SOURCE MATERIAL

LICENSE APPLICATION

Uranium In-Situ Leaching

Leuenberger Site, Converse County, Wyoming

TETON - NEDCO JOINT VENTURE

Fifteen Copies
Submitted to:

Director
Office of Nuclear Materials Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

FORM NRC-2
(7-77)
10 CFR 40

Approved by GAO
R0203

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR SOURCE MATERIAL LICENSE

Pursuant to the regulations in Title 10, Code of Federal Regulations, Chapter 1, Part 40, application is hereby made for a license to receive, possess, use, transfer, deliver or import into the United States, source material for the activity or activities described.

1. (Check one)
   - [X] (a) New license
   - [ ] (b) Amendment to License No. ______
   - [ ] (c) Renewal of License No. ______
   - [ ] (d) Previous License No. ______

2. NAME OF APPLICANT
Teton Exploration Drilling Co., Inc.

3. PRINCIPAL BUSINESS ADDRESS
P. O. Drawer A-1
3030 S. Energy Lane, Casper, Wyoming 82602

4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED (See Chapter 2)
Leuenberger In Situ Uranium Mining Project, Glenrock-Ross Road, NE of Glenrock, WY

5. NAME OF PERSON TO BE CONTACTED CONCERNING THIS APPLICATION
Mr. R. R. Appel

6. TELEPHONE NO. OF INDIVIDUAL NAMED IN ITEM 5
307/265-4102

7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED
Source material will be shipped to facilities owned by others for further processing.

8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE, POSSESS, USE, OR TRANSFER UNDER THE LICENSE

(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (*Including % U or Th.*)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (*kilograms*)
NATURAL URANIUM	$UO_4\text{-}2H_2O$	Slurry 50% U_3O_8	90,720 as U_3O_8
URANIUM DEPLETED IN THE U-235 ISOTOPE	none anticipated	---	---
THORIUM (ISOTOPE)	none anticipated	---	---

(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (*kilograms*)
90,720 kg.

9. DESCRIBE THE CHEMICAL, PHYSICAL, METALLURGICAL, OR NUCLEAR PROCESS OR PROCESSES IN WHICH THE SOURCE MATERIAL WILL BE USED, INDICATING THE MAXIMUM AMOUNT OF SOURCE MATERIAL INVOLVED IN EACH PROCESS AT ANY ONE TIME, AND PROVIDING A THOROUGH EVALUATION OF THE POTENTIAL RADIATION HAZARDS ASSOCIATED WITH EACH STEP OF THOSE PROCESSES
Refer to Chapter 3 & 5 of Application Report

10. LIST THE NAMES AND ATTACH A RESUME OF THE TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE OF APPLICANT'S SUPERVISORY PERSONNEL AND THE PERSON RESPONSIBLE FOR THE RADIATION SAFETY PROGRAM (OR OF APPLICANT IF AN INDIVIDUAL)
Refer to Chapter 5 of Application Report

11. DESCRIBE THE EQUIPMENT AND FACILITIES WHICH WILL BE USED TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE OR PROPERTY AND RELATE THE USE OF THE EQUIPMENT AND FACILITIES TO THE OPERATIONS LISTED IN ITEM 9. INCLUDE: (a) RADIATION DETECTION AND RELATED INSTRUMENTS (including film badges, dosimeters, counters, air sampling, and other survey equipment as appropriate. The description of radiation detection instruments should include the instrument characteristics such as type of radiation detected, window thickness, and the range(s) of each instrument).
Refer to Chapter 3 & 5 of Application Report

(b) METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED IN (a) ABOVE, INCLUDING AIR SAMPLING EQUIPMENT (for film badges, specify method of calibrating and processing, or name supplier).
Refer to Chapter 3 & Appendix D-10 of Application Report

11(c) VENTILATION EQUIPMENT WHICH WILL BE USED IN OPERATIONS WHICH PRODUCE DUST, FUMES, MISTS, OR GASES, INCLUDING PLAN VIEW SHOWING TYPE AND LOCATION OF HOOD AND FILTERS, MINIMUM VELOCITIES MAINTAINED AT HOOD OPENINGS AND PROCEDURES FOR TESTING SUCH EQUIPMENT.

Refer to Chapter 4 of Application Report

12. DESCRIBE PROPOSED PROCEDURES TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE AND PROPERTY AND RELATE THESE PROCEDURES TO THE OPERATIONS LISTED IN ITEM 9. INCLUDE: (a) SAFETY FEATURES AND PROCEDURES TO AVOID NONNUCLEAR ACCIDENTS, SUCH AS FIRE, EXPLOSION, ETC., IN SOURCE MATERIAL STORAGE AND PROCESSING AREAS.

Refer to Chapter 3, 5 & 7 of Application Report

(b) EMERGENCY PROCEDURES IN THE EVENT OF ACCIDENTS WHICH MIGHT INVOLVE SOURCE MATERIAL.

Refer to Chapter 7 of Application Report

(c) DETAILED DESCRIPTION OF RADIATION SURVEY PROGRAM AND PROCEDURES.

Refer to Chapter 3 & 5 of Application Report

13. WASTE PRODUCTS: *If none will be generated, state "None" opposite (a), below. If waste products will be generated, check here* ☐ *and explain on a supplemental sheet:*

(*a*) Quantity and type of radioactive waste that will be generated. Refer to Chapters 3 & 4

(*b*) Detailed procedures for waste disposal. Refer to Chapters 3 & 6

14. IF PRODUCTS FOR DISTRIBUTION TO THE GENERAL PUBLIC UNDER AN EXEMPTION CONTAINED IN 10 CFR 40 ARE TO BE MANUFACTURED, USE A SUPPLEMENTAL SHEET TO FURNISH A DETAILED DESCRIPTION OF THE PRODUCT, INCLUDING: Not applicable.

(*a*) PERCENT SOURCE MATERIAL IN THE PRODUCT AND ITS LOCATION IN THE PRODUCT.

(*b*) PHYSICAL DESCRIPTION OF THE PRODUCT INCLUDING CHARACTERISTICS, IF ANY, THAT WILL PREVENT INHALATION OR INGESTION OF SOURCE MATERIAL THAT MIGHT BE SEPARATED FROM THE PRODUCT.

(*c*) BETA AND BETA PLUS GAMMA RADIATION LEVELS (*Specify instrument used, date of calibration and calibration technique used*) AT THE SURFACE OF THE PRODUCT AND AT 12 INCHES.

(*d*) METHOD OF ASSURING THAT SOURCE MATERIAL CANNOT BE DISASSOCIATED FROM THE MANUFACTURED PRODUCT.

CERTIFICATE

(This item must be completed by applicant)

15. *The applicant, and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 40, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.*

BY: Dwain L. Hankins
(Signature)

Dated 10 October 1980

Dwain L. Hankins
(Print or type name)

President-Chief Executive Officer
(Title of certifying official authorized to act on behalf of the applicant)

WARNING: 18 U.S.C. Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

Form NRC-2 (7-77)

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INTRODUCTION

A Nuclear Regulatory Commission (NRC) Source Material License to recover uranium is required under the provisions of Title 10, Code of Federal Regulations, Part 40, "Domestic Licensing of Source Material." An applicant for a commercial-scale license to receive, possess, and use source material is required to provide detailed information on the facilities, equipment, and procedures to be used. The application report should discuss the operation's impact on the health and safety of the site workers, the public and the environment. This information is used by the Commission to determine whether the applicant's proposed activities will result in undue risk to the health and safety of the public or adversely affect the environment.

In addition to this requirement, an applicant who wishes to mine in the State of Wyoming must also acquire a Mining Permit and a License to Mine from the Wyoming Department of Environmental Quality (DEQ). The main concern to the State of Wyoming is to protect the land, water and air resources of the state. The applicant must describe a mining and reclamation plan which, when put into effect, will protect the environment and return the land to its original use.

The US NRC is primarily concerned with the operation to ensure that any potential radiological effects associated with the operation are minimized to the extent reasonably achievable, and that the public and environment are protected from such effects. The Wyoming DEQ assumes the primary role of protecting the groundwater and land surface resources from degradation due to non-radiological effects. The Wyoming DEQ sets the reclamation standards to be achieved after mining and retains a Reclamation Performance Bond to ensure that these standards are met.

CHAPTER 1

PROPOSED ACTIVITIES

1.1 Introduction

Teton-Nedco proposes to mine a uranium ore body within Converse County, Wyoming, using the in situ mining method. Teton Exploration Drilling Company (Teton) will be the project operator and Nuclear Exploration and Development Company (Nedco), a subsidiary of Pacific Power and Light Company, Portland, Oregon, is a non-operating partner.

The proposed permit area encompasses seven hundred sixty (760) acres, more or less, and contains the orebody, mining facilities and sufficient area for necessary environmental monitoring installations. The permit area is a contiguous tract of land within Township 34 North, Range 74 West of the Six Principal Meridian, Converse County, Wyoming. The legal description of the permit area is given in Appendix C.

The ore body to be mined is located within two geologic intervals approximately two hundred fifty and three hundred fifty feet below the land surface. As presently delineated the mining area will cover approximately eighty acres over the life of the mine. The orebody contains an estimated 2.3 million pounds of recoverable uranium.

Operating plans call for the commerical process plant to circulate up to two thousand gallons per minute when mining and groundwater restoration are operating concurrently. The expected annual production will be approximately two hundred eighty-five thousand (285,000) pounds of U_3O_8 per year for about eight years of active mining. Total life expectancy for the project is estimated to be eleven years allowing time for groundwater restoration, plant decomissioning, and surface reclamation. The project will be covered by a Reclamation Performance Bond with the State of Wyoming in keeping with the requirements of Wyoming Law.

1.2 General In Situ Leaching Process

The mechanics of in situ uranium mining are theoretically simple. A preselected oxidant-charged leach solution is injected through a well into the ore bearing host formation. When the leach solution comes into contact with the uranium, the metal becomes soluble and is mobilized. The uranium pregnant solution is drawn to a recovery well where it is pumped to the surface and transferred to a process plant for uranium extraction and precipitation.

The process selectively removes uranium from the ore body. All the solid tailings traditionally generated by conventional uranium mining and milling are left in place underground. This feature diminishes the potential impact of the normal hazardous waste problems typically associated with conventional uranium mining. The method does not require extensive surface disturbances or recontouring of the land, and most significantly does not result in long term uranium tailings piles commonly associated with other uranium mining methods. No dryers will be used for the final packaging of the uranium slurry product at the mine site thus eliminating the air particulate problems experienced at conventional uranium mills.

1.3 Ore Amenability To In Situ Uranium Mining

Amenability of the Leuenberger ore deposit to in situ uranium mining was demonstrated initially during April and May, 1979. During this period Teton-Nedco conducted two single hole push-pull tests using a sodium bicarbonate/carbonate lixiviant. The tests were authorized by the Wyoming Department of Environmental Quality, Land Quality Division, under License to

Explore #103. Data from the tests performed on the two uranium ore zones occurring at different depths indicated that leaching was feasible.

A more extensive pilot-scale mining project is in progress at this time (October, 1980) under the US Nuclear Regulatory Commission (US NRC) Source Material License SUA-1373 and the Wyoming Department of Environmental Quality License 2RD. Mining commenced January 22, 1980, and consists of an up to 100 gpm R&D operation from less than a one acre well field area. The first phase of the program consisted of operating two five-spot patterns completed in the two ore zones. Water circulation of these two patterns continued through July 11, 1980, at which point a scheduled shutdown was affected for plumbing of four additional patterns drilled during June, 1980, in the approved well field areas. The well field area used for the test for the two ore zones combined presently occupies .35 acres. Details concerning the progress of the R&D operation at the Leu nberger Site are forwarded to the US NRC and the Wyoming DEQ on a quarterly basis.

In order to demonstrate groundwater restoration, one of the ore zone patterns began a phased cleanup effort on June 1, 1980. A preliminary report on this program will be forwarded to the US NRC and the Wyoming DEQ when sufficient data is available to document groundwater restoration progress. A final report will be submitted at the end of the stability demonstration.

On the basis of the information and experience gained during the push-pull tests and the subsequent R&D operation, Teton-Nedco desires to proceed with a commercial scale in situ uranium mining operation in an economically acceptable and environmental responsible way. The remainder of this application report describes the mining and reclamation plans and the concurrent environmental monitoring programs to be used to meet this objective.

CHAPTER 2

SITE CHARACTERISTICS

2.1 Site Location and Layout

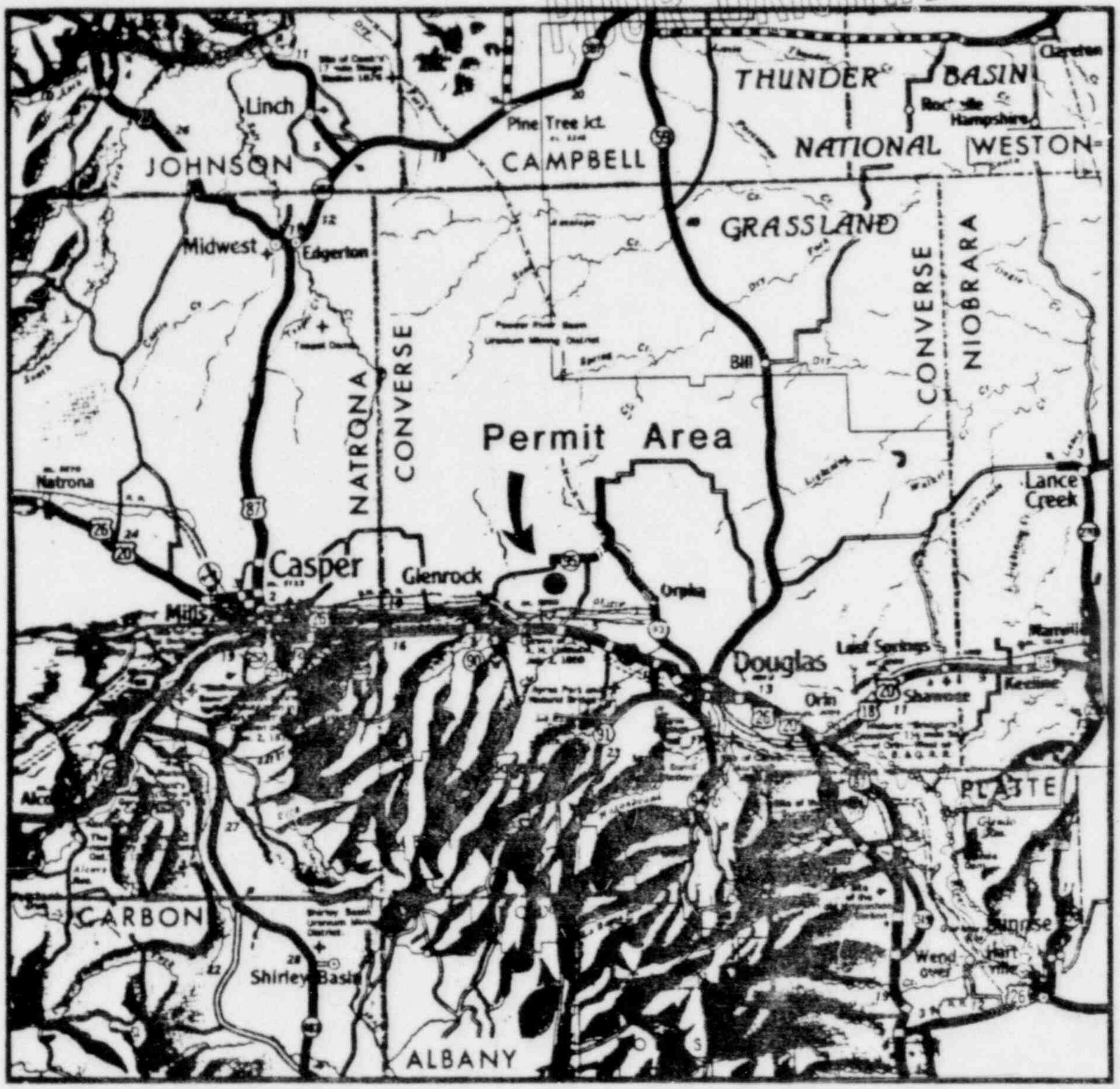
The proposed permit area also referred to as the Leuenberger Site is located in the North Platte River drainage of the southern Powder River Basin, Converse County, Wyoming, approximately 7.5 air miles northeast of the town of Glenrock, Wyoming. Figure 2-1 shows the general location and access to the permit area.

Names and addresses of the surface and mineral owners of record within the proposed permit area are given in Appendix A. Names and addresses of the surface owners and mineral owners of record within one-half mile (.8 km) of the permit area are given in Appendix B. These appendices also list owners of record with valid legal estate in the permit area and on adjacent lands. Appendix C lists all lands to be included within the permit area by section, township and range and gives an acreage tabulation. The proposed permit area contains 760 acres. An original USGS Leuenberger Ranch quadrangle map delineating the permit area boundary is included in Appendix E. This appendix also gives a map showing the relative locations of major buildings and residents adjacent to the permit area. The location of the Leuenberger Site facilities needed for the proposed operation are illustrated in Figure 2-1.

2.2. Uses of Lands and Waters

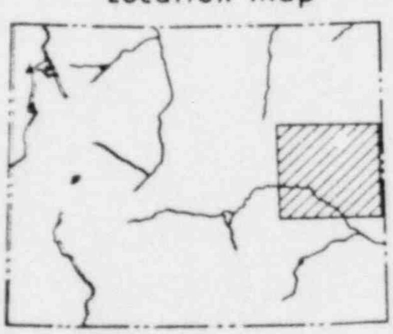
2.2.1 Permit Area

Lands contained within the permit area were historically used

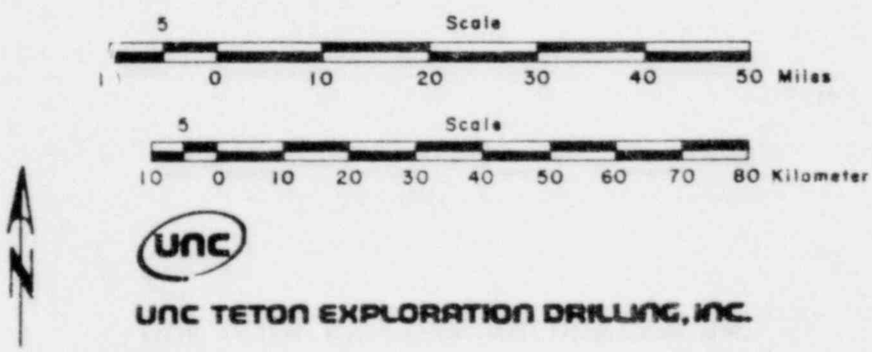


Taken from the Wyoming Highway Commission Map *JUNE, 1979*

Location Map



Wyoming



UNC TETON EXPLORATION DRILLING, INC.

Subsidiary of United Nuclear Corporation
A UNC RESOURCES Company

P.O. Drawer A-1
Casper, Wyoming 82602

LOCATION OF and ACCESS TO

LEUENBERGER SITE

FIGURE 2-1

for cattle grazing. Presently the major portion of the lands within the permit area is leased by Teton from the Smith Cattle Company and have been used for uranium exploration and for the Leuenberger in situ uranium mining Research and Development facility licensed with the US NRC and the State of Wyoming. The proposed use of the land for the immediate future includes in situ uranium mining on a commercial scale (see Appendix D-1). Surface owner consent to install monitor wells and develop a commercial scale mine within the proposed permit area will be obtained from the present landowners prior to commencement. Subsequent to the mining activities the land will be returned to the pre-mining use of cattle grazing. The reclamation plan to be used to return the land to a cattle grazing use after mining is included in this application report.

2.2.2 Agricultural Activity

Livestock grazing is the main source of food production and agricultural activity in the area. Due to the short growing season the forage provided by natural vegetation, although nutritious, is very sparce. According to personnel from the U.S.D.A. Soil Conservation Service Office in Douglas, the stocking rate in the vicinity of the mine site averages three tenths of an animal unit per acre per month on range that is in good condition. Some of the better land is irrigated for hay production and averages about three tons per acre. This hay is used or sold for winter livestock feed. In addition to the hay crop, barley production averages thirty pounds per acre and irrigated oats produce about one hundred pounds per acre. Row crops are limited to some corn production. Corn is used largely as silage for winter livestock feed. There are no known commercial row or grain crops presently adjacent to the proposed mine site.

2.2.3 Recreation

Major recreational activities within a fifty mile radius of the proposed mine site are mostly outdoor activities, such as camping, hunting, picnicing, hiking, skiing and snowmobiling. Water sports, such as water skiing, boating, canoeing and fishing are popular in the public use areas designated by the state and counties along the North Platte River and its major irrigation water bodies, such as Alcova Lake and Glendo Reservoir. In addition to State and Community designated parks and recreation areas, a portion of the Medicine Bow National Forest, approximately thirty miles south of the site provides additional area for recreational activities. Figure 2-2 shows the approximate location of these major facilities and points of interest in the general area.

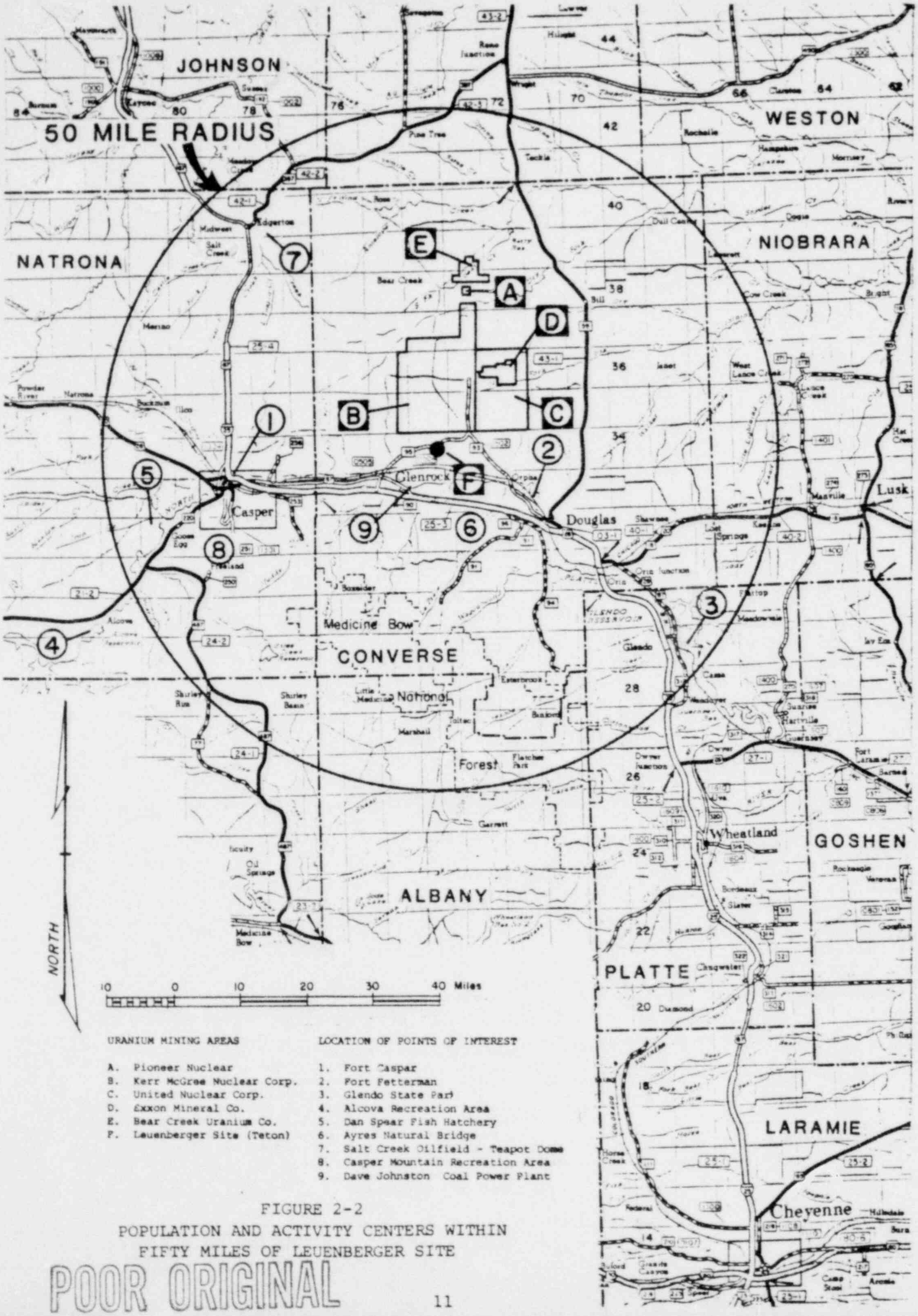
2.2.4 Water Rights

Records on file in the Office of the Wyoming State Engineer indicate that there are three adjudicated surface water rights within three miles of the permit area boundary. Teton holds two surface water rights within the permit area for the two solar evaporation ponds being used in conjunction with the R&D phase of the Leuenberger operation. A small pond created by an earthen dam placed across the ephemeral Little Sand Creek, another such structure along a small tributary in the eastern portion of the area and a pond structure near the confluence of these channels exist within the permit area. No known water rights have been recorded for these structures.

Several groundwater rights of record have been filed with the Office of the Wyoming State Engineer. All wells except the Smith Windmill presently within the permit area were installed by Teton for the purpose of collecting groundwater quality data, to determine groundwater aquifer characteristics and to conduct the R&D operation. Appendix D-6.1 lists the surface water and groundwater rights inside and within three miles of the permit area.

2.3 Population Distribution

The population within fifty miles (80 km) of the proposed Leuenberger Site is centered within the communities of Casper,



URANIUM MINING AREAS

A. Pioneer Nuclear
B. Kerr McGree Nuclear Corp.
C. United Nuclear Corp.
D. Exxon Mineral Co.
E. Bear Creek Uranium Co.
F. Leuenberger Site (Teton)

LOCATION OF POINTS OF INTEREST

1. Fort Caspar
2. Fort Fetterman
3. Glendo State Park
4. Alcova Recreation Area
5. Dan Spear Fish Hatchery
6. Ayres Natural Bridge
7. Salt Creek Oilfield - Teapot Dome
8. Casper Mountain Recreation Area
9. Dave Johnston Coal Power Plant

FIGURE 2-2
POPULATION AND ACTIVITY CENTERS WITHIN FIFTY MILES OF LEUENBERGER SITE

POOR ORIGINAL

Douglas and Glenrock, Wyoming, as shown on Figure 2-2. These communities are significant in that they provide the major locations of public services such as schools, churches, medical care facilities, public parks, and most of the cultural and scenic attractions for residents in the Converse and Natrona County areas. To our knowledge none of these features exist within five miles of the proposed mine site. With the exception of a few scattered ranch homes and development subdivisions, the major residential areas in both counties are also associated with these communities. Appendix E provides information on occupied dwellings adjacent to the proposed mine site.

Casper, Wyoming is the county seat of Natrona County and one of the largest cities in the state. In terms of population numbers it is rivaled only by Cheyenne, the state capitol. Casper may be considered the center of business and industrial activities in the state due to its approximate central location. Offices for most of the major industrial companies operating in the state are located in Casper.

Douglas, Wyoming is the county seat of Converse County. Glenrock, also in Converse County, is the closest town to the mine site, and is approximately eleven road miles to the southwest along the Glenrock-Ross road. Although these communities are much smaller than Casper they have experienced a phenomenal growth rate over the past ten years. This has been attributed to the intensive energy resource development in the Powder River Basin. Table 2-1 summarizes the magnitude of population change in the area.

Sources of information for population statistics include the Converse County Planning Office, the State of Wyoming Department of Economic Planning and Development (DEPAD) and the Casper area Chamber of Commerce. Copies of these references are provided in Appendix E.

TABLE 2-1

POPULATION TRENDS

Percentage of Population Change
Converse County

	1970	1980	Percent Change
Glenrock Area	1,515	3,100	104.6%
Douglas Area	2,677	8,800	228.7%
Converse County	5,938	13,700	130.7%

Source: Office of the Converse County Planner
(See Appendix E)

Population Summary and Growth
Converse and Natrona Counties

	NATRONA COUNTY		CONVERSE COUNTY		
Year	Casper	County	Douglas	Glenrock	County
1970	39,361	51,264	2,677	1,515	5,938
1980	61,429	83,779	9,108	3,445	14,350
1985	77,737	107,967	11,089	4,208	17,091

Source: Office of the Converse County Planner
DEPAD Community Profiles
(See Appendix E)

2.4 Regional Historic, Archaeological, Architectural, Scenic, Cultural and Natural Landmarks

The Historical, Archaeological and Cultural Surveys done in the proposed permit area are presented in Appendix D-2 and D-3. If any cultural or significant paleontological evidence are exposed during any excavation or other installation work at the Leuenberger site, such activities will be delayed until the appropriate state office has been notified and a qualified person has examined the evidence. Letters from a qualified historian and the Office of the State Archaeologist recommending clearances for the mining activities are included in Appendix D-2 and D-3. No historic, architectural, scenic or natural landmarks exist within the proposed permit area or in surrounding areas. Information concerning historic sites and the Wyoming registry of sites enrolled in the National Register of Historic Places as provided by the Wyoming State Archives and Industrial Department are included in Appendix D-2. None of the sites listed are within five miles of the proposed mine site.

2.5 Meteorology

2.5.1 General

The proposed permit area is located in eastern Wyoming where climate can be generally classified under the Köppen System (Critchfield, 1974) as semiarid and cool. The climate in the area is rather dry due to the effective barrier to moisture from the Pacific Ocean offered by the Cascades, Sierra Nevada, and the Rocky Mountains when winds are from the west and northwest. The mountain ranges in the west-central portion of Wyoming, which are oriented in a general north-south direction, are perpendicular to the prevailing winds. These ranges tend to restrict the passage of storms and thus restrict precipitation in the eastern part of the state. Data for the vicinity of the Leuenberger Site is taken from the Natrona County International Airport near Casper, Wyoming, since 1940 through 1978, and is included included in Appendix D-4.

2.5.2 Precipitation

Mean annual precipitation for the area is approximately twelve inches (31 cm) (Wyoming State Engineer's Office, 1973) and the average yearly total evaporation is reported as forty-four inches (112 cm) (U.S. Weather Bureau, 1959). The net evaporation for the area is taken as the difference between these numbers and is calculated to be thirty-two inches (81 cm) per year.

The bulk of the annual precipitation is received from moisture laden easterly winds, particularly during spring months. Most of this precipitation is in the form of rain although occasional heavy wet snowfalls in spr ionths are not uncommon, but these snows are short-lived. ummer precipitation is almost exclusively from thundershow r activity and under normal conditions provides sufficient moisture to maintain growth of rangeland grasses. Seasonal snowfall averages about seventy-two inches, but the water content of winter snow is low owing to the cold temperatures at which it usually occurs. The very dry strong west and southwest winds following these winter snows tend to clear the snow from the rangelands thereby permitting winter grazing of livestock.

The average number of days throughout the year with one hundredth of an inch of precipitation is near ninet most of which occur during the spring and summer. Consequently the absence of rain clouds or clouds usually associated with precipitation results in bright days with considerable sunshine throughout the winter season.

2.5.3 Temperature

The dryness of the air has a considerable modifying effect in preventing discomfort during the warm summer months l as during periods of subzero temperatures in the winter. e average maximum temperature during summer months is 82°F (28°C), while during the winter, the average minimum temperature is 15°F (-9°C). The average temperature is 67°F (19°C) in the summer and 26°F (-3°C) in the winter. Extreme temperatures in these respective seasons have reached as high as 104°F (40°C) and as low as -40°F (-40°C), between 1940 and 1978. The average length of the growing season is 129 days, with the average date of the last freezing temperature in spring May 22, and the first freezing temperature in fall September 28.

2.5.4 Wind

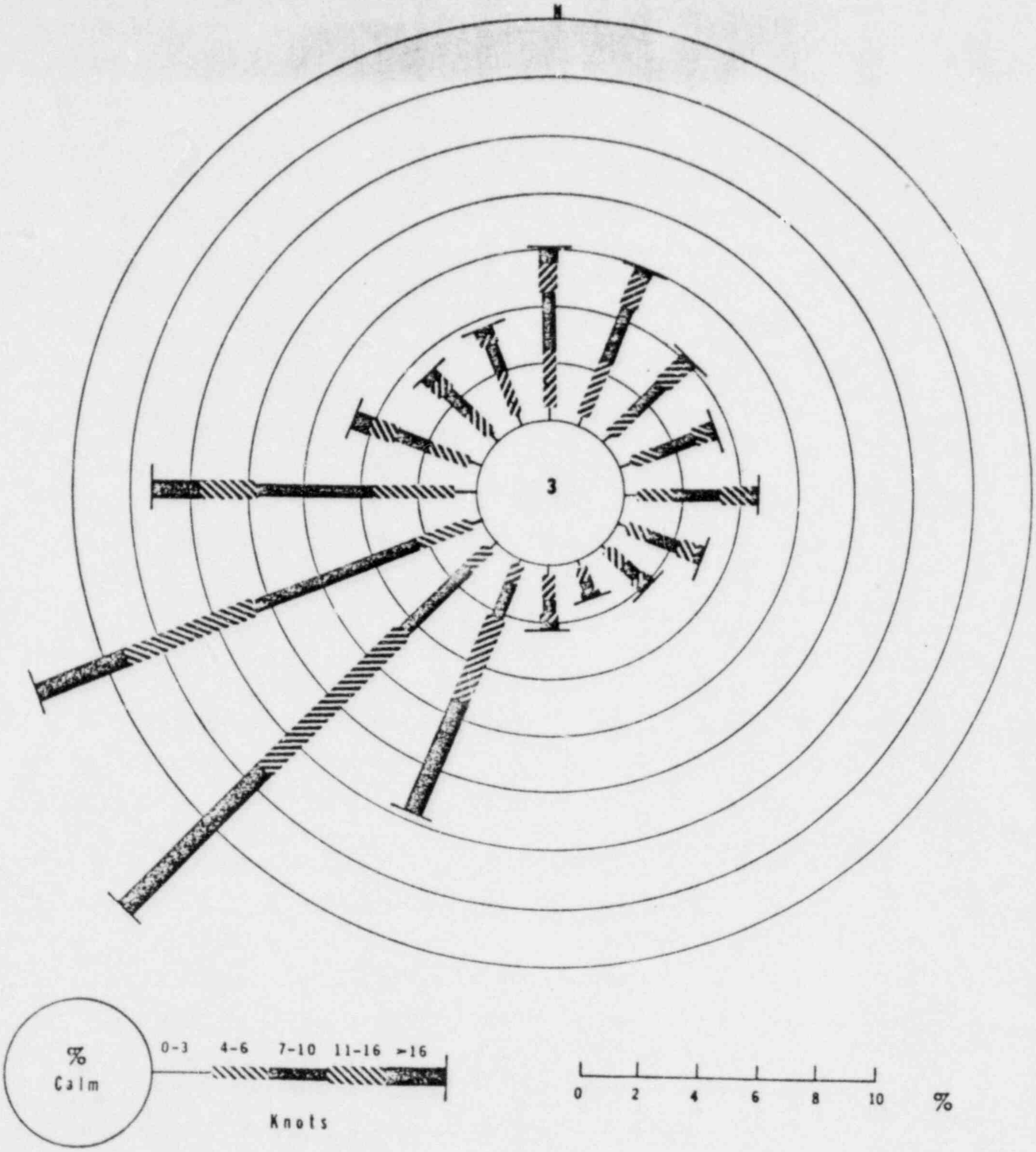
Wind speed data from the Natrona County International Airport is used to estimate wind speed and direction for the Leuenberger Site. The mean annual wind speed at the airport for the years 1941-1970 is thirteen miles (22 km) per hour from the soutwest. The highest mean monthly wind speed occurs in January and is 16.7 miles (28.2 km) per hour from a west-southwesterly direction. The lowest mean monthly wind speed occurs in July and is reported as 10.1 miles (17.1 km) per hour from the west-southwesterly direction. The maximum observed wind speed maintained for longer than one minute was eighty-one mph (136.1 km/hr) form the southeast during March, 1956. Figure 2-3 is a wind rose diagram for the Casper area indicating that the prevailing winds are from the southwest.

2.6 Geology

2.6.1 Regional Geology

The permit area is located in the southern portion of the Powder River Basin, which is in the unglaciated Missouri Plateau section of the Great Plains physiographic province. The Missouri Plateau includes that part of the Great Plains north of the northern boundary of Nebraska with the exception of the Black Hills.

The Powder River Basin covers approximately 12,000 square miles. The basin is bounded on the south by the Laramie Range-Hartville Uplift. The Black Hills Uplift delineates the eastern extent and the Big Horn Mountains mark the western extent. The basin is open to the north and continues into the State of Montana.



SOURCE: Based on the National Climatic Center's STAR program calculation for Casper (U.S. Department of Commerce, 1973).

FIGURE 2-3
ANNUAL WIND ROSE FOR CASPER, WYOMING
(Period of Record, 1967 - 1971)

The Powder River Basin is asymmetric with a synclinal axis oriented in a general northwest-southwest direction. West of this axis the sedimentary rock strata exposed at the surface dip to the east. East of the axis the strata dip to the west.

The basin incorporates a sedimentary rock sequence that has a maximum thickness of about 15,000 feet along the snyclincal axis. The sediments range in age from Recent (Holocene) to early Paleozoic (Cambrian) (500 million to 600 million years ago) and overlie a basement complex of Precambrian-age (more than a billion years old) igneous and metamorphic rocks.

The Powder River Basin represents a localized depression in a large basin extending from the Artic to the Gulf of Mexico. During Paleozoic and Mesozic time the configuration of this expansive basin changed as the result of uplifts on its margins. The northern and southern connections of the basin were open to the ocean and also changed position several times before both finally closed. During this period of time the basin as a whole experienced only slight submergence or uplift so that erosional forces were generally ineffective in depleting accumulated sediments. By the end of the Cretaceous remaining portions of the basin were well removed from the connections to the sea.

At the beginning of the Tertiary the Powder River Basin was subsiding at about the same rate that sediments derived from the surrounding uplifts were accumulating. During the early Paleocene sediments came primarily from gentle uplands of older Cretaceous rocks consisting mostly of sandstones and shales. During this period the climate was humid and swamps covered much of the lowland in the basin. As a result of these environmental conditions and the type of sediments deposited, the lower and middle Fort Union Formation consists of alternating dark gray shale, siltstone, and fine-grained sandstone beds with accumulations of coal and lignite.

During the late Paleocene, marked uplift in land masses surrounding the Powder River Basin resulted in the exposure, weathering, and erosion of granitic rocks. This led to the deposition of channel and stream bank deposits. Accelerated subsidence in the southern portion of the basin, accompanied by the Laramide uplift, resulted in masses of sediments being deposited and caused the faulting presently observed at the northern edge of the Laramie Mountains. The sediments deposited during this epoch of the Laramide Orogeny constitute the ore-bearing zone at the Leuenberger Site.

Near the end of the Eocene, northward tilting and deep weathering with minor erosion took place in the basin. Subsidence resumed in late Oligocene and continued through the Miocene and Pliocene. A great thickness of tuffaceous sediments was deposited in the basin during at least a part of this period of subsidence. By the late Pliocene, regional uplift was taking place, leading to a general rise in elevation of several thousand feet.

Subsequent to this uplift, surface weathering of Tertiary tuffaceous sediments and/or Precambrian granites exposed in mountainous areas probably resulted in oxidation and dissolution of uranium minerals. Soluble uranyl ions (UO_2^{++}) were introduced to the subsurface through percolating groundwater. These ions remained in solution and migrated in a general down dip direction as long as the host solutions were acidic, or neutral or alkaline if CO_3 was present. When reducing conditions were encountered uranium was precipitated. Accumulation of uranium in the ore bearing sands at the Leuenberger Site probably resulted from a continual process of migration, dissolution and accretion of uranyl ions since late Tertiary time.

Table 2-2 describes the sedimentary rock units exposed in the South Powder River Basin. The surface geology and prominent structural features in the vicinity of the Leuenberger Site are shown in Figure 2-4. A geologic cross section showing the Wasatch Formation (Eocene) and the Fort Union Formation (Paleocene) in the region of the permit area has been constructed by Davis (1969) (Figure 2-5). He notes when constructing this section

TABLE 2-2
(after Denson & Horn, 1975)

STRATIGRAPHIC COLUMN FOR SOUTH POWDER RIVER BASIN

DUNE SAND (HOLOCENE) -- Fine to medium grained dune sand, as much as 200 feet (61 m) thick.

OGALLALA FORMATION (PLIOCENE AND UPPER MIOCENE) -- Drab-gray poorly cemented calcareous claystone, silstone, sandstone and conglomerate of fluviatile origin. Derived largely from older Tertiary and Precambrian rocks. Composition and sorting vary laterally and vertically. Five miles (8 km) northeast of Orin, the Ogallala contains boulders of Precambrian granite and gneiss 1-4 feet (0.3-1.2 m) in diameter which are 15-25 miles (24-40 km) from the nearest Precambrian outcrops. Unconformity at base truncates the lower Miocene, Oligocene, Paleozoic, and Precambrian rocks. 0-400 feet (0-122 m) thick.

ARIKAREE FORMATION (LOWER MIOCENE) -- Buff to tan very fine grained poorly bedded sandstone containing abundant tiny grains of bluish-gray magnetite; some siltstone and limestone. Predominatly of eolian and volcanic origin. Altered chalky-white ash beds as much as two feet (0.6 m) thick common near base. Poorly cemented conglomerate, 0-75 feet (0-23 m) thick and made up of pebbles derived largely from Precambrian rocks, occurs locally near base. Good sorting, laterally persistent lithology, and the general absence of coarse detritus and of locally derived debris are outstanding characteristics. Average thickness about 600 feet (183 m).

WHITE RIVER FORMATION (OLIGOCENE) -- Interbedded chocolate-brown, pink, light- to medium-gray, and green tuffaceous siltstone and conglomerate. Upper half is generally eolian except locally along the eastern flank of the Laramie Mountains, where it is highly conglomeratic and predominantly of fluviatile origin; the lower half is generally of fluviatile origin. Thin beds of freshwater limestone and altered chalky-white ash beds occur locally. Conglomerate, 0-60 feet (0-18 m) thick near the base, is made up pebbles and cobbles derived from Precambrian igneous and metamorphic rocks. 0-1,000 feet (0-335 m) thick. Average thickness about 500 feet (152 m).

TABLE 2-? --- Continued

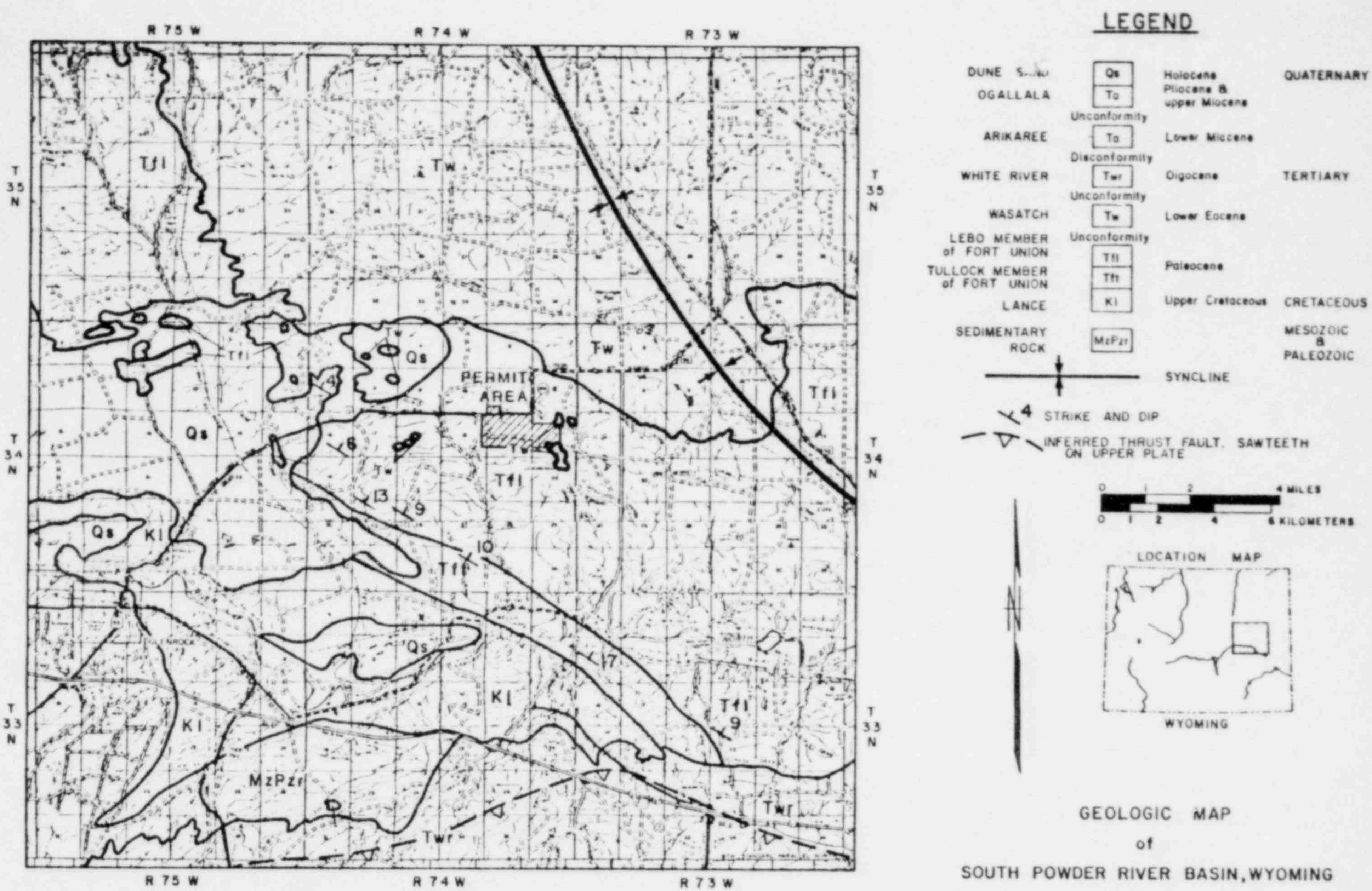
WASATCH FORMATION (LOWER EOCENE) -- Gray, brown, and reddish-pink conglomeratic to fine-grained arkosic sandstone, siltstone, carbonaceous shale, and coal; all of fluviatile and paludal origin. In general, the sandstone is coarser grained and contains two to three times more heavy minerals than those in the underlying Tertiary rocks. Conglomerate, 2-4 feet (0.6-1.2 m) thick and composed primarily of black chert pebbles, is present locally at the base. Uncomformably overlies the Lebo Member of the Fort Union Formation. Contains some of the largest coal and uranium deposits in the Powder River Basin. 0-1,800 feet (0-549 m) thick.

LEBO MEMBER OF FORT UNION FORMATION (PALEOCENE) -- Light- to dark-gray very fine grained to conglomeratic sandstone interbedded with varying amounts of siltsone, claystone, carbonaceous shale, and coal; all of fluviatile and paludal origin. Ganister (hard, dense quartzite) boulders and slabs containing numerous leaf and root impressions derived from beds of silicified swamp muck within the Lebo Member occur locally on the surface. Thin-bedded calcareous ironstone concretions interbedded with massive white sandstone and light- to dark-gray slightly bentonitic shale occur throughout the unit. Locally, coal beds are more than four feet (1.2 m) thick. Conglomeratic coarse-grained sandstone interbedded with shale occurs in the southern and southwestern parts of the basin. In general, the sandstones included in the Lebo are finer grained and better sorted than those in the Wasatch. Also, the percentage of heavy minerals in the Lebo sandstones is very low. 1,700-2,800 feet (518-853 m) thick.

TULLOCK MEMBER OF FORT UNION FORMATON (PALEOCENE) -- Interbedded sandstone, siltstone, shale, carbonaceous shale, and thin coal beds. Sandstone is tan to buff, massive to thin, and evenly bedded. Shales generally are dark gray and brown. Distinguished from the underlying Upper Cretaceous Lance Formation by the presence of thin coal beds, the lack of dinosaur-bone fragments, and a stratified appearance due to the presence of thin coal beds and carbonaceous shales interbedded with persistent thin to massive sandstone beds. Strike and dip measurements are easily obtainable. The drab appearance and massive sandstones of the Tullock make it easily distinguishable from the conformably overlying Lebo Member which generally has a lighter overall aspect and a predominance of siltstone and shale. 1,000-1,500 feet (305-475 m) thick.

LANCE FORMATION (UPPER CRETACEOUS) -- Somber shale and drab massive lenticular concretionary sandstone, and many thin coal beds in the lower half. Coal generally absent in upper part of the formation. Dinosaur bone fragments are common throughout the unit, but are absent in the overlying Tullock rocks. The Lance beds are massive and lenticular, and dip measurements are generally difficult to obtain. The contact with the overlying Tullock is arbitrarily drawn at most localities at the base of the lowest Tullock coal. Base of Lance is drawn at the top of the conformably underlying white marine sandstone of the Colgate Member of the Fox Hills Sandstone. The Lance and the overlying Tertiary formations are entirely of continental origin in contrast to the other Mesozoic and Paleozoic sedimentary rocks, which are of mixed continental and marine origin. The Lance Formation, named for exposures along Lance Creek in the eastern part of the area, ranges in thickness from about 3,000 feet (914 m) in the southwestern part of the Powder River Basin to about 2,300 feet (701 m) in the northeastern part of this mapped area.

SEDIMENTARY ROCKS (MESOZOIC AND PALEOZOIC) -- Shale, siltstone, sandstone, conglomerate, anhydrite, dolomite, and limestone of continental and marine origin. Unit excludes the Upper Cretaceous Lance Formation of purely continental origin. May be as much as 18,000 feet (5,486 m) thick.



GEOLOGIC MAP
of
SOUTH POWDER RIVER BASIN, WYOMING

(after Denson & Horn, 1975 and Hodson et.al 1973)

Geologic & Structure Map

FIGURE -4

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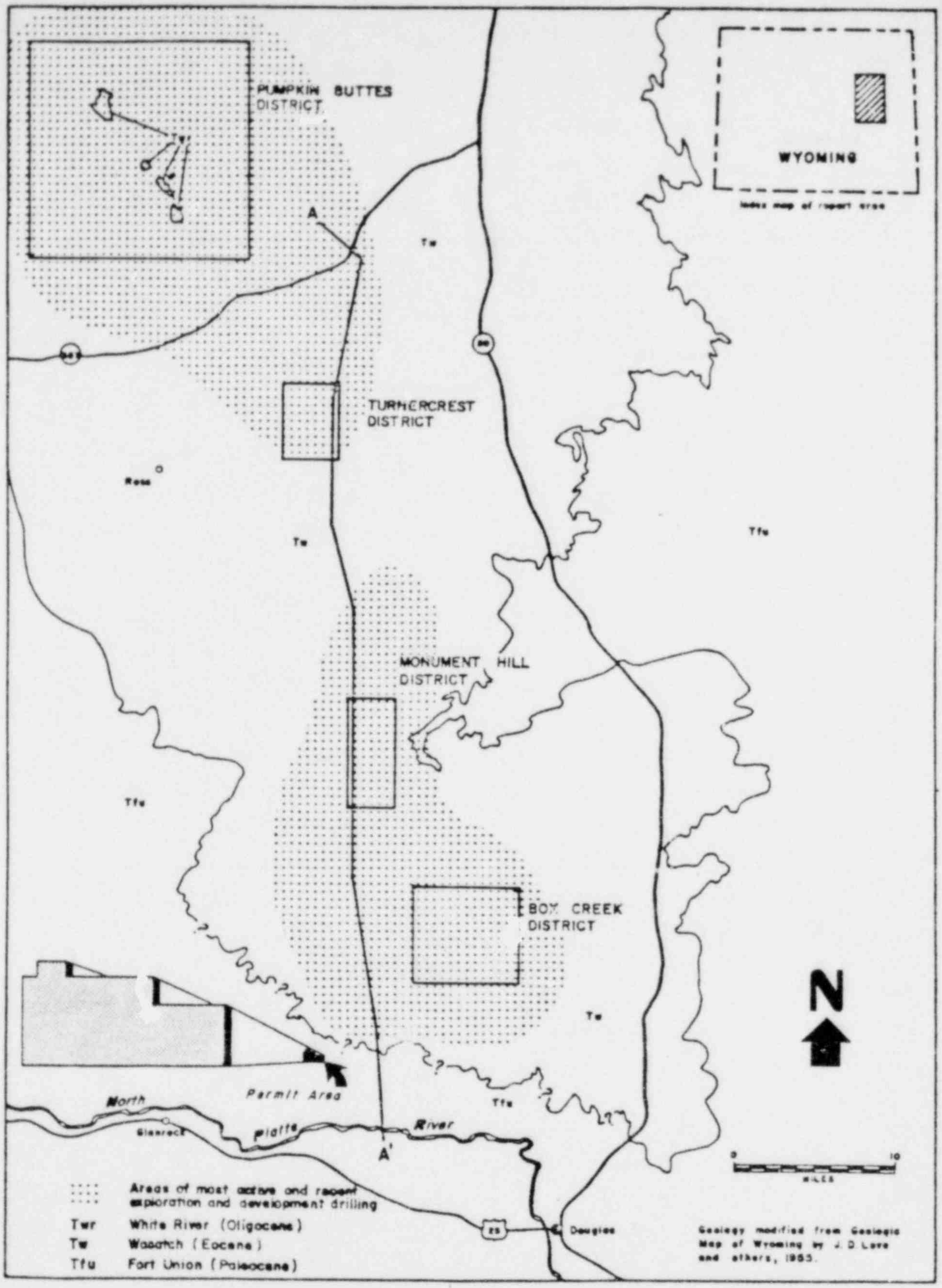


LOCATION MAP FOR GENERALIZED VERTICAL SECTION A-A'

UNC TETON EXPLORATION DRILLING, INC.

Subsidiary of United Nuclear Corporation
A UNC RESOURCES Company

P.O. Drawer A-1
Casper, Wyoming 82602

FIGURE 2-6

that "Correlation of the Watatch units is unexpectedly good over many miles as contrasted with the askosic fans of the Fort Union Formation at the south end of the Basin where correclation is difficult in drill holes a few thousand feet apart" (P. 133). This feautre is also observed at the Leuenberger Site. The groundwater regime in the Fort Union Formation is probably characterized by localized groundwater aquifers limited in areal extent and thickness. Groundwater systems in the Wasatch Formation are probably continuous over larger distances than in the Fort Union Formation based upon the observations described by Davis.

A tabulation of all exploration drill holes known to exist inside and within one-half mile of the permit area is included in Appendix D-5.1. Based upon the exploration work conducted by Teton within the proposed permit area the geology of the Leuenberger Site has been well defined.

2.6.2 Site Geology

The stratigraphic unit containing the economic uranium mineralization at the Leuenberger Site is the Lebo Member of the Paleocene Fort Union Formation. The Lebo Member is composed of interbedded fine-to-coarse-grained sandstone, siltstone, claystone, subbituminous coal and lignite.

A description of the typical lithology of this rock unit at the Leuenberger site is provided in Table 2-3. Several geologic cross sections (Figure 2-7 to 2-9) have been constructed throughout the permit area and intersect the ore bodies of interest. Figure 2-10 is a location map for each of the cross sections. The Production Zones shown on these cross sections are those intervals containing the uranium ore to be mined by the in situ mining method. The purpose for the monitor well rings shown on these figures will be discussed later in Chapter 5 of this application report. The geophysical logs used to construct each of the cross sections are provided in Appendix D-5.2. No major faults or folds have been observed within the Leuenberger Site area.

TABLE 2-3

TYPICAL VERTICAL PROFILE
AT LEUENBERGER SITE

UNIT	DESCRIPTION
O SAND	
O_2 Sand Member	Oxidized to bleached fine to coarse grained sand with occasional limonite and hematite stringers, argillaceous in part. Contains small amounts of feldspar and chert. Grain shape subrounded to subangular. Color range very pale orange to grayish orange.
Clay Member	Clay, arenaceous in part, medium bluish gray. This clay member is generally absent in the south portion of the permit area.
O_1 Sand Member	Fine to coarse grained sand with limonite and hematite stringers, trace feldspar, chert and lignite lanimae. Color grayish orange pink.
CLAY BELOW O SAND	Clay with sporadic interbeds of silt and very fine grained sand. Unit composed of various mixed layer clay minerals with significant amounts of montmorillonite. Color is medium gray.
N-SAND	Fine to coarse grained sand with frequent intervals of shale pebble conglomerate in coarse grained sand matrix. Also contains pebble units with rounded to subrounded chert, quartzite and occasional granite pebbles imbedded in clay matrix, typically near base of unit. Fine grained intervals generally interlaminated with silt and carbonaceous material. Coarse grained units contain varying amounts of muscovite, biotite, chert fragments, plagioclase feldspar and kaolinite. Color light gray to medium dark gray in unaltered areas and yellowish gray to dark yellow orange in altered areas.

Table 2-3 (Continued)

UNIT	DESCRIPTION
CLAY BELOW N SAND	Clay with sporadic silt laminae, discontinuous fine grained sand lenses and occasional carbonaceous laminae. Color medium gray to medium dark gray.
M SAND	Fine to coarse grained sand with frequent intervals of shale pebble conglomerate in coarse grained sand matrix. Fine grained intervals occasionally interlaminated with silt and carbonaceous material; with trace amounts of pyrite present in some areas. Coarse grained units typically contain small amount of muscovite, biotite, chert fragments, plagioclase feldspar, kaolinite and sporadic concentrated lignite laminae. Color light gray to medium dary gray ir unaltered areas and yellowish gray to dark yellow orange in altered areas.
CLAY BELOW M	Clay with occasional sand breaks. Color medium gray to medium dark gray.
BASAL SAND	Fine to medium grained sand and silt, very argillaceous in part with rare carbonaceous laminae. Sand typically quartzose with minor amounts of feldspar, chert and muscovite. Middle of unit typically clay from one to twenty feet in thickness. Color medium light gray to medium dark gray.

Note: Color names taken from system described in National Bureau of Sandards Research Paper RP 1239.

POOR ORIGINAL

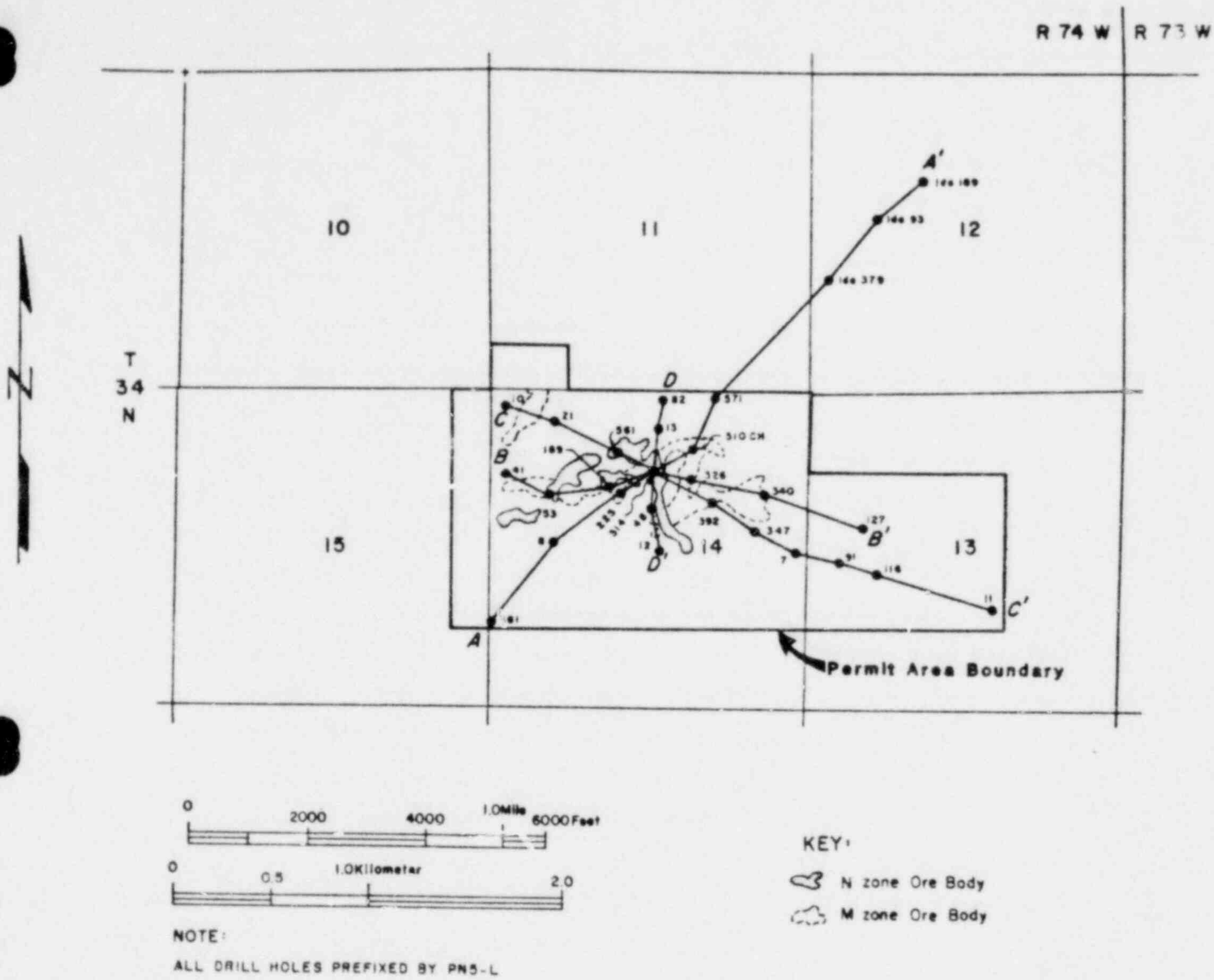


FIGURE 2-10

CROSS SECTION LOCATION MAP

UNC TETON EXPLORATION DRILLING, INC.

Two separate ore bodies exist at the Leuenberger Site and in part overlie each other. The top of the upper ore body is situated in the "N" sand and lies at a depth of 220 to 270 feet (6782 m) beneath the surface. This sand is water saturated and is referred to as the N Aquifer. The ore averages five to twenty feet (1.5 to 6.1 m) thick within a total sand thickness of approximately fifty feet (15 m). Approximately one hundred feet (30 m) of claystone overlies the N sand and separates it from the uppermost water saturated sand unit which is designated as the "O" Aquifer.

Based upon cores extracted from the N sand, this unit consists of moderately indurated to nonindurated, medium to poorly sorted, fine grained to conglomeratic (near the base of the unit) sandstone. Within the ore zone, the sandstone unit is often broken up by numerous thin {0.5 feet (.2 m) up to four to five feet (1.2 - 1.5 m) thick} interbeds of medium gray to dark gray claystone and siltstone. Also present within the unit are scattered thin stringers of carboniferous material ranging in quality from lignite to subbituminous coal. These stringers generally are less than one millimeter (0.02 in) thick, but can range up to three to four inches (8 to 10 cm) in thickness. Color of the sandstone unit varies from light gray to medium dark gray on the unaltered side of the uranium ore and yellowish gray to dark yellow orange on the altered side. The average effective porosity of the sand unit is estimated to be twenty-six percent.

The top of the lower ore body lies at a depth of 320 to 390 feet (101-119 m) beneath the surface and is contained within the "M" sand. The thickness of the ore interval ranges from five to twenty feet (1.5 - 6.1 m). This sand is also water saturated and is referred to as the M Aquifer. The aquifer thickness is fifty to sixty-five feet (12.2 - 18.3 m) throughout most of the unit. The M Aquifer is separated from the N Aquifer by approximately fifty to seventy-five feet (18.3 -

30.5 m) of interbedded claystone and siltstone. There is approximately sixty to seventy feet (21 - 31 m) of claystone separating the ore bearing portion of the M Aquifer from the next lower water saturated horizon referred as the Basal Aquifer.

Cores taken from the M sand show this unit to be slightly to moderately indurated, subround to subangular, very fine grained to medium grained and medium to well sorted. Color varies from light tan to yellowish gray on the altered side of uranium deposit to light gray to medium gray on the unaltered side. This unit differs slightly from the N sand in that generally there is less clay in the matrix. Also, very few interbeds of claystone and coaly material are present within this section. The average effective porosity of this sand unit is twenty-five percent.

The sediments in both the N and M sands are generally friable with no apparent mineral cementation by calcite, gypsum or silica. The uranium fronts lie in the transition zone between oxidizing and reducing conditions. Within this intermediate zone, both oxidized and unoxidized mineralization are found. Iron species from example range from pyritic to limonitic; and, arkosic fragments range from fresh to partially altered in some places.

Based upon x-ray diffraction work prior to the R&D operation phase, the small clay fraction within the N and M sands is identified as montmorillonitic/kaolinitic in character. Grim (1968) suggests that a montmorillonite normally prefers calcium over sodium as the interlayer cation. X-ray diffraction work indicates that the montmorillonite clays within the ore sands favor calcium as well. Experience during the R&D phase of the Leuenberger operation indicates that although sodium is substantially increased during leaching, any exchange reaction of calcium for sodium within the clays does not appreciably cause clay swelling to the extent that the permeability is effectively reduced.

2.7 Hydrology

The permit area is located in the North Platte River drainage of the South Powder River Basin east of the Continental Divide. Groundwater occurs at four horizons within the area. The groundwater quality is generally of acceptable quality in the locality; however, due to the natural radioactivity and elevated trace element concentration within the ore zones to be mined, this groundwater is not suitable for domestic, livestock or agricultural use pursuant to standards and criteria promulgated by Wyoming statute and regulation. Surface water occurs as runoff in response to intermittent precipitation and as seepage from a near surface groundwater aquifer. Surface runoff is ephemeral.

2.7.1 Groundwater

2.7.1.1 OCCURRENCE

Groundwater occurs in the O Aquifer, N Aquifer, M Aquifer and Basal Aquifer at the Leuenberger Site. The O Aquifer is the uppermost aquifer within the permit area.

Since the autumn of 1979 through the first seven months of 1980, weekly water level measurements were taken at several wells within the permit area and north of the permit area in the SE 1/4, Section 11, T-34N, R-74W. Each of these wells are selectively open to the O Aquifer (O_2 member). The weekly measurements were recorded and the average water levels at each of the wells were calculated. The average values are shown on Figure 2-11 next to the wells used to collect the data. The figure also shows the average potentiometric surface for the O Aquifer for the past year.

The direction of groundwater movement in the O Aquifer is from the northeast to the southwest. The groundwater potentiometric surface appears to intersect the land surface within the permit area at an approximate elevation of 5,170 feet along Little Sand Creek. This reach of stream is moist, contains

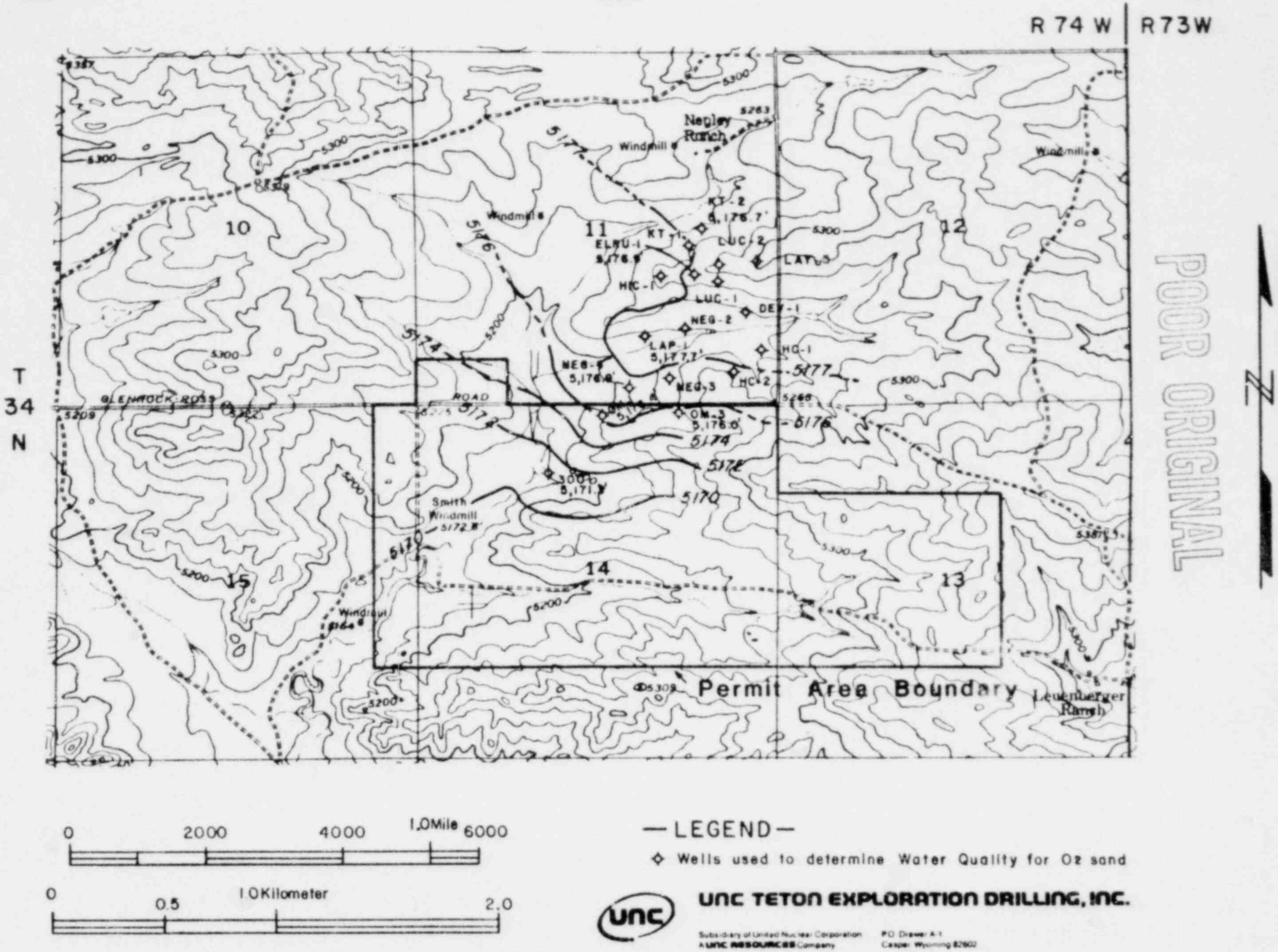


FIGURE 2-11

POTENTIOMETRIC SURFACE FOR "O" AQUIFER

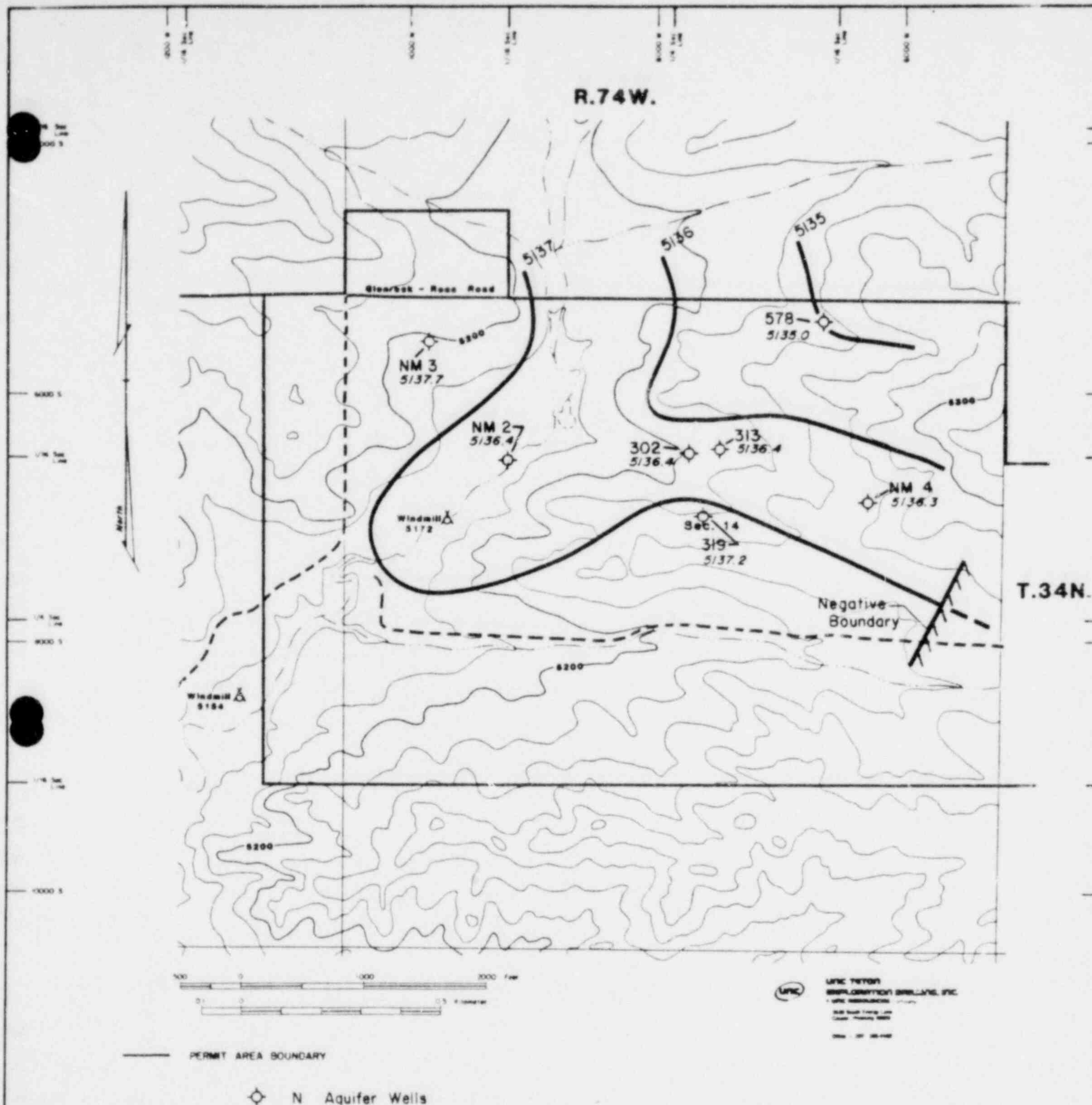
several standing pools and is characterized by lush vegetation throughout the summer months. The availability of groundwater near the surface in the area may have prompted the installation of the Smith Windmill water well located downstream from this reach of stream.

The O Aquifer potentiometric surface appears to follow the same trend as the land surface. Most of the water in the O Aquifer near the permit area is probably derived from surface recharge along the ephemeral creeks throughout the four square mile watershed above the permit area.

Three wells are completed in the O_1 sand of the O Aquifer in the northeast and central part of the permit area. The potentiometric surface in this sand tends to follow the same trend as the potentiometric surface in the O_2 sand, but the elevation is approximately two feet lower along the same vertical profile.

The O_2 sand of the O Aquifer serves as a domestic water source for several residents in the SE 1/4, Section 11, T-34N, R-74W. The water rights for the wells completed in the O_2 sand are listed in Appendix D-6.1, Table D-6.1.02, and the location these wells are shown on Figure D-6.1.01 (Sheet 1 of 4) in this Appendix. Wells deriving water from the O_2 Aquifer in this area have total depth listings in Table D-6.1.02 between 130 feet and 180 feet. The underlying groundwaters in the N Aquifer and M Aquifer are not used as a domestic water source in the area because water is generally available in the overlying O Aquifer. The drinking water supply for the Teton-Nedco Leuenberger Site personnel is and will be derived from the Basal Aquifer to avoid any usage of the groundwater in the O Aquifer by the mining operation.

The N Aquifer occurs below the O Aquifer. These aquifers are separated by approximately 100 feet of claystone. The potentiometeric surface for this aquifer is provided in Figure 2-12.



POTENTIOMETRIC SURFACE FOR "N" AQUIFER

FIGURE 2-12

POOR ORIGINAL

A constant discharge pumping test was conducted in the N Aquifer to determine the extent of any hydraulic connection between the N Aquifer and overlying and underlying aquifers. The test was also conducted to determine the hydraulic characteristics of any influencing boundaries in or near the proposed well field areas used to extract uranium solutions from the subsurface. The wells used for the test are centrally located within the N zone ore body, and the N zone deposit to be mined is contained within the area of influence of the pumping test. Appendix D-6.2 reports the testing procedures and results of the pumping test and methods used to determine the N Aquifer characteristics. Table 2-4 summarizes the pumping test results under the heading "N Aquifer Test #1."

The N Aquifer is the most permeable zone of the ore bearing sands with an average permeability of 1.9 feet/day (.6 m/day). The groundwater velocity for this aquifer under ambient conditions is approximately 2.5 feet/year (.8 m/year) in the northeast direction. A negative hydraulic boundary was detected during the pumping test southeast of the N zone ore body. The boundary is delineated on Figure 2-12 and appears to correspond with the thinning of the N zone sand and an increase in clay content in the southeast portion of the permit area. The boundary is well removed for the ore zone and should have no influence on the mining operation.

The pumping test results indicate that the 100 feet thick claystone between the O Aquifer and N Aquifer and the fifty to seventy-five feet thick claystone between the N Aquifer and the M Aquifer behave as competent confining layers retarding any measurable hydraulic connection between these aquifers.

The static water level data accumulated over the past year at the Leuenberger Site indicate that the potentiometric surface of the N Aquifer has consistantly remained approximately thirty-five to forty feet below the potentiometric surface for

TABLE 2-4

SUMMARY OF PUMPING TEST RESULTS

Well #	Distance(r) to Pumped Well (ft)	METHOD: Theis Non-Equilibrium T (gpd/ft)	Theis Non-Equilibrium S	Cooper-Jacob T (gpd/ft)	Cooper-Jacob S	Recovery T (gpd/ft)	Summary
				N AQUIFER TEST #1			
PN5-L313	295.4	610	6.4×10^{-5}	599	6.2×10^{-5}	600	T avg. = 697 gpd/ft ≈700 gpd/ft
PN5-L317	0.42 (Pumping Well)	823	---	948	---	896	S avg. = 8.3×10^{-5}
PN5-L319	297.9	659	7.4×10^{-5}	593	8.6×10^{-5}	610	b = 50 ft.
PN5-L320	248.8	677	8.5×10^{-5}	609	1.0×10^{-4}	640	$k = \frac{T}{b}$ = 14.0 gpd/ft^2 = 1.9 ft/day
PN5-L572	98.3	810	1.7×10^{-5}	711	4.3×10^{-5}	760	$r_e = (\frac{.3Tt}{S})^{½}$
PN5-L573	[illegible]7.5	706	7.0×10^{-5}	650	9.8×10^{-5}	680	$= (\frac{.3(700)(1.52)}{8.3 \times 10^{-5}})^{½}$
PN5-L574	[illegible] 1	726	2.1×10^{-5}	643	3.1×10^{-4}	680	= 1961 ft. or
Mean		716	5.52×10^{-5}	679	1.1×10^{-4}	695	2000 ft. (rounded)
				M AQUIFER TEST #1			
PN5-L301	.36 (Pumping Well)	---	---	---	---	320	T avg. = 412 gpd/ft ≈410 gpd/ft
PN5-L305	297.2	348	1.5×10^{-4}	407	7.2×10^{-4}	430	S avg. = 2.6×10^{-4}
PN5-L306	95.2	420	1.4×10^{-4}	408	1.2×10^{-4}	412	b = 60 ft.
PN5-L307	196.8	548	5.4×10^{-5}	490	6.3×10^{-5}	433	k = 6.83 gpd/ft^2 = .9 ft/day
PN5-L308	57.1	360	4.1×10^{-4}	357	3.8×10^{-4}	394	$r_e = (\frac{.3Tt}{S})^{½}$
Mean		419	1.9×10^{-4}	416	3.2×10^{-4}	398	$= (\frac{.3(410)(2)}{2.6 \times 10^{-4}})^{½}$ = 973 ft. or 1000 (rounded)

TABLE 2-4

SUMMARY OF PUMPING TEST RESULTS (Continued)

Well #	Distance(r) to Pumped Well (ft)	METHOD					Summary
		Theis Non-Equilibrium		Cooper-Jacob		Recovery	
		T (gpd/ft)	S	T (gpd/ft)	S	T (gpd/ft)	
				M AQUIFER TEST #2			
PN5-LMM6	.42 (Pumping Well)	296	---	246	---	260	T avg. = 292 gpd/ft ≈290 gpd/ft
PN5-LMM8	499.7	356	5.3×10^{-5}	291	4.9×10^{-5}	309	S avg. = 6.5×10^{-5}
PN5-LMM9	246.1	285	8.3×10^{-5}	303	7.5×10^{-5}	279	b = 65 ft
Mean		312	6.8×10^{-5}	280	6.2×10^{-5}	283	$k = \frac{T}{b} = 4.5$ gpd/ft^2 = .6 ft/dy $r_e = (\frac{.3Tt}{S})^{½}$
				M AQUIFER TEST #3			$= (\frac{.3(290)(4)}{6.5 \times 10^{-5}})^{½} = 2314$ ft = 2300 (rounded)
PN5-LMM3	798.9	324	8.3×10^{-5}	---	---	---	T avg. = 261 gpd/ft ≈260 gpd/ft
PN5-LMM4	40.2	232	4.6×10^{-4}	228	4.4×10^{-4}	239	S avg. = 2.6×10^{-4}
PN5-LMM7	642.5	279	5.1×10^{-5}	247	6.0×10^{-5}	227	b = 60 ft
PN5-LMM10	.42 (Pumping Well)	342	---	255	---	272	$k = \frac{T}{b} = 4.3$ gpd/ft^2 = .6 ft/dy
Mean		294	2.6×10^{-4}	243	2.5×10^{-4}	246	$r_e = (\frac{.3Tt}{S})^{½}$ $= (\frac{.3(260)(4)}{2.6 \times 10^{-4}}) = 1095$ ft = 1100 ft (rounded)

T = Transmissivity in gallons per day per foot (gpd/ft).

S = Storage coefficient (Unitless).

[illegible] = Aquifer thickness (ft).

k = Hydraulic conductivity (gpd/ft^2).

t = Time duration of pumping test (days).

r_e = Effec[illegible]e radius or zone of influence of pumpi[illegible] test.

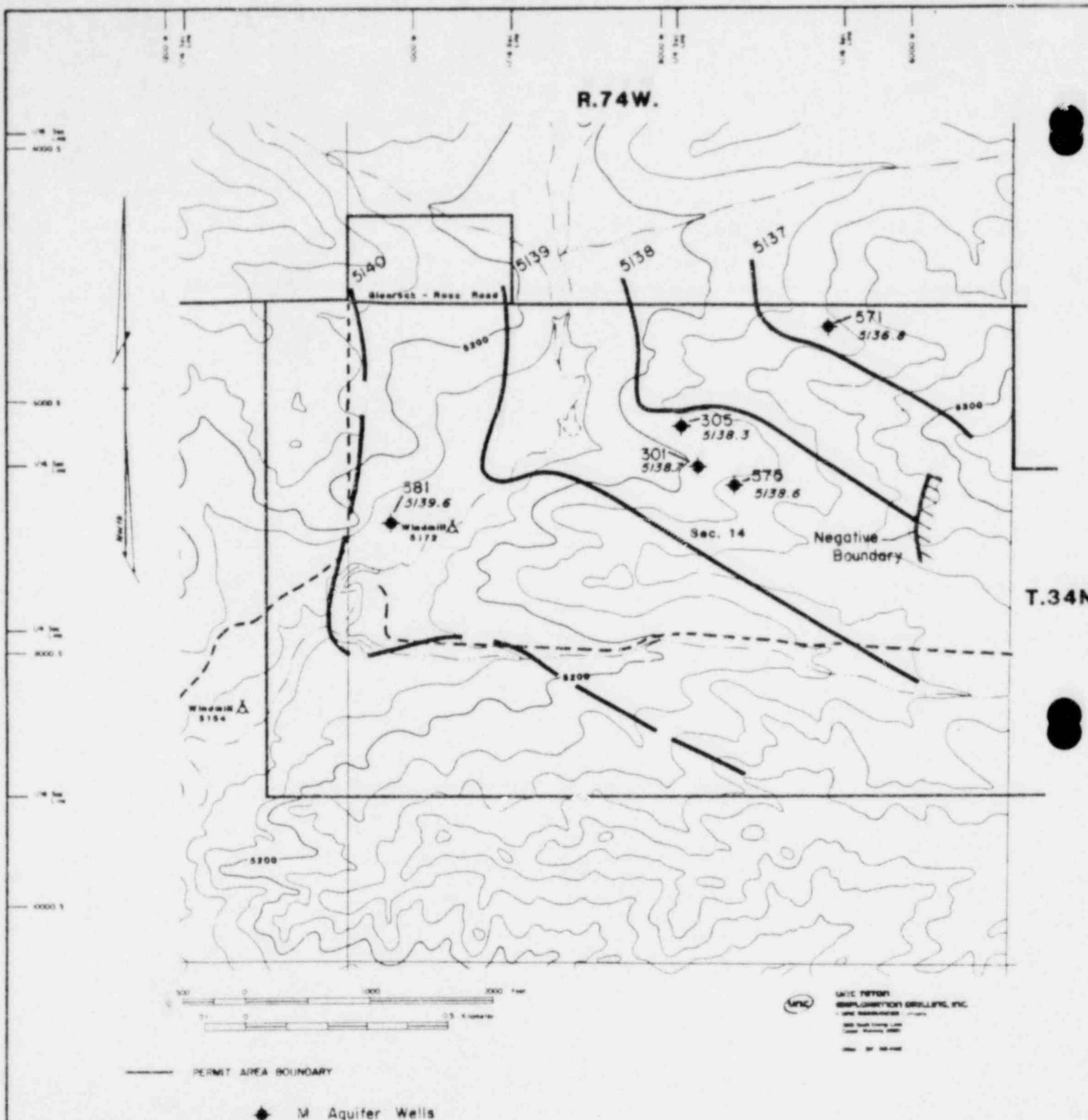
the O Aquifer. The 100 foot thick confining layer between the O Aquifer and N Aquifer has inhibited water migration between the two aquifers in that the montmorillonite clay within this unit appears to have effectively reduced the clay permeability to negligible levels. As a result, the two aquifers maintain separate and distinct potentiometric surfaces.

