49	550	65				7.3	
291423 BD		10	84	18		1.3	243	0.26	4	8		257		L1			221	380	59	0			7.3	
291424 BC		0.9		31		L1		L01		0.8		310					41.5	330		37.5	746	743	8.2	11
291501 AB		4	50	11		1.4	380	0		2		272		0			182	390	18	0	412	42.5	8.1	12
291503		45		28		L1		L01		13		155					7.5	154		132	718		8.6	11
291503 ABB		15	18	6		0	145	17.6		14		56		0.5			57	150	85	0	294	290	7.9	6
291503 CB		20		18		L1		L1		22		280					11.5	274		185	237		8.7	3
291504		31	0	10		0.28	232	L03	3	13	L02	39		L70			23	190	129	0	442	322	8.3	11
291504 CAA		13	0	3		0.4	135	7.3	3	7		28		1			14	111	59	0	233	235	7.9	4
291504 CBB				12.5		0.41		0.69			0.2			2.9			18.4	360	70		135	150	7.6	25
291505		25		L1		L1		L01		16		65					24.5	206		0	120		7.8	
291505		38	0	8		0.3	348	8.4	5	17		77		L1			67	285	165	0	42.5	149.2	8.7	32
291505 ADA		14	0	8		0.4	245	0		11		80		0			40	200	80	0	381	407	7.7	60
291506		70	0	5		0.3	427	0.22	6	18		65		L1			50	350	248	0	274		8.3	39
291506 BB		54	0	7		0.4	340	2.7		20		45		0			25	280	217	0	424	462	7.2	60
291506 BB		55	0	4		0.4	405	0		24		61		0			30	330	236	0	318		7.5	47
291506 BCC		10	0	8		1.1	378	0.11	4	11	0.1	112		L05			7	310	69	0	373		7.1	58
291506 CC				10		0.22		2.2			0			3.4			34.5	405	130		339	390	7.9	58
291506 DC		9	42	6		0.3	403	8.7	3	4		179		1			17	400	36	185			7.2	
291507 ADD		0.01	59	7		0	150	2.1		0		126		0.3			40	225	TR	0	458	472	8.4	80
291507 CAB		8	50	8		0.55	220	0.27		2		124		0			17	260		0	306		9.4	44
291507 DB				7.5		0.81		0.04			0.1			2.8			21	325	5		315		8.1	55
291507 DD		35	0	8		0.5	380	0		18		96		0			48	310	161	5		5	8.1	
291508 C				8		0.44		0.13			0.2			4.1			7.4	450	0	0	390		7.8	60
291508 CC			0	6			277	0.2						2.4					259	2			8.6	
291508 CC		8	54	7		0.6	245	0		7		128		0			25	290	46	0	274			
291508 CC		14	30	6		0.8	268	0.17	5	12		115		1			59	270	82	0	350		9.2	44
291508 CC		2	108	8		1.7	98	0.38	2	1		133		L1			13	260	10	0	367	385	8.2	65
291508 CC				200	0.38	0.3		7.5			0						65				315	308	9.5	52
291508 CC			207	7		0.85		0.25			0	237							50	200			8.8	
291508 CDB		8	42	8		0.5	293	0.1	4.2	4		150		1.2			25	310	35	300			8.8	
291510 AB								0.15					0.01	0.3		1.4	500	160	80	0	385	372	8.6	58
291510 AB				10		0.23		0.03			0.45			4.6			7	275	25	30			4.5	
291510 AB					0.03			0.4						0.05		2.8	10	160	40	90			8.5	
291510 AB		28		41		L1		0.1		15		275					14	270		55			8.1	
291510 BA		50		36		L1		L01		12		330					11	562		70			8.1	
291511 AA		26	0	9		0.34	270	0.06		13		62		0.42			18		6.9	114	435		8.3	114
291511 AA					0.04			0.2					0.01	0.44	0.25	17	210	190	70	69	535		8.2	129
291511 ADA		38	0	3		0.35	280	0		13		46		0			11	230	143	236	261		7.7	
291511 BB		15		22		L1		0.35		3		345					7	190	0	60	247		7.8	
291512 BD			0				342	0						0						130	492		8	44
291512 BD				7.5		0.27		0.51			0.15			3			12.8	510	75	39	398			120
291512 BD					0.04			0.15						0.45		16	75	280	110	120			7.6	
291512 CBB				12.5		0.2		0.05			0.18			3.3			31	450	175	70	180		7.9	
291512 DC				10		0.21		0.01			0.02			3.8			9	400	3	240			7.2	
291513 BC						0.5		0.15					0.01				45			5			9.4	
291514 CC		17	37	3		0	230	3.2		5		94		0.3			12	250	63		261		8.6	
291514 CC				7	0.03			0						0.3		15.3	12	280	40	40	80		8.5	51
291514 CC				8		0.3		0.04			0.05			3.8			8	325	5		15		8	
291514 DB		35	450	9		0.2		0.16		20		109		0.06			25		9.8		420		9	
291516 CAD		41	0	7		1.35	440	2.1		18		131		0			87	360	175	0		500	7.6	
291516 CC		25		35		L1		L01		8		253					8.5	218		159	243	388	7.4	7
291517		60	0	8		0.9	510	0		28		164		0			183	420	264	0		694	7.7	10
291517 AD		60		50		L1		L01		21		247					9	262		475	699	452	7.7	10
291517 B		30		L1		L1		L01		20		100					31.5	260		0	122.5	210	8.1	11
291517 DA		51		37		L1		L01		29		223					12	302		171	400	420	8.7	3
291518 CA		46	0	5		0.45	500	0.4	5	27		112		L1			65	410	255	0		508	7.7	11
291519 AAA		36	0	10		0	560	1.72		23		167		7.55			71	460	184	0		563	7.5	8
291520		TR	109	7		0.6	7	0		TR		107		0.6			20	200	TR	0		250	7.8	8
291521		29	0	4		1.6	270	0		18		46		5			23	220	146	0		255	10.4	4
291521 ABC				20		0.41		0.56			0.1			29.9			35	650	100		190		7.4	4
291521 ABC		22		7		0.35	245	2.48		8		66		1.4			20	200	87	0		243	7.8	
291521 ACD		20	0	7		0.45	255	1.92		11		68		0.05			24	210	94	0		225	7.7	4
																							7.8	4

Information from: Reconnaissance Ground Water Study. Explanation of terms provided on facing page.

ROCKY BOY'S MR&I NEEDS ASSESSMENT
APPENDIX B – GROUNDWATER QUALITY DATA

Analyses are in milligrams per liter unless otherwise noted.

LOCATION	B	Ca	CO3	Cl	CrO4	F	HCO3	Fe	K	Mg	Mn	Na	NO2	NO3	PO4	SiO2	SO4	ALKALINITY as CaCO3 (mg/liter)	NON-CARBONATE	SOLIDS (mg/liter) TOTAL	CALC	180C	pH	CONDUC (micro /cm @
291521 C		33	0	5		0.4	281	3.4	3	11		52		L1			16	230	126	0		258	287	7.6	
291521 CA				22.5		0.15		0.02			0.15			19.8			7	500	10		10			9	
291521 CB				15		0.78		0.05			0.01			3.85			83	450	15		45			8.5	
291521 CB		18	12	10		0.16	280	0.02		9		91		0.09			16		4.8gr			294		8.2	
291521 CC				10		0.13		0.01			0.25			3			6.5	300	30		65			8.8	
291521 DC				12.5		0.29		0.03			0.05			3.5			27.5	250	35		70			8.6	
291521 DC		21	36	8		0.68	232	L.03	6	11		83		0.28			25	250	97	0		304	263	8.4	
291521 DC		1	L1	L1		L1	L1	L.03	L1	1	L.02	1		L.05			L1	0	1	1		1	1	5.2	
291521 DC					0.04			0.03						0.25	0.1	12	90	210	10	40	50			5.1	
291521 DC		11	0	3		0.24	300	0.1	5	12	L.02	79		0.06			1	246	78	0		261	272	8.1	
291522 AA													TR	0			7	50	12	3	15			9.5	
291522 AB		0.01		L1		L.1		L.01		3		105					27.5	208		32	42.5	146.8		8.9	
291522 C		20		L1		L.1		L.1		16		90					27	236		24	130	175.8		8.5	
291522 C		10		L1		L.1		0.01		6		110					24	238		6.5	52.5	162.4		8.4	
291522 CAD		23	12	3		0.3	293	0.29	2	6		86		1			24	240	85	0		300	308	7.6	
291522 CBA		22	0	4		0.4	245	0.17		18		63		2.5			387	200	?	0		254		7.8	
291522 DAB		2	72	7		0.38	170	0.14		1		103		0.04			0		.3gr			244		9.1	
291522 DD				7.5		0.27		0.02			0.1			2.2			3.5	460	0		0			8.9	
291522 DD		0	18	2		0.2	190	8		2		72					24	186		0	8	140		9.1	
291523 AC		29	0	11		0.12	305	0.14		14		62		0.04			0		7.6gr			266		7.9	
291523 CB		36	0	3		0	245	52.6		8		43		0			10	200	123	0		221		7.9	
291523 CD		0.1	108	3		0.16	122	0.04	2	0.1		132		L.01			5	280		0	5	312	345	9.8	
291524		33	0	5		0.3	293	3.3	4	12		54		L1			16	240	134	0		268	282	7.5	
291524 AC		15	30	5		0.2	293	4.2	2	7		114		3.3			8	290		0	67	325	367	8.2	
291524 AD		36	0	6		0	275	0.2		22				0			14		180			262			
291524 AD				12.5		0.15		0.04			0.15			24.1			9	350	40		105			7.5	
291524 ADD				22.5		0.24		0.03			0.3			4.5			8.5	425	135		105			7.2	
291524 CAB		34	0	3		0.3	295	0.13		10		61		0.1			13		125	0		266		7.9	
291524 CC				7.5		0.18		0.02			0.05			2.8			21.5	395	85		115			7.3	
291524 DB				22.5		0.27		0.03			0.1			4.2			5	325	125		185			7	
291524 DC		0.1	132	12		0.68	0	1.3	2	2		116		0.21			16	230	10	0		280	325	9.6	
291525 AD				7.5		0.28		0.02			0.1			3.5			12.5	465	75		125			7.2	
291525 BA		29	0	3		0.1	287	0.04	3	20		47		1.8			12	235	154	0		255	309	7.4	
291525 BA				12.5		0.09		0			0.05			19.8			11.2	440	0		3			9.6	
291526 CBC		6	36	3		0.32	293	1.6	1	13		117		0.8			30	300	68	0		350	351	8.4	
291527 AA		0.01		L1		L.1		L.01		5		175					36.5	294		0	2.5	234.5		8.8	
291527 DD				10		0.13		0.01			0			4			12	450	85		135			7.6	
291529 DA				48			305	2.6						0						0	240	292			
291529 DA		43	0	4		0.55	355	0.25		24		58		5.5			34	290		0	295?	338		?	
291530 CAC		21	0	6		0.5	342	5	6	23		78		L1			85	280		0	147	387	384	7.3	
291530 CD		105		41		L.1		L.01		47		223					17	454		491	918	526		8.1	
291530 DC		20	24	8		L.1	256	2.35	5	12		89		0.23			41	250	98	0		325	298	8.4	
291531 BBB				7.5		0.91		0.02			0			3.2			7	375	0		0			10	
291535				10		0.11		0.03			0.1			2.4			20.5	425	65		110			7.5	
291535 BB				7.5		0.2		0.06			0.15			1.9			13.5	475	40		70			7.4	
291535 BB				0.05				0.1						0.16			560	150	70	30	100			7.2	
291535 CA		40	0	3		0.4	415	2	7	24		82		1			47	340	199	0		407	446	7.2	
291536		TR	84	6		0	170	0		TR		138		1.2			11	280	TR	0		323		9.2	
291536 D		13	30	3		0	120	5.7		5		57		1.7			22	150	53	0		189		8.7	
291613		49	0	23		0.45	499	2.3	7	18		90		L1			10	360	196	0		413	476	7.8	
301236 AAA	4.5	41	16	4350		0.7	176		35	24		2790		1.5		6.3	9.5		201	27			7360	8.3	
301300 AA				22.5		0.24		0.06			0			3.9			14	700	190		255			8	
301313 CBC		36	0	14		0.6	475	0.81		12		168		0			91	390	138	0		555		7.7	
301334 DA		87		29		L.1		L.01		31		328					15.5	458		0	108	623		7.9	
301335 AC		66	0	7		0.3	450	0		26		79		0.3			62	370	271	0		462		7.9	
301336				10		0.34		0.03			0.15			4.2			7.5	550	150		200			8.9	
301401 CBD		14	57	16		2	289	3.7	5	9	0.06	207		0.05			161	332	72	0		633	574	8.6	
301412 DB				7.5		0.33		0.03			0			3.2			6	350	5		10			9.1	
301412 DB										0.01															
301519 D		14	30	18		0.4	476	3.4	4	6		187		L1			2	440	58	0		495	525	8.2	
301531		0.01	72	13		0.4	17	0		0.01		87		0			TR	125	TR	0		189		9.8	
301531 BB		0.01		13		L.1		L.01		0		230					27.5	260		12.5	1.5	310.5		8.2	
301531 CC		11	42	4		0	185	1.66		6		97		0.8			35	220	52	0		286		8.6	
301531 CC		0.01	121	6		0	100	7.2		0		134		0			TR	280	TR	0		310		9.7	
311423 BC1	0.2	88	0	32		0.4	416			51				0.5			415		429	86			1020	8	
311426		100		24		L.1		L.01		40		336					13	348		246	636	660		8.2	