The M Aquifer occurs below the N Aquifer. These aquifers are separated by approximately fifty feet to seventy-five feet of claystone. A potentiometric surface for the M Aquifer is provided on Figure 2-13. Three separate constant discharge pumping tests were conducted within the M Aquifer to determine the hydraulic characteristics of this zone. The entire ore zone deposit to be mined is contained within the radius of influence of the M Aquifer pumping tests.

A summary of the pumping test results for the three tests are listed in Table 2-4. M Aquifer Test #1 was conducted in the central area of the M zone ore deposit while M Aquifer Tests #2 and #3 were conducted in the western and eastern extremities of the deposit respectively. M Aquifer Test #1 yielded the highest permeability of the three tests for a value of 0.9 feet/day (.3 m/day). Groundwater velocity for the M zone using this permeability is 1.23 feet/year (.4 m/yr) in a northeast direction under ambient conditions.

A negative boundary was detected during M Aquifer Test #3 and this boundary is illustrated on Figure 2-13. The boundary appears to correspond with the eastern extent of the M zone ore body and probably denotes a rapid thinning of the M sand at the eastern edge of the deposit. Testing procedures and the data analysis for the three tests are provided in Appendix D-6.2.

The Basal Aquifer underlying the M Aquifer will serve as the drinking water supply for the operation. The permeability of



POTENTIOMETRIC SURFACE FOR "M" AQUIFER

FIGURE 2-13

this aquifer is similar to that of the other sands. Two single well recovery tests have been conducted in this aquifer. The results of these tests are provided in Appendix D-6.2.

2.7.1.2 WATER QUALITY

Groundwater quality baseline samples have been taken from each of the aquifers previously described. Fourteen wells have been sampled both within and outside the permit area for the O Aquifer (O_2 member). The wells from which the samples were taken are shown on Figure 2-11. The chemical analyses are reported in Appendix D-6.3. Appendix D-6.3 includes the chemical data for wells penetrating the O Aquifer and completed in the O_1 sand within the permit area.

Groundwater quality data have been collected from both the N and M Aquifers to establish pre-mining water quality and to determine the suitable uses for this water for groundwater restoration purposes. The water quality data for these aquifers have been divided into two groups. These groups are 1) water quality within the production zones and 2) water quality outside the production zones. Figure 2-10 shows the extent of the production zones. Average values and other statistical data for the water quality inside the production zone and outside the production zone for the N Aquifer are listed in Tables 2-5 and 2-6 respectively. Water quality statistics for the production zone and outside the production zone for the M Aquifer are listed in Tables 2-7 through 2-8.

Approximately 2,900 individual chemical analyses were performed on the groundwaters within the N and M Aquifers and these data were used to compute Tables 2-5 through 2-8. The Wyoming Department of Environmental Quality has promulgated standards for the classification of groundwater for the State of Wyoming. These standards are listed in Table 2-9 according to the potential use of the groundwater. The Tables 2-5 through 2-8 describing the groundwater within these aquifers were compared to the groundwater classification listing in Table 2-9. The result of these comparisons are illustrated in Tables 2-10 through 2-13.

DEFINITION OF TERMS FOR FOLLOWING TABLE(S)

LAB = Laboratory performing the analyses
JOB = Job ID number assigned by laboratory
DS = Date sample was taken
DA = Date chemical analyses started for the sample
WN = Computer well number
SPN = Computer sample number

Parameter			Units
PH	=	-log[H+]	
TC	=	Temperature	degrees centigrade
CD	=	Electrical conductivity	μmhos/cm
NH3	=	Ammonia	mg/l
NO3	=	Nitrite/Nitrate total	"
HCO3	=	Bicarbonate	"
CO_3	=	Carbonate	"
CA	=	Calcium	"
CL	=	Chloride	"
B	=	Boron	"
F	=	Fluoride	"
MG	=	Magnesium	"
K	=	Potassium	"
NA	=	Sodium	"
SO4	=	Sulfate	"
AL	=	Aluminium	"
AS	=	Arsenic	"
BA	=	Barium	"
CD	=	Cadmium	"
CR	=	Chromium	"
CU	=	Copper	"
FE	=	Iron	"
PB	=	Lead	"
MN	=	Manganese	"
HG	=	Mercury	"
MO	=	Molybdenum	"
NI	=	Nickel	"
RA	=	Radium 226	pCi/l
RAER	=	Radium 226 error associated w/analysis	pCi/l
SE	=	Selenium	mg/l
TH	=	Thorium	pCi/l
U	=	Uranium	mg/l
V	=	Vanadium	"
ZN	=	Zinc	"
TDS	=	Total Dissolved Solids	"
CTDS	=	Total Dissolved Solids calculated by summation of Ca+Mg+Na+K+HCO3+CO3+SO4+Cl	"
CAT	=	# of milliequivalents of Ca+Na+Mg+Na	meq/l
AN	=	# of milliequivalents of $HCO_3+CO_3+SO_4+Cl$	"
CB	=	Charge balance calculated as: [(CAT-AN)/CAT+AN]100	%

USER CODE = computer operators code for selecting analyses to use in statistical computation (100 means use all analyses)

MEAN = mean of all samples listed for a given well (well mean). Mean reported on "Water Quality Analysis for Selected Wells" table is calculated by averaging the means for each parameter using the wells printed on the bottom of the table (population mean)
STDV = Standard deviation for respective mean
NSMP = Number of samples used to calculate well mean
NWEL = Number of wells used to calculate population mean
MAX = Maximum value listed for a given parameter for a given well
MIM = Minimum value listed for a given parameter for a given well
MXOBS = Maximum value for a parameter observed in any sample used to calculate a well mean
MNOBS = Minimum value for a parameter observed in any sample used to calculate a well mean
NA = Not available or not analyzed
minus sign = A minus sign after a number indicates the detection limit for the analysis and that the parameter concentration is at below detectable levels.

TABLE 2-5

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	8.39	0.84	8	7.10	12.28
TC	45.89	93.24	7	7.80	750
CD	848.34	227.34	8	390	2245
NH3	0.35	0.34	9	0.01	2
NO3	0.51	0.57	9	0.01	2.80
HCO3	155.88	36.10	8	17	220
CO3	48.25	85.79	8	0	624
CA	104.50	16.54	9	19	208
CL	20.65	27.06	8	1	123
B	0.07	0.07	9	0.01	0.30
F	0.45	0.08	9	0.26	0.90
MG	17.68	6.29	9	0	34
K	19.90	18.57	9	7.70	100
NA	37.95	5.60	9	25	63
SO4	238.78	28.31	8	138	380
AL	0.35	0.71	9	0.01	7.60
AS	0.01	0.02	9	0.00	0.50
BA	0.07	0.04	9	0.03	0.50
CD	0.02	0.01	9	0.00	0.05
CR	0.04	0.02	9	0.01	0.10
CU	0.03	0.01	9	0.01	0.09
FE	0.46	0.48	9	0.01	3.79
PB	0.04	0.02	9	0.00	0.30
MN	0.08	0.10	9	0.01	1.21
HG	.00506	.01260	9	.00004	.11000
MO	0.07	0.04	9	0.00	0.59
NI	0.04	0.02	9	0.01	0.10
RA	194.28	232.81	7	0.50	1389
RAER	0	0.000	0	0	0
SE	0.01	0.00	9	0.01	0.01
TH	4.93	7.64	7	0	22
U	0.31	0.48	8	0.00	3.55
V	0.19	0.21	9	0.01	1.00
ZN	0.32	0.85	9	0.01	9.07
TDS	545.13	59.18	8	322	896
CTDS	644.40	85.51	8	343.60	1217.50
CAT	8.81	1.06	8	4.59	14.54
AN	9.72	2.56	8	5.03	27.75
CB	5.51	4.73	8	0.18	31.23

USER CODE 100.00

Wells used in this summary are: PN5-LNR1 PN5-L302 PN5-L309 PN5-L317 PN5-L319
PN5-L572 PN5-L573 PN5-L574 PN5-LNM2

TABLE 2-6

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.61	0.20	7	7.10	8.20
TC	11.67	1.15	3	11	13
CD	667	82.85	7	475	810
NH3	0.38	0.32	7	0.01	1.00
NO3	0.44	0.31	7	0.01	1.70
HCO3	183.27	23.42	7	90	232
CO3	1.73	3.55	7	0	12
CA	92.27	18.43	7	50	139
CL	4.00	2.22	7	0.20	8
B	0.09	0.08	7	0.01	0.25
F	0.42	0.03	7	0.27	0.65
MG	49.56	85.40	7	0.50	243
K	10.08	0.64	7	8.50	14
NA	38.51	5.83	7	26	61
SO4	222.27	50.03	7	28	298
AL	0.18	0.14	7	0.05	0.90
AS	0.01	0.00	7	0.00	0.02
BA	0.10	0.06	7	0.03	0.40
CD	0.02	0.01	7	0.00	0.05
CR	0.05	0.00	7	0.01	0.10
CU	0.05	0.01	7	0.01	0.09
FE	0.88	0.55	7	0.06	2.80
PB	0.04	0.01	7	0.01	0.08
MN	0.07	0.03	7	0.01	0.50
HG	.00492	.00693	7	.00040	.10000
MO	0.16	0.18	7	0.00	3
NI	0.04	0.01	7	0.01	0.10
RA	26.92	45.71	5	0.50	211
RAER	0	0.000	0	0	0
SE	0.01	0.02	7	0.00	0.05
TH	4.43	1.96	4	2.40	7
U	0.09	0.01	7	0.00	0.25
V	0.20	0.15	7	0.05	1.00
ZN	0.05	0.03	7	0.01	0.15
TDS	545.01	74.40	7	328	764
CTDS	614.52	135.35	7	380.90	873.20
CAT	10.65	7.32	7	4.94	27.04
AN	8.05	1.14	7	4.96	9.54
CB	9.09	17.52	7	0.01	48.69
USER CODE		100.00			

Wells used in this summary: PN5-LNM1 PN5-L312 PN5-L313 PN5-L320 PN5-L578 PN5-LNM3 PN5-LNM4

TA[illegible]2-7

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE
(SUMMARY)

POOR ORIGINAL

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.68	0.24	12	7.30	8.43
TC	13.50	2.75	11	10	20
CD	548.94	126.67	13	345	1000
NH3	0.27	0.28	13	0.04	1.80
NO3	0.48	0.45	13	0.01	1.80
HCO3	221.10	21.99	12	142	281
CO3	0.81	1.59	12	0	12
CA	76.62	23.74	13	45	180
CL	4.46	1.18	12	1.80	10
B	0.15	0.10	13	0.01	0.25
F	0.48	0.09	13	0.32	1.30
MG	14.89	3.95	13	0	29
K	8.76	1.40	13	6	12.50
NA	27.78	5.79	13	22	60
SO4	134.67	76.64	12	50	340
AL	0.22	0.20	13	0.01	1.50
AS	0.01	0.01	13	0.00	0.06
BA	0.13	0.08	13	0.03	0.50
CD	0.02	0.01	13	0.00	0.05
CR	0.05	0.01	13	0.01	0.10
CU	0.05	0.01	13	0.01	0.10
FE	0.71	0.45	13	0.04	3.60
PB	0.05	0.03	13	0.00	0.43
MN	0.06	0.02	13	0.04	0.21
HG	.00092	.00014	13	.00006	.00100
MO	0.09	0.08	13	0.00	0.50
NI	0.05	0.01	13	0.01	0.10
RA	184.23	227.29	5	3.24	864
RAER	0	0.000	0	0	0
SE	0.01	0.00	13	0.01	0.03
TH	1.88	1.37	6	0.10	3.20
U	0.13	0.12	12	0.01	0.50
V	0.11	0.14	13	0.01	1.00
ZN	0.05	0.07	12	0.01	0.24
TDS	403.08	112.43	12	197	766
CTDS	490.42	105.91	12	379.30	811
CAT	6.55	1.53	12	5.09	11.69
AN	6.58	1.59	12	4.59	11.38
CB	3.83	4.40	12	0.04	21.65
USER CODE		100.00			

Wells used in this summary are: PN5-LMM2 PN5-LMR1 PN5-L301 PN5-L306 PN5-L307 PN5-L308 PN5-LMM3 PN5-LMM4 PN5-LMM5 PN5-LMM6 PN5-LMM7 PN5-LMM9 PN5-LMM1

TABLE 2-8

WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.76	0.40	7	7.12	9.56
TC	12.25	2.50	4	11	16
CD	532.26	65.64	7	295	710
NH3	0.46	0.32	7	0.01	1.00
NO3	0.53	0.28	7	0.01	1.90
HCO3	217.36	26.33	7	66	400
CO3	3.49	5.96	7	0	19
CA	66.46	21.52	7	18	120
CL	6.20	1.90	7	1.80	16
B	0.08	0.08	7	0.01	0.25
F	0.48	0.04	7	0.30	0.80
MG	12.71	4.38	7	0	32
K	9.76	2.48	7	7	20
NA	29.90	2.76	7	23	40
SO4	119.85	36.68	7	65	255
AL	0.92	2.07	7	0.02	11
AS	0.02	0.02	7	0.00	0.12
BA	0.08	0.05	7	0.03	0.50
CD	0.02	0.01	7	0.00	0.05
CR	0.05	0.01	7	0.01	0.10
CU	0.05	0.01	7	0.01	0.09
FE	0.80	0.82	7	0.01	3.90
PB	0.05	0.02	7	0.01	0.10
MN	0.07	0.02	7	0.05	0.20
HG	.00092	.00010	7	.00004	.00100
MO	0.08	0.02	7	0.00	0.50
NI	0.05	0.01	7	0.01	0.05
RA	10.21	5.48	6	0.05	32.80
RAER	0	0.000	0	0	0
SE	0.01	0.00	7	0.01	0.01
TH	3.08	2.12	6	0.90	6
U	3.01	7.73	7	0.01	41
V	0.40	0.50	7	0.05	5
ZN	0.07	0.05	7	0.01	0.34
TDS	383.05	44.50	7	250	558
CTDS	451.55	90.86	7	272.70	742
CAT	5.96	1.15	7	3.47	9.96
AN	6.12	1.21	7	4.08	9.92
CB	5.09	2.11	7	0.07	19.59

USER CODE 100.00

Wells used in this summary are: PN5-LMM1 PN5-L305 PN5-L571 PN5-L575 PN5-L576 PN5-L581 PN5-LMM8

TABLE 2-9

CLASSIFICATION SYSTEM FOR GROUNDWATERS OF WYOMING

GROUNDWATER CLASS	I	II	III	IV	VA	VB
Potential Use	Domestic	Fish/Aquatic Life	Agriculture	Livestock	Industry	
Constituent or Parameter	Concentration or Range -- mg/l unless otherwise indicated					
Aluminum (Al)		0.10	5.0	5.0		
Ammonia (NH_3)	0.5[8]	0.02[1]				
Arsenic (As)	0.05	0.05	0.10	0.2		
Barium (Ba)	1.0	5.0				
Beryllium (Be)		0.011-1.1[3]	0.10			
Boron (B)	0.75		0.75	5.0		
Cadmium (Cd)	0.01	0.0004-0.015[3]	0.01	0.05		
Chloride (Cl)	250.		100.	2,000.		
Chromium (Cr)	0.05	0.05	0.10	0.05		
Cobalt (Co)			0.05	1.0		
Copper (Cu)	1.0	0.010-0.040[3]	0.20	0.50		
Cyanide (CN)	0.2	0.005				
Fluoride (F)	1.4-2.4[7]					
Hydrogen Sulfide (H_2S)	0.05	0.002[2]				
Iron (Fe)	0.30	0.50	5.0			
Lead (Pb)	0.05	0.004-0.150[3]	5.0	0.10		
Lithium (Li)			2.5			
Manganese (Mn)	0.05	1.0	0.20			
Mercury (Hg)	0.002	0.00005		0.00005		
Nickel (Ni)		0.05-0.400[3]	0.20			
Nitrate (NO_3 as Nitrogen	10.					
Nitrite (NO_2 as Nitrogen	1.0			10.		
(NO_3+NO_2, as N)				100.		
Oil & Grease	10.	virtually free	10.	10.		
Phenol	0.001	0.001				
Selenium (Se)	0.01	0.05	0.02	0.05		
Silver (Ag)	0.05	0.00010-0.00025[3]				
Sulfate (SO_4)	250.		200.	3,000.		
Total Dissolved Solids (TDS)	500.	500.[4] 1,000.[5] 2,000.[6]	2,000.	5,000.	10,000	>10,000
Uranium (U)	5.0	0.30-1.40[3]	5.0	5.0		
Vanadium (V)			0.10	0.10		
Zinc (Zn)	5.0	0.050-0.060[3]	2.0	25.		
pH	6.5-8.5s.u.	6.5-9.0s.u.	4.5-9.0s.u.	6.5-8.5s.u.		
SAR			8			
RSC			1.25 meq/l			
Combined Total Radium-226 and Radium-228	5 pCi/l	5 pCi/l	5 pCi/l	5 pCi/l		
Total Strontium-90	8 pCi/l	8 pCi/l	8 pCi/l	8 pCi/l		
Gross alpha particle radioactivity (including Radium-226 but excluding Radon and Uranium)	15 pCi/l	15 pCi/l	15 pCi/l	15 pCi/l		
	Underground water of this class shall not contain bacteriological, biological, hazardous, toxic or potentially toxic materials or substances including pesticides, insecticides or herbicides in concentrations or amounts which exceed maximum allowable concentrations based upon the latest available information and in conformity with the latest criteria or standards established by the U.S. Environmental Protection Agency or its successor agency.					

SOURCE: Water Quality Division (DEQ)

[1]Unionized ammonia: When ammonia dissolves in water, some of the ammonia reacts with water to form ammonium ions. A chemical equilibruim is established which contains unionized ammonia (NH_3), ionized ammonia (NH_4^+), and hydroxide ions (OH^-). The toxicity of aqueous solutions of ammonia is attributed to NH_3; therefore the standard is for unionized ammonia. (Note: 0.02 mg/l NH_3 is equivalent to 0.016 NH_3 as N).

[2]Undissociated H_2S: The toxicity of sulfides derives primarily from H_2S rather than from the dissociated (HS) or (S) ions; therefore the standard is for the toxic undissociated H_2S.

[3]Dependent on hardness: The toxicity of metals in natural waters varies with the hardness of the water; generally, the limiting concentration is greater in hard water than in soft water.

[4]Egg hatching [5]Fish rearing [6]Fish and aquatic life

[7]Dependent on the annual average of the maximum daily air temperature. [8]Total ammonia-nitrogen.

TABLE 2-10

SUITABLE USE CRITERIA FOR N PRODUCTION ZONE

Potential Use	DOMESTIC		AGRICULTURE		LIVESTOCK		INDUSTRY	
Constituent or Parameter	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria
pH		X						
NH_3		X						
SO_4		X	X	X				
Al			X	X				
As		X		X		X		
Cu	X	X	X	X				
Cr		X				X		
Fe	X	X						
Pb		X				X		
Mn	X	X		X				
Hg					X	X		
Ra-226	X	X	X	X	X	X		
Se								
V			X	X	X	X		
Zn		X		X				
TDS	X	X						
Total Exceeding Criteria	5	12	5	8	3	6	0	0

Table 2-11

SUITABLE USE CRITERIA FOR N AQUIFER OUTSIDE PRODUCTION ZONE

Potential Use	DOMESTIC		AGRICULTURE		LIVESTOCK		INDUSTRY	
Constituent or Parameter	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria
pH								
NH_3		X						
SO_4		X	X	X				
Al								
As								
Cu	X	X	X	X				
Cr		X				X		
Fe	X	X						
Pb		X						
Mn	X	X		X				
Hg					X	X		
Ra-226	X	X	X	X	X	X		
Se		X						
V			X	X	X	X		
Zn								
TDS	X	X						
Total Exceeding Criteria	5	10	4	5	3	4	0	0

TABLE 2-12

SUITABLE USE CRITERIA FOR M PRODUCTION ZONE

Potential Use	DOMESTIC		AGRICULTURE		LIVESTOCK		INDUSTRY	
Constituent or Parameter	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria
pH								
NH_3								
SO_4		X		X				
Al								
As		X						
Cu	X	X	X	X				
Cr		X				X		
Fe	X	X						
Pb		X				X		
Mn	X	X		X				
Hg					X	X		
Ra-226	X	X	X	X	X	X		
Se		X		X				
V								
Zn								
TDS		X						
Total Exceeding Criteria	4	10	2	5	2	4	0	0

TABLE 2-13

SUITABLE USE CRITERIA FOR M AQUIFER OUTSIDE PRODUCTION ZONE

Potential Use	DOMESTIC		AGRICULTURE		LIVESTOCK		INDUSTRY	
Constituent or Parameter	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria	Mean Value Exceeds Criteria	At Least One Sample Exceeds Criteria
pH								
NH_3								
SO_4		X		X				
Al				X		X		
As				X		X		
Cu	X	X	X	X				
Cr		X				X		
Fe	X	X						
Pb	^	X						
Mn	X	X						
Hg					X	X		
Ra-226	X	X	X	X	X	X		
Se								
V								
Zn								
TDS		X						
Total Exceeding Criteria	5	8	2	5	2	5	0	0

Water quality within and outside the proposed production zone for both aquifers meets the criteria for industrial use. In situ uranium mining is an industrial use and thereby is an acceptable and beneficial use of these groundwater aquifers. Provided that the water was appropriately treated, the groundwater could be used for livestock watering and with further treatment may approach agricultural suitability. With additional treatment the water could possibly approach domestic criteria. Without excessive treatment, however, the groundwater is presently suitable and may be beneficially used for industrial purposes.

Although several trace metals are present in excessively high chemical concentrations with respect to the potential use classifications adopted by the State of Wyoming, Radium-226 concentration within the ore zones is probably the most noticeable and important constituent that distinguishes the water within these aquifers from typical Wyoming groundwaters. Radium-226 is present in anomalously high concentrations in these groundwaters as a radionuclide-uranium daughter product because the uranium mineralization naturally deposited in the area exists at above normal levels.

2.7.2 Surface Water

Little Sand Creek and a small tributary are the only stream channels within the permit area. The stream channels are ephemeral and only pass water during the spring months in response to snow melt or during large precipitation events. Little Sand Creek contains some water in standing ponds below the elevation of 5,170 feet. This water is derived from seepage from the upper most groundwater aquifer at Leuenberger Site. When the Smith windmill is operating, water may accumulate in Little Sand Creek downstream from the windmill due to ponding behind earthen dams. No water rights of record exist for these structures.

TABLE 2-14

WATER QUALITY DATA
FOR LITTLE SAND CREEK

(Chemical units in mg/l except as noted.)

Laboratory	1104
Job I.D. Number	Sand Creek
Date Sampled	5-15-80
Date Analyzed	5-15-80
pH	7.89
Conductivity (umhos/cm)	2590
Ammonia (NH_3 as N)	2.80
Total NO_2/NO_3 (as N)	0.29
Bicarbonate (HCO_3)	454
Carbonate (CO_3)	0
Calcium (Ca)	480
Chloride (Cl)	39
Boron (B)	0.05
Fluoride (F)	0.39
Magnesium (Mg)	73
Potassium (K)	19
Sodium (Na)	350
Sulfate (SO_4)	1808
Aluminum (Al)	0.20
Arsenic (As)	< 0.005
Barium (Ba)	< 0.05
Cadmium (Cd)	< 0.01
Chromium (Cr)	< 0.05
Copper (Cu)	< 0.05
Iron (Fe)	< 0.05
Lead (Pb)	< 0.05
Manganese (Mn)	0.45
Mercury (Hg)	< 0.001
Molybdenum (Mo)	< 0.05
Nickel (Ni)	< 0.05
Radium 226 (Ra-226) pCi/l	.16 ±.26
Selenium (Se)	< 0.005
Thorium 230 (Th) pCi/l	10.1 ± 3.3
Uranium (U)	< 0.05
Vanadium (V)	< 0.05
TDS	3270

Due to the intermittent nature of the stream flow, no stream flow has been observed upstream from the site or across the site in recent months. In an effort to establish baseline water quality a sample has been collected from one of the standing pools upstream from the Smith Windmill. The chemical results from this sample are listed in Table 2-14.

2.8 Seismology

The area of east central Wyoming where the Leuenberger Site is situated lies in a seismically relatively quiet region of the United States. Few earthquakes capable of producing damage have originated in this region as indicated on the Regional Seismicity Map provided on Figure 2-14. The seismically active region closest to the site is the Intermountain Seismic Belt of the Western United States which extends in a northerly direction between Arizona and British Columbia. It is characterized by shallow earthquake foci between 10 and 25 miles in depth, and normal faulting. Part of this seismic belt extends along the Wyoming-Idaho border, more than 415 km (250 miles) west of the permit area and would be the most probable source of earthquakes affecting the Leuenberger Site.

Table 2-15 lists the largest recorded earthquakes that have occurred within 300 miles (483 km) of the Leuenberger Site and gives the maximum ground acceleration that would be realized at the Site as a result of these disturbances. The earthquake of highest intensity that occurred nearest the Site is presumed to be the Casper, Wyoming earthquake of 1897. This earthquake has been assigned a probably maximum intensity of VII, based on damage incurred. Figure 2-15 provides a means for estimating the intensity of earth tremors at the Leuenberger Site originating from such an epicentral intensity 35 miles (59 km) away. The small figure insert shows that the probable magnitude for an earthquake with an epicentral intensity of VII is 5.67 on the Richter Scale. Assuming that the distance from the Leuenberger Site to the epicenter is approximately 35 miles (59 km), then the acceleration of the ground at the Site would be 0.04 g, or slightly greater than intensity V.

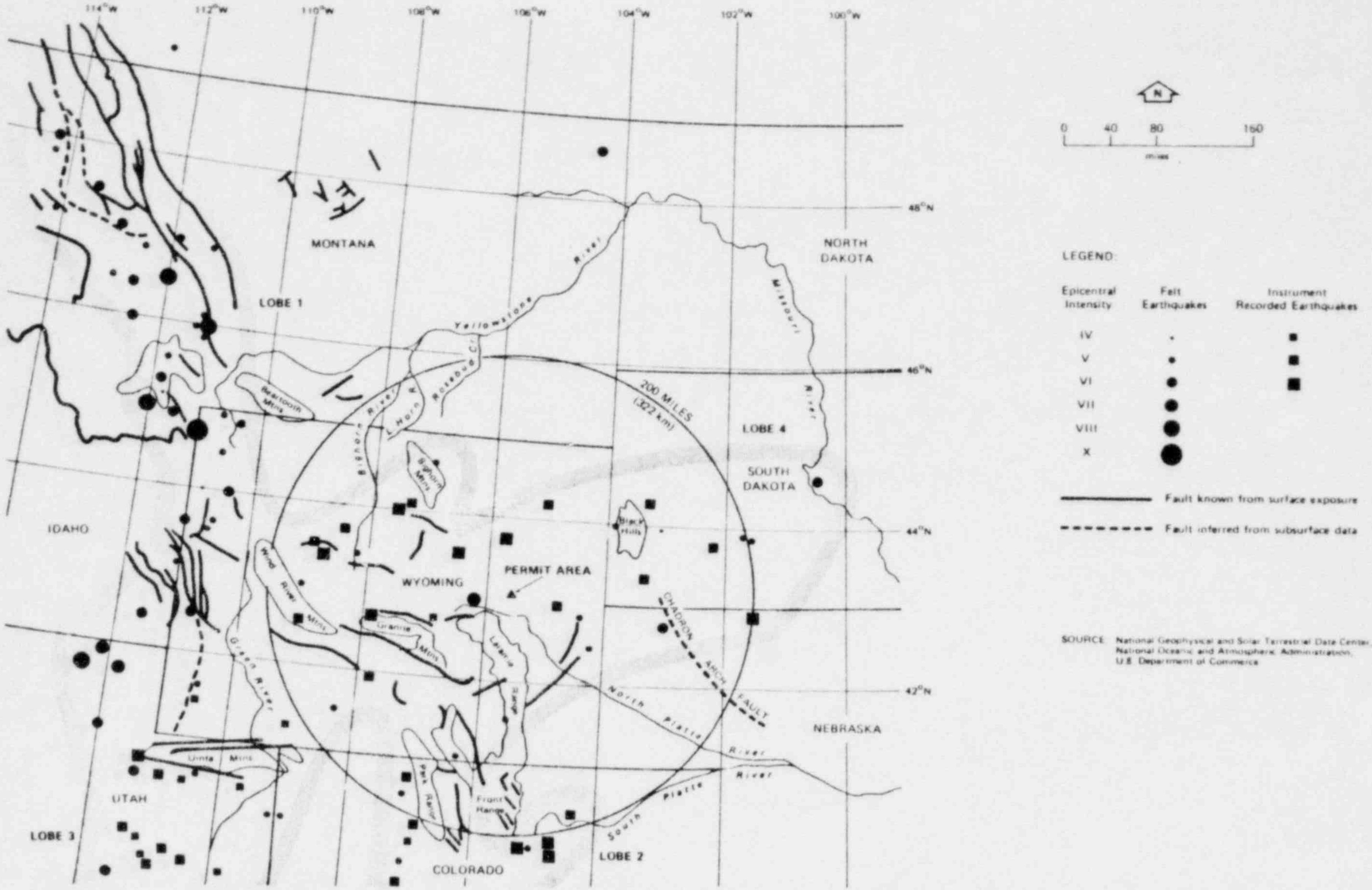
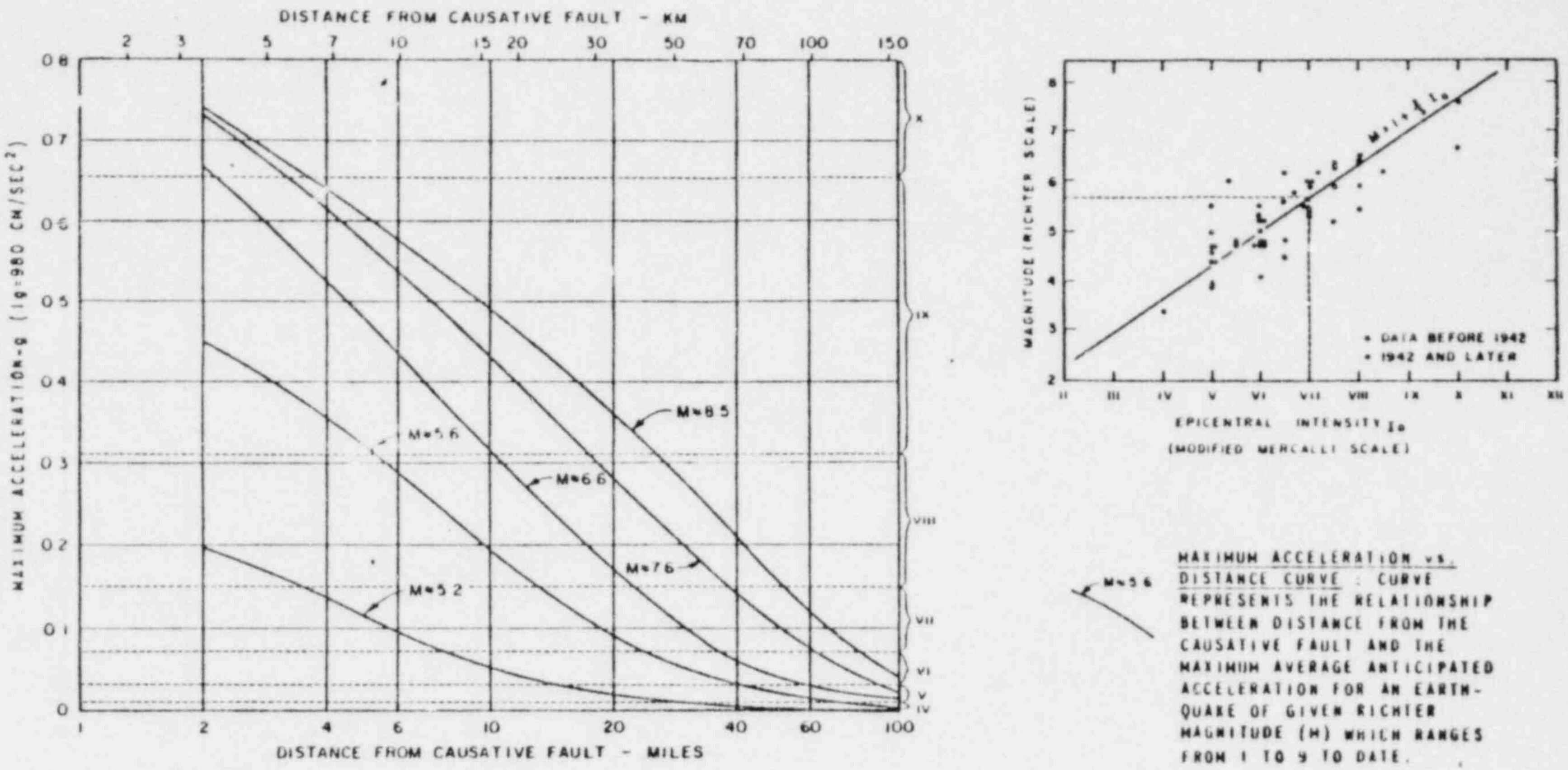


FIGURE 2-14
REGIONAL SEISMICITY

TABLE 2-15

MAXIMUM EXPECTED EARTHQUAKE INTENSITIES AND GROUND ACCELERATIONS AT THE LEUENBERGER SITE

	Maximum Epicentral Intensity of Record	Distance from Epicenter to Leuenberger Site	Maximum Probable Intensity at Leuenberger Site	Maximum Ground Acceleration at Leuenberger Site
Hebgen Lake, Montana (1959)	X	296 miles (496 km)	III-IV	Less than 0.01 g
Northeastern Nebraska (1934)	VI	130 miles (210 km)	IV	Approximately 0.02 g
Black Hills, South Dakota (1928)	V	111 miles (179 km)	III-IV	Less than 0.02 g
Powder River Basin (1967)	VI	47 miles (76 km)	IV	Approximately 0.02 g
Casper, Wyoming (1897)	VII	35 miles (56 km)	V-VI	Approximately 0.04 g



Source: Schnabel and Seed, 1972

FIGURE 2-15

Correlating Factors For Estimating Earthquakes

No faulting at the Leuenberger Site has been reported, nor is any faulting evident from geophysical log interpretations. The ground accelerations reported in Table 2-15 (.01 g to .04 g) are not considered to be of a magnitude that would disturb the operations in the unlikely event that an earthquake occurred during the estimated eleven year life of the mine.

2.9 Ecology

Topography in the permit area has a general gradient from east to west. Eastern portions of the permit area contain the higher ground where a small drainage tributary of the Little Sand Creek head. This ephemeral channel runs to the west to met the major drainage of Little Sand Creek whose channel is itself ephemeral. This drainage enters the permit area from the north in the western portion of Section 14 and runs south exiting in the southwest corner of Section 14. There are three man-made stock dams along the drainage channels within the permit area.

Soils on the hilltops and higher areas are shallow and sometimes associated with materials from rock outcrops. The soils become deeper on the side slopes of the hills and in the lower areas and drainages. Soils in the permit generally pose no special problems and are rated as good for reclamation purposes. A low intensity soil survey as well as detailed soils information is contained in Appendix D-7.

Vegetation is a typical northern plains short grass prairie forage characteristic of areas of low annual precipitation. Dominant plant species present are Sage brush, Western Wheatgrass, Needlegrasses, Blue Gramma and Threadleaf Sedge. A vegetation study presented in Appendix D-8 provides details including productivity and cover information.

The wildlife in the area is typical for the region. Studies and observations of wildlife on the permit area and in the surrounding vicinity are presented in Appendix D-9. Important game species include the Pronghorn Antelope, Cottontail Rabbit, Sage Grouse, Mourning Dove and Mule Deer. Non-game species are typical of the sage brush grassland habitat in the region. No rare or endangered species were observed. There are no domestic livestock grazing in the north 1/2 of section 14 where the plant facilities, well fields and solar evaporation ponds associated with mining activites are located.

2.10 Background Radiological Characteristics

A background pre-mining radiological survey of the area is presented in Appendix D-10.1. Background radiation for the land surface and air were normal and no anomalies were found. The surface area for the proposed permit area was surveyed before the R&D phase and recently resurveyed to include the disturbances caused during the Research and Dvelopment phase of the Leuenberger operation. No change or deviation from the original results were observed. Radiological data concerning groundwater and surface water in the vicinity are reported in Chapter 2.7. The reclamation plan presented in Chapter 6 provides the methods to be used to return the site to its natural conditions after mining is completed.

2.11 Background Nonradiological Characteristics

Background nonradiological characteristics of the site are discussed in depth in the applicable sections of Appendix D. Potentially toxic substances such as heavy metals in the water are presented in Chapter 2.7 with other baseline values as part of the groundwater quality data. Because of the relatively low surface disturbance necessary to construct the facility and ponds for fluid control very little atmospheric pollution in the form of dust and air particulate is expected. A significant change to the existing air quality in the vicinity is not anticipated.

Summaries of the results of ambient air samples for particulates collected at the site are presented in Table 2-16 through 2-18 for the last quarter of 1979 and the first two quarters of 1980.

TABLE 2-16

AMBIENT AIR QUALITY RESULTS
OCTOBER 12, 1979 - DECEMBER 29, 1979

SAMPLE DAY	DATE SAMPLED	PARTICULATE CONCENTRATION (ug/m^3)
1	October 12, 1979	17
2	October 18, 1979	45
3	October 24, 1979	39
4	October 30, 1979	5
5	November 5, 1979	14
6	November 11, 1979	7
7	November 17, 1979	84*
8	November 23, 1979	8
9	November 29, 1979	11
10	December 5, 1979	10*
11	December 11, 1979	4*
12	December 17, 1979	30
13	December 23, 1979	8*
14	December 29, 1979	12

* Qualified Data

	(μg/m^3)
Standard Deviation	14
Arithmetic Mean	19
Geometric Mean	5

TABLE 2-17

AMBIENT AIR QUALITY RESULTS
JANUARY 1, 1980 - MARCH 31, 1980

SAMPLE DAY	DATE SAMPLED	PARTICULATE CONCENTRATION (ug/m^3)
1	January 4, 1980	11
2	January 10, 1980	79*
3	January 16, 1980	9
4	January 22, 1980	7
5	January 28, 1980	14
6	February 3, 1980	10
7	February 9, 1980	14
8	February 15, 1980	8
9	February 21, 1980	11
10	February 27, 1980	32*
11	March 4, 1980	13
12	March 10, 1980	40*
13	March 16, 1980	9
14	March 22, 1980	92*
15	March 29, 1980	9*

* Qualified Data

	($\mu g/m^3$)
Standard Deviation	2
Arithmetic Mean	11
Geometric Mean	10

TABLE 2-18

AMBIENT AIR QUALITY
RESULTS
APRIL 1, 1980 - JUNE 30, 1980

SAMPLE DAY	DATE SAMPLED	PARTICULATE CONCENTRATION (ug/m^3)
1	April 3, 1980	58*
2	April 9, 1980	11
3	April 15, 1980	32
4	April 22, 1980	49
5	April 27, 1980	124*
6	May 3, 1980	20
7	May 9, 1980	20*
8	May 15, 1980	28
9	May 21, 1980	285*
10	May 27, 1980	279*
11	June 2, 1980	31
12	June 8, 1980	32
13	June 13, 1980	40*
14	June 18, 1980	34*
15	June 24, 1980	47*

* Qualified Data

	(ug/m^3)
Standard Deviation	12
Arithmetic Mean	29
Geometric Mean	27

This sampling program is designed according to the schedule set by the State Air Quality Division of the Wyoming Department of Environmental Quality and the US NRC. High volume sampling data associated with these samples is provided in Appendix D-4.2 along with periodic instrument calibration reports.

CHAPTER 3

DESCRIPTION OF PROPOSED FACILITY

The permit area boundary contains 760 surface acres. The total surface area to be affected by the proposed operation will be contained within the permit area and will constitute approximately 150 acres.

The well field area, a processing plant and solar evaporation ponds are the significant surface features associated with the proposed Leuenberger in situ uranium mining operation.

The total well field area to be used for the injection and recovery of leach solution will be approximately 80 acres over the eleven year life of the mine. The processing plant will require a concrete foundation and will be enclosed for winter operation. The plant foundation will be approximately 27,250 square feet (.63 acres). Solar evaporation ponds will occupy an estimated 38 acres. A parking lot, truck access, fuel storage tank, pipelines, chemical storage areas, auxiliary tool sheds, storage compounds and access roads will constitute the balance of surface disturbance at the Leuenberger Site.

3.1 In Situ Uranium Mining Process

3.1.1 Site Facilities Layout

The processing plant building to be utilized for housing the proposed commercial operation will be adjoining the present 50' x 100' structure used for the R&D operation. The proposed addition to the building will be approximately 200 feet long by 100 feet wide, with 24 foot eaves and 30 foot center peak. An additional office extension occupying

2,250 feet also will be added. Salvagable topsoil as identified in the Surface Reclamation Plan will be stockpiled and seeded prior to construction.

The well field areas and the solar evaporation ponds will be installed on an as needed basis. The anticipated installation schedule for the well field areas will be discussed later in this application report. Figure 3-1 shows the proposed location of all anticipated surface features within the permit area.

3.1.2 The Orebody

As discussed in Chapter 2 the orebody occurs at two stratigraphic horizons. The upper ore body is contained within the N sand and contains approximately 26 percent of the mineable ore. The top of N sand occurs at a depth of 200 feet or more at the Leuenberger Site. Most of uranium mineralization occurs in the lower ore body within the M sand and accounts for 74 percent of the ore to be mined at the site. The top of the M sand is approximately 320 feet or more below the land surface within the permit area. The areal extent of the two ore bodies are shown on Figure 3-1.

The stratagraphic intervals to be mined by the in situ mining method are shown on the geologic cross sections provided in Figures 2-7 to 2-9. The intervals identified as the production zone on these figures represent the anticipated extent of the ore sands where leach solution will be injected and recovered.

3.1.3 Well Field Areas

Injection and recovery wells completed in N well field areas will be open to the N zone. The N production zone occurs between the approximate depths of 220 to 270 feet

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(967-82 m) below the land surface. Injection and recovery wells will be selectively screened across the ore bearing horizons through this interval. Injection and recovery wells completed in M well field areas will be open to the M zone. The M production zone occurs between the approximate depths of 320 to 390 feet (101-119 m) below the land surface. Injection and recovery wells for the M Production Zone will be selectively screened across the overbearing horizons through this interval.

3.1.3.1 PATTERN LAYOUT

The anticipated well field pattern to be utilized is the conventional five spot or equivalently the staggered line drive pattern. Each production cell for the pattern w ll contain four injection wells surrounding a centrally lc ated recovery well. The cell dimensions between injection w lls are anticipated to be approximately 50 feet x 100 feet in the M zone and approximately 60 feet x 120 feet in the N zone with the respective recovery wells centrally locate' within these rectangular cells. All wells will have the capability of acting as injection or recovery wells to enable well field flow reversal and facilitate groundwater restoration. During operations leach solution will flow from the injection wells to the recovery wells with more water being recovered than injected creating an overall negative hyraulic stress in the well field areas. Under this stress the overall groundwater movement will be toward the well field areas.

Each line of injection and recovery wells will be connected to injection and recovery manifold lines respectively. These pipe lines wi'l be plumbed to a trunk line to carry solutions to and from the process plant. All well field piping will be either PVC, high density polyethylene or fiberglass and will be encased in heat traced insultation. The piping will be installed flush with ground level for accessibility and safety.

3.1.3.2 MINING UNITS

Each mining unit will consist of a reserve block of approximately twelve to thirteen percent of the total recoverable pounds

U_3O_8. There are six such units in the M zone and two in the N zone. Each mining unit is dedicated to only one ore zone and is anticipated to operate at 1200 - 1500 GPM. No injection or recovery well will simultaneously communicate with both M and N zone sands. The M sand will be mined first.

The proposed mining schedule for each of the mining units is tabulated in Figures 3-2 and 3-3 along with the anticipated groundwater restoration schedule (see Chapter 6). Mining Unit #1 will be used to mine the M zone and will consist of approximately 180 wells. Figure 3-4 shows the anticipated well field layout and piping using Mining Unit #1 as the example.

M zone wells that intersect with the N production zone areas may be cemented off above the M zone after M zone mining and groundwater restoration, and these wells may be utilized later in the N zone mining phase by underreaming the casing and resetting screen.

3.1.3.3 WELL COMPLETION

Each injection and recovery well will initially be drilled through the target ore sand to the top of the underlying claystone. The hole will then be geophysically logged and the ore interval(s) selected.

Each well will then be reamed down to the top of the selected ore interval to a size large enough to readily accept surface casing. After the casing has been set, the well casing annulus will be cemented in place to insure that the production zone is hydraulically sealed from overlying horizons. After the cement has set, the target ore interval will be underreamed with a blade type underreaming tool. Screen will be telescoped through the casing and set with the use of blank casing and screen packers so that only that portion of the sand containing economic mineralization will be directly addressed by the leach solution. The well will be developed prior to leach solution injection and recovery. Figure 3-5 shows the anticipated design for injection and recovery well completion.

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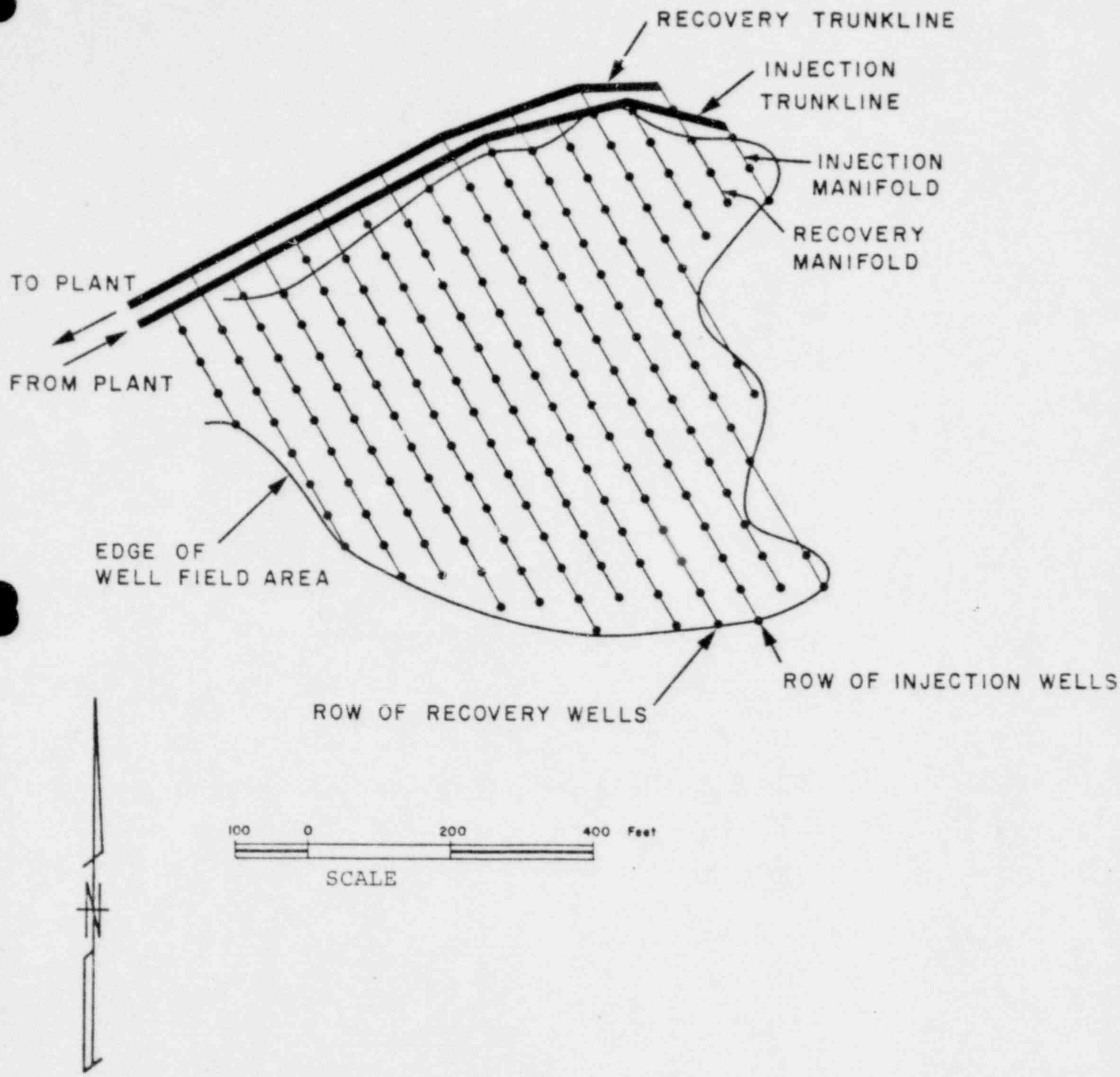
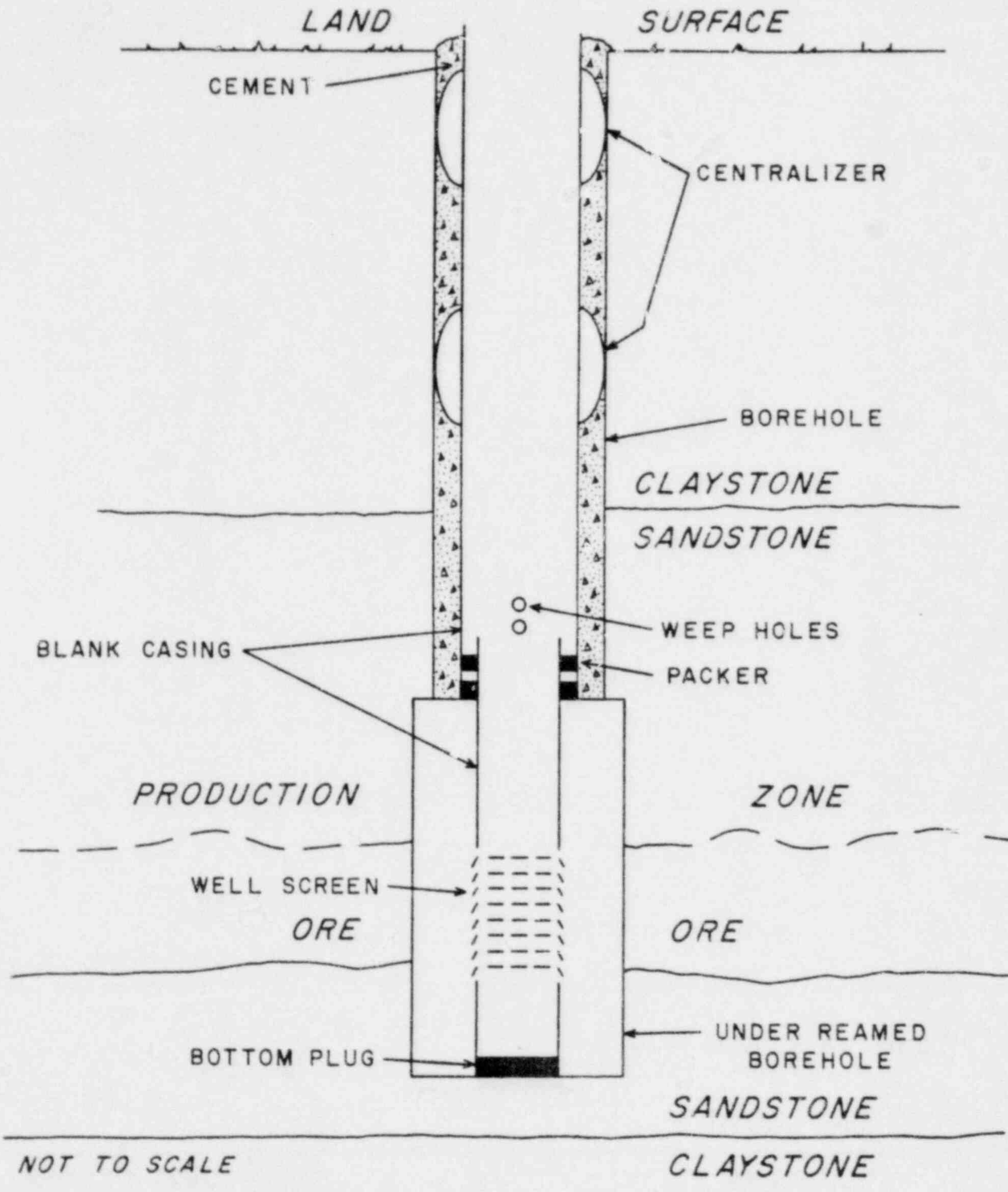


TYPICAL WELL FIELD LAYOUT
MINING UNIT 1
FIGURE 3-4



INJECTION and RECOVERY WELL COMPLETION

FIGURE 3-5

3.1.3.4 MECHANICAL INTEGRITY

Before a well is used for leach solution injection the well will be field tested to demonstrate mechanical integrity of the well casing. The mechanical integrity test will use apparatus and procedures similar to those recommended for packer tests by the U.S. Bureau of Reclamation (see Figure 10-2C and p. 573 to 578, U.S. Department of Commerce, 1974). The well head pressure used during the test will be set so that the pressure rating of the casing is not exceeded.

During the test a packer will be placed within the casing and above the well screen. The second packer will be placed below the well head. The packers will then be inflated and the space between the packers will be pressurized but in no instance will the pressure rating of the casing be exceeded. After this pressure is achieved the well will be shut in and the psi reading on a pressure gauge will be recorded every thirty seconds for a ten minute time period. If the pressure remains essentially constant over this time period then the well will be acceptable for injection. If the mechanical integrity test fails then the well casing will be checked for cracks or holes via downhole TV or other methods. If possible the well will be repaired and the packer test will be repeated. If any well casing leakage cannot be repaired or corrected, the well will be plugged and reclaimed as described in Chapter 6 of this application report.

A well head apparatus may be subsituted from time to time for the upper packer, however, this alternative would not influence the testing objective or results.

The results of the packer test will be signed by the packer test engineer responsible for the testing. These records will be maintained at the site and will be presented to regulatory personnel upon request and during scheduled or unannounced inspections. Injection pressures used during the operation will not exceed the pressures achieved during the mechanical integrity tests. Mechanical integrity tests will be repeated after downhole tools are used in the well. Mechanical integrity tests will be repeated every five years for wells that may be used after five years from the most recent testing for that well.

3.2 Process Plant Components

The process to be utilized includes a sodium bicarbonate-based lixiviant with hydrogen peroxide and/or oxygen as the oxiding agent. The process plant will have a flow capacity of up to 2,000 gpm when mining and groundwater restoration are operating concurrently. Major components of the process include an adsorption circuit, resin transfer system, and an elution/precipitation circuit. The final product will be a yellowcake slu ry with uranium in the form of $UO_4 \cdot 2H_2O$. The slurry will be shipped by DOT/NRC approved tankers or by a licensed common carrier in DOT/NRC approved drum containers to facilities owned and operated by others for further processing. No drying of the uranium slurry products will occur at the mine site. Consequently the air particulate problems resulting from the conventional drying procedures will be eliminated. Figure 3-6 is a process flow sheet showing the interaction among the various components of the Leuenberger in situ uranium mining process.

3.2.1 Adsorption Circuit

The adsorption circuit consists of the orebody, injection and recovery wells, uranium extraction vessels, injection lixiviant solution makeup, surge and related equipment.

The recovery fluid from the well field areas will be surged in tanks located within the process plant building. The recovered leach solution will be pumped from these surge vessels through the ion exchange (IX) vessels where uranyldicarbonate-unanyltircarbonate adsorption onto a strong base anion exchange resin occurs. After passing through the IX vessels, the solution will then be transferred to the injection makeup surge section with an average bleed of approximately 0.5% of recovery flow removed.

Uranium Recovery Plan Process Flowsheet

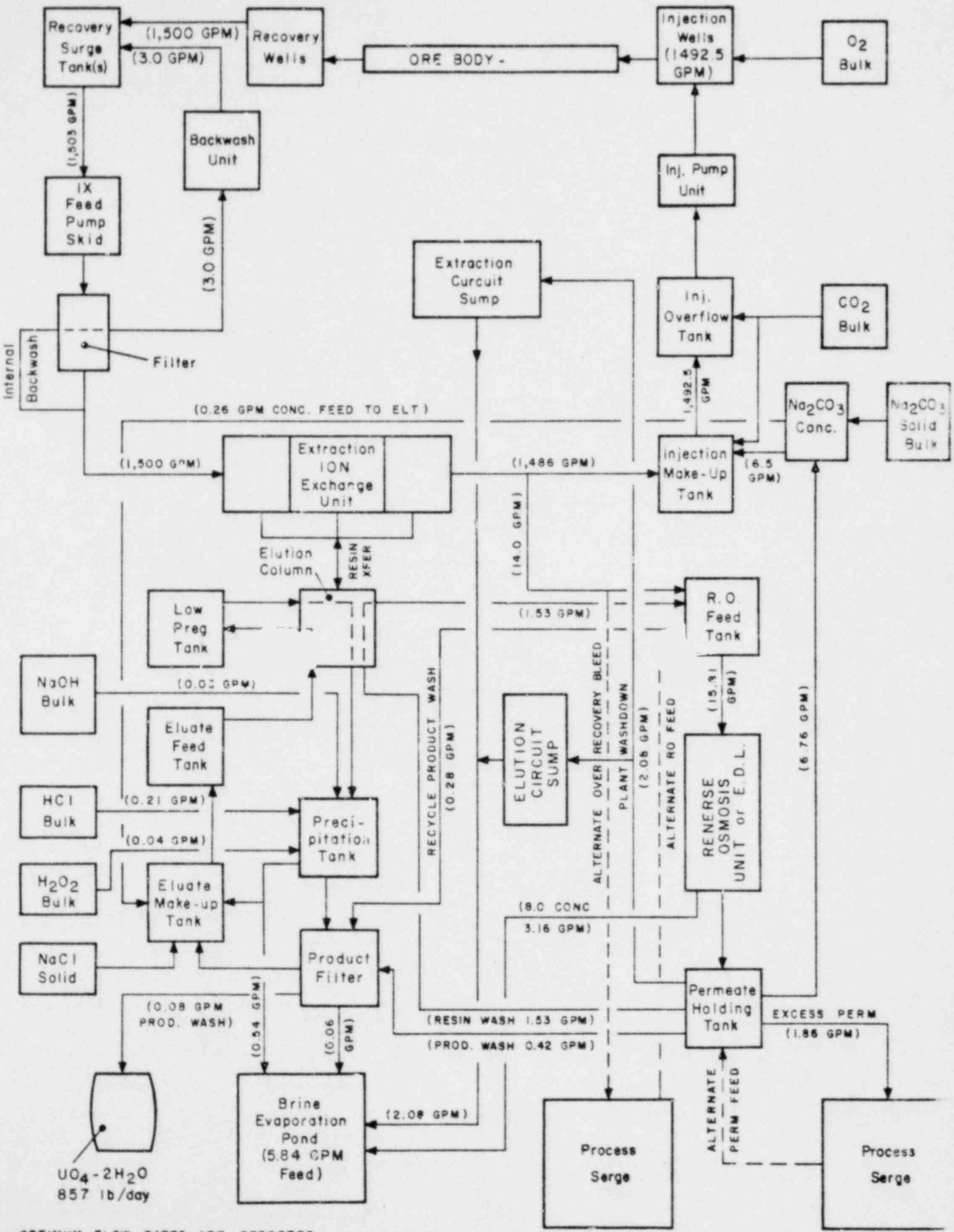


FIGURE 3-6

The bleed stream will have an average flow of 7.7 gpm and will be routed to a processing surge vessel or to a lined solar evaporation pond. Processing of the bleed stream will be carried out with the use of reverse osmosis (RO) or similar technology process to concentrate chemical constitutents in approximately twenty percent of the bleed volume. The concentrated brine generated from this process will be routed to a lined solar evaporation pond. The clean permeate would be utilized for process makeup water and, with the possible addition of a coprecipitation circuit to further remove any trace of radiometric constitutents, would be utilized for plant wash down. Excess clean permeate from the coprecipitation circuit would either be ponded for future process or well field restoration use, or would be discharged to the surface pursuant to a NPDES discharge permit. The bleed stream will be utilized to maintain a hydraulic gradient toward the operating well field areas, thus reducing leach solution excursion potential. This gradient will result in a constant inflow of groundwater from the area surrounding the well fields.

The extraction process bleed stream will consist of approximately 0.5 percent over-recovery bleed. The anticipated bleed discharge to specific holding ponds would be distributed as follows:

A.	Brine Solar Evaporation	
	Eluate Circuit Bleed	0.54 gpm
	Product Wash Bleed	0.06 gpm
	Plant Wash Bleed	2.08 gpm
	Reverse Osmosis Concentrate	3.16 gpm
	Total Pond Feed	5.84 gpm
B.	Clean Permeate Holding Ponds	
	Excess Permeate	1.86 gpm
C.	Total Bleed	7.7 gpm (0.5% over-recovery)

If increased over-production is required for excursion control, bleeds to the two ponds would increase at a 80% permeate, 20% brine split.

Prior to reinjection, barren eluant solution will be fortified with a sodium carbonate or bicarbonate concentrate in order to increase the carbonate-bicarbonate concentration to the desired level. Carbon dioxide will be sparged into the solution to convert carbonate to bicarbonate and to reduce the pH of the solution to a point where calcium carbonate solubility will be insured. The injection solution will then be pumped to the well field through appropriate filter units that will remove suspended particulates which could potentially reduce downhole injectivity.

The oxidation agent to be used for the conversion of U^{+4} to U^{+6} in the zones will be hydrogen peroxide, oxygen or a combination of both. The storage facilities for the oxidants will be located near the operating well field. The oxidant addition would be made at the surface in the case of hydrogen peroxide and downhole in the case of oxygen.

The piping and metering system for injection of reconstituted lixiviant will consist of metered trunk lines between the plant facility and the operating well field area with rows of distribution headers in the well field. These will be subdivided to feed individual wells.

The chemical reactions that take place underground when the leach solution comes into contact with the ore sand may be described as follows:

Dissolution:

$$\underset{\text{(solid)}}{2UO_2} + \underset{\text{(aqueous)}}{2H_2O_2} \rightleftarrows \underset{\text{(aqueous)}}{2UO_3} + 2H_2O$$

or

$$\underset{\text{(solid)}}{2UO_2} + \underset{\text{(gas)}}{O_2} \rightleftarrows \underset{\text{(aqueous)}}{2UO_3}$$

Complexing:

$$UO_3 + Na_2CO_3 + \underset{\text{(aqueous)}}{2NaHCO_3} \rightleftarrows \underset{\text{(aqueous)}}{Na_4UO_2(CO_3)_3} + H_2O$$

The principal stable and soluble uranyl carbonate complex formed during these reactions will be uranyldicarbonate $\{UO_2(CO_3)_2^{-2}\}$ and uranyltricarbonate $\{UO_2(CO_3)_3^{-4}\}$.

Sodium carbonate-bicarbonate is used as a leach solution because of its apparent selectivity for uranium with little reaction with the gangue minerals. This appears to be the case in that after uranium elution and chemical refortification prior to reinjection, the typical composition of the recovery fluid is low in most trace parameters. The high oxidation potential of the recovery fluid appears to result in the oxidation and precipitation of metal oxides within the production zone and tends to reduce the concentrations of most of the trace elements in the circulated groundwater. Based upon composite samples taken during the R&D operation, the average chemical composition of the injected recovery fluid into the M and N zones should approximate the listing in Table 3-1.

3.2.2 Resin Transfer Circuit

During operation of the uranium extraction circuit, the resin will become loaded with uranyldicarbonate and/or uranyltricarbonate. In order to remove the uranium from the resin to again make it available for extraction, Teton-Nedco will utilize either resin transfer to a separate elution column or will isolate the vessel containing the resin and perform in-place elution. The resin will be eluted by conventional means as described below.

3.2.3 Elution and Precipitation Circuit

In the elution circuit, loaded uranium as uranyldicarbonate/uranyltricarbonate will be removed from the resin by a chloride or sulfate ion solution. The solution to be utilized will be comprised of ±1.5 normal sodium chloride or sodium sulphate with ±0.1 to 0.25 normal sodium carbonate. A conventional batch-type elution will be used.

TABLE 3-1
EXPECTED COMPOSITION OF INJECTION SOLUTION

(Chemical units in mg/l except as noted)

pH (units)	6 - 7
Ammonia (NH_3 as N)	.27
Total NO_2/NO_3 (as N)	1.32
Boron	.35
Fluoride (F)	.19
Aluminum (Al)	< .05
Arsenic (As)	.005
Barium (Ba)	< .05
Bicarbonate (HCO_3)	1555
Cadmium (Cd)	< .01
Chloride (Cl)	62
Chromium (Cr)	< .05
Copper (Cu)	< .05
Iron (Fe)	< .05
Lead (Pb)	< .05
Manganese (Mn)	.06
Mercury (Hg)	< .001
Molybdenum (Mo)	< .05
Nickel (Ni)	< .05
Radium 226 (Ra-226) pCi/l	1540
Selenium (Se)	.130
Sodium (Na)	420
Sulfate (SO_4)	364
Uranium (U_3O_8)	< .8
Vanadium (V)	.20
Zinc (Zn)	< .01
TDS	1675

A portion of the soluble uranium liquor will be diverted to a tank where hydrochloric or sulfuric acid will be added to decompose the carbonate present in the solution and evolve it as carbon dioxide gas. Hydrogen peroxide will be added to effect precipitation of the uranium as uranium peroxide. The majority of the uranium-free supernate will be re-used in future elutions with the possible addition of sodium chloride or sodium sulfate and sodium carbonate as needed for reconstitution.

A portion of the supernate fluid will be discharged to the brine pond and should approximate 0.54 gpm during process equilibrium. Additional bleed may periodically be required to reduce concentrations of constituents in the eluate circuit that could affect product purity.

3.2.4 The Uranium Product

The washed and filtered slurry product should contain approximately fifty (50) percent U_3O_8 by weight. It will be contained on site in approved shipping drums or trailer-mounted and transferred to contract licensed facilities for further processing. No drying of the slurry will be done at the mine site. On site inventory of U_3O_8 will typically be 50,000 lbs. The maximum weight of U_3O_8 maintained on site in the event of inclement weather or other interruptions in product delivery will be 200,000 lbs.

3.2.5 Major Process Equipment

Principal equipment used in the process consists of surge tanks, IX vessels, elution/precipitation tanks and a variety of pumps and valves to move the solution among the various process components. All process equipment are sized to handle the design flowrates without exceeding recommended pressures for PVC piping. The continuous flow portion of the circuit (the ion exchange circuit) will have instrumentation designed to prevent accidental pressuring. Motors will be totally enclosed and fan cooled for safe service in a wet environment. The elution precipitation portion of the circuit is sized to handle batches of elutant based on experience with resin loading during the R&D operation.

The process plant is divided into three functional areas to provide a more efficient operational control as well as to maintain control in the event of an accidental spill (Chapter 7.5) or major equipment failure. These functional areas within the plant area are A) the ion exchange area where the uranium bearing solution from the well field is stripped of the uranium, B) the elution and precipitation area where the stripped uranium is processed into the final slurry product, and C) the restoration and reverse osmosis area where the stripped solution water is processed for recirculation to the well field. Area D is outside of the process plant and includes all outside chemical storage tanks. Figure 3-7 shows the relative location of major process equipment in each functional area keyed to Table 3-2.

3.3 Instrumentation

Process plant instrumentation will be installed to provide centralized continuous monitoring of the major process component. Operational control will be maintained with a series of remotely controlled valves and power switches. This system will be designed and installed to maximize plant operating efficient and to maintain a minimum risk from occupational radiation exposure and safety to process plant operators.

Radiation detection instruments used to monitor the operation are listed in Table 3-3. Manufacture's specifications on this equipment are provided in Appendix D-10.2. The location of monitoring instrumentation and monitoring frequency for in-plant radiation safety are discussed in Chapter 5.

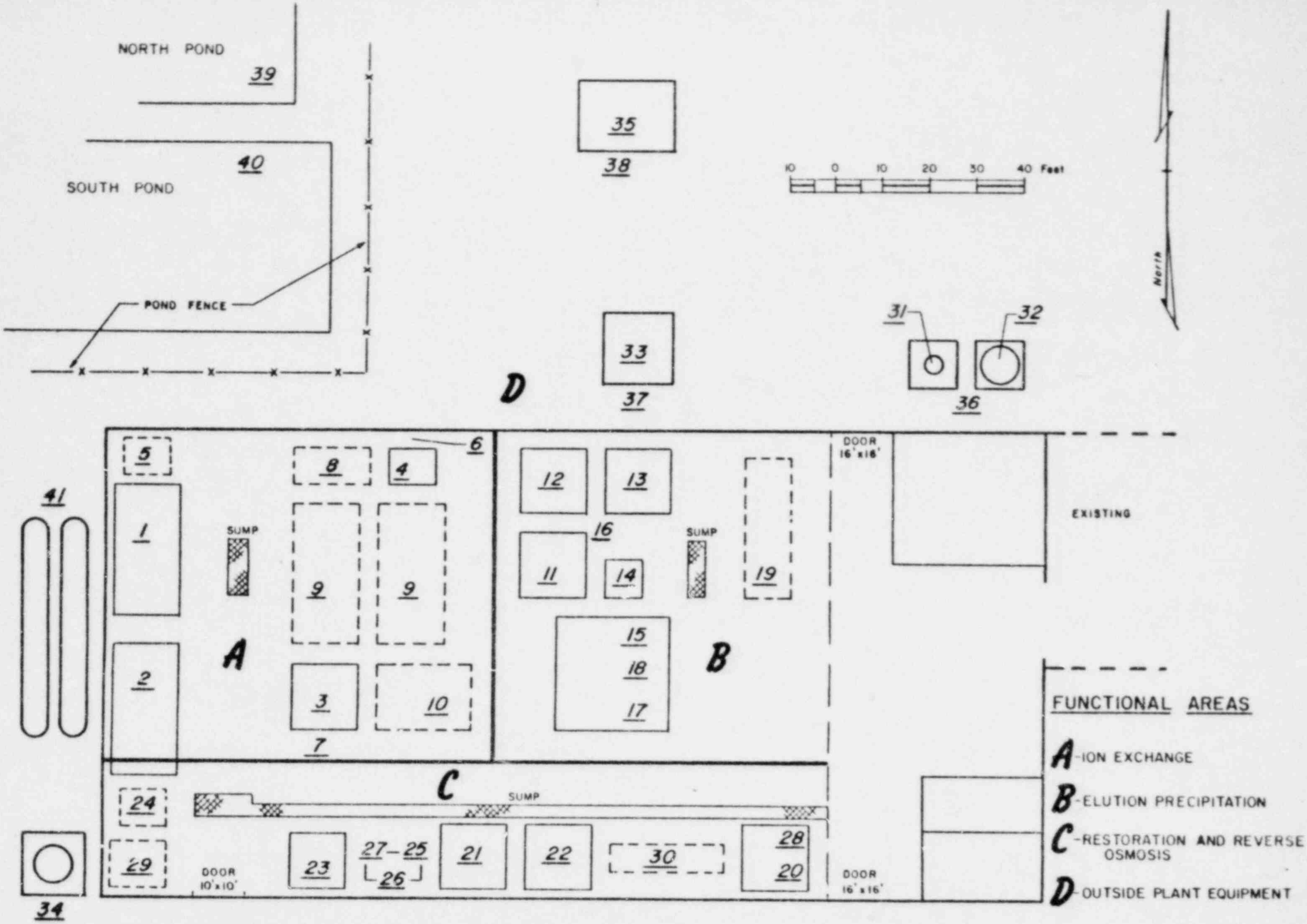


FIGURE 3-7 MAJOR PROCESS PLANT EQUIPMENT LOCATIONS

TABLE 3-2

MAJOR PROCESS EQUIPMENT
BY PLANT AREA

FIGURE CODE	NUMBER	DESCRIPTION/PURPOSE	SIZE/CAPACITY
		(A) ION EXCHANGE AREA	
1	2	Fiberglass tanks for recover fluid surge.	12'ø by 20' high
2	2	Fiberglass tanks for injection (lixiviant) surge.	12'ø by 20' high
3	1	FRP tank to surge water for resin transfer.	12'ø by 12' high
4	1	Tank to settle filter solids.	Small
5	3	Centrifugal pumps to feed ion exchange circuit.	6 x 8 -- 100 hp
6	1	Centrifugal pump to return decant from filter backwash to recovery surge tank.	1 1/2 x 2 -- 3 hp
7	1	Centrifugal pump to assist in transfer of resin between IX columns.	2 1/2 x 2 1/2 -- 7 1/2 hp
8	1 Set	Back-washable multiplex filters to remove solids prior to ion exchange.	
9	2 Set	Rubber lined mild steel ion exchange vessels to extract uranium.	Two trains of three each roughly 10'ø x 10' high. Each train sized to handle 750 gpm flowrate in series.
10	1 Set	Rubber lines, mild steel ion exchange vessel to hold resin during elution cycle.	Two each.

Table 3-2 Continued

FIGURE CODE	NUMBER	DESCRIPTION/PURPOSE	SIZE/CAPACITY
		(B) ELUTION AND PRECIPITATION AREA	
11	9	FRP tank to surge recycle eluant.	12'ø by 20' high
12	1	FRP tank to surge new eluant for feed to elution columns.	12'ø by 20' high
13	1	FRP tank to make-up fresh eluant.	12'ø by 20' high
14	1	FRP tank to max flocculant for precipitation.	6'ø by 6' high
15	1	High rubber lined mild steel tank with 45^o cone bottom for precipitation of yellowcake.	20'ø by 16' high
16	2	Centrifugal pump to feel eluant to elution columns.	1 1/2 x 3 -- 10 hp
17	1	Centrifugal pump to remove decant from precipitation vessel.	1 x 1 1/2 --
18	1	Progressive cavity pump to move settled precipitate to product filter.	10 - 15 hp
19	1	Product Filter -- recessed chamber, pressure filter to dewater and wash the yellowcake. Drip trays to collect any stray supernate or yellowcake.	6' wide, 20' long, and 6' high.
		(C) RESTORATION AND REVERSE OSMOSIS AREA	
20	1	Fiberglass tank for surge feed to reverse osmosis unit.	12'ø by 18' high
21	1	FRP tank to surge R.O. unit permeate, communicates with outside pond and plant.	12'ø by 18' high
22	1	FRP tank to surge for R.O. brine product, communicates with solar evaporation pond.	12'ø by 12' high
23	1	FRP tank to mix concentrated solution of sodium carbonate.	10'ø by 10' high

Table 3-2 Continued

FIGURE CODE	NUMBER	DESCRIPTION/PURPOSE	SIZE/CAPACITY
24	3	Centrifugal pumps to feed injection trunk lines.	3 x 4 -- 100 hp
25	1	Centrifugal pumps to provide plant wash.	2 x 2 -- 5 hp
26	1	Centrifugal pump for washing filtered cakes with permeate.	1 1/4 x 1 1/2 -- 7 1/2 hp
27	1	Centrifugal pump for sending permeate to soda mix tank.	1 1/4 x 1 1/2 -- 1 1/2 hp
28	1	Centrifugal pump to transfer R.O. brine to solar evaporation pond.	1 1/2 x 3 -- 20 hp
29	1 Set	Bag filters to remove solids prior to injection.	
30	1	Self-contained reverse osmosis unit for waste stream treatment.	200 gpm, 100 hp
		(D) OUTSIDE PLANT EQUIPMENT	
31	1	FRP tanks to surge and gravity feed HCl acid for process use.	6'ø by 6' high
32	2	FRP tanks to store bulk HCl.	12'ø by 8' high
33	1	FRP tank to store bulk NaOH.	12'ø by 18' high
34	1	Mild steel silo with 60° cone bottom to store bulk soda ash.	11'ø by 36' high
35	1	Vendor supplied tank or tanks for storage of bulk H_2O_2.	
36	1	Centrifugal pump to elevate bulk HCl into day tank.	1 x 1 1/2 -- 5 hp
37	1	Centrifugal pump to transfer bulk NaOH into plant.	1 x 1 1/2 -- 1 1/2 hp
38	1	Centrifugal pump to transfer bulk H_2O_2 into plant.	1 x 1 1/2 -- 2 hp
39	1	Self-priming centrifugal pump to move surged permeate to plant.	3 x 3 -- 10 hp

Table 3-2 Continued

FIGURE CODE	NUMBER	DESCRIPTION/PURPOSE	SIZE/CAPACITY
40	1	Self-priming centrifugal pump to move surged bleed into plant.	3 x 3 -- 10 hp
41	2	Vendor supplied bulk CO_2 storage tanks.	50 ton capacity each

TABLE 3-3

RADIATION DETECTION INSTRUMENTS

The following or comparable equipment will be available on site for the purpose of radiation monitoring:

Instrument	Radiation Detected	Surveys	Sensitivity or Range	Calibration
Eberline PRS-1 Ratemeter and HP-270 Probe for equipment.	Gamma	Plant/ Personnel gamma surveys	1200 CPM/mR/hr to $C_s 137$	*
Eberline PRS-1 Ratemeter and AC-3-8 Probe for equipment	Alpha	Contamination surveys of personnel and equipment and plant areas.	1.3×10^7 CMP/u Ci/cm^2 or 5.9 $CPM/DPM/cm^2$	*
Eberline PRS-1 Ratemeter and Eberline SAC-R5 Scintillation Detector or equipment.	Alpha	Counting air and swipe filter samples	**	*
Eberline PRS-1 Ratemeter with Eberline SAC-R5 Scintillation Detector and SC-6 Scintillation Cell or equipment.	Alpha	Radon gas	5.5 CPM/P Ci/1***	*

* All instruments will be calibrated by the manufacturer at six month intervals or manufacturer's suggested interval, whichever is less. Records of calibrations will be maintained.

** One CPM maximum background count when set to operate properly on the Alpha plateau and with the counting chamber empty.

*** Nominal response factor after Radon daughters reach equilibrium with Radon-222 (applies to SC-6 cell only).

CHAPTER 4
EFFLUENT CONTROL SYSTEMS

4.1 Gaseous

The general equipment arrangement in the process plant is designed to facilitate easy access, good air flow and separation of process function. As designed, no dust will be generated inside the process plant because there will be no dry product handled on site. Routine washdown procedures will keep the working area clean of accumulating dust from outside sources.

The principal radiological gas representing a potential radiological dose to man is radon-222 gas released to the atmosphere from circulating groundwater (see Chapter 7.3). Most of the radon gas will be generated at the recovery surge tank. Some CO_2 gas and HCL-H_2O_2 fumes will evolve from the elution/precipitation circuit, but these gases would not present a health problem at the anticipated concentrations. In order to alleviate potential discomfort or health problems due to the in-plant accumulation of gases and fumes, two ventilation systems will be installed. The ventilation systems are illustrated in Figure 4-1.

4.1.1 Tank Ventilation Systems

An above tank ventilation system for all non-sealed process tanks will be installed. The system will consist of ten inch diameter heat duct piping where fresh air will be circulated across the top of each tank to be ultimately vented to the outside atmosphere. Fresh air will be drawn from outside the plant and controlled with flues installed near the air intake. High volume exhaust fans will be used to circulate

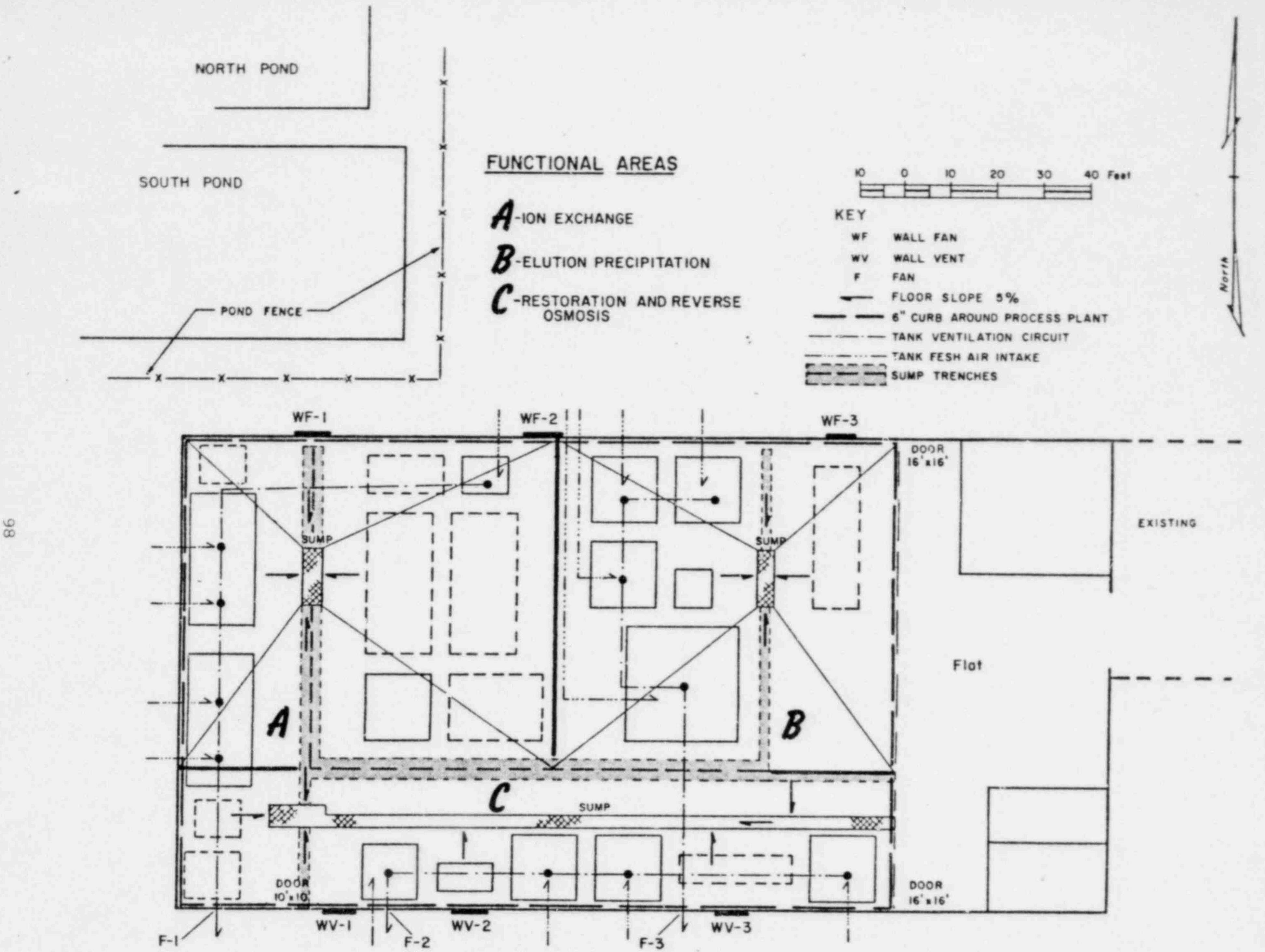


FIGURE 4-1 PROCES[illegible]ANT EFFLUENT CONTROL SYSTEMS

the fresh air across the top of the tanks and draw the gases and fumes to an outside vent placed on the south side of the building and above roof level. A separate ventilation system is used for each of the three functional areas within the process plant (see Chapter 3.2). Table 4-1 lists the flowrates and discharge volumes for the ventilation system for each functional area.

A tank ventilation system of this type was installed in the Research and Development process plant. In-plant radiation monitoring for radon and alpha radiation concentrations have shown this to be an effective system for controlling and reducing potential exposure to plant employees.

4.1.2 Work Area Ventilation System

The work area ventilation system is designed to circulate air within the process plant work area at the rate of two plant volumes per hour (1,200,000 cubic feet of air per hour). The major components of this system are shown on Figure 4-1. The work area includes the three functional areas within the process plant. The ventilation system consists of three fresh air intake wall vents on the south or windward side of the plant and three wall fans on the opposite or north side of the plant. There will also be three convection vents in the roof.

4.2 Liquids and Solids

4.2.1 Liquid Effluents

Liquid effluents from the operation will be derived both from uranium production and aquifer restoration. Restoration processes and bleed volumes are discussed in Chpater 6. The process bleed will be derived primarily from field over-production and will be necessary for well field control and containment.