APPENDIX C

ROCKY BOY'S WATER SYSTEM

WTER QUALITY DATA AND

EPA SAFE DRINKING WATER

STANDARDS AND CRITERIA

ROCKY BOY'S WATER SYSTEM

WATER QUALITY DATA

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9307-103177

Client Name: PARKER SCHOOL WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY RT.
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: PARKER SCHOOL WATER SYSTEM(002)

Date Sampled: 7-30-93
Date Received: 8-1-93
Date Extracted:
EPA 505 & 504: 8-5-93
EPA 525: 8-3-93
EPA 515.1: 8-4-93
EPA 531.1: 8-28-93
Date analyzed:
EPA 505 & 504: 8-5-93
EPA 525: 8-9-93
EPA 515.1: 8-27-93
EPA 531.1: 8-13-93

Sampled By: JAMES HOULE

Comments: METHOD 515.1 WAS COMPOSITED
C9308-103177
C9308-103187
C9308-103238
C9308-103239
C9308-103240
METHOD 531.1 WAS COMPOSITED
C9308-103177
C9308-103238
C9308-103239
C9308-103240

Analysts: Bradford A. Towle & Jill F. Cohenour

BAT JFC

Laboratory Number: C9307-103177-A

SYNTHETIC ORGANIC COMPOUNDS ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504:			
PCB's	ND	1	5
Toxaphene	ND	.5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.3	4
Aldrin	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Metolachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9307-103177

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (vydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-Hydroxycarbofuran	ND	1	N/A
Methamyl	ND	.5	N/A

ND - Analyte not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

** DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9308-103177

Client Name: PARKER SCHOOL WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY PT.
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: PARKER SCHOOL WATER SYSTEM(002)

Date Sampled: 7-30-93
Date Received: 8-2-93
Date Extracted: NA
Date Analyzed: 8-12-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED.
C9308-103177
C9308-103195
C9308-103196
C9308-103197
C9308-103198

Analyst: Dennis L. Braun DLB Date: 9-8-93

Laboratory Number: C9308-103177

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromomethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans-1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis-1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochloromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis-1,3-Dichloropropene	ND	N-Butylbenzene	ND
Toluene	ND	1,2-Dibromo-3-Chloropropane	ND
trans-1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND-Compounds not detected above the method detection limit of 2.5 ug/l, except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

Rec'd 10-15-93

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

CCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

October 14, 1993

a#	testname	sampleid	date	reported	units
					R
	08-103177 IRON		07/30/93	< 0.01	MG/L
9	308-103177 CHROMIUM		07/30/93	0.002	MG/L
	08-103177 BARIUM		07/30/93	0.027	MG/L
	08-103177 ALKALINITY IN WATER		07/30/93	226	MG/L
9	308-103177 ARSENIC		07/30/93	< 0.001	MG/L
	08-103177 MERCURY IN WATER-COMPOSITE OF 5		07/30/93	< 0.001	MG/L
	08-103177 SULFATE IN WATER		07/30/93	17	MG/L
9	308-103177 TOTAL HARDNESS AS CACO3		07/30/93	136	MG/L
	08-103177 MAGNESIUM		07/30/93	16.7	MG/L
	08-103177 CADMIUM		07/30/93	< 0.001	MG/L
9	308-103177 VOLATILE ORGANIC COMPOSITE		07/30/93	ATTACHED	UG/L
	08-103177 HERBICIDES IN WATER-COMPOSITE OF 5		07/30/93	ATTACHED	
9	308-103177 SELENIUM		07/30/93	< 0.001	MG/L
	08-103177 MANGANESE		07/30/93	< 0.001	MG/L
	08-103177 HARDNESS GRAINS PER GALLON		07/30/93	8.0	G/PG
	08-103177 CALCIUM		07/30/93	27	MG/L
9	308-103177 SOC'S BY EPA 505/504		07/30/93	ATTACHED	
	08-103177 FLUORIDE IN WATER		07/30/93	0.2	MG/L
	08-103177 SODIUM		07/30/93	47.3	MG/L
9	308-103177 VOLATILE ORGANIC COMPOSITE		07/30/93	ATTACHED	UG/L
	08-103177 SOC'S BY EPA 525		07/30/93	ATTACHED	
	08-103177 CARBAMATES IN WATER-COMPOSITE OF 5		07/30/93	ATTACHED	
9	308-103177 SPECIFIC CONDUCTANCE		07/30/93	457	UMHOS
	08-103177 NITRATE PLUS NITRITE AS N		07/30/93	0.69	MG/L
	08-103177 pH IN WATER		07/30/93	8.22	UNITS

PROVED BY: DCB

OR QUESTIONS CONCERNING THIS ANALYSIS CALL 406-444-2642

October 14, 199

lab#	testname	sampleid	date	reported	units
09308-103177	LEAD		07/30/93	< 0.001	MG/L

APPROVED BY: J.L.B.

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9308-103198

Client Name: BOX ELDER WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY RT.
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: BOX ELDER WATER SYSTEM (005)

Date sampled: 7-30-93
Date received: 8-2-93
Date extracted:
EPA 505 & 504 8-5-93
EPA 525 8-3-93
EPA 515.1 8-4-93
EPA 531.1 8-28-93
Date analyzed:
EPA 505 & 504 8-5-93
EPA 525 8-9-93
EPA 515.1 8-27-93
EPA 531.1 8-13-93

Sampled By: JAMES HOULE

Comments: METHOD 515.1 WAS COMPOSITED
C9308-103198
C9308-103300
C9308-103301

METHOD 531.1 WAS COMPOSITED
C9308-103197
C9308-103198
C9308-103300
C9308-103301
C9308-103411

Analyst: Bradford A. Towle & Jill F. Cohenour

BAT JFC

Laboratory Number: C9308-103198

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504:			
PCB's	ND	.1	.5
Toxaphene	ND	5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	.6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.3	4
Aldicarb	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Metolachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9308-103198

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
**EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (yydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-Hydroxycarbofuran	ND	1	N/A
Methamyl	ND	.5	N/A

ND - Analyte not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9308-103198

Client Name: BOX ELDER WATER SYSTEM
Address: P.O. BOX 544, ROCKY BOY RT
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: BOX ELDER WATER SYSTEM(005)
(005)

Date Sampled: 7-30-93
Date Received: 8-2-93
Date Extracted: NA
Date Analyzed: 8-12-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED
C9308-103177
C9308-103195
C9308-103196
C9308-103197
C9308-103198

Analyst: Dennis L. Braun DLB Date: 9-8-93

Laboratory Number: C9308-103198

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromomethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans-1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis-1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochloromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis-1,3-Dichloropropene	ND	N-Butylbenzene	ND
Toluene	ND	1,2-Dibromo-3-Chloropropane	ND
trans-1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND-Compounds not detected above the method detection limit of 2.5 ug/l, except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

Recd 10-20-93 pm

LABORATORY SYSTEM

CCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

October 18, 1993

#	testname	sampleid	date	reported	units
08-103198	ALKALINITY IN WATER	005 BOX ELDER WATER SYS	07/30/93	410 R	MG/L
308-103198	ARSENIC	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
308-103198	BARIUM	005 BOX ELDER WATER SYS	07/30/93	0.082	MG/L
08-103198	CALCIUM	005 BOX ELDER WATER SYS	07/30/93	72.8	MG/L
9308-103198	CADMIUM	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
08-103198	CHROMIUM	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
308-103198	SOC'S BY EPA 505/504	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	
308-103198	HERBICIDES IN WATER-COMPOSITE OE 5	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	
308-103198	SOC'S BY EPA 525	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	
9308-103198	CARBAMATES IN WATER-COMPOSITE OE 5	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	
08-103198	FLUORIDE IN WATER	005 BOX ELDER WATER SYS	07/30/93	0.3	MG/L
08-103198	IRON	005 BOX ELDER WATER SYS	07/30/93	< 0.01	MG/L
08-103198	HARDNESS GRAINS PER GALLON	005 BOX ELDER WATER SYS	07/30/93	17.8	G/PG
08-103198	TOTAL HARDNESS AS CACO3	005 BOX ELDER WATER SYS	07/30/93	305	MG/L

ROVED BY: DB

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

October 18, 1993

lab#	testname	sampleid	date	reported	units
					R
C9308-103198	MERCURY IN WATER-COMPOSITE OF 5	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
C9308-103198	MAGNESIUM	005 BOX ELDER WATER SYS	07/30/93	29.9	MG/L
C9308-103198	MANGANESE	005 BOX ELDER WATER SYS	07/30/93	< 0.005	MG/L
C9308-103198	SODIUM	005 BOX ELDER WATER SYS	07/30/93	77.8	MG/L
C9308-103198	NITRATE PLUS NITRITE AS N	005 BOX ELDER WATER SYS	07/30/93	2.57	MG/L
C9308-103198	LEAD	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
C9308-103198	pH IN WATER	005 BOX ELDER WATER SYS	07/30/93	8.39	UNITS
C9308-103198	SELENIUM	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
C9308-103198	SULFATE IN WATER	005 BOX ELDER WATER SYS	07/30/93	46	MG/L
C9308-103198	SPECIFIC CONDUCTANCE	005 BOX ELDER WATER SYS	07/30/93	870	UMHOS
C9308-103198	VOLATILE ORGANIC COMPOSITE	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	UG/L

APPROVED BY: DLB

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL (406-444-2642

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9308-103197

Client Name: AZURE SITE WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY RT
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: AZURE SITE WATER SYSTEM (004)

Date sampled: 7-30-93
Date received: 8-2-93
Date extracted:
EPA 505 & 504 8-5-93
EPA 525 8-3-93
EPA 515.1 8-4-93
EPA 531.1 8-28-93
Date analyzed:
EPA 505 & 504 8-5-93
EPA 525 8-9-93
EPA 515.1 8-27-93
EPA 531.1 8-13-93

Sampled By: JAMES HOWLETT

Comments: METHOD 515.1 WAS COMPOSITED
C9308-103193
C9308-103194
C9308-103195
C9308-103196
C9308-103197
METHOD 531.1 WAS COMPOSITED
C9308-103197
C9308-103198
C9308-103800
C9308-103801
C9308-103811

Analysts: Bradford A. Towle, Judith F. Conenour

BAT JFC

Laboratory Number: C9308-103197

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504:			
PCB's	ND	.1	.5
Toxaphene	ND	.5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	.6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.8	4
Aldrin	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Metolachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9308-1031974

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (Vydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-Hydroxycarbofuran	ND	1	N/A
Methomyl	ND	.5	N/A

ND - Analyte not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

** - DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9308-103197

Client Name: AZURE SITE WATER SYSTEM
Address: P O BOX 544 / ROCKY BOY RT
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: AZURE SITE WATER SYSTEM(006)

Date Sampled: 7-30-93
Date Received: 8-2-93
Date Extracted: NA
Date Analyzed: 8-12-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED.
C9308-103177
C9308-103195
C9308-103196
C9308-103197
C9308-103198

Analyst: Dennis L. Braun DLB Date: 9-8-93

Laboratory Number: C9308-103197

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromomethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans 1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis 1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochloromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis 1,3 Dichloropropene	ND	N-Butylbenzene	ND
[illegible]	ND	1,2-Dibromo-3-Chloropropane	ND
trans 1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND-Compounds not detected above the method detection limit of 2.5 ug/l, except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

Rec'd 10-15-93

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

COUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

October 14, 1993

	testname	sampleid	date	reported	units
					R
8-103197	HERBICIDES IN WATER-COMPOSITE OF 5	004 AZURE SITE	07/30/93	ATTACHED	
08-103197	VOLATILE ORGANIC COMPOSITE	004 AZURE SITE	07/30/93	ATTACHED	UG/L
8-103197	BARIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
08-103197	MANGANESE	004 AZURE SITE	07/30/93	< 0.005	MG/L
08-103197	CARBAMATES IN WATER-COMPOSITE OF 5	004 AZURE SITE	07/30/93	ATTACHED	
8-103197	LEAD	004 AZURE SITE	07/30/93	< 0.001	MG/L
308-103197	SODIUM	004 AZURE SITE	07/30/93	87.5	MG/L
08-103197	MERCURY IN WATER-COMPOSITE OF 5	004 AZURE SITE	07/30/93	< 0.001	MG/L
08-103197	CHROMIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
08-103197	ALKALINITY IN WATER	004 AZURE SITE	07/30/93	183	MG/L
08-103197	NITRATE PLUS NITRITE AS N	004 AZURE SITE	07/30/93	< 0.01	MG/L
08-103197	SPECIFIC CONDUCTANCE	004 AZURE SITE	07/30/93	440	UMHOS
308-103197	CADMIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
08-103197	MAGNESIUM	004 AZURE SITE	07/30/93	2.6	MG/L
08-103197	CALCIUM	004 AZURE SITE	07/30/93	6.8	MG/L
308-103197	SOC'S BY EPA 505/504	004 AZURE SITE	07/30/93	ATTACHED	
08-103197	FLUORIDE IN WATER	004 AZURE SITE	07/30/93	0.4	MG/L
08-103197	SOC'S BY EPA 525	004 AZURE SITE	07/30/93	ATTACHED	
08-103197	SULFATE IN WATER	004 AZURE SITE	07/30/93	37	MG/L
08-103197	IRON	004 AZURE SITE	07/30/93	< 0.01	MG/L
08-103197	SELENIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
08-103197	pH IN WATER	004 AZURE SITE	07/30/93	8.91	UNITS
308-103197	VOLATILE ORGANIC COMPOSITE	004 AZURE SITE	07/30/93	ATTACHED	UG/L
08-103197	ARSENIC	004 AZURE SITE	07/30/93	< 0.001	MG/L
08-103197	HARDNESS GRAINS PER GALLON	004 AZURE SITE	07/30/93	1.6	G/PG

APPROVED BY:

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

October 14, 19

lab#	testname	sampleid	date	reported	units
C9308-103197	TOTAL HARDNESS AS CACO3	004 AZURE SITE	07/30/93	28	MG/L

APPROVED BY:

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9308-103195

Client Name: NEWTOWN WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY RT.
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: NEW TOWN WATER SYSTEM (001)

Date sampled: 7-30-93
Date received: 8-2-93
Date extracted:
EPA 505 & 504 8-5-93
EPA 525 8-3-93
EPA 515.1 8-4-93
EPA 531.1 8-28-93
Date analyzed:
EPA 505 & 504 8-5-93
EPA 525 8-9-93
EPA 515.1 8-27-93
EPA 531.1 8-13-93

Sampled By: JAMES HOULE

Comments: METHOD 515.1 WAS COMPOSITED
C9308-103193
C9308-103194
C9308-103195
C9308-103196
C9308-103197
METHOD 531.1 WAS COMPOSITED
C9308-103193
C9308-103194
C9308-103195
C9308-103196

Approved: Bradford A. Towle & Julie F. Cohenour

Laboratory Number: C9308-103195

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504.1			
PCB's	ND	.1	.5
Toxaphene	ND	.5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	.6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.3	4
Aldrin	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Ketofachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9308-103195

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (vydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-hydroxycarbofuran	ND	1	N/A
Methamyl	ND	.5	N/A

ND = Analyte not detected at the stated detection limit.
N/A = No maximum contaminant level is established at this time.

** DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9308-103195

Client Name: NEWTOWN WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY RT.
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: NEWTOWN WATER SYSTEM(001)

Date Sampled: 7-30-93
Date Received: 8-2-93
Date Extracted: NA
Date Analyzed: 8-12-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED.
C9308-103177
C9308-103195
C9308-103196
C9308-103197
C9308-103198

Analyst: Dennis L. Braun DLB Date: 9-8-93

Laboratory Number: C9308-103195

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromomethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans 1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis 1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochoromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis 1,3-Dichloropropene	ND	N-Butylbenzene	ND
Toluene	ND	1,2-Dibromo-3-Chloropropane	ND
trans 1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND-Compounds not detected above the method detection limit of 2.5 ug/l, except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9308-103196

Client Name: EAGLEMEN WATER SYSTEM
Address: P.O. BOX 544 ROCKY BOY RT.
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: EAGLEMEN WATER SYSTEM (003)

Date sampled: 7-30-93
Date received: 8-2-93
Date extracted:
EPA 505 & 504 8-5-93
EPA 525 8-3-93
EPA 515.1 8-4-93
EPA 531.1 8-28-93
Date analyzed:
EPA 505 & 504 8-5-93
EPA 525 8-9-93
EPA 515.1 8-27-93
EPA 531.1 8-13-93

Sampled By: JAMES HOULE

Comments: METHOD 515.1 WAS COMPOSITED
C9308-103193
C9308-103194
C9308-103195
C9308-103196
C9308-103197
METHOD 531.1 WAS COMPOSITED
C9308-103193
C9308-103194
C9308-103195
C9308-103196

Analysts: Bradford A. Towle & Jill F. Cohenour

BT JC

Laboratory Number: C9308-103196

SYNTHETIC ORGANIC COMPOUNDS ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504:			
PCB's	ND	.1	.5
Toxaphene	ND	.5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	.6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.3	4
Aldrin	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Metolachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9308-103196

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (vydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-Hydroxycarbofuran	ND	1	N/A
Methamyl	ND	.5	N/A

ND = Analyte not detected at the stated detection limit.
N/A = No maximum contaminant level is established at this time.

** DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9308-103196

Client Name: EAGLEMEN WATER SYSTEM
Address: P.O. BOX 544/ ROCKY BOY RT
BOX ELDER, MT 59521

Account #: B0000031

Sample ID: EAGLEMEN WATER SYSTEM(003)

Date Sampled: 7-30-93
Date Received: 8-2-93
Date Extracted: NA
Date Analyzed: 8-12-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED.
C9308-103177
C9308-103195
C9308-103196
C9308-103197
C9308-103198

Analyst: Dennis L. Braun DLB Date: 9-8-93

Laboratory Number: C9308-103196

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromomethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans 1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis 1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochloromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis 1,3-Dichloropropene	ND	N-Butylbenzene	ND
Toluene	ND	1,2-Dibromo-3-Chloropropane	ND
trans 1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND Compounds not detected above the method detection limit of 2.5 ug/l, except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

Rec'd 10-15-93

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

ACCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

October 14, 1993

lb#	testname	sampleid	date	reported	units
					R
9308-103195	HERBICIDES IN WATER-COMPOSITE OF 5	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
9308-103195	FLUORIDE IN WATER	NEWTOWN WATER SYSTEM	07/30/93	0.2	MG/L
9308-103195	ALKALINITY IN WATER	NEWTOWN WATER SYSTEM	07/30/93	242	MG/L
9308-103195	NITRATE PLUS NITRITE AS N	NEWTOWN WATER SYSTEM	07/30/93	1.46	MG/L
9308-103195	VOLATILE ORGANIC COMPOSITE	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	UG/L
9308-103195	CADMIUM	NEWTOWN WATER SYSTEM	07/30/93	< 0.001	MG/L
9308-103195	SPECIFIC CONDUCTANCE	NEWTOWN WATER SYSTEM	07/30/93	486	UMHOS
9308-103195	VOLATILE ORGANIC COMPOSITE	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	UG/L
9308-103195	MERCURY IN WATER-COMPOSITE OF 5	NEWTOWN WATER SYSTEM	07/30/93	< 0.001	MG/L
9308-103195	MAGNESIUM	NEWTOWN WATER SYSTEM	07/30/93	5.9	MG/L
9308-103195	LEAD	NEWTOWN WATER SYSTEM	07/30/93	0.001	MG/L
9308-103195	MANGANESE	NEWTOWN WATER SYSTEM	07/30/93	< 0.005	MG/L
9308-103195	BARIUM	NEWTOWN WATER SYSTEM	07/30/93	0.006	MG/L
9308-103195	SODIUM	NEWTOWN WATER SYSTEM	07/30/93	94.5	MG/L
9308-103195	CHROMIUM	NEWTOWN WATER SYSTEM	07/30/93	< 0.001	MG/L
9308-103195	SOC'S BY EPA 505/504	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
9308-103195	HARDNESS GRAINS PER GALLON	NEWTOWN WATER SYSTEM	07/30/93	3.3	G/PG
9308-103195	CARBAMATES IN WATER-COMPOSITE OF 4	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
9308-103195	CALCIUM	NEWTOWN WATER SYSTEM	07/30/93	12.7	MG/L
9308-103195	ARSENIC	NEWTOWN WATER SYSTEM	07/30/93	0.001	MG/L
9308-103195	SELENIUM	NEWTOWN WATER SYSTEM	07/30/93	0.001	MG/L
9308-103195	pH IN WATER	NEWTOWN WATER SYSTEM	07/30/93	8.66	UNITS
9308-103195	TOTAL HARDNESS AS CACO3	NEWTOWN WATER SYSTEM	07/30/93	56	MG/L
9308-103195	IRON	NEWTOWN WATER SYSTEM	07/30/93	0.06	MG/L
9308-103195	SOC'S BY EPA 525	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	

APPROVED BY: DNB

**FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 1406-444-2642

lab#	testname	sampleid	date	reported	unit
C9308-103195	SULFATE IN WATER	NEWTOWN WATER SYSTEM	07/30/93	14	MG/I
C9308-103196	NITRATE PLUS NITRITE AS N	003 EAGLEMAN WATER SYS	07/30/93	0.04	MG/L
C9308-103196	SOC'S BY EPA 505/504	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
C9308-103196	SOC'S BY EPA 525	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
C9308-103196	CARBAMATES IN WATER-COMPOSITE OF 4	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
C9308-103196	pH IN WATER	003 EAGLEMAN WATER SYS	07/30/93	9.53	UNIT
C9308-103196	SULFATE IN WATER	003 EAGLEMAN WATER SYS	07/30/93	13	MG/L
C9308-103196	MAGNESIUM	003 EAGLEMAN WATER SYS	07/30/93	1.1	MG/
C9308-103196	ARSENIC	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
C9308-103196	LEAD	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/
C9308-103196	MANGANESE	003 EAGLEMAN WATER SYS	07/30/93	< 0.005	MG/L
C9308-103196	CALCIUM	003 EAGLEMAN WATER SYS	07/30/93	3	MG/
C9308-103196	SODIUM	003 EAGLEMAN WATER SYS	07/30/93	127	MG/
C9308-103196	HERBICIDES IN WATER-COMPOSITE OF 5	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
C9308-103196	SELENIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/
C9308-103196	CADMIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
C9308-103196	MERCURY IN WATER-COMPOSITE OF 5	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/
C9308-103196	ALKALINITY IN WATER	003 EAGLEMAN WATER SYS	07/30/93	284	MG/
C9308-103196	VOLATILE ORGANIC COMPOSITE	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	UG/L
C9308-103196	FLUORIDE IN WATER	003 EAGLEMAN WATER SYS	07/30/93	0.2	MG/
C9308-103196	TOTAL HARDNESS AS CACO3	003 EAGLEMAN WATER SYS	07/30/93	12	MG/L
C9308-103196	CHROMIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/
C9308-103196	HARDNESS GRAINS PER GALLON	003 EAGLEMAN WATER SYS	07/30/93	0.7	G/PG
C9308-103196	BARIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/
C9308-103196	VOLATILE ORGANIC COMPOSITE	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	UG/