As previously discussed the over-production bleed will be directed to a reverse osmosis unit or similar technology device in order to concentrate contained ions in a reduced

TABLE 4-1

FLOW RATES AND DISCHARGE VOLUMES
FOR TANK VENTILATION SYSTEM

Functional Area	(A) Ion Exchange Area (Extraction Circuit Tank Vents)	(B) Elution Precipitation Area (Elution Circuit Tank Vents)	(C) RO Restoration Area (Bleed Treatment Tank Vents)
Number of Tanks	5	4	5
Total Tank Volume	8,531 Cu. Ft.	7,687 Cu. Ft.	5,256 Cu. Ft.
Number of Displacements Per Hours	5	5	5
Fan Displacements	F-1	F-3	F-2
Fan and Vent Location*	710 cfm	640 cfm	438 cfm

* See Figure 4-1 for locations in plant.

volume referred to as a brine. Approximately twenty to twenty-five (20-25) percent of the solution fed to this unit will be ponded as brine, with the remaining seventy-five to eighty (75-80) percent of the volume retained for process uses or ponded as clean water permeate or will be surface discharged. Approximately 3.2 gpm brine would be generated as a waste product from the membrane device when the plant is at full production.

The clean permeate may be utilized for plant wash, uranium product wash, resin wash and/or sodium carbonate concentrate generation. Of the permeate generated, approximately 2.1 gpm would be ponded after the process uses. The excess permeate would be diverted to a separate pond for future use in restoration or possibly surface discharge.

It is anticipated at this time that several lined solar evaporation ponds will be used during the life of the project for effluents from the plant and aquifer restoration processes. Two of the required ponds have been constructed and are currently being used for the R&D portion of the project. These will most probably be used for the clean permeate storage and alternate storage of well field over-recovery solution. Other ponds may be constructed on an as needed basis and will be used to contain brine and other liquid effluents generated by the production facility. The expected composition will contain high levels of sodium carbonate and bicarbonate, chloride, calcium, and moderate levels of radium. These concentrations will probably achieve saturation concentrations during evaporation.

Sanitary wastes from the office facilities will be disposed of by a state-approved septic tank/leach field system, the location of which is shown on the Site Facilities Layout (Figure 3-1).

4.2.2 Solid Effluents

Minor amounts of solid wastes are anticipated during the project life. Low level radioactive solids generated will result from materials entrained by the IX feed and injection filter systems (Figure 4-1), injection filter media, tankage sediments, sump sediments, spent or broken ion exchange resin, contaminated used piping and equipment, and solids precipitated in or introduce to the solar evaporation ponds. These wastes will be contained in the solar evaporation ponds.

4.2.3 Solar Evaporation Ponds

The engineering design plan and method of construction of the solar evaporation ponds will be similar to the ponds approved during the R&D phase. The ponds will be lined with a 30 mil hypalon liner or similar material. The anticipated location and extent of disturbance for the solar evaporation ponds are shown of Figure 3-1. The ponds will not be located in or across surface drainages and will maintain at least two feet of freeboard.

The leak detection system for the ponds will be similar to the system presently being used and will consist of a sump located hydraulically down gradient from each pond with a network of perforated pipe located below the liner in a sand filter bed. If liquid is detected in the sump (see Chapter 5.7.8) analysis of the fluid will be performed to verify that liner failure has occurred. In this event, the liner will be repaired by adding a bentonite slurry or similar material to the pond bottom either with the solution remaining in the pond of after transferring the liquid to separate holding ponds. If this procedure is not successful the liner will be cleaned and repaired by patching any leaky areas identified.

All usable topsoil will be reserved for reclamation as prescribed or approved by the Wyoming Department of Environmental Quality.

CHAPTER 5

OPERATIONS

The Leuenberger Project is a joint venture with Teton Exploration Drilling Company (Teton) as the operating partner and Nuclear Exploration and Development Company (Nedco) as the non-operating partner. Teton is a subsidiary of the United Nuclear Corporation, Falls Church, Virginia. Nedco is a subsidiary of Pacific Power & Light Company, Portland, Oregon. Teton as the operator will conduct the day to day operations at the Leuenberger Site, and administer the radiological protection programs.

5.1 Corporate Organization and Administrative Procedures

Teton is a small company with its own Board of Directors, President and various department administrators. The Solution Mining Department is administratively subordinate to the Company President. The major levels of management within the Teton corporate organization are schematically represented in Figure 5-1. The figure also shows the detailed management scheme regarding the implementation of the operational and environmental procedures for the Leuenberger in situ mining project.

The Mine Manager at the Leuenberger Project is responsible for conducting daily operating procedures, radiation safety procedures and environmental monitoring programs on-site. The Environmental and Safety Coordinator/RPO* is charged with supervising the safety and environmental activities. The Mine Manager obtains technical support from the Solution Mining Department at the Teton Casper office for surveying, process plant and solar evaporation pond design,

*RPO = Radiation Protection Officer

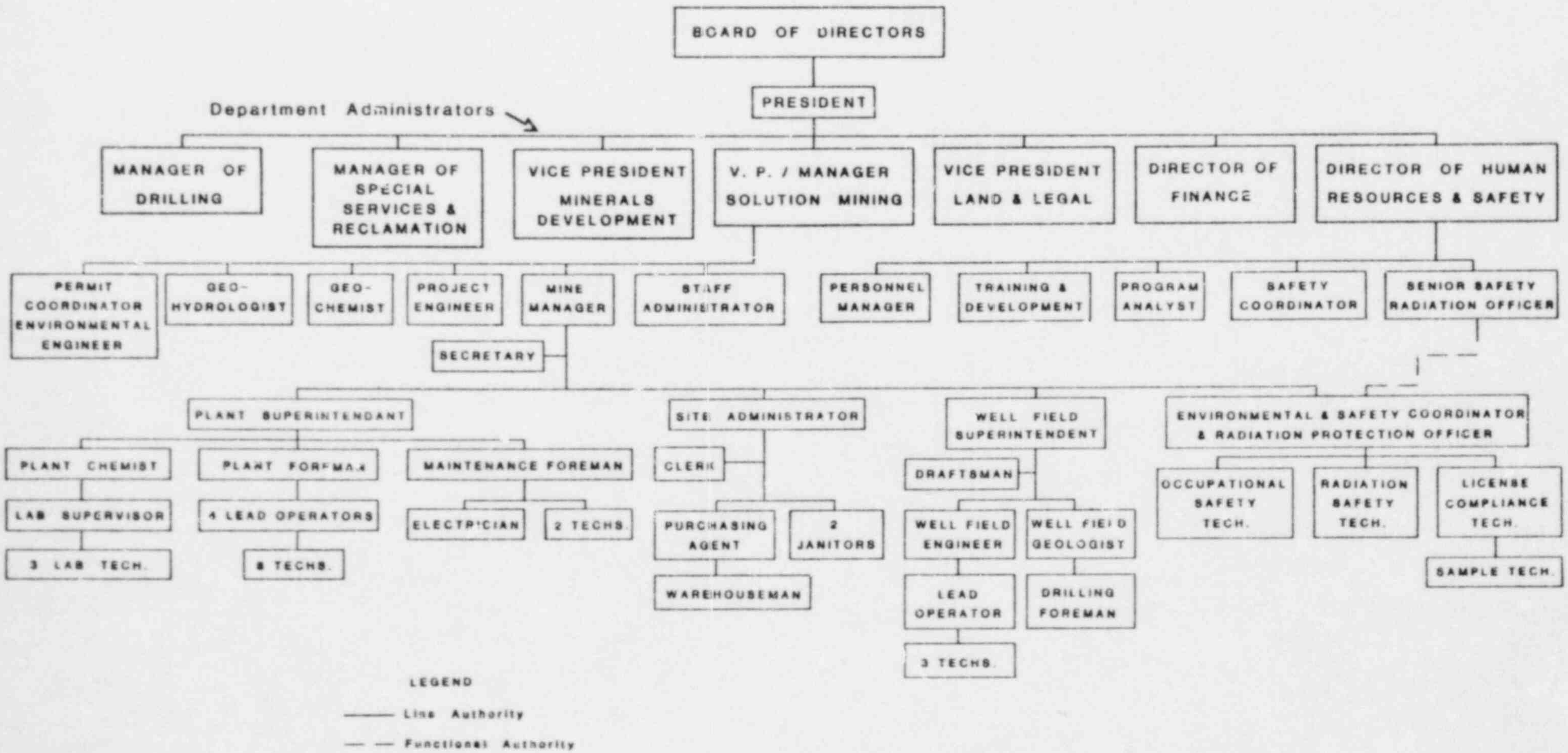


FIGURE 5-1 TETON CORPORATE ORGANIZATION

financing and feasibility assessments, permit coordination and liaison, well drilling and well field reclamation, large volume chemical analyses at the Casper Research Laboratory, and other non-routine matters that may arise from time to time. At the mine site the Mine Manager is supported by the site staff to conduct the routine operations as described in Chapter 3, and to administer the radiological safety and environmental monitoring programs as described in Chapters 4 and 5.7.

Although radiation and safety matters are supervised by the on-site Environmental and Safety Coordinator/RPO, final authority in safety and radiation protection is delegated to the Senior Safety and Radiation Officer and this individual's superiors at the Casper office. The Senior Safety and Radiation Officer is available to the on-site Environmental and Safety Coordinator/RPO for technical support.

The Director of Human Resources and Safety (Figure 5-1) is available to respond to any personnel problems that may arise at any level within the organization. The director has functional authority in the areas of occupational health and safety, radiation safety and personnel qualifications and training.

5.2 Management Control Program

The on-site Environmental and Safety Coordinator/RPO is responsible for supervising all programs related to occupational safety, radiation safety and enviromental monitoring. The supportive staff is trained to handle the necessary routine functions comensurate with safety and environmental monitoring. Under normal operations the on-site Environmental and Safety Coordinator/RPO reports directly to the Mine Manager. However, if a non-routine problem should arise the Senior Safety and Radiation Officer at the Casper office will be contacted and consulted. The Senior Safety and Radiation Officer and this individual's supervisors have final authority concerning occupational safety and radiation protection for the project personnel.

The safety and environmental programs will be discussed and reviewed at the weekly mine staff meetings. Any problem areas identified through the safety and environmental monitoring programs will be reported to the Manager of Solution Mining and the Director of Human Resources via the Mine Manager and the Senior Safety and Radiation Officer respectively. These matters may be discussed at the President's weekly department administrator meeting at the Casper office at the request of the Director of Human Resources or the Manager of Solution Mining. Using this organizational approach upper management can be assured that any problems that may arise are resolved in a timely fashion.

The on-site Environmental and Safety Coordinator/RPO will have the responsibility to make on-the-spot decisions concerning safety and environmental matters that may require immediate attention. The Environmental and Safety Coordinator/RPO shall maintain records of all samples taken, safety and radiation protection data collected, and any infractions of radiation safety procedures. These records will be maintained on-site and reviewed by the Mine Manager and the Senior Safety and Radiation Officer during routine audits and inspections.

5.3 Management Audit and Inspection Program

An on-site internal inspection program including radiation safety and training will be designed by the Senior Safety and Radiation Officer and approved by the Mine Manager. This program will specify the frequency, type, scope and procedures used for the inspection concerning radiation safety, occupational health and safety, and radiation monitoring programs. Semi-annual audits and inspections will be conducted by the Senior Safety and Radiation Officer. The results of these audits will be maintained at the Casper Office and reported to the Manager of Solution Mining and the Director of Human Resources via the Mine Manager and the Senior Safety and Radiation Officer. The audit results will be available to the NRC during scheduled and unannounced site visits.

5.4 Qualifications

The minimum qualifications for the Mine Manager are as follows:

> The individual shall have a bachelors degree from an accredited college or university in a physical science. Two years or equivalent work related experience may be substituted for each year of formal education. The individual shall have six years of industry work experience in a supervisory position. Each year of formal education beyond the bachelors degree may be substituted for a year of industry related experience. The Mine Manager shall be familiar with radiological monitoring requirements and monitoring apparatus.

The minimum qualifications for the Environmental and Safety Coordinator/ RPO are as follows:

> The individual shall have a bachelors degree from an accredited college or university in a physical science. Two years or equivalent work experience may be substituted for each year of formal education. The individual shall have one year of uranium industry experience in a supervisory position with a year's experience in applied health-physics radiation protection, industrial hygiene or similar work. A training course concerning health physics for the uranium industry will be completed. A uranium health-physics refresher course will be required every two years. The individual will have a knowledge of the proper application and use of the health-physics and monitoring equipment at the site. Procedures used for radiological sampling and monitoring, and methods used to relate personnel exposure to concentrations of various radionuclide will be understood and assimilated.

Qualifications for the Senior Safety and Radiation Officer will be similar to those required of the Environmental and Safety Coordinator/RPO with the exception that four years additional experience will be required.

Brief work related resumes of the individuals proposed for these positions during the operation of the Leuenberger in situ uranium mine are included in Appendix D-10.3.

5.5 Employee Training

Each new employee will be instructed in the inherent risks and precautionary measures to use when dealing with uranium and its daughters prior to beginning their jobs. It is anticipated that this initial indoctrination course will consist of a lecture and subsequent discussion period including the following topics:

1) Plant Process
2) Basic atomic structure and physics relative to radionuclides
3) Fundamentals of health protection including personal hygiene and good housekeeping practices.
4) Health protection measures provided by the Company.
5) Health protection surveys, monitoring equipment and their location.
6) Radiation protection regulations.
7) Plant emergency procedures.
8) Employees right to access plant monitoring records and exposer calculations (see Chapter 5.7.5).

As part of this initial orientation, each employee will receive a copy of a manual detailing each of the above mentioned topics. After a reasonable time for studying purposes, a written test will be given to each employee containing questions directly related to the principles of radiation health and safety protection. The results of this test will be reviewed orally with each employee.

The instructor will at that time discuss any wrong answers with the employee until the individual understands the correct answer. Employees receiving a grade of less than 70% correct will be retested. All test results will remain a permanent part of the employee's file.

In addition to the above mentioned program, each permanent employee will undergo an annual retraining course after which a dated statement will be signed by the employee attesting to completion of the course and understanding of all principles and procedures discussed.

5.6 Security

It is not anticipated at this time that security will be a serious problem during normal daytime working hours. All visitors will be required to report to the site office where they will register, be briefed concerning safety precautions and radiation protection measures, and be issued a hard hat and safety glasses prior to entering the process plant or well field area. After normal daytime hours and on weekends the entrance gate will remain closed and locked to prevent any unauthorized entry onto the mine site.

5.7 Radiation Safety Controls and Monitoring

5.7.1 Effluent Control Techniques

It is anticipated that liquid waste products generated from the process will have a relatively low level of radioactivity. Chapter 3 discusses the source of these effluents. The liquid effluent will be directed to, contained and evaporated in lined solar evaporation ponds as described in Chapters 3 and 4.

The floor of the functional areas within the process plant (Figure 4-1 will be sloped towards a centralized sump system so that any accidental spills that may occur will be directed into the sump system to be ultimately sent to the solar evaporation ponds. In addition, there will be a six inch curb completely surrounding the edge of the floor of the process portion of the building to contain any spilled liquids (see Chapter 7.5.1).

Any spills will be immediately cleaned by washing the floor with clean water. The affected area will be swiped, counted for alpha contamination and re-washed if necessary.

.7.2 External Radiation Exposure Monitoring Program

The only radionuclide expected to be released in any quantity is radon-222 gas evolving from the solutions circulated through the process plant. All process tanks and vessels will be covered and vented to the atmosphere utilizing a forced air exhaust system. A forced air wall ventilation system will be installed in the working area of the process plant to diminish the possibility of radon-222 and other gases accumulating within the process plant. These ventilation systems are discussed in Chapter 4.1.

A survey will be made quarterly within the restricted area to determine gamma radiation exposure rates at representative locations shown in Figure 5-2. Measurement will be in mR/hr and will be made with an Eberline Model PRS-1 ratemeter eequipped with an HP-270 probe or equivalent equipment.

All persons employed at the facility will be issued TLD badges. These badges will be exchanged and read at regular intervals to estimate external radiation dose equivalent to each person. It is estimated that the total number of badges issued will be around 50. Results will be recorded in total dose equivalent in millirems (mRem) to the skin (penetrating plus non-penetrating) and dose equivalent of penetrating radiation to the entire body.

Alpha contamination surveys will be performed at representative locations throughout the facility as shown in Figure 5-2. Special attention will be directed to areas approved for eating, drinking or smoking. None of these activities will be permited in the functional areas (Figure 4-1) within the process plant. The frequency of the surveys will depend upon results obtained during the initial months of operation, but the expected frequency will not be less than quarterly.

Total Alpha activity will be monitored using an Eberline PRS-1/ AC-3 or equivalent equipment. Removable Alpha activity

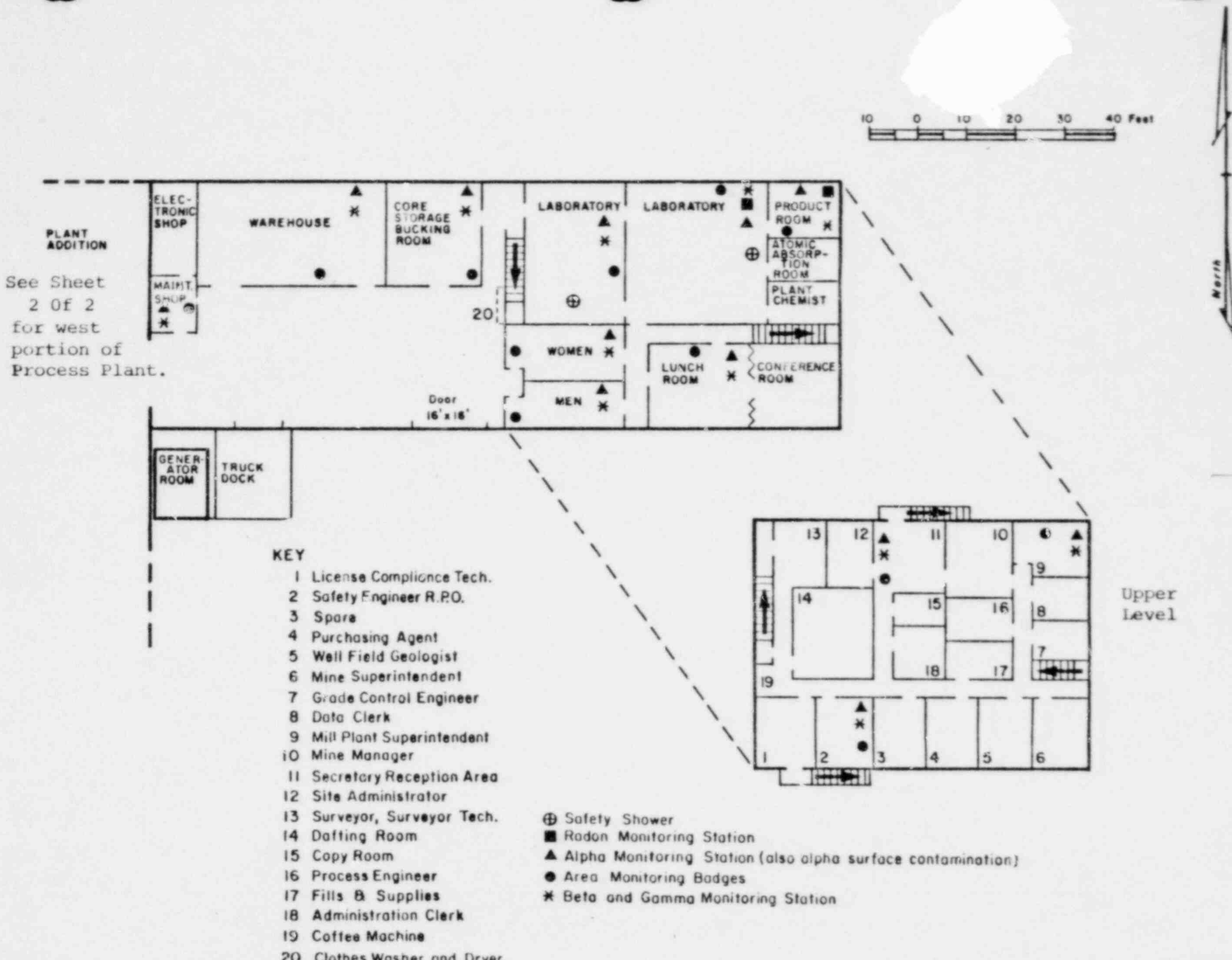


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FIGURE 5-2 PROCESS PLANT RADIOLOGICAL MONITORING STATIONS

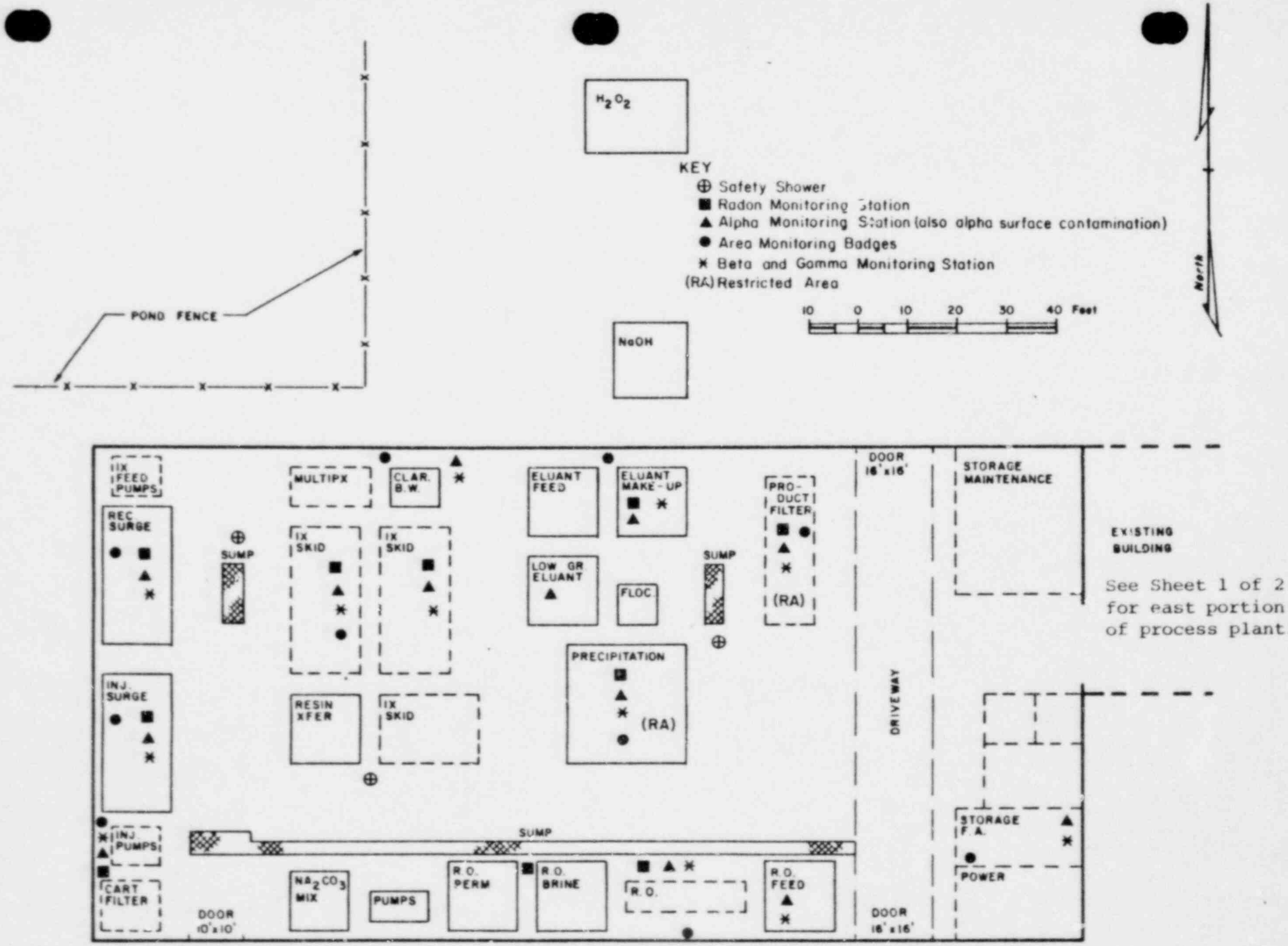

FIGURE 5-2 PROCESS PLANT RADIOLOGICAL MONITORING STATIONS

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will be monitored by dry swipes counted on an Eberline SAC-R5/PRS-1 or equivalent equipment.

5.7.3 Airborne Radiation Monitoring Program

Since the proposed facility will be designed for maximum ventilation as described in Chapter 4.1, high concentrations of radon gas within the facility are not expected. Should high concentrations be noted in any area, the area will be posted, ventilated and employee occupancy times will be kept to a minimum until sample results show concentrations below the maximum permissible concentrations (MPC).

Radon gas samples will be collected routinely at representative locations shown in Figure 5-2. Sampling frequency will be determined based upon radon concentration measurements during the first few months of operation, but is presently estimated to be monthly.

The radon sampling method consists of drawing filtered air into an Eberline SC-6 scintillation cell or equivalent which is coated with zinc sulfide. The zinc sulfide emits a light scintillation when struck by an Alpha particle. The scintillations are detected by an Eberline SACR5 Scintillation Detector and registered on an Eberline PRS1 Rate Meter or equivalent equipment. Monitoring for radon progeny will be perfomred in accordance with standard ANSI N7.1a-1969.

Proposed sample locations are shown in Figure 5-2. Frequency of sampling will be determined within the first few months of operation, but is presently estimated to be monthly.

Since the final product will be in slurry form, the only anticipated airborne dust contamination other than radon progeny will be from the resuspension of dried yellowcake in the event of accidental spill from the process equipment. It is expected that this contamination source will be kept at a minimum by the maintenance and housekeeping procedures at the facility. All spills will be cleaned immediately and the affected area surveyed to insure that contamination levels are consistent with ambient background levels throughout the plant.

To verify that long-lived alpha airborned activity is negligible air filter samples will be collected at several locations as shown in Figure 5-2 and counted for gross alpha activity. Air is drawn through a 0.45 micron filter for a minimum of twenty-four hours at a flow rate of at least 30 liters per minute. The samples are collected with the use of an Eberline RAS-1 pump or equivalent and anlayzed for gross alpha using a SAC-R5 scintillation detector and a PRS-1 ratemeter or equivalent equipment. Results are expressed in microcuries per cubic centimeter (u Ci/cm^3).

5.7.4 Exposure Calculations

The procedures used to determine the intake of radiative materials by personnel in work areas will be in conformance with 10 CFR Part 20.103. All monitoring schedules for in-plant radiation safety will be recorded. Additional sampling may be conducted at any time the on-site Environmental and Safety Coordinator/RPO, Mine Manager or Senior Safety and Radiation Officer deem it prudent and in the best interest of the safety program. Non-routine operations, plant maitenance and clean-up activities will be monitored for radiation safety as necessary, in addition to the routine operations. Exposure calculations will conform to the sampling equipment manfacture's recommended procedures.

5.7.5 Bioassey Program

Because the final uranium product will exist in a slurry form, the potential for human injestion is expected to be minimal. As a precaution, urine samples will be collected from any employee when a potential uptake has occurred due to a spill, accident or when air particulate sample results show a consistent elevation above 25% of the permissable air concentrations. Each sample will be analyzed for uranium.

The results of personal bioassay samples will be posted upon receipt of the analytical information, and all plant monitoring records and exposure calculations will be maintained in an open file available for inspection by plant employees as well as regulatory inspectors.

5.7.6 Contamination Control Programs

Monitoring stations for the radiation safety program are shown on Figure 5-2. Manufacture specifications for the monitoring equipment are provided in Appendix D-10.2. Good housekeeping practices will include routine plant washdowns. Additionl washdown of the elution preciptation area of the plant will be conducted after each use. Plant washdowns will be conducted at anytime a leak or spill occurs.

Employee decontamination and safety devices include the installation of at least one safety shower in each of the three functional areas of the plant. Showers in the locker room/restroom facilities are available for use. Personnel monitoring equipment is placed in the locker rooms to be used by all personnel after showering. It should be noted that the process plant building is designed so that employees passing directly from the working area to the lunch room must pass through the locker room/restroom facility. The locker room/restroom facility also provides a means of decontamination during shift changes. A clothes washer and dryer (Figure 3-7) is available for decontamination of work clothing on-site.

The need for respiratory protective equipment is not expected during normal operations. However, in the event of spills or leakage, resuspension of dried yellowcake could possibly present a respiratory hazard. Teton will provide and require the use of properly maintained respiratory equipment where fumes or dust may potentially occur.

Monitoring, clean-up and decontamination activities within the process plant will be conducted as often as necessary to ensure and maintain safe working conditions. Initially the frequency of regularly scheduled clean-up activities will be determined by the in-plant monitoring results obtained on daily walk throughs, bioassays and samples taken in the plant area.

Equipment and materials associated with the facility will not be released for unrestricted use unless they are below radiological limits as specified in the proposed standard, ANSI N328-197 (5000 dpm/100/cm^2 total and 1000 dpm/100 cm^2 removable).

5.7.7 Airborne Effluent and Environmental Monitoring Programs

The airborn effluent and environmental monitoring program is designed to monitor the release of particulates and radon gas within the process plant; and to ensure that no harmful effects from build up of radon and radon daughter products occur in the vicinity of the site or on adjacent areas. Methods and procedures for in-plant monitoring have been discussed in previous sections.

The proposed schedule for initial airborne particulate and radionuclei monitoring outside the process plant is presented in Table 5-1. The location of the monitoring devices are shown on Figure 5-3.

Teton monitoring equipment outside the process plant consists of one permanently installed high volume air sampler located downwind from the process plant in SE 1/4, Section 11, T-34N, R-74W, and one portable high volume air sampler which will be moved between the remaining two locations. The portable high volume air sampler may also be used at random locations around the process plant to check for dispersion and build-up as conditions may dictate. Radon bag samples will be taken at the same locations as air particulate samples.

TABLE 5-1

PROPOSED AIRBORNE EFFLUENT MONITORING SCHEDULE

SAMPLE TYPE	LOCATION	SCHEDULE/ FREQUENCY	ANALYSIS	APPARATUS
Radon	1) up wind -- site boundary 2) down wind -- nearest residence 3) down wind -- Site boundary	1 week per quarter, 3 x 48 hour composite	RN-222	Bag Sampler
Air Particulate	1) up wind -- site boundary 2) down wind -- nearest residence 3) down wind -- site boundary	1 week per quarter (quarterly composite)	Gross alpha natural uranium Th-230 Ra-226 Pb-210	High Volume

Additional nonscheduled radon and high volume air samples may be taken at selected locations within the permit area as a background check.

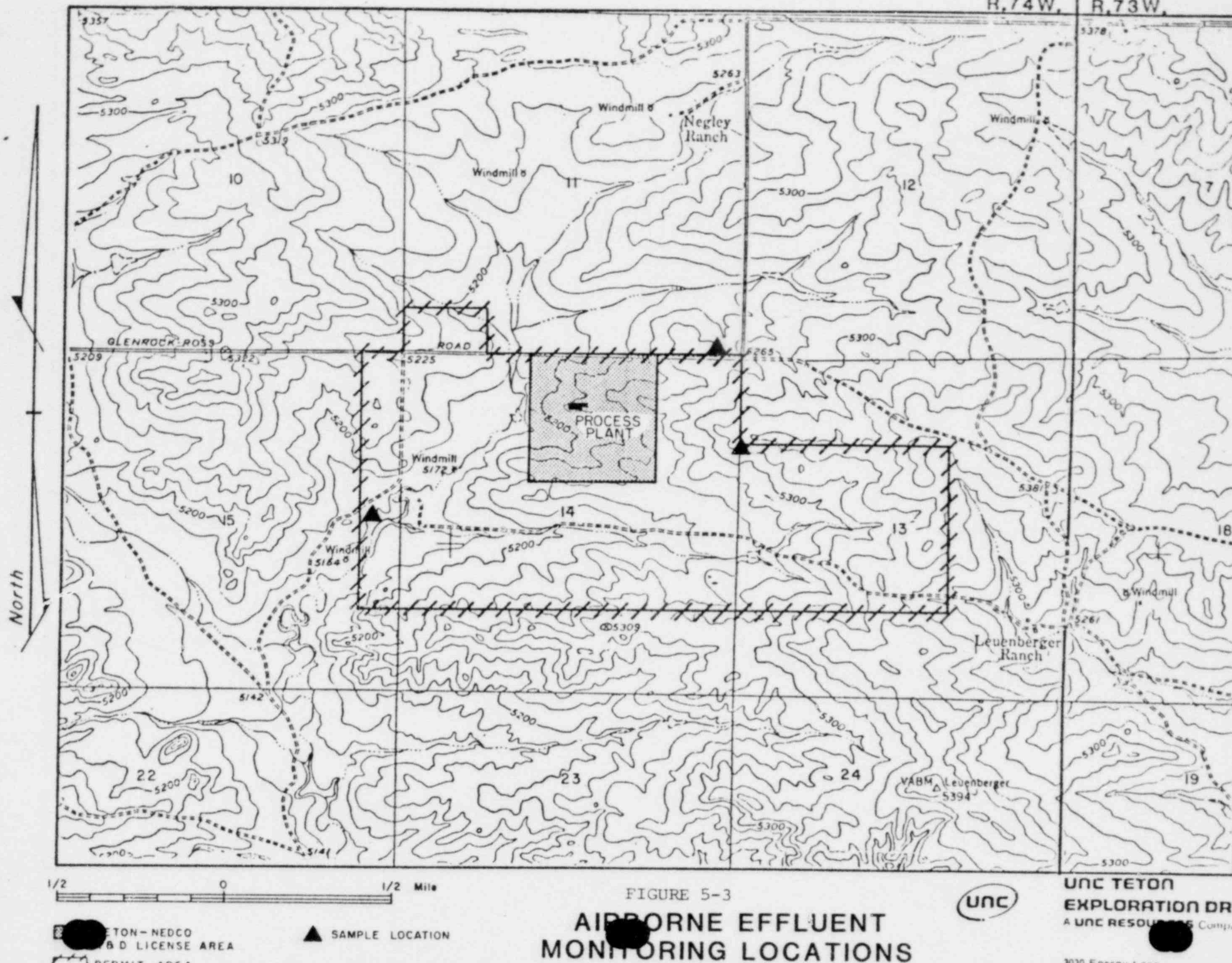


FIGURE 5-3

AIRBORNE EFFLUENT MONITORING LOCATIONS

UNC TETON EXPLORATION DRILLING, INC
A UNC RESOU Company

3030 Energy Lane
Casper, Wyoming 82601

5.7.8 Liquid Effluent and Environmental Monitoring Program

The liquid effluent and environmental monitoring program is designed to ensure that all fluids circulated and produced as a result of the mining operation are contained within predetermined boundaries. The monitoring program consists of on-site and off-site monitoring of groundwater and surface water.

In keeping with the procedures adopted by the US NRC and the Wyoming DEQ during the R&D phase of the Leuenberger Operation, the Wyoming DEQ may modify the groundwater and surface water monitoring programs commensurate with the evolving policies concerning in situ mining. The US NRC will be appraised in writing of all such modifications. The approved In Situ Mining Permit application filed with the State of Wyoming will be forwarded to the US NRC to document the approved monitoring programs.

5.7.8.1 WELL FIELD MONITOR WELLS

Monitor wells will be placed within the M and N monitor well rings shown on Figures 3-2 and 3-3 respectively. The extent of the monitor well rings are also illustrated on Figures 2-7 to 2-9. Monitor wells for the N production zone will be open to the N Aquifer and monitor wells for the M production zone will be open to the M Aquifer.

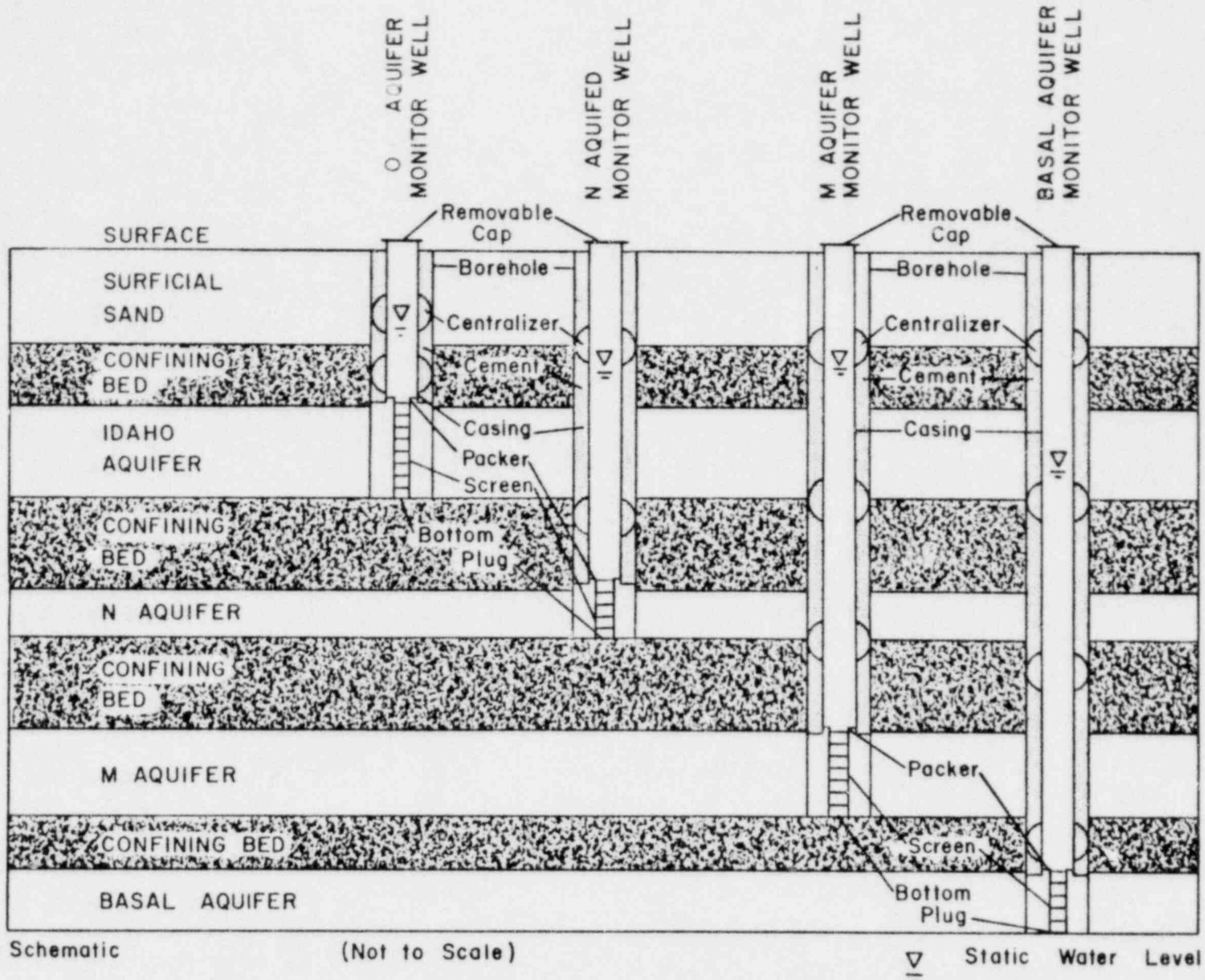
Before the N and M zone monitor wells are installed the pilot drill hole will be geophysically logged to identify the receiving strata (strata which contains the production zone). The monitor well will then be screened throughout the receiving strata from top to bottom to ensure that these wells will be in hydraulic connection with the production zone. The casing string above the screened interval will be cemented in place to avoid any hydraulic connection with overlying horizons. Monitor wells will be placed in the O Aquifer or O_1 Aquifer where present for every four to five acres of well field area.

No additional Basal Aquifer monitor wells other than those presently on site will be installed in that no future drilling is expected to extend to these depths within the well field areas. Preoperational pumping tests have indicated that the claystone beds between the M Aquifer and Basal Aquifer appear to behave as competent confining layers. The Basal Aquifer monitor wells presently installed will be left in place throughout the operation. Typical well completion design for the monitor wells are shown on Figure 5-4.

5.7.8.2 EXCURSION DETECTION PROCEDURE

The leach solution to be used will be composed of $NaHCO_3^-$ - Na_2CO_3. The mineral to be mined contains uranium. The TDS of the water within the production zone will increase during leaching, and chloride will be introduced into the production zones as a result of chloride elution during processing. Sulfate would increase in place of chloride if sulfate were to be used in the elution circuit. Based upon these considerations the chemical parameters to be used to detect leach solution excursions out of the production zone will be Sodium (Na), Alkalinity, Uranium (U), Chloride (Cl) and Conductivity. These chemical species are the excursion parameters for the Leuenberger in situ mining operation. Sulfate will be used in place of chloride when sulfate is used in the elution circuit.

Each monitor well will be installed and developed and then sampled at least three times prior to leach solution injection for a given mining unit (see Figures 3-2 and 3-3). Upper control limits (UCL) will be set at each monitor well for each excursion parameter and will be equal to twenty-five percent above the maximum value observed during preinjection sampling at that well or as otherwise prescribed and approved by the Wyoming DEQ. The UCL for Uranium will be set a 1 mg/l above average baseline.



MONITOR WELL DESIGN

FIGURE 5-4

After injection commences for a given mining unit the following excursion detection procedures will be implemented.

1. Monitor wells will be sampled once every two weeks. The SWL will be recorded before pumping at least one casing volume prior to sample collection.
2. If any three parameters from a well exceed their respective UCL an additional sample will be collected from this well within forty-eight hours of observing this occurrence.
3. If this sample behaves similarily, an excursion will be detected.
4. The US NRC will be notified within forty-eight hours than an excursion has occurred. The excursion parameter concentrations and the well(s) in excursion status will be reported to the US NRC in writing within thirty days thereafter.

Chemical analyses will be performed using standard methods. If an excursion is detected the following procedures will be implemented.

1. Increase the solution bleed stream to twice the normal operating bleed stream for three weeks. Sample the affected well at least once per week and analyze for the excursion parameters.
2. If the excursion is not corrected after three weeks, reduce leach solution injection in the injection wells nearest the monitor well in excursion status.
3. After six weeks of excursion status increase the solution bleed to three times the normal operating bleed stream. If the excursion is occurring in the O Aquifer reduce the injection pressure head to a level below the SWL of the O Aquifer.
4. After nine weeks increase the bleed to four times the operation bleed.
5. After twelve weeks terminate injection near the affected well if a chemical parameter initially below domestic use criteria at the affected well exceeds potential domestic water use criteria (Table 2-9).

An excursion will be corrected when two consecutive samples do not have three excursion parameters above their respective UCL.

Under normal operations the rate of leach solution recovery from the ore zone will exceed the rate of injection by approximately .5 percent. This excess solution is called a bleed stream. The .5 percent over-recovery is necessary for efficient uranium processing and will serve to contain the injected fluids within the monitor well rings by inducing a net groundwater flow to the recovery wells. During the groundwater restoration phase (see Chapter 6) monitor wells will be sampled once per quarter for a given mining unit.

5.7.8.3 SOLAR EVAPORATION PONDS

Each solar evaporation pond constructed will be equipped with a separate leak detection system as described in Chapter 4. During the operation, the leak detection system stand pipe for each pond will be sampled at one month intervals to insure that the pond liner is not leaking. Effluent wastes in the pond will be sampled at least once per quarter. The effluent waste solutions will be analyzed for Ca, Cl, Alkaliniity, Na, Ra-226, SO_4, and U. If water is retrieved from the stand pipe during monthly sampling, the sample will be analyzed for the same constituents to determine if the water in the stand pipe is derived from the leakage of effluent wastes. Normally the stand pipe should be dry. If pond leakage is detected, the leak will be repaired as described in Chapter 4.

5.7.8.4 SURFACE WATER MONITORING

No known surface water rights of record exist within one-half mile downstream from the permit area boundary. Teton presently retains two water rights within the permit area for the solar evaporation ponds used for the R&D operation. Teton will sample Little Sand Creek immediately upstream from the permit area, at a location within the permit area, and downstream from the permit area when surface water is flowing during the spring months.

5.7.8.5 OFF-SITE GROUNDWATER MONITORING

Teton will sample all wells in use within one-half mile of the permit area as shown in Figure D-6.1.01 (Appendix D-6.1) on a quarterly basis throughout the mining operation irrespective of whether or not a water right of record exists. Water samples will also be collected from these wells upon reasonable request from the well owner.

CHAPTER 6

RECLAMATION PLAN

6.1 Groundwater Restoration

6.1.1 Water Quality Criteria

The groundwater restoration plan is designed to return the affected groundwater to a quality of use that is equal to and consistent with the uses for which the water was suitable prior to mining pursuant to Wyoming Statute WS 35-11-103f(iii) and applicable regulations. The water quality criteria to be used for groundwater restoration shall be prescribed and approved by the Wyoming Department of Environmental Quality. The approved criteria shall be forwarded to the US NRC.

6.1.2 Method

The Mine Plan and Groundwater Restoration plan are highly interdependent. As planned groundwater restoration will normally commence about 1.5 to 2 years after a mining unit is first brought on line. As presently anticipated the initial Mining Unit will be mined through the injection and recovery of leach solution at a circulation rate up to 1,500 gpm for about six months. At this point the second Mining Unit will be brought on line and the initial Mining Unit will be allowed to "soak" with no injection or recovery for approximately another six months. During the next half year the initial Mining Unit will be mined again through the injection and recovery of leach solution except that the well field will be reversed. During well field reversal the old injection wells are used as recovery wells and vice-versa. At the same time Mining Unit II will be left to "soak."

After this six month period, groundwater from Mining Unit III will be transferred to Mining Unit I and the solutions in Mining Unit I will be sent to the process plant at a rate of 500 gpm for residential uranium extraction and chemical refortification. This water will then be injected into Mining Unit III; and, Unit III will be allowed to "soak" for approximately four months in preparation for active leach solution circulation and uranium recovery. Mining Unit I will be put on the restoration circuit at a rate of up to 200 gpm after the water transfer from Mining Unit III. The transfer stage denotes the beginning of mining for one unit and groundwater restoration for the previous unit. Complete transfer will take approximately two months. Groundwater restoration including transfer should be achieved within twelve months for a given mining unit.

This mining and groundwater restoration sequence will continue where clean water from Mining Unit IV is transferred to Mining Unit II and the soaking and mining sequence will begin between Mining Units III and IV. This proposed plan will be used throughout the remainder of the operation. The anticipated time schedule showing the duration of mining and groundwater restoration for each mining unit is illustrated in Figures 3-2 and 3-3. Water transfer will not be possible for the last two mining units in that no new mining units will be brought on line. Present plans call for straight groundwater circulation through a RO unit or similar device to effectuate groundwater restoration for these two mining units.

The restoration circuit includes an RO unit or similar technology where groundwater undergoing restoration is passed through the unit to improve the water quality. Approximately eighty percent of this water will be returned to the well field undergoing restoration as clean water permeate and twenty percent will be sent to the brine solar evaporation pond for evaporation. The clean water permeate will be reinjected back to the well field in such a way that the twenty percent over recovery will be derived from groundwater outside the well field areas or from groundwater in previously restored mining units.

6.1.3 Well Abandonment

Subsequent to the completion of groundwater restoration of a given mining unit, all injection and recovery wells will be filled with a bentonite slurry, capped with a cement plug and the well casing will be cut off at least two feet below the land surface. Any wells not reclaimed in this manner will remain as a water well and will be permitted with the Wyoming State Engineer.

The Wyoming State Engineer will be given the location of the well field areas and the range of depths of the production zones during site decomissioning.

6.2 Surface Reclamation and Decomissioning

6.2.1 Introduction

All lands disturbed by the Teton-Nedco proposed in situ uranium mine will be returned to their premining land use of livestock grazing and wildlife unless an alternative use acceptable to the state and landowner can be justified. The objectives of the surface reclamation effort will be to return the disturbed lands to production of equal or better quality than that of premining conditions. The soils, vegetation and radiological baseline data will be used as a guideline to evaluate final reclamation.

6.2.2 Topsoil Handling and Replacement

The soil disturbances caused by the in situ mining operation will be kept to a minimum. Disturbed areas have been divided into two classes to accomplish this objective. Areas where topsoil must be removed and stored will be called Class I Disturbance

Areas. These include additional process plant and support facility area, fuel storage tank area and evaporation pond areas. The disturbance caused in these areas and estimated soils volumes are shown in Table 6-1. All available topsoils in Class I areas will be removed by visual appraisal and relocated in designated storage stockpiles. The topsoil stockpiles will be sloped no greater than 3:1 and will be seeded with a cover crop to control erosion. The stockpiles will be located on the side slopes away from drainages and windy ridge tops. They will be properly posted with signs as required by Wyoming statute. It should be noted that topsoil recovered from construction of the commercial mine facility will be primarily from the cc.struction of new evaporation ponds and the addition to the present plant building. Construction sequence for new ponds calls for rolling the topsoil back first and using substrate for berm construction after which the topsoil can again be placed on the berm and seeded during the operation.

Class II Disturbance areas include the well field, outside storage, trunklines and access. These are listed in Table 6-2. The well field is the major portion of the Class II Disturbance. Teton feels that best topsoil conservation practices are achieved by leaving the soils in place in these areas because excavation would cause an excessive wind and water erosion problems within the well field areas as well as the need to stabilize an additional large topsoil stockpile.

Measures taken to control soil erosion in the well field will be to restrict unnecessary traffic and designate specific traffic areas to and from the well field. This will help maintain the present plant root structure and decrease erosion potential. Teton will also keep the well field area seeded with a cover crop as much as practical.

TABLE 6-1

CLASS I SURFACE DISTURBANCE

AREA DESCRIPTION	SIZE IN ACRES	ESTIMATED TOPSOIL IN CUBIC YARDS**
Process Plant and Support Facility		10,000
(R&D) Previously Disturbed	1.8	
Commercial Additions	1.9	
Fuel Storage Area	.1	80
Evaporation Ponds		
R&D Previous Disturbances	4.6	10,000
1st Year Commercial	17.2	29,000
Later Additions*	18.4	32,000
Total 1st Year Disturbance	25.6	49,080
Total Class I Disturbance	44.0	81,080

* Area not used in first year calculation for Reclamation Bond.

** Soils volume calculated from baseline data using average depth by soil type indicate enough topsoil available to cover all Class I disturbance with one foot of topsoil during final reclamation.

TABLE 6-2

CLASS II SURFACE DISTURBANCE

AREA DESCRIPTION	SIZE IN ACRES
Total Well Field	80
(1st Year Disturbance)	(20)
Outside Storage Yard	.8
Trunk Lines, storage areas and R&D Well Fields	3.6
Total 1st Year Disturbance	24.4
Total Class II Disturbance	84.4

The construction of mud pits during well installation is one variation of the above procedure in that topsoil from the mud pits for well drilling operations will be temporarily saved. Following the use of the mud pit,the fluids will be allowed to evaporate, the hole will be back filled and the topsoil replaced and seeded.

Upon final reclamation after decomissioning, all disturbed areas will be topsoiled and reseeded. Stored topsoils taken from the Class I Disturbance areas will be replaced evenly over those areas after contouring has been completed and all remaining Class II areas will be graded if necessary and seeded. Final grading will be such that adequate drainage is established and no depressions to accumulate water will be created. Access roads will be ripped prior to topsoiling and seeding. Although slope conditions in the area are not severe the topsoil replaced during final reclamation of the Class I disturbance areas will be protected from wind erosion by respreading it along the contour in areas where slopes exceed ten percent or perpendicular to the prevailing winds when slopes are less than ten percent. Tilling and reseeding will be conducted similiarly. Water erosion will be controlled on all slopes by mulching if the slopes exceed over twenty percent over a distance of one hundred and forty feet. A straw mulch applied at the rate of one and one-half to two tons per acre will be anchored in the soil by discing. The final reclaimed surface will be left roughen with ridges perpendicular to prevailing winds (Figure 2-3).

6.2.3 Revegetation Practices

During mining operations the topsoil stockpiles, pond berms and, as much as practical, the well field areas will be seeded with a cover crop to prevent wind and water erosion. Upon decommissioning and final reclamation, all disturbed areas will be seeded using the following seed mix containing pure live seed:

Plant Species	Seeding Rate
Stream Bank Wheatgrass	6 lbs/acre
Thickspike Wheatgrass	6 lbs/acre
Western Wheatgrass	6 lbs/acre
Four-winged Salt Bush	2 lbs/acre

Seeding will be accomplished by drilling before May 1 or after October 15, during the year which the reclamation is accomplished. If drilling is not practical seeds will be broadcast with a hand spreader and harrowed or hand raked.

Vegetation in reclaimed areas will be protected by fencing until a viable stand of growth in obtained. Presently the portion of the permit area in which all activities will take place is fenced to keep livestock out. Vegetation cover and productivity will be measured on the reclaimed area and compared with baseline data presented in this application for evaluation of final reclamation and to determine bond release with the State of Wyoming DEQ.

6.2.4 Decontamination and Decommissioning

After groundwater restoration is complete the well field areas will be scarified and prepared for seeding. If the US NRC and/or Wyoming DEQ considers the precipated salts in the solar evaporation pond to represent a significant radioactive waste as evidence by periodic effluent monitor and gamma survey of the pond liners, the evaporation pond liners will be removed and disposed of in a licensed tailings facility or other NRC/DEQ approved location. In this instance a gamma radiation survey will be conducted on the earthern material beneath the liner. The process building will be dismantled and removed from the site. Miscellaneous debris and the process building foundation, if not contaminated by a significant gamma radioativity as determined by gamma survey, will be broken into manageable segments and desposited in the evaporation pond area. All topsoil will be removed from the face of the berms and the evaporation ponds will then be regraded. A gamma radioactivity survey will be conducted on all disturbed areas prior to retopsoiling. The gamma ray scintillometer will be calibrated against baseline values for unaffected lands and compared with the baseline data from unaffected lands before the reclamation is completed. If gamma radiation is detected at twice background, the area will be decontaminated by transporting the contaminated material from the site to a licensed facility. A gamma survey of the well field areas will be conducted and should radiation be detected, the material will be removed from this area and handled similarly. Topsoil will then be regraded for seeding.

6.2.5 Final Contouring

Recontouring of the land where Class I Surface Disturbance has taken place will restore it to a surface configuration which will blend in with adjacent topograph and will be consistant with the post mining land use. There is no final contour map presented in this application because no major changes in topography will result from the proposed mining operation.

6.2.6 Reclamation Cost Estimate

Estimated reclamation costs associated with the proposed mine plan for the first year of operation are as follows:

GROUNDWATER RESTORATION	
Power Consumption	$ 125,000.00
R.O. Unit	$ 250,000.00
Well Abandonment	
360 wells @ $140.00 Each	$ 50,400.00
SUBTOTAL	$ 425,400.00
SURFACE RECLAMATION	
Building and Equipment Removal	$ 50,000.00
Pond Back Fill, Grading and Topsoil Replacement 30 acres	$ 50,000.00
Seeding - 50 acres at $55/acre	$ 2,750.00
Mulching - 50 acres at $250/acre	$ 12,500.00
SUBTOTAL	$ 115,250.00
TOTAL	$ 540,650.00

The total Class I surface disturbance area anticipated during the first year of operations includes the process plant building, the existing ponds, and proposed pond area to the south of the plant. Total Class II surface disturbance area considered for the first year of mining includes ten acres for each of the two mining units brought on line in the first year for a total of twenty acres. Fifty acres of total surface disturbance are considered in estimating the first years reclamation costs. Total estimated surface disturbances for the life of the mine is approximately 150 acres.

6.2.7 Bonding Assessment

Based upon the above estimated costs of reclamation for groundwater and the fifty (50) acres of surface disturbance anticipated during the first year of mining, Teton proposed to secure a Reclamation Performance Bond to cover surface reclamation and groundwater restoration in the amount of $540,650.00. This bond will be filed with the Wyoming Department of Environmental Quality.

CHAPTER 7

ENVIRONMENTAL EFFECTS

The objective of the mining and environmental monitoring program is to conduct a mining operation that is viable and environmentally responsible. The environmental monitoring programs used to ensure that the sources of land, water and air pollution are controlled and monitored are presented in Chapter 3.

This Chapter discusses and describes the degree of unavoidable environmental change, the short-term and long-term impact due to the operation, and the consequences of possible accidents at the Leuenberger Site.

7.1 Site Preparation and Construction

The soil and vegetation in the permit area will be affected by the construction of the processing plant and support facilities, the installation of the well field areas, the construction of solar evaporation ponds, and the development of the access roads from the processing plant to the various mining units. Some of these temporary disturbances such as the construction of two of the solar evaporation ponds have already taken place pursuant to Source Material License SUA-1373 and Wyoming Department of Environmental Quality R&D Testing License 2RD. Topsoil from the areas already disturbed has been stockpiled nearby as part of the overall land reclamation plan.

During the operation, these surface features will temporarily alter the natural topography, however, as described in the

Reclamation Plan (Chapter 6), the land will be returned to its initial condition after the operation. Consequently, no long-term effects due to site preparation and construction are anticipated.

7.2 Effects of Operations

No significant or measurable impacts to air or surface water quality are envisioned as a result of the operation. Over the long-term, the groundwater quality in the ore zone will probably remain slightly oxidized as compared with the initial condition. The consequence of this change will be minimal. Typically, the groundwater will no longer be characterized by the foul smell of H_2S gas as is presently the case. In addition, trace elements such as Fe and Mn should be below baseline concentrations due to precipitation of these elements as oxides during mining. Levels of uranium and other trace constituents will probably rise due to the difference in oxidation potential of the restored groundwater; however, these levels will not change the potential use category of these waters as defined by the Wyoming Department of Environmental Quality.

Radium-226 levels in the groundwater will probably be twice the ambient concentrations; however, premining natural levels of R-226 within the ore body exist at an order of magnitude above Ra-226 concentrations immediately outside the ore zone and up to two orders of magnitude when compared to other local aquifers. A factor of two above Ra-226 ambient concentrations is insignificant compared to the order of magnitude differences presently observed.

The overall effect of the in situ mining operation will be minimal. As opposed to conventional uranium mining methods, no long-term stability of uranium ore tailings waste will be required because these wastes are left in place in the ore zone during mining.

7.3 Radiological Effects

In situ uranium mining exposure pathways to radiological materials are considerably different from pathways assoicated with other uranium mining methods. The important environmental advantages of the in situ uranium mining method and the processing of the uranium commodity at the Leuenberger Site are two-fold. First, the majority of the uranium radioactive daughter products are not removed from the ore body but remain underground wtihin the ore zone. Second, no drying of the uranium slurry product will be conducted on site. This feature eliminates the radiological air particulate environmental probelm typically assoicated with conventional uranium ore milling.

7.3.1 Exposure Pathways

The possible pathways for radiological exposure at the site vary in degrees and form. The least signficant pathway is through the water system. This results from the selectivity of the process to dissolve and complex with uranium while mobilizing only a small fraction of other radioactive daughter products. The more important pathway is through air. Worker safety within the processing plant will require a venting system to mitigrate the potential accumulation of Radon-222 within the process plant. The gaseous control systems and the associated in-plant environmental monitoring programs are described in Chapters 4.1 and 5.7 respectively. The process plant tank ventilation systems has the potential of emitting small but measurable amounts of radiological gas and thus becomes a possible source of radiological exposure.

7.3.2 Exposure from Water Pathways

As previously described, the leach solution selectively removes uranium from the orebody because the oxidation potential of the leach solution causes the uranium mineral to solubilize and the free leach solution carbonate forms stable complexes with the dissolved uranium. Radium-226 when present within the uranium mineral, tends to dissolve with the uranium. Radium solubility within the circulated solution and natural formation water, and the adsorptive capacity of the clay fraction within the production zone reduces the concentration of radium to the extent that only a small fraction remains in solution long enough to reach the recovery well. Radium does not readily complex within carbonate in the presence of relatively high concentrations of soluble uranium oxide.

This chemical behavior tends to keep most of the radium naturally present in the formation within the orebody during mining. A small fraction of the available radium does remain in solution. This fraction is circulated through the process plant and is returned to the subsurface. In the process plant, only uranium is selectively removed. Based upon composite sampling conducted during the R&D phase, the average concentration of Ra-226 circulated through the process plant will be approximately 1,540 pCi/1.

During the operation, a small bleed stream is maintained to ensure that the overall groundwater flow within the receiving strata is from the monitor well ring towards the well field area. The bleed is maintained at approximately .5% of the leach solution circulation rate and will be equal to approximately 7.7 gpm. The chemical constitutents within the process bleed will be concentrated and the resulting brine solution will be evaporated from solar evaporation ponds. Based upon the 7.7 gpm bleed containing 1,540 pCi/1, the total amount of Radium-226 that will accumulate within the ponds due to production will be approximately 2.4 x 10^{-2} grams/year*. This amount of radium is considered neglibile in comparison to conventional uranium mill tailings where tons of radioactive wastes as generated each year due to the milling of the entire orebody on the land surface.

$$* \left(\frac{7.7 \text{ gals.}}{\text{min}}\right)\left(\frac{3.785 \text{ l}}{\text{gal}}\right)\left(\frac{1540 \text{ pCi}}{1}\right)\left(\frac{1 \text{ gram}}{10^{12} \text{ pCi}}\right)\left(\frac{525{,}600 \text{ min}}{\text{yr}}\right) = 2.4 \times 10^{-2} \frac{\text{gr}}{\text{yr}}$$

IMAGE EVALUATION
TEST TARGET (MT-3)

6″

MICROCOPY RESOLUTION TEST CHART

IMAGE EVALUATION
TEST TARGET (MT-3)

6"

MICROCOPY RESOLUTION TEST CHART

Because the leach solution and the radioactive daughter products are contained within the production zone, no radiological exposure from water pathways is envisioned. A small and intermittent stream of clean water permeate may be discharged to the surface, however, this water will meet NPDES discharge permit criteria as required of all discharges from presently operating and licensed conventional mining and milling operations. No exposure pathways are envisioned from this intermittent stream.

7.3.3 Exposure from Air Pathways

As described in the previous section, most of the Ra-226 associated with the uranium processing remains underground. Small but relatively consistent amounts of radium are circulated through the process plant and are surged in process tanks. Because there is a potential for Radon-222 buildup in the plant due to the decay of Ra-226 within solutions circulated through the plant, a venting system will be used to maintain in-plant concentrations of Rn-222 well below safe working levels (see Chapter 4.1). This venting system consitutes a minor but potential air pathway for exposure to radiological materials outside the process plant.

In an effort to quantify the level of radiological exposure to the outdoor environmental during the commercial operation, on-site measurements were taken during the R&D operation for the purpose of making this assessment. A series of samples were taken at the ventilation stack. The ventilation stack was placed on the upwind side of the process plant roof so that radon samples could be collected at the stack and at designated intervals directly downwind.

Appendix D-10.4 lists the site specific data collected during the R&D operation, and applies the data to an Air Pathway Exposure Model to estimate the annual radiological dose expected during the commercial operation at various distances and directions from the process plant. Table 7-1 lists the results of the calibration.

To estimate the equivalent dose in millirems (mRem) from a given concentration of Rn-222 gas, a factor of 2.83×10^{-6} mRem/yr was applied (Radon-222 expressed in pCi/m^3, US NRC, May 1979). For comparison, the maximum permissible concentration (MPC) for Rn-222 for a 168 hour week for humans is 10^{-8} uCi/cc (Bureau of Radiological Health, 1970) or equivalently 5.4×10^{-4} mRem/week*. The emission levels from the process plant at the nearest site boundary is below this level. No radiological hazard via air pathways is anticipated as a result of the in situ uranium mining operation.

7.3.4 Exposures from External Radiation

The maximum annual external dose that would be received by an individual from direct radiation at the nearest site boundary, if the individual resides at this point for the entire year, would be equal to the background radiation plus the exposure due to the air pathway from the process plant ventilation system. The annual exposure due to the ventilation system would be equal to 4.95×10^{-3} mRem/year (Table 7-1).

This value should be added to the dose the average U.S. citizen is exposed to each year from natural sources such as cosmic radiation, the earth, buildings, air, and elements within the human body. Table 7-2 lists the radiation exposures in the United States from a variety of sources. The individual at the site boundary should add 4.95×10^{-3} mRem/year to the Overall Total listed in this table.

7.3.5 Total Human Exposures

The major population areas within 80 km of the Leuenberger Site are the towns of Glenrock with a population of 3,100, Douglas with a population of 8,800, and Casper with a population of approximately 58,200 (see Appendix E). The

$$* \ \frac{10^{-8}\ \text{uCi}}{\text{cc}} \cdot \frac{10^{-6}\ \text{Ci}}{\text{uCi}} \cdot \frac{10^{12}\ \text{pCi}}{\text{Ci}} \cdot \frac{10^{6}\ \text{cc}}{\text{m}^3} \cdot \frac{2.83 \times 10^{-6}\ \text{mRem}}{\text{year}} \cdot \frac{\text{year}}{52\ \text{weeks}} =$$

$$5.4 \times 10^{-4}\ \frac{\text{mRem}}{\text{week}}$$

regional population within an 80 km radius is approximately 70,100 persons. The level of man-rems/year due to background radiation is approximately 1.35×10^4 man-rems. No measurable increase to this number is envisioned as a result of the operation due to the extremely low levels of Rn-222 gas emitted from the process plant. The effect of the mining operation on the regional population will be immeasurable.

The exposure to the nearest resident is 1.95×10^{-3} millirems/year/person (Table 7-1). This value compares with the 193.2 millirems each person at this residence receives on the average due to natural radiation (Table 7-2). This small increase in exposure is insignificant and less than the permissible working levels used for personnel safety within the process plant.

7.3.6 Exposures to Flora and Fauna

Chapter 2.9 characterizes the plant flora and wildlife near the Leuenberger Site. The general project area is a summer range for antelope. Cattle and sheep graze in the vicinity. Fencing near the perimeter of the permit area will preclude any cattle or sheep grazing on site during the operation.

Due to the nature of the solution mining operation, a small amount of radioactive elements will accumulate in the solar evaporation ponds. The hypalon (or equivalent) pond liner and the associated leak detection system will prevent the direct release of these materials to the environment. The ponds will be fenced to prevent access to animals.

As previously discussed, the primary radiological source from the processing plant will be airborne Rn-222. The Rn-222 source term is relatively small and is less than 1 percent of what could be expected from a conventional uranium mill. Inhalation dosage to large animals will be roughly equivalent to those to man. Process plant activity and fencing will discourage close-in occupancy of animals and birds.

Radon daughters such as Lead-210 may accumulate in vegetation and soil; however, the concentrations will be so small as to constitute a negligible radiation dose to foraging animals or birds.

No specific dose rate estimates to animals have been calculated because of the relatively sparce distribution and the mobility that precludes a knowledge of their location. The dose rate estimates to man previously discussed give an idea of the magnitude of the radiation dose to animals. In any case, the dose rates are very low and would not result in any significant or measurable effects.

7.4 Nonradiological Effects

The potential nonradiological effects of the operation include the possibility of leach solution excursion, solar evaporation pond leakage and temporary disturbance of the land during site preparation, construction and operations. The effects of these possible occurrences are considered small in that the environmental monitoring programs are designed to mitigate any adverse effects that may result. Corrective action procedures to be implemented in the event of a leach solution excursion or pond leakage are discussed in Chapter 4 and 5.

The reclamation plan (Chapter 6) describes the procedures and time schedule to be used to relcaim the land to its initial condition. No long-term effects other than those discussed in Chapter 7.2 are anticipated.

7.5 Effects of Accidents

Accidents involving human safety associated with the in situ uranium mining technology typically have far less severe consequences than accidents associated with underground and open pit mining methods. In situ mining provides a higher level of safety for workers on site and neighboring communities when compared to conventional mining methods or other energy related industries. Accidents that may occur are minor and are not catastrophic as would be the case for explosions at oil refineries or in equipment malfunction or human error in the public transporation industries. Radiological accidents at the Leuenberger Site, if they occur, would typically manifest slowly and are therefore detectable in sufficient time to be safely and methodically corrected.

7.5.1 Accidents Involving Radioactivity

7.5.1.1 TANK FAILURE

Under normal operating conditions the process fluids are contained in vessels and piping circuits within the process plant. However, the process plant has been designed to control and confine liquid spills should they accidentally occur. This will be done with separate sumps for each functional area within the process plant (Figure 4-1). These sumps will be equipped with automatic level control systems to empty any spilled solutions into the RO brine tank. Should the brine tank become full, it will discharge to the brine pond on a level control signal.

A six inch curb constructed around the operational portion of the process plant will be installed as an integral part of the concrete floor. The curb will contain liquid spills to a volume equivalent to the volume of groundwater circulated in a fifty minute time period, when operating at full capacity (74,500 gallons). The five percent floor slope will direct any spilled solutions to the sumps. The fifty minute period should be ample time to react to any spill that may occur during the operation. Figure 4-1 shows the curb, sloped floor and sumps within the three functional areas of the process plant.

The most severe catastrophic radilogical accident envisioned at the Leuenberger Site would be the instantaneous failure of one of the process surge tanks. The largest such tank will be twelve (12) feet in diameter and twenty (20) feet high containing 2,260 cubic feet (64 m^3) of process solution. Should instantaneous failure of this tank occur the solutions would fall to the concrete floor and flow to one of the floor sumps. As previously discussed the sumps are fitted with piping which transfer all solution in the sump to the solar evaporation ponds. Consequently the accident would be of short duration and the remedial procedure is incorporated into the process plant design.

All tanks in the process plant will be made of fiberglass or steel. Instaneous failure is highly unlikely. Tank failure would more likely occur as a small leak in the tank. In this instance the tank could be methodically emptied to the sump below the leakage level and the tank could be repaired.

7.5.1.2 PIPE FAILURE

A rupture of pipeline within the process plant is easily visible and can be repaired quickly. The maintenance shop within the process plant building is equipped to handle these small leaks.

The rupture of an injection or recovery manifold line will result in either barren or pregnant leach solution contaminating the ground surface near the break. A large and sudden rupture will be detected by a drop in pressure in the system and interruptions in the flow of liquids. A small break will be detected visually during routine inspection of the lines. Any ground contamination will be removed to the solar evaporation ponds as prescribed by the US NRC and the State of Wyoming.

TABLE 7-1

RADIOLOGICAL DOSE FROM RADON-222 PLANT EMISSIONS

Location	Distance From Ventilation Stack		Radon-222 Concentration pCi/l[1]	Whole Body & Bronchial Epithelium[3]	
	Ft.	Meters		mRem/yr	mRem/week
Nearest Site Boundary	853	260	1.75	4.95×10^{-3}	9.52×10^{-5}
Site Boundary in Direction of Prevailing Wind	1320	402	1.06	3.00×10^{-3}	5.77×10^{-5}
Nearest Residence	1625	495	.69	1.95×10^{-3}	3.76×10^{-5}

1) 1,000 liters = 1 cubic meter

2) Values reported are those above background. Background dose for whole body and bronchial epithelium are between 2.8×10^{-4} mRem/yr to 5.7×10^{-4} mRem/yr (5.4×10^{-6} to 1.1×10^{-5} mRem/week).

3) Doses to internal body are assumed to be the same as computed for the whole body (US NRC, May 1979).

TABLE 7-2

RADIATION EXPOSURES IN THE UNITED STATES
(after Inglis, 1973)

NATURAL SOURCES	MILLIREMS
A. External to the body	
1. From cosmic radiation	50.0
2. From the earth	47.0
3. From building materials	3.0
B. Inside the body	
1. Inhalation of air	5.0
2. Elements found naturally in human tissues	21.0
TOTAL NATURAL SOURCES	126.0
MAN-MADE SOURCES	
A. Medical procedures	
1. Diagnostic x-rays	50.0 (up to 95 in 1970)
2. Radiotherapy x-rays, radioisotopes	10.0
3. Internal diagnosis, therapy	1.0
SUBTOTAL	(61.0)
B. Atomic energy industry, laboratories	0.2
C. Luminous watch dials, television tubes, radioactive industrial wastes, etc.	2.0
D. Radioactive fallout	4.0*
SUBTOTAL	(6.2)
TOTAL MAN-MADE SOURCES	67.2
-- OVERALL TOTAL	193.2

* Down to 1.0 in 1970.

7.5.1.3 SOLAR EVAPORATION POND LEAKAGE

An accident involving a leak in a solar evaporation pond is detectable via the leak detection system placed beneath the pond lines as previously described. The contingency repair procedures in the event of leakage are described in Chapter 4.2. Based upon analyses during the R&D phase the average Ra-226 concentration in the ponds is 37.9 pCi/l. This moderately low concentration is probably attributable to a low Ra-226 solubility in the presence of sulfate and the high absorptive capacity of radium on to charge surfaces such as clays or the hypalon pond liners.

Because of this low concentration, it appears that the radium concentrations can be easily diluted in the groundwater system to drinking water standards by an eight parts to one part dilution. This feature exists because most of the radium associated with the in situ mining process remains in the orebody during mining.

7.5.1.4 LEACH SOLUTION EXCURSION

Premining hydraulic testing have defined the aquifer characteristics for the receiving strata and the production zones at the Leuenberger Site. The ore zones are physically and hydraulically separate from overlying and underlying aquifers as previously discussed. The well completion procedures used and the mechanical integrity testing for each injection well performed prior to leach solution injection ensure that injected solutions are contained within the well and are transmitted to the target production zone. The monitoring program for overlying and underlying aquifers is a backup check to ensure that the injection is controlled in this manner. Should an excursion occur to any aquifer the excusion correction procedures outlined in Chapter 5.7 are instituted immediately to correct the excursion.

Excursion parameter upper control limits for all aquifers are extremely close to baseline concentrations so that the slightest perturbation in water quality is interpreted as an excursion and precautionary measures are taken. Because of the chemically conservative nature of the excursion parameter sed, it would be extremely unlikely that at the time excursion correction procedures are instituted that any chemical parameter other than the excursion indicators will be different from baseline values. Because of the oxidizing nature of the recovery fluid, several constituents in the production zone will be at lower concentrations then baseline concentrations. As such, no groundwater degradation should result when a well is in excursion status.

In the event that an excursion does occur and is accidentally undetected, radium concentrations are likely to be low due to natural precipitation and adsorption on to clays. This phenomenum is observed under natural conditions where radium concentrations down gradient from the uranium orebody are at negligible levels or are equal to radium concentrations upgradient from the orebody. Natural radium levels within a uranium orebody are typically two to three orders of magnitude higher. This situation exists because the radium, naturally soluble in the orebody, is selectively removed from solution down gradient via precipitation or adsorption. This chemical behavior should not change during mining.

7.5.2 Transporation Accidents

Transport of the uranium slurry product from the mine to the hexafluoride processing plant will be by a licensed contractor. The truck drivers will be trained in accident response and the truck trailers will be constructed in accordance with NRC specifications.

7.5.3 Other Accidents

Other potential accidents involving non-radiological materials are associated with the various chemical and fuel storage tanks maintained outside the process plant (Figure 3-1). The caustic solutions and anticipated volumes stored in tanks outside the process plant are H_2O_2 (15 m^3), NaOH (56 m^3) and HCl (52.41 m^3). Each of these storage tanks will be placed on a concrete pad and an earthern berm will be placed around the tank(s) holding these solutions. Each tank will be labeled to identify the solutions within the tanks. Corrosive resistant materials will be used to handle the solutions. In the event that a tank should instantaneously rupture, the solutions will be retained by the surrounding earthen berm placed around the tank for that purpose.

The fuel storage tank is placed in an area remote from the building to avoid any fire damage to the building or injury to workers in the unlikely event of combustion of the fuel.

7.6 Economic And Social Effects of Construction and Operation

Due to the small amount of construction necessary and the relatively small number of employees required to operate the Leuenberger in situ uranium mine, the economic and social effects resulting from the operation are considered to be minimal. Notwithstanding the benefits and costs associated with the operation are identified and quantified where possible in an effort to assess the degree of the economic and social impact of the proposed operation.

7.6.1 Benefits

7.6.1.1 US ENERGY NEEDS

The primary benefit from the Leuenberger Operation is the electrical power that will be derived from the uranium recovered at the site. Assuming that 30 kilowatt-hours of power can be produced per pound of U_3O_8 mined, the Leuenberger Project can potentially furnish 6.9×10^7 kilowatt-hours of power to the nation's energy needs.

7.6.1.2 EMPLOYMENT AND INCOME

The Leuenberger Site payroll represents a direct benefit to the employees and the community. The payroll and supplies expenditures will have a multiplier effect as these dollars are turned over throughout the local economy. If it is assumed that each one dollar of direct expenditure creates an additional dollar of income for others, then approximately $11,500,000 will be realized throughout the local community.

At the time of this writing (October, 1980), several large open pit and underground uranium mines in the South Powder River Basin have had to cut back their working force or shut down completely. The Leuenberger operation will require a work force of approximately 50 people and therefore could relieve a small part of the unemployment situation for Converse County, Wyoming. Several residents in the community near the site are presently employed with the Teton-Nedco R&D Leuenberger Project.

7.6.1.3 TAXES

The federal government, state government and local governments receive various revenues from employee income taxes, royalty owners taxes, severence taxes, ad valorem taxes and sales taxes. This total revenue distributed throughout the various governments is estimated to be approximately $6,800,000.

7.6.1.4 TECHNOLOGICAL ADVANCE

Finally, the Leuenberger Operation offers a sound technology to mine the uranium commodity and diminishes many of the major environmental problems associated with the conventional uranium mining techniques. By operating the Leuenberger in situ uranium mine valuable experience and process techniques can be developed and refined to improve the nation's energy security, and offer a distinct improvement in environmental protection currently available in the uranium mining industry.

7.6.2 Costs

7.6.2.1 PUBLIC FACILITIES AND SERVICES

The adverse impact on public facilities and services, such as the congestion of streets and highways, overloading of utilities such as water supply and sewage treatment system, and the overtaxing of public facilities such as schools, hospitals, and police and fire protection is expected to be minimal due to the small population increase necessary for the project, the existence of an adequate work force in the town of Glenrock and nearby communities, and the expectation that many of those to be hired already reside in the area or will be available as a result of layoffs elsewhere in the industry.

7.6.2.2 HOUSING

Because of the small number of people involved in this proposed project and recognizing that a large portion of housing in the area is in the form of mobile homes, housing shortages, if any develop, are expected to be short-lived.

7.6.2.3 IMPAIRMENT OF HISTORICAL, SCENIC AND RECREATIONAL VALUES

No official or unofficial historical, recreational or scenic places of interest are found in the vicinity of the project site. Of the eight archaeological findings identified in the permit area, four may have subsurface value. These archaeological findings have been field identified and will not be affected by the operation.

7.6.3 Resources Committed

Fuel, building materials, well casing, cement and other commodities not capable of being recycled will be utilized by the Leuenberger Project. Such items as well field submersible pumps, the process plant building and any wells requested to remain unreclaimed by the landowner can be salvaged.

Fuel, labor and foundation materials for the process plant and solar evaporation ponds represent the irretrievable resources committed to the project. No long-term impact is envisioned from the use of these resources on the nearby communities or the State of Wyoming.

CHAPTER 8

ALTERNATIVES TO THE PROPOSED ACTION

The in situ mining method is proposed over other mining methods to recover the uranium commodity because in situ mining appears to offer the most economical and environmentally sound mining method presently available.

8.1 Alternative Mining Methods

Undergound mining and open pit mining represent the two currently available alternatives to mining the uranium ore at the Leuenberger Site.

From an economic viewpoint, the relatively small size and moderate depth of the Leuenberger orebody precludes the much larger investment necessary for either an open pit or underground mine. Both underground and open pit mining methods would require an initial investment in heavy equipment to begin earthwork to expose the orebody. Each method would require a large mill and a large tailings pond for the mill wastes.

For an underground mine, the conventional mill that would be required would involve higher risks of spillage and radiological exposure to both personnel and the atmosphere than that associated with the proposed process plant. Rock waste dumps generated by shaft sinking and development excavations would result in changes in surface topography, even after landscaping. The overall size of the facilities would necessarily be greater because of larger manpower and material requirements.

Workers would be exposed to the normal hazards of underground mining and, additionally, to radiation exposures from radon gas if not continually vented to the atmosphere. The personnel injury rate is traditionally much higher in underground mines than in in situ uranium mining operations.

Operation of an underground mine would result in higher operating costs and would lead to abandonment of much of the lower grade mineralization, resulting in a lower overall recovery of an important energy resource. After mining, the land surface would be subject to subsidence.

When one considers the alternative of open pit mining, the economic and environmental disadvantages closely parallel those for an underground mine. As in the case of an underground mine, a mill would be required with the problems mentioned above. Permanent changes in topography would result, with an excavated and/or disturbed area approximately three times the area of the orebody mined in order to maintain slope stability. The site facilities would be larger than for an in situ uranium mining operation (or for an underground mine).

Both methods would require substantial dewatering to depress the potentiometric surface of all local aquifers. Large quantities of groundwater would be discharged to the surface. In this instance the groundwater naturally contaminated with Ra-226, iron and manganese would have to be treated and the metals would have to be disposed of as a solid waste. A mill tailings pond would be required to contain 2.0×10^6 tons of produced waste from the uranium mill. This tonnage would represent a radioactive pile containing 1.3×10^6 yd^3 of a tailings slurry over the life of the mine.

The economic costs and environmental problems although not insoluble suggests that in situ mining is the most viable technique to use. The initial investment is lower, the tailings problem is completely eliminated, and the local groundwater resource is preserved when using the in situ mining technique.

8.2 Alternative Sites for Surface Structures

Proposed siting of the plant and evaporative ponds is shown on Figure 3-1.

Because of the nature of the in situ solution mining process, all facilities, including processing plant and evaporative ponds, must be located as close as possible to the well field area. Within the small license area there are few, if any, alternative sites for the plant and solar evaporation ponds other than those proposed.

The process plant is located close to the well field areas, but is situated near Glenrock-Ross Road for easy and safe access for supply and transport trailers. The ponds near the plant are situated at a lower elevation than the process plant sump - RO brine tank system to facilitate drainage in the event of a catastrophic tank failure (See Chapter 7.5).

The solar evaporation ponds are placed near the well field areas to minimize piping and to contain all surface disturbance within a limited surface area. An additional constraint is that, to the extent practicable, all ponding should be kept out of any ephemeral drainage to avoid flooding problems during major precipitation events.

The surface structures as proposed appear to be the most efficient and environmental responsible approach to the operation design and layout.

8.3 Alternative Energy sources

For a discussion of alternative energy sources available to the U.S., the reader is referred to an excellent summary of the subject in Chapter 2.2 of NUREG 687 (US NRC, 1980).

CHAPTER 9

BENEFIT-COST ANALYSIS

9.1 Non-Quantifiable Benefits and Costs

The knowledge and experience gained by the employees in a new and developing technology creates a more diversified and skilled work force for the community. The detailed baseline studies for the area is a benefit to the State's knowledge of the land and water resources of the state and may represent a non-quatifiable cost if additional information beyond that which can reasonably be acquired is requested.

The relatively low cost of uranium production using the new in situ mining technique should help the producer to weather tight market conditions better than producers using conventional mining methods. The overall environmental impacts of in situ uranium mining is much less than that for a conventional mine.

9.2 Quantifiable Benefits and Costs

The quatifiable benefits and costs applicable to the Leuenberger Project are listed in Table 9-1.

TABLE 9-1

SUMMARY OF COSTS AND BENEFITS

COST		PRESENT WORTH
Capital		$ 7,000,000
Operating		25,000,000
Decommissioning		300,000
	TOTAL	$ 32,300,000

BENEFIT		PRESENT WORTH
Uranium		$ 44,000,000
Employees & Royalty Owners		10,000,000
Government		6,800,000
Others		16,500,000
	TOTAL	$ 77,300,000

$$\text{RATIO:} \quad \frac{\text{Benefits}}{\text{Costs}} = \frac{77.3}{32.3} = 2.4$$

CHAPTER 10

ENVIRONMENTAL APPROVALS AND CONSULTATIONS

All licenses, permits and approvals required or requested by federal, state and local government for construction and operation of the proposed Leuenberger in situ uranium mine are listed in Table 10-1.

Teton will continue to attempt to maintain a close laison with all applicable regulatory authorities and interested citizens in order to protect individual rights and process the necessary permits and approvals. Teton will comply with applicable statuatory requirements and intends to address all legitimate concerns that may be raised by interested parties with respect to the environmental aspects of the proposed operations.

TABLE 10-1

SUMMARY OF PERMIT AND LICENSE REQUIREMENTS

Permit or License	Agency	Status
Source Material License	US NRC	Pending Review
Air Quality Permit to Construct	DEQ	Potential
Mine Permit		
1) License to Mine	DEQ	Filed September 15, 1980
2) In Situ Mining Permit	DEQ	Filed Sep ember 15, 1980
Permit to Appropriate Surface Water	Wyoming State Engineer	Approved September 11, 1979
Permit to Construct Solar Evaporation Ponds	DEQ	Approved September 10, 1979
Permit to Construct Additional Ponds	DEQ/ State Engineer	Future application as needed
Permit to Appropriate Groundwater for well field areas	Wyoming State Engineer	Filed May 7, 1980
Water Discharge Permit (NPDES)	DEQ	Potential in future
Permit to Construct Access Driveway	Wyoming Highway Department	Approved August 6, 1979
Permit to Construct Sanitary Leach Field	DEQ	Approved August 14, 1979
Permit for Subdivision Development Plan (requested)	Converse County	Pending Plan Review
Trash and Burn Permit	DEQ/ Converse County	Future Application

Chapter 11

REFERENCES CITED

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APPENDIX A

LEGAL ESTATE WITHIN PERMIT AREA

APPENDIX "A"

Surface Owners of Record within Permit Area
(See Figure A-1)

1. Smith Sheep Company
   207 North 4th
   Douglas, Wyoming 82633

2. Carl J. Hildebrand
   719 Sun Valley Drive
   Cheyenne, Wyoming 82001

3. A. C. Layton
   166 N. Iowa
   Casper, Wyoming 82601

   Contract for Deed to:

   Vollman Ranches, Inc.
   Box 13
   Douglas, Wyoming 82633

APPENDIX "A"

KEY

TETON-NEDCO R&D LICENSE AREA

PERMIT AREA

3 OWNERSHIP OR LEASE HOLDER OF RECORD

1/2 0 1/2 Mile

Figure: A-1

SURFACE OWNERSHIP

(Within Permit Area)

UNC TETON
EXPLORATION DRILLING, INC.
A UNC RESOURCES Company
3030 Energy Lane
Casper, Wyoming

APPENDIX "A"

Mineral Owners of Record within Permit Area

Uranium Ownership (See Figure A-2)

1. Fee Mineral

Edward F. Leuenberger
Box 177
Glenrock, WY 82637

Smith Sheep Co.
Douglas, WY 82633-- Mineral Owners

Teton Exploration Drilling Co., Inc.
P. O. Drawer A-1
Casper, WY 82602

NERCO
111 SW Columbia
Portland, OR 97201-- Mineral Lessees

2. U. S. Minerals

Paul S. Coupey
Box 428
Santa Fe, NM 87501

Dean & Evelyn Cureton
401 Irish Dr.
Ft. Collins, CO 80521

Harry R. & Wanda Cureton
1425 S. Birch
Casper, WY 82601-- Mineral Claimants

Teton Exploration Drilling Co., Inc.
P. O. Drawer A-1
Casper, WY 82602

NERCO
111 SW Columbia
Portland, OR 97201-- Mineral Lessees

3. U. S. Minerals

Kerr-McGee Resources Corp.
Kerr-McGee Center
Oklahoma City, OK 73125-- Mineral Claimant

APPENDIX "A"

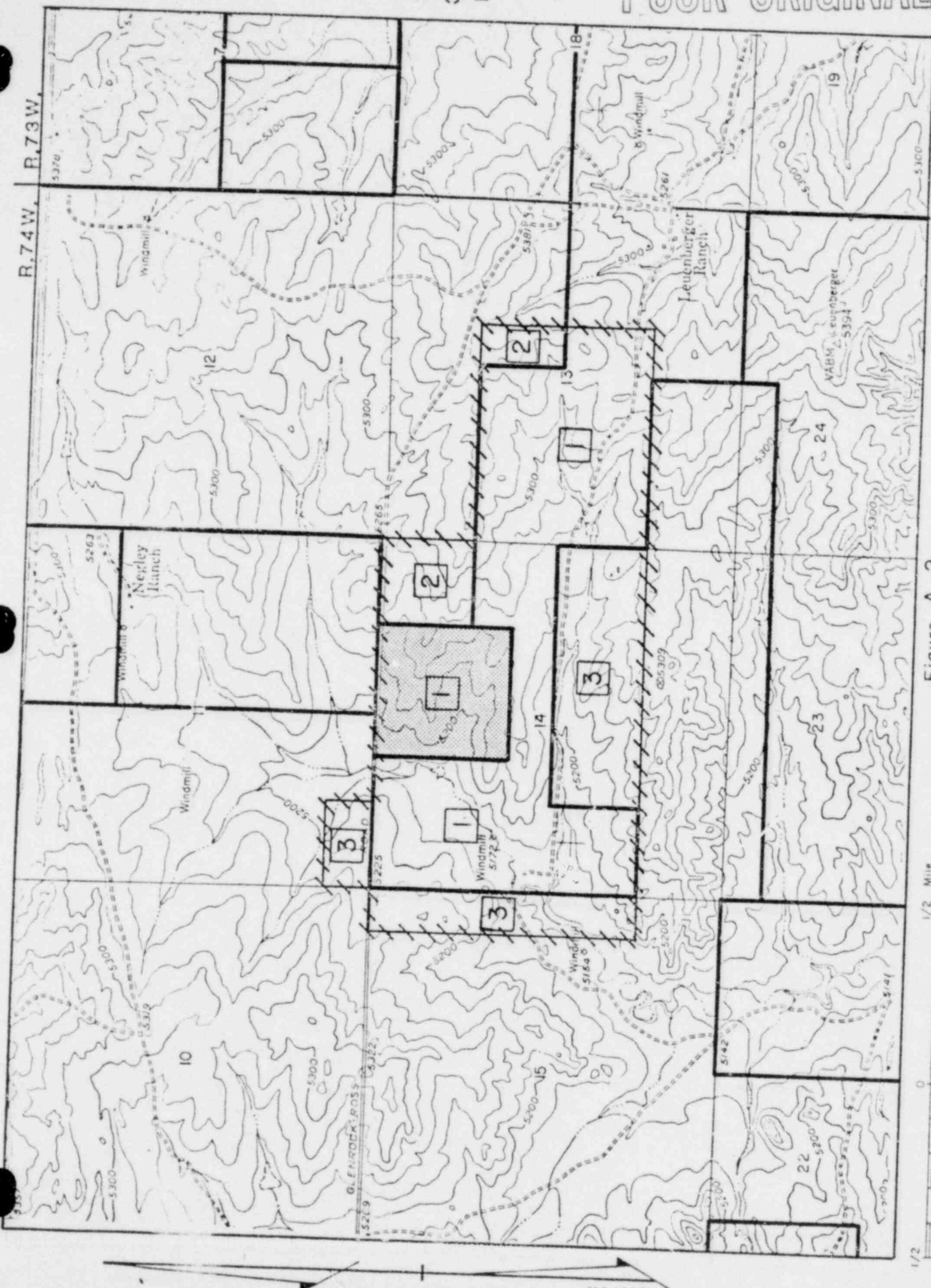


Figure A-2

URANIUM OWNERSHIP

(Within Permit Area)

KEY

TETON-NEDCO R&D LICENSE AREA

3 OWNERSHIP OR LEASE HOLDER OF RECORD

PERMIT AREA

UNC TETON EXPLORATION DRILLING, INC.

A UNC RESOURCES

APPENDIX "A"

Coal Ownership (see Figure B-4)

1. U. S. Mineral

   Bureau of Land Management
   Cheyenne, Wyoming 82001

2. Fee Mineral

   Smith Sheep Co.
   Douglas, Wyoming 82633

   Edward F. Leuenberger
   P. O. Box 177
   Glenrock, Wyoming 82637

APPENDIX "A"

Oil & Gas Leaseholders (see Figure B-5)

1. Cities Service Company
   P. O. Box 300
   Tulsa, Oklahoma 74102

2. #W56256A

   Kenneth G. Cone
   Box 1610
   Lease dated 8/1/75

3. Amoco Production Company
   Security Life Building
   Denver, Colorado 80202

4. #W51189

   W. A. Moncrief
   Moncrief Building, 9th & Commerce
   Ft. Worth, Texas 76102

5. #W51190

   Chorney Oil Company
   401 Lincoln Tower Bldg.
   Denver, Colorado 80295

   Amerada Hess Oil & Gas Co.
   P. O. Box 2040
   Tulsa, Oklahoma 74102

   Wintershall Oil & Gas Co.
   1520 Esperson Bldg.
   Houston, Texas 77002

   Lingen Exploration, Inc.
   1111 Commerce Bldg.
   Houston, Texas 77002

Oil & Gas Leaseholders (cont.)

6. #W56256

Chorney Oil Company
401 Lincoln Tower Bldg.
Denver, Colorado 80295

Amerada Hess Oil & Gas Co.
P. O. Box 2040
Tulsa, Oklahoma 74102

Wintershall Oil & Gas Co.
1520 Esperson Bldg.
Houston, Texas 77002

Lingen Exploration, Inc.
1111 Commerce Bldg.
Houston, Texas 77002

APPENDIX "A"

Rights of Way and Easements of Record

1. Albert Leuenberger, Edward F. Leuenberger and Jesse Leuenberger to Mountain States Telephone & Telegraph, covering portions of SW¼NW¼ of Sec. 12, S½, NW¼ of Sec. 13, T34N, R74W, dated 2/4/56, and recorded in Book 282 at Page 257 of the records of Converse County, Wyoming.

2. Hildebrand, Inc., to Mountain States Telephone & Telegraph covering portions of N½N½ of Sec. 15, T34N, R74W, dated 5/24/65, and recorded in Book 380 at Page 103 of the records of Converse County, Wyoming.

3. Jesse Leuenberger to Mountain States Telephone & Telegraph covering portions of N½N½ of Sec. 14, T34N, R74W, dated 5/21/65, and recorded in Book 380 at Page 80 of the records of Converse County, Wyoming.

4. Smith Sheep Company to Mountain States Telephone & Telegraph covering portions of NW¼NE¼ of Sec. 14, T34N, R74W, dated 6/8/79, and recorded in Book 704 at Page 480 of the records of Converse County, Wyoming.

5. William R. and Alice Vollman, Albert C. and Mary I. Layton to Pacific Power & Light Co., covering portions of NW¼NW¼ of Sec. 1; E½, SW¼ of Sec. 2; SE¼ of Sec. 10; W½ of Sec. 11, all in T34N, R74W, dated 2/8/74, and recorded in Book 554 at Page 528 of the records of Converse County, Wyoming.

6. Albert C. and Mary I. Layton to County of Converse, covering portions of S½SE¼ of Sec. 10; S½SW¼ of Sec. 11, all in T34N, R74W, dated 7/17/65, and recorded in Book 380 at Page 272 of the records of Converse County, Wyoming.

7. Jesse Leuenberger to County of Converse, covering portions of N½N½ of Sec. 14, T34N, R74W, dated 7/17/65, and recorded in Book 380 at Page 271 of the records of Converse County, Wyoming.

8. Hildebrand, Inc., to County of Converse, covering portions of N½N½ of Sec. 15, T34N, R74W, dated 8/5/65, and recorded in Book 380 at Page 269 of the records of Converse County, Wyoming.

APPENDIX B

LEGAL ESTATE ON ADJACENT LANDS

APPENDIX "B"

Surface Owners of Record and Others Having Valid Legal Estate on Lands Adjacent to the Permit Area.

Surface Owners (See Figure B-1.)

1. Smith Sheep Company
   207 North 4th
   Douglas, Wyoming 82633

2. Pacific Power & Light Company
   926 S.W. 6th Avenue
   Portland, Oregon 97204

3. State of Wyoming
   Commissioner of Public Lands
   Pioneer Building
   Cheyenne, Wyoming 82001

   Carl J. Hildebrand--Grazing Lessee

4. Carl J. Hildebrand
   719 Sun Valley Drive,
   Cheyenne, Wyoming 82001

5. Joe R. Keenan
   Box 113
   Glenrock, Wyoming 82637

6. A. C. Layton
   166 N. Iowa
   Casper, Wyoming 82601

   Contract for Deed to:

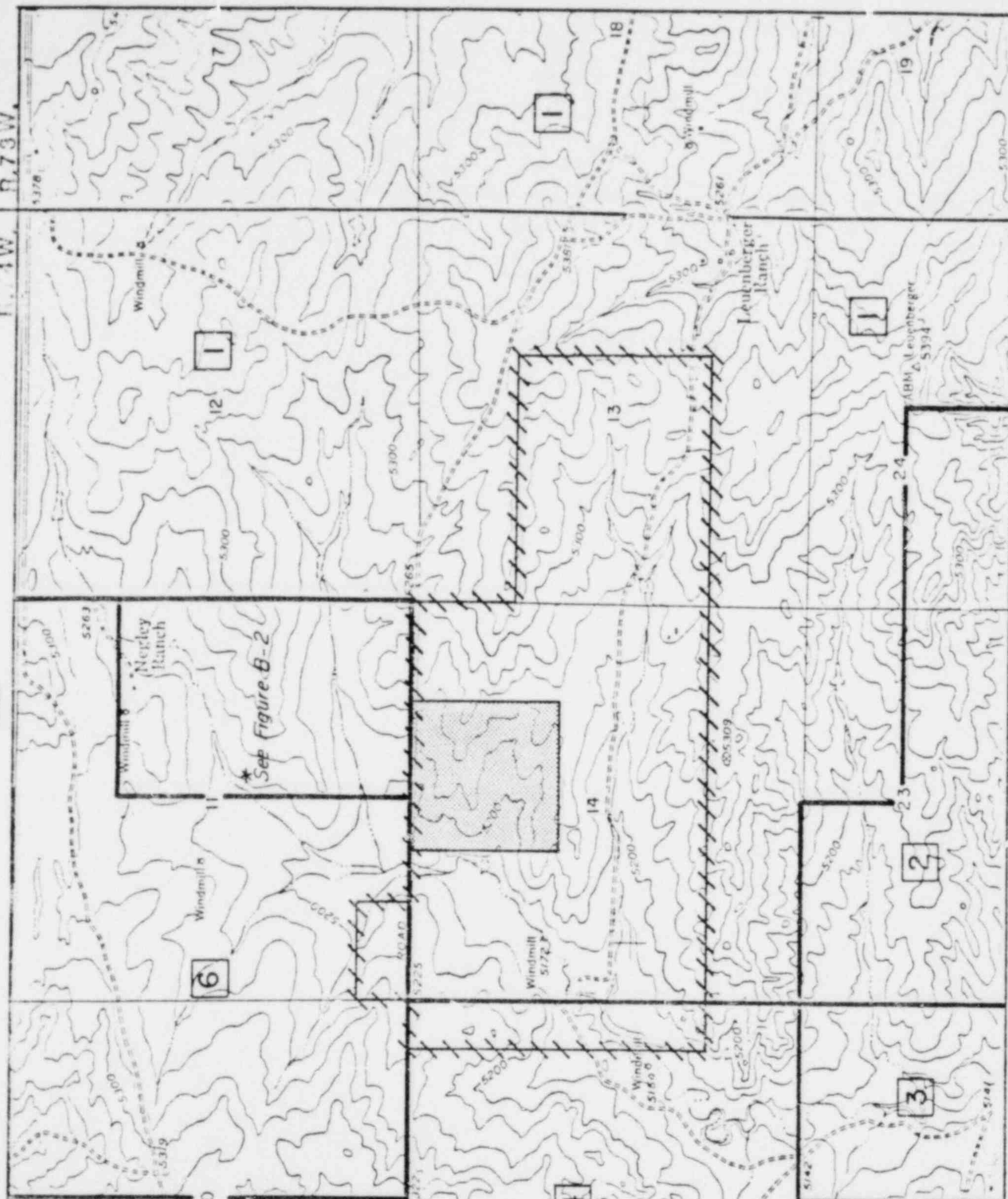
   Vollman Ranches, Inc.
   Box 13
   Douglas, Wyoming 82633

(See Figure B-2 for owners of record Nos. 7 through 18.)

7. Jacob S. Negley
   Box 14
   Glenrock, Wyoming 82637

8. Hawley L. & Dollie Pixler
   Glenrock, Wyoming 82637

APPENDIX "B"



KEY

TETON-NEDCO R&D LICENSE AREA

PERMIT AREA

3 OWNERSHIP OR LEASE HOLDER OF RECORD

1/2 0 1/2 Mile

Figure: B-1

SURFACE OWNERSHIP

(Lands Adjacent to Permit Area)

UNC TETON EXPLORATION DRILLING, INC.
A UNC RESOURCES

3030 Energy Lane
Casper, Wyoming

APPENDIX "B"

(Surface Owners of Record--cont.)

9. Jacob S. Negley
   Box 14
   Glenrock, Wyoming 82637

   Contract for Deed to:

   Evert L. & Kathryn M. Bourquin
   Box 231
   Glenrock, Wyoming 82637

10. Robert D. & Lorna N. Haun
    Box 125
    Glenrock, Wyoming 82637

11. Sheldon Henderson et ux
    Box 492
    Glenrock, Wyoming 82637

12. Merle H. Dunham et ux
    Box 533
    Glenrock, Wyoming 82637

13. Patrick Riddell et ux
    Box 1915
    Glenrock, Wyoming 82637

14. Elmer G. Doege et ux
    Box 477
    Glenrock, Wyoming 82637

15. Earl G. Doege et ux
    Box 477
    Glenrock, Wyoming 82637

16. Harry G. Reeves et ux
    Box 52
    Glenrock, Wyoming 82637

17. Earlene LaPlant
    Box 1617
    Glenrock, Wyoming 82637

18. Ron L. Rogers et ux
    Box 664
    Glenrock, Wyoming 82637

APPENDIX "B"

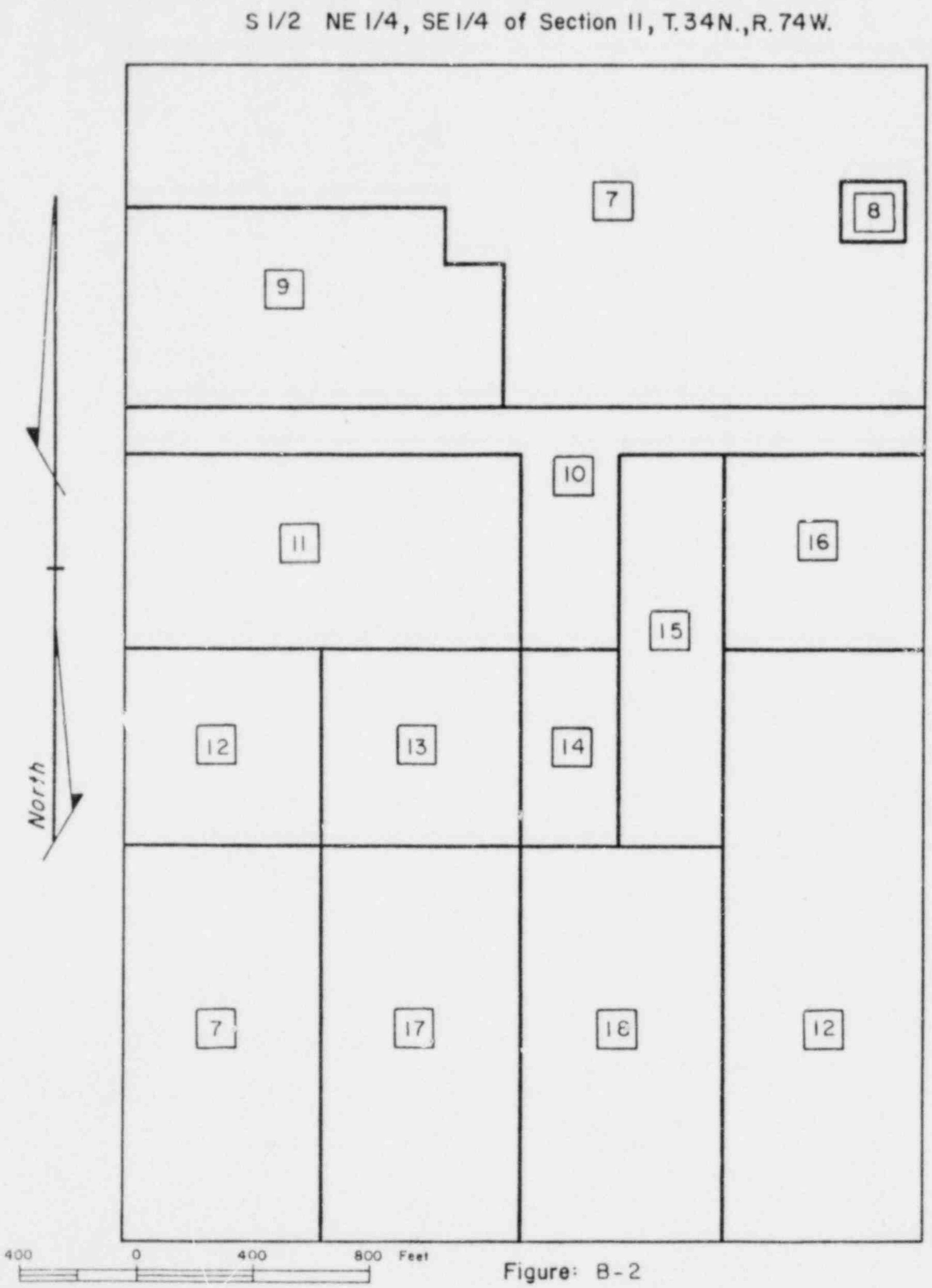


Figure: B-2

KEY

[14] OWNERSHIP

SURFACE OWNERSHIP

(Lands Adjacent to Permit Area)

UNC TETON
EXPLORATION DRILLING, INC.
A UNC RESOURCES Company

3030 Energy Lane
Casper, Wyoming 82601
Telephone 307/265-4102

APPENDIX "B"

Uranium Ownership (See Figure B-3)

1. U. S. Minerals

Paul S. Coupey
Box 428
Santa Fe, NM 87501

Dean & Evelyn Cureton
401 Irish Dr.
Ft. Collins, CO 80521

Harry R. & Wanda Cureton
1425 S. Birch
Casper, WY 82601-- Mineral Claimants

Teton Exploration Drilling Co., Inc.
P. O. Drawer A-1
Casper, WY 82602

NERCO
111 SW Columbia
Portland, OR 97201-- Mineral Lessees

2. U. S. Minerals

Teton Exploration Drilling Co., Inc.
P. O. Drawer A-1
Casper, WY 82602-- Mineral Claimant

3. Fee Mineral

Edward F. Leuenberger
Box 177
Glenrock, WY 82637

Smith Sheep Co.
Douglas, WY 82633-- Mineral Owners

Teton Exploration Drilling Co., Inc.
P. O. Drawer A-1
Casper, WY 82602

NERCO
111 SW Columbia
Portland, OR 97201-- Mineral Lessees

(Uranium Owr -ship--cont.)

4. U. S. Minerals

    - G. Jebsen
    2737 Harvard
    Casper, WY 82601-- Mineral Claimant

5. U. S. Mineral

    Kerr-McGee Resources Corp.
    Kerr-McGee Center
    Oklahoma City, OK 73125-- Mineral Claimant

6. State of Wyoming

    Commissioner of Public Lands
    Pioneer Building
    Cheyenne, WY 82001-- Mineral Own

    American Nuclear Corp.
    314 W. Midwest Avenue
    Casper, W 82601

    Tennessee Valley Authority
    403 Power Bldg.
    Chattanooga, TN 37401-- Mineral Lessees

7. Fee Mineral

    Jacob S. Negley
    P. O. Box 14
    Glenrock, WY 82637-- Mineral Owner

8. Fee Mineral

    A. C. & Mary Layton
    166 N. Iowa
    Casper, WY 82601-- Mineral Owners

9. Fee Mineral

    Edward F. Leuenberger
    Box 177
    Glenrock, WY 82637

    Smith Sheep Co.
    Douglas, WY 82633-- Mineral Owners

APPENDIX "B"

(Uranium Ownership--cont.)

Kerr-McGee Resources Corp.
Kerr-McGee Center
Oklahoma City, OK 73125-- Mineral Lessee

10. U. S. Minerals

American Nuclear Corp.
314 W. Midwest
Casper, WY 82601-- Mineral Claimant

APPENDIX "B"

POOR ORIGINAL

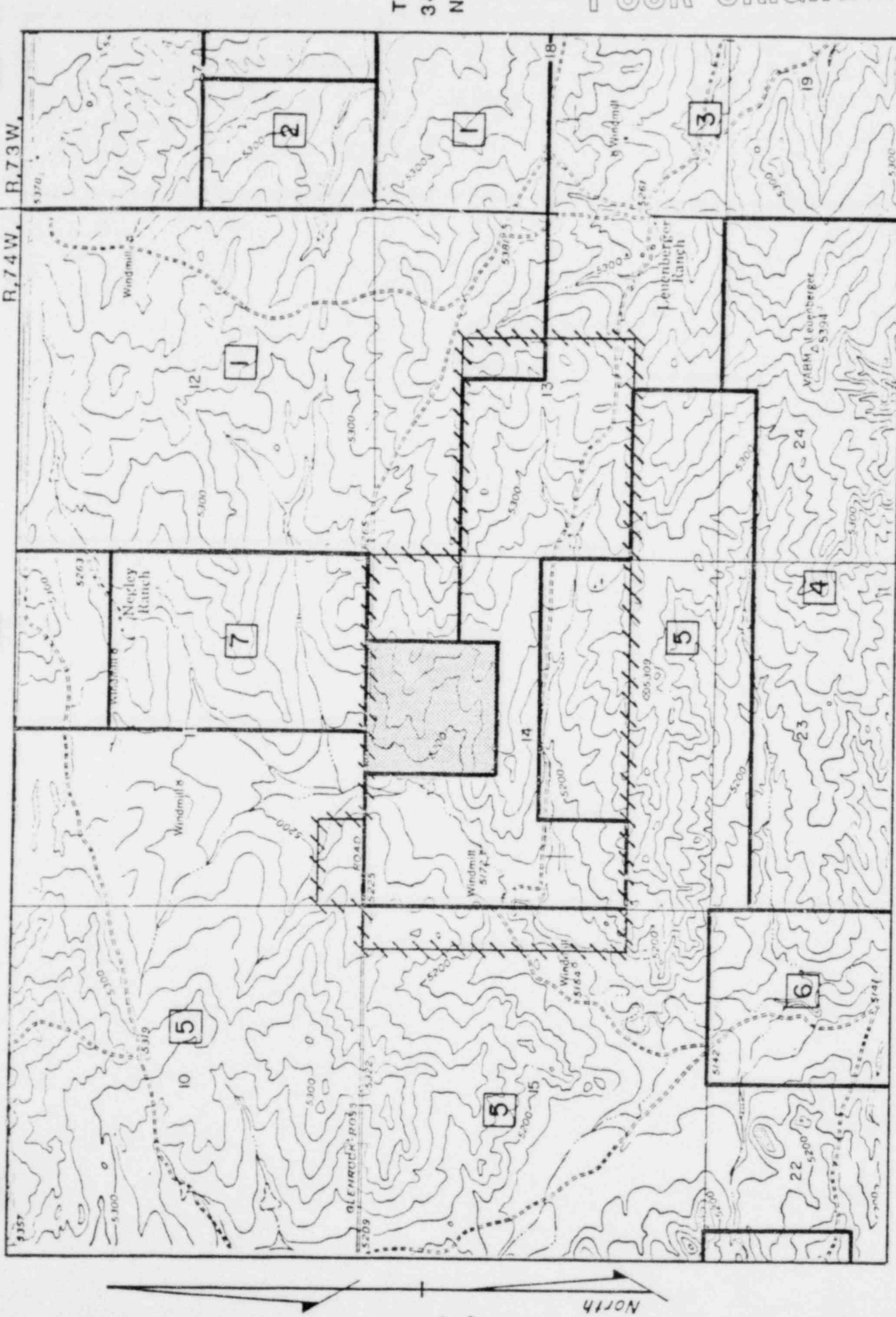


Figure: B-7

URANIUM OWNERSHIP
(Lands Adjacent to Permit Area)

KEY

- TETON-NEDCO R&D LICENSE AREA
- 3 OWNERSHIP OR LEASE HOLDER OF RECORD
- PERMIT AREA

UNC TETON EXPLORATION DRILLING, INC.
A UNC RESOURCES COMPANY

Coal Ownership (See Figure B-4)

1. U. S. Mineral

   Bureau of Land Management
   Cheyenne, Wyoming 82601

2. Fee Mineral

   Smith Sheep Company
   Douglas, Wyoming 82533

3. State of Wyoming

   Commissioner of Public Lands
   Pioneer Building
   Cheyenne, Wyoming 82001

   Extractive Fuels, Inc.
   Box 917
   Casper, Wyoming 82602-- Lessee

4. Fee Mineral

   Jacob S. Negley
   P. O. Box 14
   Glenrock, Wyoming 82601

5. Fee Mineral

   A. C. & Mary I. Layton
   166 N. Iowa
   Casper, WY 82601

APPENDIX "B"

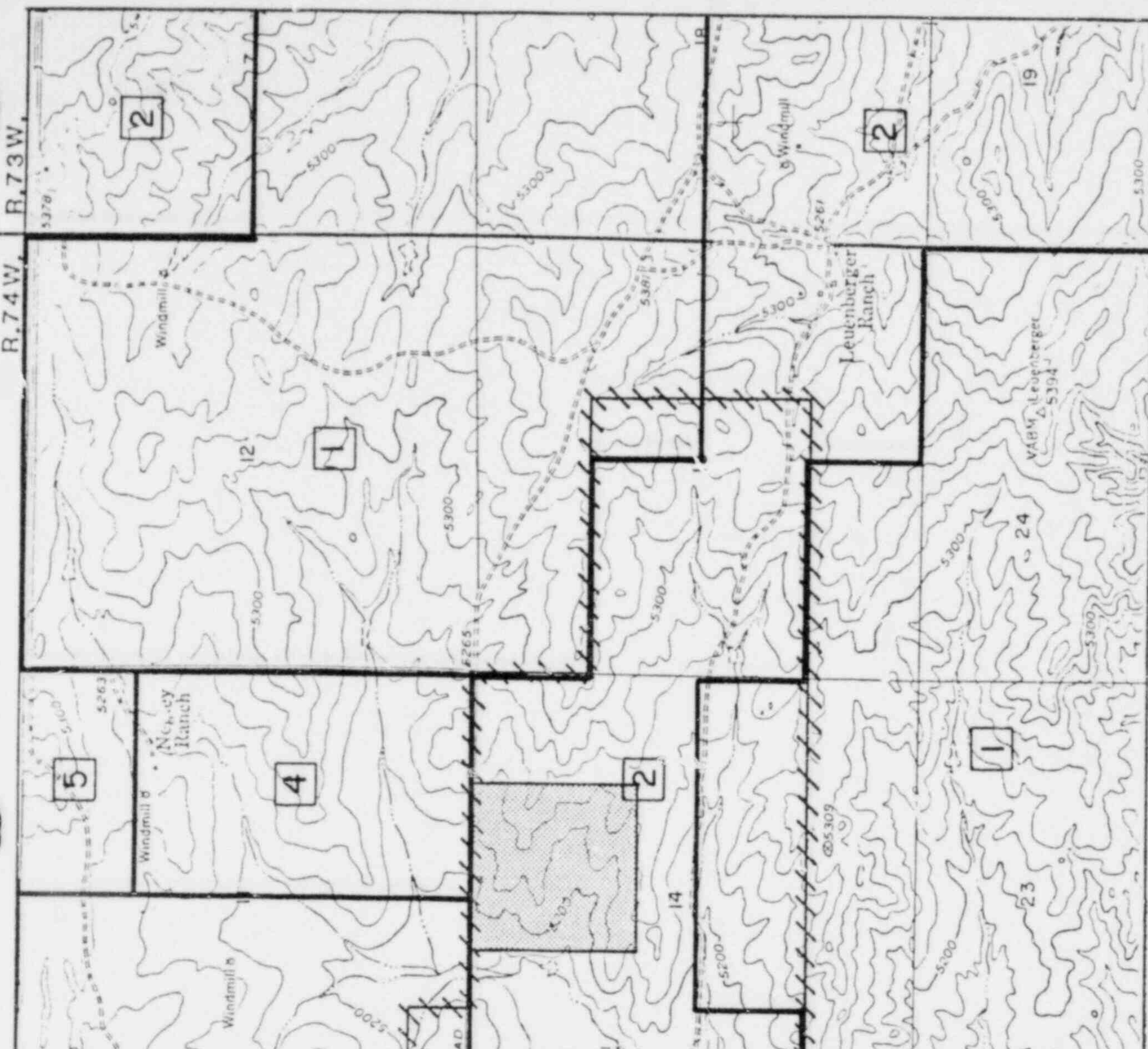


Figure: B-4

COAL OWNERSHIP

(Permit Area and Adjacent Lands)

KEY

- TETON-NEDCO R&D LICENSE AREA
- 3 OWNERSHIP OR LEASE HOLDER OF RECORD
- PERMIT AREA

1/2 0 1/2 Mile

UNC TETON EXPLORATION DRILLING, INC.
A UNC RESOURCES

3030 Energy Lane
Casper, Wyoming 82601

POOR ORIGINAL

APPENDIX "B"

Oil and Gas Leaseholders (See Figure B-5)

1. Cities Service Company
   P. O. Box 300
   Tulsa, Oklahoma 74102

2. #W56256A

   Kenneth G. Cone
   Box 1610
   Lubbock, Texas 79413

3. Amoco Production Company
   Security Life Building
   Denver, Colorado 80202

4. #W51189

   W. A. Moncrief
   Moncrief Building, 9th & Commerce
   Ft. Worth, Texas 76102

5. #W51190

   Chorney Oil Company
   401 Lincoln Tower Bldg.
   Denver, Colorado 80295

   Amerada Hess Oil & Gas Co.
   P. O. Box 2040
   Tulsa, Oklahoma 74102

   Wintershall Oil & Gas Co.
   1520 Esperson Bldg.
   Houston, Texas 77002

   Lingen Exploration, Inc.
   1111 Commerce Bldg.
   Houston, Texas 77002

(Oil and Gas Leaseholders--cont.)

6. #W56256

Chorney Oil Company
401 Lincoln Tower Bldg.
Denver, Colorado 80295

Amerada Hess Oil & Gas Co.
P. O. Box 2040
Tulsa, Oklahoma 74102

Wintershall Oil & Gas Co.
1520 Esperson Bldg.
Houston, Texas 77002

Lingen Exploration, Inc.
1111 Commerce Bldg.
Houston, Texas 77002

7. Anderman & Company
1776 Lincoln, Suite 506
Denver, Colorado 80203

Janes K. Wollard
2121-F Victor
Aurora, Colorado 80014

8. #W56256A

Energy Reserves Group, Inc.
601 Jefferson St., Suite 1900
Houston, Texas 77002

9. #W51176

Northern Natural Gas
6750 W. Loop South
Bellaire, Texas 77401

10. #W57974

S. P. Yates
Martin Yates III

Yates Petroleum
207 S. Fourth Street
Artesia, New Mexico 88210

(Oil and Gas Leaseholders--cont.)

11. #W34722

Estelle Wolf
Box 1714
Denver, Colorado 80201

Chorney Oil Company
401 Lincoln Tower Bldg.
Denver, Colorado 80295

Amerada Hess Corporation
Box 2040
Tulsa, Oklahoma 74102

Wintershall Oil & Gas Co.
1520 Esperson Bldg.
Houston, Texas 77002

Lingen Exploration, Inc.
1111 Commerce Bldg.
Houston, Texas 77002

12. #W30229

Amoco Production Co.
Security Life Bldg.
Denver, Colorado 80202

13. #74-53902

Cities Service Company
Box 300
Tulsa, Oklahoma 74102

14. #W32229

Amoco Production Company
Security Life Bldg.
Denver Colorado 80202

Vincent J. Duncan
Walter Duncan
Raymond T. Duncan
J. Walter Duncan, Jr.
Walter Duncan III

1800 Security Life Bldg.
Denver, Colorado 80202

APPENDIX "B"

(Oil and Gas Leaseholders--cont.)

15. Anderman & Co.
1776 Lincoln St., Suite 506
Denver, Colorado 80203

James K. Wollard
2121-F Victor St.
Aurora, Colorado 80014

16. To be Issued

John T. Krusiek
P. O. Box 26245
Milwaukee, Wisconsin 53226

APPENDIX "B"

POOR ORIGINAL

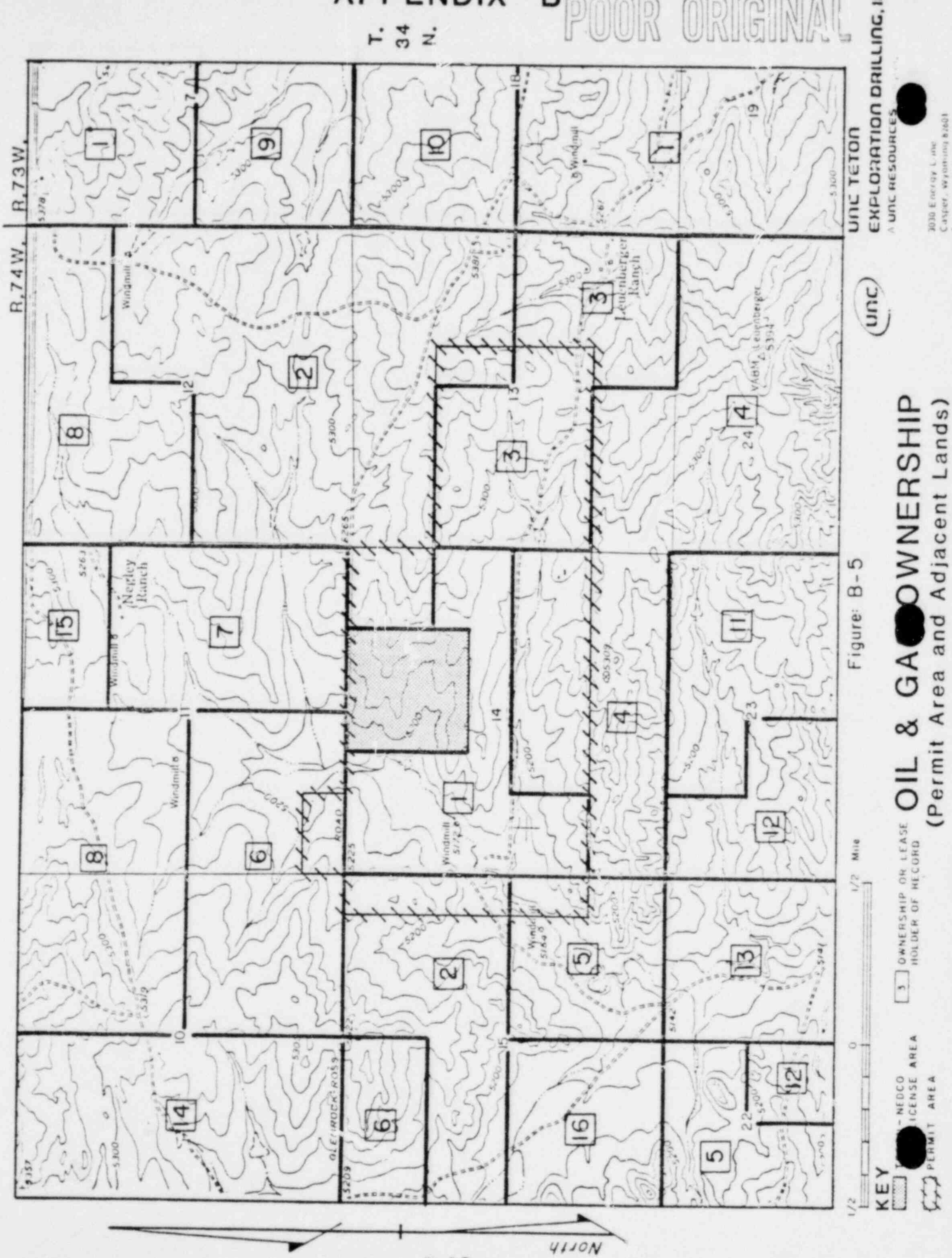


Figure: B-5
OIL & GA[redacted]OWNERSHIP
(Permit Area and Adjacent Lands)

APPENDIX "B"

Rights of Way and Easements of Record

1. Jacob S. Negley to Merle H. and Mona Dunham, covering portions of SE¼ of Sec. 11, T34N, R74W, dated 9/11/73 and recorded in Book 544 at Page 439 of the records of Converse County, Wyoming.

2. Jacob S. Negley to Merle H. and Mona Dunham, covering portions of SE¼ of Sec. 11, T34N, R74W, dated 10/10/73 and recorded in Book 544 at Page 485 of the records of Converse County, Wyoming.

3. Albert Leuenberger to Mountain States Telephone & Telegraph Co., covering portions of N½NW¼ of Sec. 24, T34N, R74W, dated 2/4/56 and recorded in Book 282 at Page 258 of the records of Converse County, Wyoming.

4. Albert Leuenberger, Edward F. Leuenberger and Jesse Leuenberger to Mountain States Telephone & Telegraph Co., covering portions of SW¼NW¼ of Sec. 12; S½, NW¼ of Sec. 13, T34N, R74W, dated 2/4/56 and recorded in Book 282 at Page 257 of the records of Converse County, Wyoming.

5. Hildebrand, Inc., to Mountain States Telephone & Telegraph Co., covering portions of N½N½ of Sec. 15, T34N, R74W, dated 5/24/65 and recorded in Book 380 at Page 103 of the records of Converse County, Wyoming.

6. Smith Sheep Company to Mountain States Telephone & Telegraph Co., covering portions of NW¼SW¼, SW¼NW¼ of Sec. 12, T34N, R74W, dated 6/2/71 and recorded in Book 503 at Page 532 of the records of Converse County, Wyoming.

7. Sheldon C. and N. Jean Henderson to Mountain States Telephone & Telegraph Co., covering portions of NW¼SE¼ of Sec. 11, T34N, R74W, dated 5/22/78 and recorded in Book 675 at Page 176 of the records of Converse County, Wyoming.

8. Robert D. and Lorna N. Haun to Mountain States Telephone & Telegraph Co., covering portions of SW¼NE¼ of Sec. 11, T34N, R74W, dated 5/22/78 and recorded Book 675 at Page 178 of the records of Converse County, Wyoming.

9. Hildebrand, Inc., to Pacific Power & Light Co., covering portions of W½, NE¼ of Section 15, T34N, R74W, dated 2/8/74 and recorded in Book 554 at Page 526 of the records of Converse County, Wyoming.

(Rights of Way and Easements--cont.)

10. William R. & Alice Vollman, Albert C. & Mary I. Layton to Pacific Power & Light Co., covering portions of NW¼NW¼ of Sec. 1; E½, SW¼ of Sec. 2; SE¼ of Sec. 10; W½ of Sec. 11, all in T34N, R74W, dated 2/8/74 and recorded in Book 554 at Page 528 of the records of Converse County, Wyoming.

11. Merle H. Dunham to Pacific Power & Light Co., covering portions of SE¼SE¼ of Sec. 11, T34N, R74W, dated 9/9/75 and recorded in Book 606 at Page 2 of the records of Converse County, Wyoming.

12. Richard Deveraux to Pacific Power & Light Co., covering portions of NE¼SE¼ of Sec. 11, T34N, R74W, dated 9/13/75 and recorded in Book 606 at Page 1 of the records of Converse County, Wyoming.

13. Robert D. and Lorna Haun to Pacific Power & Light Co., covering portions of NE¼SE¼ of Sec. 11, T34N, R74W, dated 12/12/79 and recorded in Book 723 at Page 401 of the records of Converse County, Wyoming.

14. Ed Leuenberger, Albert Leuenberger, Jesse Leuenberger to County of Converse, covering portions of W½W½ of Sec. 12, T34N, R74W, dated 7/17/65 and recorded in Book 380 at Page 274 of the records of Converse County, Wyoming.

15. Henry Keenan to County of Converse, covering portions of S½SE¼ of Sec. 9, S½SW¼ of Sec. 10, all in T34N, R74W, dated 7/17/65 and recorded in Book 380 at Page 373 of the records of Converse County, Wyoming.

16. Albert C. & Mary I. Layton to County of Converse, covering portions of S½SE¼ of Sec. 10, S½SW¼ of Sec. 11, all in T34N, R74W, dated 7/17/65 and recorded in Book 380 at Page 272 of the records of Converse County, Wyoming.

17. Hildebrand, Inc., to County of Converse, covering portions of N½N½ of Sec. 15, T34N, R74W, dated 8/5/65 and recorded in Book 380 at Page 269 of the records of Converse County, Wyoming.

18. Smith Sheep Company to State Highway Commission of Wyoming covering portions of Lot 1, NE¼NW¼, N½NE¼ of Sec. 7; T34N, R73W, N½N½, SW¼NW¼, W½SW¼ of Sec. 12; T34N, R74W, dated 4/2/71, and recorded in Book 515 at Page 207 of the records of Converse County, Wyoming.

APPENDIX "B"

(Rights of Way and Easements--cont.)

19. Cordero Mining Company and Nuclear Exploration & Development Company to State Highway Commission of Wyoming, covering portions of S½S½ of Sec. 5; Lot 7, SE¼SW¼, S½SE¼ of Sec. 6; Lot 1, NE¼NE¼, N½NE¼ of Sec. 7; N½N½ of Sec. 8, all in T34N, R73W; S½S½ of Sec. 1, NE¼SE¼, E½NE¼ of Sec. 11; NW¼SW¼, SW¼NW¼, N½N½ of Sec. 12, all in T34N, R74W, and dated 4/8/71 and recorded in Book 515 at Page 77 of the records of Converse County, Wyoming.

20. Kerr-McGee Corporation to the State Highway Commission of Wyoming, covering portions of S½S½ of Sec. 5; Lot 7, SE¼SW¼, S½SE¼ of Sec. 6; Lot 1, NE¼NW¼, N½NE¼ of Sec. 7; N½N½ of Sec. 8, all in T34N, R73W; S½S½ of Sec. 1, NE¼SE¼, E½NE¼ of Sec. 11, NW¼SW¼, SW¼NW¼, N½N½ of Sec. 12, all in T34N, R74W, dated 5/13/71, and recorded in Book 515 at Page 126 of the records of Converse County, Wyoming.

21. Union Pacific Mining Corporation to State Highway Commission of Wyoming, covering portions of S½S½ of Sec. 5; Lot 7, SE¼SW¼, S½SE¼ of Sec. 6; Lot 1, NE¼NW¼, N½NE¼ of Sec. 7; N½N½ of Sec. 8, all in T34N, R73W; S½S½ of Sec. 1, NE¼SE¼, E½NE¼ of Sec. 11, NW¼SW¼, SW¼NW¼, N½N½ of Sec. 12, all in T34N, R74W, dated 5/26/71, and recorded in Book 515 at Page 153 of the records of Converse County, Wyoming.

APPENDIX C

LEGAL DESCRIPTION OF PERMIT AREA

APPENDIX "C"

Tabulation of lands in the proposed permit area by legal subdivision, section, township range, county and number of acres. (See Figure C-1)

The permit area is a contiguous tract of land consisting of the following portions, as tabulated below, all within Township 34 North, Range 74 West, Sixth Principal Meridian, Converse County, Wyoming.

Description		Acreage
Section 11:	S½SW¼SW¼	20
Section 13:	W½SW¼NE¼	20
	W½NW¼SE¼	20
	S½NW¼	80
	N½SW¼	80
Section 14:	N½	320
	N½S½	160
Section 15:	E½E½NE¼	40
	E½NE¼SE¼	20
	Total	760

Said lands in their entirety contain 760 acres, more or less.

Form C-1

APPENDIX "C"

This appendix "C" represents the location of lands by legal subdivision, section, township, range, county, and municipal corporation, if any, (W.S. 35-11-406,(a),(vi)) and the number of acres in each description. No mining activity may take place on land for which there is not in effect a valid mining permit (W.S. 35-11-405). To include additional lands within a permit area it is necessary to amend the permit (W.S. 35-11-406,(a),(xii)), so care should be taken to include all lands necessary to the mining and reclamation operation as defined in W.S. 35-11-103, (e),(viii). All acreage figures should be obtained from official survey documents or recent surveys if available. An original U.S.G.S. topographic map with the permit area clearly outlined should accompany each permit application.

Permit Area

S½SW¼SW¼	Section 11	T. 34 N.	R. 74 W.	Acres 20
W½SW¼NE¼	Section 13	T. 34 N.	R. 74 W.	Acres 20
W½NW¼SE¼	Section 13	T. 34 N.	R. 74 W.	Acres 20
S½NW¼	Section 13	T. 34 N.	R. 74 W.	Acres 80
N½SW¼	Section 13	T. 34 N.	R. 74 W.	Acres 80
N½	Section 14	T. 34 N.	R. 74 W.	Acres 320
N½S½	Section 14	T. 34 N.	R. 74 W.	Acres 160
E½E½NE¼	Section 15	T. 34 N.	R. 74 W.	Acres 40
E½NE½SE¼	Section 15	T. 34 N.	R. 74 W.	Acres 20
	Section	T. N.	R. W.	Acres
	Section	T. N.	R. W.	Acres
	Section	T. N.	R. W.	Acres
	Section	T. N.	R. W.	Acres
	Section	T. N.	R. W.	Acres
	Section	T. N.	R. W.	Acres

COUNTY of Converse

Subtotal Above Acres 760

Municipal Corporation ______

Total Permit (Amendment) Acres 760

Reviewed (compiled), DEQ/LQD ______ Date ______

Duwain L. Watkins
Applicant Signature ______ Date ______

Checked, DEQ/LQD ______ Date ______

Permit No. ______

TFN ______

Revised 4/1980

Page 1 of 1

APPENDIX "C"

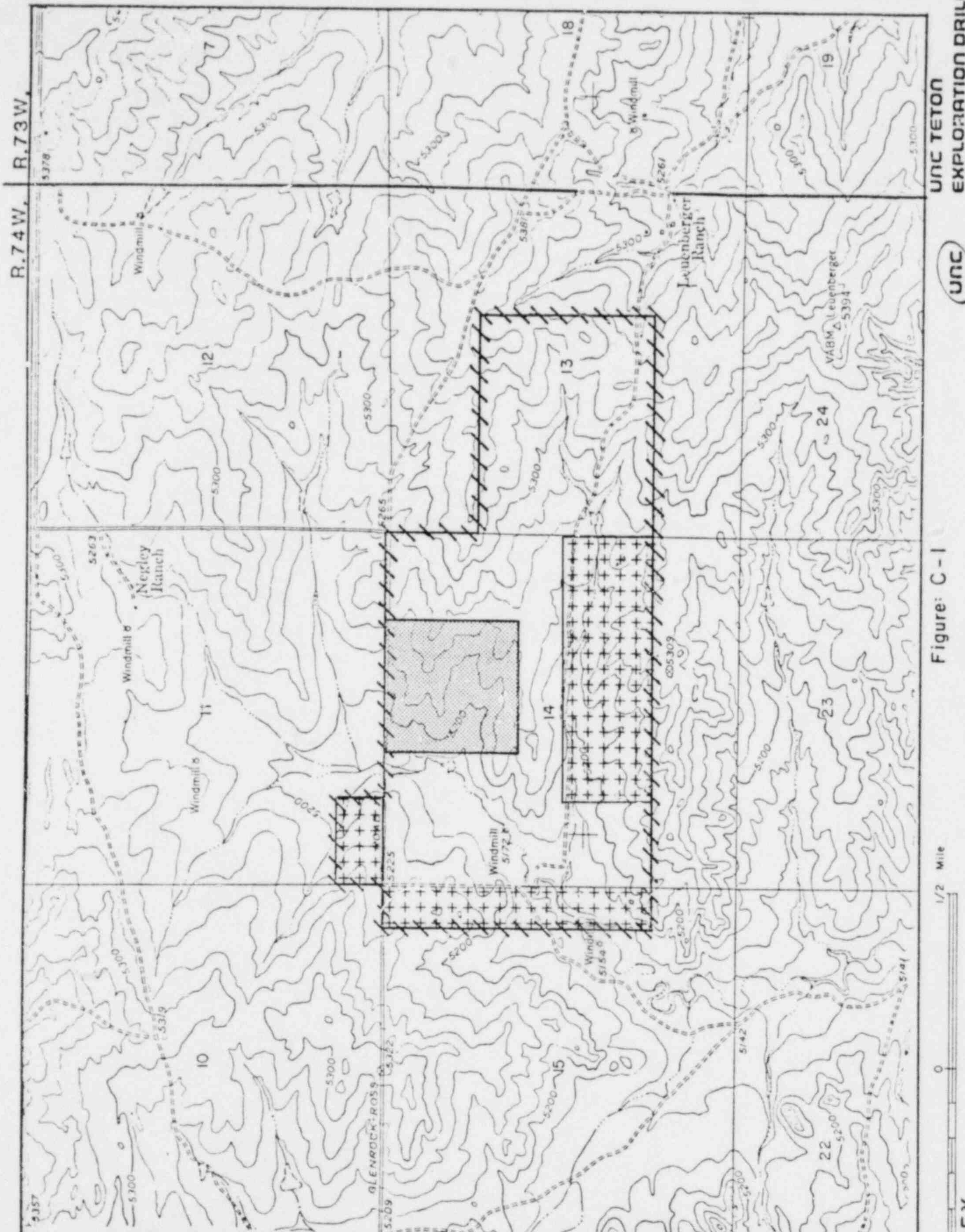


Figure: C-1

MINING PERMIT AREA

APPENDIX "C"

Lands within the permit area for which Teton has no right to mine are tabulated as follows: (see Figure C-1)

Description		Acreage
Section 11:	S½SW¼SW¼	20
Section 14:	NE¼SW¼	40
	N½SE¼	80
Section 15:	E½E½NE¼	40
	E½NE¼SE¼	20
	Total	200

Said lands totaling some 200 acres, more or less, within the permit area.

There are no lands within the permit area that are included within other permit areas with the exception of Teton's Research and Development License Area (see Figure C-1).

The Research and Development Area, License No. 2 RD is described as follows, all within T34N, R74W:

Description		Acreage
Section 14:	NE¼SE¼NW¼	10
	E½NE¼NW¼	20
	N½SW¼NE¼	20
	NW¼NE¼	40
	Total	90

Said lands totaling some 90 acres, more or less, within the permit area.

APPENDIX D

LAND DESCRIPTION AND SPECIFIC RADIOLOGICAL DATA

APPENDIX D-1

Land Use

APPENDIX D-1

LAND USE

In the past lands within and adjacent to the permit area have been used primarily for domestic livestock grazing. A few areas in the vicinity shows signs of having been tiled perhaps during early day settlement. Most of these areas have now been reseed to range land. During recent years an industrial use has been introduce to this area with the growing need for uranium, coal, as well as oil and gas resources. A more recently introduced land use has been subdivision of the land for single family dwellings on small tracts to accommodate the influx of new citizens brought in by mining development. Use of lands in and adjacent to the permit area by native wildlife has been a natural occurrence, however, this use has been incidental to man's objective since the area was settled.

Presently lands in the vicinity are being used for livestock grazing as well as mineral exploration and development. The Converse County Land Use Plan designated this area of Converse County for mining and agricultural use. There is one subdivision north of the permit area, see Appendix E. Teton-Nedco's in situ solution mine Research and Development Plan is one of several industrial facilities in Converse County.

In the near future it appears that industrial use and subdivision of the land will continue along with livestock grazing. Long term to conserve and recover natural resources will see the land temporarily affected by activities such as mining, return to livestock grazing and wildlife use of equal or greater quality.

APPENDIX D-2

Brief History of Area

APPENDIX D-2

HISTORY

The proposed Leuenberger in situ uranium mine site is located on property surrounded by many sites of potential historic significance. Converse County was crossed by both the Oregon and Bozeman Trails and also Pong Express routes. Fort Fetterman, one of the sites enrolled in the National Register of Historic Places, is located approximately fifteen miles southeast of the proposed mine site. Because of this historic potential in this area, the Wyoming State Archives and Historical Department suggested an independent researcher be engaged to conduct an examination of the area. The following letter is the report of that survey.

WILLIAM F. BRAGG, JR.
2921 HANWAY
CASPER, WYOMING 82601

July 14, 1979

Mr. Dan Herlihy
Solution Mining Department
Teton Exploration Drilling Co., Inc.
Drawer A 1, Casper, WY 82602

Gentlemen:

On July 10, 1979, I drove my automobile to the Teton Exploration Drilling Company, Inc. Research and Development and Commercial Operation Area north of Glenrock known by the map given me as the USGS Leuenberger Quadrangle Map, T34N, R74W.

My mission was to make an on site inspection of the Research and Development Area and an on site inspection of the Commercial Operation Area.

The company, in asking me to make this inspection was fully aware of the many historic arteries that passed through this section of Wyoming as far back as the Ezekial Williams trapping expedition of 1810. Several years later, Robert Stuart and six companions, all members of John Jacob Astor's Pacific Fur Company ' [illegible] east down the North Platte River, also passed through this area. It was late December, 1812.

Between the Williams - Stuart period and the 1820's, no one seems to have been in this area. If they were, their records are yet to be found.

Once Stuart had crossed South Pass and found a low, wide, flat pass over the Continental Divide instead of a terrible sheer impassable rock wall, traffic began to flow west up the North Platte River until that unique and broad road of emigration became known as the Oregon Trail. After 1847, another title was added, the Mormon Trail. And, after gold was found in the mill race of Sutter's

Mill in California in 1848, the trail got a third title - the California Trail.

At no place, and at no time did any of the named incursions by Williams or Stuart come closer to the Teton Leuenberger site than four miles or more, to the south, deep in the valley where the North Platte River flows.

During the next 30 years, the Emigrant Road saw the staggering number of well over 600,000 people and a 1,000,000 head of linestock pass south of the site in question. The only historic part this site might have played at this time could have been when an astounded or indignant High Plains Indian sat his horse on a high point overlooking the Emigrant Road, watching the endless parade of humanity afoot, on horse, or in wagons heading West carving ruts in his land, casting debris out of overloaded wagons, and grazing a mile wide strip as this horde moved slowly and ponderously to Zion, Oregon, or California.

In 1859, the Raynolds-Maynadier topographical party wintered on Deer Creek near the present site of Glenrock. This corps of engineers, hydrologists, geologists, and other "bugg ketchers" arrived in late September and repaired the ruins of Mormon Houses built and abandoned in 1847. At that time, Major Twiss was Indian Agent for all Indians from Salt Lake to Fort Laramie, and he had his headquarters in the Mormon House ruins, also.

In October, 1859, Captain Raynolds sent a survey party north across the North Platte River up a little known, but vital, trail from the Emigrant Road to the Crow Indians approximately where Kaycee, Wyoming is today. This trail was then called Bissonette's Trail, or simply, the Powder River Trail.

This trail, according to the survey reports and compass readings, passed a half dozen miles west of the present Teton Leuenberger Ranch D site, and Commercial Operations site.

In the Spring of 1860, Captain Raynolds sent another survey party north across the North Platte River to explore the Pumpkin Butte area in what is now the Campbell-Johnson County region, thence east to the head of Lightning Creek, and finally south to the valley of the North Platte where La Bonte Creek joins the larger river.

This second survey party passed approximately four miles west of the Teton Leuenberger ~~Ranch~~ and D site, and the Commercial Operation site.

During the Civil War period, much action of a military nature as well as continued migration of thousands kept the Emigrant Road a busy thoroughfare. At the beginning of the period, the Pony Express and the Overland Stage route passed through the Deer Creek area, then called the Deer Creek Station for stage and pony riders.

Soon thereafter, the telegraph poles joining the nation from coast-to-coast were in place by October 15, 1861.

Once more, none of this activity took place upon the Teton Leuenberger ~~Ranch~~ and D site, nor the Commercial Operation site. All action took place south in the valley of the North Platte River.

The Bozeman Trail, initiated so gold hungry miners could find an easy way to Alder Gulch, Montana Territory was a long way to the east. Therefore, no traffic off this artery crossed the Teton Leuenberger ~~Ranch~~ and D site, nor the Commercial Operation site.

Because of the Bozeman Trail violating the Treaty of 1868, Indian-cavalry campaigns were carried out north of Glenrock in 1865, 1866, 1867, 1868, 1870, 1874 and 1876. None of these battles of attendant features left any marks upon the Teton Leuenberger ~~Ranch~~ and D site, nor the Commercial Operations site.

As early as 1866, cattle herds began to penetrate the Glenrock area, but once nore, well to the east, and along the Bozeman Trail. Once Custer was defeated, the whole Powder River Basin, a great, lush cattle country, opened up. Up to 1876, few cattle could be located in that vast area. Ten years later, it was called "the best damn cattle country in the world" by some early ranchers.

Great ranchers grew and fell off as the terrible winter of 1886-1887 wiped the cattle slate clean. Following this period of cattle barons, absentee ownership, and land owned and controlled by Lords (from Europe) and Lordlings (from the East), homesteaders and small ranchers and ranchers appeared.

No part of the famed Johnson County Cattle war stemmed from the land here discussed, nor was it the scene of any real, or imagined cattle rustling or shootouts.

Dry farming was tried and today, the Leuengerger Ranch site is one of the small ranches of which there were hundreds to appear in not only the Glenrock area, but the entire west.

Gus Vernon's oil field was found at the turn of the century near Glenrock as well as the Vernon quarry, chromium strikes, coal at Inez, and a dozen other mineral ventures were carried out in the area. None of this took place on the land here in question.

This Teton Leuenberger R and D site, and Commercial Operations site is a rolling valley bordered on the immediate north by State Highway 95. Across the State Highway right of way some 13 dwelling units have been built ranging from large mobile trailor units sitting upon concrete or cinder block foundations to small frame homes to larger ranch homes with foilage windbreaks.

The land is also crossed on the west side by a Pacific Power and Light high power line, and the R.E.A. has strung its line to the above mentioned homes. Nothing on the east prohibits the use of the land from the use intended by Teton.

Therefore, in the final analysis, taking a close look at the Teton Leuenberger R and D site, and the Commercial site, it is my opinion there is nothing of vital nor important historic value that either would be destroyed or marred, or replaced should the company in question pursue its intent to install a water well field for the purpose of injecting and recovering leach solutions used to mine uranium ore. Other future surface installations such as a processing plant or solar evaporation ponds will in no way destroy nor marr items of historic value in the area in question.

In short, the land has no historic value.

Sincerely yours,

Bill Bragg

Bill Bragg, Historian
Casper College

WFB:dgr

WYOMING REGISTRY OF SITES
ENROLLED IN THE
NATIONAL REGISTER OF HISTORIC PALCES
CONVERSE AND NATRONA COUNTIES

SITE NAME	STATUS	APPROVED	ENROLLED
	NATRONA COUNTY		
Tom Sun Ranch	NHL	8-17-59	8-17-59
Independence Rock	NHL	7- 2-61	7- 2-61
Fort Casper	NHP	2-19-71	8-12-71
Pathfinder Dam	NHP	2-19-71	8-21-71
Casper Buffalo Trap	NHP	5-26-73	6-25-74
Teapot Rock	NHP	6-28-74	12-30-74
Bridger Immigrant Road Waltman Crossing	NHP	5-26-73	1-17-75
Split Rock (Twin Peaks)	NHP	4- 9-76	12-22-76
Martin's Cove	NHP	4- 9-76	3- 8-77
Big Horn Hotel	NHP	6-17-78	12-18-78
	CONVERSE COUNTY		
Fort Fetterman	NHP	10- 8-68	4-16-69
Glenrock Buffalo Jump	NHP	10- 8-68	4-16-69

CONVERSE COUNTY ENROLLED SITES

These sites are enrolled in the National Register of Historic Places

Site Name	Date of Enrollment	Designation
FORT FETTERMAN	April 16, 1969	Nat. Historic Place
GLENROCK BUFFALO JUMP	April 16, 1969	Nat. Historic Place

PROPOSED AND/OR PENDING SITES. Sites listed here are in some stage of the nomination process which consists of: research, compilation of the nomination, presentation to the Wyoming Review Board for approval, final preparation for submission to the Keeper, obtaining the signature of the State Historic Preservation Officer, and finally being submitted to the Keeper for his review and possible enrollment.

BROWN SPRINGS
CHEYENNE FORK STAGE STATION
CONVERSE COUNTY COURTHOUSE
BARBER HOME
BRONCO BUILDING

INVENTORY SITES

The attached pages list sites in the order of their presentation in the 1973 Volume II of the WYOMING HISTORIC PRESERVATION PLAN and in the annual updates of that PLAN.

PROPERTIES ADDED TO THE WYOMING HISTORIC SITES INVENTORY SINCE THE PUBLICATION OF THE LATEST (1973) EDITION OF VOLUME II:

CONVERSE COUNTY - VOLUME III, 1975

NONE

CONVERSE COUNTY - VOLUME III, 1976

NONE

CONVERSE COUNTY - VOLUME III, 1977

NONE

CONVERSE COUNTY - 1978

SITE NUMBER 48CO43, BADGER MINE, SW¼ Section 15, T36N, R75W, Fifty-five Ranch Quadrangle. January 6, 1977

HOUSE. 309 N. 3rd. Street, Douglas, Wy.

CITY HALL, 130 S. 3rd. Street, Douglas, Wy.

CHRIST EPISCOPAL CHURCH, 411 E. Center Street, Douglas, Wy.

ST. JAMES CATHOLIC CHURCH, 311 S. 5th Street, Douglas, Wy.

CONVERSE COUNTY COURTHOUSE, no address stated, Douglas, Wy.

SHERIFF'S OFFICE, no address stated, Douglas, Wy.

HOUSE, 425 Center St., Douglas, Wy.

HOUSE, 406 Cedar Street, Douglas, Wy.

UNITED CHURCH OF CHIRST, 8th and Birch, Douglas, Wy.

HOUSE, 214 N. 6th Street, Douglas, Wy.

HOUSE, 107 N. 6th Street, Douglas, Wy.

HOUSE, 139 S. 7th Street, Douglas, Wy.

BURLINGTON NORTHERN RAILROAD DEPOT, no address stated, Douglas, Wy.

PROPERTIES ADDED TO THE WYOMING HISTORIC SITES INVENTORY SINCE THE PUBLICATION OF THE LATEST (1973) EDITION OF VOLUME II:

CONVERSE COUNTY - 1978

SITE NUMBER 48CA26 RED BUTTE STONE CIRCLE SITE. December 30, 1977. Eligible for nomination to the National Register of Historic Places. Location not for publication.

BARBER HOME. February 16, 1978. Southwest corner of 5th and Birch Streets, Glenrock, Wyoming.

BRONCO BUILDING. February 16, 1978. Northwest corner of 5th and Birch Streets, Glenrock, Wyoming.

CONVERSE COUNTY

ANTELOPE CREEK STATION. Sec. 24, T40N, R75W.

ASTORIAN ROUTE (STUART PARTY).

AYRES NATURAL BRIDGE. Secs. 16, 21, T32N, R73W.

BIG MUDDY OIL FIELD. Tps. 33, 34N, Rs. 76, 77W.

BOZEMAN TRAIL.

BRIDGER'S FERRY. Secs. 19, 20, T31N, R69W.

BROWN SPRINGS. Sec. 1, T37N, R74W.

BROWN SPRINGS STATION. Sec. 1, T37N, R74W.

BUCKSHOT OR CROSS RANCH. On Buckshot Creek, Sec. 36, T32N, R74W.

DEER CREEK STATION. Glenrock.

FORT FETTERMAN. Secs. 10, 15, T33N, R72W.

GLENROCK BUFFALO JUMP. Sec. 11, T33N, R76W.

LaBONTE STATION. Sec. 4, T30N, R71W.

LaPRELE CREEK STATION. Sec. 10, T32N, R73W.

LITTLE BOX ELDER CREEK MONUMENT. Sec. 35, T33N, R74W.

MAGILL GRAVE. 4 miles west of Glenrock at Parkerton.

OREGON TRAIL.

SAGE CREEK FIGHT SITE. Sec. 18, T35N, R73W.

SAGE CREEK STATION. Sec. 18, T35N, R73W.

SAND CREEK STATION. Sec. 8, T31N, R74W.

SPANISH DIGGINGS. The Diggings is a large area 30 miles long by 10 miles wide, whose inclusive boundaries are: north, U.S. Highway 20 between Orin and Lusk; east, U.S. Highway 85; south, U.S. Highway 26 and the North Platte River; and west, the North Platte River.

UNTHANK GRAVE. Sec. 18, T33N, R74W.

Historic Site Summary in Converse County
Accoinding to the Wyoming State Archieves
and Historical Department

SITE	LOCATION
Ayres Natural Bridge	I-25, 150' off the highway, west of Douglas at Natural Bridge Interchange.
Big Muddy Information Sign	North side of I-25 rest by pass, 6 miles west of south Glenrock Interchange.
Bozeman Trail Marker	17.3 miles south of Wyoming 387 and/or 6 1/4 miles southeast of of discountinued post office at Ross.
Bozeman Trail Monument	West side of road 0502, 1 mile south of Fort Fetterman State Park.
Bridger Ferry Monument	West side of U.S. 26-87, south side of Platte River near Orin Junction.
Fort Fetterman Informative Sign	North side of road U.S. 87 off I-25 west of Douglas.
Fort Fetterman Plaques	Fort Fetterman.
Fort Fetterman Post Cemetery Marker	West of Orpha road on the east of the fort.
Hayden, Ferdinand V. -- Oregon Trail Marker	Glenrock City Park.
Hooker, Bill Cabin Site	.7 miles south of Converse No. 16. Turn east 1.6 miles to bridge across irrigation ditch, .3 miles left through meadow and along ditch bank.
Hooker, Bill Monument	South side of abandoned U.S. 20-26-87, west of Douglas.
Magill, Ada Grave	North of U.S. 20-26-87, west of Glenrock near old C. & N. W. Railroad
Oregon Trail - Bozeman Trail	South side of road 0203, 6 miles southwest of Douglas.

Oregon Trail Marker	7.3 miles off highway. Eight miles by road. Approximately seven miles northwest from Platte County Transcontinental Telegraph Momument.
Oregon Trail Marker	East side of road 1503, 6 1/2 miles south of Douglas.
Oregon Trail Marker	10 miles west of Douglas, east side of Ayres Natural Bridge road.
Oregon Trail Marker	South side of U.S. 20-26-87, near Dave Johnson Power Plant, east of Glenrock.
Oregon Trail Marker	North of U.S. 20-26-87, west of Glenrock near old C. & N. W. Railroad station at Parkerton.
Oregon Trail Marker - John Hunton Memorial	On Wyoming State Fair Grounds on lawn beside Pioneer Association.
Oregon Trail Monument	South side of abandoned U.S. 20-26-78, 2 miles west of Bill Hooker Monument.
Pony Express Marker	North of U.S. 20-26-87, west of Glenrock near old C. & N. W. Railroad station at Parkerton.
Unthank Grave	South side of U.S. 20-26-87, near Dave Johnson Power Plant, east of Glenrock.
Herman Werner Plaque	Fort Fetterman

APPENDIX D-3

Archaeological Resources

APPENDIX D-3

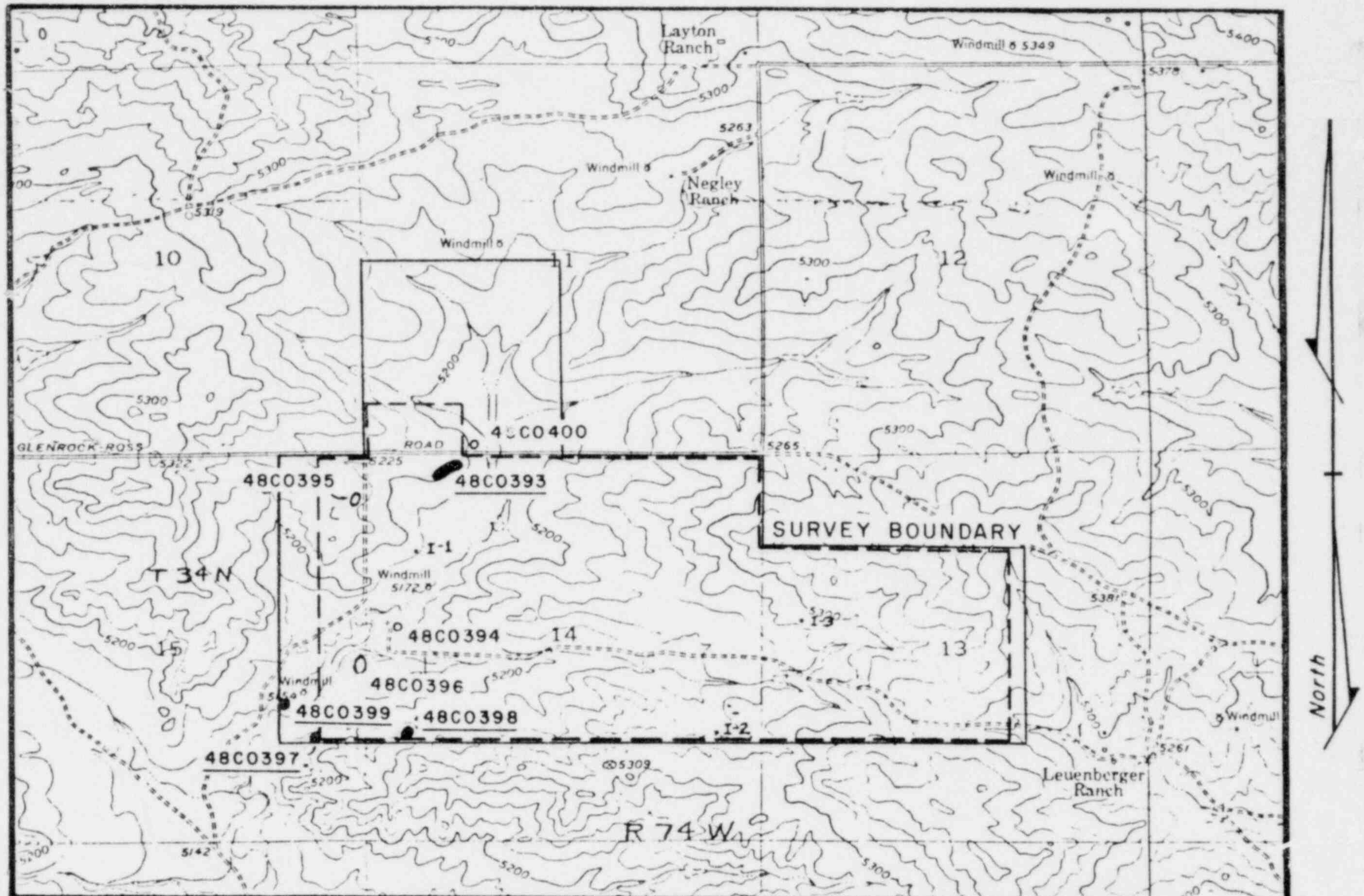
ARCHAEOLOGY

Personnel for the Office of the Wyoming State Archaeologist were engaged to conduct a cultural resource inventory on the proposed commercial Leuenberger in situ uranium mine permit area. Approximately 1,000 ares was surveyed and a total of eight archaeological sites and three isolated artifacts were found. Locations of the sites are shown on Figure D-3.1. Four of the eight sites in the survey have potential subsurface deposits and will be avoided or evaluated further prior to any disturbance. These four sites are listed in Table D-3.1.

Only one of the four sites located in the area is of potential significance to the mining operation as presently planned, Site No. 48CC393. Although it is not located over the ore deposit, care must be taken tc avoid disturbance during monitor well installation and by traffic in the area. Should this become a problem the state archaeologist will be requested to further evaluate the sites significance and eligibility for nomination to the National Register of Historic Places.

The following letter recommends archaeological clearance for the permit area provided the recommendations are followed to avoid known sites and report any findings to the State Historical Preservation Officer and the Department of Environmental Quality.

All mine site personnel and construction contractors will be made aware of these requirements and Teton management will insist that compliances with these recommendations is maintained.



1/2 0 1/2 Mile

USGS LEUENBERGER RANCH QUADRANGLE

POOR ORIGINAL

FIGURE D-3.1

- LEGEND -

- I-1 ISOLATED ARTIFACT
- O SURFACE SITE
- ● POTENTIAL SUBSURFACE SITE (NOT TO BE DISTURBED PRIOR TO ADDITIONAL TESTING.)
- MINE PERMIT AREA BOUNDARY
- SURVEY AREA BOUNDARY

UNC TETON EXPLORATION DRILLING, INC.
Subsidiary of United Nuclear Corporation, A UNC RESOURCES Company
P.O. Drawer A-1, Casper, Wyoming 82602

LOCATION OF ARCHEOLOGICAL SITES

Secs. 13 & 14, T 36 N-R 74 W, CONVERSE COUNTY, WYOMING

TABLE D-3.1

ARCHAELOGICAL SITES
WITHIN THE PERMIT AREA
HAVING POTENTIAL SUBSURFACE VALUE

SITE NUMBER	SITE LOCATION	DESCRIPTION	REMARKS
48C0393	NE/NW/NW Section 14	Camp site	Potential problem not to be disturbed unless investigated further.
48C0397	SW/SE/NE/SE Section 15	Camp site	Just east of the boundary of the proposed permit area.
48C0398	SE/SW/NW/SW Section 14	Rock feature	Not located in or close to areas of planned disturbance.
48C0399	NW/NE/SE Section 15	Camp site	East of the permit area boundary.

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

Wyoming Recreation Commission

OFFICE OF THE WYOMING STATE ARCHEOLOGIST

DEPARTMENT OF ANTHROPOLOGY
LARAMIE, WYOMING 82071

UNIVERSITY OF WYOMING
TELEPHONE: 766-5301

JAN L. WILSON
Director
777-7695

July 11, 1980

Mr. Richard Appel
Coordinator Permits and Licensing
UNC Teton Exploration Drilling, Inc.
P. O. Drawer A-1
Casper, WY 82602

Project #: WY-28-80

Dear Dick:

This letter is to inform you of the completion of the cultural resource inventory of the UNC Teton Exploration permit area in Converse County, Wyoming. This area is shown on the attached map. Approximately 1000 acres was surveyed and legal locations are as follows:

T34N, R74W,
Section 11, SW¼,
Section 13, S½/NW¼, N½/SW¼, SW¼/NE¼, NW¼/SE¼.
Section 14, N½, N½/SW¼,N½/SE¼,
Section 15, E½/NE¼, NE¼/SW¼.
U.S.G.S. Leuenberger Ranch Quadrangle 7.5'.

A total of eight archeological sites and three isolated artifacts were found. A description of these sites follows.

48CO393 NE/NW/NW of Section 14; campsite, 120m (E-W) x 50m (N-S), Test

48CO394 SW/SW/NW of Section 14; lithic scatter, 20m in diameter, No further work

48CO395 NE/NE/NE of Section 15; lithic scatter, 80m (N-S) x 40m (E-W), No further work

48CO396 NE/NE/SE of Section 15; lithic scatter, 150m (N-S) x 40m (E-W), No further work

48CO297 SW/SE/NE/SE of Section 15; campsite, 20m (N-S) x 15m (E-W), Test

48CO398 SE/SW/NW/SW of Section 14, rock feature, 30m in diameter, Test

48CO399 NW/NE/SE of Section 15; campsite, 40m in diameter, Test

48CO400 SW/SW/SE/SW of Section 11; lithic scatter, 30m in diameter, No further work.

Sites 48CO394, 395, 396, and 400 are all surface sites and will require no further work. They are not considered eligible for nomination to the National Register of Historic Places. Sites 48CO393, 397, 398, and 399 all have the potential to have subsurface deposits. These sites should be avoided. If avoidance is impossible, testing is recommended in order to evaluate their significance and eligibility for nomination to the National Register of Historic Places. All sites are marked with an orange datum stake.

Archeological clearance is recommended, provided the recommendations outlined in this report are followed and with the standard stipulation that should any cultural materials be found during drilling, the appropriate agencies (SHPO, DEQ) be contacted immediately.

We will send a bill for field work and costs to date after the 20th of this month. A final report and billing with detailed discussion of findings will be submitted at a later date. If you have any questions, please contact me.

Sincerely,

Paul Sanders ns

Paul Sanders
Field Supervisor

Julie Francis

Julie Francis
Principle Investigator
Assistant State Archeologist

JF/ns
cc: Tom Larson, SHPO, Review and Compliance

Encl: 2

APPENDIX D-4

Climatology

Appendix D-4.1
Local Climatological Data

POOR ORIGINAL

Meteorological Data For The Current Year

Station: CASPER, WYOMING # 24089 NATRONA COUNTY INTL AIRPORT Standard time used: MOUNTAIN Latitude: 42° 55' N Longitude: 106° 28' W Elevation (ground): 5338 feet Year: 1978

Month	Temperature °F Averages Daily maximum	Daily minimum	Monthly	Extremes Highest	Date	Lowest	Date	Degree days Base 65 °F Heating	Cooling	Precipitation in inches Water equivalent Total	Greatest in 24 hrs.	Date	Snow, ice pellets Total	Greatest in 24 hrs.	Date	Relative humidity pct. Hour 05 (Local time)	Hour 11	Hour 17	Hour 23	Wind Resultant Direction	Resultant Speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Fastest mile Direction	Fastest mile Date	Percent of possible sunshine	Average sky cover, tenths, sunrise to sunset	Number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperature °F Maximum (b) 90° and above	Maximum 32° and below	Minimum 32° and below	Minimum 0° and below	Average station pressure mb. Elev. 5290 feet m.s.l.
JAN	27.6	6.5	17.1	42	5	-15	1	1481	0	0.70	0.29	15	14.2	4.3	15	81	73	74	81	23	6.1	12.1	35	22	6		7.5	5	3	23	10	6	0	3	0	18	31	9	836.1
FEB	31.8	17.8	22.3	48	5	-13	14	1191	0	0.75	0.26	11-12	14.6	4.5	11-12	77	69	69	77	24	6.7	12.9	33	25	23		7.2	4	11	13	11	5	0	2	0	13	28	7	835.1
MAR	49.4	26.9	37.2	77	30	-8	3	854	0	0.93	0.37	10	8.0	5.3	10	73	53	48	72	24	6.5	12.6	29	22	17		7.5	3	11	17	9	2	0	1	0	2	25	3	835.9
APR	57.8	31.4	44.6	72	26	20	13	605	0	1.05	0.40	28-29	5.4	4.3	10	73	44	39	65	25	3.7	12.6	44	[illegible]	11		7.7	2	9	19	12	1	1	3	0	0	16	0	833.1
MAY	61.1	38.0	49.6	86	15	30	7	471	2	6.46	2.61	17-18	24.6	13.0	4	74	52	50	72	27	3.2	12.8	32	2[illegible]	22		7.5	4	9	18	13	4	5	1	0	0	6	0	835.1
JUN	79.4	47.8	63.6	97	23	36	2	107	72	1.40	0.79	3-4	0.0	0.0		72	34	27	61	28	2.9	9.5	32	23	25		5.6	9	11	10	9	0	6	0	2	0	0	0	838.8
JUL	86.2	55.0	69.6	97	27	44	22	1[illegible]	170	2.62	1.32	20-21	0.0	0.0		72	35	30	56	30	1.1	9.7	68	28	18		3.8	14	12	5	12	0	13	0	11	0	0	0	839.8
AUG	82.1	51.5	66.8	95	11	42	19	60	124	0.93	0.48	17-18	0.0	0.0		64	33	25	51	23	4.5	10.6	50	26	12		5.0	11	12	8	7	0	6	0	8	0	0	0	839.8
SEP	76.9	43.4	60.2	96	6	26	20	212	74	0.26	0.17	17-18	T	T	20	57	26	22	46	24	6.4	10.6	55	23	15		4.4	12	12	6	5	0	0	1	5	0	6	0	838.1
OCT	63.6	32.7	47.9	76	10	21	31	522	0	0.40	0.26	21-22	3.1	2.0	24-25	55	35	29	54	25	5.3	11.2	36	22	29		4.3	16	6	9	4	2	0	0	0	0	17	0	840.8
NOV	38.0	15.7	26.9	69	8	-10	14	1137	0	0.94	0.39	25-26	17.1	7.4	10-11	72	60	61	70	24	7.0	12.7	40	22	4		6.9	6	6	18	6	5	0	2	0	14	26	4	837.1
DEC	23.8	2.5	13.2	42	18	-34	31	1602	0	1.20	0.45	19-20	25.7	7.4	19-20	69	67	68	69	23	11.6	16.9	45	25	4		6.6	8	3	20	12	6	0	0	0	20	30	13	834.1
YEAR	56.5	30.8	43.3	97	JUL 27	-34	DEC 31	8259	442	17.64	2.61	MAY 17-18	112.7	13.0	MAY 4	70	49	45	65	24	5.2	12.0	48	28	JUL 18		6.2	94	105	106	110	31	31	13	26	67	185	36	837.0

Normals, Means, And Extremes

Month	Temperatures °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precipitation in inches Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Snow, ice pellets Maximum monthly	Year	Maximum in 24 hrs.	Year	Relative humidity pct. Hour 05 (Local time)	Hour 11	Hour 17	Hour 23	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Fastest mile Direction	Fastest mile Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max. (b) 90° and above	Max. 32° and below	Min. 32° and below	Min. 0° and below	Average station pressure mb. Elev. 5290 feet m.s.l.
(a)				28		28					28		28		28		28		28		14	14	14	14	28	13	23	23			28	28	28	28	28	28	28	28	14	14	14	14	6
J	33.6	12.7	23.2	60	1971	-40	1972	1296	0	0.50	0.99	1974	T	1952	0.53	1972	19.2	197[illegible]	[illegible]	[illegible]972	69	60	62	69	16.7	SW	56	20	1954		6.7	6	8	17	7	3	0	1	0	13	29	7	833.6
F	37.7	15.9	26.8	65	1962	-19	1960	1070	0	0.50	1.01	1955	0.13	1957	0.42	1977	23.8	1952	10.4	1952	69	58	56	69	15.2	SW	58	23	1957		6.5	6	8	14	8	3	*	1	0	8	27	3	833.9
M	42.8	19.4	31.0	73	1966	-21	1965	1054	0	[illegible]	2.43	1954	0.25	1953	1.00	1958	36.2	1975	14.6	1954	72	53	48	69	14.2	SW	61	23	1956		6.7	6	9	16	9	4	*	1	0	6	27	2	832.8
A	55.3	29.9	42.7	81	1962	-4	1966	609	0	[illegible]	3.92	1974	0.20	1952	3.00	1974	56.3	1973	16.3	1973	75	50	44	70	12.9	WSW	54	25	1967		6.8	6	9	15	10	3	1	1	0	1	19	*	834.5
M	66.1	39.3	52.7	91	1969	10	1953	388	6	1.74	6.46	1978	0.30	1966	2.61	1978	24.6	1978	14.1	1950	77	44	40	88	11.8	WSW	58	32	1959		6.6	6	10	15	11	1	8	1	*	*	3	0	839.2
J	76.8	4[illegible]	61.9	101	1970	28	1969	147	54	1.44	3.75	1967	0.03	1956	1.67	1969	3.0	1969	3.0	1969	76	39	34	64	11.1	WSW	52	36	1959		5.2	10	11	9	6	*	8	1	3	0	*	0	837.2
J	87.1	54.9	71.0	104	1954	30	1972	13	199	0.95	3.05	1951	0.11	1971	1.51	1977	0.0		0.0		70	35	26	55	10.1	WSW	52	25	1974		4.1	15	11	5	8	0	9	*	11	0	*	0	839.8
A	85.6	53.3	69.6	99	1969	35	1977	17	159	0.57	1.52	1972	0.02	1950	1.00	1974	T	1964	T	1964	65	31	26	51	10.5	SW	50	25	1954		4.5	14	10	7	5	0	8	*	9	0	*	0	839.6
S	74.1	42.3	58.7	96	1978	19	1965	229	40	0.87	3.28	1973	0.07	1956	2.01	1973	8.8	1965	4.3	1965	67	37	30	58	11.0	WSW	53	32	1965		4.4	14	8	8	7	*	5	1	1	*	4	0	839.6
O	61.9	33.9	47.7	85	1957	-3	1971	536	0	0.92	2.49	1962	T	1963	2.49	1962	13.1	1971	8.2	1970	68	45	40	65	12.2	SW	55	23	1954		5.2	12	8	11	6	2	*	1	0	1	16	*	839.8
N	44.9	22.9	33.9	71	1965	-19	1977	933	0	0.88	1.30	1959	0.07	1963	0.56	1955	19.9	1956	10.5	1977	69	54	55	66	14.4	SW	49	23	1970		6.5	7	9	14	7	3	*	1	0	8	28	2	836.8
D	36.2	16.2	26.2	61	1973	-39	1978	1203	0	0.49	1.20	1978	0.03	1952	0.47	1970	25.7	1978	8.2	1953	68	59	62	68	16.2	SW	63	20	1955		6.5	8	8	15	7	3	0	1	0	14	29	5	833.2
YR	58.4	32.4	45.4	104	JUL 1954	-40	JAN 1972	7553	498	11.22	6.46	MAY 1978			3.00	APR 1974	56.3	APR 1973	16.3	APR 1973	70	47	43	66	13.0	SW	81	23	MAR 1956		5.8	110	109	146	92	24	34	9	24	49	188	20	836.7

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Maximum precipitation in 24 hours 3.09 in April 1941; maximum snowfall in 24 hours 20.6 in May 1946.