APPROVED BY: DJB

FOR QUESTIONS CONCERNING THIS ANALYSIS, CALL: 406-444-2642

October 14, 1993

b#	testname	sampleid	date	reported	units
					R
9308-103196	IRON	003 EAGLEMAN WATER SYS	07/30/93	< 0.01	MG/L
9308-103196	SPECIFIC CONDUCTANCE	003 EAGLEMAN WATER SYS	07/30/93	581	UMHOS

APPROVED BY:

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

Recd 12-8-93

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA 59620-0901
LABORATORY SYSTEM

ACCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

November 29, 1993

#	testname	sampleid	date	reported	units
9308-103177	CADMIUM		07/30/93	< 0.001	MG/L
308-103177	BARIUM		07/30/93	0.027	MG/L
308-103177	ALKALINITY IN WATER		07/30/93	226	MG/L
308-103177	HARDNESS GRAINS PER GALLON		07/30/93	8.0	G/PG
9308-103177	SULFATE IN WATER		07/30/93	17	MG/L
308-103177	CHROMIUM		07/30/93	0.002	MG/L
308-103177	IRON		07/30/93	< 0.01	MG/L
308-103177	TOTAL HARDNESS AS CACO3		07/30/93	136	MG/L
9308-103177	SODIUM		07/30/93	47.3	MG/L
308-103177	pH IN WATER		07/30/93	8.22	UNITS
308-103177	FLUORIDE IN WATER		07/30/93	0.2	MG/L
308-103177	SPECIFIC CONDUCTANCE		07/30/93	457	UMHOS
9308-103177	VOLATILE ORGANIC COMPOSITE		07/30/93	ATTACHED	UG/L
308-103177	CALCIUM		07/30/93	27	MG/L
308-103177	MERCURY IN WATER-COMPOSITE OF 5		07/30/93	< 0.001	MG/L
9308-103177	HERBICIDES IN WATER-COMPOSITE OF 5		07/30/93	ATTACHED	
308-103177	NITRATE PLUS NITRITE AS N		07/30/93	0.69	MG/L
308-103177	LEAD		07/30/93	< 0.001	MG/L
9308-103177	ARSENIC		07/30/93	< 0.001	MG/L
9308-103177	SOC'S BY EPA 525		07/30/93	ATTACHED	
308-103177	SELENIUM		07/30/93	< 0.001	MG/L
308-103177	CARBAMATES IN WATER-COMPOSITE OF 5		07/30/93	ATTACHED	
9308-103177	SOC'S BY EPA 505/504		07/30/93	ATTACHED	
308-103177	MANGANESE		07/30/93	< 0.001	MG/L

APPROVED BY: DLB

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

November 29, 1993

lab#	testname	sampleid	date	reported	units
					I
C9308-103177	MAGNESIUM		07/30/93	16.7	MG/L
C9308-103195	FLUORIDE IN WATER	NEWTOWN WATER SYSTEM	07/30/93	0.2	MG/L
C9308-103195	ALKALINITY IN WATER	NEWTOWN WATER SYSTEM	07/30/93	242	MG/L
C9308-103195	SODIUM	NEWTOWN WATER SYSTEM	07/30/93	94.5	MG/L
C9308-103195	pH IN WATER	NEWTOWN WATER SYSTEM	07/30/93	8.66	UNITS
C9308-103195	SOC'S BY EPA 505/504	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
C9308-103195	CALCIUM	NEWTOWN WATER SYSTEM	07/30/93	12.7	MG/L
C9308-103195	SOC'S BY EPA 525	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
C9308-103195	LEAD	NEWTOWN WATER SYSTEM	07/30/93	0.001	MG/L
C9308-103195	ARSENIC	NEWTOWN WATER SYSTEM	07/30/93	0.001	MG/L
C9308-103195	NITRATE PLUS NITRITE AS N	NEWTOWN WATER SYSTEM	07/30/93	1.46	MG/L
C9308-103195	MANGANESE	NEWTOWN WATER SYSTEM	07/30/93	< 0.005	MG/L
C9308-103195	SPECIFIC CONDUCTANCE	NEWTOWN WATER SYSTEM	07/30/93	486	UMHOS
C9308-103195	SELENIUM	NEWTOWN WATER SYSTEM	07/30/93	0.001	MG/L
C9308-103195	CADMIUM	NEWTOWN WATER SYSTEM	07/30/93	< 0.001	MG/L
C9308-103195	MERCURY IN WATER-COMPOSITE OF 5	NEWTOWN WATER SYSTEM	07/30/93	< 0.001	MG/L
C9308-103195	CHROMIUM	NEWTOWN WATER SYSTEM	07/30/93	< 0.001	MG/L
C9308-103195	SULFATE IN WATER	NEWTOWN WATER SYSTEM	07/30/93	14	MG/L
C9308-103195	BARIUM	NEWTOWN WATER SYSTEM	07/30/93	0.006	MG/L
C9308-103195	HARDNESS GRAINS PER GALLON	NEWTOWN WATER SYSTEM	07/30/93	3.3	G/PG
C9308-103195	IRON	NEWTOWN WATER SYSTEM	07/30/93	0.06	MG/L
C9308-103195	CARBAMATES IN WATER-COMPOSITE OF 4	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
C9308-103195	MAGNESIUM	NEWTOWN WATER SYSTEM	07/30/93	5.9	MG/L
C9308-103195	VOLATILE ORGANIC COMPOSITE	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	UG/L
C9308-103195	HERBICIDES IN WATER-COMPOSITE OF 5	NEWTOWN WATER SYSTEM	07/30/93	ATTACHED	
C9308-103195	TOTAL HARDNESS AS CACO3	NEWTOWN WATER SYSTEM	07/30/93	56	MG/L
C9308-103196	LEAD	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
C9308-103196	NITRATE PLUS NITRITE AS N	003 EAGLEMAN WATER SYS	07/30/93	0.04	MG/L
C9308-103196	MANGANESE	003 EAGLEMAN WATER SYS	07/30/93	< 0.005	MG/L
C9308-103196	FLUORIDE IN WATER	003 EAGLEMAN WATER SYS	07/30/93	0.2	MG/L
C9308-103196	CARBAMATES IN WATER-COMPOSITE OF 4	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
C9308-103196	pH IN WATER	003 EAGLEMAN WATER SYS	07/30/93	9.53	UNITS
C9308-103196	SULFATE IN WATER	003 EAGLEMAN WATER SYS	07/30/93	13	MG/I
C9308-103196	SPECIFIC CONDUCTANCE	003 EAGLEMAN WATER SYS	07/30/93	581	UMHOS
C9308-103196	IRON	003 EAGLEMAN WATER SYS	07/30/93	< 0.01	MG/I
C9308-103196	MAGNESIUM	003 EAGLEMAN WATER SYS	07/30/93	11.1	MG/L

APPROVED BY: DCB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

November 29, 1993

lab#	testname	sampleid	date	reported	units
		SYS			
9308-103196	CHROMIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L R
9308-103196	HERBICIDES IN WATER-COMPOSITE OF 5	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
9308-103196	MERCURY IN WATER-COMPOSITE OF 5	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
9308-103196	BARIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
9308-103196	TOTAL HARDNESS AS CACO3	003 EAGLEMAN WATER SYS	07/30/93	12	MG/L
9308-103196	SODIUM	003 EAGLEMAN WATER SYS	07/30/93	127	MG/L
9308-103196	SELENIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
9308-103196	VOLATILE ORGANIC COMPOSITE	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	UG/L
9308-103196	SOC'S BY EPA 505/504	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
9308-103196	CALCIUM	003 EAGLEMAN WATER SYS	07/30/93	3	MG/L
9308-103196	ALKALINITY IN WATER	003 EAGLEMAN WATER SYS	07/30/93	284	MG/L
9308-103196	HARDNESS GRAINS PER GALLON	003 EAGLEMAN WATER SYS	07/30/93	0.7	G/PG
9308-103196	CADMIUM	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
9308-103196	SOC'S BY EPA 525	003 EAGLEMAN WATER SYS	07/30/93	ATTACHED	
9308-103196	ARSENIC	003 EAGLEMAN WATER SYS	07/30/93	< 0.001	MG/L
9308-103197	SOC'S BY EPA 505/504	004 AZURE SITE	07/30/93	ATTACHED	
9308-103197	pH IN WATER	004 AZURE SITE	07/30/93	8.91	UNITS
9308-103197	NITRATE PLUS NITRITE AS N	004 AZURE SITE	07/30/93	< 0.01	MG/L
9308-103197	SODIUM	004 AZURE SITE	07/30/93	87.5	MG/L
9308-103197	SELENIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
9308-103197	CALCIUM	004 AZURE SITE	07/30/93	6.8	MG/L
9308-103197	ARSENIC	004 AZURE SITE	07/30/93	< 0.001	MG/L
9308-103197	SULFATE IN WATER	004 AZURE SITE	07/30/93	37	MG/L
9308-103197	ALKALINITY IN WATER	004 AZURE SITE	07/30/93	183	MG/L
9308-103197	CARBAMATES IN WATER-COMPOSITE OF 5	004 AZURE SITE	07/30/93	ATTACHED	
9308-103197	MANGANESE	004 AZURE SITE	07/30/93	< 0.005	MG/L
9308-103197	HERBICIDES IN WATER-COMPOSITE OF 5	004 AZURE SITE	07/30/93	ATTACHED	
9308-103197	SOC'S BY EPA 525	004 AZURE SITE	07/30/93	ATTACHED	
9308-103197	HARDNESS GRAINS PER GALLON	004 AZURE SITE	07/30/93	1.6	G/PG

APPROVED BY: DGB

**FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

November 29, 199

lab#	testname	sampleid	date	reported	units
C9308-103197	LEAD	004 AZURE SITE	07/30/93	< 0.001	MG/
C9308-103197	SPECIFIC CONDUCTANCE	004 AZURE SITE	07/30/93	440	UMHO
C9308-103197	CADMIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
C9308-103197	VOLATILE ORGANIC COMPOSITE	004 AZURE SITE	07/30/93	ATTACHED	UG/
C9308-103197	IRON	004 AZURE SITE	07/30/93	< 0.01	MG/
C9308-103197	MAGNESIUM	004 AZURE SITE	07/30/93	2.6	MG/
C9308-103197	TOTAL HARDNESS AS CACO3	004 AZURE SITE	07/30/93	28	MG/L
C9308-103197	MERCURY IN WATER-COMPOSITE OF 5	004 AZURE SITE	07/30/93	< 0.001	MG/
C9308-103197	CHROMIUM	004 AZURE SITE	07/30/93	< 0.001	MG/
C9308-103197	BARIUM	004 AZURE SITE	07/30/93	< 0.001	MG/L
C9308-103197	FLUORIDE IN WATER	004 AZURE SITE	07/30/93	0.4	MG/
C9308-103198	LEAD	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/
C9308-103198	MANGANESE	005 BOX ELDER WATER SYS	07/30/93	< 0.005	MG/L
C9308-103198	SULFATE IN WATER	005 BOX ELDER WATER SYS	07/30/93	46	MG/
C9308-103198	VOLATILE ORGANIC COMPOSITE	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	UG/L
C9308-103198	IRON	005 BOX ELDER WATER SYS	07/30/93	< 0.01	MG
C9308-103198	SODIUM	005 BOX ELDER WATER SYS	07/30/93	77.8	MG/L
C9308-103198	FLUORIDE IN WATER	005 BOX ELDER WATER SYS	07/30/93	0.3	MG
C9308-103198	SELENIUM	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
C9308-103198	pH IN WATER	005 BOX ELDER WATER SYS	07/30/93	8.39	UNI
C9308-103198	CADMIUM	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L
C9308-103198	SPECIFIC CONDUCTANCE	005 BOX ELDER WATER SYS	07/30/93	870	UMH
C9308-103198	BARIUM	005 BOX ELDER WATER SYS	07/30/93	0.082	MG/L
C9308-103198	HARDNESS/GRAINS PER GALLON	005 BOX ELDER WATER SYS	07/30/93	17.8	G/
C9308-103198	SOC'S BY EPA 525	005 BOX ELDER WATER SYS	07/30/93	ATTACHED	
C9308-103198	NITRATE PLUS NITRITE AS N	005 BOX ELDER WATER SYS	07/30/93	2.57	MG
C9308-103198	MERCURY IN WATER-COMPOSITE OF 5	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/
C9308-103198	MAGNESIUM	005 BOX ELDER WATER SYS	07/30/93	29.9	MG
C9308-103198	ARSENIC	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/