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

POOR ORIGINAL

Average Temperature

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1940	18.5	28.2	38.4	47.2	55.4	66.4	74.0	70.4	64.1	52.0	27.9	29.8	47.3
1941	28.5	30.4	31.8	46.0	56.0	62.4	71.0	66.8	56.6	46.1	39.0	29.2	46.3
1942	21.6	19.7	31.8	47.6	49.4	61.0	71.2	68.8	56.6	49.9	36.2	29.4	44.8
1943	25.7	32.9	23.8	50.1	48.2	60.6	71.6	71.8	58.4	49.1	36.4	27.4	46.3
1944	23.0	24.0	25.9	41.6	54.6	59.4	68.0	68.6	57.6	50.6	32.2	24.0	44.1
1945	26.6	25.4	34.2	34.9	51.1	56.0	70.1	69.2	54.2	50.4	36.7	24.5	44.4
1946	27.9	29.5	39.4	50.6	47.2	62.8	71.6	68.0	58.2	41.8	33.1	33.0	46.9
1947	23.6	21.9	32.1	40.8	52.8	56.9	71.1	71.0	61.0	52.1	26.1	26.6	44.6
#1948	22.8	21.5	27.4	49.2	54.4	62.8	70.5	69.7	63.0	46.8	29.4	21.4	44.5
1949	5.7	20.8	35.0	46.8	53.2	60.2	70.6	69.7	57.1	41.0	42.7	24.4	43.8
#1950	17.7	32.8	30.9	40.7	46.2	61.0	66.3	66.4	56.2	52.3	35.8	31.2	44.6
1951	20.6	29.6	28.7	37.9	55.0	56.2	69.9	68.0	55.1	44.1	33.5	20.4	43.1
1952	25.8	26.4	27.0	47.1	53.7	66.2	[illegible]	72.2	63.2	49.6	28.1	28.3	46.1
1953	32.7	29.9	36.5	38.4	48.6	63.5	73.5	70.8	62.2	50.7	39.2	24.7	47.3
1954	27.1	37.5	26.8	46.9	53.2	63.1	76.1	71.1	62.5	46.2	40.2	29.8	48.3
1955	22.1	20.5	25.9	45.5	54.8	60.4	73.2	73.2	60.8	50.4	26.0	27.2	44.8
1956	27.4	24.1	35.2	40.7	55.9	68.2	70.8	67.0	61.0	49.8	29.8	28.4	46.4
1957	16.2	32.1	34.7	38.9	51.8	61.5	71.8	71.1	56.2	46.4	29.1	31.4	45.1
#1958	28.1	31.5	28.4	40.5	59.0	63.7	66.3	71.1	60.1	49.5	34.0	29.0	46.8
1959	25.7	23.0	37.4	42.0	50.6	66.8	70.0	70.2	56.2	43.7	30.6	30.4	45.0
1960	22.1	18.5	35.2	46.2	55.0	63.7	71.4	67.5	60.9	47.8	33.7	25.4	45.1
1961	28.7	31.4	37.0	41.0	54.9	66.1	70.5	72.1	51.4	44.8	30.9	21.4	45.7
1962	15.6	26.4	30.5	46.7	54.5	61.5	67.8	67.7	58.4	51.9	39.9	30.4	45.9
1963	15.7	32.4	34.8	42.4	55.2	64.9	72.0	70.4	64.1	54.6	38.2	24.9	47.3
#1964	23.0	21.8	25.1	38.7	54.1	61.1	74.1	66.1	56.1	47.1	31.5	23.4	43.5
1965	29.7	22.4	20.5	45.8	49.9	60.1	69.5	66.5	47.7	51.8	39.8	29.1	44.4
1966	21.8	24.5	36.2	38.9	55.8	61.8	74.9	66.6	62.2	47.2	36.1	25.3	45.8
1967	26.7	27.7	36.6	42.7	49.1	58.5	69.8	69.0	61.0	[illegible]	30.8	17.4	44.8
1968	25.2	30.3	36.7	38.4	48.1	60.5	69.1	64.9	56.5	47.9	32.0	18.8	43.5
1969	27.1	29.0	28.4	46.7	55.4	57.0	71.6	71.8	63.2	37.9	36.4	28.5	45.9
1970	25.3	32.7	27.4	38.8	53.8	62.8	71.2	72.5	54.7	41.2	34.9	25.2	44.8
1971	25.4	24.7	31.7	40.9	50.1	64.1	67.2	71.5	55.9	42.8	30.5	23.9	45.9
1972	17.7	28.5	38.2	45.0	52.1	63.0	69.9	68.0	56.7	44.1	30.6	17.7	[illegible]
1973	19.2	24.9	33.0	36.1	51.1	63.0	68.4	70.7	55.0	48.7	33.1	[illegible]	[illegible]
1974	18.7	27.6	36.2	45.1	51.4	66.9	[illegible]	64.4	54.4	48.5	34.7	26.2	43.0
1975	21.1	20.9	30.2	37.9	48.9	58.8	72.9	68.0	56.7	47.8	32.9	28.4	43.7
1976	25.0	30.8	37.0	44.0	53.6	60.7	72.8	68.4	59.2	43.8	34.2	28.3	45.9
1977	20.2	30.9	31.9	46.9	55.1	69.4	71.7	66.1	60.2	48.8	33.2	24.9	46.5
1978	17.1	22.9	37.2	44.8	49.8	63.8	69.8	66.8	60.2	47.9	26.9	13.2	43.3
RECORD MEAN	22.8	26.7	31.8	42.4	52.4	62.1	70.8	69.1	58.2	47.4	33.3	25.9	45.2
MAX	32.8	37.8	45.8	54.9	65.8	77.0	86.8	85.0	75.6	61.0	44.2	35.6	58.1
MIN	12.8	16.1	20.8	29.9	39.0	47.5	54.8	53.1	42.8	33.7	22.4	16.1	32.3

Heating Degree Days

CASPER, WY

Season	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
#1958-59	37	11	158	469	924	1108	1276	1169	999	684	441	63	[illegible]
1959-60	23	12	312	654	1026	1066	1318	1342	979	615	349	80	[illegible]
1960-61	11	61	193	535	951	1220	1118	936	863	714	331	71	[illegible]
1961-62	24	0	409	527	1033	1341	1537	1071	1072	544	324	139	8114
1962-63	19	57	194	418	748	1066	1590	906	928	672	300	56	6952
1963-64	3	8	56	324	795	1236	1298	1264	1231	751	346	136	7468
#1964-65	0	101	274	504	1004	1283	1084	1181	1377	569	463	145	8024
1965-66	4	44	512	401	749	1108	1334	1132	887	775	289	141	7581
1966-67	0	67	124	609	862	1229	1180	1037	878	664	468	193	7505
1967-68	6	21	149	516	1017	1470	1289	999	868	794	514	166	7813
1968-69	30	81	231	520	984	1426	1164	998	1127	561	304	232	7674
1969-70	3	3	74	834	914	1125	1289	897	1149	797	355	143	7580
1970-71	1	0	326	735	894	1225	1222	1119	1025	714	456	71	7787
1971-72	36	0	336	681	1026	1268	1461	1052	824	653	303	48	7794
1972-73	67	42	251	641	1025	1461	1415	1124	984	861	424	[illegible]	8417
1973-74	36	0	290	495	951	1181	1432	1044	885	650	416	105	7491
1974-75	3	81	319	504	912	1255	1352	1230	1066	813	493	195	8199
1975-76	1	18	267	532	969	1126	1295	1004	1017	625	346	149	7329
1976-77	3	14	199	654	913	1133	1385	969	1040	549	298	12	7149
1977-78	3	51	164	492	945	1240	1481	1191	834	605	471	107	7604
1978-79	17	60	214	527	1137	1602							

Cooling Degree Days

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1969	0	0	0	0	12	18	213	222	26	0	0	0	491
1970	0	0	0	0	0	77	200	[illegible]	24	0	0	0	535
1971	0	0	0	0	0	58	109	202	26	0	0	0	395
1972	0	0	0	0	0	54	101	142	7	0	0	0	304
1973	0	0	0	0	1	65	147	182	5	0	0	0	400
1974	0	0	0	0	0	109	243	47	7	0	0	0	406
1975	0	0	0	0	0	16	254	119	5	1	0	0	395
1976	0	0	0	0	0	29	250	127	33	0	0	0	439
1977	[illegible]	0	0	0	0	150	218	92	31	0	0	0	491
1978	0	0	0	0	2	72	170	124	74	0	0	0	442

Precipitation

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1940	0.30	0.61	0.35	1.90	1.11	0.17	0.60	0.85	1.41	0.24	0.84	0.36	8.94
1941	0.47	0.06	1.29	3.75	1.35	0.54	0.99	2.79	0.42	1.39	0.46	0.73	14.24
1942	0.14	0.45	0.46	0.96	2.74	0.09	0.37	0.32	0.54	1.95	1.83	0.35	9.88
1943	0.80	0.28	1.16	1.00	1.79	0.36	0.29	0.09	0.88	1.02	0.53	0.31	8.91
1944	1.30	0.31	1.48	0.53	2.78	1.27	1.14	T	1.08	0.35	0.84	0.30	11.67
1945	0.28	0.49	0.88	1.26	1.07	2.46	0.60	1.17	1.39	0.27	0.29	0.79	10.92
1946	0.43	0.57	0.95	0.72	3.73	1.28	1.22	0.56	1.43	1.29	0.61	0.40	12.99
1947	0.46	0.81	0.26	2.05	2.97	3.11	1.95	0.71	0.36	0.86	1.51	0.39	15.40
#1948	0.40	0.66	0.40	1.25	1.30	2.30	0.93	0.25	0.87	1.16	0.70	0.29	10.39
1949	1.36	0.29	0.64	0.88	2.53	0.75	0.77	0.44	0.66	2.00	0.04	0.48	10.88
#1950	0.54	0.60	0.90	2.16	1.97	1.50	0.88	0.02	3.11	0.74	0.37	0.46	12.75
1951	0.27	0.14	0.44	1.31	1.45	1.53	3.05	0.10	1.12	0.88	0.20	0.42	10.93
1952	T	0.79	1.36	0.20	3.95	1.06	0.58	0.61	0.25	0.46	0.57	0.03	10.00
1953	0.33	1.06	0.25	0.94	1.60	1.07	1.32	0.98	0.21	0.06	0.72	0.74	9.72
1954	0.49	0.37	2.43	0.30	0.70	0.62	0.36	0.29	0.23	1.36	0.12	0.32	7.70
1955	0.39	1.01	0.99	1.44	4.73	2.07	0.27	0.81	0.65	0.47	1.19	1.04	11.26
1956	0.44	0.49	0.71	1.86	1.97	0.03	0.76	0.77	0.07	0.28	1.30	0.39	8.93
1957	0.42	0.15	1.91	2.47	3.63	1.93	1.06	1.13	1.09	2.00	0.77	0.53	16.12
#1958	0.11	0.68	1.27	1.95	0.74	1.32	0.96	1.00	0.34	0.07	1.06	0.33	10.42
1959	0.36	0.61	1.32	0.74	1.99	1.79	0.27	0.23	1.99	0.71	0.27	0.65	10.75
1960	0.71	0.65	0.42	1.06	0.56	0.40	0.59	0.37	0.66	0.27	1.03	0.47	7.34
1961	0.04	0.31	1.16	0.90	0.71	0.54	1.21	0.08	2.46	1.12	0.56	0.62	9.96
1962	0.55	0.44	0.35	0.93	3.80	1.75	1.24	0.25	1.14	2.49	0.34	0.63	14.01
1963	0.38	0.46	0.35	2.07	0.80	0.94	1.20	0.35	0.35	0.35	0.31	0.31	7.90
1964	0.75	0.72	0.66	3.09	2.17	0.59	0.73	0.47	0.34	0.23	0.66	0.47	10.88
1965	0.76	0.37	0.52	0.96	2.66	2.47	1.16	0.21	1.07	T	0.07	0.87	12.12
1966	0.30	0.45	0.49	1.29	0.30	1.12	0.46	1.03	0.29	1.35	0.43	0.37	8.14
1967	0.38	0.65	[illegible]	1.24	1.62	3.75	1.44	0.61	1.67	1.37	1.09	0.82	15.32
1968	0.35	0.44	0.92	1.18	3.35	1.86	1.02	0.61	0.30	0.58	0.56	0.71	11.88
1969	0.06	0.29	1.10	1.52	0.85	2.37	0.70	0.78	0.10	1.45	0.96	0.16	10.66
1970	0.50	0.27	1.55	1.57	2.03	2.05	0.73	0.16	0.21	1.01	1.01	0.99	12.03
1971	0.19	0.80	1.17	3.60	5.59	0.17	0.11	0.11	0.76	1.73	0.81	0.56	14.96
1972	0.99	0.41	1.41	1.66	0.76	0.83	1.04	1.52	0.37	2.06	0.66	0.91	11.88
1973	0.65	0.37	0.32	3.86	1.02	0.66	2.26	0.36	2.28	0.80	0.80	0.35	15.09
1974	0.59	0.42	0.37	2.02	0.62	0.60	0.75	1.00	0.83	1.19	0.46	0.42	11.03
1975	0.31	0.31	2.01	0.97	3.68	0.94	0.63	0.12	0.11	1.01	0.51	0.72	11.92
1976	0.44	0.69	0.50	1.52	2.69	1.66	1.07	0.31	1.15	1.21	0.09	0.66	11.91
1977	0.35	0.64	1.05	1.07	1.93	0.19	1.88	0.36	0.30	0.71	0.79	0.71	10.01
1978	0.70	0.75	0.95	1.05	6.65	1.40	2.62	0.93	0.26	0.40	0.96	1.40	17.66
RECORD MEAN	0.51	0.55	0.92	1.60	2.11	1.28	1.01	0.58	0.89	0.96	0.67	0.50	11.56

Snowfall

Season	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1939-40							9.4	9.3	5.0	6.2	0.0	0.0	
1940-41	0.0	0.0	0.0	0.3	9.8	6.1	7.4	1.1	12.0	21.5	T	0.0	58.2
1941-42	0.0	0.0	T	0.8	3.5	8.9	2.4	5.9	1.6	2.7	7.8	0.0	33.6
1942-43	0.0	0.0	0.3	5.4	19.2	2.0	5.4	3.3	11.3	T	4.1	0.4	56.6
1943-44	0.0	0.0	0.0	0.6	5.0	4.9	11.5	5.2	15.9	1.1	5.1	0.0	49.5
1944-45	0.0	0.0	4.1	0.8	8.3	7.0	4.4	8.2	10.2	21.9	0.4	T	65.5
1945-46	0.0	0.0	3.7	6.7	7.7	13.4	7.3	7.8	7.6	5.8	32.8	0.0	90.8
1946-47	0.0	0.0	1.8	6.6	8.3	3.4	8.6	15.2	5.0	17.5	4.7	4.5	76.1
1947-48	0.0	0.0	0.6	5.8	75.8	7.5	10.3	14.5	11.2	0.9	1.5	0.0	77.9
1948-49	0.0	0.0	0.0	5.6	16.6	8.1	30.3	8.0	10.2	T	T	0.0	85.8
#1949-50	0.0	0.0	1.0	22.1	T	10.1	10.2	3.4	12.7	20.8	23.9	T	104.2
1950-51	0.0	0.0	0.8	7.7	7.1	5.9	6.2	3.4	13.2	9.1	T	1.5	54.9
1951-52	0.0	0.0	0.2	6.7	4.5	12.9	0.3	23.8	29.3	2.7	2.9	0.0	83.6
1952-53	0.0	0.0	0.0	5.1	13.7	1.5	11.8	18.5	3.2	10.5	2.6	0.0	66.9
[illegible]	0.0	0.0	0.0	T	5.4	14.7	9.6	6.6	32.9	1.7	0.9	T	71.8
1954-55	0.0	0.0	T	8.0	3.8	5.5	13.2	21.5	17.9	15.3	T	0.0	85.2
1955-56	0.0	0.0	T	4.8	16.7	14.5	9.0	9.9	11.3	13.6	3.8	0.0	83.0
1956-57	0.0	0.0	0.0	1.4	19.9	7.9	10.3	1.5	13.1	21.2	T	0.0	75.9
1957-58	0.0	0.0	T	3.9	10.5	6.6	1.4	7.3	25.9	21.0	0.0	0.0	76.6
#1958-59	0.0	0.0	T	T	12.2	4.3	11.8	10.6	22.1	8.9	1.1	0.0	71.0
1959-60	0.0	0.0	1.2	4.1	4.4	4.8	10.8	11.9	5.1	9.7	T	0.0	52.0
1960-61	0.0	0.0	0.0	1.6	17.3	8.6	1.6	7.7	8.5	4.8	0.0	0.0	49.9
1961-62	0.0	0.0	6.2	5.5	7.0	11.7	16.2	9.7	8.0	1.1	0.0	T	65.3
1962-63	0.0	0.0	0.2	0.0	4.5	5.2	10.6	5.6	5.0	10.1	0.0	0.0	39.2
1963-64	0.0	0.0	0.0	1.6	1.2	5.1	13.2	12.7	12.8	22.8	T	0.0	69.2
1964-65	0.0	T	0.0	T	12.9	6.7	16.5	8.6	11.6	7.3	7.1	0.0	70.5
1965-66	0.0	0.0	8.6	0.0	0.5	10.0	5.5	6.2	9.2	17.0	2.1	3.0	62.5
1966-67	0.0	0.0	T	11.9	8.0	11.8	9.2	10.6	8.8	7.5	10.2	0.0	78.0
1967-68	0.0	0.0	0.0	4.5	[illegible]	17.8	5.2	3.0	13.3	16.5	3.4	T	76.6
1968-69	0.0	0.0	T	0.7	4.9	16.6	2.0	6.9	13.1	12.1	T	3.0	59.1
1969-70	0.0	0.0	0.0	12.9	12.0	2.7	9.0	4.8	22.3	10.9	1.7	T	75.9
1970-71	0.0	0.0	0.4	11.2	7.4	11.9	3.7	11.2	14.8	24.2	2.2	0.0	86.9
1971-72	0.0	0.0	2.8	13.1	9.7	4.7	19.2	7.2	14.5	13.9	0.0	0.0	85.1
1972-73	0.0	0.0	0.2	9.8	8.1	9.1	9.6	11.3	10.7	56.3	1.7	0.0	116.8
1973-74	0.0	0.0	T	5.9	13.2	9.6	14.0	8.1	7.5	19.4	2.0	0.0	79.7
1974-75	0.0	0.0	3.1	1.9	8.9	5.1	10.3	8.1	36.2	13.4	21.3	0.0	109.6
1975-76	0.0	0.0	T	11.4	6.8	10.1	6.9	10.1	7.3	6.1	1.4	T	70.5
1976-77	0.0	0.0	0.0	3.4	1.8	6.2	8.5	11.0	26.6	6.8	T	0.0	63.5
1977-78	0.0	0.0	0.0	4.9	18.2	16.9	14.2	14.6	5.0	9.4	24.6	0.0	106.1
1978-79	0.0	0.0	T	3.1	17.1	25.7							
RECORD MEAN	0.0	T	0.9	4.8	9.4	9.7	9.3	10.0	14.7	13.0	3.2	0.3	75.5

# Indicates a station move or relocation of instruments. See Station Location table.

Record mean values above are means through the current year for the period beginning in 1940 for temperature and precipitation, 1951 for snowfall.

POOR ORIGINAL

STATION LOCATION

CASPER, WYOMING

Location	Occupied from	Occupied to	Airline distance and direction from previous location	Latitude North	Longitude West	Elevation above: Sea level										Remarks
							Ground									
						Ground at temperature site	Wind instruments	Extreme thermometers	Psychrometer	Telepsychrometer	Tipping bucket rain gage	Weighing rain gage	8" rain gage	Hygrothermometer		
AIRPORT																
Inland Air Lines Hangar Wardwell Field 5 miles NNW of P. O.	3/07/37	12/15/39		42° 55'	106° 20'	-										Airways observations
Hangar, Wardwell Field 5 miles NNW of P. O.	12/15/39	9/13/48	Approximate 150 ft. SW	42° 55'	106° 20'	5287	49	35	35			a30	30			First Order Station. a - Added June 1940.
Hangar, Wardwell Field 5 miles NNW of P. O.	9/13/48	3/08/50	Approximate 100 ft. ENE	42° 55'	106° 20'	5287	49	5	5			4	3			
Terminal Building Casper Air Terminal 8 miles WNW of P. O.	3/[illegible]/50	11/12/58	5-1/2 miles W	42° 55'	106° 28'	5322	80	6	5			b5	3			b - 4 feet to 5/20/52.
New WB-FAA Building Casper Air Terminal † † Natrona County International Airport effective Jan. 1973.	11/12/58	Present	1/2 mile SW	42° 55'	106° 28'	e5338	c20	f6	f5			5	4	d5		c - 33 feet to 8/12/54. d - Commissioned 2112 feet N. of thermometer site 9/11/64. e - 5319 feet to 9/11/64. f - Standby status after 9/11/64.

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I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

Director, National Climatic Center

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APPENDIX D-4.2

Ambient Air Quality

Data for air particules for October 1, 1979 through June 30, 1980, are listed in the tabulation provided on the following pages.

HIGH-VOLUME SAMPLING DATA

Job No.: EA 7920-15
Job Name: Teton Exploration
Location: Leuenberger Lease

Sampler Number				
Sample Date	10/12/79	10/18/79	10/24/79	10/30/79
Start Time	0000	0000	0000	0000
End Time	2400	2410	2415	2310
Filter Number	T-1	T-2	T-3	T-5
Weight filter and particulate (g)	4.0183	4.0700	4.0793	4.0221
Tare weight of filter (g)	3.9905	4.0020	4.0193	4.0141
Weight of particulate (g)	0.0278	0.0680	0.0600	0.0080
Sampling duration (min.)	1440	.450	1455	1390
Avg. air sampled rate (meter)	36.0	34.0	34.0	36.0
Corrected air sampling rate* (CFM)	39.3	37.2	37.2	39.3
Total air sampled (m^3)	1601.6	1526.5	1531.8	1545.9
Particulate concentration ($\mu g/m^3$)	17	45	39	5

*Meter velocity corrected to calibration curve on each high-volume sampler.

HIGH-VOLUME SAMPLING DATA

Job No.: EA 7920-15
Job Name: Teton Exploration
Location: Leuenberger Lease

Sampler Number				
Sample Date	11/5/79	11/11/79	11/17/79	11/23/79
Start Time	0000	0000	0000	0000
End Time	2305	2410	2400	2310
Filter Number	T-5	T-6	T-7	T-8
Weight filter and particulate (g)	4.0231	4.0303	4.1591	4.0236
Tare weight of filter (g)	4.0025	4.0189	4.0304	4.0111
Weight of particulate (g)	0.0206	0.0114	0.1287**	0.0125
Sampling duration (min.)	1385	1450	1440	1390
Avg. air sampled rate (meter)	35.5	35	34.5	35.5
Corrected air sampling rate* (CFM)	38.8	38.3	37.7	38.8
Total air sampled (m^3)	1520.8	1571.6	1536.4	1526.3
Particulate concentration ($\mu g/m^3$)	14	7	84**	8

*Meter velocity corrected to calibration curve on each high-volume sampler.
**Back of filter was also dirty.

POOR ORIGINAL

HIGH-VOLUME SAMPLING DATA

Job No.: EA 7920-15
Job Name: Teton Exploration
Location: Leuenberger Lease

Sampler Number				
Sample Date	11/29/79	12/5/79	12/11/79	12/17/79
Start Time	0000	**	**	0000
End Time	2305	**	**	2310
Filter Number	T-9	T-10	T-11	T-12
Weight filter and particulate (g)	4.0326	4.0535	4.0645	3.9903
Tare weight of filter (g)	4.0152	4.0386	4.0590	3.9454
Weight of particulate (g)	0.0174	0.0149	0.0055	0.0449
Sampling duration (min.)	1385	1385	1385	1390
Avg. air sampled rate (meter)	36.0	36.0**	36.0**	35.0
Corrected air sampling rate* (CFM)	39.3	39.3	39.3	38.3
Total air sampled (m^3)	1540.4	1540.4	1540.4	1506.6
Particulate concentration ($\mu g/m^3$)	11	10	4	30

*Meter velocity corrected to calibration curve on each high-volume sampler.
**Recorder failed to mark chart. Sampling duration and flow rate data were taken from 11/29/79.

HIGH-VOLUME SAMPLING DATA

Job No.: EA 7920-15
Job Name: Teton Exploration
Location: Leuenberger Lease

Sampler Number				
Sample Date	12/23/79	12/29/79		
Start Time	**	0000		
End Time	**	2310		
Filter Number	T-13	T-14		
Weight filter and particulate (g)	3.9655	3.9638		
Tare weight of filter (g)	3.9539	3.9433		
Weight of particulate (g)	0.0116	0.0205		
Sampling duration (min.)	1390	1390		
Avg. air sampled rate (meter)	35.0**	39.0		
Corrected air sampling rate* (CFM)	38.3	42.4		
Total air sampled (m^3)	1506.6	1667.9		
Particulate concentration ($\mu g/m^3$)	8	12		

*Meter velocity corrected to calibration curve on each high-volume sampler.
**The recorder failed to mark the chart properly. Sample duration and flow rate were taken from 12/17/79.

HIGH-VOLUME SAMPLING DATA

Job Number EA 7920-15 **Location** Glenrock, Wyoming

Job Name Teton Exploration **Site** Leuenberger Lease

Sample Date	1/4/80	1/10/80	1/16/80	1/22/80
Start Time	0000	0000	0000	0000
End Time	2340	0125**	2335	2240
Filter Number	T-15	T-16	T-18	T-17
Weight filter and particulate (g)	3.9520	3.9558	4.0121	3.9490
Tare weight of filter (g)	3.9379	3.9502	4.0013	3.9413
Weight of particulate (g)	0.0141	0.0056	0.0108	0.0077
Sampling duration (min.)	1420	85	1415	1360
Average temperature (^oK)	---	---	---	---
Average barometric pressure (mm Hg)	626.8	626.8	626.8	626.8
Average air sampling rate (meter)	36.5	35.0	35.0	37.0
Corrected air sampling rate* (CFM)	30.6	29.4	29.4	31.0
Corrected air sampling rate (CFM ref cond.)	---	---	---	---
Total air sampled (m^3)	1229.7	70.7	1177.3	1193.1
Particulate concentration (ug/m^3)	11	79	9	7

*Meter velocity corrected to calibration curve on each high-volume sampler.
* Sampler operated for approximately one and one-half hours.

HIGH-VOLUME SAMPLING DATA

Job Number EA 7920-15 Location Glenrock, Wyoming

Job Name Teton Exploration Site Leuenberger Lease

Sample Date	1/28/80	2/3/80	2/9/80	2/15/80
Start Time	0000	0000	0000	0000
End Time	2245	2245	2240	2325
Filter Number	T-19	T-20	T-21	T-22
Weight filter and particulate (g)	4.0306	4.0358	4.0441	4.0315
Tare weight of filter (g)	4.0133	4.0240	4.0291	4.0214
Weight of particulate (g)	0.0173	0.0118	0.0150	0.0101
Sampling duration (min.)	1365	1365	1360	1405
Average temperature (°K)	---	---	271	258
Average barometric pressure (mm Hg)	626.8	626.8	626.8	626.8
Average air sampling rate (meter)	37.0	35.0	36.0	37.5
Corrected air sampling rate* (CFM)	31.0	29.4	30.1	31.5
Corrected air sampling rate (CFM ref cond.)	---	---	28.7	30.7
Total air sampled (m^3)	1197.5	1135.7	1103.3	1222.5
Particulate concentration ($\mu g/m^3$)	14	10	14	8

*Meter velocity corrected to calibration curve on each high-volume sampler.

HIGH-VOLUME SAMPLING DATA

Job Number EA 7920-15 Location Glenrock, Wyoming

Job Name Teton Exploration Site Leuenberger Lease

Sample Date	2/21/80	2/27/80	3/4/80	3/10/80
Start Time	0000	0000	0000	0000
End Time	2425	2425**	2310	0130***
Filter Number	T-23	T-24	T-25	T-26
Weight filter and particulate (g)	4.0279	4.0361	4.0204	3.9958
Tare weight of filter (g)	4.0142	3.9993	4.0042	3.9927
Weight of particulate (g)	0.0137	0.0368	0.0162	0.0031
Sampling duration (min.)	1465	1465**	1390	90***
Average temperature (°K)	---	281	267	266
Average barometric pressure (mm Hg)	626.8	626.8	626.8	626.8
Average air sampling rate (meter)	35.0	35.0**	38.0	37.5
Corrected air sampling rate* (CFM)	29.4	29.4	31.8	31.5
Corrected air sampling rate (CFM ref cond.)	---	27.5	30.5	30.3
Total air sampled (m^3)	1218.9	1140.0	1200.2	77.1
Particulate concentration ($\mu g/m^3$)	11	32	13	40

*Meter velocity corrected to calibration curve on each high-volume sampler.

*Dickson recorder chart wet and therefore illegible. Sample duration and rate taken from previous sample date.

** Sampler operated for approximately one and one-half hours.

HIGH-VOLUME SAMPLING DATA

Job Number EA 7920-15 **Location** Glenrock, Wyoming

Job Name Teton Exploration **Site** Leuenberger Lease

Sample Date	3/16/80	3/22/80	3/29/80	
Start Time	0000	0000	0000	
End Time	2310	0120**	0120**	
Filter Number	T-27	T-28	T-29	
Weight filter and particulate (g)	4.0278	3.9699	3.9475	
Tare weight of filter (g)	4.0173	3.9638	3.9469	
Weight of particulate (g)	0.0105	0.0061	0.0006	
Sampling duration (min.)	1390	80**	80**	
Average temperature (°K)	270	276	269	
Average barometric pressure (mm Hg)	626.8	626.8	626.8	
Average air sampling rate (meter)	37.5	37.0	37.0	
Corrected air sampling rate* (CFM)	31.5	31.0	31.0	
Corrected air sampling rate (CFM ref cond.)	30.1	29.3	29.6	
Total air sampled (m^3)	1182.3	66.2	67.1	
Particulate concentration ($\mu g/m^3$)	9	92	9	

*Meter velocity corrected to calibration curve on each high-volume sampler.
**Sampler operated for approximately one and one-half hours.

POOR ORIGINAL

HIGH-VOLUME SAMPLING DATA

Job Number 80A015 Location Glenrock, Wyoming

Job Name Teton Exploration Site Leuenberger Lease

Sample Date	4/3/80	4/9/80	4/15/80	4/22/80
Start Time	0000	0000	0000	0000
End Time	0120**	2310	2400	2410
Filter Number	T-30	T-31	T-32	T-33
Weight filter and particulate (g)	3.9596	3.9760	4.0007	4.0362
Tare weight of filter (g)	3.9547	3.9604	3.9548	3.9650
Weight of particulate (g)	0.0049	0.0156	0.0459	0.0712
Sampling duration (min.)	80**	1390	1440	1450
Average temperature (°K)	274	279	285	289
Average barometric pressure (mm Hg)	626.8	626.8	626.8	626.8
Average air sampling rate (meter)	37.0	35.0	36.0	36.0
Corrected air sampling rate* (CFM)	39.3	37.2	38.3	38.3
Corrected air sampling rate (CFM ref cond.)	37.2	34.9	35.6	35.3
Total air sampled (m^3)	84.3	1373.5	1449.5	1449.4
Particulate concentration ($\mu g/m^3$)	58	11	32	49

*Meter velocity corrected to calibration curve on each high-volume sampler.
* Timer failed to operate properly, resulting in a short sampling duration.

HIGH-VOLUME SAMPLING DATA

Job Number 80A015 Location Glenrock, Wyoming

Job Name Teton Exploration Site Leuenberger Lease

Sample Date	4/27/80	5/3/80	5/9/80	5/15/80
Start Time	0000	0000	0000	0000
End Time	0130**	2400	1300***	2300
Filter Number	T-34	T-35	T-36	T-37
Weight filter and particulate (g)	3.9627	3.9934	3.9640	3.9999
Tare weight of filter (g)	3.9515	3.9661	3.9498	3.9652
Weight of particulate (g)	0.0112	0.0273	0.0142	0.0347
Sampling duration (min.)	90**	1440	780***	1380
Average temperature (^oK)	286	285	****	283
Average barometric pressure (mm Hg)	626.8	626.8	626.8	626.8
Average air sampling rate (meter)	36.0	33.0	30.0	32.0
Corrected air sampling rate* (CFM)	38.3	35.2	32.0	34.1
Corrected air sampling rate (CFM ref cond.)	35.5	32.7	***	31.8
Total air sampled (m^3)	90.4	1332.2	706.4	1241.1
Particulate concentration ($\mu g/m^3$)	124	20	20	28

*Meter velocity corrected to calibration curve on each high-volume sampler.

**Timer failed to operate properly, resulting in a short sampling duration.

***Timer failed to operate properly. Mechanism tripped manually, resulting in a short sampling duration.

****No temperature data received. Results not corrected to reference condition.

POOR ORIGINAL

HIGH-VOLUME SAMPLING DATA

Job Number 80A015 Location Glenrock, Wyoming

Job Name Teton Exploration Site Leuenberger Lease

Sample Date	5/21/80	5/27/80	6/2/80	6/8/80
Start Time	0000	0000	0000	0000
End Time	0045**	0130**	2415	2410
Filter Number	T-38	T-39	T-40	T-42
Weight filter and particulate (g)	3.9587	3.9746	3.9853	3.9935
Tare weight of filter (g)	3.9487	3.9550	3.9411	3.9477
Weight of particulate (g)	0.0100	0.0196	0.0442	0.0458
Sampling duration (min.)	45**	90**	1455	1450
Average temperature (°K)	291	290	288	286
Average barometric pressure (mm Hg)	626.8	626.8	626.8	626.8
Average air sampling rate (meter)	28.0	28.0	35.0	35.0
Corrected air sampling rate* (CFM)	30.0	30.0	37.1	37.1
Corrected air sampling rate (CFM ref cond.)	27.6	27.6	34.3	34.4
Total air sampled (m^3)	35.1	70.3	1411.3	1411.4
Particulate concentration ($\mu g/m^3$)	285	279	31	32

*Meter velocity corrected to calibration curve on each high-volume sampler.
**Timer failed to operate properly, resulting in a short sampling duration.

POOR ORIGINAL

HIGH-VOLUME SAMPLING DATA

Job Number 80A015 Location Glenrock, Wyoming

Job Name Teton Exploration Site Leuenberger Lease

Sample Date	6/13/80	6/18/80	6/26/80	
Start Time	0000**	0000**	0000**	
End Time	2410**	2410**	2410**	
Filter Number	T-43	T-44	T-45	
Weight filter and particulate (g)	3.9963	4.0456	4.0761	
Tare weight of filter (g)	3.9409	3.9981	4.0103	
Weight of particulate (g)	0.0554	0.0475	0.0658	
Sampling duration (min.)	1450	1450	1450	
Average temperature (^{o}K)	294	294	295	
Average barometric pressure (mm Hg)	626.8	626.8	626.8	
Average air sampling rate (meter)	35.0**	35.0**	35.0**	
Corrected air sampling rate (CFM)	37.1	37.1	37.1	
Corrected air sampling rate (CFM ref cond.)	33.9	33.9	33.9	
Total air sampled (m^3)	1392.0	1392.0	1389.7	
Particulate concentration (ug/m^3)	40	34	47	

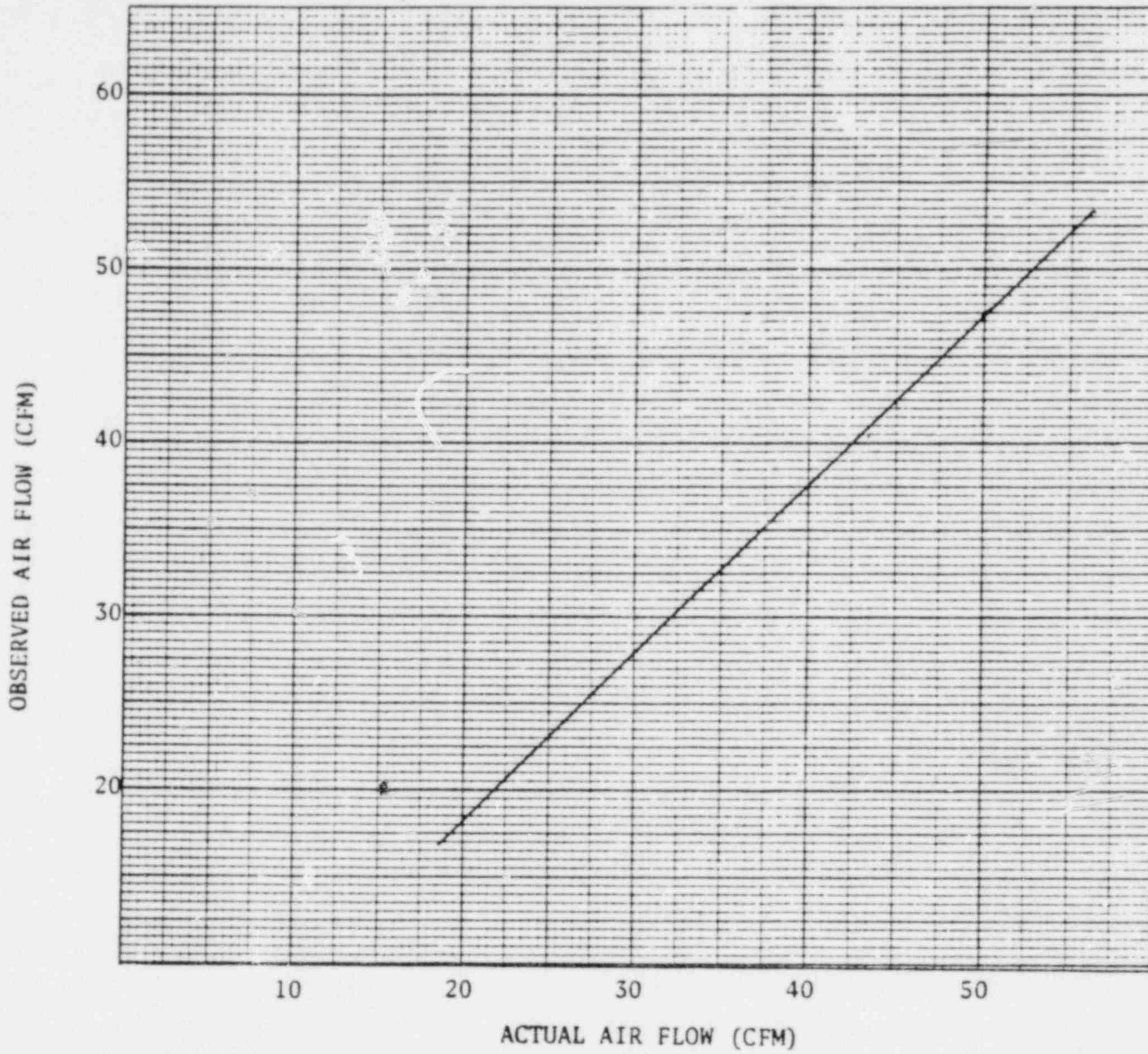
*Meter velocity corrected to calibration curve on each high-volume sampler.
*Marking pen not set properly on Dickson Recorder chart. Sampling rate and duration were taken from 6/6/80.

HIGH VOLUME SAMPLER CALIBRATION REPORT

Project Teton Exploration Site Leuenberger Lease Date 4/16/80

—— = pre maintenance curve
---- = post maintenance curve

personnel JD



Premaintenance Check				Post Maintenance Check			
Calib. Orifice	Mnmtr. In.Wat.	Obs. Flow	Actual Flow	Calib. Orifice	Mnmtr. In.Wat.	Obs. Flow	Actual Flow
				5	1.7	22.5	23.3
				7	2.8	28.0	30.0
				10	4.2	34.0	36.4
				13	5.0	37.5	39.6
				18	6.2	41.5	43.8

Remarks

APPENDIX D-5

Geological Data

APPENDIX D-5.1

ABANDON WELL AND DRILL HOLE SURVEY

A tabulation of all known drill holes within the permit area and on adjacent lands to the extent such information is available in the public records, Teton's records and from reasonable inspection of the property is presented in Tables D-5.1.01 and D-5.1.02.

PUBLIC RECORDS

A research of available public records encompassed the Office of the State Engineer, Department of Environmental Quality, State Geological Society of Wyoming and the records of the U.S. Geological Oil and Gas District Office.

Records of the Wyoming State Engineer did not list any abandoned wells within the area in question and records with respect to abandoned mineral exploration bore holes are kept in confidential status, (see letter dated July 7, 1980, page D-5.4).

Personal communication with the District Engineer, Land Quality Division of the DEQ, confirmed that exploration bore hole records of the DEQ are not public information.

Inquiries of records of the Geolcgical Society of Wyoming yielded no drill hole information (see letter dated May 21, 1980, page D-5.5).

Records of the U.S. Geological Survey District Oil and Gas Office were reviewed and no oil or gas wells were observed within the subject area.

TETON'S RECORDS

Table D-5.1.01 is a tabulated result of Teton drilling records, logs and reports, cross-checked with associated maps on which drilling information has been plotted from the beginning of Teton's activities in the area to the present time. This table also includes known bore holes which were drilled prior to Teton's activities.

These drill holes were used for geological purposes including uranium exploration, development and claims validation. All holes drilled by Teton for these purposes were properly plugged and abandoned in keeping with the requirements of the laws of the State of Wyoming as reported and filed with the Land Quality Division of DEQ.

REASONABLE INSPECTION

Reference to the uranium ownership maps, figures A-2 and B-3 located in Appendix A and B respectively shows that most of the adjacent lands, north and south of the permit area and all lands to the west are areas of unknown drilling activities. A colored composite aerial photo, scale eight inches to one mile was used to attempt to locate and identify bore hole locations. Table D-5.1.02 is a tabulation of the surface disturbances counted from the photo. The letter dated August 7, 1980, page D-5.6, is the only known in formation on how these holes were plugged and abandoned.

With the exception of Teton drilling activities in Section 14, and the southwest 1/4 of Section 13, T34N, R74W, the majority of the drilling information reported here is over one-half mile away from the well field area Teton is proposing to mine.

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

State Engineer's Office

BARRETT BUILDING CHEYENNE, WYOMING 82002

July 7, 1980

Mr. Richard R. Appel
Coordinator, Permits & Licenses
UNC Teton Exploration Drilling, Inc.
P.O. Drawer A-1
Casper, WY 82602

Dear Mr. Appel:

In response to your June 10, 1980 inquiry regarding the confidentiality of plugged exploration boreholes, you are advised as follows. Information received in the State Engineer's Office with respect to the plugging of Abandoned mineral exploration boreholes are kept in a confidential status.

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

Sincerely,

Richard G. Stockdale
Ground Water Geologist

RGS/jh

DANIEL N. MILLER, JR.
DIRECTOR AND
STATE GEOLOGIST
DEPUTY DIRECTOR AND
STAFF GEOLOGIST
GARY B. GLASS
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May 21, 1980

Mr. Richard R. Appel, Coordinator
Permits & Licenses
UNC Teton Exploration Drilling, Inc.
P. O. Drawer A-1
Casper, WY 82602

Dear Mr. Appel:

Our files contain no drill hole information in T. 34N., R. 74W. There was also no drill hole data in immediately adjacent areas. A check for oil and gas drilling also proved negative.

I'm sorry we could not be of any help in this matter.

Sincerely,

Gary B. Glass
Deputy Director/Coal Specialist

Geology--Interpreting the past to provide for the future

KERR-McGEE CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

August 7, 1980

Mr. Dan Herlihy
UNC Teton Exploration Drilling, Inc.
P.O. Drawer A-1
Casper, Wyoming 82602

Dear Mr. Herlihy:

Your letter of July 9, 1980 addressed to Mr. Calvin Fletcher regarding recent exploration holes drilled by or for this Company in Sections 11 and 14-34N-74W has been referred to me for a reply.

Those holes were drilled for the purposes of uranium exploration. The holes were sealed and abandoned and the sites reclaimed in compliance with all laws and valid regulations of the State of Wyoming. Reports with respect thereto have been filed with the appropriate State agency or department.

Sincerely yours,

KERR-McGEE CORPORATION

G.A. Carlyle

George A. Carlyle
Director of Mineral Land

GAC:bac

cc: Calvin Fletcher

HOLE LOCATIONS

Table D-5.1.01 uses two coordinate systems for drill hole location. During earlier exploration activities the southwest corner of the section in which exploration holes were drilled was used as the Zero Zero Point and hole locations were designated by the number of feet north and east of that Point. Therefore, coordinates listed in the table with a north and east designation may be plotted from the southwest section corner of the section they are listed in.

The second system uses the northeast corner of Section 12, T34N, R74W as the Zero Zero Point. The coordinates are generally measured to the south and west and are used to locate holes drilled in several adjoining sections. Any coordinates listed in the table followed by a south and west direction may be plotted from the northeast corner of Section 12.

DRILL HOLE AND ABANDON WELL TABULATION
WITHIN THE PERMIT AREA AND ADJACENT LANDS

TABLE D-5.1.01

SECTION 12 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
DN 169	1971 N	309 E	6- 4-73	360
DN 170	2173 N	298 E	6- 4-73	380
DN 171	2381 N	294 E	6- 4-73	380
DN 172	2585 N	289 E	6- 4-73	380
DN 183	2273 N	295 E	6- 6-73	400
70-11	2458 N	2141 E	11-10-70	400
70-12	2222 N	2236 E	11-10-70	400
70-13	1859 N	2238 E	11-10-70	400
70-14	1636 N	2345 E	11-10-70	400
70-15	2586 N	2040 E	11-11-70	400
70-17	2422 N	2641 E	11-13-70	400
70-18	2287 N	2652 E	11-13-70	400
70- 3	2532 N	2630 E	11- 9-70	460
72- 3	1802 N	308 E	8-29-72	340
Ida 1	2372 N	3636 E	8-23-74	397
Ida 2	2593 N	2708 E	8- 9-74	393
Ida 3	2492 N	2717 E	8- 8-74	390
Ida 4	2502 N	3098 E	8- 8-74	383
Ida 5	2412 N	3670 E	8- 8-74	440
Ida 6	2686 N	2519 E	8- 9-74	417
Ida 7	2621 N	1988 E	8- 9-74	397
Ida 8	2506 N	1502 E	8- 9-74	400
Ida 9	2297 N	1107 E	8-22-74	399
Ida 10	2544 N	3125 E	8-23-74	379
Ida 11	2634 N	2508 E	8-22-74	399
Ida 12	2450 N	1750 E	8-22-74	400
Ida 13	2553 N	1538 E	8-22-74	398
Ida 14	1736 N	4678 E	1-28-74	533
Ida 15	2480 N	4680 E	1-28-74	532
Ida 16	2480 N	4080 E	1-29-74	695
Ida 17	1728 N	4076 E	1-29-74	614
Ida 18	1730 N	3480 E	1-29-74	628
Ida 19	2480 N	3480 E	1-29-74	694
Ida 20	2480 N	2880 E	1-30-74	612
Ida 21	1730 N	2880 E	1-30-74	612
Ida 22	2480 N	3780 E	1-30-74	453
Ida 23	2280 N	3780 E	1-30-74	438
Ida 24	2480 N	3180 E	1-30-74	451
Ida 25	2280 N	3180 E	1-30-74	472

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HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 26	3230 N	3280 E	2- 3-75	690
Ida 27	3980 N	3480 E	2- 3-75	697
Ida 28	3980 N	2280 E	2- 4-75	689
Ida 29	3980 N	1080 E	2- 7-75	794
Ida 30	3230 N	1060 E	2- 4-75	736
Ida 31	3230 N	2280 E	2- 4-75	404
Ida 32	2680 N	4680 E	2- 3-75	488
Ida 33	2880 N	4680 E	1-30-75	633
Ida 34	2680 N	4080 E	1-30-75	391
Ida 35	2280 N	4080 E	2- 3-75	483
Ida 36	2080 N	3180 E	2- 3-75	494
Ida 37	2380 N	3780 E	2- 3-75	494
Ida 38	2380 N	2780 E	2- 6-75	494
Ida 39	2580 N	2780 E	2- 3-75	492
Ida 40	2580 N	3180 E	2- 3-75	494
Ida 41	4730 N	2280 E	2- 6-75	689
Ida 42	4730 N	3480 E	2- 6-75	792
Ida 43	2880 N	4080 E	2-10-75	532
Ida 44	2480 N	3980 E	2- 7-75	491
Ida 45	2480 N	3880 E	2- 7-75	409
Ida 46	2330 N	3780 E	2- 6-75	489
Ida 47	2880 N	2780 E	2-12-[illegible]	496
Ida 48	2880 N	3780 E	2-12[illegible]	492
Ida 49	2280 N	3980 E	2- 7-[illegible]	489
Ida 50	2280 N	3880 E	2- 6-75	488
Ida 51	2180 N	3180 E	2-10-80	497
Ida 52	2380 N	4080 E	2- 7-75	494
Ida 53	2280 N	4380 E	2- 7-75	491
Ida 54	2077 N	4396 E	2- 7-75	490
Ida 55	2080 N	4080 E	2- 7-75	406
Ida 56	2680 N	2780 E	2-10-75	NR
Ida 57	2880 N	3780 E	2-10-75	511
Ida 58	2680 N	4380 E	2-10-75	NR
Ida 59	2880 N	3480 E	2-10-75	513
Ida 60	3080 N	3180 E	2-10-75	511
Ida 61	3280 N	2780 E	2-10-75	492
Ida 62	3480 N	2280 E	2-10-75	491
Ida 63	2180 N	2880 E	2-11-75	487
Ida 64	2[illegible]30 N	3880 E	2- 7-75	490
Ida 65	2280 N	3480 E	2-10-75	488
Ida 66	2330 N	3980 E	2-10-75	487
Ida 67	2280 N	4030 E	2-10-75	409
Ida 68	2230 N	4080 E	2-12-75	490
Ida 69	1883 N	4382 E	2-11-75	487
Ida 70	2078 N	4567 E	2-11-75	486
Ida 71	2180 N	4180 E	2-12-75	488
Ida 72	2180 N	4280 E	21-12-75	491

SECTION 12 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 73	2280 N	4180 E	2-11-75	488
Ida 74	2430 N	4080 E	2-12-75	497
Ida 75	2380 N	4180 E	2-11-75	485
Ida 76	2305 N	3930 E	2-12-75	492
Ida 77	2580 N	3780 E	2-18-75	491
Ida 78	2530 N	3380 E	12-20-75	486
Ida 79	2480 N	3930 E	2-18-75	487
Ida 80	2430 N	3980 E	2-17-75	495
Ida 81	1980 N	4080 E	2-12-75	473
Ida 82	3080 N	3780 E	2-20-75	490
Ida 83	2880 N	3880 E	2-20-75	490
Ida 84	2780 N	3780 E	2-18-75	NR
Ida 85	2980 N	3480 E	2-20-75	492
Ida 86	2880 N	3380 E	2-20-75	490
Ida 87	2780 N	3480 E	2-19-75	490
Ida 88	2880 N	3580 E	2-19-75	491
Ida 89	2880 N	3680 E	2-20-75	494
Ida 90	2580 N	2280 E	2-13-75	497
Ida 91	2680 N	1680 E	2-13-75	495
Ida 92	2680 N	1380 E	2-13-75	494
Ida 93	2900 N	1080 E	2-13-75	498
Ida 94	3680 N	1080 E	2-13-75	495
Ida 95	2980 N	3180 E	2-20-75	490
Ida 96	3080 N	2980 E	2-19-75	499
Ida 97	3380 N	2780 E	NR	498
Ida 98	2080 N	3480 E	2-12-75	497
Ida 99	1880 N	3180 E	2-12-75	496
Ida 100	1880 N	2880 E	2-13-75	497
Ida 101	2078 N	4769 E	2-12-75	489
Ida 102	2280 N	4280 E	2-12-75	491
Ida 103	2380 N	4130 E	2-12-75	509
Ida 104	2330 N	4180 E	2-12-75	492
Ida 105	2230 N	4180 E	2-13-75	494
Ida 106	2180 N	4230 E	2-12-75	491
Ida 107	2180 N	4330 E	2-12-75	491
Ida 108	2080 N	4280 E	2-21-75	491
Ida 109	2230 N	4130 E	2-13-75	455
Ida 110	2180 N	4130 E	2-13-75	496
Ida 111	1880 N	3780 E	2-12-75	476
Ida 112	2180 N	4080 E	2-13-75	482
Ida 113	2280 N	4230 E	2-13-75	488
Ida 114	2230 N	4280 E	2-13-75	494
Ida 115	2130 N	4280 E	2-13-75	496
Ida 116	2130 N	4330 E	2-13-75	510
Ida 117	1880 N	3480 E	2-18-75	494
Ida 118	2180 N	4380 E	2-13-75	492
Ida 119	2230 N	4330 E	2-13-75	491
Ida 120	2060 N	2880 E	2-17-75	500

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SECTION 12 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 121	2230 N	4330 E	2-13-75	491
Ida 122	2130 N	4130 E	2-14-75	513
Ida 123	2130 N	4180 E	2-14-75	477
Ida 124	2130 N	4230 E	2-17-75	497
Ida 125	2130 N	4380 E	2-14-75	494
Ida 126	2080 N	4330 E	2-14-75	491
Ida 127	2330 N	3830 E	2-20-75	492
Ida 128	2280 N	3680 E	2-19-75	496
Ida 129	2280 N	3580 E	NR	499
Ida 130	2630 N	2280 E	2-14-75	498
Ida 131	2230 N	4380 E	2-17-75	452
Ida 132	2030 N	4508 E	2-17-75	508
Ida 133	2180 N	4430 E	2-17-75	508
Ida 134	2130 N	4480 E	2-17-75	508
Ida 135	2130 N	4430 E	2-14-75	492
Ida 136	2080 N	3580 E	2-18-75	497
Ida 137	2080 N	3680 E	2-18-75	499
Ida 138	2180 N	4580 E	2-14-75	491
Ida 139	2079 N	4473 E	2-17-75	453
Ida 140	2130 N	4480 E	2-17-75	511
Ida 141	2130 N	4530 E	2-17-75	497
Ida 142	2180 N	4530 E	2-17-75	484
Ida 143	2430 N	4030 E	2-18-75	491
Ida 144	2034 N	4463 E	2-18-75	494
Ida 145	2081 N	4527 E	2-18-75	494
Ida 146	1984 N	4551 E	2-18-75	492
Ida 147	1985 N	4452 E	2-18-75	489
Ida 148	2080 N	4431 E	2-18-75	494
Ida 149	1980 N	4505 E	2-19-75	453
Ida 150	2030 N	4430 E	2-19-75	390
Ida 151	1980 N	4405 E	2-20-75	456
Ida 152	1680 N	4480 E	2-19-75	490
Ida 153	1880 N	4480 E	2-19-75	394
Ida 154	1780 N	4480 E	2-19-75	472
Ida 155	1880 N	4580 E	2-19-75	393
Ida 156	1780 N	4580 E	2-19-75	493
Ida 157	1930 N	4430 E	2- -75	491
Ida 158	1930 N	4480 E	2-20-75	490
Ida 159	1930 N	4530 E	2-20-75	553
Ida 160	3080 N	3080 E	2-20-75	490
Ida 161	1880 N	4530 E	2-20-75	493
Ida 162	1930 N	4580 E	2-20-75	494
Ida 163	1830 N	4580 E	2-20-75	494
Ida 164	1880 N	4680 E	2-20-75	496
Ida 165	1880 N	4780 E	2-20-75	493

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SECTION 12 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 166	1780 N	4780 E	2-20-75	490
Ida 167	2830 N	3780 E	2-24-75	460
Ida 168	1980 N	4330 E	2-21-75	494
Ida 169	2830 N	3730 E	2-24-75	460
Ida 170	2780 N	3830 E	2-21-75	457
Ida 171	2730 N	3780 E	2-21-75	491
Ida 172	2630 N	3780 E	2-24-76	456
Ida 173	2580 N	3830 E	2-21-75	496
Ida 174	3030 N	3180 E	2-24-75	460
Ida 175	2880 N	3730 E	2-25-75	432
Ida 176	2800 N	1080 E	2-19-75	432
Ida 177	2780 N	1380 E	2-20-75	367
Ida 178	2580 N	1680 E	2-17-75	497
Ida 179	2680 N	1530 E	2-17-75	403
Ida 180	2980 N	3180 E	2-20-75	479
Ida 181	3780 N	1080 E	2-21-75	399
Ida 182	3380 N	2280 E	2-19-75	498
Ida 183	3580 N	1680 E	2-20-75	498
Ida 184	1960 N	2880 E	2-20-75	497
Ida 185	2630 N	1680 E	2-24-75	439
Ida 186	2530 N	1680 E	2-17-75	493
Ida 187	2630 N	1380 E	2-17-75	493
Ida 188	3680 N	1380 E	2-20-75	492
Ida 189	3480 N	1980 E	2-20-75	497
Ida 190	1980 N	3580 E	2-19-75	497
Ida 191	2080 N	3630 E	2-19-75	498
Ida 192	2030 N	3480 E	2-24-75	496
Ida 193	2330 N	3680 E	2-20-75	499
Ida 194	2180 N	3580 E	2-20-75	499
Ida 195	2460 N	3660 E	2-20-75	494
Ida 196	2730 N	1380 E	2-21-75	453
Ida 197	3280 N	1980 E	NR	498
Ida 198	2030 N	3180 E	2-21-75	399
Ida 199	2010 N	2880 E	2-21-75	393
Ida 200	2030 N	3280 E	2-24-75	399
Ida 201	2010 N	2980 E	2-21-75	397
Ida 202	2030 N	3080 E	2-21-75	399
Ida 203	1380 N	2780 E	2-21-75	399
Ida 204	2310 N	3630 E	2-24-75	500
Ida 205	2480 N	480 E	2-25-75	459
Ida 206	2680 N	1080 E	2- -75	396
Ida 207	3280 N	2280 E	2-24-75	438
Ida 208	3380 N	1680 E	2-26-75	393
Ida 209	3880 N	1380 E	2-26-75	455
Ida 210	3880 N	1080 E	2-26-75	499
Ida 211	4280 N	780 E	2-26-76	397

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HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 212	4280 N	480 E	2-26-75	391
Ida 213	2630 N	1080 E	2-25-75	500
Ida 214	2730 N	1080 E	2-25-75	440
Ida 215	2580 N	780 E	2-25-75	500
Ida 216	3380 N	1980 E	2-24-75	497
Ida 217	3330 N	2280 E	2-26-75	416
Ida 218	3330 N	1980 E	2-26-75	395
Ida 219	2780 N	780 E	2-25-75	400
Ida 220	2680 N	480 E	2-25-75	392
Ida 221	2880 N	3530 E	2-21-75	429
Ida 222	3080 N	3130 E	2-24-75	456
Ida 223	1780 N	4880 E	2-20-75	398
Ida 224	1980 N	4680 E	2-20-75	436
Ida 225	1980 N	4780 E	2-20-75	463
Ida 226	1880 N	4880 E	2- -75	493
Ida 227	1880 N	4980 E	2-21-75	492
Ida 228	1780 N	4980 E	2-21-75	497
Ida 229	2980 N	3280 E	2-24-75	438
Ida 230	2980 N	3380 E	2-24-75	460
Ida 231	3030 N	3480 E	2-24-75	457
Ida 232	2980 N	3530 E	2-24-75	497
Ida 233	2680 N	3980 E	2-25-75	408
Ida 234	2580 N	3380 E	2-24-75	454
Ida 235	2630 N	3830 E	2-25-75	455
Ida 236	2980 N	3630 E	2-25-75	440
Ida 237	3030 N	3380 E	2-25-75	453
Ida 238	3030 N	3330 E	2-25-75	390
Ida 239	3180 N	3130 E	2-25-75	440
Ida 240	2680 N	3880 E	2-25-75	457
Ida 241	2580 N	3980 E	2-26-75	479
Ida 242	3330 N	2780 E	2-26-75	480
Ida 243	2980 N	3630 E	2-26-75	400
Ida 244	3180 N	2980 E	2-26-75	440
Ida 245	3180 N	2880 E	2-26-75	457
Ida 246	2930 N	3680 E	2-26-75	420
Ida 247	2880 N	3980 E	2-26-75	440
Ida 248	3386.0 S	514.3 W	12- 2-76	435
Ida 249	3367.8 S	421.1 W	12- 2-76	433
Ida 250	3442.7 S	558.5 W	12- 2-76	435
Ida 251	3426.2 S	470.1 W	12- 2-76	435
Ida 252	3404.3 S	372.3 W	12- 1-76	433
Ida 253	3476.5 S	504.9 W	12- 3-76	431
Ida 254	3464.6 S	413.3 W	12- 1-76	434
Ida 255	3455.9 S	206.7 W	12- 1-76	493
Ida 256	3516.9 S	260.1 W	12- 1-76	438
Ida 257	3521.3 S	152.3 W	12- 1-76	489
Ida 258	3569.4 S	209.6 W	12- 1-76	437
Ida 259	3665.4 S	292.8 W	12- 2-76	435
Ida 260	3609.8 S	248.8 W	12- 2-76	438

SECTION 12 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 261	3614.4 S	350.5 W	12- 2-76	437
Ida 262	3565.8 S	304.6 W	12- 2-76	435
Ida 263	3356.8 S	375.7 W	12- 2-76	435
Ida 264	3376.4 S	464.6 W	12- 2-76	436
Ida 265	3458.8 S	369.2 W	12- 2-76	434
Ida 266	3469.4 S	459.2 W	12- 2-76	437
Ida 267	3350.6 S	568.0 W	12- 3-76	433
Ida 268	3340.6 S	523.4 W	12- 3-76	436
Ida 269	3405.0 S	602.4 W	12- 2-76	435
Ida 270	3394.2 S	561.7 W	12- 3-76	438
Ida 271	3704.4 S	199.4 W	12- 3-76	435
Ida 272	3796.1 S	178.6 W	12- 6-76	436
Ida 273	3519.2 S	460.6 W	12- 6-76	436
Ida 274	3505.2 S	366.6 W	12- 6-76	437
Ida 275	3552.1 S	362.6 W	12- 6-76	437
Ida 276	3662.4 S	349.2 W	12- 6-76	438
Ida 277	3717.8 S	250.7 W	12- 6-76	437
Ida 278	3570.5 S	491.4 W	12- 6-76	438
Ida 279	3327.5 S	476.4 W	12- 7-76	435
Ida 280	3294.6 S	529.0 W	12- 7-76	437
Ida 281	3305.1 S	568.6 W	12- 8-76	437
Ida 282	3316.0 S	608.5 W	12- 8-76	438
Ida 283	3553.6 S	406.4 W	12- 7-76	437
Ida 284	3563.7 S	450.6 W	12- 7-76	437
Ida 285	3569.4 S	253.7 W	12- 7-76	416
Ida 286	3653.7 S	251.6 W	12- 6-76	418
Ida 287	3664.7 S	393.5 W	12- 7-76	435
Ida 288	3893.3 S	170.3 W	12- 7-76	377
Ida 289	3498.9 S	106.0 W	12- 9-76	418
Ida 290	3401.5 S	123.4 W	12- 9-76	416
Ida 291	3284.2 S	483.8 W	12- 8-76	439
Ida 292	3237.0 S	494.2 W	12- 8-76	437
Ida 293	3212.5 S	557.3 W	12- 8-76	439
Ida 294	3164.8 S	606.3 W	12- 9-76	439
Ida 295	3155.0 S	735.9 W	12- 9-76	438
Ida 296	3159.9 S	693.8 W	12- 9-76	438
Ida 297	NR	NR	12- 9-76	437
Ida 298	3255.0 S	556.1 W	12- 9-76	437
Ida 299	3669.3 S	63.4 E	12-15-76	415
Ida 300	3574.1 S	63.3 E	12-10-76	415
Ida 301	3768.5 S	61.7 E	12- 9-76	416
Ida 302	3111.3 S	822.9 W	12-10-76	439
Ida 303	3060.8 S	918.7 W	12-10-76	438
Ida 304	3066.2 S	867.4 W	12-10-76	438
Ida 305	3053.4 S	1025.5 W	12-10-76	438
Ida 306	3051.9 S	1074.3 W	12-10-76	420
Ida 307	2814.1 S	876.8 W	12-13-76	438
Ida 308	2607.9 S	872.6 W	12-13-76	437
Ida 309	2970.2 S	974.1 W	12-13-76	435
Ida 310	2966.6 N	1022.7 E	12-13-76	433

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HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 311	2620.4 N	1071.8 E	12-13-76	436
Ida 312	2812.1 N	1066.6 E	12-13-76	440
Ida 313	2809.8 N	1182.4 E	12-13-76	439
Ida 314	2858.6 N	1184.0 E	12-13-76	438
Ida 315	2760.6 N	1072.3 E	12-13-76	435
Ida 316	2814.1 N	977.8 E	12-14-76	436
Ida 317	2859.3 N	1069.0 E	12-14-76	435
Ida 318	2710.1 N	1237.4 E	12-14-76	438
Ida 319	2523.7 N	1333.7 E	12-15-76	434
Ida 320	2573.5 N	1324.2 E	12-14-76	439
Ida 321	NR	NR	12-15-76	438
Ida 322	2711.1 N	1461.9 E	12-14-76	438
Ida 323	2760.9 S	1466.0 W	12-14-76	438
Ida 324	2912.1 S	1127.6 W	12-15-76	436
Ida 325	2909.2 S	1357.7 W	12-15-76	434
Ida 326	2912.5 S	1460.5 W	12-14-76	435
Ida 327	2970.2 S	1420.1 W	12-15-76	437
Ida 328	2865.3 S	1410.0 W	12-14-76	435
Ida 329	2811.4 S	1119.4 W	12-17-76	438
Ida 330	2760.6 S	1122.5 W	12-16-76	439
Ida 331	2759.3 S	1174.6 W	12-16-76	436
Ida 332	2811.1 S	1232.2 W	12-15-76	436
Ida 333	2858.6 S	1235.3 W	12-16-76	436
Ida 334	NR	NR	12-16-76	439
Ida 335	3027.7 S	1249.4 W	12-16-76	439
Ida 336	3135.6 S	1257.2 W	12-16-76	439
Ida 337	3018.5 S	1143.6 W	12-16-76	436
Ida 338	3164.5 S	1187.7 W	12-16-76	434
Ida 339	3166.2 S	1135.2 W	12-17-76	439
Ida 340	3382.7 S	886.3 W	12-19-76	436
Ida 341	3319.9 S	932.1 W	12-17-76	432
Ida 342	3362.2 S	807.5 W	12-19-76	437
Ida 343	3118.5 S	1035.7 W	12-17-76	436
Ida 344	3021.1 S	1195.5 W	12-19-76	438
Ida 345	3063.1 S	1139.5 W	12-17-76	437
Ida 346	3173.3 S	1237.6 W	12-27-76	438
Ida 347	2418.7 S	1734.4 W	12-20-76	438
Ida 348	2474.9 S	1682.2 W	12-20-76	435
Ida 349	2473.5 S	1632.7 W	12-27-76	437
Ida 350	2473.3 S	1584.9 W	12-20-76	438
Ida 351	2523.2 S	1729.1 W	12-20-76	438
Ida 352	2522.9 S	1533.4 W	12-20-76	438
Ida 353	2576.6 S	1571.4 W	12-21-76	433
Ida 354	2574.6 S	1626.3 W	12-21-76	438
Ida 355	2574.5 S	1674.6 W	12-21-76	439
Ida 356	2576.3 S	1481.2 W	12-20-76	438
Ida 357	2470.1 S	1380.5 W	12-21-76	436
Ida 358	2623.2 S	1440.8 W	12-19-76	435
Ida 359	2666.4 S	1450.7 W	12-19-76	433
Ida 360	2707.4 S	1507.4 W	12-27-76	438

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HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 361	2632.7 S	1308.8 W	12-19-76	438
Ida 362	2575.1 S	1526.6 W	12-20-76	433
Ida 363	2625.5 S	1486.6 W	12-21-76	438
Ida 364	2469.1 S	1779.6 W	12-27-76	439
Ida 365	2468.9 S	1732.5 W	12-21-76	437
Ida 366	2668.7 S	1499.1 W	12-27-76	436
Ida 367	2625.9 S	1538.1 W	12-27-76	437
Ida 368	2471.9 S	1538.3 W	12-27-76	436
Ida 369	2423.0 S	1579.6 W	12-27-76	396
Ida 370	5223.1 S	5067.0 W	12-29-76	797
Ida 371	6320.1 S	5090.7 W	12-29-76	796
Ida 372	2759.5 S	1514.8 W	12-28-76	438
Ida 373	2670.0 S	1150.5 W	12-28-76	438
Ida 374	2368.3 S	1727.7 W	12-28-76	398
Ida 375	2371.7 S	1635.3 W	12-28-76	398
Ida 376	2758.0 S	1616.4 W	12-28-76	439
Ida 377	2775.0 S	1707.7 W	12-28-76	437
Ida 378	4304.9 S	5007.7 W	1-17-77	596
Ida 379	3401.4 S	4957.5 W	1-17-77	559
Ida 380	5081.6 S	6.8 E	1-17-77	531
Ida 389	2500.2 S	4945.1 W	3- 7-77	998
Ida 390	3942.3 S	39.5 E	3- 7-77	997
Ida 391	2479.6 S	16.5 E	3-10-77	996
Ida 392	1242.2 S	67.0 E	3- 9-77	996
Ida 393	118.4 S	40.8 W	3-15-77	1056
Ida 400	654.4 S	8.9 W	3-18-77	476
Ida 401	955.8 S	31.1 E	3-22-77	470
Ida 402	860.0 S	37.1 E	8-17-78	468
Ida 403	1048.6 S	31.3 E	8-21-78	472
Ida 404	966.4 S	160.1 W	8-17-78	468
Ida 405	1019.8 S	168.6 W	8-21-78	414
Ida 406	967.7 S	57.5 W	8-21-78	440
Ida 407	909.6 S	36.3 E	8-21-78	468
Ida 408	809.8 S	38.3 E	8-21-78	455
Ida 409	1074.7 S	78.1 W	8-21-78	470
Ida 410	1142.7 S	16.8 E	8-21-78	474
Ida 411	962.1 S	353.3 W	8-22-78	474
Ida 412	1000.2 S	34.7 E	8-22-78	453
Ida 413	1099.1 S	24.1 E	8-22-78	454
Ida 414	1025.9 S	70.8 W	8-22-78	431
Ida 415	763.5 S	335.7 W	8-22-78	475
Ida 416	779.3 S	519.9 W	8-22-78	474
Ida 417	881.5 S	257.7 W	8-22-78	475
Ida 418	149.1 S	1713.3 W	8-22-78	474
Ida 419	964.4 S	253.8 W	8-22-78	435
Ida 420	1025.4 S	120.2 W	8-22-78	435
Ida 421	928.0 S	198.1 W	8-25-78	436
Ida 422	851.5 S	102.1 W	8-23-78	430
Ida 423	973.7 S	209.0 W	8-23-78	430

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SECTION 12 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 424	587.9 S	321.2 W	8-23-78	455
Ida 425	870.1 S	170.9 W	8-23-78	436
Ida 426	928.0 S	149.3 W	8-23-78	435
Ida 427	771.3 S	198.3 W	8-23-78	435
Ida 428	665.6 S	332.6 W	8-23-78	473
Ida 429	826.9 S	41.5 W	8-23-78	435
Ida 430	771.6 S	249.8 W	8-23-78	455
Ida 431	597.1 S	412.4 W	8-23-78	457
Ida 432	776.5 S	48.8 W	8-23-78	431
Ida 433	NR	NR	7-20-79	477
Ida 434	NR	NR	7-23-79	439
Ida 435	NR	NR	7-23-79	377
Ida 436	NR	NR	7-23-79	437
Ida 437	NR	NR	7-23-79	398
Ida 438	NR	NR	7-24-79	418
Ida 439	NR	NR	7-24-79	437
Ida 440	NR	NR	7-24-79	417
Ida 441	NR	NR	7-24-79	438
Ida 442	NR	NR	7-24-79	438

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SECTION 13 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 382	7801.4 S	539.8 W	2-21-77	995
Ida 383	5210.3 S	1267.5 W	2-22-77	838
Ida 384	6702.1 S	2404.2 W	2-24-77	736
Ida 386	7620.3 S	1661.5 W	3- 3-77	797
Ida 387	5719.6 S	71.2 W	2-28-77	575
Ida 388	7689.7 S	2659.3 W	3- 3-77	791
Ida 394	7701.6 S	1164.8 W	3- 8-77	796
Ida 395	7775.3 S	866.0 W	3-10-77	678
Ida 396	6307.6 S	208.6 W	3- 9-77	817
Ida 397	7542.9 S	458.2 W	3-11-77	718
Ida 398	7785.1 S	630.2 W	3-14-77	696
Ida 399	7642.3 S	488.4 W	3-15-77	698
L 11	8907.8 S	2346.5 W	5-28-76	998
L 16	8566.3 S	5132.0 W	12-30-76	696
L 19	8766.1 S	5140.7 W	1- 3-77	796
L 24	8668.4 S	5134.9 W	1- 4-77	756
L 25	8857.4 S	5145.3 W	1- 5-77	755
L 66	9089.8 S	5152.0 W	1-18-77	753
L 67	8578.3 S	4027.6 W	1-20-77	796
L 68	9877.4 S	2458.1 W	1-18-77	796
L 69	10741.0 S	2180.0 W	1-18-77	498
L 70	10714.7 S	1626.2 W	1-21-77	618
L 71	9408.6 S	2387.7 W	1-24-77	958
L 72	9933.5 S	2064.3 W	1-21-77	638
L 73	10504.5 S	1333.8 W	1-24-77	618
L 74	10522.8 S	1643.9 W	1-24-77	618
L 75	10540.3 S	64.6 W	2-24-77	638
L 76	8670.6 S	4016.4 W	1-26-77	797
L 77	9143.0 S	3963.7 W	1-26-77	797
L 78	8957.7 S	5143.2 W	1-25-77	749
L 79	9087.9 S	4954.1 W	1-25-77	778
L 83	10598.9 S	1641.3 W	2-14-77	615
L 86	9114.6 S	4756.1 W	1-27-77	778
L 87	8600.9 S	4478.2 W	1-27-77	788
L 88	8950.6 S	3995.1 W	1-31-77	794
L 89	6181.0 S	8288.7 W	1-28-77	397
L 90	8568.6 S	4933.1 W	1-28-77	777
L 91	8104.6 S	4571.4 W	1-31-77	769
L 92	8640.0 S	4179.3 W	1-28-77	778
L 100	8030.4 S	4587.8 W	2- 1-77	775
L 101	9046.5 S	3980.8 W	2- 2-77	733
L 102	8688.0 S	3922.4 W	2- 2-77	772
L 103	8482.3 S	4034.5 W	2- 1-77	795
L 104	8272.1 S	3846.9 W	2- 4-77	796
L 105	8680.3 S	3520.4 W	2- 3-77	791
L 108	8654.4 S	4096.8 W	2- 7-77	776
L 109	8978.4 S	3496.1 W	2- 8-77	797
L 110	8376.9 S	4032.5 W	2- 4-77	798

SECTION 13 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
L	113	9064.8	S	4082.2	W	2- 7-77	778
L	116	8286.7	S	4055.4	W	2- 8-77	796
L	118	8271.7	S	3947.4	W	2- 9-77	798
L	119	8188.7	S	4075.1	W	2- 9-77	794
L	120	8006.5	S	4109.0	W	2-10-77	795
L	121	8226.0	S	4283.2	W	2-10-77	796
L	122	8097.0	S	4097.2	W	2-11-77	798
L	123	8207.6	S	4179.3	W	2-11-77	797
L	124	7935.1	S	5133.1	W	3- 1-77	736
L	125	7471.0	S	5119.4	W	3- 3-77	750
L	126	7909.7	S	4853.4	W	3- 4-77	756
L	127	7396.8	S	4161.5	W	3- 3-77	776
L	128	7914.4	S	4647.9	W	3- 7-77	772
L	129	7920.5	S	3776.9	W	3- 8-77	837
L	130	7898.8	S	3975.5	W	3- 9-77	817
L	131	7910.5	S	3887.3	W	3-10-77	816
L	132	7699.5	S	3952.1	W	3-10-77	815
L	133	7994.2	S	3975.7	W	3-11-77	783
L	134	7987.3	S	3873.7	W	3-15-77	797
L	135	8281.8	S	3753.7	W	3-16-77	777
L	136	9641.8	S	2426.7	W	3-16-77	678
L	137	8482.8	S	3928.4	W	3-16-77	779
L	138	7810.0	S	3904.6	W	3-17-77	814
L	139	7775.9	S	3209.1	W	3-17-77	797
L	140	9528.8	S	2404.8	W	3-18-77	795
L	141	9143.1	S	3864.3	W	3-17-77	798
L	142	7919.3	S	3561.6	W	3-22-77	814
L	143	8690.3	S	3677.5	W	3-21-77	797
L	355	9183.7	S	4954.4	W	11-15-78	759
L	356	8883.9	S	4944.8	W	11- 9-78	758
L	357	8690.7	S	4939.8	W	11- 8-78	761
L	358	8892.2	S	4745.2	W	11- 9-78	760
L	364	8684.3	S	4765.9	W	11-13-78	760
L	365	8498.4	S	4485.7	W	11-15-78	779
L	366	8790.1	S	4474.0	W	11-14-78	778
L	403	8983.9	S	4952.5	W	11-16-78	760
L	404	8786.4	S	4947.2	W	11-15-78	760
L	412	8776.6	S	4759.7	W	11-16-78	752
L	414	8941.3	S	3901.5	W	11-17-78	780
L	415	8955.4	S	4091.5	W	11-17-78	777
L	416	9139.0	S	3773.1	W	11-20-78	780
L	417	9152.8	S	4148.9	W	11-17-78	780
L	418	8817.6	S	3919.3	W	11-20-78	761
L	419	8968.6	S	4459.7	W	11-17-78	780
L	420	8392.9	S	4491.7	W	11-22-78	700
L	421	10472.9	S	2399.2	W	NR	894
L	422	8958.9	S	4191.4	W	11-20-78	762
L	423	9156.9	S	4250.5	W	11-21-78	776
L	424	8984.8	S	3805.3	W	11-27-78	774

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HOLE NUMBER		LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
L	425	8696.8	S	3823.2	W	11-22-78	777
L	426	8491.3	S	3837.8	W	11-22-78	777
L	427	8458.6	S	4120.6	W	11-21-78	797
L	428	10466.2	S	795.5	W	11-30-78	900
L	429	8706.3	S	4474.1	W	11-29-78	780
L	430	8496.9	S	4662.4	W	11-27-78	752
L	431	8133.2	S	4290.7	W	11-29-78	780
L	441	8298.1	S	4494.8	W	11-27-78	778
L	442	8408.9	S	4675.6	W	11-30-78	760
L	443	9161.0	S	4353.0	W	11-30-78	780
L	444	8501.0	S	3145.9	W	11-29-78	798
L	445	8445.6	S	4220.1	W	11-29-78	780
L	446	8851.7	S	4091.0	W	12- 1-78	780
L	447	8311.1	S	4272.5	W	12- 4-78	773
L	448	8095.5	S	3964.6	W	12- 1-78	800
L	449	8315.6	S	4683.4	W	12- 4-78	860
L	450	9156.1	S	4065.8	W	12- 1-78	769
L	451	8818.8	S	4275.7	W	12- 5-78	770
L	452	8097.8	S	3878.9	W	12- 6-78	791
L	453	9161.5	S	4440.7	W	12- 7-78	751
L	454	8422.6	S	4785.1	W	12- 6-78	751
L	455	8211.7	S	4681.1	W	12- 6-78	751
L	456	8593.4	S	3829.0	W	12- 8-78	779
L	457	8382.9	S	3843.6	W	12- 7-78	789
L	458	8185.2	S	3862.6	W	12- 8-78	790
L	459	8834.4	S	4186.1	W	12- 7-78	769
L	460	8697.0	S	4676.0	W	12- 8-78	750
L	639	8694.3	S	4294.5	W	3-31-80	757
L	644	8378.6	S	3935.2	W	3-20-80	799
L	645	8194.6	S	3954.8	W	3-20-80	799
L	646	9060.6	S	4242.7	W	3-18-80	779
L	647	9041.7	S	3878.0	W	3-18-80	777
L	648	9134.0	S	3673.6	W	3-18-80	780
L	649	9164.9	S	4528.3	W	3-17-80	759
L	650	9661.2	S	1061.2	W	3-10-80	717
L	651	9271.1	S	1602.2	W	3-11-80	600
L	652	9040.2	S	2455.6	W	3-12-80	619
L	653	9179.0	S	2012.5	W	3-14-80	599
L	654	8569.7	S	4108.0	W	3-19-80	780
L	655	8766.5	S	5039.5	W	3-19-80	757
L	656	8872.3	S	5058.9	W	3-20-80	757
L	657	8707.8	S	4573.7	W	3-26-80	759
L	658	9064.8	S	4164.8	W	3-26-80	774
L	659	8311.8	S	4589.6	W	3-27-80	720
L	660	8299.3	S	4163.6	W	3-21-80	779
L	661	8383.2	S	4146.4	W	3-21-80	780
L	662	8125.0	S	4692.7	W	3-27-80	757

SECTION 13 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
L 663	8777.6	S	4851.3	W	3-21-80	758
L 664	8783.7	S	4671.5	W	3-21-80	760
L 665	8582.0	S	3930.9	W	3-27-80	777
L 666	8375.9	S	4248.6	W	3-27-80	778
L 667	8599.0	S	4368.7	W	3-26-80	780
L 668	8466.2	S	4330.3	W	3-28-80	778
L 669	8838.6	S	3997.7	W	3-31-80	775
L 670	8975.9	S	4846.2	W	3-28-80	757
L 671	9051.6	S	4340.0	W	3-31-80	759
L 672	9108.7	S	2229.6	W	3-31-80	600
Ross 32	6292.2	S	79.4	E	2-28-77	560
70-1	2492	N	1240	E	NR	NR
M-39	3488	N	130	E	6- 2-69	600
M-49	3200	N	4420	E	6- 4-69	620