APPROVED BY: DLB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

November 29, 1993

)#	testname	sampleid	date	reported	units	R
308-103198	SOC'S BY EPA 505/504	005 BOX ELDER WATER SYS	07/30/93	ATTACHED		
9308-103198	TOTAL HARDNESS AS CACO3	005 BOX ELDER WATER SYS	07/30/93	305	MG/L	
308-103198	CARBAMATES IN WATER-COMPOSITE OF 5	005 BOX ELDER WATER SYS	07/30/93	ATTACHED		
9308-103198	CALCIUM	005 BOX ELDER WATER SYS	07/30/93	72.8	MG/L	
308-103198	CHROMIUM	005 BOX ELDER WATER SYS	07/30/93	< 0.001	MG/L	
9308-103198	HERBICIDES IN WATER-COMPOSITE OF 3	005 BOX ELDER WATER SYS	07/30/93	ATTACHED		
308-103198	ALKALINITY IN WATER	005 BOX ELDER WATER SYS	07/30/93	410	MG/L	

PROVED BY: DLR

*FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

ACCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER, MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

January 7, 1994

i	testname	sampleid	date	reported	units R
9	12-106617 LEAD	BOX ELDER-SWAN		0.001	MG/L
9	12-106617 COPPER	BOX ELDER-SWAN		0.69	MG/L
9	12-106618 LEAD	BOX ELDER-ROSETTE JR.		0.011	MG/L
9	12-106618 COPPER	BOX ELDER-ROSETTE JR.		0.30	MG/L
9	12-106619 COPPER	BOX ELDER-ALEXANDER		0.60	MG/L
9	12-106619 LEAD	BOX ELDER-ALEXANDER		0.038	MG/L
9	12-106620 COPPER	BOX ELDER-RUSSETTE		0.66	MG/L
9	12-106620 LEAD	BOX ELDER-RUSSETTE		0.019	MG/L
9	12-106621 COPPER	BOX ELDER-BACON		0.53	MG/L
9	12-106621 LEAD	BOX ELDER-BACON		0.003	MG/L
9	12-106622 LEAD	BOX ELDER-KOOPS		0.029	MG/L
9	12-106622 COPPER	BOX ELDER-KOOPS		1.93	MG/L
9	12-106623 LEAD	BOX ELDER-DENNY		0.0021	MG/L
9	12-106623 COPPER	BOX ELDER-DENNY		0.26	MG/L
9	12-106624 COPPER	BOX ELDER-HENRY		0.53	MG/L
9	12-106624 LEAD	BOX ELDER-HENRY		0.001	MG/L
9	12-106625 COPPER	BOX ELDER-PUMPHOUSE		0.03	MG/L
9	12-106625 LEAD	BOX ELDER-PUMPHOUSE		0.002	MG/L
9	12-106626 COPPER	BOX ELDER-STANLEY		0.06	MG/L
9	12-106626 LEAD	BOX ELDER-STANLEY		0.008	MG/L

APPROVED BY: DLB

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

lab#	testname	sampleid	date	reported	units
C9312-106600	COPPER	NEWTON-SMALL		1.51	MG/
C9312-106600	LEAD	NEWTON-SMALL		0.003	MG/L
C9312-106601	COPPER	NEWTON-TENDOY		0.65	MG/
C9312-106601	LEAD	NEWTON-TENDOY		0.001	MG/
C9312-106602	COPPER	NEWTON-DEARCE		0.43	MG/L
C9312-106602	LEAD	NEWTON-DEARCE		0.001	MG/
C9312-106603	COPPER	NEWTON-MITCHELL		0.49	MG/
C9312-106603	LEAD	NEWTON-MITCHELL		0.004	MG/L
C9312-106604	COPPER	NEWTON-D.J. WATSON		0.29	MG/L
C9312-106604	LEAD	NEWTON-D.J. WATSON		0.004	MG/
C9312-106605	COPPER	NEWTON-E WATSON		1.03	MG/
C9312-106605	LEAD	NEWTON-E WATSON		0.001	MG/L
C9312-106606	COPPER	NEWTON-L. GOPHER		1.04	MG/
C9312-106606	LEAD	NEWTON-L. GOPHER		0.002	MG/
C9312-106607	COPPER	NEWTON-JOHNSON		0.65	MG/L
C9312-106607	LEAD	NEWTON-JOHNSON		0.001	MG/L
C9312-106617	COPPER	BOX ELDER-SWAN		0.69	MG/
C9312-106617	LEAD	BOX ELDER-SWAN		0.001	MG/L
C9312-106618	COPPER	BOX ELDER-ROSETTE JR.		0.30	MG/L
C9312-106618	LEAD	BOX ELDER-ROSETTE JR.		0.011	MG/
C9312-106619	COPPER	BOX ELDER-ALEXANDER		0.60	MG/
C9312-106619	LEAD	BOX ELDER-ALEXANDER		0.038	MG/
C9312-106620	COPPER	BOX ELDER-RUSSETTE		0.66	MG/L
C9312-106620	LEAD	BOX ELDER-RUSSETTE		0.019	MG/L
C9312-106621	COPPER	BOX ELDER-BACON		0.53	MG/
C9312-106621	LEAD	BOX ELDER-BACON		0.003	MG/
C9312-106622	COPPER	BOX ELDER-KOOPS		1.93	MG/L
C9312-106622	LEAD	BOX ELDER-KOOPS		0.029	MG/
C9312-106623	COPPER	BOX ELDER-DENNY		0.26	MG/
C9312-106623	LEAD	BOX ELDER-DENNY		0.0021	MG/L
C9312-106624	COPPER	BOX ELDER-HENRY		0.53	MG/L
C9312-106624	LEAD	BOX ELDER-HENRY		0.001	MG/
C9312-106625	COPPER	BOX ELDER-PUMPHOUSE		0.03	MG/
C9312-106625	LEAD	BOX ELDER-PUMPHOUSE		0.002	MG/L
C9312-106626	COPPER	BOX ELDER-STANLEY		0.06	MG/
C9312-106626	LEAD	BOX ELDER-STANLEY		0.008	MG/

APPROVED BY: DLB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

ACCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

December 17, 1993

lab#	testname	sampleid	date	reported	units
					R
312-106588	COPPER	PARKER-STUMP		0.01	MG/L
C9312-106588	LEAD	PARKER-STUMP		0.004	MG/L
9312-106589	COPPER	PARKER-MYERS		1.41	MG/L
312-106589	LEAD	PARKER-MYERS		0.002	MG/L
C9312-106590	COPPER	PARKER-PUMPHOUSE		0.02	MG/L
9312-106590	LEAD	PARKER-PUMPHOUSE		0.003	MG/L
312-106591	COPPER	PARKER-ROASTING STICK		0.03	MG/L
C9312-106591	LEAD	PARKER-ROASTING STICK		0.003	MG/L
312-106592	COPPER	PARKER-GARDAPEE		0.69	MG/L
C9312-106592	LEAD	PARKER-GARDAPEE		0.019	MG/L
9312-106593	COPPER	EAGLEMEN-J EAGLEMEN		0.08	MG/L
312-106593	LEAD	EAGLEMEN-J EAGLEMEN		0.008	MG/L
C9312-106594	COPPER	EAGLEMEN-K EAGLEMEN		0.04	MG/L
9312-106594	LEAD	EAGLEMEN-K EAGLEMEN		0.011	MG/L
312-106595	COPPER	EAGLEMEN-GOPHER		< 0.01	MG/L
312-106595	LEAD	EAGLEMEN-GOPHER		< 0.001	MG/L
C9312-106596	COPPER	EAGLEMEN-TENDOY		< 0.01	MG/L
9312-106596	LEAD	EAGLEMEN-TENDOY		< 0.001	MG/L
312-106597	COPPER	EAGLEMEN-PUMPHOUSE		0.02	MG/L
C9312-106597	LEAD	EAGLEMEN-PUMPHOUSE		0.002	MG/L
9312-106598	COPPER	NEWTON-PUMPHOUSE #1		0.01	MG/L
312-106598	LEAD	NEWTON-PUMPHOUSE #1		0.003	MG/L
9312-106599	COPPER	NEWTON-PUMPHOUSE #2&3		0.01	MG/L
9312-106599	LEAD	NEWTON-PUMPHOUSE #2&3		0.004	MG/L

APPROVED BY: DCR

*FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

STATE OF MONTANA
DEPARTMENT HEALTH AND ENVIRONMENTAL SCIE
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

ACCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

January 7, 1994

#	testname	sampleid	date	reported	units
					R
312-106588	LEAD	PARKER-STUMP		0.004	MG/L
312-106588	COPPER	PARKER-STUMP		0.01	MG/L
9312-106589	LEAD	PARKER-MYERS		0.002	MG/L
312-106589	COPPER	PARKER-MYERS		1.41	MG/L
312-106590	LEAD	PARKER-PUMPHOUSE		0.003	MG/L
312-106590	COPPER	PARKER-PUMPHOUSE		0.02	MG/L
9312-106591	COPPER	PARKER-ROASTING STICK		0.03	MG/L
312-106591	LEAD	PARKER-ROASTING STICK		0.003	MG/L
312-106592	COPPER	PARKER-GARDAPEE		0.69	MG/L
312-106592	LEAD	PARKER-GARDAPEE		0.019	MG/L
9312-106593	LEAD	EAGLEMEN-J EAGLEMEN		0.008	MG/L
312-106593	COPPER	EAGLEMEN-J EAGLEMEN		0.08	MG/L
312-106594	COPPER	EAGLEMEN-K EAGLEMEN		0.04	MG/L
312-106594	LEAD	EAGLEMEN-K EAGLEMEN		0.011	MG/L
9312-106595	LEAD	EAGLEMEN-GOPHER		< 0.001	MG/L
312-106595	COPPER	EAGLEMEN-GOPHER		< 0.01	MG/L
312-106596	COPPER	EAGLEMEN-TENDOY		< 0.01	MG/L
9312-106596	LEAD	EAGLEMEN-TENDOY		< 0.001	MG/L
312-106597	LEAD	EAGLEMEN-PUMPHOUSE		0.002	MG/L
312-106597	COPPER	EAGLEMEN-PUMPHOUSE		0.02	MG/L
9312-106598	LEAD	NEWTON-PUMPHOUSE #1		0.003	MG/L
9312-106598	COPPER	NEWTON-PUMPHOUSE #1		0.01	MG/L
312-106599	LEAD	NEWTON-PUMPHOUSE #2&3		0.004	MG/L
9312-106599	COPPER	NEWTON-PUMPHOUSE #2&3		0.01	MG/L