SECTION 14 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
Ida 381	5433.0 S	5729.3 W	1-17-77	518
L 7	7924.1 S	5321.0 W	5-18-76	998
L 8	7883.7 S	9433.4 W	5-18-76	996
L 9	5899.1 S	6575.4 W	12-29-76	585
L 10	5555.5 S	10249.1 W	5-19-76	997
L 12	7940.8 S	7489.9 W	5-28-76	998
L 13	5918.4 S	7773.1 W	12-29-76	635
L 14	5980.8 S	10244.4 W	12-30-76	671
L 15	7952.0 S	7091.8 W	12-30-76	396
L 17	6408.9 S	7764.9 W	1- 3-77	598
L 18	6096.4 S	6576.3 W	1- 4-77	600
L 20	7965.0 S	6588.2 W	1- 4-77	395
L 21	5863.1 S	9370.8 W	1- 3-77	598
L 22	6061.7 S	9360.0 W	1- 7-77	438
L 23	6359.8 S	10252.7 W	1- 6-77	455
L 26	6512.1 S	7751.5 W	1- 4-77	500
L 27	6288.1 S	6591.2 W	1- 5-77	540
L 28	7955.1 S	7000.0 W	1- 6-77	697
L 29	7967.5 S	6498.7 W	1- 6-77	396
L 30	6610.0 S	7736.3 W	1- 5-77	460
L 31	7260.5 S	5870.7 W	1- 5-77	535
L 32	6475.7 S	6612.3 W	1- 5-77	494
L 33	6705.7 S	7721.2 W	1- 6-77	435
L 34	6483.8 S	6720.6 W	1- 7-77	456
L 35	7250.5 S	6069.7 W	1- 7-77	500
L 36	7256.2 S	5960.7 W	1-10-77	479
L 37	6156.6 S	10243.5 W	1- 7-77	413
L 38	6807.1 S	7703.8 W	1-10-77	412
L 39	7954.5 S	7049.5 W	1-10-77	297
L 40	7232.8 S	6675.7 W	1-10-77	417
L 41	6744.5 S	10219.4 W	1-10-77	393
L 42	6445.2 S	9410.0 W	1-10-77	418
L 43	6868.8 S	6652.3 E	1-11-77	435
L 44	7219.7 S	7281.4 W	1-11-77	454
L 45	6903.4 S	7689.6 W	1-10-77	432
L 46	6028.7 S	9810.0 W	1-11-77	399
L 47	7383.2 S	9580.2 W	1-11-77	398
L 48	7228.2 S	7641.3 W	1-12-77	433
L 49	5996.8 S	10043.7 W	1-12-77	358
L 50	5578.1 S	9972.4 W	1-12-77	435
L 51	7278.1 S	10298.2 w	1-14-77	354
L 52	6968.3 S	6659.4 W	1-12-77	450
L 53	6952.7 S	9477.6 W	1-12-77	375
L 54	7224.8 S	7462.8 W	1-12-77	434
L 55	6011.4 S	9949.6 W	1-12-77	375
L 56	6840.8 S	9469.3 W	1-13-77	350
L 58	7227.6 S	7564.1 W	1-13-77	434
L 59	5588.2 S	9869.3 W	1-13-77	418
L 60	6748.0 S	9458.3 W	1-14-77	359

SECTION 14 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES	DATE COMPLETED	DEPTH DRILLED
L 61	7960.6 S 10161.6 W	1-14-77	318
L 62	6996.7 S 10257.0 W	1-14-77	346
L 63	7599.0 S 10216.4 W	1-14-77	328
L 64	6886.0 S 10239.0 W	1-14-77	359
L 65	7482.2 S 10246.0 W	1-14-77	209
L 80	5514.1 S 6602.5 W	1-25-77	455
L 81	5846.8 S 6780.6 W	1-26-77	480
L 82	5467.2 S 7770.6 W	1-26-77	467
L 84	6498.6 S 7659.7 W	1-27-77	413
L 85	6091.3 S 6673.7 W	1-27-77	478
L 93	6398.7 S 7663.2 W	1-28-77	416
L 94	6450.7 S 7659.6 W	2- 1-77	416
L 95	6180.6 S 8191.2 W	2- 1-77	396
L 96	6175.7 S 8382.2 W	2- 2-77	390
L 97	6279.0 S 8293.8 W	2- 2-77	389
L 98	6083.1 S 8286.5 W	2- 1-77	395
L 99	6190.3 S 6684.1 W	2- 1-77	473
L 106	6185.9 S 6782.1 W	2- 2-77	475
L 107	6286.7 S 6694.7 W	2- 2-77	476
L 111	6283.5 S 6785.0 W	2- 7-77	476
L 112	6278.1 S 6889.2 W	2- 7-77	476
L 114	6271.6 S 8391.1 w	2- 7-77	393
L 115	6277.3 S 8195.1 W	2- 8-77	416
L 117	6185.2 S 6581.6 W	2-10-77	476
L 144	5992.1 S 8286.5 W	10- 2-78	300
L 145	6382.3 S 8287.1 W	10- 2-78	420
L 146	6280.1 S 8573.9 W	10- 2-78	400
L 147	6284.1 S 8006.4 W	10- 2-78	420
L 148	6320.6 S 7773.6 W	10- 2-78	420
L 149	6275.1 S 6986.7 W	10- 2-78	440
L 150 CH	6540.7 S 7748.4 W	10-28-78	421
L 151	6185.8 S 8007.1 W	10- 3-78	300
L 152	6483.1 S 7998.8 W	10- 3-78	420
L 153	6391.7 S 7562.6 W	10- 3-78	420
L 154	6473.4 S 8568.9 W	10- 4-78	400
L 155	6275.8 S 7177.0 W	10- 3-78	440
L 156	6375.2 S 7375.6 W	10- 3-78	420
L 157	6183.1 S 6990.5 W	10- 3-78	435
L 158	6571.2 S 8306.3 W	10- 3-78	420
L 159	6699.6 S 8000.0 W	10- 3-78	420
L 160	6095.8 S 8000.8 W	10- 5-78	300
L 161	6462.5 S 6975.6 W	10- 4-78	440
L 162	6677.8 S 6681.9 W	10- 4-78	460
L 163	6295.0 S 7560.9 W	10- 6-78	438
L 164	6286.0 S 7391.4 W	10- 6-78	440
L 165	6180.6 S 7180.5 W	10- 5-78	439
L 166	6588.8 S 8000.0 W	10- 4-78	420
L 167	6099.7 S 7000.1 W	10- 4-78	440
L 168	6798.3 S 7999.4 W	10- 5-78	420
L 169	6665.1 S 8307.8 W	10- 5-78	421

SECTION 14 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
L	170	6371.6	S	6982.3	W	10- 5-78	440
L	171	6470.9	S	6899.5	W	10- 5-78	438
L	172	6478.9	S	6808.3	W	10- 5-78	438
L	173	6651.4	S	8570.9	W	10- 5-78	400
L	174	6656.9	S	8770.8	W	10- 6-78	399
L	183	6984.3	S	7992.4	W	10-12-78	419
L	184	6382.8	S	6800.7	W	10-10-78	440
L	185	6182.7	S	8102.8	W	10- 6-78	300
L	186	6845.6	S	8312.3	W	10-11-78	421
L	187	6088.5	S	7184.3	W	10-11-78	438
L	188	6188.2	S	7399.0	W	10-10-78	440
L	189	6833.4	S	8576.7	W	10-11-78	400
L	190	6560.1	S	8774.2	W	10-12-78	380
L	191	6852.7	S	8752.4	W	10-11-78	420
L	192	6189.9	S	7558.9	W	10-10-78	460
L	193	7094.4	S	8997.2	W	10-11-78	399
L	194	6692.5	S	8973.4	W	10-12-78	400
L	195	6902.3	S	9194.6	W	10-11-78	361
L	196	6592.0	S	7565.4	W	10-10-78	418
L	197	6674.3	S	8202.7	W	10-11-78	421
L	198	6687.1	S	8104.1	W	10-10-78	420
L	199	6685.9	S	6963.8	W	10-11-78	438
L	200	6604.0	S	7649.2	W	10-11-78	418
L	201	6799.5	S	7564.4	W	10-11-78	419
L	202	6885.5	S	6949.6	W	10-27-78	459
L	203	6998.6	S	7572.0	W	10-27-78	420
L	204	7105.4	S	7570.4	W	10-30-78	441
L	205	6690.4	S	7162.1	W	10-30-78	440
L	206	6572.5	S	6968.0	W	10-27-78	439
L	207	7022.5	S	8583.4	W	10-12-78	419
L	208	7036.3	S	8320.8	W	10-12-78	419
L	209	6924.9	S	8576.5	W	10-13-78	421
L	210	6740.2	S	8573.3	W	10-12-78	392
L	211	6833.8	S	8672.2	W	10-13-78	399
L	212	6502.7	S	9000.5	W	10-16-78	281
L	213	6837.7	S	8401.8	W	10-13-78	399
L	214	6833.4	S	8494.7	W	10-13-78	401
L	215	6984.1	S	8994.3	W	10-13-78	399
L	216	6993.8	S	9193.8	W	10-13-78	359
L	217	6942.9	S	8318.1	W	10-16-78	414
L	218	7222.8	S	8331.9	W	10-13-78	418
L	219	7062.4	S	8786.9	W	10-13-78	417
L	220	6974.3	S	9356.9	W	10-16-78	360
L	221	7062.1	S	9475.1	W	10-16-78	361
L	222	6693.8	S	9199.0	W	10-16-78	359
L	223	7297.4	S	8997.0	W	10-16-78	399
L	224	6955.2	S	8776.3	W	10-16-78	421
L	225	7035.0	S	8414.6	W	10-17-78	419

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HOLE NUMBER		LOCATION COORDINATES				DATE COMPLETED	DEPTH* DRILLED
L	226	7089.9		9199.5	W	10-10-78	358
L	227	6750.4		8308.7	W	10-17-78	421
L	228	7070.2	S	9346.2	W	10-16-78	359
L	229	7155.0	S	9476.6	W	10-17-78	360
L	230	7052.4	S	9594.8	W	10-17-78	361
L	231	6882.9	S	10011.9	W	10-17-78	358
L	232	6874.0	S	9799.8	W	10-17-78	359
L	233	6397.5	S	8992.5	W	10-17-78	261
L	234	6584.6	S	9192.0	W	10-17-78	261
L	235	6851.2	S	8202.7	W	10-17-78	419
L	236	7182.4	S	9194.7	W	10-17-78	359
L	237	6794.7	S	8973.7	W	10-17-78	359
L	238	6754.3	S	8199.7	W	10-18-78	419
L	239	6844.4	S	9597.7	W	10-18-78	341
L	240	7157.9	S	9596.1	W	10-18-78	341
L	241	6765.6	S	8073.7	W	10-18-78	419
L	242	6786.1	S	10012.4	W	10-18-78	358
L	243	6976.7	S	10012.4	W	10-19-78	338
L	244	6775.6	S	9808.1	W	10-18-78	359
L	245	6973.1	S	9790.4	W	10-19-78	339
L	246	6304.8	S	8994.1	W	10-20-78	259
L	247	6599.3	S	8993.2	W	10-20-78	258
L	248	6461.8	S	8775.8	W	10-20-78	258
L	249	6492.3	S	9192.0	W	10-19-78	239
L	250	6745.3	S	9597.6	W	10-19-78	339
L	251	6946.7	S	9599.6	W	10-[illegible]-78	339
L	252	7256.1	S	9594.7	W	10-2[illegible]-78	338
L	253	6885.5	S	10122.3	W	10-23-78	359
L	254	6893.7	S	10350.8	W	10-23-78	359
L	255	5603.2	S	9779.4	W	10-24-78	418
L	256	5396.2	S	9868.5	W	10-24-78	438
L	257	5787.4	S	9963.6	W	10-24-78	421
L	258	6073.3	S	10246.1	W	10-24-78	401
L	259	6257.3	S	10248.1	W	10-24-78	399
L	260	6395.0	S	9188.4	W	10-24-78	240
L	261	7072.0	S	9779.5	W	10-24-78	339
L	262	6346.5	S	8791.4	W	10-24-78	259
L	263	6564.9	S	8566.6	W	10-24-78	261
L	264	7267.2	S	9776.1	W	10-25-78	333
L	265	6805.2	S	10352.8	W	10-24-78	361
L	266	7415.6	S	7449.5	W	10-30-78	460
L	267	7064.1	S	6662.2	W	10-27-78	458
L	268	7075.3	S	6463.5	W	10-30-78	459
L	269	7283.0	S	9980.5	W	10-25-78	319
L	270	5794.9	S	9873.0	W	10-25-78	418
L	271	5774.5	S	10060.7	W	10-25-78	421
L	272	5895.1	S	9960.7	W	10-25-78	401
L	273	5694.3	S	9871.3	W	10-25-78	419
L	274	6166.2	S	10348.3	W	10-26-78	421
L	275	6155.2	S	10147.3	W	10-25-78	402

SECTION 14 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
L 276	5396.2 S	9766.0 W	10-26-78	419
L 277	5499.3 S	9872.1 W	10-26-78	418
L 278	6233.8 S	8760.4 W	10-26-78	259
L 279	5805.7 S	9779.0 W	10-26-78	401
L 280	7357.3 S	10189.8 W	10-25-78	339
L 281	5394.3 S	9966.8 W	10-27-78	420
L 282	5903.0 S	9876.3 W	10-27-78	397
L 283	6096.7 S	10036.8 W	10-26-78	401
L 284	7184.1 S	10001.4 W	10-26-78	221
L 285	7291.3 S	10087.6 W	10-26-78	222
L 286	6271.7 S	10350.3 W	10-27-78	401
L 287	5392.6 S	9670.0 W	10-20-78	439
L 288	5821.4 S	9678.0 W	10-30-78	411
L 289	6999.0 S	7672.8 W	10-31-78	401
L 290	5404.2 S	8763.8 W	10-30-78	459
L 291	7070.5 S	6945.8 W	11- 2-78	459
L 292	7220.1 S	7371.4 W	10-30-78	440
L 293	6975.3 S	6469.8 W	10-31-78	439
L 294	7145.9 S	6667.2 W	10-31-78	439
L 295	6891.9 S	7150.3 W	10-31-78	440
L 296	7766.4 S	7095.8 W	11- 1-78	382
L 297	7784.7 S	6503.0 W	11- 1-78	400
L 298	7441.0 S	6056.7 W	11- 1-78	439
L 299	7091.2 S	6076.2 W	10-31-78	459
L 300WW	6341.3 S	8585.0 W	1-16-78	NR
L 301CH	6524.7 S	7768.6 W	11- -78	387
L 302CH	6491.0 S	7770.8 W	11- 8-78	268
L 303	6534.2 S	7787.3 W	11-15-78	497
L 304	6485.8 S	7754.8 W	11- 7-78	NR
L 305	6226.4 S	7790.5 W	11-27-78	400
L 306	6533.8 S	7863.4 W	1-11-79	395
L 307	6717.5 S	7729.4 W	1-11-79	381
L 308	6518.3 S	7711.8 W	1-15-79	390
L 309	6438.5 S	7768.5 W	12- 6-78	255
L 310	6592.4 S	7753.6 W	1- 3-79	255
L 311	6456.5 S	7573.9 W	NR	NR
L 312	6526.8 S	8100.4 W	1-12-79	270
L 313	6444.2 S	7550.3 W	12-22-78	249
L 314	6508.2 S	7797.0 W	12-26-78	548
L 315WW	6294.1 S	8582.0 W	4- 9-79	78
L 316	7128.8 S	8232.1 W	4-30-79	418
L 317WW	6713.4 S	7671.9 W	5-24-79	265
L 318	6946.8 S	10173.5 W	4-30-79	358
L 319WW	7006.9 S	7620.9 W	5-29-79	275
L 320WW	6754.8 S	7917.3 W	5-25-79	257
L 321	7224.7 S	7183.4 W	11- 1-78	440
L 322	5390.7 S	9568.3 W	10-31-78	438
L 323	7427.6 S	7552.2 W	10-31-78	421

SECTION 14 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
L	324	7413.3	S	7356.4	W	10-31-78	440
L	325	7615.8	S	7338.0	W	11- 1-78	421
L	326	6691.8	S	7068.2	W	11- 7-78	420
L	327	7032.4	S	7387.2	W	11- 3-78	439
L	328	6877.5	S	6478.5	W	11- 1-78	439
L	329	7077.8	S	7159.5	W	11- 2-78	440
L	330	6880.6	S	6106.3	W	11- 1-78	478
L	331	7085.4	S	6178.4	W	11- 7-78	461
L	332	7096.4	S	5982.5	W	11- 6-78	481
L	333	7229.0	S	7088.2	W	11- 2-78	440
L	334	7444.4	S	6250.6	W	11- 2-78	439
L	335	7780.2	S	6691.6	W	11- 2-78	400
L	336	7785.4	S	6406.8	W	11- 2-78	399
L	337	7520.0	S	7344.7	W	10- 2-78	421
L	338	6786.7	S	6488.0	W	11- 3-78	461
L	339	6874.6	S	6205.0	W	11- 7-78	479
L	340	6861.7	S	6010.8	W	11- 6-78	500
L	341	6681.6	S	6215.7	W	11- 2-78	501
L	342	7763.7	S	7202.7	W	11- 3-78	380
L	343	7773.2	S	6996.7	W	11- 3-78	400
L	344	7619.5	S	7241.8	W	11- 3-78	380
L	345	6971.6	S	6952.3	W	11- 7-78	419
L	346	7443.1	S	6351.7	W	11- 3-78	441
L	347	7445.8	S	6150.6	W	11- 3-78	440
L	348	7347.3	S	6063.3	W	11- 3-78	440
L	349	6682.9	S	6314.8	W	11- 7-78	457
L	350	6683.4	S	6119.4	W	11- 6-78	480
L	351	6583.8	S	6223.2	W	11- 6-78	480
L	352	6684.8	S	6401.0	W	11- 6-78	460
L	353	7544.5	S	6366.8	W	11- 6-78	442
L	354	7518.4	S	7247.8	W	11- 7-78	381
L	359	7664.0	S	6385.9	W	11- 7-78	421
L	360	9226.3	S	9126.2	W	11- 8-78	760
L	361	9203.2	S	10383.8	W	11- 8-78	800
L	362	7082.8	S	6283.9	W	11- 8-78	461
L	363	6782.9	S	6304.3	W	11- 8-78	460
L	367	5387.1	S	9455.9	W	11-13-78	433
L	368	5683.2	S	9768.9	W	11- 9-78	432
L	369	5713.2	S	9935.6	W	11-13-78	388
L	370	5880.0	S	10059.3	W	11-15-78	395
L	371	6239.9	S	10147.4	W	11-13-78	395
L	372	7253.9	S	10212.5	W	11-15-78	334
L	373	6882.4	S	9363.2	W	11-15-78	357
L	374	6746.6	S	8476.7	W	11-17-78	388
L	375	6366.0	S	8381.3	W	11-15-78	288
L	376	6273.0	S	8118.7	W	11- 9-78	290

SECTION 14 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
L	377	6094.0	S	8192.5	W	11- 9-78	299
L	378	6361.0	S	8133.3	W	11-17-78	291
L	379	[illegible]706.6	S	10070.7	W	11-15-78	393
L	380	7126.6	S	8331.5	W	11-17-78	409
L	381	7041.7	S	8219.5	W	11-17-78	421
L	382	6881.1	S	8001.7	W	11-17-78	422
L	383	6225.6	S	10051.9	W	11-[illegible]7-78	395
L	384	6770.1	S	9[illegible]	W	11-17-78	356
L	385	6349.2	S	8479.6	W	11-17-78	271
L	386	7094.4	S	7673.9	W	11-18-78	395
L	387	6896.7	S	7793.7	W	11-18-78	416
L	388	6410.5	S	7860.6	W	11-18-78	416
L	389	6587.6	S	7464.7	W	11-18-78	416
L	390	6589.9	S	7161.1	W	11-19-78	437
L	391	6687.4	S	7266.1	W	11-19-78	438
L	392	7070.5	S	6841.9	W	11-17-78	450
L	393	7433.1	S	7247.1	W	11-27-78	415
L	394	7631.6	S	7139.9	W	11-27-78	397
L	395	7661.3	S	6480.2	W	11-27-78	415
L	396	7667.6	S	6278.4	W	11-27-78	415
L	397	7347.5	S	6234.4	W	11-29-78	440
L	398	7183.5	S	6268.0	W	11-29-78	457
L	399	7084.8	S	7773.5	W	11-30-78	395
L	400	6891.8	S	6313.2	W	11-29-78	456
L	401	8634.9	S	10379.5	W	11- 9-78	420
L	402	8609.7	S	9124.2	W	11- 9-78	420
L	405	8913.5	S	9133.0	W	11-13-78	420
L	406	8923.3	S	10378.5	W	11-13-78	298
L	407	9077.2	S	9132.1	W	11-13-78	420
L	408	8745.7	S	9123.2	W	11-13-78	338
L	409	8789.3	S	10366.4	W	11-14-78	278
L	410	8994.9	S	9133.4	W	11-14-78	420
L	411	9094.1	S	9323.0	W	11-14-78	418
L	413	8769.9	S	9737.8	W	11-15-78	414
L	465	7390.2	S	10287.3	W	12-14-78	335
L	432	7098.1	S	5898.2	W	11-30-78	457
L	433	6686.1	S	6031.6	W	11-30-78	457
L	434	7193.3	S	6360.2	W	11-30-7[illegible]	437
L	435	6659.3	S	5932.2	W	12-[illegible]	477
L	436	5495.2	S	9774.1	W	12-12-[illegible]	433
L	437	5498.5	S	9683.8	W	12-21-78	435
L	438	5491.7	S	9565.8	W	12-12-78	433
L	439	5604.5	S	9686.0	W	12-12-78	433
L	440	5911.4	S	9777.6	W	12-12-78	438
L	461	6075.1	S	10142.8	W	12-12-78	417
L	462	6586.5	S	9432.9	W	12-13-78	237
L	463	6680.2	S	9389.8	W	12-13-78	235
L	464	6784.4	S	10124.1	W	12-13-78	353

Drill Hole and Abandon Well Tabulation
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HOLE NUMBER		LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
L	466	6564.3 S	8491.2 W	12-13-78	413
L	467	6652.1 S	8495.2 W	12-13-78	416
L	468	6448.9 S	8389.4 W	12-14-78	417
L	469	6922.2 S	8515.4 W	12-15-78	415
L	470	6091.7 S	8395.0 W	12-14-78	295
L	471	6386.0 S	8211.1 W	12-14-78	416
L	472	6492.1 S	8121.9 W	12-15-78	415
L	473	6578.8 S	8204.9 W	12-15-78	415
L	474	6590.5 S	8110.8 W	12-15-78	416
L	475	7313.5 S	7569.6 W	12-19-78	433
L	476	7038.5 S	7489.1 W	12-19-78	433
L	477	7117.0 S	7464.5 W	12-19-78	433
L	478	7316.4 S	7460.3 W	12-19-78	436
L	479	7032.2 S	7278.1 W	12-19-78	436
I	480	6900.3 S	7247.8 W	12-19-78	436
L	482	6082.2 S	6896.6 W	12-19-78	436
I	483	6177.3 S	6890.3 W	12-18-78	432
L	484	6083.0 S	6799.7 W	12-19-78	433
L	485	6373.6 S	6900.0 W	12-18-78	433
L	486	6386.9 S	6692.5 W	12-18-78	437
L	487	6792.5 S	6687.8 W	12-18-78	470
L	488	6685.7 S	6493.4 W	12-19-78	475
L	489	6584.3 S	6318.3 W	12-18-78	475
L	490	6590.6 S	6148.0 W	12-18-78	473
L	491	7197.0 S	6453.5 W	12-15-78	453
L	492	7257.9 S	6163.6 W	12-15-78	455
L	493	7351.2 S	6137.9 W	12-15-78	450
L	494	7537.9 S	6272.8 W	12-15-78	435
L	495	7550.5 S	6457.2 W	12-15-78	436
L	496	6985.9 S	10123.1 W	12-13-78	351
L	497	5484.1 S	9471.4 W	12-13-78	435
L	498	8945.7 S	9739.0 W	12-19-78	415
L	499	9095.9 S	9512.5 W	12-19-78	417
L	500	6910.3 S	7343.3 W	12-20-78	433
L	501	6723.6 S	7747.5 W	12-14-78	383
L	502	6800.1 S	7268.2 W	12-20-78	435
L	503	7125.1 S	7366.4 W	12-20-78	433
L	504	7284.6 S	7664.7 W	12-19-78	433
L	505	7327.8 S	7356.5 W	12-20-78	431
L	506	7143.4 S	7152.6 W	12-20-78	435
L	507	9222.4 S	9323.8 W	12-19-78	433
L	508	9087.2 S	9418.8 W	12-20-78	415
L	509CH	6531.9 S	7825.3 W	3-30-79	400
L	510CH	6178.9 S	7081.6 W	4- 4-79	419
L	511CH	6183.2 S	8237.6 W	4- 9-79	278
L	512CH	6871.2 S	9412.8 W	4-12-79	319
L	513	6353.8 S	7836.0 W	4-19-79	418
L	514	6304.8 S	7900.7 W	4-18-79	423
L	515	6415.0 S	7911.0 W	4-19-79	418

SECTION 14 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
L	516	6676.9 S	7840.4 W	4-20-79	399
L	517	6598.0 S	7609.0 W	4-16-79	400
L	518	6663.0 S	7639.5 W	4-16-79	400
L	519	6193.1 S	7473.3 W	4-18-79	438
L	520	6132.6 S	7315.9 W	4-18-79	439
L	521	6345.1 S	7467.3 W	4-18-79	439
L	522	6373.8 S	7327.0 W	4-18-79	419
L	523	6588.9 S	7513.9 W	4-17-79	400
L	524	6592.7 S	7261.9 W	4-17-79	435
L	525	6497.6 S	7172.7 W	4-17-79	439
L	526	6694.3 S	7364.4 W	4-17-79	439
L	527	6803.4 S	7372.8 W	4-17-79	438
L	528	6916.8 S	7440.1 W	4-17-79	438
L	529	6239.3 S	7474.9 W	4-18-79	438
L	530	6027.3 S	7108.5 W	4-18-79	438
L	531	6036.7 S	6898.6 W	4-19-79	438
L	532	6274.7 S	6490.9 W	4-19-79	449
L	533	6178.5 S	6486.5 W	1-19-79	437
L	534	6383.3 S	6590.4 W	4-20-79	448
L	535	6524.2 S	6896.8 W	4-20-79	437
L	536	6631.0 S	6966.1 W	4-20-79	438
L	537	6635.1 S	7077.2 W	4-20-79	438
L	538	6802.3 S	7054.7 W	4-23-79	439
L	539	6791.5 S	6953.4 W	4-23-79	438
L	540	6663.0 S	7586.8 W	4-20-79	398
L	541	6778.9 S	6857.3 W	4-23-79	458
L	542	6874.4 S	6744.2 W	4-23-79	459
L	543	6796.6 S	6590.8 W	4-23-79	458
L	544	6745.0 S	6397.9 W	4-25-79	459
L	545	6577.8 S	5934.1 W	4-25-79	496
L	546	6651.1 S	5828.7 W	4-25-79	477
L	547	6784.3 S	5925.5 W	4-24-79	476
L	548	6966.6 S	5951.5 W	4-24-79	495
L	549	7210.0 S	5884.7 W	4-24-79	478
L	550	7355.4 S	5954.4 W	4-24-79	455
L	551	7199.5 S	6557.8 W	4-26-79	458
L	552	7172.3 S	6833.2 W	4-25-79	457
L	553	7226.6 S	6980.0 W	4-25-79	438
L	554	7336.0 S	7088.4 W	4-25-79	435
L	555	6792.5 S	7154.5 W	4-26-79	435
L	556	6922.1 S	7540.0 W	4-26-79	418
L	557	6742.1 S	8365.3 W	4-26-79	415
L	558	6384.5 S	8013.3 W	4-27-79	417
L	559	6182.2 S	7947.2 W	4-27-79	298
L	560	6042.9 S	8010.6 W	4-27-79	296
L	561	6276.5 S	8443.4 W	4-27-79	295
L	562	6965.6 S	5857.7 W	4-26-79	493
L	563	7224.7 S	6828.0 W	4-27-79	457
L	564	6412.1 S	8574.8 W	4-30-79	398

SECTION 14 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
L	565	6484.5 S	8673.3 W	4-30-79	398
L	566	6812.3 S	9215.5 W	4-30-79	300
L	567CH	NR	NR	5- 8-79	448
L	568CH	5748.7 S	9824.5 W	5- 3-79	373
L	570	6735.3 S	7663.8 W	5-17-79	100
L	571	5449.7 S	6632.3 W	6- 5-79	440
L	572WW	6615.6 S	7682.9 W	5-22-79	259
L	573WW	6719.3 S	7604.7 W	5-30-79	274
L	574WW	6761.7 S	7737.0 W	5-30-79	265
L	575	6639.5 S	7433.3 W	6- 4-79	379
L	576	6707.3 S	7922.3 W	5-31-79	384
L	577	NR	NR	6-22-79	458
L	578	5448.2 S	6669.2 W	6-11-79	335
L	581	6959.4 S	10200.2 W	6-25-79	296
L	582A	NR	NR	6-22-79	459
L	583	NR	NR	7- 5-79	170
L	584CH	5393.0 S	9719.0 W	2-13-80	421
L	585CH	6178.6 S	1020[illegible].8 W	2-13-80	400
L	586CH	6873.2 S	9905.6 W	2-25-80	336
L	587CH	7180.5 S	9113.5 W	3-12-80	350
L	588CH	6740.2 S	8437.1 W	2-22-80	260
L	604CH	6970.3 S	7208.3 W	2-27-80	410
L	589	5589.4 S	10015.0 W	2-22-80	400
L	590	5749.0 S	9731.8 W	2-22-80	399
L	591	5873.1 S	10098.4 W	2-22-80	380
L	592	5982.1 S	10180.4 W	2-22-80	380
L	593	5610.4 S	9590.3 W	2-25-80	399
L	594	6115.1 S	10347.1 W	2-20-80	380
L	595	6283.0 S	10148.6 W	2-20-80	380
L	596	6819.1 S	10222.7 W	2-26-80	340
L	605CH	7865.5 S	6621.6 W	3- 4-80	386
L	618CH	7234.4 S	6307.6 W	2-29-80	440
L	627CH	7362.9 S	7408.2 W	3- 7-80	400
L	628CH	6601.2 S	6924.9 W	3-11-80	415
L	640CH	6551.6 S	9138.9 W	3-20-80	NR
L	641CH	6408.9 S	8747.7 W	3-18-80	250
L	642CH	6720.9 S	8159.0 W	3-14-80	236
L	634	6660.0 S	8626.3 W	3-14-80	399
L	635	7310.8 S	7197.4 W	3-10-80	418
L	636	7690.3 S	7280.3 W	3-11-80	399
L	637	7624.2 S	7644.8 W	3-11-80	419
L	638	7133.5 S	7679.5 W	3-11-80	399
L	643	6572.1 S	8633.9 W	3-13-80	398
L	622	7575.7 S	7585.6 W	3- 6-80	420
L	623	6933.5 S	8234.3 W	3- 6-80	420
L	624	6947.6 S	8689.9 W	3- 7-80	418
L	625	6571.8 S	8385.6 W	3- 7-80	419

SECTION 14 T-34N R-74W

HOLE NUMBER		LOCATION COORDINATES		DATE COMPLETED	DEPTH DRILLED
L	626	6456.6 S	8882.0 W	3-12-80	278
L	629	6911.5 S	9844.9 W	3- 7-80	420
L	630	7502.7 S	7809.4 W	3- 6-80	420
L	631	7421.5 S	7883.0 W	3-10-80	418
L	632	5739.7 S	9643.7 W	3-13-80	398
L	633	5691.7 S	9566.1 W	3-13-80	399
L	603	6434.1 S	7082.3 W	3- 5-80	437
L	614	6494.2 S	7456.2 W	3- 3-80	419
L	615	6322.8 S	7261.6 W	3- 3-80	439
L	616	7306.4 S	7273.5 W	2-29-80	419
L	617	6021.4 S	7181.4 W	3- 4-80	455
L	619	6300.2 S	7627.6 W	3- 5-80	439
L	620	7426.3 S	7771.1 W	3- 5-80	418
L	621	7543.6 S	7713.5 W	3- 6-80	420
L	610	7518.7 S	7138.8 W	2-29-80	398
L	611	7700.2 S	7216.4 W	2-27-80	399
L	612	7877.1 S	7192.5 W	2-27-80	400
L	613	7646.1 S	7039.6 W	2-29-80	398
L	606	7377.8 S	7678.0 W	2-27-80	420
L	607	7466.5 S	7656.7 W	2-28-80	418
L	608	7518.9 S	7545.5 W	2-28-80	419
L	609	7517.5 S	7445.9 W	2-27-80	419
L	597	6814.7 S	9711.1 W	2-19-80	340
L	598	6963.7 S	9702.6 W	2-26-80	339
L	599	6981.9 S	9894.7 W	2-26-80	340
L	600	5690.1 S	9663.4 W	2-25-80	400
L	601	5529.1 S	9968.2 W	2-25-80	399
L	602	6765.1 S	9245.3 W	2-26-80	320
L	674	7476.4 S	8120.0 W	6-25-80	618
L	675	7569.9 S	8720.1 W	6-26-80	618
L	676	7251.6 S	8138.2 W	6-24-80	598
L	677	7623.9 S	8183.1 W	6-26-80	618

Drill Hole and Abandon Well Tabulation
Table D-5.1.01
Page 26

SECTION 18 T-34N R-73W

HOLE NUMBER	LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
FU 24	10312.0	S	3167.6	E	2-15-77	1000
FU 34	NR		NR		3-25-77	637
M-48	3422	N	1333	E	6-24-69	600
Ross 1	4700	N	5100	E	1-20-76	1000
Ross 2	2400	N	5150	E	1-20-76	1000
Ross 3	1200	N	5000	E	2- 2-76	1000
Ross 4	NR		NR		2-23-77	1000
Ross 5	7862.4	S	878.9	E	2-16-77	1020
Ross 6	7789.3	S	457.3	E	2-17-77	1000
Ross 7	6870.0	S	758.5	E	2-18-77	600
Ross 8	7796.1	S	1360.7	E	2-17-77	1000
Ross 9	7809.1	S	2101.4	E	2-17-77	560
Ross 10	7326.9	S	1877.7	E	2-17-77	500
Ross 11	6358.7	S	948.2	E	2-18-77	600
Ross 12	7401.4	S	2363.3	E	2-21-77	580
Ross 13	7848.9	S	2349.8	E	2-21-77	580
Ross 14	7881.3	S	2857.5	E	2-22-77	560
Ross 15	7486.3	S	2874.2	E	2-21-77	540
Ross 16	7577.1	S	4130.7	E	2-22-77	580
Ross 17	5824.7	S	2846.6	E	2-23-77	900
Ross 18	7530.1	S	3537.9	E	2-22-77	560
Ross 19	7546.3	S	3630.0	E	2-23-77	560
Ross 20	7212.9	S	3631.5	E	2-24-77	560
Ross 21	7555.3	S	3731.4	E	2-24-77	540
Ross 22	7159.3	S	3456.9	E	2-24-77	540
Ross 23	8007.7	S	3473.5	E	2-24-77	540
Ross 24	7564.1	S	3816.9	E	2-24-77	540
Ross 25	6284.7	S	532.6	E	2-25-77	540
Ross 26	7963.1	S	3203.7	E	2-24-77	540
Ross 27	7273.7	S	3889.5	E	2-25-77	520
Ross 28	6283.6	S	333.4	E	2-28-77	540
Ross 29	7557.6	S	3772.2	E	2-28-77	540
Ross 30	6289.9	S	235.5	E	3- 1-77	540
Ross 31	6090.3	S	216.6	E	3- 2-77	540
Ross 32	6292.2	S	79.4	E	2-28-77	560
Ross 33	NR		NR		5- 6-80	540
Ross 34	NR		NR		5- 7-80	460
Ross 35	NR		NR		5- 7-80	700
Ross 36	NR		NR		5- 7-80	700
Ross 37	NR		NR		5- 8-80	460
Ross 38	NR		NR		5- 9-80	460

SECTION 23 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
72-1	4900	N	305	E	8-29-72	400
72-2	4985	N	330	E	8-30-72	401
M-51	5010	N	620	E	7- 1-69	600
N- 2	4675	N	2878	E	NR	NR
N- 5	4570	N	1765	E	NR	NR
N- 6	5070	N	1808	E	NR	NR
N- 8	4900	N	333	E	NR	NR
N- 9	4615	N	340	E	NR	NR
N-12	5115	N	300	E	NR	NR
N-13	5355	N	263	E	NR	NR
DN-176	4808	N	228	E	6- 1-73	380
DN-177	4808	N	325	E	6- 4-73	380
DN-178	4808	N	425	E	6- 5-73	380
DN-179	4805	N	526	E	6- 5-73	400
DN-180	4805	N	625	E	6- 5-73	400
DN-181	4808	N	379	E	6- 6-73	400
DN-182	4855	N	429	E	6- 6-73	400
DN-319	4808	N	300	E	11- 4-73	380
DN-320	4903	N	280	E	11- 4-73	400
DN-321	4808	N	357	E	11- 4-73	380
FU 1	12579.0	S	6127.8	W	1-19-77	500
FU 2	11588.1	S	8781.3	W	1-19-77	460
FU 3	11834.2	S	6809.9	W	1-19-77	520
FU 4	11425.6	S	5239.2	W	1-20-77	400
FU 5	12254.3	S	8566.3	W	1-19-77	340
FU 6	13502.0	S	6572.7	W	1-19-77	460
FU 8	12661.8	S	8634.9	W	1-19-77	400
FU 12	11419.3	S	5840.9	W	1-31-77	600
FU 13	11420.4	S	5937.0	W	2- 3-77	600
FU 14	11769.3	S	6149.0	W	1-31-77	600
FU 17	11417.2	S	5746.8	W	2- 3-77	640
FU 18	11419.4	S	6040.7	W	2- 8-77	300
FU 19	11510.2	S	5738.2	W	2- 9-77	300
FU 20	11598.9	S	5713.1	W	2- 8-77	280
FU 21	11582.6	S	5521.9	W	2- 9-77	300
FU 22	11795.8	S	5308.1	W	2- 9-77	300
FU 25	11793.8	S	5508.7	W	2-11-77	300
FU 27	11620.6	S	5809.6	W	2-11-77	300

SECTION 24 T-34N R-74W

HOLE NUMBER	LOCATION COORDINATES				DATE COMPLETED	DEPTH DRILLED
M-25	4510	N	3015	E	6-30-69	600
FU 7	11718.1	S	1268.9	W	1-20-77	600
FU 9	11237.0	S	1940.6	W	1-20-77	500
FU 10	11977.9	S	751.7	W	1-20-77	600
FU 11	11327.9	S	2554.0	W	1-21-77	600
FU 15	11975.5	S	1868.0	W	1-21-77	600
FU 16	11160.2	S	1438.1	W	2-14-77	640
FU 23	11797.5	S	4997.2	W	2-10-77	300
FU 28	11274.0	S	2145.0	W	3-22-77	820
FU 29	11990.0	S	2363.0	W	3-21-77	480
FU 31	11256.0	S	2051.0	W	3-23-77	460
FU 32	13001.6	S	3579.0	E	3-23-77	480
FU 35	11191.0	S	3859.0	W	4- 1-77	720

DRILL HOLE (Surface Disturbance) COUNTS
TO THE NEAREST 40 ACRE AREA
ON LAND ADJACENT TO THE PERMIT AREA

TABLE D-5.1.02

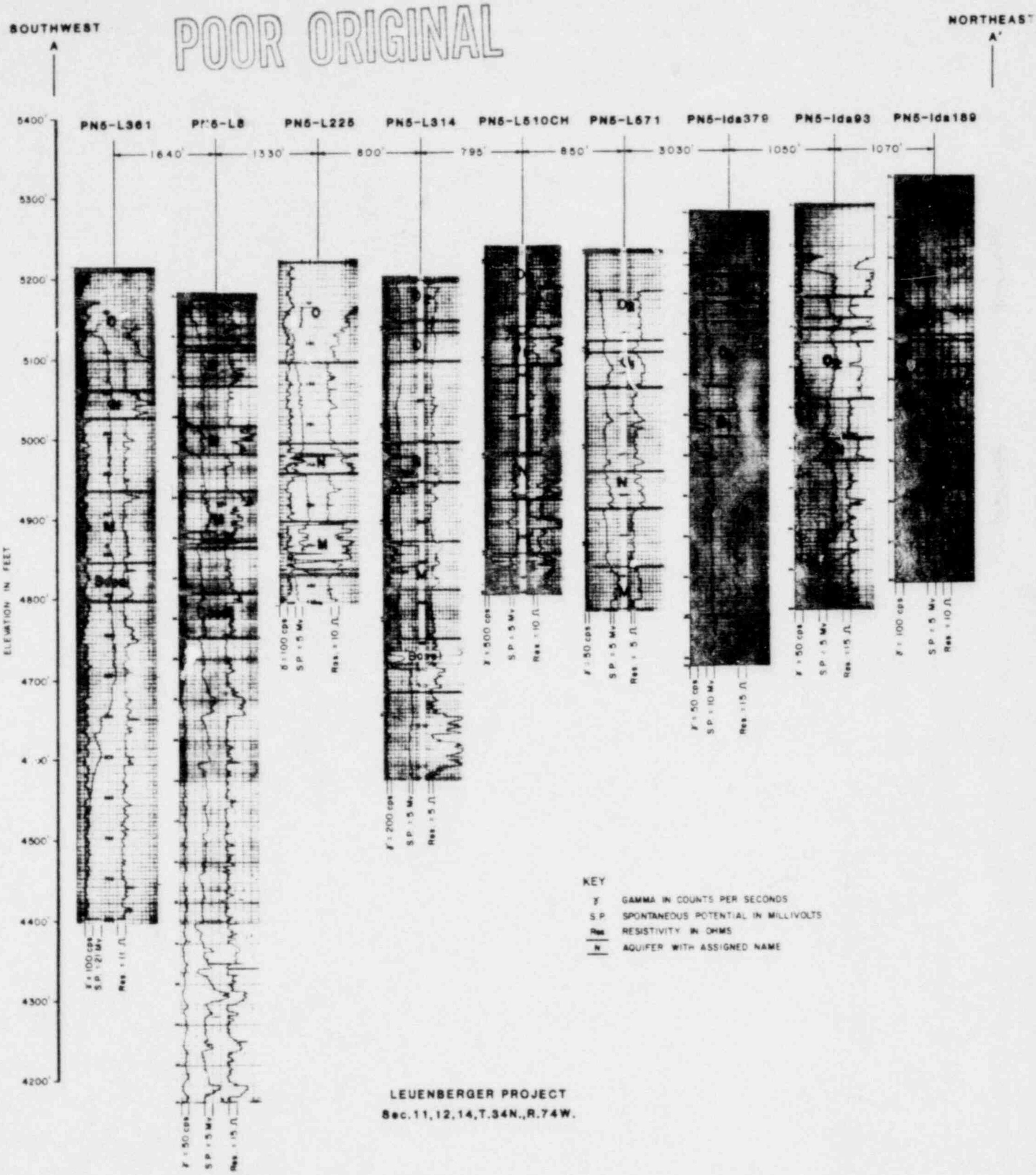
SECTION	TOWNSHIP	RANGE	QUARTER SECTION	NUMBER OF SURFACE DISTURBANCES
10	T-34N	R-74W		
			NE 1/4 SW 1/4	0
			SE 1/4 SW 1/4	1
			NE 1/4 SE 1/4	1
			NW 1/4 SE 1/4	5
			SW 1/4 SE 1/4	14
			SE 1/4 SE 1/4	2
11	T-34N	R-74W		
			SW 1/4 NW 1/4	1
			NE 1/4 SW 1/4	18
			NW 1/4 SW 1/4	2
			SW 1/4 SW 1/4	2
			SE 1/4 SW 1/4	16
			NE 1/4 SE 1/4	0
			NW 1/4 SE 1/4	1
			SW 1/4 SE 1/4	1
			SE 1/4 SE 1/4	0
13	T-34N	R-74W		
			SW 1/4 SW 1/4	2
			SE 1/4 SW 1/4	5
14	T-34N	R-74W		
			NE 1/4 SW 1/4	0
			SW 1/4 SW 1/4	12
			SE 1/4 SW 1/4	4
			NE 1/4 SE 1/4	11
			NW 1/4 SE 1/4	1
			SW 1/4 SE 1/4	23
			SE 1/4 SE 1/4	19

SECTION	TOWNSHIP	RANGE	QUARTER SECTION	NUMBER OF SURFACE DISTURBANCES
15	T-34N	R-74W		
			NE 1/4 NE 1/4	4
			NW 1/4 NE 1/4	4
			SW 1/4 NE 1/4	21
			SE 1/4 NE 1/4	2
			NE 1/4 NW 1/4	3
			SE 1/4 NW 1/4	3
			NE 1/4 SW 1/4	5
			SE 1/4 SW 1/4	4
			NE 1/4 SE 1/4	6
			NW 1/4 SE 1/4	2
			SW 1/4 SE 1/4	0
			SE 1/4 SE 1/4	1
22	T-34N	R-74W		
			NE 1/4 NE 1/4	0
			NW 1/4 NE 1/4	1
			NE 1/4 NW 1/4	5
23	T-34N	R-74W		
			NE 1/4 NE 1/4	15
			NW 1/4 NE 1/4	7
			NE 1/4 NW 1/4	5
			NW 1/4 NW 1/4	13
24	T-34	R-74W		
			NE 1/4 NE 1/4	--
			NW 1/4 NE 1/4	--
			NE 1/4 NW 1/4	3
			NW 1/4 NW 1/4	6

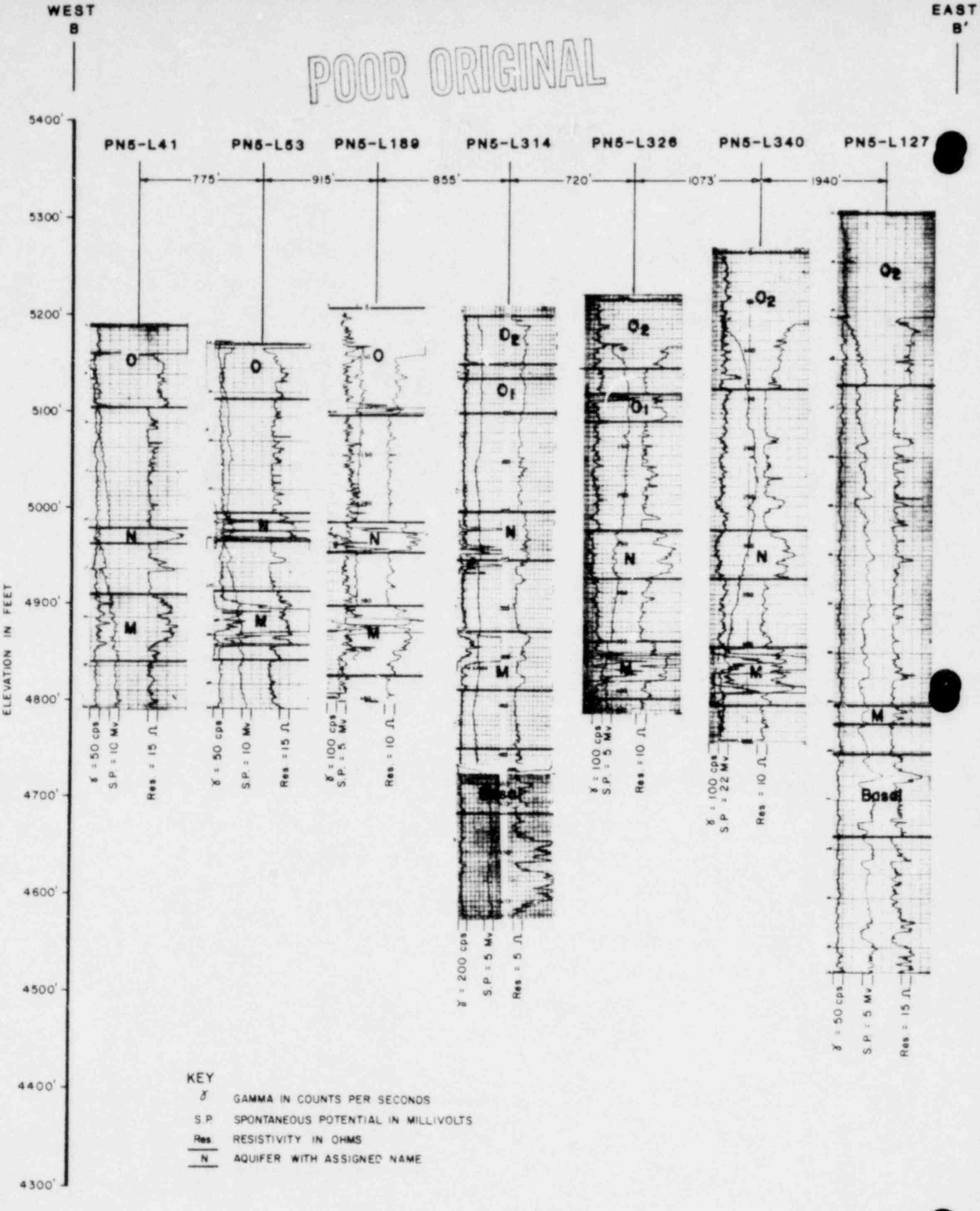
APPENDIX D-5.2

GEOPHYSICAL LOGS

Geologic cross sections given in Section II were constructed from the following geophysical logs. The logs have been photographically reduced in order to place them in sequence according to the cross sections shown. The bore holes selected to construct the cross sections provide the deepest geologic information available along the cross section. Spacing between bore holes was kept as consistent as possible in order to produce a good geologic representation of the area along the cross section. Two cross sections were drawn along the strike and dip of the formation respectively. Two additional cross sections were constructed to intersect the major trend of the ore zones.



GEOPHYSICAL LOGS USED TO CONSTRUCT CROSS SECTION A-A'

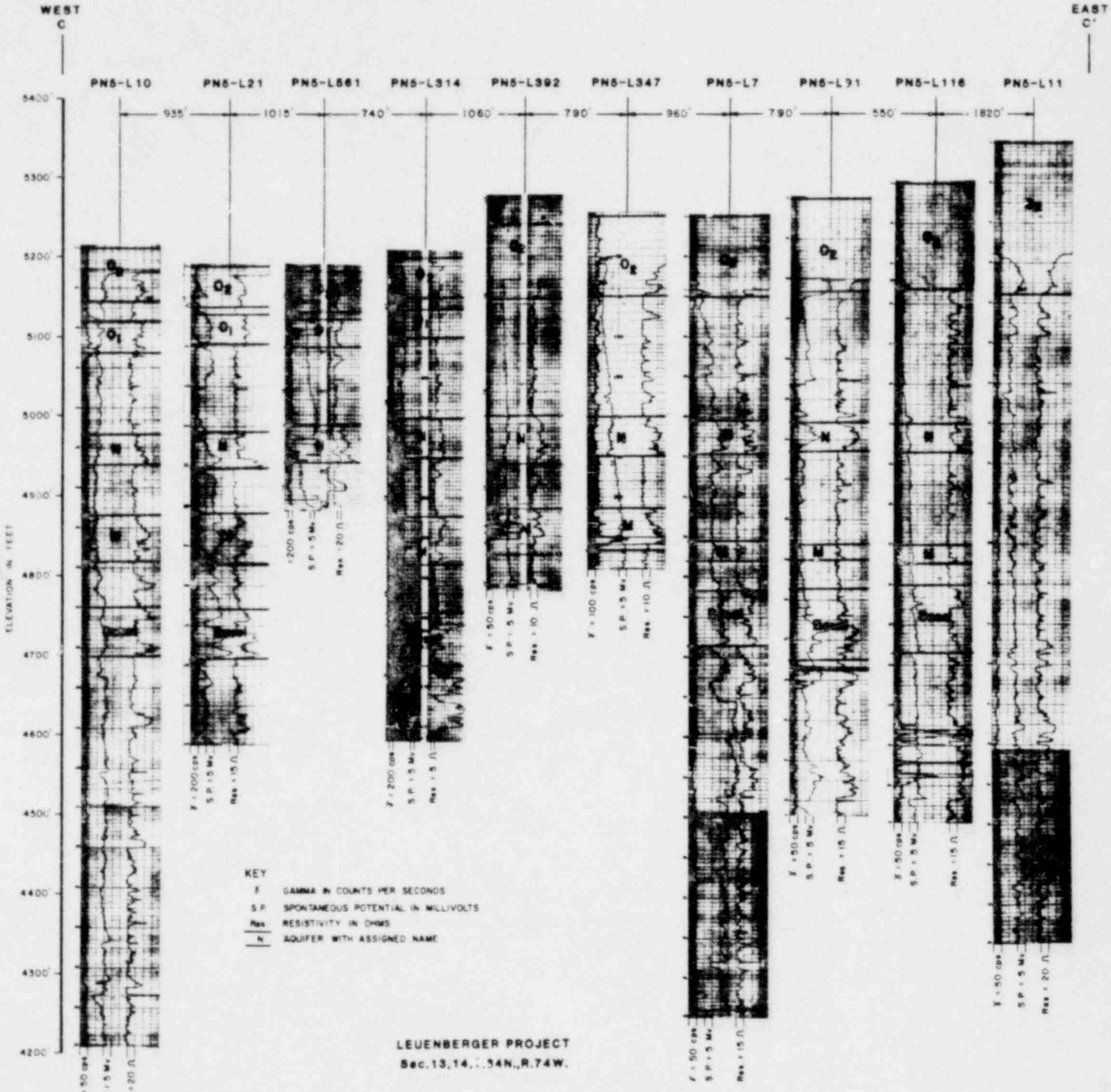


LEUENBERGER PROJECT

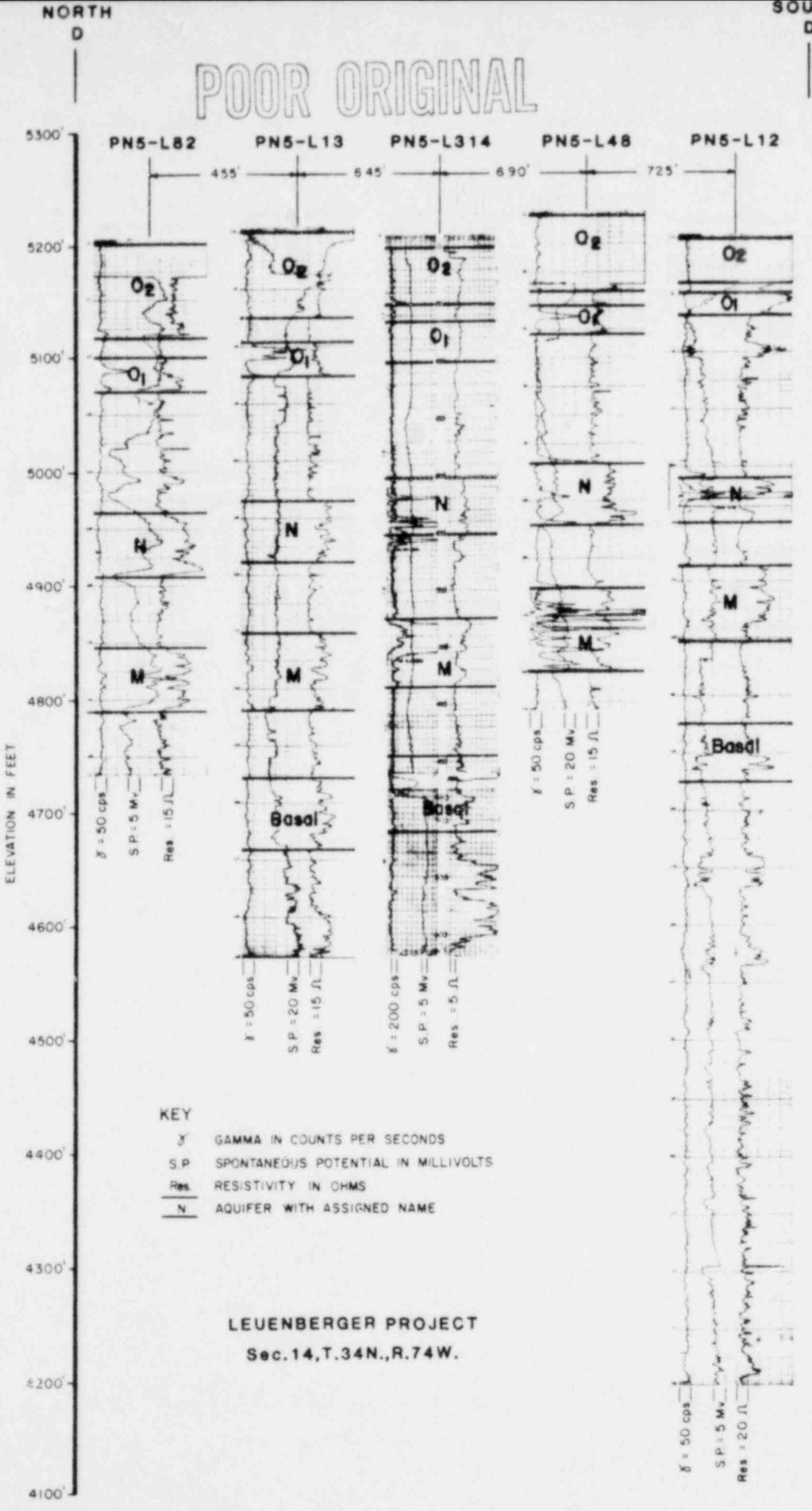
Sec.13,14,T.34N.,R74W.

GEOPHYSICAL LOGS USED TO CONSTRUCT CROSS SECTION B-B'

POOR ORIGINAL



GEOPHYSICAL LOGS USED TO CONSTRUCT CROSS SECTION C-C'



GEOPHYSICAL LOGS USED TO CONSTRUCT CROSS SECTION D-D'

APPENDIX D-6

Hydrological Assessment

APPENDIX D-6.1

WATER RIGHTS

Table D-6.1.01 lists all the surface water rights and Table D-6.1.02 the groundwater rights within the permit area and within three miles of the permit area boundary. Figure D-6.1.01 in this Appendix shows the locations of these water rights. The water right "map number" in the tabulations correspond to the number shown on Figure D-6.1.01. Wells that do not have a water right of record according to the Office of the Wyoming State Engineer, but that are known to exist within the three miles radius, are included in Table D-6.1.02 and Figure D-6.1.01. In these instances no "Permit Number" is listed in the tabulation.

Some wells have been issued a water right but apparently have never been drilled. These permitted well locations are included on Figure D-6.1.01.

TABLE D-6.1.01

SURFACE WATER RIGHTS OF RECORD INSIDE AND
WITHIN 3 MILE OF THE PERMIT AREA

Well Map Number	Well Location	Facility Name	Permit Number	Applicant	Total Capacity	Tributary	Use	Priority Date
S-1	NE¼NW¼ Sec 11 T34N R74W	Layton Spreader Dike	P20585D	A. C. Layton	Unknown	Little Sand Crk	IRR	01/15/51
S-2	NE¼NW¼ Sec 14 T34N R74W	S. Leuenberger	P8065R	Teton Expl Drlg	8.76 ac/ft	Little Sand Crk	IND	08/20/79
S-3	NE¼NW¼ Sec 14 T34N R74W	N. Leuenberger	P8066R	Teton Expl Drlg	9.14 ac/ft	Little Sand Crk	IND	08/20/79
S-4	NE¼NE¼ Sec 2 T34N R74W	Layton Pit #1	P14565	A. C. Layton	.50 ac/ft	Sage Crk	STO	07/09/56
S-5	NE¼NE¼ Sec 18 T34N R73W	#16	P37605	Leuenberger Brothers	7.57 ac/ft	Bennett Dr.	STO	05/22/61
S-6	NW¼NW¼ Sec 30 T34N R73W	Tower #1	P37615	Y Three Cattle Company	4.94 ac/ft	Dry Fork Sand Crk	STO	05/22/61

TABLE D-6.1.02

GROUND WATER RIGHTS OF RECORD INSIDE AND WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Dpth to Static Water Level[1]	Yield	Use	Priority Date
1	NE¼SW¼ Sec 36 T35N R74W	Smith #20	P3701P	William J. Smith	170	60	7.50 gpm	STO	03/18/52
2	SW¼SW¼ Sec 27 T35N R74W	Smith #22	P3702P	William J. Smith	126	75	7.50 gpm	STO	03/27/69
3	SE¼NE¼ Sec 12 T34N R74W	Smith #4	P4987P	William J. Smith	150	70	10.00 gpm	STO	12/31/45
4	SW¼NW¼ Sec 14 T34N R74W	Smith #5	P4988P	William J. Smith	145	60	10.00 gpm	STO	12/31/45
5	NE¼SW¼ Sec 33 T35N R73W	Smith #10	P4991P	William J. Smith	80	38	12.00 gpm	STO	10/04/65
6	NE¼SW¼ Sec 32 T35N R73W	Smith #19	P4995P	William J. Smith	60	5	15.00 gpm	STO	12/21/42
7	SE¼NW¼ Sec 35 T35N R74W	Smith #21	P4996P	William J. Smith	135	85	10.00 gpm	STO	09/23/50
8	SW¼SW¼ Sec 28 T35N R74W	Smith #23	P4997P	William J. Smith	180	95	6.00 gpm	STO	03/08/38
9	NE¼SE¼ Sec 09 T34N R74W	Henry Keenan #1	P8171P	Henry J. Keenan	160	60	5.00 gpm	STO	03/31/40
10	NE¼SE¼ Sec 09 T34N R74W	Henry #2	P8172P	Henry J. Kennan	60	32	5.00 gpm	STO	04/30/53
11	NE¼SE¼ Sec 09 T34N R74W	Henry Keenan #3	P8173P	Henry J. Keenan	41	32	3.00 gpm	STO	04/30/20
12	SW¼SW¼ Sec 33 T35N R74W	Henry Keenan #4	P8174P	Henry J. Keenan	141	85	5.00 gpm	STO	03/31/41
13	SE¼SE¼ Sec 05 T34N R74W	Henry Keenan #5	P8175P	Henry J. Keenan	120	60	8.00 gpm	STO	05/31/53
14	SE¼SE¼ Sec 02 T34N R74W	Layton #1	P8605P	A. C. Layton	140	40	4.00 gpm	STO	07/31/42
15	SW¼SW¼ Sec 31 T35N R73W	Layton #2	P8606P	A. C. Layton	94	50	2.50 gpm	STO	06/25/46
16	NE¼SW¼ Sec 11 T34N R74W	Layton #3	P8607P	A. C. Layton	114	20	3.00 gpm	STO	06/28/46
17	SW¼SW¼ Sec 01 T34N R74W	Layton #5	P8608P	A. C. Layton	215	75	10.00 gpm	STO	01/18/61
18	SE¼SE¼ Sec 01 T34N R74W	Layton #4	P8609P	A. C. Layton	180	40	2.00 gpm	STO	10/20/50
19	SW¼NE¼ Sec 11 T34N R74W	Negley #1	P9484P	J. S. Negley	130	80	7.00 gpm	STO	08/31/22
20	SE¼ Sec 11 T34N R74W	Negley #2	P9485P	J. S. Negley	130	60	25.00 gpm	STO	07/31/56
20A	SW¼SE¼ Sec 11 T34N R74W	Negley #3	--	--	--	--	--	DOM	--

[1]When two numbers are reported they represent the maximum & minimum depths observed.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND
WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Dpth to Static Water Level[1]	Yield	Use	Priority Date
21	SE¼SW¼ Sec 09 T34N R74W	E. Evanoff #1	P14322P	E. L. Evanoff	63	23	4.00 gpm	STO	12/31/20
22	SW¼SW¼ Sec 09 T34N R74W	E. Evanoff #2	P14323P	E. L. Evanoff	206	?	6.00 gpm	DOM	05/31/65
23	NW¼SE¼ Sec 32 T34N R74W	Hildebrand #5 (Sand Creek)	P19400P	Pacific Power & Light	28	20	10.00 gpm	STO	12/31/40
24	SE¼SW¼ Sec 35 T34N R74W	Hildebrand #7 (Little Sand Crk)	P19402P	Pacific Power & Light	28	20	10.00 gpm	STO	12/31/45
25	NE¼NE¼ Sec 35 T34N R74W	Hildebrand #8 (School Section)	P19403P	Pacific Power & Light	118	80	5.00 gpm	STO	12/31/54
26	NE¼SE¼ Sec 09 T34N R73W	Moore 9-34-73	P22299P	John A. Lambert	260	?	5.00 gpm	STO	12/31/47
27	NE¼SW¼ Sec 15 T34N R74W	Hildebrand #1	P27740P	Carl J. Hildebrand	20	15	7.50 gpm	STO	08/22/74
28	NE¼NE¼ Sec 16 T34N R74W	Hildebrand #2	P27741P	Carl Hildebrand	20	15	17.50 gpm	STO	08/22/74
29	SE¼NW¼ Sec 04 T34N R74W	Smith #37	P4565W	William J. Smith	143	100	10.00 gpm	STO	02/13/70
30	SW¼SE¼ Sec 30 T34N R73W	Smith #39	P4567W	William J. Smith	265	110	10.00 gpm	STO	02/13/70
31	SW¼SW¼ Sec 28 T35N R74W	Smith #42	P8611W	William J. Smith	103	60	7.00 gpm	STO	04/09/71
32	NW¼NW¼ Sec 19 T34N R73W	Smith #43	P8612W	William J. Smith	?	?	10.00 gpm	STO	04/09/71
33	NE¼SE¼ Sec 13 T34N R74W	Smith #45	P9823W	William J. Smith	180	150	7.00 gpm	STO	07/22/71
34	NW¼SE¼ Sec 03 T34N R74W	Layton #1	P14850W	William R. Vollman	118	80	10.00 gpm	STO	07/31/72
35	SW¼SW¼ Sec 09 T34N R74W	Evanoff #3	P16146W	Eugene L. Evanoff	?	?	12.00 gpm	DOM	11/01/72
36	NE¼NE¼ Sec 11 T34N R74W	AC #1	P24572W	A. C. Layton	?	?	25.00 gpm	STO	09/20/73
37	NE¼NW¼ Sec 29 T35N R73W	Smith #48	P25039W	William J. Smith	65	35	5.00 gpm	STO	11/26/73
38	NE¼SE¼ Sec 14 T34N R74W	Reeves #1	P25672W	Harry G. & Emily H. Reeves	?	?	15.00 gpm	DOM	01/22/74
39	NE¼SE¼ Sec 11 T34N R74W	KT #1	P26415W	Robert D. Haun	180	80	12.00 gpm	DOM	04/23/74
40	NE¼SE¼ Sec 11 T34N R74W	Lucky Five #1	P26463W	Earl G. Doege	180	80	5.00 gpm	DOM	04/25/74

[1] When two numbers are reported they represent the maximum & minimum depths observed.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Depth to Static Water Level[1]	Yield	Use	Priority Date
41	NE¼SE¼ Sec 11 T34N R74W	Bobbie #1	P30262W	E. L. Evanoff	?	?	est. 25.00 gpm	DOM	06/25/75
42	NE¼SE¼ Sec 11 T34N R74W	Jean #1	P30263W	Richard G. Deveraux	?	?	est. 25.00 gpm	DOM	06/25/75
43	SE¼SE¼ Sec 11 T34N R74W	Hghway Corner #1	P30264W	Merle H. Dunham	180	55	10.00 gpm	DOM	06/25/75
44	SE¼SE¼ Sec 11 T34N R74W	Hghway Corner #2	P30265W	Merle H. Dunham	160	45	10.00 gpm	DOM	06/25/75
45	SW¼SW¼ Sec 9 T34N R74W	Evanoff #3	P30669W	Eugene L. Evanoff	200	100	12.00 gpm	DOM	08/12/75
46	SE¼SW¼ Sec 11 T34N R74W	Hickerson #1	P32804W	Mark A. & Ardith A. Hickerson	195	80	6.00 gpm	DOM	04/20/76
47	SE¼SE¼ Sec 15 T34N R74W	J & J #36	P34863W	J & J Development Co.	?	?	25.00 gpm	DOM	09/22/76
48	NW¼SW¼ Sec 31 T35N R73W	Winsinger #1	P38137W	William R. Vollman	175	21	4.00 gpm	STO	05/17/77
49	NE¼SW¼ Sec 9 T34N R74W	Evanoff #3	P38647W	Eugene & Lois Evanoff	?	?	10.00 gpm	DOM	05/25/77
50	SW¼NE¼ Sec 11 T34N R74W	Bourquin #2	P40688W	Evert L. Bourquin	200	53.4-52.2	12.00 gpm	STO	11/02/77
51	SW¼NE¼ Sec 11 T34N R74W	Bourquin #1	P40689W	Evert L. Bourquin	125	64.0-62.6	12.00 gpm	DOM	11/02/77
52	SE¼SE¼ Sec 15 T34N R74W	J & J #36	P41284W	J & J Development	320	40	12.00 gpm	DOM	12/19/77
53	NE¼SE¼ Sec 11 T34N R74W	Negley #6	P42818W	J. S. Negley	120	59.1-57.1	20.00 gpm	DOM	04/13/78
53A	SE¼NW¼ Sec 11 T34N R74W	Pixler #1	--	--	--	--	--	DOM	--
54	NE¼SE¼ Sec 11 T34N R74W	Lucky Five #2	P42928W	Earl G. Doege, Mr. or Mrs.	180	100	20.00 gpm	DOM	04/20/78
55	SW¼SW¼ Sec 8 T34N R74W	Badley #1	P43477W	Bobby G. Badley	?	?	20.00 gpm	STO	05/25/78
56	NE¼SE¼ Sec 11 T34N R74W	Elru #1	P46720W	Elmer Doege	180	97.1-95.5	23.00 gpm	DOM	02/28/79
57	SE¼NE¼ Sec 11 T34N R74W	KT-2	P50985W	Teton Expl Drlg Co Dan Herlihy & Robert Haun	196	70.4-64.4	0.00 gpm	MIS;MON	01/21/80
58	SW¼SE¼ Sec 11 T34N R74W	La Plant #1	P50986W	Teton Expl Drlg Co Dan Herlihy & Mrs. Earlene LaPlant	131	46.2-44.3	0.00 gpm	MIS;MON	01/21/80

[1] When two numbers are reported they represent the maximum & minimum depths observed.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND
WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Depth to Static Water Level[1]	Yield	Use	Priority Date
59	NW¼NW¼ Sec 29 T35N R74W	Neosho #4	P50987W	Neosho Const. Co.	?	?	20.00 gpm	MIS	01/21/80
60	NE¼SE¼ Sec 6 T34N R73W	Smith #9	P4990P	William J. Smith	90	50	8.00 gpm	STO	12/31/22
61	NE¼SE¼ Sec 30 T35N R73W	Four Corners #1	P14028W	Burton O. Barber	?	?	25.00 gpm	STO	05/30/72
62	SW¼SE¼ Sec 17 T34N R73W	Ed Moore, Spring Pasture Well #1	P14294W	Edward D. Moore	292	71	4.00 gpm	STO	06/15/72
63	SW¼SE¼ Sec 11 T34N R74W	Negley #4	--	--	--	32.2-26.7	--	--	--
64	SW¼SW¼ Sec 2 T34N R74W	Layton 1a	--	--	--	--	--	--	--
65	SW¼NE¼ Sec 18 T34N R73W	Bacon #3	--	--	--	--	--	--	--
66	NW¼SW¼ Sec 18 T34N R73W	Smith 45A	--	--	--	--	--	--	--
67	SE¼SE¼ Sec 13 T34N R74W	Bacon #1	--	--	--	--	--	--	--
68	SE¼NW¼ Sec 11 T34N R74W	Vollman Windmill	--	--	--	--	--	--	--
69	NE¼NW¼ Sec 14 T34N R74W	PN5-L300	P45751W	Teton Expl Drlg Co	78	15.0-13.1	20.00 gpm	MIS	10/31/78
70	NW¼NE¼ Sec 14 T34N R74W	PN5-L301	P45752W	Teton Expl Drlg Co	390	86.9-61.7	0.00 gpm	MIS;MON	10/31/78
71	NW¼NE¼ Sec 14 T34N R74W	PN5-L302	P45753W	Teton Expl Drlg Co	265	69.2-62.5	30.00 gpm	MIS	10/31/78
72	NW¼NE¼ Sec 14 T34N R74W	PN5-L303	P45754W	Teton Expl Drlg Co	540	?	0.00 gpm	MIS;MON	10/31/78
73	NW¼NE¼ Sec 14 T34N R74W	PN5-L304	P45755W	Teton Expl Drlg Co	105	33.7-29.2	0.00 gpm	MIS;MON	10/31/78
74	NW¼NE¼ Sec 14 T34N R74W	PN5-L305	P45756W	Teton Expl Drlg Co	400	135.2-61.7	0.00 gpm	MIS;MON	10/31/78
75	NW¼NE¼ Sec 14 T34N R74W	PN5-L306	P45757W	Teton Expl Drlg Co	392	102.2-61.1	0.00 gpm	MIS;MON	10/31/78
76	NW¼NE¼ Sec 14 T34N R74W	PN5-L307	P45758W	Teton Expl Drlg Co	385	101.4-60.8	0.00 gpm	MIS;MON	10/31/78
77	NW¼NE¼ Sec 14 T34N R74W	PN5-L308	P45759W	Teton Expl Drlg Co	395	83.3-59.2	0.00 gpm	MIS;MON	10/31/78
78	NW¼NE¼ Sec 14 T34N R74W	PN5-L309	P45760W	Teton Expl Drlg Co	265	69.5-52.3	0.00 gpm	MIS;MON	10/31/78

[1] When two numbers are reported they represent the maximum & minimum depths observed.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Depth to Static Water Level[1]	Yield	Use	Priority Date
79	NW¼NE¼ Sec 14 T34N R74W	PN5-L310	P45761W	Teton Expl Drlg Co	255	Abdn.	0.00 gpm	MIS;MON	10/31/78
80	NW¼NE¼ Sec 14 T34N R74W	PN5-L311	P45762W	Teton Expl Drlg Co	215	Abdn.	0.00 gpm	MIS;MON	10/31/78
81	NW¼NE¼ Sec 14 T34N R74W	PN5-L312	P45763W	Teton Expl Drlg Co	270	62.1-5[illegible].4	0.00 gpm	MIS;MON	10/31/78
82	NW¼NW¼ Sec 14 T34N R74W	PN5-L313	P45764W	Teton Expl Drlg Co	255	84.82-63.3	0.00 gpm	MIS;MON	10/31/78
83	NW¼NW¼ Sec 14 T34N R74W	PN5-L314	P45765W	Teton Expl Drlg Co	540	176.6-96.2	0.00 gpm	MIS;MON	12/31/79
84	NE¼NE¼ Sec 14 T34N R74W	PN5-L315	P45766W	Teton Expl Drlg Co	78	13	0.00 gpm	MIS;MON	10/31/78
85	SE¼NW¼ Sec 14 T34N R74W	PN5-L316	P45767W	Teton Expl Drlg Co	259	67	0.00 gpm	MIS;MON	10/31/78
86	SE¼NE¼ Sec 14 T34N R74W	PN5-L317	P45768W	Teton Expl Drlg Co	270	83.0-65.2	0.00 gpm	MIS;MON	10/31/78
87	SE¼NE¼ Sec 14 T34N R74W	PN5-L318	P45769W	Teton Expl Drlg Co	Not Drilled		0.00 gpm	MIS;MON	10/31/78
88	SW¼NE¼ Sec 14 T34N R74W	PN5-L319	P45770W	Teton Expl Drlg Co	260	80.9-74.3	0.00 gpm	MIS[illegible]	10/31/78
89	SE¼NW¼ Sec 14 T34N R74W	PN5-L320	P45902W	Teton Expl Drlg Co	262	79.5-54.8	0.00 gpm	MIS;MON	11/13/78
90	SW¼NE¼ Sec 14 T34N R74W	PN5-L570	P48008W	Teton Expl Drlg Co	113	39.9-33.[illegible]	0.00 gpm	MIS:MON	05/14/79
91	NE¼NE¼ Sec 14 T34N R74W	PN5-L571	P48009W	Teton Expl Drlg Co	?	103.8-97.[illegible]	0.00 gpm	MIS;MON	05/14/79
92	NW¼NE¼ Sec 14 T34N R74W	PN5-L572	P50976W	Teton Expl Drlg Co	?	75.2-64.7	0.00 gpm	MIS;MON	01/21/80
93	SW¼NE¼ Sec 14 T34N R74W	PN5-L573	P48007W	Teton Expl Drlg Co	280	81.4-67.2	0.00 gpm	MIS;MON	05/14/79
94	SW¼NE¼ Sec 14 T34N R74W	PN5-L574	P49056W	Teton Expl Drlg Co	270	92.6-65.3	0.00 gpm	MIS;MON	07/16/79
95	SW¼NE¼ Sec 14 T34N R74W	PN5-L575	P49057W	Teton Expl Drlg Co	390	102.6-74.7	0.00 gpm	MIS;MON	07/16/79
96	SE¼NW¼ Sec 14 T34N R74W	PN5-L576	P49058W	Teton Expl Drlg Co	375	103.28-56.3	0.00 gpm	MIS;MON	07/05/79
97	NW¼NE¼ Sec 14 T34N R74W	PN5-L578	P50977W	Teton Expl Drlg Co	325	100.9-95.8	0.00 gpm	MIS;MON	01/21/80

[1] When two numbers are reported they represent the maximum & minimum depths observed.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Depth to Static Water Level[1]	Yield	Use	Priority Date
98	SW¼NW¼ Sec 14 T34N R74W	PN5-L581	P45769W	Teton Expl Drlg Co	312	57.2-43.9	0.00 gpm	MIS;MON	01/21/80
99	NW¼NE¼ Sec 14 T34N R74W	PN5-L583	P50978W	Teton Expl Drlg Co	141	62.4-61.6	0.00 gpm	MIS;MON	01/21/80
100	NE¼NW¼ Sec 14 T34N R74W	PN5-LOM1	P50979W	Teton Expl Drlg Co	85	33.6-32.7	0.00 gpm	MIS;MON	01/21/80
101	SW¼NE¼ Sec 14 T34N R74W	PN5-LOM2	P50980W	Teton Expl Drlg Co	140	37.3-36.1	0.00 gpm	MIS;MON	01/21/80
102	NW¼NE¼ Sec 14 T34N R74W	PN5-LOM3	P50981W	Teton Expl Drlg Co	115	55.0-54.3	0.00 gpm	MIS;MON	01/21/80
103	NE¼NW¼ Sec 14 T34N R74W	PN5-LMM1	P50982W	Teton Expl Drlg Co	380	89.6-66.1	0.00 gpm	MIS;MON	01/21/80
104	NW¼NE¼ Sec 14 T34N R74W	PN5-LMM2	P50983W	Teton Expl Drlg Co	380	115.5-76.5	0.00 gpm	MIS;MON	01/21/80
105	NW¼NE¼ Sec 14 T34N R74W	PN5-LMM3	TBA[2]	Teton Expl Drlg Co	412	115.3-101.6	0.00 gpm	MIS;MON	TBA
106	SE¼NE¼ Sec 14 T34N R74W	PN5-LMM4	TBA	Teton Expl Drlg Co	412	145.1-128.2	0.00 gpm	MIS;MON	TBA
107	SE¼NW¼ Sec 14 T34N R74W	PN5-LMM5	TBA	Teton Expl Drlg Co	313	69.4-64.4	0.00 gpm	MIS;MON	TBA
108	NW¼NW¼ Sec 14 T34N R74W	PN5-LMM6	TBA	Teton Expl Drlg Co	384	93.7-70.6	0.00 gpm	MIS;MON	TBA
109	SW¼NE¼ Sec 14 T34N R74W	PN5-LMM7	TBA	Teton Expl Drlg Co	367	118.7-109	0.00 gpm	MIS;MON	TBA
110	NW¼NW¼ Sec 14 T34N R74W	PN5-LMM8	TBA	Teton Expl Drlg Co	367	81.6-66.0	0.00 gpm	MIS;MON	TBA
111	NW¼NW¼ Sec 14 T34N R74W	PN5-LMM9	TBA	Teton Expl Drlg Co	359	83.5-64.4	0.00 gpm	MIS;MON	TBA
112	SE¼NE¼ Sec 14 T34N R74W	PN5-LMM10	TBA	Teton Expl Drlg Co	421	133.5-128.0	0.00 gpm	MIS;MON	TBA
113	SW¼NE¼ Sec 14 T34N R74W	PN5-LNM1	P5098W	Teton Expl Drlg Co	275	95.3-72.7	0.00 gpm	MIS;MON	01/21/80
114	SW¼NW¼ Sec 14 T34N R74W	PN5-LNM2	TBA	Teton Expl Drlg Co	220	40.9-37.0	0.00 gpm	MIS;MON	TBA
115	NW¼NW¼ Sec. 14 T34N R74W	PN5-LNM3	TBA	Teton Expl Drlg Co	270	66.5-62.4	0.00 gpm	MIS;MON	TBA

[1] When two numbers are reported they represent the maximum & minimum depths observed.

[2] To be assigned.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Depth to Static Water Level[1]	Yield	Use	Priority Date
116	SE¼NE¼ Sec 14 T34N R74W	PN5-LNM4	TBA[2]	Teton Expl Drlg Co	317	128.2-117.0	0.00 gpm	MIS;MON	TBA
117	SE¼NE¼ Sec 14 T34N R74W	PN5-LBM1	TBA	Teton Expl Drlg Co	561	168.1-519.9	0.00 gpm	MIS;MON	TBA
118	NW¼NW¼ Sec 14 T34N R74W	PN5-LBM2	TBA	Teton Expl Drlg Co	503	118.2-109.3	0.00 gpm	MIS;MON	TBA
119	NW¼NE¼ Sec 14 T34N R74W	PN5-LMR1	P49670	Teton Expl Drlg Co	304	IR[3]	73.00 gpm	IND	09/11/80
120	NW¼NE¼ Sec 14 T34N R74W	PN5-LMR3	P49670	Teton Expl Drlg Co	390	IR	73.00 gpm	IND	09/11/80
121	NW¼NE¼ Sec 14 T34N R74W	PN5-LMR5	P49670	Teton Expl Drlg Co	389	IR	73.00 gpm	IND	09/11/80
122	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI1	P49670	Teton Expl Drlg Co	360	IR	73.00 gpm	IND	09/11/80
123	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI2	P49670	Teton Expl Drlg Co	364	IR	73.00 gpm	IND	09/11/80
124	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI3	P49670	Teton Expl Drlg Co	[illegible]	IR	73.00 gpm	IND	09/11/80
125	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI4	P49670	Teton Expl Drlg Co	340	IR	73.00 gpm	IND	09/11/80
126	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI6	P49670	Teton Expl Drlg Co	388	IR	73.00 gpm	IND	09/11/80
127	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI8	P49670	Teton Expl Drlg Co	383	IR	73.00 gpm	IND	09/11/80
128	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI10	P49670	Teton Expl Drlg Co	387	IR	73.00 gpm	IND	09/11/80
129	NW¼NE¼ Sec 14 T34N R74W	PN5-LMI12	P49670	Teton Expl Drlg Co	390	IR	73.00 gpm	IND	09/11/80
130	SW¼NE¼ Sec 14 T34N R74W	PN5-LNR1	P49671	Teton Expl Drlg Do	[illegible]	IR	73.00 gpm	IND	09/11/80
131	SW¼NE¼ Sec 14 T34N R74W	PN5-LNR3	P49671	Teton Expl Drlg Co	243	IR	73.00 gpm	IND	09/11/80
132	SW¼NE¼ Sec 14 T34N R74W	PN5-LNR5	P49671	Teton Expl Drlg Co	253	IR	73.00 gpm	IND	09/11/80
133	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI1	P49671	Teton Expl Drlg Co	203	IR	73.00 gpm	IND	09/11/80

[1] When two numbers are reported they represent the maximum & minimum depths observed.

[2] To be assigned.

[3] Solution Mining Injection Recovery Well.

TABLE D-6.1.02 (Continued)

GROUND WATER RIGHTS OF RECORD INSIDE AND WITHIN 3 MILES OF PERMIT AREA

Map Number	Well Location	Facility Name	Permit Number	Applicant	Well Depth	Depth to Static Water Level[1]	Yield	Use	Priority Date
134	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI2	P49671	Teton Expl Drlg Co	226	IR	73.00 gpm	IND	09/11/80
135	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI3	P49671	Teton Expl Drlg Co	216	IR	73.00 gpm	IND	09/11/80
136	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI4	P49671	Teton Expl Drlg Co	212	IR	73.00 gpm	IND	09/11/80
137	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI6	P49671	Teton Expl Drlg Co	247	IR	73.00 gpm	IND	09/11/80
138	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI8	P49671	Teton Expl Drlg Co	249	IR	73.00 gpm	IND	09/11/80
139	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI10	Pr9671	Teton Expl Drlg Co	270	IR	73.00 gpm	IND	09/11/80
140	SW¼NE¼ Sec 14 T34N R74W	PN5-LNI12	P49671	Teton Expl Drlg Co	250	IR	73.00 gpm	IND	09/11/80

[1] When two numbers are reported they represent the maximum & minimum depths observed.