APPROVED BY: DLB

FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

lab#	testname	sampleid	date	reported	unit	R
C9312-106600	COPPER	NEWTON-SMALL		1.51	MG/L	
C9312-106600	LEAD	NEWTON-SMALL		0.003	MG/L	
C9312-106601	COPPER	NEWTON-TENDOY		0.65	MG/L	
C9312-106601	LEAD	NEWTON-TENDOY		0.001	MG/L	
C9312-106602	LEAD	NEWTON-DEARCE		0.001	MG/L	
C9312-106602	COPPER	NEWTON-DEARCE		0.43	MG/L	
C9312-106603	COPPER	NEWTON-MITCHELL		0.49	MG/L	
C9312-106603	LEAD	NEWTON-MITCHELL		0.004	MG/L	
C9312-106604	COPPER	NEWTON-D.J. WATSON		0.29	MG/L	
C9312-106604	LEAD	NEWTON-D.J. WATSON		0.004	MG/L	
C9312-106605	LEAD	NEWTON-R WATSON		0.001	MG/L	
C9312-106605	COPPER	NEWTON-R WATSON		1.03	MG/L	
C9312-106606	LEAD	NEWTON-L. GOPHER		0.002	MG/L	
C9312-106606	COPPER	NEWTON-L. GOPHER		1.04	MG/L	
C9312-106607	LEAD	NEWTON-JOHNSON		0.001	MG/L	
C9312-106607	COPPER	NEWTON-JOHNSON		0.65	MG/L	

APPROVED BY: DLB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9309-104976

Client Name: NEW AGENCY PUMPHOUSE
Address: OPER. & MAINT. P.O. BOX 544
BOX ELDER, MT 59521

Account #:

Sample ID:

Date sampled:	09-29-93
Date received:	09-30-93
Date extracted:	
EPA 505 & 504	10-12-93
EPA 525	09-29-93
EPA 515.1	10-04-93
EPA 531.1	11-17-93
Date analyzed:	
EPA 505 & 504	10-12-93
EPA 525	10-25-93
EPA 515.1	10-22-93
EPA 531.1	11-18-93

Sampled By: JAMES HOULE

Comments: METHODS 531.1 & 515.1 WERE COMPOSITED
C9309-104950
C9309-104951
C9309-104974
C9309-104975
C9309-104976

Analyst: Bradford A. Towle & Jill F. Cohenour

BAT JFC

Laboratory Number: C9309-104976

SYNTHETIC ORGANIC COMPOUNDS ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504:			
PCB's	ND	.1	.5
Toxaphene	ND	.5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	.6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.3	4
Aldrin	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Metolachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9309-104976

SYNTHETIC ORGANIC COMPOUNDS ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (vydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-Hydroxycarbofuran	ND	1	N/A
Methamyl	ND	.5	N/A

ND - Analyte not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

** - DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9309-104976

Client Name: ROCKY BOY AGENCY
Address: P.O. BOX 544 OPER&MAINT
BOX ELDER, MT 59521

Account #:

Sample ID: NEW PUMP HOUSE (NOT IN SERVICE)

Date Sampled: 9-29-93
Date Received: 9-30-93
Date Extracted: NA
Date Analyzed: 9-30-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED.
C9309-104974
C9309-104975
C9309-104976
C9309-104980
C9309-104981

Analyst: Dennis L. Braun DLB Date: 10-18-93

Laboratory Number: C9309-104976

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromoethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans 1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis 1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochoromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis 1,3-Dichloropropene	ND	N-Butylbenzene	ND
Toluene	ND	1,2-Dibromo-3-Chloropropane	ND
trans 1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND-Compounds not detected above the method detection limit of 2.5 ug except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

ACCOUNT: B0000029 ATTN: SUPERVISOR

ROCKY BOY AGENCY
GEN DEL
BOX ELDER MT 59521-0000

FOR: ROCKY BOY AGENCY

SAMPLE ANALYSIS REPORT

January 20, 1994

lab#	testname	sampleid	date	reported	units
					R
C9309-104976	ALKALINITY IN WATER	NEW PUMP HOUSE (NOT IN SR	09/29/93	230	MG/L
C9309-104976	ARSENIC	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.001	MG/L
C9309-104976	BARIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	0.083	MG/L
C9309-104976	CALCIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	27.7	MG/L
C9309-104976	CADMIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.001	MG/L
C9309-104976	CHROMIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.001	MG/L
C9309-104976	SOC'S BY EPA 505/504	NEW PUMP HOUSE (NOT IN SR	09/29/93	ATTACHED	
C9309-104976	HERBICIDES IN WATER-COMPOSITE OF 5	NEW PUMP HOUSE (NOT IN SR	09/29/93	ATTACHED	
C9309-104976	SOC'S BY EPA 525	NEW PUMP HOUSE (NOT IN SR	09/29/93	ATTACHED	
C9309-104976	CARBAMATES IN WATER-COMPOSITE OF 5	NEW PUMP HOUSE (NOT IN SR	09/29/93	ATTACHED	
C9309-104976	FLUORIDE IN WATER	NEW PUMP HOUSE (NOT IN SR	09/29/93	0.18	MG/L
C9309-104976	IRON	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.01	MG/L
C9309-104976	HARDNESS GRAINS PER GALLON	NEW PUMP HOUSE (NOT IN SR	09/29/93	7.9	G/PG
C9309-104976	TOTAL HARDNESS AS CACO3	NEW PUMP HOUSE (NOT IN SR	09/29/93	136	MG/L

APPROVED BY: DLB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL (406) 444-2642

lab#	testname	sampleid	date	reported	units
C9309-104976	MERCURY IN WATER-COMPOSITE OF 5	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.001	MG/L
C9309-104976	MAGNESIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	16.2	MG/L
C9309-104976	MANGANESE	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.005	MG/L
C9309-104976	SODIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	55.7	MG/L
C9309-104976	NITRATE PLUS NITRITE AS N	NEW PUMP HOUSE (NOT IN SR	09/29/93	0.34	MG/L
C9309-104976	LEAD	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.001	MG/L
C9309-104976	pH IN WATER	NEW PUMP HOUSE (NOT IN SR	09/29/93	7.97	UNIT
C9309-104976	SELENIUM	NEW PUMP HOUSE (NOT IN SR	09/29/93	< 0.001	MG/L
C9309-104976	SULFATE IN WATER	NEW PUMP HOUSE (NOT IN SR	09/29/93	19	MG/L
C9309-104976	SPECIFIC CONDUCTANCE	NEW PUMP HOUSE (NOT IN SR	09/29/93	477	UMHOS
C9309-104976	VOLATILE ORGANIC COMPOSITE OF 5	NEW PUMP HOUSE (NOT IN SR	09/29/93	ATTACHED	UG/L

APPROVED BY: DCB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

MONTANA DEPARTMENT OR HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
SYNTHETIC ORGANIC CHEMICALS

Laboratory Number: C9309-104975

Client Name: ROCKY BOY AGENCY WELL
Address: OPER. & MAINT. P.O. BOX 544
BOX ELDER, MT 59521

Account #:

Sample ID: ROCKY BOY AGENCY WELL

Date sampled: 09-29-93
Date received: 09-30-93
Date extracted:
EPA 505 & 504 10-12-93
EPA 525 09-29-93
EPA 515.1 10-04-93
EPA 531.1 11-17-93
Date analyzed:
EPA 505 & 504 10-12-93
EPA 525 10-25-93
EPA 515.1 10-22-93
EPA 531.1 11-18-93

Sampled By: JAMES HOULE

Comments: METHODS 531.1 & 515.1 WERE COMPOSITED
C9309-104950
C9309-104951
C9309-104974
C9309-104975
C9309-104976

Analyst: Bradford A. Towle & Jill F. Cohenour

BAT JFC

Laboratory Number: C9309-104975

SYNTHETIC ORGANIC COMPOUNDS ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL(ug/L)
EPA Method 505 & 504:			
PCB's	ND	.1	.5
Toxaphene	ND	.5	3
Chlordane	ND	.4	2
EDB	ND	.02	.05
DBCP	ND	.05	.2
Dieldrin	ND	.02	N/A
EPA Method 525:			
Di(2-ethylhexyl) adipate	ND	6	400
Di(2-ethylhexyl) phthalate	ND	6	6
Hexachlorobenzene	ND	.2	1
Hexachlorocyclopentadiene	ND	1	50
Benzo(A)pyrene	ND	.2	.2
Atrazine	ND	.6	3
Alachlor	ND	.4	2
Endrin	ND	.3	2
Heptachlor	ND	.2	.4
Heptachlor epoxide	ND	.1	.2
Lindane	ND	.1	.2
Methoxychlor	ND	1	40
Simazine	ND	0.3	4
Aldrin	ND	0.1	N/A
Propachlor	ND	0.1	N/A
Metribuzin	ND	0.1	N/A
Butachlor	ND	0.1	N/A
Metolachlor	ND	0.1	N/A

ND - Analytes not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

Laboratory Number: C9309-104975

SYNTHETIC ORGANIC COMPOUNDS
ANALYSIS REPORT

COMPOUNDS	ANALYTICAL RESULTS (ug/L)	DETECTION LIMIT (ug/L)	MCL (ug/L)
EPA Method 515.1: **			
Pentachlorophenol	ND	.05	1
Dalapon	ND	3	200
2,4-D	ND	1	70
Dinoseb	ND	1.5	7
Picloram	ND	1	500
2,4,5-TP (Silvex)	ND	1	50
Dicamba	ND	1	N/A
EPA Method 531.1: **			
Oxymyl (vydate)	ND	1	200
Carbofuran	ND	1	40
Aldicarb	ND	1	N/A
Aldicarb Sulfoxide	ND	1	N/A
Aldicarb Sulfone	ND	1	N/A
Carbaryl	ND	1	N/A
3-Hydroxycarbofuran	ND	1	N/A
Methamyl	ND	.5	N/A

ND - Analyte not detected at the stated detection limit.
N/A - No maximum contaminant level is established at this time.

** - DETECTION LIMITS WITHIN METHODS THAT HAVE BEEN COMPOSITED MUST BE MULTIPLIED BY THE NUMBER OF COMPOSITES.

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
CHEMISTRY LABORATORY
VOLATILE ORGANIC COMPOUNDS

Laboratory Number: C9309-104975

Client Name: ROCKY BOY AGENCY
Address: P.O. BOX 544 OPER&MAINT
BOX ELDER, MT 59521

Account #:

Sample ID: ROCKY BOY AGENCY WELL

Date Sampled: 9-29-93
Date Received: 9-30-93
Date Extracted: NA
Date Analyzed: 9-30-93

Sample Matrix: WATER
Sampled By: JAMES HOULE

Extraction Method: NA
Analysis Method: EPA 524.2

Comments: THE SAMPLE WAS COMPOSITED.
C9309-104974
C9309-104975
C9309-104976
C9309-104980
C9309-104981

Analyst: Dennis L. Braun DLB Date: 10-18-93

Laboratory Number: C9309-104975

VOLATILE ORGANIC COMPOUNDS ANALYSIS REPORT

All results expressed in ug/l.

PARAMETER	RESULT	PARAMETER	RESULT
Dichlorodifluoromethane	ND	1,2-Dibromoethane	ND
Chloromethane	ND	Chlorobenzene	ND
Vinyl Chloride	ND	1,1,1,2-Tetrachloroethane	ND
Bromomethane	ND	Ethylbenzene	ND
Chloroethane	ND	meta plus para Xylene	ND
Trichlorofluoromethane	ND	ortho Xylene	ND
1,1-Dichloroethene	ND	Styrene	ND
Methylene Chloride	ND	Bromoform	ND
trans 1,2-Dichloroethene	ND	Isopropylbenzene	ND
1,1-Dichloroethane	ND	Bromobenzene	ND
2,2-Dichloropropane	ND	1,2,3-Trichloropropane	ND
cis 1,2-Dichloroethene	ND	1,1,2,2-Tetrachloroethane	ND
Bromochoromethane	ND	N-Propylbenzene	ND
Chloroform	ND	2-Chlorotoluene	ND
1,1,1-Trichloroethane	ND	4-Chlorotoluene	ND
Carbon Tetrachloride	ND	1,3,5-Trimethylbenzene	ND
1,1-Dichloropropene	ND	tert-Butylbenzene	ND
Benzene	ND	1,2,4-Trimethylbenzene	ND
1,2-Dichloroethane	ND	sec-Butylbenzene	ND
Trichloroethene	ND	1,3-Dichlorobenzene	ND
1,2-Dichloropropane	ND	1,4-Dichlorbenzene	ND
Dibromomethane	ND	4-Isopropyltoluene	ND
Bromodichloromethane	ND	1,2-Dichlorobenzene	ND
cis 1,3-Dichloropropene	ND	N-Butylbenzene	ND
Toluene	ND	1,2-Dibromo-3-Chloropropane	ND
trans 1,3-Dichloropropene	ND	1,2,4-Trichlorobenzene	ND
1,1,2-Trichloroethane	ND	Naphthalene	ND
Tetrachloroethene	ND	Hexachlorobutadiene	ND
1,3-Dichloropropane	ND	1,2,3-Trichlorobenzene	ND
Dibromochloromethane	ND		

ND-Compounds not detected above the method detection limit of 2.5 ug/l except 1,2-Dibromo-3-Chloropropane method detection limit of 5.0 ug/l.

Rec'd 1-25-94

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
COGSWELL BUILDING
HELENA MONTANA, 59620-0901

LABORATORY SYSTEM

CCOUNT: B0000031 ATTN: RICKY MORSETTE

ROCKY BOY OPS & MAINT
P.O. BOX 544
BOX ELDER MT 59522-0000

FOR: ROCKY BOY OPS & MAINT

SAMPLE ANALYSIS REPORT

January 20, 1994

lab#	testname	sampleid	date	reported	units
C9309-104975	ALKALINITY IN WATER	ROCKY BOY AGENCY WELL	09/29/93	239	MG/L R
309-104975	ARSENIC	ROCKY BOY AGENCY WELL	09/29/93	< 0.001	MG/L
9309-104975	BARIUM	ROCKY BOY AGENCY WELL	09/29/93	0.083	MG/L
309-104975	CALCIUM	ROCKY BOY AGENCY WELL	09/29/93	29.6	MG/L
309-104975	CADMIUM	ROCKY BOY AGENCY WELL	09/29/93	< 0.001	MG/L
309-104975	CHROMIUM	ROCKY BOY AGENCY WELL	09/29/93	< 0.001	MG/L
309-104975	SOC'S BY EPA 505/504	ROCKY BOY AGENCY WELL	09/29/93	ATTACHED	
C9309-104975	HERBICIDES IN WATER-COMPOSITE OF 5	ROCKY BOY AGENCY WELL	09/29/93	ATTACHED	
309-104975	SOC'S BY EPA 525	ROCKY BOY AGENCY WELL	09/29/93	ATTACHED	
309-104975	CARBAMATES IN WATER-COMPOSITE OF 5	ROCKY BOY AGENCY WELL	09/29/93	ATTACHED	
309-104975	FLUORIDE IN WATER	ROCKY BOY AGENCY WELL	09/29/93	0.18	MG/L
309-104975	IRON	ROCKY BOY AGENCY WELL	09/29/93	0.02	
C9309-104975	HARDNESS GRAINS PER GALLON	ROCKY BOY AGENCY WELL	09/29/93	8.4	
309-104975	TOTAL HARDNESS AS CACO3	ROCKY BOY AGENCY WELL	09/29/93	144	

PROVED BY: DLB

*FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

lab#	testname	sampleid	date	reported	ui
C9309-104975	MERCURY IN WATER-COMPOSITE OF 5	ROCKY BOY AGENCY WELL	09/29/93	< 0.001	MG
C9309-104975	MAGNESIUM	ROCKY BOY AGENCY WELL	09/29/93	17.1	MG
C9309-104975	MANGANESE	ROCKY BOY AGENCY WELL	09/29/93	< 0.005	MG
C9309-104975	SODIUM	ROCKY BOY AGENCY WELL	09/29/93	56.4	MG
C9309-104975	NITRATE PLUS NITRITE AS N	ROCKY BOY AGENCY WELL	09/29/93	0.52	MG
C9309-104975	LEAD	ROCKY BOY AGENCY WELL	09/29/93	< 0.001	MG
C9309-104975	pH IN WATER	ROCKY BOY AGENCY WELL	09/29/93	7.96	UNI
C9309-104975	SELENIUM	ROCKY BOY AGENCY WELL	09/29/93	< 0.001	MG
C9309-104975	SULFATE IN WATER	ROCKY BOY AGENCY WELL	09/29/93	16	MG
C9309-104975	SPECIFIC CONDUCTANCE	ROCKY BOY AGENCY WELL	09/29/93	499	UMH
C9309-104975	VOLATILE ORGANIC COMPOSITE OF 5	ROCKY BOY AGENCY WELL	09/29/93	ATTACHED	UG

APPROVED BY: DLB

***FOR QUESTIONS CONCERNING THIS ANALYSIS CALL: 406-444-2642

EPA SAFE DRINKING WATER

STANDARDS AND CRITERIA

APPENDIX C

EPA Safe Drinking Water Standards and Criteria

TABLE C.1 CONTAMINANTS UNDER SDWA AMENDMENTS OF 1986 PRIMARY INORGANICS

Contaminant	Maximum Contaminant Level (MCL) Status (a)	Units (b)	Measure	Page (c)	Carcinogen Class
Antimony	Phase V	mg/l	.006	34	D
Arsenic	Current	mg/l	.05	7	
	Scheduled	mg/l	.005-.05	41	
Asbestos	Current	MFL	7	30	A
Barium	Current	mg/l	2	30	
Beryllium	Phase V	mg/l	.004	34	B2
Cadmium	Current	mg/l	.005	41	B1
Chromium	Current	mg/l	.1	41	
Copper	Current	mg/l	Treatment Requirement Technique	26	D
Cyanide	Phase V	mg/l	.2	34	D
Fluoride	Current	mg/l	4	10	D
Lead	Current	mg/l	.005	26	
Mercury	Current	mg/l	.002	30	D
Nickel	Phase V	mg/l	.1	34	D
Nitrate	Current	mg/l	10	30	D
Nitrite	Current	mg/l	1	30	
Selenium	Current	mg/l	.05	30	

a. Current - Presently regulated contaminant.
Scheduled - To be proposed at undetermined future date.
Phase V - Phase V contaminants with MCLG's and MCL's Monitoring Requirements

b. µg/l - micrograms per liter (1/1,000,000 grams per liter)
mg/l - milligrams per liter (1/1,000 grams per liter)
MFL - million fibers per liter longer than 10 micrometers

c. Environmental Protection Agency, August 1991, *Drinking Water Regulations Under the Safe Drinking Water Act Fact Sheet*, Criteria and Standards Division, Office of Drinking Water, Washington, DC.

Table C.1 also includes a carcinogenicity classification, which can be summarized as follows (EPA September 24, 1986, Federal Register, 51:33992-34003 as reported in EPA 1990):

Group A: Human Carcinogen - Enough evidence in epidemiologic or occupational studies to support causal association between exposure and cancer in humans

Group B: Probable Human Carcinogen - Limited evidence in human studies (Group B1) and/or enough evidence from animal studies (Group B2)

Group C: Possible Human Carcinogen - Limited evidence from animal studies and inadequate or no data in humans

Group D: Not Classifiable - Inadequate or no human and animal evidence of carcinogenicity

Group E: No Evidence of Carcinogenicity - No evidence of carcinogenicity in at lease two animal tests in different species or inadequate human and animal studies.

The table shows asbestos as a Class A carcinogen since it is known to cause cancer in humans. Beryllium is a Class B2 carcinogen. This contaminant is linked with limited evidence of cancer in animals and perhaps in humans. All other contaminants with a carcinogenic classification in Table D.1 are Group D contaminants with inadequate or nonexistent evidence of carcinogenicity in animals or humans. The failure to include a classification for some contaminants does not mean the contaminant is not carcinogenic; it means it is unclassified.

RADIONCULIDES

Contaminant	Maximum Contaminant Level (MCL) Status (a)	Units (b)	Measure	Page (c)
Gross Beta	Current	mrem	4	36, 42
Gross Alpha	Current	pCi/l	Screen 15	37, 42
Radium	Proposed	pCi/l	5	36
Radium 228/226	Current	pCi/l	5	42
Radon	Proposed	pCi/l	200-2,000	36
Uranium	Proposed	pCi/l	5-40	36

a. Current - Presently regulated contaminant.
Proposed - Final rule for regulation anticipated December.
Scheduled - To be proposed at undetermined future date.

b. mrem, milli radiation equivalents in man, (1 rem equals 1 radiation dose (rad) or 100 ergs per gram of matter of beta particles; 1 rem equals 20 rads of alpha particles.) pCi/l picocuries per liter (1/1,000,000,000,000 curie)

c. Environmental Protection Agency, August 1991, *Drinking Water Regulations Under the Safe Drinking Water Act Fact Sheet*, Criteria and Standards Division, Office of Drinking Water, Washington, DC.

It is estimated that the average U.S. citizen is exposed to about 200 mrems per year, half from natural radiation, the rest from man-made sources, including x-rays, mining, and color television.

TABLE C.3 CONTAMINANTS TO BE REGULATED UNDER SDWA AMENDMENTS OF 1986: VOLATILE AND SYNTHETIC ORGANIC CHEMICALS

Contaminant	Maximum Contaminant Level (MCL)				Carcinogen Class
	Status (a)	Units (b)	Measure	Page (c)	
Acrylamide	Current	mg/l	TT	31	B2
Alachor	Current	mg/l	.002	31	B2
Aldicarb	Current	mg/l	deferred	31	
Aldicarb Sulfone	Current	mg/l	deferred	31	
Aldicarb Sulfoxide	Current	mg/l	deferred	31	
Atrazine	Current	mg/l	.003	31	C
Benzene	Current	mg/l	.005	11	A
Carbofuran	Current	mg/l	.04	31	E
Carbon Tetrachloride	Current	mg/l	.005	11	B2
Chlordane	Current	mg/l	.002	31	B2
2,4,-D	Current	mg/l	.07	31 31	D D
Dalapon	Scheduled	mg/l	.2	35	D
Dibromochloro-propane	Current	mg/l	.0002	31	
Para-Dichlorobenzene	Current	mg/l	.075	11	C
o-Dichlorobenzene	Current	mg/l	.6	30	D
1,2-Dichloroethane	Current	mg/l	.005	11	B2
1,1-Dichloroethylene	Current	mg/l	.007	11	C
cis-1,2-Dichloroethylene	Current	mg/l	.07	30	D

TABLE C.3 (CONT.)

Contaminant	Maximum Contaminant Level (MCL)				Carcinogen Class
	Status (a)	Units (b)	Measure	Page (c)	
Trans-1,2-Dichloroethylene	Current	mg/l	.1	30	D
Dichloromethane	Scheduled	mg/l	.005	35	B2
1,2-Dichloropropane	Current	mg/l	.005	30	B2
Di(ethylhexyl) adipate	Scheduled	mg/l	.4	35	C
Di(ethylhexyl) phthalate	Scheduled	mg/l	.006	35	B2
Dinoseb	Scheduled	mg/l	.007	35	D
Diquat	Scheduled	mg/l	.02	35	D
Endothall	Scheduled	mg/l	.1	35	D
Endrin	Current	mg/l	.002	35	D
Epichlorohydrin	Current	mg/l	TT	31	B2
Ethylbenzene	Current	mg/l	.7	30	D
Ethylene dibromide	Current	mg/l	.00005	31	
Glyphosate	Scheduled	mg/l	.7	35	D
Heptachlor	Current	mg/l	.0004	31	B2
Heptachlor epoxide	Current	mg/l	.0002	31	B2
Hexachloro-benzene	Scheduled	mg/l	.001	35	B2
Hexachlorocyclo-pentadiene	Scheduled	mg/l	.05	35	D
Lindane	Current	mg/l	.0002	31	C
Methoxychlor	Current	mg/l	.04	31	D
Monochloro-benzene	Current	mg/l	.1	30	D
Oxymyl (vydate)	Scheduled	mg/l	.2	35	E

TABLE C.3 (CONT.)