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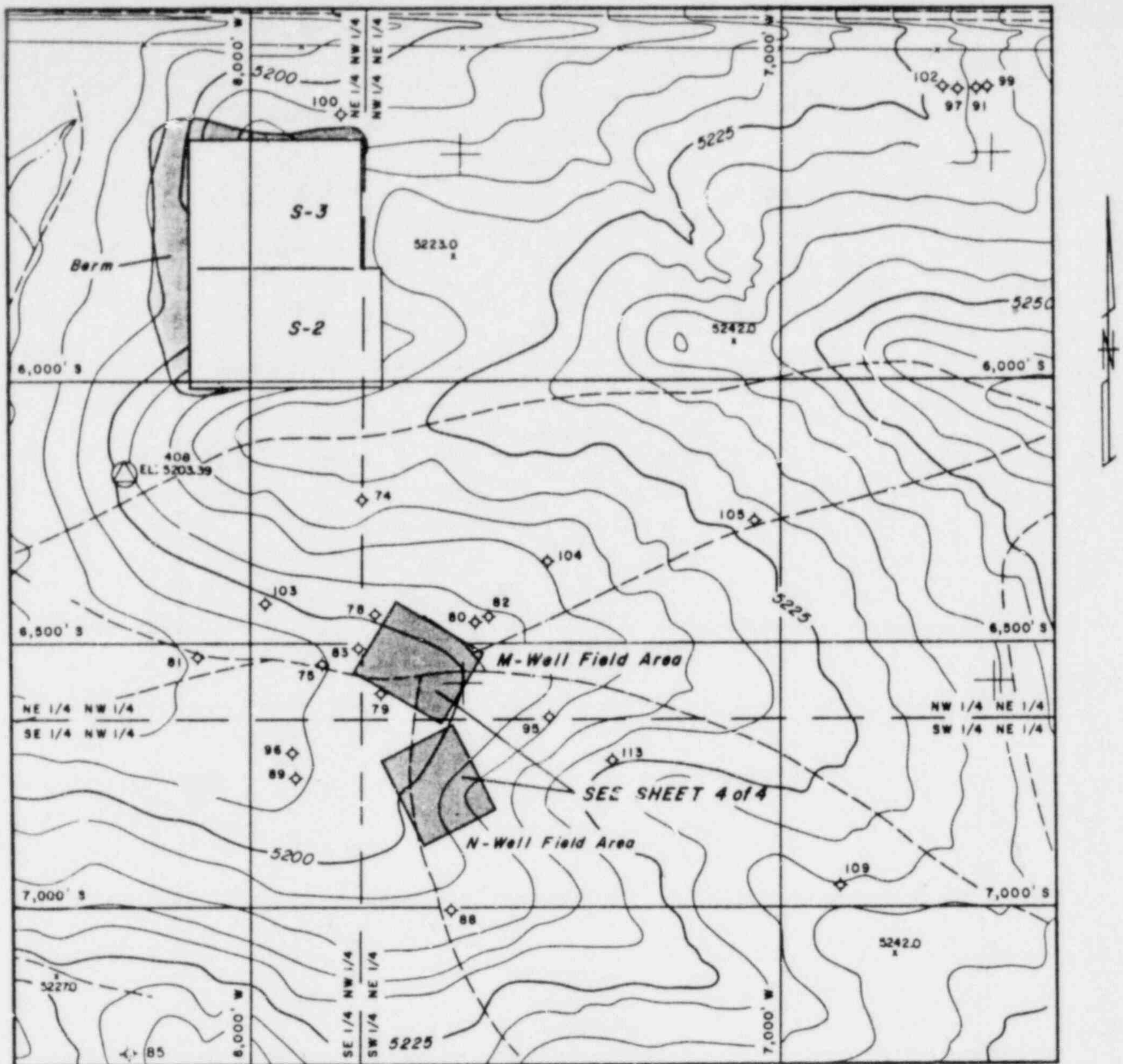


RESEARCH & DEVELOPMENT LICENSE AREA BOUNDARY *

0 100 200 300 500 800 FEET

0 50 100 200 METERS

CONTOUR INTERVALS : 5 FEET

NOTE : 0.0 POINT OF COORDINATE SYSTEM IS THE NE CORNER OF SECTION 12, T 34 N - R 74 W.

* RESEARCH & DEVELOPMENT AREA WITHIN SECTION 14, T 34 N - R 74 W.

— LEGEND —

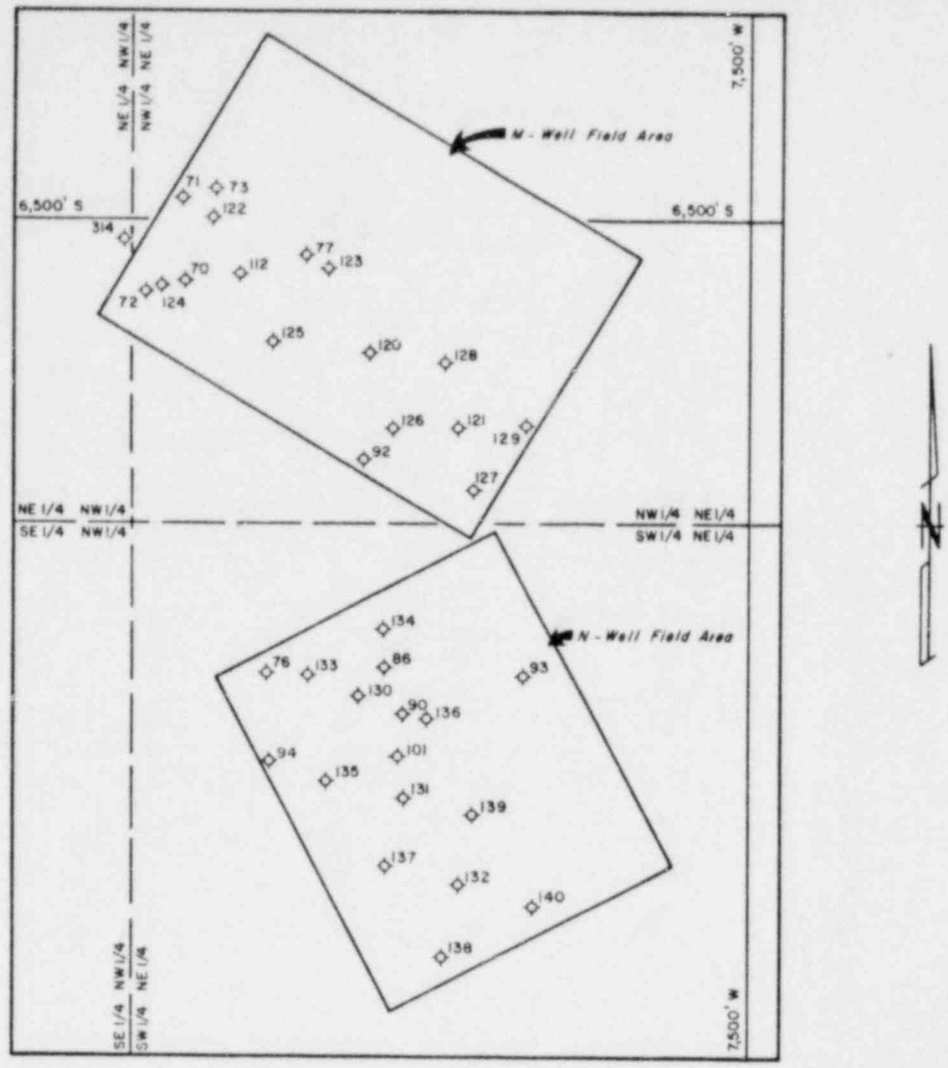
S-2	SURFACE WATER RIGHTS (SEE TEXT)
◇ 99	WELL WITH DESIGNATED NUMBER (SEE TEXT)

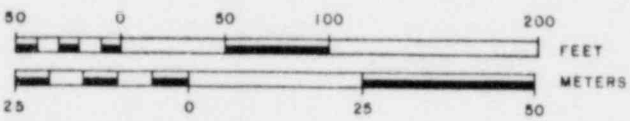
UNC TETON EXPLORATION DRILLING, INC.
A UNC RESOURCES Company
3030 South Energy Lane
Casper, Wyoming 82601
Office — 307 · 265-4102

FIGURE D-6.1.01

Water Rights Inside and Within 3 Miles of Permit Area

Sheet 3 of 4





— LEGEND —

◇77 WELL WITH DESIGNATED NUMBER (SEE TEXT)

WELL FIELD AREAS WITHIN
RESEARCH & DEVELOPMENT LICENSE AREA
(WITHIN SECTION 14, T 34 N - R 74 W)

NOTE: 0,0 POINT OF COORDINATE SYSTEM
IS NE CORNER OF SECTION 12,
T 34 N - R 74 W

UNC TETON
EXPLORATION DRILLING, INC.
A UNC RESOURCES Company
3030 South Energy Lane
Casper, Wyoming 82601

Office - 307 265-4102

Water Rights Inside and Within 3 Miles of Permit Area

Sheet 4 of 4

FIGURE D-6.1.01

APPENDIX D-6.2

AQUIFER CHARACTERISTICS

Introduction

A total of eight aquifer tests were conducted throughout the Leuenberger Site. Four pumping tests were conducted to determine aquifer characteristics of the receiving strata (geolgic strata containing the production zone). Such aquifer characteristics include the transmissivity, hydraulic conductivity (permeability), storage coefficient and the nature and extent of any hydraulic boundaries within the receiving strata in or near the production zones. These tests in addition to two other tests were conducted, in part, to determine if the claystones above and below the production zones behave as competent hydraulically confining layers. Two recovery tests were conducted in the Basal Aquifer to estimate the hydraulic conductivity of the zone.

Definition of Terms

Q = Constant discharge rate for pumping test (gallons per minutes, gpm)

r = Radius from center of pumping well (ft)

S = Storage coefficient (unitless)

s = Drawdown (ft)

Δs = Change in drawdown per long cycle of time (ft)

s' = Residual drawdown (ft)

$\Delta s'$ = Change in residual drawdown per long cycle of t/t' (ft)

T = Transmissivity (gallons per day per foot, gpd/ft)

t = Time since pumping began (days)

t_0 = Time at $s = 0$ for Jacob Method (days)

t' = Time since pumping stopped (days)

u = $1.87\ r^2\ S/Tt$ (unitless)

u_t = u during pumping period

$u_{t'}$ = u during recovery period

Methods

Production Zone Pumping Tests

To determine the aquifer characteristics for the receiving strata four constant rate discharge pumping tests were performed using several wells installed throughout the permit area. For the N production zone which contains twenty-six (26) percent of the ore to be mined, one pumping test was centrally located within the deposit. For the M production zone which contains seventy-four (74) percent of the ore to be mined, three pumping tests were conducted throughout the proposed mining area. One pumping test was performed in the center of the M zone deposit and two other tests were conducted in the western and eastern extremities of the production zone. Using this aquifer testing approach the entire Leuenberger ore deposit was contained within the zone of influence of one or more of the tests. The testing results were used to quantitatively determine the vertical hydraulic conductivity of the claystones above and below the production zone and to determine the aquifer characteristics of the receiving strata. The wells used for each of the pumping tests are shown in Figure D-6.2.01. Well completion data for the wells used in the testing are provided in Table D-6.2.01.

The pumping wells and the observation wells with five inch ID casing were completed using the Halliburton casing method of grouting (Johnson, 1972) and telescoping four inch or three inch well screen through the five inch surface casing. Two inch ID observation wells were hacksaw slotted opposite the aquifer of interest and cemented from the top of the aquifer to the surface using a tremie pipe.

R&D Five Spot Tests

One five spot well field pattern was placed in the M production zone and one five spot well field pattern was placed in the N production zone at the commencement phase of the R&D operation. The five spots operated for several months with leach solution circulation rates similar to that which will be used during the commercial operation. During operation of these five spots water level data and chemical data were taken from the Basal and O Aquifers (O_1 member) to determine if leach solution could migrate to these zones through the claystone overlying the N Aquifer and underlying the M Aquifer. Previous analysis of the N Aquifer Test #1 and the M Aquifer Test #1 indicated that the claystones exhibited negligible permeabilities. Leach solution migration through these claystones was considered unlikely. The monitoring of water levels and chemical quality in the O Aquifer and Basal

Aquifer was conducted to substantiate the results from the previous pumping tests.

Bas l Aquifer Recovery Tests

Two single well recovery tests were performed in the Basal Aquifers to estimate the hydraulic conductivity of the formation in that recovery tests are one of the reliable methods to use to estimate average hydraulic conductivities from single well tests.

Procedure

Production Zone Pumping Tests

N Aquifer Test #1

The pumping well for this test was PN5-L317 and the observation wells were PN5-L313, PN5-L319, PN5-L320, PN5-L572, PN5-L573 and PN5-L574. These wells are open to the N Aquifer. Well PN5-L570 was monitored during the test in the O Aquifer (O_1 sand) and well PN5-L307 was used to monitor the M Aquifer water level response during the test. Barometric pressure was recorded throughout the testing period (Table D.6.2.03).

A five horsepower submersible pump was set to a depth just above the top of the screen packer in the pumping well. The pumping test began at 8:20 a.m. on June 26, 1979, and continued for 36.5 hours (1.52 days) at an average constant discharge rate of 43.1

gpm. Electric well sounds were used to record water level drawdown in all observation wells and the pumping well during the test. Water level recovery measurements were taken for a thirty-five hour time period after the pump was shut off. The pumping test water level measurements recorded during the test are provided in Table D-6.2.02a through D6.2.02i.

M Aquifer Test #1

The pumping well for this test was PN5-L301 and the observation wells were PN5-L305, PN5-L306, PN5-L307, and PN5-L308. These wells are open to the M Aquifer. Well PN5-L302 was monitored during the test in the N Aquifer and well PN5-L314 was used to monitor the Basal Aquifer water level response during the test. Barometric pressure was recorded throughout the testing period (Table D-6.02.05). The testing wells were centrally located within the M production zone (Figure D-6.2.01).

A five horsepower submersible turbine pump was set to a depth just above the top of the screen packer in the pumping well. The pumping test began at 8:32 a.m. on Feburary 21, 1979, and continued for forty-eight (48) hours (two days) at a constant discharge rate of 44 gpm. Electric well sounders were used to record water level drawdown in all observation wells and the pumping well during the test. Water level recovery measurements were taken for 32.1 hours (1.34 days) after the pump was shut off. The pumping test water level measurements recorded during the test are provided in Tables D6.2.04a through D6.2.04e.

M Aquifer Test #2

The pumping well for this test was PN5-LMM6 and the observation wells were PN5-LMM8 and PN5-LMM9. Well PN5-LNM3 was monitored during the test in the N Aquifer and well PN5-LBM2 was used to monitor the Basal Aquifer water level response during the test. Barometric pressure was recorded throughout the testing period (Table D-6.2.06d). The wells used for this test were located at the western extent of the ore deposit to be mined.

Before conducting this test, periodic water level measurements were recorded from wells PN5-LBM2 and PN5-LNM3 in the Basal and N Aquifers respectively to detect any consistent change in water level in these wells prior to testing. Well PN5-LBM2 was pumped during a recovery test on July 14, 1980, and the pump was shut off at 10:00 a.m. Water level readings were taken from this well over a four day period prior to M Aquifer Test #2 to detect any systematic change in water level occurring at this well (Waton, 1970, p. 207). A similar procedure was used for well PN5-LNM3 where a water sample was collected after well development on July 8, 1980, at 4:00 p.m. just prior to shutting off the pump. Water levels were taken from this well over a four day period prior to the M Aquifer Test #2. Based upon these measurements and assuming that any systematic changes in static water level at these wells behaved as a function of log(t) (t = time), the expected trend was extrapolated based upon the pretesting data. The pretesting measurements and resulting regression equations are as follows:

PN5-LNM3

Time (min) since Last Pumping	Depth to SWL
14070	65.02
15600	64.81
17040	64.81
18300	64.62

Regression Equation:

SWL = -3.14 (log t) + 78.02

R (Correlation Coef.) = -.95

PN5-LBM2

Time (min) since Last Pumping	Depth to SWL
4320	112.75
5640	112.21
7080	111.75
8520	111.44

Regression Equation:

SWL = -4.48 (log t) + 129.01

R = -.999

where t = o @ last pumping

The drawdown during the M Aquifer Test #2 at these wells is the observed drawdown less the extrapolated drawdown.

A seven and one-half (7 1/2) horsepower submersible pump (Franklin SP10-25, Model 2341182863, 3 phase, 23 volt, 60 Hz, 3450 rpm, max. amp 26.8) was set to a depth of approximately 330 feet and above the screen packer. The pumping test began at 9:00 a.m. on July 21, 1980, and continued for ninety-six (96) hours (four days) at an average constant discharge rate of 29.8 gpm Electric well sounders were used to record water level drawdown in all observation wells and the pumping well during the test. Water level recovery measurements were taken over a four day time period after the pump was shut off. The pumping test water level measurements and barometric pressure recorded during the test are provided in Table D-6.2.06a through D-6.2.04e.

M Aquifer Test #3

The pumping well for this test was PN5-LMM10 and the observation wells were PN5-LMM3, PN5-LMM4 and PN5-LMM7. Well PN5-LNM4 was monitored during the test in the N Aquifer and well PN5-LBM1 was used to monitor the Basal Aquifer water level response during the test. Barometric pressure was recorded throughout the testing period (Table D-6.2.07e). The wells used for the test were located at the eastern extent of the ore deposit to be mined (Figure D-6.2.01).

Before conducting this test periodic water level measurements were recorded from wells PN5-LBM2 and PN5-LNM3 in the Basal and N Aquifers respectively to detect any consistent change in water level in these wells prior to testing. Well PN5-LBM1 was pumped for a water sample on July 25, 1980, at 12 noon although this sample was misplaced and was never logged in at the Teton laboratory. Well PN5-LNM4 was sampled on July 7, 1980, and this pumping represents the last pumping before M Aquifer Test #3 for this well. Static water levels were taken from these wells for several days prior to the beginning of M Aquifer Test #3. Based upon these measurements the future trend for the water levels in these wells was extrapolated. The pretesting measurements and resulting regression are provided on the following page.

PN5-LMN4

Time (min.) since Last Pumping	Depth to SWL
24,480	118.57
26,850	118.39
28,652	118.27
31,410	118.48

No trend.

PN5-LBM1

Time (min.) since Last Pumping	Depth to SWL
1,050	165.70
2,850	164.74
5,460	163.12

Regression Equation:

SWL = 3.49 (log t) + 76.39

R = -.96

where t = o @ last pumping

The drawdown during the M Aquifer Test #3 at well PN5-LBM1 is the observed drawdown less the extrapolated drawdown.

The submersible pump used for M Aquifer Test #2 was used for this test. The pump was set to a depth of approximately 290' and above the screen packer. The pumping test began at 9:30 a.m. on July 29, 1980, and continued for ninety-six (96) hours (four days) at an average constant discharge rate of 26.3 gpm. Electric well sounders were used to record water level drawdown in all observation wells and the pumping well during the test. Water level recovery measurements were taken for a four day time period after the pump was shut off. The pumping test water level measurements and barometric pressure recorded during the test are provided in Table D-6.2.07a through D-6.2.07f.

R&D Five Spot Test

Both R&D five spots were brought on line on January 22, 1980, with 40 gpm recovery rates and 39 gpm injection rates. CO_2 and H_2O_2 were added to the groundwater circulated through the well field patterns on January 31 and February 18, 1980, respectively. Sodium bicarbonate addition took place on March 14 for the N field and March 17 for the M field. Since January 22 water samples and water levels were taken twice per month in wells in the O Aquifer (PN5-L304 and PN5-L570) and in the Basal Aquifer (PN5-L314). The procedure was used to detect any leach solution migration into these zones as a result of leakage through the claystone layers separating these zones from the ore horizons.

The well fields were shut down on July 11, 1980, for well field maintainence and so that Aquifer Test #2 and #3 could be conducted. Restoration commenced on August 21, 1980, for the N zone while mining of M zone resumed during the second week of August. The monitoring data results are contained in quarterly reports (dated April 9, 1980 and July 9, 1980) submitted to the US NRC and the Wyoming DEQ. Figure D-6.2.02 shows the injection and recovery wells for the N and M well fields in addition to wells PN5-570, PN5-L304 and PN5-L314.

Basal Aquifer Recovery Tests

Recovery Test #1

A Basal Aquifer Recovery test was performed on well PN5-LBM2 on July 14, 1980. A five horsepower submersible turbine pump was set to a depth of 300' and the well was pumped at a rate of 15.2 gpm for a period of 100 minutes. The pump was shut off and recovery measurements were recorded over a 100 minute time period. Water level measurements were made with an electric well sounder. The water level recovery measurements are provided in Table D-6.2.08.

Recovery Test #2

A second Basal Aquifer recovery test was performed on well PN5-LBM1 on July 18, 1980. A five horsepower submersible turbine pump was set to a depth of 340 feet and the well was pumped at a rate of 28.6 gpm for a 110 minute time period. Recovery measurements were taken for a ninety minute time period after the pump was shut off. Water level measurements were recorded with an electric well sounder. The water level recovery measurements are provided in Table D-6.2.09.

Results

Production Zone Pumping Tests

Three methods were used to quantitatively evaluate the data for the four long term constant discharge rate pumping tests. The Theis Non Equilibrium method (Ferris et. al., 1962) was applied to each well to determine aquifer transmissivity and storage. Normally the intermediate time data was used in the curve matching procedure in that early time data is typically subject to field measurement noise (error) due to the small changes in water levels during the initial stages of pumping. Late time data when plotted on a log(s) log(t) scale (s = drawdown in ft, t = time in minutes) approximates a straight line and therefore a straight line and therefore is not highly suitable for curve matching as required by the method. Intermediate time data exhibit curves whose shape is dependent upon the aquifer characteristics that are to be determined. This data was therefore used for curve matching. The early and late time data is used to aid in the curve matching to reach the "best match." This same curve was applied to the Hantush Modified Method (Lohman, 1972; Plate 4) to determine if leaky aquifer conditions could be detected. Based upon the characteristic convex nature of the Theis curve for the observation wells, no leaky conditions were measured for any of the tests. The Theis Curves and the match point for each of the wells used in each of the tests are included in the set of graphs provided in Figures D-6.2.03 to D-6.2.09.

In addition to the Theis Mon-Equilibrium Method, the Jacob Method (Cooper-Jacob) and Recovery Method (Ferris et. al, 1962) were applied to the pumping test results when $u_t \leq .05$ and $u_{t'} \leq .05$ respectively (Figures D.6.2.03 to D.6.2.09). Transmissivity and the storage coefficent are determined from the Jacob Method and transmissivity only is determined from the Recovery Method in that t'_o can not be determined from the Residual Drawdown verses t/t' plot used for recovery analysis. The Jacob Method was used to delineate any boundaries if present. Boundary effects were observed during N Aquifer Test #1 (wells PN5-L313, PN5-L319, PN5-L572 and PN5-L573) and during M Aquifer Test #3 (well PN5-LMM4).

The distance to these boundaries was computed using the law of times (Walton, 1970, p. 159). The computed boundary for the N Production zone probably concides with the thinning of the N sand which occurs to the southeast of the pumping test area. The boundary detected in the M zone probably represents a rapid thinning of the M sand and conicides with the eastern extent of the production zone in the M Aquifer. Calculations for transmissivity, storage and distance to detected boundaries (where appropriate) for each of the two straight line methods (Jacob and Recovery) are provided on Figure D6.2.03 to D6.2.09.

The tranmissivity and storage results determined by the three methods are in good agreement. A summary listing of the pumping test results are provided in the "Groundwater (occurrence)" portion of the application report. The transmissivity values determined by the three methods and the storage coefficents determined by the Theis and Jacob methods are in very good agreement. The storage coefficient for each of the tests is rather low. This result supports the non-leaky aquifer interpretation derived from the Theis and Modified Hantush methods in that if leakage was apparent or significant, the transmissivity values and particularly the storage coefficents determined from the curve matching methods would yield higher results than those observed. A low storage coefficent implies that only an infinitesimal amount of water is derived from a given area of aquifer. If leakage was significant, the apparent storage coefficient would be high in that larger quantities of water would be derived per unit area of aquifer via leakage. This phenonmenom can be observed when attempting to fit data from a leaky aquifer with the non leaky type curve (Lohman, 1972). Recognizing that all methods used yielded low storage coefficients, leakage through the claystones above and below the production zones is considered negligible. This result is shown quantitatively when using the curve matching procedure.

The water levels observed during each of the four tests in the respective aquifers above and below typically fluctuate a few tenths of a foot during the test. Although these data cannot quantitatively be evaluated by the methods previously referenced, the results support and serve as a back up check on the non leaky result derived from the quantitative treatment of the data. The small rise and decline of water levels in the overlying and underlying aquifers during the pumping test for N Aquifer Test #1 and M Aquifers Test #2 are not entirely attributed to fluctuations in barometric pressure, but may reflect small changes in pore pressure in the aquifers as a result of a reduction of pore pressure in the pumping aquifer. The changes in water levels in the overlying and underlying aquifers during M Aquifer Test #2 and M Aquifer Test #3, appear to correlate with the overall trend in barometric pressure although small changes in pore pressure probably occurred in these zones as well due to the reduction in pressure in the pumped aquifer.

R&D Five Spot Test

The data collected during the R&D five spot tests at the wells overlying and underlying the production zone have not detected any vertical excursions. In one instance the Basal Aquifer sampling technically reached excursion status, however, verification sampling during the following weeks indicated that this anomally did not persist. If the excursion status represented leach solution migration then the excusion parameter valves should have subsequently increased and not fall below the excursion detection levels as observed. No excursions were observed according to the excursion detection criteria for the O Aquifer. In addition, water levels in the O Aquifer did not respond to the injection pressures or recovery rates during the R&D operation. These results indicate that the claystones above the N production zone and below the M production zone appear to behave as competant confining layers. These results are consistant with the results from the preoperational pumping test.

Basal Aquifer Recovery Tests

Graphical presentation and numerical calculation for the two Basal Aquifer Recovery Tests are provided in Figure D-6.2.11. The hydraulic conductivities for this zone based upon the results are 5.2 fpd/ft to 1.8 gpd/ft or equivalently .7 ft/day to .2 ft/day. These results are somewhat lower but consistent with the results observed for the N and M sands and appear typical for the stream channel type deposits that characterize the Lebo Member of the Fort Union Formation.

References Cited

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Johnson Division, 1972, Ground Water & Wells: Johnson Division, St. Paul, Minnesota.

Lohman, S. W., 1972, Ground Water Hydraulics, USGS Professional Paper 708: USGS Printing OfFice, Washington, D.C.

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TABLE D-6.2.01

POOR ORIGINAL

WELL COMPLETION DATA

Field ID	Wyoming Permit Number	Date of Completion	Location South	Coordinates West	Surface Casing ID (in)	Screen ID (in)	Drill Bit Diamtr. @ Screened Inter. (in)	Surface Elevation / Top of Casing (ft)[1]	Depth of Cemented Annulus (ft) (Casing bottom) Depth	Depth of Cemented Annulus (ft) (Casing bottom) Elev.	Total Depth (Feet) Depth	Total Depth (Feet) Elev.	Open or Screened Interval (ft) Depth	Open or Screened Interval (ft) Elev.	Screen-Packer Depth (ft) from Surface	Aquifer Repres.
[illegible]	45751	1/15/79	6341.3	8585.0	5"	4"	8 3/4"	5182.3 / 5183.2	40'	5142.3	78'	5104.3	40-70	5142.3-5104.3		O_1
PN5-L301	45752	1/08/79	6524.7	7768.6	5"	4"	8 3/4"	5199.3 / 5200.4	325'	4874.3	390'	4809.3	325-390 380-390	4874.3-4839.3 4819.3-4820.3		M
PN5-L302	45753	12/28/78	6491.0	7770.8	5"	4"	8 3/4"	5198.8 / 5200.0	221'	4977.8	265'	4933.8	230-265	4968.8-4933.8	215	N
PN5-L303	45754	12/22/78	6534.2	7787.3	5"	4"	--	5198.7 / 5199.7	500'	4698.7	540'	4658.7	500-540	4698.7-4658.7	410	M
PN5-L304	45755	1/05/79	6485.8	7754.8	5"	4"	8 3/4"	5199.4 / 5201.0	75'	5124.4	105'	5094.4	75-105	5124.4-5094.4		O_1
PN5-L305	45756	1/04/79	6226.4	7790.5	5"	4"	8 3/4"	5217.6 / 5218.9	340'	4877.6	400'	4817.6	340-400	4877.6-4817.6		M
PN5-L306	45757	1/10/79	6533.1	7863.4	2"	2"	4 3/4"	5197.5 / 5198.9	314[2]	4883.5	392'	4805.5	315-382	4882.5-4805.5	N/A	M
PN5-L307	45758	1/12/79	6717.5	7729.4	2"	2"	4 3/4"	5199.4 / 5201.1	304[2]	4895.4	385'	4814.4	305-385	4894.4-4814.4	N/A	M
PN5-L308	45759	1/15/79	6518.3	7711.8	2"	2"	4 3/4"	5200.3 / 5203.1	324[2]	4876.3	395'	4805.3	325-395	4875.3-4805.3	N/A	M
PN5-L309	45760	1/07/79	6440.7	7767.9	2"	2"	4 3/4"	5201.1 / 5202.2	214[2]	4987.1	265'	4936.1	215-255	4986.1-4946.1	N/A	N
[illegible]	45761	1/04/79	6592.4	7753.6	5"		4 3/4"	5199.9 / 5200.4	204'	4995.9	255'	4944.9	205-255	4994.9-4944.9	--	Abdn[3]
[illegible]	45762	12/22/78	6456.5	7573.9	5"	-	--	5209.8	-	--	215'	--	-	-- --	--	Abdn[3]
[illegible]	45763	1/10/79	6526.8	8100.4	2"	2"	4 3/4"	5191.6 / 5194.5	199[2]	4992.6	270'	4921.6	200-270	4991.6-4921.6	N/A	N
PN5-L313	45764	1/16/79	6444.2	7550.3	5"	4"	8 3/4"	5205.5 / 5207.5	215'	4990.5	255'	4950.5	215-255	4990.5-4950.5		N
PN5-L314	51977	2/15/79	6509.2	7796.9	5"	4"	8 3/4"	5198.5 / 5201.2	500'	4698.5	617'	4658.5	500-617	4698.5-4658.5	480	Basal
PN5-L315	45766	5/01/79	6294.1	8582.0	5"	4"	8 3/4"	5181.9 / 5183.0	15'	5066.9	7[illegible]'	5003.9	15-78	5066.9-5003.9	15	O_1
PN5-L317	45768	6/14/79	6713.4	7671.9	5"	4"	10 1/2"	5202.3 / 5203.1	202'	5000.3	270'	4932.3	202-240	5000.3-4962.3	175	N
PN5-L319	45770	6/16/79	7006.9	7620.9	5"	4"	10 1/2"	5211.4 / 5212.[illegible]	200'	5011.4	260'	4951.4	200-257	5011.4-4954.4	183	N
PN5-L320	45902	6/15/79	6754.8	7917.3	5"	4"	10 1/2"	5197.0 / 5198.3	203'	4994.0	262'	4935.0	197-257	5010.0-4935.0	187	N
PN5-L570	48008	6/12/79	6735.3	7664.2	5"	4"	8 3/4"	5203.9 / 5203.9	60'	5143.9	113'	5090.9	60-113	5143.9-5090.9	50	O_1
PN5-L571	48009	6/06/79	5449.7	6632.3	5"	4"	4 3/4'	5232.9 / 5233.7	380'	4852.9	396'	4836.9	380-396	4852.9-4836.9	348	M
PN5-L572	50976	5/23/79	6615.6	7682.9	2"	2"	5 1/8"	5200.8 / 5202.5	195[2]	5005.8	259'	4941.8	195-259	5005.8-4941.8	N/A	N
PN5-L573	49005	5/30/79	6719.3	7604.7	2"	2"	4 3/4"	5207.2 / 5208.2	200[2]	5007.2	280'	4927.2	205-260	5002.2-4947.2	N/A	N

TABLE D-6.2.01 Continued

Field ID	Wyoming Permit Number	Date of Completion	Location South	Coordinates West	Surface Casing ID (in)	Screen ID (in)	Drill Bit Diamtr. @ Screened Inter. (in)	Surface Elevation / Top of Casing (ft)	Depth of Cemented Annulus (ft) (Casing bottom) Depth	Depth of Cemented Annulus (ft) (Casing bottom) Elev.	Total Depth (Feet) Depth	Total Depth (Feet) Elev.	Open or Screened Interval (ft) Depth	Open or Screened Interval (ft) Elev.	Screen-Packer Depth (ft) from Surface	Aquifer Repres.
PN5-L574	49056	5/30/79	6761.7	7737.0	2"	2"	4 3/4"	5199.7 / 5203.1	190[2]	5009.7	270'	4929.7	205-265	4994.7-4934.7	N/A	N
PN5-L575	49057	6/18/79	6639.5	7433.3	5"	4"	10 1/2"	5211.7 / 5213.2	325'	4886.7	370'	4873.2	325-345 360-370	4886.7-4868.2 4853.2-4843.2	295	M
PN5-L576	49058	6/19/79	6707.3	7922.3	5"	4"	10 1/2"	5195.9 / 5196.3	300'	4895.9	375'	4820.9	300-375	4895.9-4820.9	300	M
PN5-L578	50977	6/11/79	5448.2	6669.2	2"	2"	5 1/8"	5231.0 / 5233.3	267[2]	4964.0	325'	4906.0	267-325	4964.9-4906.0	N/A	N
PN5-L581	45769	6/25/79	6959.4	10200.2	2"	2"	4 3/4"	5177.6 / 5130.5	265[2]	4912.6	312'	4865.6	265-312	4912.6-4865.6	N/A	M
PN5-L583	50978	11/02/79	5447.8	6614.8	5 1/2"	4"	9"	5233.7 / 5236.1	130'	5103.7	141'	5092.7	130-141	5103.7-5092.7	105	O_1
PN5-LOM1	50979	10/29/79	5496.8	7826.7	5"	5"	9"	5206.1 / 5209.0	85'	5121.1	85'	5121.1	55-75	5151.1-5131.1	N/A	O_2
PN5-LOM2	50980	11/06/79	6756.0	7665.8	5"	4"	9"	5203.8 / 5206.7	94[2]	5063.8	140'	5063.8	130-135	5073.8-5068.8	N/A	Confg. layer below O_1
PN5-LOM3	50981	11/01/79	5445.2	6697.2	5"	4"	9"	5229.3 / 5230.4	77'	5152.3	115'	5114.3	77-115	5152.3-5114.3	N/A	O_2
PN5-LMM1	50982	1/10/79	6418.6	7970.8	5"	4"	10"	5199.3 / 5201.0	320'	4879.3	400	4799.3	320-400	4879.3-4799.3	300	M
PN5-LMM2	50983	1/11/78	6341.7	7437.2	5"	5"	10"	5211.2 / 212.2	340'	4871.2	380	4831.2	340-380	4871.2-4831.2	330	M
PN5-LNM1	50984	1/12/78	6723.4	7318.9	5"	4"	10"	5223.5 / 5224.4	220'	5003.5	275	4948.5	220-275	5003.5-4948.5	210	N
PN5-LMR1	49670	12/06/79	6527.9	7742.5	5"	3"	10"	5199.8 / 5201.7	325'	4874.8	360	4839.8	332-357	4867.8-584[illegible].8	304	M
PN5-NR1	49671	12/20/79	6722.3	7684.7	5"	4"	10"	5201.7 / 5203.0	230'	4971.7	255	4946.7	235-250	4966.7-4951.7	220	N
KT-2	50985		2616.4	6205.7	5 1/2"	5 1/2"	9"	5241.9 / 5243.8	N/A	N/A	196	5045.9	186-196	5057.8-5045.9	N/A	O_2
LaPlant 1	50986		4183.3	7030.9	5 1/2"	5 1/2"	9"	5219.8 / 5222.5	N/A	N/A	131	5088.8	71-131	5148.8-5088.8	N/A	O_2
PN5-LMM3	TBA[4]	5/22/80	6264.4	7049.9	5"	4"	10"	5227.09 / 5229.38	307.8	4859.3	412	4815.1	376-406	4851.1-4821.1	363	M
PN5-LMM4	TBA	5/22/80	6905.7	6257.9	5"	4"	10"	5253.34 / 5254.78	391.9	4861.4	411.5	4841.8	399.5-408.5	4853.8-4844.8	384.5	M
PN5-LMM5	TBA	5/19/80	6947.2	9111.0	5"	4"	10"	5189.2 / 5190.25	292.1	4897.1	313	4885.5	295-307.5	4903.5-4891.0	2[illegible]	M
PN5-LMM6	TBA	5/31/80	5643.9	9831.4	5"	4"	10"	5199.84 / 5200.64	346.2	4853.6	384	4815.8	350-376	4849.8-4823.8	[illegible]0	M
PN5-LMM7	TBA	6/19/80	6958.0	6888.2	5"	4"	10"	5235.52 / 5236.09	360	4875.5	387	4848.5	356.5-380	4879.0-4855.5	341.5	M
PN5-LMM8	TBA	6/27/80	5819.0	9363.4	5"	3"	4 7/8"	5191.68 / 5192.28	340	4851.7	367	4824.7	341-361	4850.7-4830.7	326	M

TABLE D-6.2.01 Continued

Field ID	Wyoming Permit Number	Date of Completion	Location South	Coordinates West	Surface Casing ID (in)	Screen ID (in)	Drill Bit Diamtr. @ Screened Inter.(in)	Surface Elevation / Top of Casing(ft) [1]	Depth of Cemented Annulus (ft) (Casing bottom) Depth	Depth of Cemented Annulus (ft) (Casing bottom) Elev.	Total Depth (Feet) Depth	Total Depth (Feet) Elev.	Open or Screened Interval (ft) Depth	Open or Screened Interval (ft) Elev.	Screen Packer Depth (ft) from Surface	Aquifer Repres.
PN5-LMM9	TBA	7/07/80	5875.2	9915.3	5"	3"	4 7/8"	5192.00 / 5193.02	320	4872.0	359	4833.0	332.5-359	4859.5-4833.0	317	M
PN5-LMM10	TBA	7/07/80	6865.9	6252.3	5"	3"	4 7/8"	5253.98 / 5254.63	345.5	4908.5	421	4833.0	378-421	4876-4833	312	M
PN5-LNM2	TBA	5/20/80	6530.0	9180.6	5"	4"	10"	5173.25 / 5173.45	196.5	4976.8	220	4953.3	198-214	4975.3-4959.3	177	N
PN5-LNM3	TBA	6/26/80	5598.9	9829.0	5 1/2"	3"	4 7/8"	5202.50 / 5202.95	245	4957.5	270	4932.5	243.5-263.5	4959.0-4939.0	233.5	N
PN5-LNM4	TBA	6/17/80	6866.8	6281.4	5 1/2"	4"	10"	5252.80 / 5253.35	260	4992.8	317	4935.8	273-311	4979.8-4941.8	253	N
PN5-LBM1	TBA	6/18/80	7021.0	6367.5	5 1/2"	4"	10"	5249.11 / 5250.01	485	4764.1	561	4688.1	485-554	4764.1-4695.1	470	Basal
PN5-LBM2	TBA	6/26/80	5683.8	9814.3	5 1/2"	3"	4 7/8"	5198.51 / 5199.16	430	4768.5	503	4695.5	466.5-496.5	4732.0-4702.0	416.5	Basal

[1] These elevations are accurate as of 8/21/80. Any changes to the top of casing elevations should be recorded.
[2] Cement basket used. Casing extends to T.D.
[3] Abandoned, sealed & cemented top to bottom.
[4] To be assigned.

TABLE D-6.2.02a
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. [illegible]-L317
Location 6716.75, 7729.2W Leuenberger Site
Obs. Well No. PN5-L307
Measuring Point (MP) is Top of Casing
Elevation of MP 5206.2
Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 57.55 ft. r^2= 3312.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			62.35					Pump On
		1								
		2								
		3								
		4								
		5								
		6								
		7								
		8								
		10								
		12								
		14								
		16								
		18								
		20								
		22								
		25								
	8:50	30			62.40		.05			
		35								
		40								
		45								
		50								

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317
Obs. Well No. PN5-L307
Elevation of MP 5206.2

Location 6716.75 7720.2W Leuenberger Site
Measuring Point (MP) is Top of Casing
Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55								
	9:20	60			62.42		.07			
		70								
		80								
	9:50	90			62.43		.08			
		100								
	10:20	120			62.40		.05			
		140								
		160			62.40		.05			
	11:20	180								
		210			62.3		-.05			
	12:20pm	240								
		270			62.48		.13			
	1:20	300								
		330			62.30		-.05			
	2:20	360								
	3:20	420			62.45		.10			
	4:20	480			62.41		.06			
	5:20	540			62.38		.03			
	6:20	600			62.45		.10			
	7:50	690			62.55		.20			
	9:20	780			62.46		.11			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317 | Location 6716.7S, 7729 W Leuenberger Site
Obs. Well No. PN5-L307 | Measuring Point (MP) is Top of Casing
Elevation of MP 6206.2 | Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 57.55 ft. r^2= 3312.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			62.63		.28			
6/27/79	12:20am	990			62.52		.17			
	3:20	1170			62.61		.26			
	6:20	1350			62.55		.20			
	9:20	1530			62.95		.60			
	12:20pm	1710			62.51		.16			
	6:20	1950			62.56		.21			
	8:50	2190	0	∞						Pump Off
		2191	1	2191						
		2192	2	1096						
		2193	3	731						
		2194	4	548						
		2195	5	439						
		2196	6	366						
		2197	7	314						
		2198	8	275						
		2200	10	220						
		2202	12	184						
		2204	14	157.4						
		2206	16	138						
		2208	18	123						
		2210	20	111						

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317
Obs. Well No. PNS-L307
Elevation of MP 5206.2

Location 6716.7S, 7729.4W LEUENBERGER SITE
Measuring Point (MP) is TOP OF CASING
Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm $r=$ 57.55 ft. $r^2=$ 3312.4

Date	Hour	t (min)	t′ (min)	t/t′	Depth to Water	s (unadjusted)	Adjustment Δs	s′ (Adjusted)	Q (gpm)	Remarks
		2212	22	100						
		2215	25	88.6						
		2220	30	74						
		2225	35	63.6						
		2230	40	55.8						
		2235	45	49.7						
		2240	50	44.8						
		2245	55	40.8						
		2250	60	37.5	62.46		.11			
		2260	70	32.3						
		2270	80	28.4						
		2280	90	25.3						
		2310	120	19.3	62.53		.18			
	11:30	2350	160	14.7	62.63		.28			
6/28/79	12:20AM	2400	210	11.4	62.72		.37			
	1:20	2460	270	9.1	62.61		.26			
	2:20	2520	330	7.6	62.56		.21			
	3:50	2610	420	6.2	62.49		.14			
	5:50	2730	540	5.1	62.58		.23			
	8:20	2880	690	4.2	62.49		.14			
	11:20	3060	870	3.5	62.55		.20			
	4:20pm	3360	1170	2.9	62.40		.05			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN6-L307

Elevation of MP 5206.2

Location 6716.7 S 7729.2 W LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 57.55 ft. r^2= 3312.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	62.67		.32			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L313U

Elevation of MP 5212.6

Location 6443.2S, 7550.3W Leuenberger Site

Measuring Point (MP) is .54' above Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 295.35 ft. r^2= 87,230.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			71.82					Pump On
		1								Measuring scope #4
		2								
		3								
		4								
		5								
		6								
		7								
		8								
		10								
		12								
		14								
		16								
		18								
		20								
		22								
		25								
	8:50	30								
		35								
		40								
		45								
		50								

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317u
Obs. Well No. PN5-L313u
Elevation of MP 5212.6

Location 644335 7550.3W Leuenberger Site
Measuring Point (MP) is .64 ft above Top of Casing
Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 295.35 ft. r^2= 87,230.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55								
	9:20	60								
		70								
		80			79.22		7.4			
	9:50	90			79.62		7.8			
		100			80.25		8.43			
	10:20	120			81.13		9.31			
		140			82.17		10.35			
		160			82.97		11.15			
	11:20	180			83.56		11.74			
		210			84.71		12.89			
	12:20pm	240			85.53		13.71			
		270			86.46		14.64			
	1:20	300			87.16		15.34			
		330			87.83		16.01			
	2:20	360			88.42		16.60			
	3:20	420			88.80		16.98			
	4:20	480			90.85		19.03			
	5:20	540			91.52		19.70			
	6:20	600			92.66		20.84			
	7:50	690			93.72		21.90			
	9:20	780			94.64		22.82			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317 Location LEUENBERGER SITE

Obs. Well No. PN5-L313 u Measuring Point (MP) is TOP OF CASING

Elevation of MP 5212.6 Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 295.35 ft. r^2= 87,230.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			95.51		23.69			
6/27/79	12:20am	990			96.50		24.68			
	3:20	1170			97.90		26.08			
	6:20	1350			99.13		27.31			
	9:20	1530			100.35		28.53			
	12:20pm	1710			101.04		29.82			
	6:20	1950			103.02		31.20			
	8:50	2190	0	∞	103.99		32.17			PUMP OFF
		2191	1	2191	103.97		32.15			
		2192	2	1096	103.93		32.11			
		2193	3	731	103.92		32.10			
		2194	4	548	103.91		32.09			
		2195	5	439	103.88		32.06			
		2196	6	366	103.82		32.00			
		2197	7	314	103.75		31.93			
		2198	8	275	103.62		31.80			
		2200	10	220	103.42		31.60			
		2202	12	184	103.27		31.45			
		2204	14	157.4	103.01		31.19			
		2206	16	138	102.69		30.87			
		2208	18	123	102.53		30.71			
		2210	20	111	102.37		30.56			

PUMPI' TEST MEASUREMENTS

Pumped Well No. PN5-L317u

Obs. Well No. PN5-L313u

Elevation of MP 5212.6

Location 6443.3S 7550.3W LELENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 295.35 ft. r^2= 87,230.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	102.06		30.24			
		2215	25	88.6	101.72		29.90			
		2220	30	74	101.22		29.40			
		2225	35	63.6	100.72		28.90			
		2230	40	55.8	100.25		28.43			
		2235	45	49.7	99.79		27.97			
		2240	50	44.8	99.48		27.66			
		2245	55	40.8	99.08		27.26			
		2250	60	37.5	98.79		26.97			
		2260	70	32.3	98.09		26.27			
		2270	80	28.4	97.52		25.70			
		2280	90	25.3	96.98		25.16			
		2310	120	19.3	95.20		23.38			
	11:30	2350	160	14.7	93.92		22.10			
6/28/79	12:20AM	2400	210	11.4	92.66		20.84			
	1:20	2460	270	9.1	91.22		19.40			
	2:20	2520	330	7.6	90.00		18.18			
	3:50	2610	420	6.2	88.59		16.77			
	5:50	2730	540	5.1	87.20		15.38			
	8:20	2880	690	4.2	85.51		13.69			
	11:20	3060	870	3.5	84.09		12.77			
	4:20pm	3360	1170	2.9	82.45		10.63			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Location LEVENBERGER SITE

Obs. Well No.

Measuring Point (MP) is TOP OF CASING

Elevation of MP

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/78	8:15	4315	2125	2.0	79.05		7.23			

TABLE D-6.2.02c
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317 u

Obs. Well No. PN5-L317 u

Elevation of MP 5208.2

Location 6712.5S, 7671.8W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			68.5					Pump On
		1			106.33		36.83			
		2			111.09		42.59			
		3			113.60		45.10			
		4			117.10		48.60			
		5			117.82		49.32			
		6			118.58		50.08			
		7			119.78		51.28			
		8			120.57		52.07			
		10			120.85		52.35			
		12			124.62		56.12			
		14			125.48		56.98			
		16			126.17		57.67			
		18			127.60		59.10			
		20			127.98		59.48			
		22			128.67		60.17			
		25			128.86		60.36			
	8:50	30			129		60.61			
		35			130		61.50			
		40			130.85		62.35			
		45			131.60		63.10			
		50			132.03		63.53			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317u
Obs. Well No. PNS-L317u
Elevation of MP 6208.2

Location 6712.5S 7671.8W LEVENBERGER SITE
Measuring Point (MP) is 1.85' above TOP OF CASING
Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= .42 ft. r^2= .18

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			132.73		64.23			
	9:20	60			132.92		64.42			
		70			133.70		65.20			
		80			135.13		66.63			
	9:50	90			135.65		67.15			
		100			136.15		67.65			
	10:20	120			137.5		69.00			
		140			138.49		69.99			
		160			139.52		71.02			
	11:20	180			140.00		71.5			
		210			141.11		72.65			
	12:20pm	240			141.38		72.88			
		270			142.18		73.68			
	1:20	300			143.00		74.50			
		330			143.43		74.93			
	2:20	360			144.46		75.96			
	3:20	420			145.69		77.19			
	4:20	480			146.35		77.85			
	5:20	540			146.85		78.35			
	6:20	600			147.15		75.65			
	7:50	690			147.36		78.86			
	9:20	780			147.98		79.48			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317u

Obs. Well No. PN5-L317u

Elevation of MP 5208.2

Location 6712.5S 7617.8W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= .42 ft. r^2= .18

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			148.80		80.30			
6/27/78	12:20am	990			149.25		80.75			
	3:20	1170			150.36		81.86			
	6:20	1350			151.90		83.40			
	9:20	1530			154.04		85.54			
	12:20pm	1710			155.60		87.10			
	6:20	1950			155.77		87.27			
	8:50	2190	0	∞	156.5		92.03			Pump Off
		2191	1	2191	120.4		51.90			
		2192	2	1096	118.4		49.90			
		2193	3	731	113.6		45.10			
		2194	4	548	112.0		43.50			
		2195	5	439	110.7		42.20			
		2196	6	366	109.6		41.10			
		2197	7	314						
		2198	8	275	108.75		40.25			
		2200	10	220	10[illegible].70		39.20			
		2202	12	184	106.63		38.13			
		2204	14	157.4	105.35		36.85			
		2206	16	138	103.7		35.20			
		2208	18	123	103.4		34.90			
		2210	20	111	103.2		34.70			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317u
Location 6712.5 S 7671.8 W LEUENBERGER SITE
Obs. Well No. PNS-L317u
Measuring Point (MP) is TOP OF CASING
Elevation of MP 5208.2
Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= .42 ft. r^2= .18

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	102.45		33.95			
		2215	25	88.6	102.07		33.57			
		2220	30	74	100.97		32.47			
		2225	35	63.6	100.28		31.78			
		2230	40	55.8	99.62		31.12			
		2235	45	49.7	98.70		30.20			
		2240	50	44.8	98.59		30.09			
		2245	55	40.8	97.98		29.40			
		2250	60	37.5	97.46		28.96			
		2260	70	32.3	96.67		28.17			
		2270	80	28.4	95.92		27.42			
		2280	90	25.3	95.24		26.74			
		2310	120	19.3	93.63		25.13			
	11:30	2350	160	14.7	91.90		23.40			
6/28/79	12:20AM	2400	210	11.4	90.45		21.95			
	1:20	2460	270	9.1	88.74		20.24			
	2:20	2520	330	7.6	87.51		19.01			
	3:50	2610	420	6.2	85.90		17.40			
	5:50	2730	540	5.1	84.65		16.15			
	8:20	2880	690	4.2	83.05		14.55			
	11:20	3060	870	3.5	80.00		11.50			
	4:20pm	3360	1170	2.9	78.46		9.96			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Obs. Well No. ____

Elevation of MP ____

Location LEVENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ____ gpm r= ____ ft. r^2= ____

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	75.47		6.97			

TABLE D-6.2.02d
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317
Obs. Well No. PN5-L319u
Elevation of MP 5217.3

Location 7006.0S 7620.6W Levenberger Site
Measuring Point (MP) is Top of Casing
Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= 297.9 ft. r^2= 88,744.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			76.7					Pump On
		1			76.75		.05			Measuring Slope #5
		2			76.80		.10			
		3			76.70		0			
		4			76.70		0			
		5			76.70		0			
		6			76.75		.05			
		7			76.85		.15			
		8			76.90		.20			
		10			77.0		.30			
		12			77.3		.60			
		14			77.25		.55			
		16			77.50		.80			
		18			77.60		.90			
		20			77.90		1.20			
		22			78.00		1.30			
		25			78.25		1.55			
	8:50	30			79.00		2.30			
		35			79.35		2.65			
		40			79.75		3.05			
		45			80.15		3.45			
		50			80.6		3.90			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L319u

Elevation of MP 5217.3

Location 7006.0S 7620.6W LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 297.93 ft. r^2= 88,762.28

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			80.85		4.15			
	9:20	60			81.25		4.55			
		70			81.9		5.20			
		80			82.6		5.90			
	9:50	90			83.15		6.45			
		100			83.75		7.05			
	10:20	120			84.6		7.90			
		140			85.45		8.75			
		160			86.35		9.65			
	11:20	180			87.15		10.45			
		210			88.20		11.50			
	12:20pm	240			88.90		12.20			
		270			89.75		13.05			
	1:20	300			90.5		13.8			
		330			91.5		14.8			
	2:20	360			91.8		15.1			
	3:20	420			93.12		16.42			
	4:20	480			95.35		18.65			
	5:20	540			95.15		18.45			
	6:20	600			96.20		19.50			
	7:50	690			97.58		20.88			
	9:20	780			97.98		21.28			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L319

Elevation of MP 5217.3

Location 7006.0S 7620.6W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 297.93 ft. r^2= 88,762.28

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			98.82		22.12			
6/27/79	12:20am	990			99.90		23.20			
	3:20	1170			101.29		24.59			
	6:20	1350			102.62		25.92			
	9:20	1530			103.63		26.93			
	12:20pm	1710			104.55		27.85			
	6:20	1950			106.25		29.55			
	8:50	2190	0	∞	107.15		30.45			Pump Off
		2191	1	2191						
		2192	2	1096						
		2193	3	731						
		2194	4	548						
		2195	5	439						
		2196	6	366						
		2197	7	314						
		2198	8	275						
		2200	10	220						
		2202	12	184	106.89		30.19			
		2204	14	157.4	106.65		29.95			
		2206	16	138	106.45		29.75			
		2208	18	123	106.25		29.55			
		2210	20	111	106.00		29.30			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317u
Obs. Well No. PNS-L319u
Elevation of MP 5217.3

Location 7006.08 7620.6 W LEUENBERGER SITE
Measuring Point (MP) is TOP OF CASING
Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 297.93 ft. r^2= 88,762.28

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	105.75		29.05			
		2215	25	88.6	105.50		28.80			
		2220	30	74	105.10		28.40			
		2225	35	63.6	104.70		28.00			
		2230	40	55.8	104.30		27.60			
		2235	45	49.7	104.00		27.30			
		2240	50	44.8	103.6		26.90			
		2245	55	40.8	103.35		26.65			
		2250	60	37.5	103.10		26.40			
		2260	70	32.3	102.45		25.75			
		2270	80	28.4	102		25.30			
		2280	90	25.3	101.45		24.75			
		2310	120	19.3	100.45		23.75			
	11:30	2350	160	14.7	98.93		22.23			
6/28/79	12:20AM	2400	210	11.4	97.63		20.93			
	1:20	2460	270	9.1	96.17		19.47			
	2:20	2520	330	7.6	94.97		18.27			
	3:50	2610	420	6.2	93.50		16.80			
	5:50	2730	540	5.1	92.00		15.30			
	8:20	2880	690	4.2	90.32		13.62			
	11:20	3060	870	3.5	87.55		10.85			
	4:20pm	3360	1170	2.9	85.75		9.05			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Obs. Well No. PNS-L319u

Elevation of MP 5217.3

Location 7006.0 S' 7620.6 W LEVENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= 297.93 ft. r^2= 88,762.28

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	83.75		7.05			

TABLE D-6.2.02e
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Location 6754.2S, 7917.1W Levenberger Site

Obs. Well No. PN5- L320u

Measuring Point (MP) is Top of Casing

Elevation of MP 5203.3

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 248.8 ft. r^2= 61901.44

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			63.02					Pump On
		1			63.05		.03			
		2			63.05		.03			
		3			63.05		.03			
		4			63.08		.05			
		5			63.08		.05			
		6			63.34		.32			
		7			63.50		.48			
		8			63.59		.57			
		10			63.86		.84			
		12			64.17		1.15			
		14			64.31		1.29			
		16			64.65		1.63			
		18			64.85		1.83			
		20			65.17		2.15			
		22			65.44		2.42			
		25			65.69		2.67			
	8:50	30			66.32		3.30			
		35			66.72		3.70			
		40			67.08		4.06			
		45			67.43		4.41			
		50			67.97		4.95			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L320u

Elevation of MP 5203.3

Location 6754.25 7017.1 W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 248.8 ft. r^2= 61901.44

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			68.40		5.38			
	9:20	60			68.89		5.87			
		70			69.56		6.54			
		80			70.33		7.31			
	9:50	90			70.76		7.74			
		100			71.34		8.32			
	10:20	120			72.60		9.58			
		140			73.36		10.34			
		160			74.29		11.27			
	11:20	180			74.94		11.92			
		210			76.04		13.02			
	12:20pm	240			76.84		13.82			
		270			77.57		14.55			
	1:20	300			78.33		15.31			
		330			79.07		16.05			
	2:20	360			79.78		16.76			
	3:20	420			80.94		17.92			
	4:20	480			81.92		18.90			
	5:20	540			82.85		19.83			
	6:20	600			83.65		20.63			
	7:50	690			84.81		21.79			
	9:20	780			85.63		22.61			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L320 u

Elevation of MP 5203.3

Location 6754.2 S 7917.1 W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= 248.82 ft. r^2= 61901.44

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			86.35		23.33			
6/27/79	12:20am	990			87.43		24.41			
	3:20	1170			88.81		25.79			
	6:20	1350			89.94		26.52			
	9:20	1530			91.34		28.32			
	12:20pm	1710			92.51		29.49			
	6:20	1950			93.90		30.88			
	8:50	2190	0	∞	94.81		31.79			Pump Off
		2191	1	2191						
		2192	2	1096						
		2193	3	731						
		2194	4	548						
		2195	5	439						
		2196	6	366						
		2197	7	314						
		2198	8	275						
		2200	10	220						
		2202	12	184						
		2204	14	157.4						
		2206	16	138						
		2208	18	123						
		2210	20	111						

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L320 u

Elevation of MP 5203.3

Location 6754.28 7917.1W LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 248.8 ft. r^2= 61900.44

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	93.12		30.10			
		2215	25	88.6	92.72		29.68			
		2220	30	74	92.15		29.13			
		2225	35	63.6	91.68		28.69			
		2230	40	55.8	91.31		28.29			
		2235	45	49.7	90.71		27.69			
		2240	50	44.8	90.41		27.39			
		2245	55	40.8	90.00		26.98			
		2250	60	37.5	89.76		26.74			
		2260	70	32.3	89.14		26.12			
		2270	80	28.4	88.56		25.54			
		2280	90	25.3	87.96		24.94			
		2310	120	19.3	86.50		23.48			
	11:30	2350	160	14.7	85.23		22.21			
6/28/79	12:20AM	2400	210	11.4	83.81		20.79			
	1:20	2460	270	9.1	82.34		19.32			
	2:20	2520	330	7.6	81.30		18.28			
	3:50	2610	420	6.2	79.71		16.69			
	5:50	2730	540	5.1	78.29		15.27			
	8:20	2880	690	4.2	76.65		13.63			
	11:20	3060	870	3.5	75.15		12.13			
	4:20pm	3360	1170	2.9	73.52		10.50			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Location LEVENBERGER SITE

Obs. Well No.

Measuring Point (MP) is TOP OF CASING

Elevation of MP

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= ________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	70.12		7.10			

TABLE D-6.2.02f
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L570

Elevation of MP

Location LEVENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r=________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			33.11					Pump On
		1								
		2								
		3								
		4								
		5								
		6								
		7								
		8								
		10								
		12								
		14								
		16								
		18								
		20								
		22								
		25								
	8:50	30			33.07		-.04			
		35								
		40								
		45								
		50								

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317 Location Leuenberger Site

Obs. Well No. PN5-L570 Measuring Point (MP) is Top of Casing

Elevation of MP ______ Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r=______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55								
	9:20	60			32.90		-.21			
		70								
		80								
	9:50	90			32.96		-.15			
		100								
	10:20	120			33.05		-.06			
		140								
		160			33.00		-.11			
	11:20	180								
		210			32.95		-.16			
	12:20pm	240								
		270			33.03		-.08			
	1:20	300								
		330			33.05		-.06			
	2:20	360			33.02		-.09			
	3:20	420			32.98		-.13			
	4:20	480			33.0		-.11			
	5:20	540			32.98		-.13			
	6:20	600			33.04		-.07			
	7:50	690			32.95		-.16			
	9:20	780			33.13		.02			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L570

Elevation of MP

Location LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= ________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55								
	9:20	60			32.90		-.21			
		70								
		80								
	9:50	90			32.96		-.15			
		100								
	10:20	120			33.05		-.06			
		140								
		160			33.00		-.11			
	11:20	180								
		210			32.95		-.16			
	12:20pm	240								
		270			33.03		-.08			
	1:20	300								
		330			33.05		-.06			
	2:20	360			33.02		-.09			
	3:20	420			32.98		-.13			
	4:20	480			33.0		-.11			
	5:20	540			32.98		-.13			
	6:20	600			33.04		-.07			
	7:50	690			32.95		-.16			
	9:20	780			33.13		.02			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L570

Elevation of MP

Location LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55								
	9:20	60			32.90		-.21			
		70								
		80								
	9:50	90			32.96		-.15			
		100								
	10:20	120			33.05		-.06			
		140								
		160			33.00		-.11			
	11:20	180								
		210			32.95		-.16			
	12:20pm	240								
		270			33.03		-.08			
	1:20	300								
		330			33.05		-.06			
	2:20	360			33.02		-.09			
	3:20	420			32.98		-.13			
	4:20	480			33.0		-.11			
	5:20	540			32.98		-.13			
	6:20	600			33.04		-.07			
	7:50	690			32.95		-.16			
	9:20	780			33.13		.02			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317 Location Leuenberger Site

Obs. Well No. Measuring Point (MP) is Top of Casing

Elevation of MP Discharge Meas. Method Cummulative Flow Meter

Average Q ____ gpm r= ____ ft. r^2= ____

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			33.09		-.02			
6/27/79	12:20am	990			33.06		-.05			
	3:20	1170			33.15		.04			
	6:20	1350			33.19		.08			
	9:20	1530			33.04		-.07			
	12:20pm	1710			33.02		-.09			
	6:20	1950			33.19		.08			
	8:50	2190	0	∞						Pump Off
		2191	1	2191						
		2192	2	1096						
		2193	3	731						
		2194	4	548						
		2195	5	439						
		2196	6	366						
		2197	7	314						
		2198	8	275						
		2200	10	220						
		2202	12	184						
		2204	14	157.4						
		2206	16	138						
		2208	18	123						
		2210	20	111						

PUMPING TEST MEASUREMENTS

Pumped Well No. PWS-L317

Location LEUENBERGER SITE

Obs. Well No.

Measuring Point (MP) is TOP OF CASING

Elevation of MP

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unad-justed)	Adjust-ment Δs	s' (Ad-justed)	Q (gpm)	Remarks
		2212	22	100						
		2215	25	88.6						
		2220	30	74						
		2225	35	63.6						
		2230	40	55.8						
		2235	45	49.7						
		2240	50	44.8						
		2245	55	40.8						
		2250	60	37.5	33.24		.13			
		2260	70	32.3						
		2270	80	28.4						
		2280	90	25.3						
		2310	120	19.3	33.31		.20			
	11:30	2350	160	14.7	33.33		.22			
6/28/79	12:20AM	2400	210	11.4	33.44		.33			
	1:20	2460	270	9.1	33.35		.24			
	2:20	2520	330	7.6	33.30		.19			
	3:50	2610	420	6.2	33.29		.18			
	5:50	2730	540	5.1	33.35		.24			
	8:20	2880	690	4.2	33.22		.11			
	11:20	3060	870	3.5	33.19		.08			
	4:20pm	3360	1170	2.9	33.25		.14			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Location LEVENBERGER SITE

Obs. Well No. PNS-L570

Measuring Point (MP) is TOP OF CASING

Elevation of MP ______

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unad-justed)	Adjust-ment Δs	s' (Ad-justed)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	33.27		.16			

TABLE D-6.2.02g
N AQUIFER TEST #1

PUMPING TES MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L572 u

Elevation of MP 5207.9

Location 6614.85S 7682.9W Levenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= 98.3 ft. r^2= 9662.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			61.31					Pump On
		1			67.55		6.24			
		2			68.65		7.34			
		3			69.28		7.97			
		4			70.33		9.02			
		5			71.59		10.23			
		6			72.43		11.12			
		7			73.29		11.98			
		8			74.01		12.70			
		10			75.32		14.01			
		12			76.41		15.1			
		14			77.22		15.91			
		16			78.06		16.75			
		18			78.75		17.44			
		20			79.35		18.04			
		22			80.01		18.70			
		25			80.67		19.36			
	8:50	30			81.38		20.07			
		35			82.33		21.02			
		40			83.18		21.87			
		45			84.04		22.73			
		50			84.44		23.13			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L572 u

Elevation of MP 5207.0

Location 6614.85 7682.0W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Commulative Flow Meter

Average Q ______ gpm r= 98.3 ft. r^2= 9662.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			84.83		23.52			
	9:20	60			85.24		23.93			
		70			86.12		24.81			
		80			86.91		25.60			
	9:50	90			87.62		26.31			
		100			88.29		26.98			
	10:20	120			89.56		28.25			
		140			90.46		29.15			
		160			91.38		30.07			
	11:20	180			92.18		30.87			
		210			93.25		31.94			
	12:20pm	240			94.08		32.77			
		270			94.86		33.55			
	1:20	300			95.62		34.31			
		330			96.27		34.95			
	2:20	360			96.97		35.66			
	3:20	420			98.23		36.92			
	4:20	480			99.14		37.83			
	5:20	540			99.95		38.64			
	6:20	600			101.4		40.09			
	7:50	690			101.62		40.31			
	9:20	780			102.65		41.34			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Location 6614.85 76829W LEUENBERGER SITE

Obs. Well No. PN5-L572u

Measuring Point (MP) is TOP OF CASING

Elevation of MP 5207.9

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= 98.3 ft. r^2= 9662.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			103.41		42.10			
6/27/79	12:20am	990			104.41		43.10			
	3:20	1170			105.71		44.40			
	6:20	1350			106.98		45.67			
	9:20	1530			108.98		47.67			
	12:20pm	1710			109.63		48.32			
	6:20	1950			110.91		49.60			
	8:50	2190	0	∞	111.70		50.39			PUMP OFF
		2191	1	2191	111.67		50.36			
		2192	2	1096	110.95		49.64			
		2193	3	731	110.00		48.69			
		2194	4	548	108.68		47.37			
		2195	5	439	107.63		46.32			
		2196	6	366	106.95		45.64			
		2197	7	314	106.08		44.77			
		2198	8	275	105.34		44.03			
		2200	10	220	104.20		42.89			
		2202	12	184	103.49		42.18			
		2204	14	157.4	102.52		41.21			
		2206	16	138	101.71		40.40			
		2208	18	123	101.30		39.99			
		2210	20	111	100.48		39.17			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317
Location 66148S 7682.9W Leuenberger Site
Obs. Well No. PNS-L572u
Measuring Point (MP) is Top of Casing
Elevation of MP 5207.9
Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 98.3 ft. r^2= 9662.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	100.06		38.75			
		2215	25	88.6	99.43		38.12			
		2220	30	74	98.91		37.60			
		2225	35	63.6	97.62		36.31			
		2230	40	55.8	96.95		35.64			
		2235	45	49.7	96.50		35.19			
		2240	50	44.8	95.86		34.55			
		2245	55	40.8	95.32		34.01			
		2250	60	37.5	94.78		33.47			
		2260	70	32.3	94.10		32.79			
		2270	80	28.4	93.31		32.00			
		2280	90	25.3	92.60		31.29			
		2310	120	19.3	90.48		29.17			
	11:30	2350	160	14.7	89.50		28.19			
6/28/79	12:20AM	2400	210	11.4	87.71		26.40			
	1:20	2460	270	9.1	86.15		24.84			
	2:20	2520	330	7.6	84.70		23.39			
	3:50	2610	420	6.2	83.35		22.04			
	5:50	2730	540	5.1	81.96		20.65			
	8:20	2880	690	4.2	80.21		18.90			
	11:20	3060	870	3.5	80.16		18.85			
	4:20pm	3360	1170	2.9	77.05		15.74			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Obs. Well No. PNS-L372

Elevation of MP 5207.9

Location 6614.85 76828 W LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 98.3 ft. r^2= 9662.89

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	73.68		12.37			

TABLE D-6.2.02h
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317
Obs. Well No. PN5-L573u
Elevation of MP 5213.3

Location 6718.4S 7604.6W Leuenberger Site
Measuring Point (MP) is Top of Casing
Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= 67.5 ft. r^2= 4556.25

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			72.28					Pump On
		1			72.45		.17			Measuring Scope #3
		2			73.80		1.52			
		3			75.39		3.11			
		4			77.9		5.62			
		5			79.38		7.10			
		6			80.62		8.34			
		7			81.71		9.43			
		8			82.62		10.34			
		10			83.37		11.09			
		12			84.70		12.42			
		14			85.85		13.57			
		16			86.73		14.45			
		18			87.5		15.22			
		20			88.79		16.51			
		22			89.36		17.08			
		25			90.04		17.76			
	8:50	30			91.09		18.81			
		35			91.94		19.66			
		40			92.72		20.44			
		45			93.35		21.07			
		50			94.06		21.78			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L573u

Elevation of MP 5213.3

Location 6718.45' 7604.6 W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= 67.5 ft. r^2= 4556.25

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			94.64		22.36			
	9:20	60			95.15		22.87			
		70			96.28		24.00			
		80			96.78		24.50			
	9:50	90			97.63		25.35			
		100			98.2		25.92			
	10:20	120			99.45		27.17			
		140			100.4		28.12			
		160			101.32		29.04			
	11:20	180			102.14		29.86			
		210			103.25		30.97			
	12:20pm	240			104.08		31.80			
		270			104.99		32.71			
	1:20	300			105.8		33.52			
		330			106.39		34.11			
	2:20	360			107.13		34.85			
	3:20	420			108.46		36.18			
	4:20	480			109.42		37.14			
	5:20	540			110.21		37.93			
	6:20	600			111.50		39.22			
	7:50	690			112.0		39.72			
	9:20	780			111.63		39.35			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317
Obs. Well No. PN5-L573u
Elevation of MP 5213.2

Location 6718.4 S 7604.6 W Leuenberger Site
Measuring Point (MP) is Top of Casing
Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 67.5 ft. r^2= 4556.25

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			113.50		41.22			
6/27/79	12:20am	990			114.40		42.12			
	3:20	1170			115.78		43.50			
	6:20	1350			117.07		44.79			
	9:20	1530			118.65		46.37			
	12:20pm	1710			120		47.72			
	6:20	1950			121.8		49.52			
	8:50	2190	0	∞	120.83		48.55			Pump Off
		2191	1	2191	120.45		48.17			
		2192	2	1096	118.00		45.72			
		2193	3	731	116.50		44.22			
		2194	4	548	115.28		43.06			
		2195	5	439	114.07		41.79			
		2196	6	366	113.10		40.82			
		2197	7	314	112.25		39.97			
		2198	8	275	111.45		39.17			
		2200	10	220	110.56		38.28			
		2202	12	184	109.6		37.32			
		2204	14	157.4	108.73		36.45			
		2206	16	138	107.83		35.55			
		2208	18	123	107.21		34.93			
		2210	20	111	106.73		34.45			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317
Obs. Well No. PNS-L573u
Elevation of MP 5213.3

Location 6718.4S 7604.6W LEUENBERGER SITE
Measuring Point (MP) is TOP OF CASING
Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ______ gpm r= 67.5 ft. r^2= 4556.25

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	106.25		33.97			
		2215	25	88.6	105.63		33.35			
		2220	30	74	104.50		32.22			
		2225	35	63.6	103.67		31.39			
		2230	40	55.8	103.00		30.72			
		2235	45	49.7	102.39		30.11			
		2240	50	44.8	101.93		29.65			
		2245	55	40.8	101.40		29.13			
		2250	60	37.5	100.93		28.65			
		2260	70	32.3	100.10		27.82			
		2270	80	28.4	99.4		27.12			
		2280	90	25.3	98.75		26.47			
		2310	120	19.3	96.77		24.49			
	11:30	2350	160	14.7	95.30		23.02			
6/28/79	12:20AM	2400	210	11.4	93.96		21.68			
	1:20	2460	270	9.1	92.34		20.06			
	2:20	2520	330	7.6	91.07		18.79			
	3:50	2610	420	6.2	89.52		17.24			
	5:50	2730	540	5.1	88.02		15.74			
	8:20	2880	690	4.2	86.48		14.20			
	11:20	3060	870	3.5	84.91		12.63			
	4:20pm	3360	1170	2.9	83.16		10.88			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Obs. Well No. PNS-L573u

Elevation of MP 5213.3

Location 6718.4S 7604.6W LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 67.5 ft. r^2= 4556.25

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	79.78		7.5			

TABLE D-6.2.02i
N AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317
Obs. Well No. PN5-L574 4
Elevation of MP 5208.2

Location 6760.8 S 7736.0 W Leuenberger Site
Measuring Point (MP) is Top of Casing
Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 81.1 ft. r^2= 6577.2

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/26/79	8:20	0			67.22					Pump On
		1			67.37		.15			
		2			67.77		.55			
		3			68.28		1.06			
		4			69.15		1.93			
		5			69.57		2.37			
		6			70.02		2.80			
		7			70.51		3.29			
		8			70.96		3.74			
		10			71.61		4.39			
		12			72.31		5.09			
		14			72.81		5.59			
		16			73.44		6.22			
		18			73.55		6.33			
		20			74.50		7.28			
		22			74.88		7.66			
		25			75.53		8.31			
	8:50	30			76.40		9.18			
		35			77.16		9.94			
		40			77.81		10.59			
		45			78.46		11.24			
		50			79.05		11.83			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L574u

Elevation of MP 5208.2

Location 6760.9S 7736.9W Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 81.1 ft. r^2= 6577.2

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			79.51		12.29			
	9:20	60			79.98		12.76			
		70			80.33		13.11			
		80			81.14		13.92			
	9:50	90			81.96		14.74			
		100			82.45		15.23			
	10:20	120			84.15		16.93			
		140			84.79		17.57			
		160			85.63		18.41			
	11:20	180			86.54		19.22			
		210			87.56		20.34			
	12:20pm	240			88.46		21.24			
		270			89.91		22.69			
	1:20	300			90.00		22.78			
		330			90.73		23.51			
	2:20	360			91.45		24.23			
	3:20	420			92.68		25.46			
	4:20	480			93.72		26.54			
	5:20	540			94.57		27.35			
	6:20	600			95.47		28.25			
	7:50	690			96.55		29.33			
	9:20	780			97.48		30.26			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L574u

Elevation of MP 5208.2

Location 6760.05 S 7736.9 N Leuenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ______ gpm r= 81.1 ft. r^2= 6577.2

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	10:50	870			98.17		30.95			
6/27/78	12:20am	990			99.18		31.96			
	3:20	1170			100.52		33.30			
	6:20	1350			101.71		34.49			
	9:20	1530			103.12		35.90			
	12:20pm	1710			104.37		37.15			
	6:20	1950			105.69		38.47			
	8:50	2190	0	∞	106.56		39.34			Pump Off
		2191	1	2191	106.64		39.42			
		2192	2	1096	106.15		38.93			
		2193	3	731	105.75		38.53			
		2194	4	548	105.32		38.10			
		2195	5	439	104.88		37.66			
		2196	6	366	104.31		37.09			
		2197	7	314	104.01		36.79			
		2198	8	275	103.63		36.41			
		2200	10	220	103.3		36.08			
		2202	12	184	102.28		35.06			
		2204	14	157.4	101.75		34.53			
		2206	16	138	101.24		34.02			
		2208	18	123	100.75		33.53			
		2210	20	111	100.36		33.14			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-L317

Obs. Well No. PNS-L574u

Elevation of MP 5208.2

Location 6760.9S 7736.9W Levenberger Site

Measuring Point (MP) is Top of Casing

Discharge Meas. Method Cummulative Flow Meter

Average Q ________ gpm r= 81.1 ft. r^2= 6577.2

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		2212	22	100	99.94		32.72			
		2215	25	88.6	99.38		32.16			
		2220	30	74	98.47		31.25			
		2225	35	63.6	97.75		30.53			
		2230	40	55.8	97.12		29.90			
		2235	45	49.7	96.67		29.45			
		2240	50	44.8	96.18		28.96			
		2245	55	40.8	95.52		28.30			
		2250	60	37.5	95.39		28.17			
		2260	70	32.3	94.48		27.26			
		2270	80	28.4	93.87		26.65			
		2280	90	25.3	93.10		25.88			
		2310	120	19.3	91.53		24.31			
	11:30	2350	160	14.7	89.92		22.70			
6/28/79	12:20AM	2400	210	11.4	88.61		21.39			
	1:20	2460	270	9.1	87.00		19.78			
	2:20	2520	330	7.6	85.9		18.68			
	3:50	2610	420	6.2	84.28		17.06			
	5:50	2730	540	5.1	82.77		15.55			
	8:20	2880	690	4.2	81.28		14.06			
	11:20	3060	870	3.5	79.65		12.43			
	4:20pm	3360	1170	2.9	78		10.78			

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L317

Obs. Well No. PN5-L574u

Elevation of MP 5208.2

Location 6760.9S 7736.9W LEUENBERGER SITE

Measuring Point (MP) is TOP OF CASING

Discharge Meas. Method CUMMULATIVE FLOW METER

Average Q ________ gpm r= 81.1 ft. r^2= 6577.2

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
6/29/79	8:15	4315	2125	2.0	73.6'		6.39			

TABLE D.6.2.03

Barometric Pressure During N Aquifer Test #1

Time In Minutes	Barometric Pressure In. of Mg	Barometric Pressure Ft. of H_2O
0	29.82	33.70
120	29.81	33.69
160	29.82	33.70
195	29.81	33.69
235	29.80	33.67
360	29.76	33.63
480	29.75	33.62
600	29.75	33.62
710	29.76	33.63
795	29.80	33.67
860	29.81	33.69
975	29.83	33.71
1030	29.89	33.78
1340	29.86	33.74
1430	29.87	33.75
1560	29.87	33.75
1740	29.84	33.72
1860	29.82	33.70
1950	29.81	33.69
1960	29.78	33.65
2050	29.79	33.66
2060	29.81	33.69
2350	29.84	33.72
2360	29.88	33.76
2550	29.84	33.72
2660	29.87	33.75
2885	29.85	33.73
4050	29.84	33.72

May 1976

TABLE D-6.2.04a
M AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301   Location Leuenberger

Obs. Well No. PN5-L301   Measuring Point (MP) is T.O.C. 3.89' Above

Elevation of MP 5205.5'   Discharge Meas. Method Badger Flow Meter & 5 Gal. Bucket

End 125148
Meter Begin 2781

Average Q 44.2 gpm r= NA ft. r^2= NA

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Gallons Pumped
2-12	SWL				65.44					
	0739				66.36					
	0811				66.43					
	PUMP ON AT 0832									
	0832	PUMP ON								
		1				M Scope Malfunction				
		2								
		3								
		4								
		5								
		6							66.5	3180
		7								
		8								
		9								
		10								
		11								
		12								
		13								
		14								
		15								
		16								

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301

Location ______

Obs. Well No. PN5-L301

Measuring Point (MP) is ______

Elevation of MP ______

Discharge Meas. Method ______

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12		17								
		18								
		19								
		20								
		22								
		24								
		26								
	900	28							58	4323
		30							60	
		32								
		34								
		36								
		38								
		40								
		42								
		44								
		46								
	920	48							50	
		50								
		52								
		54								
		56								

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location ______

Obs. Well No. PN5-L301 Measuring Point (MP) is ______

Elevation of MP ______ Discharge Meas. Method ______

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Gallons Pumped
2-12		58								
	932	60							50	
		75								
		90								
		105								
		120								
	1051				PUMP OFF TO LOWER PUMP 60'					
	1059				PUMP ON				60	
	1120								50	
	1146									
		195							49	11,800
		210								
		225							49	
		240							49	
		270							49	
	1307								47	15,623
									Increased to 49	
	1339								49	
	1409								49	
	1439	367							49	19,[illegible]
	1507								49	
	1537	425							49	

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location ______

Obs. Well No. PN5-L301 Measuring Point (MP) is ______

Elevation of MP ______ Discharge Meas. Method ______

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	1607	455							48	24,200
									Increased to 49	
	1637	485							48	
	1737	545							48	28,300
	1837	605							48	
	1937	665								34,000
	2037	725							47	36,800
	2137	785							48	39,700
	2237	845							46	42,400
	2337	905							46	45,200
2-13	0037	965							45	47,900
Measured 5 min. early.	0132	1025							42*	50,400
	0237	1085							46	53,200
	0337	1145							45	55,900
	0437	1205							45	58,600
	0537	1265							45	61,300
	0637	1325							45	64,000
	0737	1385							45	66,700
	0837	1445							45	69,500
	1237	1685							45	
	1710	1958							43	92,600
	2118	2206							43	103,400

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location ______

Obs. Well No. PN5-L301 Measuring Point (MP) is ______

Elevation of MP ______ Discharge Meas. Method ______

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Gallons Pumped
2-14	0107	2435							40	113,400
	0503	2671							41	123,700
	0650	2778								125,248

DOWN 9 MINUTES

END 125148

BEGIN 2781

122367

in 2778 - 9 minutes = 2769 minutes = 44.19 gpm

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301

Obs. Well No. PN5-L301

Elevation of MP

Location

Measuring Point (MP) is

Discharge Meas. Method

S.W.L. 66.43

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-14-79										
		PUMP OFF 0650 AT t= 2788 MINUTES.								
	0951	2959	81	24.04	110.00			43.57		
	1055	3023	145	16.07	104.63			38.20		
	1100	3028	150	15.67	103.97			37.54		
	1130	3058	280	11.04	102.41			35.98		
	1204	3092	314	9.85	100.39			33.96		
	1234	3122	344	9.08	98.89			32.46		
	1304	3152	374	8.43	97.48			31.05		
	1332	3180	402	7.91	96.58			30.15		
	1402	3210	432	7.43	95.40			28.97		
	1432	3240	462	7.01	94.48			28.05		
	1501	3269	491	6.66	93.50			27.07		
	1601	3329	551	6.04	91.90			25.47		
	1701	3389	601	5.64	90.57			24.14		
	1801	3449	661	5.22	89.36			22.93		
	1901	3509	721	4.87	88.20			21.77		
	2001	3569	781	4.57	87.10			20.67		
2-15-79	0910	4213	1580	2.67	80.01			13.58		
	1505	4568	1935	2.36	76.84			10.41		

Form PT-1
Feb. 1976

TABLE 6.2.04b
M AQUIFERS TEST #1

PUMPING TEST MEASUREMENTS (FIELD)

Pumped well no. PN5-L301

Location Leuenberger Lease

Obs. Well no. PN5-L305

Measuring point (MP) is Not applicable

Elevation of MP

Discharge meas. method

Date	Hour	Water level (ft.)		Discharge GPM	Time since Pumping Started (Minutes)	Remarks
		Below MP	Draw-down			
2-12-79	0800	81.34				
	0832				0	
	0845	81.35	0.01		13	
	0907	81.52	0.18		35	
	0926	82.12	0.78		54	
	0953	83.39	2.05		81	
	1030	85.37	4.03		118	
	1044	85.99	4.65		132	
	1100	86.80	5.46		148	
	1111	87.20	5.86		159	
	1200	89.17	7.83		208	
	1230	90.38	9.04		238	
	1313	92.01	10.67		281	
	1330	92.70	11.36		298	
	1400	93.76	12.42		328	
	1430	94.79	13.45		358	
	1500	95.76	14.42		388	
	1530	96.67	15.33		418	
	1600	97.53	16.19		448	
	1630	98.35	17.01		478	
	1645	98.73	17.39		493	
	1652	98.94	17.60		500	

RECOVERY

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301

Obs. Well No. PN5-L305

Elevation of MP

S.W.L. = 8.34

Location

Measuring Point (MP) is

Discharge Meas. Method

Average Q ________ gpm r= 297.2 ft. r^2= 88336.6

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-14-79										
	PUMP OFF 0650 AT t = 2788 MINUTES									*True Readings
	0901	2859	70	40.84	127.60		-10.0	36.26		117.60
	0919	2877	88	32.69	126.89		-10.0	35.55		116.89
	0929	2887	98	29.46	126.48		-10.0	35.14		116.48
	0938	2896	108	26.81	126.12		-10.0	34.78		116.12
	0947	2905	117	24.83	125.76		-10.0	34.42		115.76
	1024	2942	154	19.10	124.31		-10.0	32.97		114.31
	1043	2941	173	17.00	124.99		-10.0	33.65		114.99
	1108	2966	198	14.98	124.40		-10.0	33.06		114.40
	1140	2968	230	12.90	121.99		-10.0	30.65		111.99
	1209	2997	259	11.57	120.98		-10.0		110.98	Discard measurement,
	1240	3028	290	10.44	121.20		-10.0		111.20	M-scope battery check.
	1315	3063	325	9.42	120.74		-10.0	29.43		110.74
	1342	3090	352	8.78	120.00		-10.0	28.66		110.00
	1408	3126	388	8.06	119.32		-10.0	27.98		109.32
	1438	3156	418	7.55	118.77*		-10.0	27.43		108.77
	1507	3185	447	7.13	118.21*		-10.0	26.87		108.21
	1607	3245	507	6.40	107.08			25.74		Correct Readings
	1707	3305	547	6.04	106.23			24.89		
	1807	3365	607	5.54	105.36			24.02		

*NOTE: Subtract 10' from above measurements.