Contaminant	Maximum Contaminant Level (MCL) Status (a)	Units (b)	Measure	Page (c)	Carcinogen Class
PAHs	Scheduled	mg/l	.0002	35	B2
PCBs	Current	mg/l	.0005	31	B2
Pentachloro-phenol	Current	mg/l	.001	31	
Picloram	Scheduled	mg/l	.5	35	D
Simazine	Scheduled	mg/l	.004	35	C
Styrene	Current	mg/l	.1	30	
2,3,7,8-TCDD (Dioxin)	Scheduled	mg/l	3e-8	35	B2
2,4,5,-TP (Silvex)	Current	mg/l	.05	31	D
Tetrachloroc-thylene	Current	mg/l	.005	30	B2
Toluene	Current	mg/l	1	30	B2
Toxaphene	Current	mg/l	.003	31	
1,2,4,-Trichlorobenzene	Scheduled	mg/l	.009	35	D
1,1,1-Trichloroethane	Current	mg/l	.2	11	D
Trichloroethylene	Current	mg/l	.005	11	B2
1,1,2-Trichloroethane	Scheduled	mg/l	.005	35	C
Vydate	Scheduled	mg/l	.2	35	E
Vinyl Chloride	Current	mg/l	.002	11	A
Xylene	Current	mg/l	10	30	D

a. Current - Presently regulated contaminant.
Scheduled - To be proposed at undetermined future date.

b. µg/l - micrograms per liter (1/1,000,000 grams per liter)
mg/l - milligrams per liter (1/1,000 grams per liter)
TT - Treatment technique requirement

c. Environmental Protection Agency, August 1991, *Drinking Water Regulations Under the Safe Drinking Water Act Fact Sheet*, Criteria and Standards Division, Office of Drinking Water, Washington, DC.

TABLE C.4 CONTAMINANTS TO BE REGULATED UNDER SDWA AMENDMENTS OF 1986 MICROBIOLOGY AND TURBIDITY

Contaminant	Status	Current Standard	Implied % Removal	Future MCL	Page (a)
Giardia Lambia	Current	TT (c)	99.9 (b)		17 41
Legionella	Current	TT (c)			41
Standard Plate Count Heterotrophic Bacteria, HPC	Current	500/ml (d)		TT (c)	17 41
Total Coliforms (source)	Current	100/100ml (c)			16
Total Coliforms (treated)	Scheduled			1/100ml	41
Population Served 25-1,000 1,000-2,500 2,501-3,300 17,201+	TC Samples Per month 1 2 3 20+				22 22 22 22
Fecal Coliforms (source)	Current	20/100ml (c)			16
Turbidity	Current	.5-1 NTU			41
Viruses	Current Scheduled	TT (c)	99.99 (b)		17 41
Total Trihalomethane (TTHM)	Interim Scheduled		.1 mg/l	 25-50 µg/l	38 40

a. Environmental Protection Agency, August 1991, Drinking Water Regulations under the Safe Drinking Water Act, Fact Sheet, Criteria and Standards Division, Office of Drinking Water, Washington, DC.

b. Disinfection implies removal levels indicated, when the product of residual concentration of disinfectant (chlorine) and contact time (CT) meet rules when system is operating at peak hourly flow. Failure to meet rules 1 time per month is a violation.

(Notes for Table C.4 continued)

c. TT-Treatment technique established in lieu of MCL.

d. Disinfectant residuals cannot be undetectable or HPC levels cannot exceed 500/ml in 5% of the samples taken monthly for any two consecutive months.

e. Source must contain less than indicated levels before filtration. Ten percent (10%) of the samples for the previous six months must not exceed the levels indicated. Samples are taken and computations are made monthly.

f. NTU-Nelphelometric turbidity units.

TABLE C.5 CONTAMINANTS TO BE REGULATED UNDER SDWA AMENDMENTS OF 1986: SECONDARY CONTAMINANTS

Maximumn Contaminant Level (MCL)				
Contaminant	Status (a)	Units (b)	Measure (b)	Page(c)
Aluminum	Current	mg/l	.05-2	33
Chloride	Current	mg/l	250	43
Iron	Current	mg/l	.3	43
Manganese	Current	mg/l	.05	43
Silver	Current	mg/l	.1	33
Sulfate	Current	mg/l	250	43
Zinc	Current	mg/l	5	43
TDS	Current	mg/l	500	43

a. Current - Presently regulated contaminant.
Scheduled - To be proposed at undetermined future date.
C. Secondary - Current secondary drinking water standard.
P. Secondary - Proposed secondary drinking water standard.
Removed - Contaminant removed from drinking water standards.
Proposed Pri - Removed from secondary list and placed on primary list.

b. µg/l - micrograms per liter (1/1,000,000 grams per liter)
mg/l - milligrams per liter (1/1,000 grams per liter)

c. Environmental Protection Agency, May 1990, *Drinking Water Regulations Under the Safe Drinking Water Act Fact Sheet*, Criteria and Standards Division, Office of Drinking Water, Washington, DC.

A

APPENDIX D

LETTER FROM FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
100 North Park, Suite 320
Helena Montana 59601

RECEIVED
AUG 31 1995
MSE-HKM, Inc.

IN REPLY REFER TO:

ES-61130-Billings
M.01 - BIA (I)
Rocky Boy Reservation

August 29, 1995

Mr. Terry Spang, J.D.
Native American Projects Coordinator
MSE-HKM, Inc.
2727 Central Avenue
P.O. Box 31318
Billings, Montana 59107-1318

Dear Mr. Spang:

Thank you for your August 11, letter regarding the needs assessment for a municipal, rural and industrial water system for the Chippewa-Cree Tribe of the Rocky Boy's Reservation, Montana. Threatened or endangered species which may occur in the project area include bald eagle (Haliaeetus leucocephalus), peregrine falcon (Falco perigrinus), pallid sturgeon (Scaphirhynchus albus) and black-footed ferret (Mustela nigripes).

Although not discussed in your letter, if Federal funding or permitting of the proposed project is ultimately required, section 7 provisions of the Endangered Species Act of 1973, as amended would apply. In order to determine if formal consultation is required, the Service recommends the responsible agency prepare a biological assessment for construction projects requiring an environmental impact statement (refer to section 402.12, 50 CFR, Part 402, June 3, 1986), or an equivalent analysis for other projects, in accordance with section 402.14, 50 CFR, part 402. We recommend that biological assessments include the following:

1. A description of the project,

2. A description of the specific area that may be affected by the action,

3. The current status, habitat use, and behavior of threatened and endangered species in the project area,

4. Discussion of the methods used to determine the information in Item 3,

5. An analysis of the affects of the action on listed species and proposed species and their habitats, including an analysis of any cumulative effects (see section 402.02 50 CFR, Part 402),

6. Coordination/mitigation measures that will reduce/eliminate adverse impacts to threatened and endangered species,

7. The expected status of threatened and endangered species in the future (short and long term during and after project completion),

8. A determination of the project affects for listed species,

9. A determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species, and

10. Documentation of the basis of all conclusions, such as the data considered, citation of literature and personal contacts used in developing the assessment.

If it is determined that the proposed project may affect any listed species, formal consultation should be initiated with this office, unless an exception applies. One exception is if a Federal agency, upon further informal review, finds and the Service concurs, that the proposed action is not likely to adversely affect "listed species," then formal consultation is not required.

Section 7(d) of the Act requires that the federal agency and permit or license applicant shall not make any irreversible or irretrievable commitment of resources which would preclude the formulation of reasonable and prudent alternatives until consultation on listed species is completed.

The following information is provided to assist you in your determination. We are not aware of nesting bald eagles near the proposed project. Bald eagles may occur as migrants or winter residents. Peregrine falcons are known to occur only as migrants. Black-footed ferrets are potential residents of black-tailed prairie dog colonies. Pallid sturgeon occur in the Missouri River and may occur in major tributaries. There is no critical habitat of federally listed threatened or endangered species near the proposed project.

Many Federal Agencies have policies to protect candidate species from further population declines. The taxa in category 1 are considered by the U.S. Fish and Wildlife Service as candidates for possible addition to the List of Endangered and Threatened Wildlife and Plants. The Service encourages their consideration in environmental planning; however, none of the substantive or procedural provisions of the Act apply to candidate species. Category 1 candidate species that may occur in the project area include mountain plover (Charadrius montanus), sturgeon chub (Macrhybopsis (=Hybopsis) gelida) and sicklefin chub (Macrhybopsis (=Hybopsis) meeki).

We appreciate your efforts to consider endangered species in your project planning.

Sincerely,

Kemper M. McMaster
Field Supervisor
Montana Field Office

DMC/jf

cc: Billings Suboffice, ES, Billings, MT

APPENDIX E

ROCKY BOY SCHOOLS POPULATION PROJECTION

Rocky Boy Schools

Rocky Boy Route Box 620
Box Elder, Montana 59521

TO: Jim Morsette

FROM: Dr. Robert J. Swan, Federal Projects Coordinator

DATE: March 1, 1994

RE: Population Projections

Based on a steady 5% growth rate factor we predicted in 1991 for the future, we are 3.8% above the projections for 1993 with 1064 students predicted versus the 1104 students in 1993 we actually served.

We projected the following in 1991 for the 1993-94 and 1994-95 school years with revised projections also included below.

Category	1993-94 Projections	1993-94 Actual	1994-95 Projections	1994-95 Revised Projections
Daycare	50	51	53	77
Head Start	92	92	96	116
K-8	550	564	578	612
9-12	140	151	146	166
13-14	231	246	246	255
TOTAL	1,063	1104 (+3.8%)	1,119	1,226 (+9.6%)

This year we exceeded our projected growth by 3.8%. Next year we will exceed our projections by 9.6%. This includes the additional 24 daycare and 24 Head Start students we want to serve next year. If we didn't include these 48 children in our growth rate, we would exceed our projections by 59 students or by 5.2% or increase from 1,119 to 1,178 students in 1994.

The population projections on the next page are projected at a 5% population increase each year between 1993 and the year 2050. Pretty scary if we don't plan now for jobs, homes, water, sewer, etc. or if birth control is not mandated.

ROCKY BOY'S RESERVATION
POPULATION GROWTH (1993-2050)
EARLY CHILDHOOD THROUGH JUNIOR COLLEGE

	1993	1994	1996	1998	2000	2002	2004	2006	2008	2010
Daycare	50	53	58	64	70	77	85	94	103	113
Headstart	93	98	108	119	131	144	158	174	192	211
K-8	550	578	636	700	770	847	932	1025	1128	1241
9-12	140	147	162	178	196	216	238	262	288	317
13-14	231	243	255	268	281	295	310	326	342	359
TOTAL	1064	1119	1219	1329	1448	1579	1723	1881	2053	2241

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030
Daycare	124	136	150	165	182	200	220	242	266	293
Headstart	232	255	304	334	367	404	444	488	537	591
K-8	1365	1502	1652	1817	1999	2199	2419	2661	2927	3220
9-12	349	384	422	464	510	561	617	679	747	822
13-14	395	435	479	527	580	638	702	772	849	934
TOTAL	2465	2712	3007	3307	3638	3965	4402	4842	5326	5860

	2032	2034	2036	2038	2040	2042	2044	2046	2048	2050
Daycare	322	354	389	428	471	518	570	627	690	759
Headstart	650	715	787	866	953	1048	1153	1268	1395	1535
K-8	3542	3896	4286	4715	5187	5706	6277	6905	7596	8356
9-12	904	994	1093	1202	1322	1454	1599	1759	1935	2129
13-14	1027	1130	1243	1367	1504	1654	1819	2001	2201	2421
TOTAL	6445	7089	7798	8578	9437	10380	11418	12560	13817	15200

ACTUAL GROWTH RATE (1993-94)

Day Care	51	+ 1	(does not count unserved daycare children)
Headstart	92	- 1	(does not count 73 [3-4 year olds] not served)
K-8	564	+14	
9-12	151	+11	
13-14	243	+12	
	1,104	+37	

Based upon a 5% growth rate per annum. Growth rate from 1980-87 = 3.2% and from 1987-93 = 7.8%. Average growth rate from 1980-93 = 5%.

cc: Sandra Murie, Superintendent of Schools