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301

Obs. Well No. PN5-L305

Elevation of MP

Location

Measuring Point (MP) is

Discharge Meas. Method

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-14-79	1907	3425	667	5.13	104.81			23.47		
	2007	3485	727	4.79	103.73			22.39		
2-15-79	0850	4193	1560	2.95	97.88			16.54		
	1445	4548	1915	2.55	96.05			14.71		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301

Location Leuenberger

Obs. Well No. PN5-L306

Measuring Point (MP) is T.O.C.

Elevation of MP 5204.0'

Discharge Meas. Method NA

Average Q 44.2 gpm r= 95.2 ft. r^2= 9071.7

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	SWL				61.26					
	PUMP ON AT 0832									
	0833	1			61.26	0.00				
	0834	2			61.85	0.59				
	0835	3			62.52	1.26				
	0836	4			63.24	1.98				
	0837	5			64.40	3.14				
	0838	6			65.26	4.00				
	0839	7			65.11	3.85				
	0840	8			65.50	4.24				
	0841	9			65.60	4.34				
	0842	10			66.21	4.95				
	0843	11			66.12	4.86				
	0844	12			66.40	5.14				
	0845	13			66.94	5.68				
	0846	14			67.15	5.89				
	0847	15			67.85	6.63				
	0848	16			68.30	7.04				
	0849	17			68.92	7.66				
	0850	18			69.33	8.07				
	0851	19			69.91	8.65				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________ Location ____________

Obs. Well No. PN5-L306 Measuring Point (MP) is ____________

Elevation of MP ____________ Discharge Meas. Method ____________

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	0852	20			70.22	8.96				
	0854	22			71.49	10.23				
	~~0856~~	26			74.91	13.65				
	0858	26			75.73	14.47				
	0900	28			76.38	15.12				
	0902	30			77.90	16.64				
	0904	32			77.77	16.51				
	0906	34			78.30	17.04				
	0908	36			78.78	17.52				
	0910	38			79.05	17.79				
	0912	40			79.63	18.37				
	0914	42			80.01	18.75				
	0916	44			80.07	18.88				
	0918	46			80.90	19.64				
	0920	48			81.23	19.97				
	0922	50			81.63	20.37				
	0924	52			81.97	20.71				
	0926	54			82.31	21.05				
	~~0928~~	~~56~~			~~82.55~~	~~21.29~~				
	0930	58			82.83	21.57				
	0932	60			83.50	22.24				
	0947	75			84.79	23.53				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________ Location ____________

Obs. Well No. PN5-L306 Measuring Point (MP) is ____________

Elevation of MP ____________ Discharge Meas. Method ____________

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	1002	90			86.07	24.81				
	1017	105			87.06	25.80				
	1032	120			88.04	26.78				
	1047	135			88.61	27.35				
	1102	150			85.64	24.38				Pump Off
	1117	165			90.00	28.74				
	1132	180			91.64	30.38				
	1147	195			93.12	31.86				
	1202	210			94.33	33.07				
	1217	225			95.30	34.04				
	1232	240			96.83	35.57				
	1302	270			98.03	36.77				
	1335	303			99.67	38.41				
	1405	333			101.00	38.74				
	1435	363			102.11	39.85				
	1505	393			103.16	40.90				
	1535	423			104.25	41.99				
	1605	453			104.92	42.66				
	1635	482			[illegible]5.83	43.57				
	1735	542			[illegible]7.27	45.01				
	1835	602			108.77	46.51				
	1935	662			110.00	47.74				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________ Location ____________

Obs. Well No. PN5-L306 Measuring Point (MP) is ____________

Elevation of MP ____________ Discharge Meas. Method ____________

Average Q ________ gpm r= ________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	2035	722			111.20	48.94				
	2135	782			112.33	50.07				
	~~2235~~	~~842~~			~~113.21~~	~~50.95~~				
	2335	902			114.03	51.77				
2-13	0035	962			114.78	52.52				
	0135	1022			115.66	53.40				
	0235	1082			116.42	54.16				
	0335	1142			117.00	54.74				
	0445	1202			117.57	55.31				
	0545	1262			118.20	55.94				
	0645	1322			118.80	56.54				
	0745	1382			119.46	57.20				
	0830	1438			119.80	57.54				
	1230	1678			121.47	59.21				
	1708	1956			123.30	61.04				
	2104	2192			124.70	62.44				
2-14	0110	2438			126.47	64.21				
	0504	2672			127.43	65.17				

RECOVERY

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location ______

Obs. Well No. PN5-L306 Measuring Point (MP) is ______

Elevation of MP ______ Discharge Meas. Method ______

S.W.L. 61.26

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	PUMP OFF AT 0650 AT t = 2788 MINUTES.									
2-14-79	0748	2836	58	48.90	111.94			50.68		
	0757	2845	67	42.46	110.68			49.42		
	0805	2853	75	38.04	109.65			48.39		
	0812	2860	82	34.88	108.75			47.49		
	0819	2867	89	32.21	107.84			46.58		
	0828	2876	98	29.35	106.74			45.48		
	0845	2893	115	25.15	105.14			43.88		
	0915	2923	145	20.16	102.76			41.50		
	0922	2930	152	19.28	102.22			40.96		
	0931	2939	161	18.25	101.54			40.28		
	0941	2949	171	17.25	100.90			39.64		
	0950	2958	180	16.43	100.28			39.02		
	1027	2995	217	13.80	98.00			36.82		
	1047	3015	237	12.72	97.17			35.91		
	1106	3034	256	11.85	97.24			35.98		
	1138	3066	288	10.65	95.20			33.94		
	1211	3092	314	9.85	93.73			32.47		
	1236	3117	339	9.19	92.85			31.59		
	1307	3148	370	8.51	92.52			31.26		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location

Obs. Well No. PN5-L306 Measuring Point (MP) is

Elevation of MP Discharge Meas. Method

Average Q gpm r= ft. r^2=

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-14-79	1334	3175	397	8.00	91.33			30.07		
	1402	3203	425	7.54	90.36			29.10		
	1431	3232	554	5.83	89.75			28.49		
	1500	3261	583	5.59	89.10			27.84		
	1600	3321	643	5.16	87.66			26.40		
	1700	3381	703	4.81	86.79			25.53		
	1800	3441	763	4.51	86.03			24.77		
	1900	3501	823	4.25	85.37			24.11		
	2000	3561	883	4.03	84.48			23.22		
2-15-79	0856	4199	1566	2.68	77.95			16.69		
	1500	4553	1920	2.37	76.02			14.76		

TABLE D.6.2.04d
M AQUIFER TEST #1

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301

Location Leuenberger

Obs. Well No. PN5-L307

Measuring Point (MP) is T.O.C.

Elevation of MP 5206.2'

Discharge Meas. Method NA

Average Q 44.2 gpm r= 196.8 ft. r^2= 38724.2

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	0735	SWL			57.82					
					57.83					
	PUMP	ON AT	0832							
	0833	1			57.83					
	0834	2			57.84	0.01				
	0835	3			57.84	0.01				
	0836	4			57.85	0.02				
	0837	5			57.85	0.02				
	0838	6			57.86	0.03				
	0839	7			57.86	0.03				
	0840	8			57.88	0.05				
	0841	9			57.81	0.08				
	0842	10			58.00	0.17				
	0843	11			58.09	0.26				
	0844	12			58.10	0.27				
	0845	13			58.14	0.31				
	0846	14			58.16	0.33				
	0847	15			58.23	0.40				
	0848	16			58.36	0.53				
	0849	17			58.44	0.61				
	0850	18			58.55	0.72				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________ Location ____________

Obs. Well No. PN5-L307 Measuring Point (MP) is ____________

Elevation of MP ____________ Discharge Meas. Method ____________

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	0851	19			58.78	0.95				
	0852	20			58.95	1.12				
	0854	22			59.29	1.46				
	0856	24			59.66	1.83				
	0858	26			60.02	2.19				
	0900	28			60.67	2.84				
	0902	30			61.50	3.67				
	0904	32			61.60	3.77				
	0906	34			61.73	3.90				
	0908	36			62.12	4.29				
	0910	38			62.45	4.62				
	0912	40			62.83	5.00				
	0914	42			63.22	5.39				
	0916	44			63.71	5.88				
	0918	46			64.08	6.25				
	0920	48			64.47	6.64				
	0922	50			64.91	7.08				
	0924	52			65.21	7.38				
	0926	54			65.66	7.83				
	0928	56			65.94	8.11				
	0930	58			66.27	8.44				
	0932	60			66.66	8.83				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________ Location ____________

Obs. Well No. PN5-L307 Measuring Point (MP) is ____________

Elevation of MP ____________ Discharge Meas. Method ____________

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	0947	75			68.83	10.50				
	1002	90			70.56	12.73				
	1017	105			71.90	14.07				
	1032	120			73.24	15.41				
	1047	135			74.07	16.24				Lowered pump 60'
	1102	150			74.79	16.96				
	1117	165			74.80	16.97				
	1132	180			76.17	18.34				
	1147	195			77.48	19.65				
	1202	210			78.67	20.84				
	1217	225			79.66	21.83				
	1232	240			80.51	22.68				
	1307	270			82.17	24.34				
	1334	302			83.61	25.78				
	1404	332			84.80	26.97				
	1434	362			85.76	27.93				
	1504	392			86.51	28.68				
	1534	422			87.12	29.29				
	1601	449			87.90	30.07				
	1632	480			88.65	30.82				
	1732	540			89.80	31.97				
	1832	600			90.92	33.09				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________________ Location ____________________

Obs. Well No. PN5-L307 Measuring Point (MP) is ____________

Elevation of MP ____________________ Discharge Meas. Method ____________

Average Q ________ gpm r=________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	1932	660			9190	34.07				
	2032	720			92.92	35.09				
	2132	780			93.65	35.82				
	2232	840			94.48	36.65				
	2332	900			94.98	37.15				
2-13	0032	960			95.61	37.78				
	0132	1020			95.97	38.14				
	0232	1080			96.52	38.69				
	0332	1140			97.09	39.26				
	0432	1200			97.56	39.73				
	0532	1260			98.09	40.26				
	0632	1320			98.44	40.61				
	0732	1380			98.92	41.09				
	0832	1440			99.33	41.50				
	1232	1680			100.79	42.96				
	1706	1954			102.10	44.27				
	2101	2189			103.37	45.54				
2-14	0059	2426			104.54	46.71				
	0508	2675			105.82	47.99				

RECOVERY

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location

Obs. Well No. PN5-L307 Measuring Point (MP) is

Elevation of MP Discharge Meas. Method

S.W.L. = 57.83

Average Q ______ gpm r= ______ ft. r^2= ______

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	PUMP OFF AT 0650 AT t = 2788 MINUTES.									
2-14-79	0752	2842	62	45.8	99.31			41.48		
	0800	2850	70	40.7	98.45			40.62		
	0807	2857	77	37.1	97.70			39.87		
	0815	2865	85	33.7	97.05			39.22		
	0822	2872	92	31.2	96.45			38.62		
	0830	2880	100	28.8	95.95			38.12		
	0851	2901	121	24.0	94.12			36.29		
	0911	2921	141	20.7	93.01			35.18		
	0924	2934	154	19.1	92.35			34.52		
	0933	2943	163	18.1	91.79			33.96		
	0943	2953	173	17.1	91.31			33.48		
	0951	2961	181	16.4	90.88			33.05		
	1029	2999	219	13.7	89.15			31.32		
	1050	3018	238	12.7	88.28			30.45		
	1104	3032	252	12.1	87.74			29.91		
	1135	3063	283	10.8	86.87			29.04		
	1214	3102	322	9.63	85.53			27.70		
	1234	3122	342	9.13	84.91			27.08		
	1312	3150	370	8.51	83.82			25.99		
	1340	3178	398	7.98	83.20			25.37		
	1406	3204	424	7.56	82.51			24.68		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location

Obs. Well No. PN5-L307 Measuring Point (MP) is

Elevation of MP Discharge Meas. Method

Average Q gpm r= ft. r^2=

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-14-79	1436	3234	454	7.12	81.87			24.04		
	1505	3265	485	6.73	81.30			23.47		
	1605	3325	545	6.10	80.09			22.26		
	1705	3385	605	5.60	79.32			21.49		
	1805	3445	665	5.18	78.43			20.60		
	1905	3505	725	4.83	77.72			19.89		
	2005	3565	785	4.54	76.91			19.08		
2-15-79	0902	4205	1472	2.86	71.31			13.48		
	1456	4559	1926	2.37	69.78			11.95		

TABLE D-6.2.04e
M AQUIFER TEST #1

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location Leuenberger

Obs. Well No. PN5-L308 Measuring Point (MP) is T.O.C.

Elevation of MP 5207.2' Discharge Meas. Method NA

Average Q 44.2 gpm $r=$ 57.1 ft. $r^2=$ 3264.7

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	0735	SWL			64.55					
		PUMP ON AT 0832								
	0833	1			64.55	0.00				
	0834	2			64.55	0.00				
	0835	3			64.57	0.02				
	0836	4			64.60	0.05				
	0837	5			64.71	0.16				
	0838	6			64.83	0.28				
	0839	7			64.90	0.35				
	0840	8			65.02	0.47				
	0841	9			65.25	0.70				
	0842	10			65.43	0.88				
	0843	11			65.61	1.06				
	0844	12			65.83	1.28				
	0845	13			66.03	1.48				
	0846	14			66.35	1.80				
	0847	15			66.70	2.15				
	0848	16			67.00	2.55				
	0849	17			67.72	3.17				
	0850	18			68.05	3.50				
	0851	19			68.43	3.88				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________________ Location ____________________

Obs. Well No. PN5-L308 Measuring Point (MP) is ____________

Elevation of MP ____________________ Discharge Meas. Method ____________

Average Q ________ gpm r= ________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	0852	20			68.89	4.34				
	0854	22			69.33	4.78				
	0856	24			70.50	5.95				
	0858	26			71.73	7.18				
	0900	28			72.78	8.23				
	0902	30			73.43	8.88				
	0904	32			74.07	9.52				
	0906	34			75.24	10.69				
	0908	36			76.75	12.20				
	0910	38			77.52	12.97				
	0912	40			78.35	13.80				
	0914	42			79.01	14.46				
	0916	44			79.75	15.20				
	0918	46			80.27	15.72				
	0920	48			80.60	16.05				
	0922	50			81.25	16.70				
	0924	52			81.80	17.25				
	0926	54			82.05	17.50				
	0928	56			82.39	17.84				
	0930	58			83.02	18.47				
	0932	60			83.84	19.29				
	0947	75			87.65	23.10				

PUMPING TEST MEASUREMENTS

Pumped Well No. ____________

Location ____________

Obs. Well No. PN5-L308

Measuring Point (MP) is ____________

Elevation of MP ____________

Discharge Meas. Method ____________

Average Q ________ gpm r= ________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	1002	90			90.10	25.55				
	1017	105			91.62	27.07				
	1032	120			92.57	28.02				
	1047	135			93.47	28.92				Pump Off
	1102	150			91.08	26.53				
	1117	165			92.65	28.10				
	1115	178			95.21					
	1132	195			97.10	32.55				
	1147	210			98.47	33.92				
	1202	225			99.75	35.20				
	1232	240			100.78	36.23				
	1302	270			102.66	38.11				
	1330	298			104.32	39.77				
	1400	328			105.82	41.27				
	1430	358			107.08	42.53				
	1500	388			108.22	43.67				
	1530	418			109.34	44.79				
	1600	448			110.25	45.70				
	1630	478			111.15	46.60				
	1730	538			112.78	48.23				
	1830	598			114.43	49.88				
	1930	658			115.78	51.23				

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. ________ Location ________

Obs. Well No. PN5-L308 Measuring Point (MP) is ________

Elevation of MP ________ Discharge Meas. Method ________

Average Q ________ gpm r= ________ ft. r^2= ________

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-12	2030	718			117.38	52.83				
	2130	778			118.17	53.62				
	2230	838			119.39	54.84				
	2330	898			120.35	55.80				
2-13	0030	958			121.06	56.51				
	0130	1018			121.79	57.24				
	0230	1078			122.57	58.22				
	0330	1138			123.13	58.78				
	0430	1198			123.72	59.37				
	0530	1258			124.32	59.97				
	0630	1318			125.22	60.87				
	0730	1378			125.58	61.23				
	0830	1438			126.09	61.71				
	1230	1678			127.70	63.32				
	1705	1953			129.57	65.19				
	2054	2182			130.64	66.26				
2-14	0101	2429			132.55	68.17				
	0458	2666			133.49	69.11				

RECOVERY

May 1976

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location

Obs. Well No. PN5-L308 Measuring Point (MP) is

Elevation of MP Discharge Meas. Method

S.W.L. = 64.55

Average Q gpm r= ft. r^2=

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	PUMP OFF AT 0650 AT t = 2788 MINUTES.									
2-14-79	0745	2835	55	51.5	118.00			53.45		
	0755	2845	65	43.8	116.43			51.88		
	0802	2852	72	39.6	115.07			50.52		
	0809	2859	79	36.2	113.94			49.39		
	0817	2867	87	33.0	112.90			48.35		
	0826	2876	96	30.0	111.78			47.23		
	0842	2892	112	25.8	110.04			45.49		
	0906	2916	136	21.4	107.88			43.33		
	0926	2936	156	18.8	106.42			41.87		
	0936	2946	166	17.7	105.74			41.19		
	0953	2963	183	16.2	104.40			39.85		
	1022	2992	212	14.1	102.66			38.11		
	1052	3012	242	12.4	101.10			36.55		
	1102	3022	252	12.0	100.64			36.09		
	1132	3055	285	10.70	98.36			33.81		
	1216	3089	319	9.70	97.62			33.07		
	1245	3118	348	8.96	97.34			32.79		
	1310	3133	363	8.63	96.12			31.57		
	1338	3161	391	8.08	95.11			30.56		
	1404	3187	418	7.62	94.28			29.73		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-L301 Location ____

Obs. Well No. PN5-L308 Measuring Point (MP) is ____

Elevation of MP ____ Discharge Meas. Method ____

Average Q ____ gpm r= ____ ft. r^2= ____

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
2-14-79	1434	3217	448	7.18	93.52			28.97		
	1503	3246	477	6.81	92.84			28.29		
	1603	3306	537	6.16	91.64			27.09		
	1703	3366	597	5.64	90.47			25.92		
	1803	3426	657	5.21	89.47			24.92		
	1903	3486	717	4.86	88.59			24.04		
	2003	3546	777	4.56	87.61			23.06		
2-15-79	0905	4208	1575	2.67	81.16			16.61		
	1451	4554	1921	2.37	78.08			13.53		

TABLE D-6.2.05

Barometric Pressure Durring
M Aquifer Test #1

Time In Minutes	Barometric Pressure In. of Mg	Barometric Pressure Ft. of H_2O
95	29.96	33.85
160	29.91	33.80
220	29.87	33.75
580	29.91	33.80
1100	29.81	33.68
1400	29.76	33.63
1900	29.77	33.64
2200	29.60	33.45
2500	29.65	33.50
2900	29.55	33.39

TABLE D-6.2.06a
M AQUIFER TEST #2

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6
Obs. Well No. MM-6
Elevation of MP
Location 5643.9S, 9831.4W
Measuring Point (MP) is TOC
Discharge Meas. Method Cummulative Flow meter

Average Q 29.8 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
7/21/80	9:00am	0			72.72		0			Pump on
		1			123.50		50.78			
		2			152.78		80.06			
		3			167.72		95.00			
		4			178.62		105.90			
		5			185.85		113.13			
		6			192.96		120.24			
		7			197.73		125.01			
		8			203.36		130.64			
		9			207.11		134.39			
		10			210.47		137.75			
		12			215.73		143.01			
		14			219.62		146.90			
		16			222.73		150.01			
		18			225.39		152.67			
		20			227.83		155.11			
		25			232.32		159.60			
		30			236.0		163.28			
		35			239.23		166.51			
		40			241.32		168.60			
		45			243.10		170.38			
		50			244.92		172.20			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6

Obs. Well No. MM-6

Elevation of MP ______

Location 5643.95, 9831.4W

Measuring Point (MP) is TOC

Discharge Meas. Method Cummulative Flow meter

Average Q 298 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			245.47		172.75			
	10:00 am	60			246.87		174.15			
		70			249.42		176.70			
		80			251.24		178.52			
	10:30	90			252.94		180.22			
		100			254.62		181.90			
	11:00	120			255.35		182.63			
		140			257.0		184.28			
		160			258.45		185.73			
	12:00	180			259.82		187.10			
		210			262.4		189.68			
	1:00pm	240			263.83		191.11			
		270			264.91		192.19			
	2:00	300			265.98		193.26			
	3:00	360			268.52		195.80			
	4:00	420			270.86		198.14			
	5:00	480			272.68		199.96			
	6:00	540			273.59		200.87			
	7:00	600			274.38		201.66			
	9:00	720			281.36		208.64			
	11:00	840			283.62		210.90			
7/22	1:00 am	960			285.02		213.30			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5643.95, 9831.46W

Obs. Well No. MM-6 Measuring Point (MP) is TOC

Elevation of MP ______ Discharge Meas. Method Cummulative Flow meter

Average Q 29.8 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unad-justed)	Adjust-ment Δs	s' (Ad-justed)	Q (gpm)	Remarks
	5:30am	1230			287.49		214.77			
	11:00	1500			288.4		215.68			
	3:00pm	1800			290.99		218.27			
	8:00	2100			292.57		219.85			
7/23	1:00am	2400			291.75		219.03			
	6:00	2730			291.62		218.55			
	11:00	3000			299.29		226.57			
	4:00pm	3300			300.24		227.52			
	9:00	3600			301.43		228.71			
7/24	7:00am	4200			303.14		230.42			
	5:00pm	4800			302.99		230.27			
7/25	3:00am	5400			311.84		239.12			
	9:00am	5760	0	—	313.18			240.46		Pump off
		5762	2	2881	243.64			170.92		
		5764	4	1441	216.16			143.44		
		5766	6	961	200.98			128.26		
		5768	8	721	187.58			114.86		
		5770	10	577	181.35			108.63		
		5775	15	385	169.57			96.85		
		5780	20	289	161.58			88.86		
		5790	30	193	150.70			77.98		
		5800	40	145	143.87			71.15		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5643.95, 9831.4W

Obs. Well No. MM-6 Measuring Point (MP) is TOC

Elevation of MP ______ Discharge Meas. Method Cummulative Flow meter

Average Q 29.8 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5810	50	116.20	138.79			66.07		
	10:00	5820	60	97.00	135.04			62.32		
		5835	75	77.80	130.64			57.92		
	10:30	5745	90	63.83	127.32			54.60		
	11:00	5880	120	49.00	122.55			49.83		
		5920	160	37.00	118.26			45.54		
	1:30pm	6030	270	22.33	110.99			38.27		
	3:00pm	6120	360	16.70	107.62			34.90		
	5:00	6240	480	13.00	103.69			30.97		
	7:00	6360	600	10.60	101.14			28.42		
	9:00	6480	720	9.00	99.08			26.36		
7/26	5:00am	6960	1200	5.80	93.74			21.02		
	3:00pm	7560	1800	4.20	90.10			17.38		
7/27	1:00am	8160	2400	3.40	87.58			14.86		
	11.00	8760	3000	2.92	85.59			12.87		
	9:00pm	9360	3600	2.60	83.43			10.71		
7/28	5:00am	9840	4080	2.41	82.38			9.66		
7/29	7:30am	11430	5670	2.02	81.32			8.60		

TABLE D-6.2.06b
M AQUIFER TEST #2

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5819.0S, 9363.4W
Obs. Well No. MM-8 Measuring Point (MP) is TOC
Elevation of MP 5192.28 Discharge Meas. Method Cammulative Flow meter

Average Q 29.8 gpm r= 499.68 ft. r^2= 249684.01

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
7/21/80	9:00am	0			64.39		0			Pump on
		1			64.38		-.01			
		2			64.38		-.01			
		3			64.38		-.01			
		4			64.38		-.01			
		5			64.38		-.01			
		6			64.38		-.01			
		7			64.38		-.01			
		8			64.38		-.01			
		9			64.38		-.01			
		10			64.38		-.01			
		12			64.37		-.02			
		14			64.37		-.02			
		16			64.37		-.02			
		18			64.35		-.04			
		20			64.37		-.02			
		25			64.36		-.03			
		30			64.37		-.02			
		35			64.42		.03			
		40			64.48		.09			
		45			64.55		.16			
		50			64.67		.28			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6

Obs. Well No. mm-8

Elevation of MP 5192.28

Location 5819.0S, 9363.4W

Measuring Point (MP) is TOC

Discharge Meas. Method Cummulative Flow meter

Average Q 298 gpm r= 492.68 ft. r^2= 249684.01

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			64.78		.39			
	10:00 a.m	60			64.92		.53			
		70			65.22		.83			
		80			65.57		1.18			
	10:30	90			66.00		1.61			
		100			66.33		1.94			
	11:00	120			67.06		2.67			
		140			67.79		3.40			
		160			68.49		4.10			
	12:00	180			69.11		4.72			
		210			70.11		5.72			
	1:00pm	240			70.96		6.57			
		270			71.67		7.28			
	2:00	300			72.35		7.96			
	3:00	360			73.67		9.28			
	4:00	420			74.74		10.35			
	5:00	480			75.70		11.31			
	6:00	540			76.69		12.30			
	7:00	600			77.48		13.09			
	9:00	720			78.96		14.57			
	11:00	840			80.28		15.89			
7/22	1:00am	960			81.52		17.13			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5819.0S, 9363.4W

Obs. Well No. MM-8 Measuring Point (MP) is TOC

Elevation of MP 5192.28 Discharge Meas. Method Cummulative Flow meter

Average Q 298 gpm r= 499.68 ft. r^2= 249684.01

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	5:30am	1230			83.81		19.42			
	11:00	1500			86.16		21.77			
	3:00pm	1800			87.34		22.95			
	8:00	2100			88.77		24.38			
7/23	1:00am	2400			89.97		25.58			
	6:00	2730			91.01		26.62			
	11:00	3000			92.18		27.79			
	4:00pm	3300			93.07		28.68			
	9:00	3600			93.97		29.58			
7/24	7:00am	4200			95.80		31.41			
	5:00pm	4800			95.92		31.53			
7/25	3:00am	5400			97.52		33.13			
	9:00am	5760	0	—	98.30			33.91		Pump off
		5762	2	2881	98.35			33.96		
		5764	4	1441	98.36			33.97		
		5766	6	961	98.36			33.97		
		5768	8	721	98.35			33.96		
		5770	10	577	98.35			33.96		
		5775	15	385	98.39			34.00		
		5780	20	289	98.37			33.98		
		5790	30	193	98.38			33.99		
		5800	40	145	98.29			33.90		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5819.0S, 9363.4W

Obs. Well No. MM 8 Measuring Point (MP) is TOC

Elevation of MP 5192.28 Discharge Meas. Method Cummulative Flow meter

Average Q 29.8 gpm r= 499.68 ft. r^2= 249684.01

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5810	50	116.20	98.11			33.72		
	10:00	5820	60	97.00	97.87			33.48		
		5835	75	77.80	97.41			33.02		
	10 30	5745	90	63.83	96.89			32.50		
	11:00	5880	120	49.00	95.66			31.27		
		5920	160	37.00	94.20			29.81		
	1:30pm	6030	270	22.33	91.05			26.66		
	3:00pm	6120	360	16.70	89.11			24.72		
	5:00	6240	480	13.00	86.75			22.36		
	7:00	6360	600	10.60	85.31			20.92		
	9:00	6480	720	9.00	83.91			19.52		
7/26	5:00am	6960	1200	5.80	81.22			16.83		
	3:00pm	7560	1800	4.20	81.55			17.16		
7/27	1:00am	8160	2400	3.40	76.39			12.00		
	11.00	8760	3000	2.92	75.15			10.76		
	9:00pm	9360	3600	2.60	73.86			9.46		
7/28	5:00am	9840	4080	2.41	73.00			8.61		
7/29	7:30am	11430	5670	2.02	70.73			6.34		

TABLE D-6.2.06c
M AQUIFER TEST #2

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6

Location 5875.2S , 9915.3W

Obs. Well No. MM-9

Measuring Point (MP) is TOC

Elevation of MP 5193.02

Discharge Meas. Method Cammulative Flow meter

Average Q 29.8 gpm r= 246.05 ft. r^2= 60538.9

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
7/21/80	9:00am	0			64.02		0			Pump on
		1			64.02		0			
		2			64.03		.01			
		3			64.04		.02			
		4			64.07		.05			
		5			64.08		.06			
		6			64.09		.07			
		7			64.10		.08			
		8			64.10		.08			
		9			64.10		.08			
		10			64.09		.07			
		12			64.06		.04			
		14			64.08		.06			
		16			64.25		.23			
		18			64.25		.23			
		20			64.28		.26			
		25			64.44		.42			
		30			64.81		.79			
		35			65.21		1.19			
		40			65.75		1.73			
		45			66.13		2.11			
		50			66.69		2.67			

PUMPING TEST MEASUREMENTS

Pumped Well No. PWS-LMM6 Location 5875.2 S, 9915.3 W

Obs. Well No. mm-9 Measuring Point (MP) is TOC

Elevation of MP 5193.02 Discharge Meas. Method Cummulative Flow meter

Average Q 298 gpm r= 246.05 ft. r^2= 60538.9

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			67.18		3.16			
	10:00 a.m	60			67.70		3.68			
		70			68.73		4.71			
		80			69.70		5.68			
	10:30	90			70.65		6.63			
		100			71.42		7.40			
	11:00	120			72.95		8.93			
		140			74.35		10.33			
		160			75.96		11.94			
	12:00	180			77.04		13.02			
		210			78.25		14.23			
	1:00pm	240			79.61		15.59			
		270			80.57		16.55			
	2:00	300			81.64		17.62			
	3:00	360			83.50		19.48			
	4:00	420			85.00		20.98			
	5:00	480			86.31		22.29			
	6:00	540			87.54		23.52			
	7:00	600			88.60		24.58			
	9:00	720			90.44		26.42			
	11:00	840			92.39		28.37			
7/22	1:00am	960			93.80		29.78			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5875.2 S, 9915.3W

Obs. Well No. MM-9 Measuring Point (MP) is TOC

Elevation of MP 5193.02 Discharge Meas. Method Cummulative Flow meter

Average Q 298 gpm r= 246.05 ft. r^2= 60538.9

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	5:30am	1230			96.52		32.5			
	11:00	1500			99.44		35.42			
	3:00pm	1800			100.88		36.86			
	8:00	2100			102.40		38.38			
7/23	1:00am	2400			103.76		39.74			
	6:00	2730			104.93		40.91			
	11:00	3000			106.39		42.37			
	4:00pm	3300			107.53		43.14			
	9:00	3600			108.62		44.23			
7/24	7:00am	4200			110.65		46.26			
	5:00pm	4800			112.06		48.04			
7/25	3:00am	5400			114.42		50.40			
	9:00am	5760	0	—	115.29			51.27		Pump off
		5762	2	2881	115.19			51.17		
		5764	4	1441	115.21			51.19		
		5766	6	961	115.22			51.20		
		5768	8	721	115.22			51.20		
		5770	10	577	115.28			51.26		
		5775	15	385	115.19			51.17		
		5780	20	289	115.07			51.05		
		5790	30	193	114.54			50.52		
		5800	40	145	113.70			49.68		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6

Obs. Well No. MM-9

Elevation of MP 5193.02

Location 5875.2S, 9915.3W

Measuring Point (MP) is TOC

Discharge Meas. Method Cummulative Flow meter

Average Q 29.8 gpm r= 246.05 ft. r^2= 60538.9

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5810	50	116.20	112.63			4861		
	10:00	5820	60	97.00	111.58			47.56		
		5835	75	77.80	110.03			46.01		
	10:30	5745	90	63.83	108.60			44.58		
	11:00	5880	120	49.00	106.22			4220		
		5920	160	37.00	10341			39.39		
	1:30pm	6030	270	22.33	97.70			3368		
	3:00pm	6120	360	16.70	95.00			30.98		
	5:00	6240	480	13.00	92.19			28.17		
	7:00	6360	600	10.60	90.07			26.05		
	9:00	6480	720	9.00	88.28			24.26		
7/26	5:00am	6960	1200	5.80	83.51			19.49		
	3:00pm	7560	1800	4.20	80.25			16.23		
7/27	1:00am	8160	2400	3.40	78.00			1398		
	11:00	8760	3000	2.92	76.08			1206		
	9:00pm	9360	3600	2.60	74.82			10.80		
7/28	5:00am	9840	4080	2.41	72.86			8.84		
7/29	7:30AM	11430	5670	2.02	71.25			7.23		

TABLE D-6.2.06d
M AQUIFER TEST #2
PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM6 Location 5683.8S, 9814.3W
Obs. Well No. PN5-LBM2 Measuring Point(MP) TOC
Elevation of MP 5199.16

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/21/80	9:00AM	0		111.27	111.13	.14		34.10
		1		111.29	111.12	.17		
		3		111.32	111.12	.20		
		7		111.32	111.12	.20		
		9		111.33	111.12	.21		
		12		111.38	111.12	.26		
		16		111.36	111.12	.24		
		20		111.33	111.12	.21		
		25		111.33	111.12	.21		
		30		111.32	111.12	.20		
		35		111.30	111.12	.18		
		40		111.31	111.12	.19		
		45		111.30	111.12	.18		
		50		111.29	111.12	.17		
		55		111.29	111.11	.18		
	10:00AM	60		111.30	111.11	.19		34.10
		70		111.29	111.11	.18		
		80		111.29	111.11	.18		
	10:30AM	90		111.29	111.11	.18		
		100		111.28	111.11	.17		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM6

Location 5683.8 S, 9814.3 W

Obs. Well No. PN5-LBM2

Measuring Point(MP) TOC

Elevation of MP 5199.16

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
	11:00 Am	120		111.20	111.10	.10		34.10
		140		111.19	111.10	.09		
		160		111.15	111.09	.06		
	12:00 pm	180		111.14	111.09	.05		34.09
		210		111.13	111.08	.05		
	1:00 pm	240		111.09	111.08	.01		34.09
		270		111.08	111.07	.01		
	2:00 pm	300		111.04	111.07	-.03		34.06
	3:00 pm	360		111.05	111.06	-.01		34.05
	4:00 pm	420		110.98	111.04	-.06		34.04
	5:00 pm	480		110.97	110.03	-.06		34.04
	6:00 pm	540		110.95	111.02	-.07		34.02
	7:00 pm	600		110.93	111.01	-.08		34.02
	9:00 pm	720		110.90	110.99	-.09		34.02
	11:00 pm	840		110.92	110.97	-.05		34.02
7/22/80	1:00 am	960		110.83	110.95	-.12		34.02
	5:30 Am	1230		110.75	110.90	-.15		34.02
	11:00 Am	1500		110.73	110.85	-.12		34.01
	3:00 pm	1800		110.62	110.80	-.18		33.95
	8:00 pm	2100		110.53	110.75	-.22		33.92

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM6 Location 5683.8S, 9814.3W

Obs. Well No. PN5-LBM2 Measuring Point(MP) TOC

Elevation of MP 5199.16

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H2O(ft)
7/23/80	1:00 Am	2400		110.52	110.70	-.18		33.92
	6:00 Am	2730		110.39	110.65	-.26		33.91
	11:00 Am	3000		110.37	110.61	-.24		33.90
	4:00 pm	3300		110.25	110.57	-.32		33.88
	9:00 pm	3600		110.29	110.52	-.23		33.88
7/24/80	7:00 Am	4200		110.04	110.44	-.40		33.83
	5:00 pm	4800		109.96	110.36	-.46		33.87
7/25/80	3:00 Am	5400		109.96	110.28	-.32		33.[illegible]
	9:00 Am	5760	0	109.81	110.23	-.38		33.99
		5764	4	109.86	110.23	-.37		
		5768	8	109.76	110.23	-.47		
		5780	20	109.76	110.23	-.47		
		5800	40	109.74	110.23	-.49		
		5810	50	109.72	110.23	-.51		
		5815	60	109.72	110.23	-.51		33.98
	11:00 Am	5880	120	109.84	110.22	-.38		33.99
	11:40 Am	5920	160	109.79	110.21	-.42		
	1:30 pm	6030	270	109.79	110.20	-.41		
		6120	360	109.72	110.19	-.47		
	5:00 pm	6240	480	109.74	110.17	-.43		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM6
Location 56838S, 9814.3W
Obs. Well No. PN5-LBM2
Measuring Point(MP) TOC
Elevation of MP 5199.16

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H2O(ft)
7/25/80	7:00pm	6360	600	109.73	110.16	-.43		
		6480	720	109.88	110.15	-.27		
7/26/80	5:00 Am	6960	1200	109.69	110.09	-.40		
	3:00pm	7560	1800	109.62	110.02	-.40		
7/27/80	1:00Am	8160	2400	109.55	109.96	-.41		
	11:00Am	8760	3000	109.45	109.89	-.44		
	9:00pm	9360	3600	109.32	109.83	-.51		
		9840	4080	109.29	109.78	-.49		
7/28/80	5:00Am	10560	4800	109.18	109.71	-.53		
7/29/80	7:30 Am	11430	5670	108.84	109.63	-.79	29.90	33.79

TABLE D-6.2.06e
M AQUIFER TEST #2
PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM6 Location 5598.9S, 9829.0W
Obs. Well No. PNS-LNM3 Measuring Point(MP) TOC
Elevation of MP 5202.95

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/21/80	9:00AM	0		64.62	64.65	-.03	30.18	34.10
		2		64.63	64.65	-.02		
		4		64.58	64.65	-.07		
		8		64.50	64.65	-.15		
		10		64.60	64.65	-.05		
		14		64.67	64.65	.02		
		18		64.65	64.65	.00		
		30		64.67	64.64	.03		
		35		64.64	64.64	.00		
		40		64.60	64.64	-.04		
		45		64.63	64.64	-.01		
		50		64.61	64.64	-.03		
		55		64.66	64.64	.02		
	10:00AM	60		64.63	64.64	-.01	30.18	34.10
		70		64.56	64.64	-.08		
		80		64.55	64.64	-.09		
	10:30AM	90		64.54	64.64	-.10		
	10:40AM	100		64.58	64.64	-.06		
	11:00AM	120		64.54	64.64	-.10	30.18	34.10
		140		64.54	64.64	-.10		

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM6
Location 5598.9 S, 9829.0 W
Obs. Well No. PN5-LNM3
Measuring Point(MP) TOC
Elevation of MP 5202.95

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
		160		64.56	64.63	-.07		
	12:00pm	180		64.55	64.63	-.08	30.17	34.09
		210		64.49	64.63	-.14		
	1:00pm	240		64.47	64.63	-.16	30.24	34.17
		270		64.46	64.63	-.17		
	2:00pm	300		64.43	64.62	-.20	30.14	34.06
	3:00pm	360		64.46	64.62	-.16	30.13	34.05
	4:00pm	420		64.42	64.62	-.20	30.12	34.04
	5:00pm	480		64.39	64.61	-.22	30.12	34.04
	6:00pm	540		64.40	64.61	-.21	30.11	34.02
	7:00pm	600		64.41	64.60	-.19	30.11	34.02
	9:00pm	720		64.42	64.59	-.17	30.11	34.02
	11:00pm	840		64.49	64.59	-.10	30.11	34.02
7/22/80	1:00Am	960		64.40	64.58	-.18	30.11	34.02
	5:30Am	1230		64.38	64.56	-.18	30.11	34.02
	11:00Am	1500		64.42	64.54	-.12	30.10	34.01
	3:00pm	1800		64.32	64.52	-.20	30.04	33.95
	8:00pm	2100		64.30	64.50	-.20	30.02	33.92
7/23/80	1:00Am	2400		64.34	64.48	-.14	30.02	33.92
	6:00Am	2730		64.34	64.46	-.12	30.01	33.91

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5- LMM6 Location 5598.9S, 9829.0W

Obs. Well No. PN5- LNM3 Measuring Point(MP) TOC

Elevation of MP 5202.95

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure Hg(in)	Barometric Pressure H_2O(ft)
	11:00 am	3000		64.32	64.44	-.12	30.00	33.90
	4:00 pm	3300		64.22	64.42	-.20	29.98	33.88
	9:00 pm	3600		64.30	64.40	-.10	29.98	33.88
7/24/80	7:00 Am	4200		64.18	64.37	-.19	29.98	33.88
	5:00 pm	4800		64.16	64.33	-.17	29.97	33.87
7/25/80	3:00 Am	5400		64.30	64.29	-.10	30.06	33.97
	9:00 Am	5760		64.16	64.27	-.11	30.08	33.99
		5762	2	64.35	64.27	.08		
		5766	6	64.28	64.27	.01		
		5770	10	64.12	64.27	-.15		
		5775	15	64.04	64.27	-.23		
		5790	30	64.07	64.27	-.20		
		5800	40	64.12	64.27	-.15		
		5810	50	64.12	64.27	-.15		
	10:00 Am	5820	60	64.15	64.27	-.15	30.07	33.98
	10:15 Am	5835	75	64.15	64.27	-.15		
		5850	90	64.15	64.27	-.15		
	11:00 Am	5880	120	64.19	64.27	-.08	30.08	33.99
	11:40 Am	5920	160	64.24	64.26	-.02		
		5970	210		64.21		30.07	33.98

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-Lmm6
Location 5598.9 S, 9829.0 W
Obs. Well No. PN5-LNm3
Measuring Point(MP) TOC
Elevation of MP 5202.95

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/25/80	1:30pm	6030	270	64.21	64.26	-.03	30.06	33.97
	3:00pm	6130	360	64.17	64.25	-.08	30.05	33.96
	5:00pm	6240	480					
	7:00pm	6360	600	64.68	64.24	.44	29.97	33.87
7/26/80	5:00 AM	6960	1200	64.67	64.56	.11		
	3:00pm	7560	1800	64.64	64.52	.12		
7/27/80	1:00AM	8160	2400	64.51	64.48	.03		
	11:00AM	8760	3000	64.56	64.44	.12		
	9:00pm	9360	3600	64.40	64.40	.00		
7/28/80	5:00AM	10560	4800	64.39	64.64	-.25		
7/29/80	7:30AM	11400	5670	63.16	63.99	-.83	29.90	33.79

TABLE D-6.2.07a
M AQUIFER TEST #3

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10

Obs. Well No. MM-3

Elevation of MP 5229.30

Location 6264.4S, 7049.9W

Measuring Point (MP) is TOC

Discharge Meas. Method Cumm. Flow Meter

Average Q 26.3 gpm r= 798.87 ft. r^2= 638190.76

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
7/29/80	9:30 a.m.	0			104.54		0			
Tues.		1			104.54		0			
		2			104.54		0			
		3			104.54		0			
		4			104.54		0			
		5			104.54		0			
		6			104.54		0			
		7			104.54		0			
		8			104.54		0			
		9			104.54		0			
		10			104.54		0			
		12			104.54		0			
		14			104.54		0			
		16			104.54		0			
		18			104.54		0			
		20			104.54		0			
		25			104.54		0			
		30			104.54		0			
		35			104.53		.01			
		40			104.53		.01			
		45			104.53		.01			
		50			104.53		.01			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10 Location 6264.4 S, 7049.9W

Obs. Well No. mm-3 Measuring Point (MP) is [illegible]

Elevation of MP 5229.30 Discharge Meas. Method Cumm. Flow meter

Average Q 26.3 gpm r= 798.87 ft. r^2= 638190.76

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			104.54		0			
	10:30	60			104.53		.01			
		70			104.53		.01			
		80			104.53		.01			
		90			104.53		.01			
		100			104.54		0			
	11:30	120			104.57		.03			
	11:50	140			104.61		.07			
	12:10pm	160			104.67		.13			
	12:30	180			104.75		.21			
	1:00	210			105.16		.62			
	1:30	240			105.20		.66			
	2:00	270			105.40		.86			
	2:30	300			105.60		1.06			
	3:30	360			106.00		1.46			
	4:30	420			106.41		1.87			
	5:30	480			106.62		2.08			
	6:30	540			107.24		2.70			
	7:30	600			107.66		3.12			
	9:30	720			108.32		3.78			
	11:30	840			109.13		4.59			
7/30/80	1:30am	960			109.83		5.29			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10

Ob. Well No. MM-3

Elevation of MP 5229.30

Location 6264.4 S, 7049.9W

Measuring Point (MP) is TOC

Discharge Meas. Method Cummulative Flow Meter

Average Q 26.3 gpm r= 798.87 ft. r^2= 638190.76

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s (Adjusted)	Q (gpm)	Remarks
	5:30	1200			111.12		6.58			
	10:30	1500			112.66		8.12			
	3:30pm	1800			114.52		9.98			
	8:30	2100			116.15		11.61			
7/31/80	1:30am	2400			117.10		12.56			
	6:30	2700			117.82		13.28			
	11:30	3000			118.26		13.72			
	4:30pm	3300			119.80		15.26			
	9:30	3600			119.95		15.41			
8/1/80	7:30am	4200			121.24		16.70			
	5:30pm	4800			122.71		18.17			
8/2/80	3:30am	5400			123.83		19.29			
	9:30	5760	0	—	124.43			19.89		
		5762	2	2881	124.35			19.81		
		5764	4	1441	124.35			19.81		
		5766	6	961	124.34			19.80		
		5768	8	721	124.35			19.81		
		5770	10	577	124.35			19.81		
		5772	12	481	124.35			19.81		
		5776	16	361	124.35			19.81		
		5780	20	289	124.35			19.81		
	10:00	5790	30	193	124.39			19.85		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-Lmm10
Obs. Well No. mm-3
Elevation of MP 5229.30

Location 6264.4S, 7049.9W
Measuring Point (MP) is TOC
Discharge Meas. Method Recovery

Average Q 26.3 gpm r= 798.87 ft. r^2= 638190.76

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5800	40	145	124.45			19.91		
		5810	50	116.2	124.45			19.91		
	10:30	5820	60	97.0	124.45			19.91		
	10:50	5840	80	73	124.45			19.91		
	11:10	5860	100	58.6	124.45			19.91		
	11:50	5900	140	42.1	124.43			19.89		
	12:30	5940	180	33	124.43			19.89		
	1:30pm	6000	240	25	124.33			19.79		
	2:30	6060	300	20.2	123.88			19.34		
	4:30	6180	420	14.7	123.15			18.61		
	6:30	6300	540	11.7	122.03			18.49		
	9:30	6480	720	9.0	121.69			17.15		
8/3/80	1:30am	6720	960	7.0	120.09			15.55		
	10:30	7260	1500	4.8	118.59			14.05		
	8:30pm	7860	2100	3.7	117.08			12.54		
8/4/80	7:30am	8520	2760	3.1	115.69			11.15		
	4:30pm	9060	3300	2.8	114.58			10.04		
8/5/80	7:30am	9960	4200	2.4	113.39			8.85		
8/6/80	3:30am	11160	5400	2.1						
	9:50	11540	5780	2.0	111.55			7.01		
8/7/80	9:00am	12930	7170	1.8	110.26			5.72		

TABLE D-6.2.07b
M AQUIFER TEST #3

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10

Obs. Well No. MM-4

Elevation of MP 5254.78

Location 6905.7S, 6257.9W

Measuring Point (MP) is TOC

Discharge Meas. Method Cumm. Flow Meter

Average Q 26.3 gpm r= 40.19 ft. r^2= 1615.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unad-justed)	Adjust-ment Δs	s' (Ad-justed)	Q (gpm)	Remarks
7/29/80	9:30 a.m.	0			130.59		0			
Tues.		1			130.59		0			
		2			130.69		.10			
		3			130.86		.27			
		4			131.12		.53			
		5			131.48		.89			
		6			131.91		1.32			
		7			132.33		1.74			
		8			132.85		2.26			
		9			133.34		2.75			
		10			133.89		3.30			
		12			135.08		4.49			
		14			136.20		5.61			
		16			137.29		6.70			
		18			138.27		7.68			
		20			139.33		8.74			
		25			141.35		10.76			
		30			143.33		12.74			
		35			145.07		14.48			
		40			146.73		16.14			
		45			147.95		17.36			
		50			148.62		18.03			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10 Location 6905.7S, 6257.9W
Obs. Well No. MM-4 Measuring Point (MP) is TOC
Elevation of MP 5254.78 Discharge Meas. Method Cumm. Flow meter

Average Q 26.3 gpm r= 40.19 ft. r^2= 1615.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			150.22		19.63			
	10:30	60			151.17		20.58			
		70			152.76		22.17			
		80			154.26		23.67			
		90			155.94		25.35			
		100			157.25		26.66			
	11:30	120			159.41		28.82			
	11:50	140			161.19		30.60			
	12:10pm	160			162.63		32.04			
	12:30	180			163.90		33.31			
	1:00	210			166.18		35.59			
	1:30	240			167.56		36.97			
	2:00	270			168.72		38.13			
	2:30	300			170.13		39.54			
	3:30	360			172.63		42.04			
	4:30	420			174.41		43.82			
	5:30	480			176.87		46.28			
	6:30	540			177.95		47.36			
	7:30	600			179.24		48.65			
	9:30	720			181.51		50.92			
	11:30	840			183.42		52.83			
7/30/80	1:30am	960			185.31		54.72			

PUMPING TEST MEASUREMENTS

Pumped Well No.	PVS-LMM10	Location	6905.7S, 6257.9W
Obs. Well No.	MM-4	Measuring Point (MP) is	TOC
Elevation of MP	5254.78	Discharge Meas. Method	Cummulative Flow Meter

Average Q 26.3 gpm r= 40.19 ft. r^2= 1615.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	5:30	1200			191.66		61.07			
	10:30	1500			191.48		60.89			
	3:30pm	1800			193.39		6280			
	8:30	2100			193.15		62.56			
7/31/80	1:30pm	2400			198.55		67.96			
	6:30	2700			198.72		68.13			
	11:30	3000			202.46		71.87			
	4:30pm	3300			204.37		73.78			
	9:30	3600			205.49		74.90			
8/1/80	7:30am	4200			207.51		76.92			
	5:30pm	4800			210.00		79.41			
8/2/80	3:30am	5400			209.41		78.85			
	9:30	5760	0	—	210.08		79.49			
		5762	2	2881	210.08			79.49		
		5764	4	1441	209.66			79.07		
		5766	6	961	208.94			78.35		
		5768	8	721	208.03			77.44		
		5770		577	207.11			76.52		
		5772	12	481	[illegible].13			75.54		
		5776	16	361	204.31			73.72		
		5780	20	289	202.47			71.88		
	10:00	5790	30	193	198.58			67.99		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-Lmm10

Obs. Well No. mm-4

Elevation of MP 5254.78

Location 6905.7S, 6257.9W

Measuring Point (MP) is TOC

Discharge Meas. Method Recovery

Average Q 26.3 gpm r= 40.19 ft. r^2= 1615.4

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5800	40	145	195.41			64.82		
		5810	50	116.2	192.93			62.34		
	10:30	5820	60	97.0	190.95			60.36		
	10:50	5840	80	73	187.93			57.34		
	11:10	5860	100	58.6	185.51			54.92		
	11:50	5900	140	42.1	181.88			51.29		
	12:30	5940	180	33	179.22			48.63		
	1:30pm	6000	240	25	176.20			45.61		
	2:30	6060	300	20.2	173.57			42.98		
	4:30	6180	420	14.7	169.27			38.68		
	6:30	6300	540	11.7	166.67			36.08		
	9:30	6480	720	9.0	163.29			32.70		
8/3/80	1:30am	6720	960	7.0	160.29			29.70		
	10:30	7260	1500	4.8	154.61			24.02		
	8:30pm	7860	2100	3.7	150.90			20.31		
8/4/80	7:30am	8520	2760	3.1	147.88			17.29		
	4:30pm	9060	3300	2.8	145.95			15.36		
8/5/80	7:30am	9960	4200	2.4	143.79			13.20		
8/6/80	3:30am	11160	5400	2.1						
	9:50	115[illegible]	5[illegible]80	2.0	140.95			10.36		
8/7/80	9:00am	1293[illegible]	7170	1.8	139.16			8.57		

TABLE D-6.2.07c
M AQUIFER TEST #3

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10 Location 6958O S, 6888.2 W

Obs. Well No. MM-7 Measuring Point (MP) is TOC

Elevation of MP 5236.09 Discharge Meas. Method Cumm. Flow Meter

Average Q 26.3 gpm r= 642.53 ft. r^2= 412851.22

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
7/29/80	9:30 a.m.	0			111.72		0			
Tues.		1			111.72		0			
		2			111.72		0			
		3			111.715					
		4			111.72		0			
		5			111.72		0			
		6			111.71		.01			
		7			111.70		.02			
		8			111.70		.02			
		9			111.70		.02			
		10			111.71		.01			
		12			111.71		.01			
		14			111.70		.02			
		16			111.70		.02			
		18			111.70		.02			
		20			111.70		.02			
		25			111.70		.02			
		30			111.70		.02			
		35			111.70		.02			
		40			111.69		.03			
		45			111.71		.01			
		50			111.72		0			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10
Obs. Well No. MM-7
Elevation of MP 5236.09

Location 6958.0 S, 6888.2 W
Measuring Point (MP) is TOC
Discharge Meas. Method Comm. Flow meter

Average Q 26.3 gpm r= 642.53 ft. r^2= 412,851.22

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			111.74		.02			
	10:30	60			111.76		.04			
		70			111.84		.12			
		80			111.92		.20			
		90			112.05		.33			
		100			112.17		.45			
	11:30	120			112.47		.75			
	11:50	140			112.82		1.10			
	12:10pm	160			113.17		1.45			
	12:30	180			113.57		1.85			
	1:00	210			114.20		2.48			
	1:30	240			114.82		3.10			
	2:00	270			115.38		3.66			
	2:30	300			115.93		4.66			
	3:30	360			116.94		5.67			
	4:30	420			117.75		6.48			
	5:30	480			118.63		7.36			
	6:30	540			119.45		8.18			
	7:30	600			120.23		8.96			
	9:30	720			120.68		9.41			
	11:30	8[illegible]			121.50		10.23			
7/30/80	1:30am	9[illegible]			122.79		11.07			

PUMPING TEST MEASUREMENTS

Pumped Well No. PVS-LMM10

Obs. Well No MM-7

Elevation of MP 5236.09

Location 6958.0 S, 6888.2 W

Measuring Point (MP) is TOC

Discharge Meas. Method Cummulative Flow Meter

Average Q 26.3 gpm r= 642.53 ft. r^2= 412851.22

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	5:30	1200			124.81		13.09			
	10:30	1500			126.92		15.20			
	3:30pm	1800			128.83		17.11			
	8:30	2100			129.42		17.70			
7/31/80	1:30am	2400			132.26		20.54			
	6:30	2700			134.75		23.03			
	11:30	3000			135.38		23.66			
	4:30pm	3300			136.70		24.98			
	9:30	3600			142.25		30.53			
8/1/80	7:30am	4200			139.49		27.77			
	5:30pm	4800			141.42		29.70			
8/2/80	3:30am	5400			142.71		30.99			
	9:30	5760	0	—	143.60			31.88		
		5762	2	2881	143.70			31.98		
		5764	4	1441	143.65			31.93		
		5766	6	961	143.67			31.95		
		5768	8	721	143.60			31.88		
		5770	10	577	143.60			31.88		
		5772	12	481	143.63			31.91		
		5776	16	361	143.60			31.88		
		5780	20	289	143.60			31.88		
	10:00	5790	30	193	143.60			31.88		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10

Obs. Well No. MM-7

Elevation of MP 5236.09

Location 69580S, 6888.2W

Measuring Point (MP) is TOC

Discharge Meas. Method Recovery

Average Q 26.3 gpm r= 642.53 ft. r^2= 412851.22

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5800	40	145	143.63			31.91		
		5810	50	116.2	143.63			31.91		
	10:30	5820	60	97.0	143.53			31.81		
	10:50	5840	80	73	143.34			31.62		
	11:10	5860	100	58.6	143.13			31.41		
	11:50	5900	140	42.1	142.56			30.84		
	12:30	5940	180	33	141.62			29.90		
	1:30pm	6000	240	25	140.70			28.98		
	2:30	6060	300	20.2	139.75			28.03		
	4:30	6180	420	14.7	138.23			26.51		
	6:30	6300	540	11.7	143.25			31.53		
	9:30	6480	720	9.0	134.87			23.15		
8/3/80	1:30am	6720	960	7.0	133.05			21.33		
	10:30	7260	1500	4.8	130.00			18.28		
	8:30pm	7860	2100	3.7	132.17			20.45		
8/4/80	7:30am	8520	2760	3.1	125.62			13.90		
	4:30pm	9060	3300	2.8	124.07			12.35		
8/5/80	7:30am	9960	4200	2.4	122.54			10.82		
8/6/80	3:30am	11160	5400	2.1						
	9:50	11540	5780	2.0	120.26			8.54		
8/7/80	9:10am	12930	7170	1.8	118.75			7.03		

TABLE D-6.2.07d
M AQUIFER TEST #3

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10
Obs. Well No. MM-10
Elevation of MP 5255.60

Location 6865.9S, 6252.3W
Measuring Point (MP) is TOC
Discharge Meas. Method Cumm. Flow Meter

Average Q 26.3 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
7/29/80	9:30 a.m.	0			131.75		0			
Tues.		1			177.18		45.83			
		2			183.58		51.83			
		3			187.63		55.88			
		4			190.87		59.12			
		5			193.24		61.49			
		6			194.87		63.12			
		7			196.41		64.66			
		8			197.25		65.50			
		9			198.18		66.43			
		10			198.9		67.15			
		12			200.27		68.52			
		14			201.14		69.39			
		16			201.79		70.04			
		18			202.37		70.62			
		20			202.87		71.12			
		25			204.96		73.21			
		30			206.44		74.69			
		35			208.25		76.50			
		40			209.53		77.78			
		45			210.14		78.39			
		50			210.35		78.60			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10

Location 68659.8, 6252.3W

Obs. Well No. MM-10

Measuring Point (MP) is TOC

Elevation of MP 5255.60

Discharge Meas. Method Camn. Flow meter

Average Q 26.3 gpm r= 42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		55			211.48		79.73			
	10:30	60			211.35		79.60			
		70			212.24		80.49			
		80			217.28		85.53			
		90			218.56		86.81			
		100			220.09		88.34			
	11:30	120			221.55		89.80			
	11:50	140			222.77		91.02			
	12:10pm	160			223.06		91.31			
	12:30	180			224.32		92.57			
	1:00	210			227.98		96.23			
	1:30	240			227.05		95.30			
	2:00	270			230.00		98.25			
	2:30	300			231.76		100.01			
	3:30	360			233.54		101.79			
	4:30	420			234.41		102.66			
	5:30	480			238.03		106.22			
	6:30	540			238.06		106.25			
	7:30	600			238.20		106.45			
	9:30	720			241.05		109.30			
	11:30	840			242.23		110.48			
7/30/80	1:30am	960			244.41		112.66			

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10

Obs. Well No. MM-10

Elevation of MP 5255.60

Location 68659 S, 62523 W

Measuring Point (MP) is TOC

Discharge Meas. Method Cumulative Flow Meter

Average Q 26.3 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
	5:30	1200			245.68		113.93			
	10:30	1500			249.17		117.42			
	3:30pm	1800			249.74		117.99			
	8:30	2100			254.02		122.27			
7/31/80	1:30am	2400			254.78		123.03			
	6:30	2700			252.98		121.23			
	11:30	3000			259.67		127.92			
	4:30pm	3300			261.07		129.32			
	9:30	3600			262.07		130.32			
8/1/80	7:30am	4200			263.65		131.90			
	5:30pm	4800			265.75		134.00			
8/2/80	3:30am	5400			264.67		132.92			
	9:30	5760	0	—	262.04			130.29		
		5762	2	2881	205.45			73.70		
		5764	4	1441	206.48			74.73		
		5766	6	961	205.79			74.04		
		5768	8	721	204.80			73.05		
		5770	10	577	203.83			72.08		
		5772	12	481	202.78			71.03		
		5776	16	361	198.71			66.96		
		5780	20	289	197.74			65.99		
	10:00	5790	30	193	194.91			63.16		

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-Lmm10

Location 6865.9 S, 6252.3 W

Obs. Well No. mm-10

Measuring Point (MP) is TOC

Elevation of MP 5255.60

Discharge Meas. Method Recovery

Average Q 26.3 gpm r= .42 ft. r^2= .17

Date	Hour	t (min)	t' (min)	t/t'	Depth to Water	s (unadjusted)	Adjustment Δs	s' (Adjusted)	Q (gpm)	Remarks
		5800	40	145	192.72			60.97		
		5810	50	116.2	190.71			58.96		
	10:30	5820	60	97.0	189.13			57.38		
	10:50	5840	80	73	186.37			54.62		
	11:10	5860	100	58.6	184.18			52.43		
	11:50	5900	140	42.1	180.87			49.12		
	12:30	5940	180	33	178.32			46.57		
	1:30pm	6000	240	25	175.43			43.68		
	2:30	6060	300	20.2	172.92			41.17		
	4:30	6180	420	14.7	169.23			37.48		
	6:30	6300	540	11.7	166.25			34.50		
	9:30	6480	720	9.0	163.22			31.47		
8/3/80	1:30am	6720	960	7.0	158.08			26.33		
	10:30	7260	1500	4.8	154.82			23.07		
	8:30pm	7860	2100	3.7	151.73			19.98		
8/4/80	7:30am	8520	2760	3.1	148.51			16.76		
	4:30pm	9060	3300	2.8	146.49			14.74		
8/5/80	7:30am	9960	4200	2.4	144.52			12.77		
8/6/80	3:30am	11160	5400	2.1						
	9:50	11540	5780	2.0	141.88			10.13		
8/7/80	9:00am	12930	7170	1.8	140.00			8.25		

TABLE D-6.2.07e
M ACQUIFER TEST #3

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM10
Location 7021.0S, 6367.5W
Obs. Well No. PN5-LBM1
Measuring Point(MP) TOC
Elevation of MP 5250.01

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/29/80	9:30am	0		163.12	163.36	-.24	29.90	33.79
	10:30am	60		163.12	163.34	-.22	29.90	33.79
	11:30am	120		163.12	163.33	-.21	29.90	33.79
	11:50am	140		163.12	163.32	-.20	29.90	33.79
	12:10pm	160		163.09	163.32	-.23	29.89	33.78
	12:30pm	180		163.09	163.31	-.22	29.89	33.78
	1:00pm	210		163.09	163.30	-.21	29.88	33.76
	1:30pm	240		163.03	163.29	-.26	29.88	33[illegible]
	2:00pm	270		163.03	163.29	-.26	29.88	33.76
	2:30pm	300		163.05	163.28	-.23	29.87	33.75
	3:30pm	360		163.03	163.26	-.23	29.86	33.74
	4:30pm	420		162.97	163.25	-.27	29.85	33.73
	5:30pm	480		163.00	163.23	-.23	29.83	33.71
	6:30pm	540		162.95	163.22	-.27	29.82	33.70
	7:30pm	600		162.95	163.20	-.25	29.80	33.67
	9:30pm	720		162.93	163.17	-.24	29.89	33.78
	11:30pm	840		162.93	163.14	-.21	29.96	33.85
7/30/80	1:30am	960		162.90	163.11	-.21	29.98	33.88
	5:30am	1200		162.90	163.09	-.16	29.99	33.89
	10:30am	1500		162.82	162.99	-.17	30.06	33.97

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10 Location 7021.0S, 6367.5W

Obs. Well No. PNS-LBM1 Measuring Point(MP) TOC

Elevation of MP 5250.01

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/30/80	3:30pm	1800		162.81	162.93	-.12	30.00	33.88
	8:30pm	2100		162.75	162.87	-.12	29.96	33.85
7/31/80	1:30am	2400		162.78	162.81	-.03	29.96	33.85
	6:30am	2700		162.77	162.75	-.02	29.99	33.84
	11:30am	3000		162.70	162.70	.00	30.06	33.87
	4:30pm	3300		162.71	162.64	.07	30.06	33.97
	9:30pm	3600		162.76	162.59	.17	30.04	33.95
8/01/80	7:30am	4200		162.42	162.50	-.08	29.96	33.85
	5:30pm	4800		162.38	162.40	-.02	29.92	33.81
8/02/80	3:30am	5400		162.52	162.32	-.2	30.01	33.91
	9:30am	5760		160.84	162.27	-.57	33.90	33.90
			0	160.84		-1.43	30.00	33.90
	10:30am	5820	60	162.22	162.26	-.04	29.96	33.85
	11:50am	5900	140	162.18	162.25	-.07	29.95	33.84
	12:30pm	5940	180	162.24	162.25	-.01	29.95	33.81
	1:30pm	6000	240	162.26	162.24	.02	29.94	33.83
	2:30pm	6060	300	162.29	162.23	.06	29.91	33.80
	4:30pm	6180	420	162.24	162.21	.03	29.86	33.74
	6:30pm	6300	540	162.25	162.20	.05	29.81	33.72
	9:30pm	6480	720	162.16	162.17	-.01	29.83	33.71

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMm10 Location 7021.0 S, 6367.5 W

Obs. Well No. PN5-LBm1 Measuring Point(MP) TOC

Elevation of MP 5250.01

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
8/03/80	1:30AM	6720	960	162.11	162.14	-.03	29.78	33.65
	10:30AM	7260	1500	162.02	162.08	-.06	29.63	33.48
	8:30pm	7860	2100	162.13	162.01	.12	29.76	33.63
8/04/80	7:30 AM	8520	2760	162.00	161.94	.06	29.82	33.70
	4:30pm	9060	3300	161.92	161.88	.04	29.79	33.66
8/05/80	7:30AM	9960	4200	161.88	161.78	.10	29.86	33.74
8/06/80	9:50AM	11540	5780	161.67	161.64	.03	29.84	33.72

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10 Location 6866.8S, 6281.4W
Obs. Well No. PNS-NM4 Measuring Point(MP) TOC
Elevation of MP 5253.35

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/29/80	9:30 am	0		118.48		—	29.90	33.79
	10:30 am	60		118.48		0	29.90	33.79
	11:30 am	120		118.43		-.05	29.90	33.79
	11:50 am	140		118.47		-.01	29.90	33.79
	12:10 pm	160		118.39		-.09	29.89	33.78
	12:30 pm	180		118.44		-.04	29.89	33.78
	1:00 pm	210		118.39		-.09	29.88	33.76
	1:30 pm	240		118.35		-.13	29.88	33.76
	2:00 pm	270		118.32		-.16	29.88	33.76
	2:30 pm	300		118.34		-.14	29.87	33.75
	3:30 pm	360		118.34		-.14	29.86	33.74
	4:30 pm	420					29.85	33.73
	5:30 pm	480		118.26		-.22	29.83	33.71
	6:30 pm	540		118.22		-.26	29.82	33.70
	7:30 pm	600		118.20		-.28	29.80	33.67
	9:30 pm	720		118.34		-.14	29.89	33.78
	11:30 pm	840		118.33		-.15	29.96	33.75
7/30/80	1:30 am	960		118.30		-.18	29.98	33.88
	5:30 am	1200		118.35		-.13	29.99	33.89
	10:30 am	1500		118.22		-.26	30.06	33.97

PUMPING TEST MEASUREMENTS

Pumped Well No. PNS-LMM10 Location 6866.8S, 6281.4W

Obs. Well No. PNS-LNM 4 Measuring Point(MP) TOC

Elevation of MP 5253.35

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
7/30/80	3:30pm	1800		118.39		-.09	30.00	33.88
	8:30pm	2100		118.58		-.10	29.96	33.85
7/31/80	1:30AM	2400		118.66		.18	29.96	33.85
	6:30AM	2700		118.58		.10	29.99	33.84
	11:30AM	3000		118.55		.07	30.06	33.87
	4:30AM	3300		118.65		.17	30.06	33.97
	9:30pm	3600		118.75		.27	30.04	33.95
8/01/80	7:30AM	4200		118.71		.23	29.96	33.[illegible]
	5:30pm	4800		118.79		.31	29.92	33.81
8/02/80	3:30AM	5400		118.79		.31	30.01	33.91
	9:30AM	5760		117.96		-.52	33.90	33.90
			0				30.[illegible]	33.90
	10:30AM	5820	60	118.78		.30	29.96	33.85
	11:50AM	5900	140	118.82		.34	29.95	33.84
	12:30AM	5940	180	118.79		.31	29.95	33.84
	1:30pm	6000	240	118.77		.29	29.94	33.83
	2:30pm	6060	300	118.77		.29	29.91	33.80
	4:30pm	6180	420	118.77		.29	29.86	33.74
	6:30pm	6300	540	118.91		.43	29.81	33.72
	9:30pm	6480	720	118.80		.32	29.83	33.71

PUMPING TEST MEASUREMENTS

Pumped Well No. PN5-LMM10
Location 6866.8S, 6281.4W
Obs. Well No. PN5-LNM4
Measuring Point(MP) TOC
Elevation of MP 5253.35

Date	Hour	t (min)	t' (min)	Depth to Water Observed (ft)	Depth to Water Extrapolated (ft)	Drawdown (-) up (+) down (ft)	Barometric Pressure	
							Hg(in)	H_2O(ft)
8/03/80	1:30 am	6720	960	118.82		.34	29.78	33.65
	10:30 am	7260	1500	118.75		.27	29.63	33.48
	8:30 pm	7860	2100	118.89		.41	29.76	33.63
8/04/80	7:30 am	8520	2760	118.82		.34	29.82	33.70
	4:30 pm	9060	3300				29.79	33.66
8/05/80	7:30 am	9960	4200	118.90		.42	29.86	33.74
8/06/80	9:50 am	11540	5780	118.20		.28	29.84	33.72

TABLE D-6.2.08

RECOVERY TEST #1
(Basal Aquifer)

Well PN5-LBM1

Time Since Pumping Began	Time Since Pumping Stopped	t/t'	Depth	Residual Drawdown
110	0		238	70.8
111	1	111	201.88	34.68
112	2	56	196.65	29.45
113	3	37.7	192.99	25.79
114	4	28.5	190.49	23.29
115	5	23.0	188.51	21.31
116	6	19.3	187.0	19.80
117	7	16.7	185.84	18.64
118	8	14.8	184.95	17.75
120	10	12	183.50	16.30
122	12	10.2	182.44	15.24
124	14	8.9	181.57	14.37
126	16	7.88	180.80	13.6
128	18	7.11	180.16	12.96
130	20	6.5	179.64	12.44
135	25	5.4	178.53	11.33
140	30	4.67	177.60	10.4
145	35	4.14	176.85	9.65
150	40	3.75	176.34	9.14
155	45	3.44	175.79	8.59
160	50	3.20	175.20	8.00
170	60	2.83	174.55	7.35
180	70	2.57	174.06	6.8
190	90	2.11	173.03	5.83

TABLE D-6.2.0a
RECOVERY TEST #2
(Basal Aquifer)

Well PNS-LBM2

Time Since Pumping Began	Time Since Pumping Stopped	t/t'	Depth	Residual Drawdown
100	0	—	255.77	137.95
101	1	101	218.23	100.41
102	2	51	208.69	90.87
103	3	34.3	199.89	82.07
104	4	26	192.70	74.88
105	5	21	185.96	68.14
106	6	17.7	178.40	60.58
107	7	15.3	175.80	57.76
108	8	13.5	171.47	53.65
109	9	12.11	167.71	49.89
110	10	11.0	164.40	46.58
112	12	9.3	158.68	40.86
114	14	8.14	154.12	36.35
116	16	7.25	150.69	32.87
120	20	6.0	145.34	27.52
125	25	5.0	140.70	22.88
130	30	4.33	137.61	19.79
136	36	3.78	134.66	16.84
140	40	3.50	133.56	15.74
145	45	3.22	132.07	14.25
150	50	3.00	131.05	13.23
160	60	2.67	129.22	11.40
170	70	2.43	128.05	10.23

RECOVERY TEST #2
(Basal Aquifer)

Well PN5-LBM2

Time Since Pumping Began	Time Since Pumping Stopped	t/t'	Depth	Residual Drawdown
180	80	2.25	126.86	9.04
190	90	2.11	126.18	8.36
200	100	2.0	125.50	7.68
210	110	1.91	124.92	7.10

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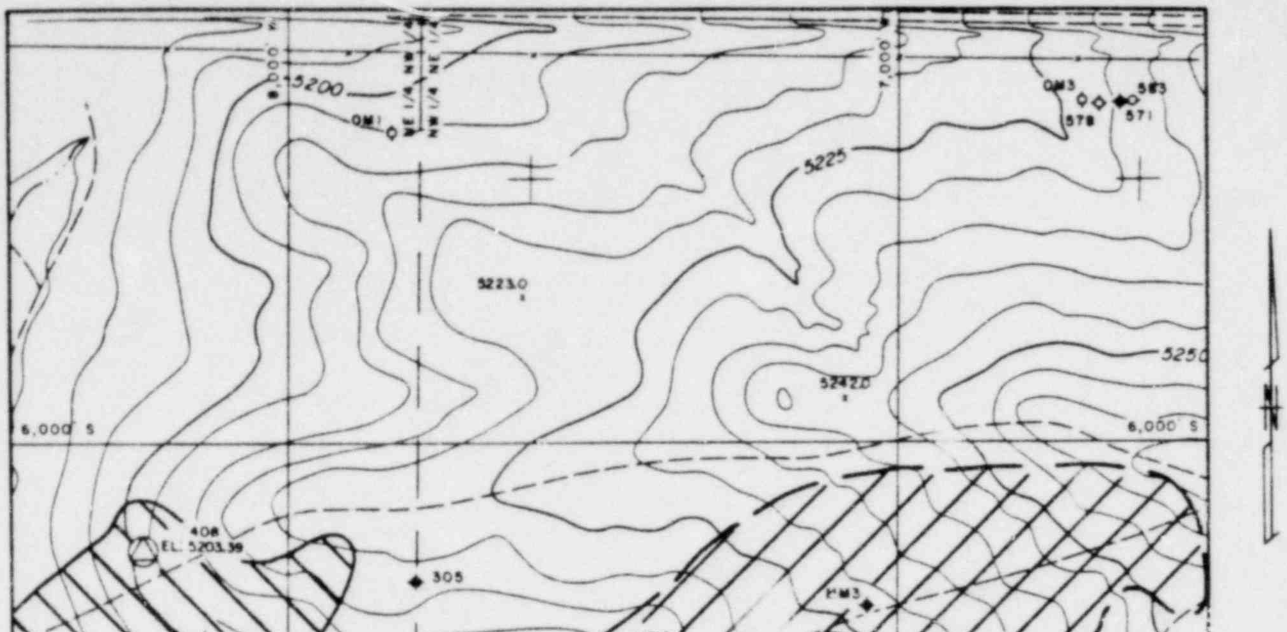


0 100 200 300 500 800 FEET

0 50 100 200 METERS

● RESEARCH & DEVELOPMENT AREA WITHIN SECTION 14, T 34 N - R 74 W

UNC TETON
EXPLORATION DRILLING, INC.
UNC RESOURCES

CONTOUR INTERVALS: 5 FEET

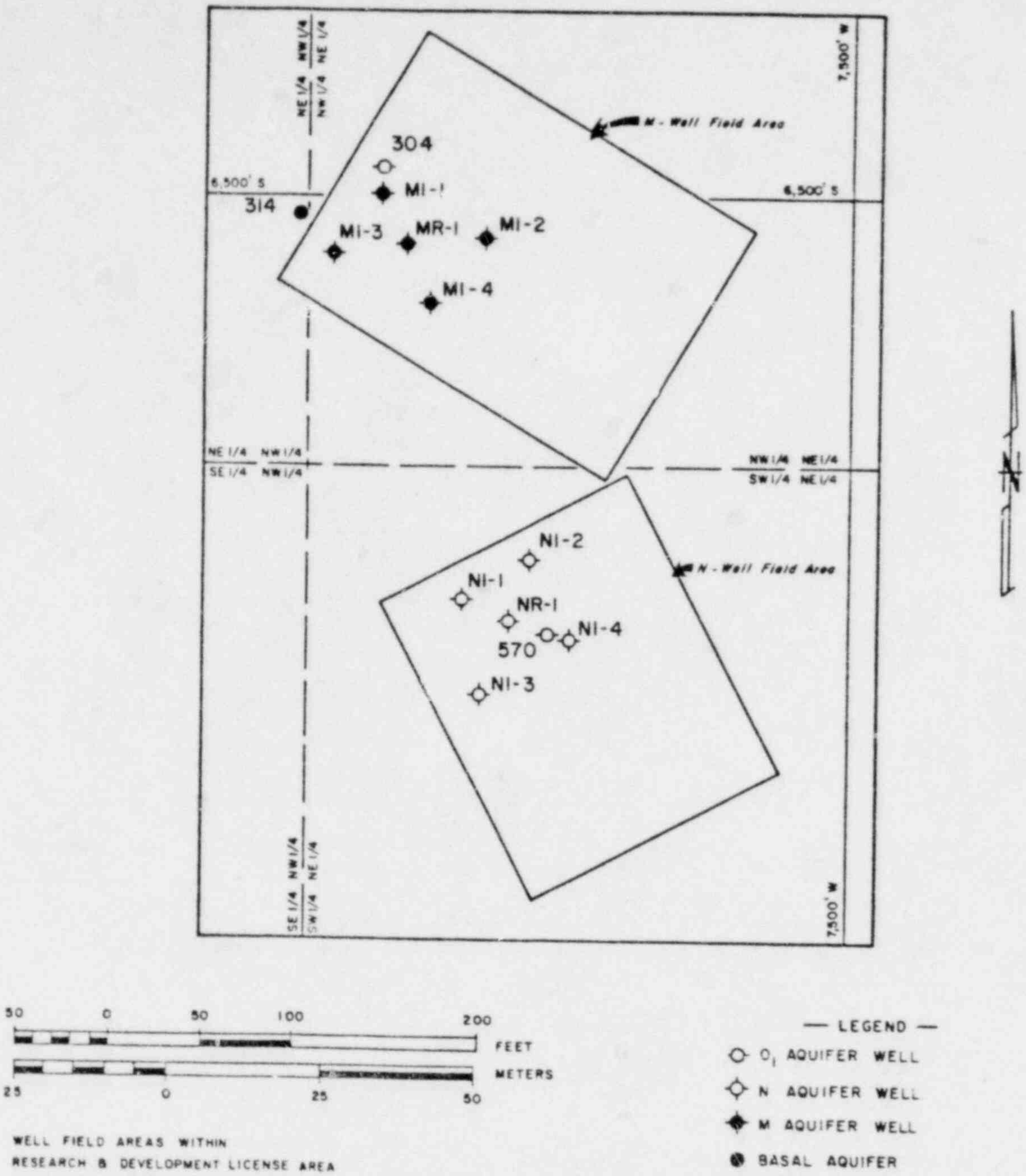
NOTE: 0,0 POINT OF COORDINATE SYSTEM IS THE NE CORNER OF SECTION 12, T 34 N - R 74 W.

ALL HOLES ARE PREFIXED BY PNS-L

— LEGEND —

- ◇ NM1 WELL WITH FIELD IDENTIFICATION NUMBER (SEE TEXT)
- O_2 AQUIFER WELL
- O_1 AQUIFER WELL
- N AQUIFER WELL
- M AQUIFER WELL
- BASAL AQUIFER WELL
- N PRODUCTION ZONE
- M PRODUCTION ZONE

FIGURE D-6.2.01
Wells Used to Determine
Ground Water Quality & Aquifer Characteristics
Sheet 2 of 2



WELL FIELD AREAS WITHIN
RESEARCH & DEVELOPMENT LICENSE AREA
(WITHIN SECTION 14, T 34 N - R 74 W)

NOTE: 0,0 POINT OF COORDINATE SYSTEM
IS NE CORNER OF SECTION 12,
T 34 N - R 74 W

UNC TETON EXPLORATION DRILLING, INC.

Subsidiary of United Nuclear Corporation
A UNC RESOURCES Company

P.O. Drawer A-1
Casper, Wyoming 82602

Figure D-6.2.02

INITIAL FIVE SPOT PATTERNS FOR N AND M WELL FIELD AREA

For Location See Figure D-6.1.01, Sheet 4 of 4

FIGURE D-6.2.03

N AQUIFER TEST #1

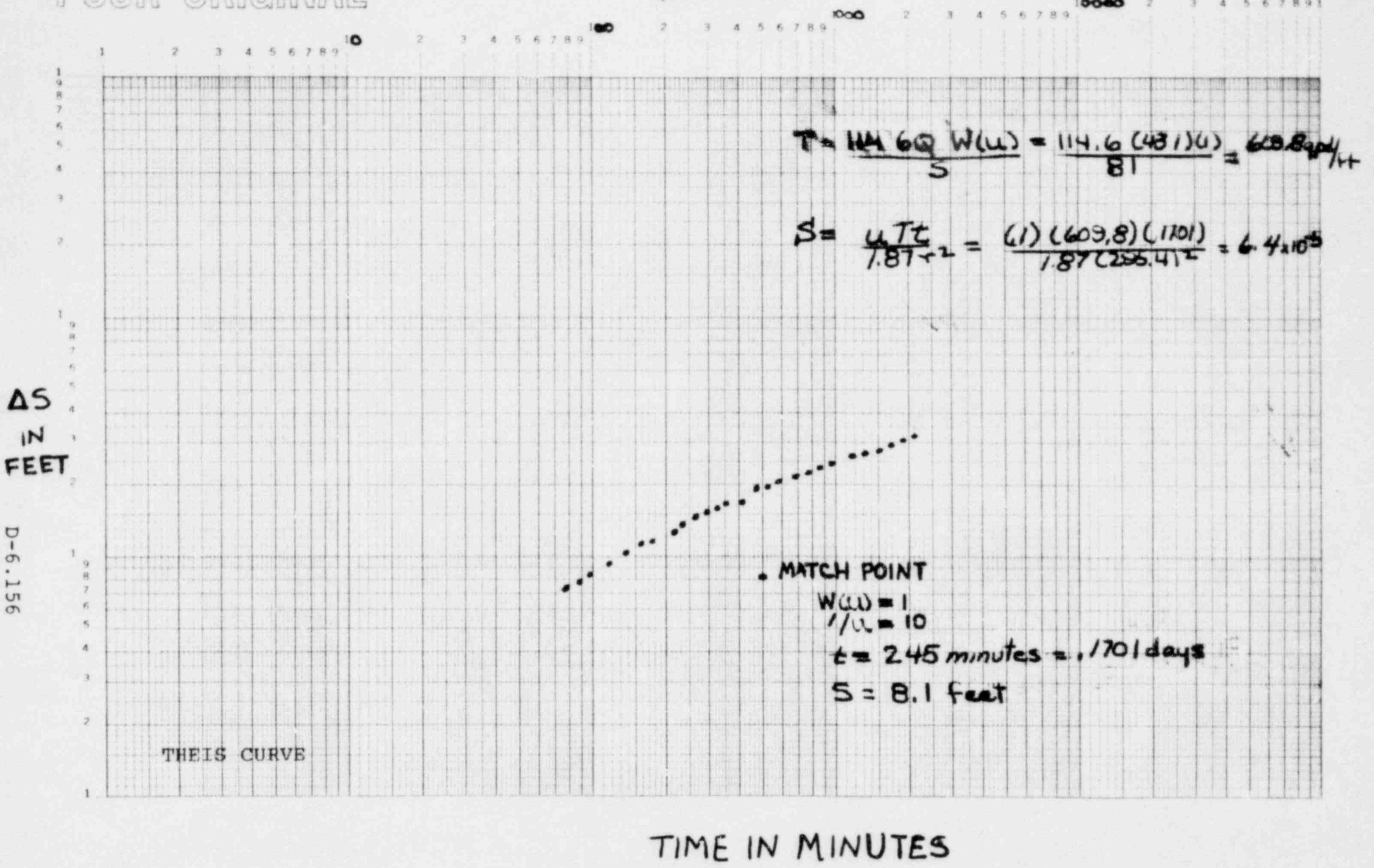
THEIS CURVE, JACOB PLOT AND RECOVERY PLOT FOR WELLS
PN5-L313, 317, 319,320,572,573 and 574

K&E LOGARITHMIC 3 x 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.

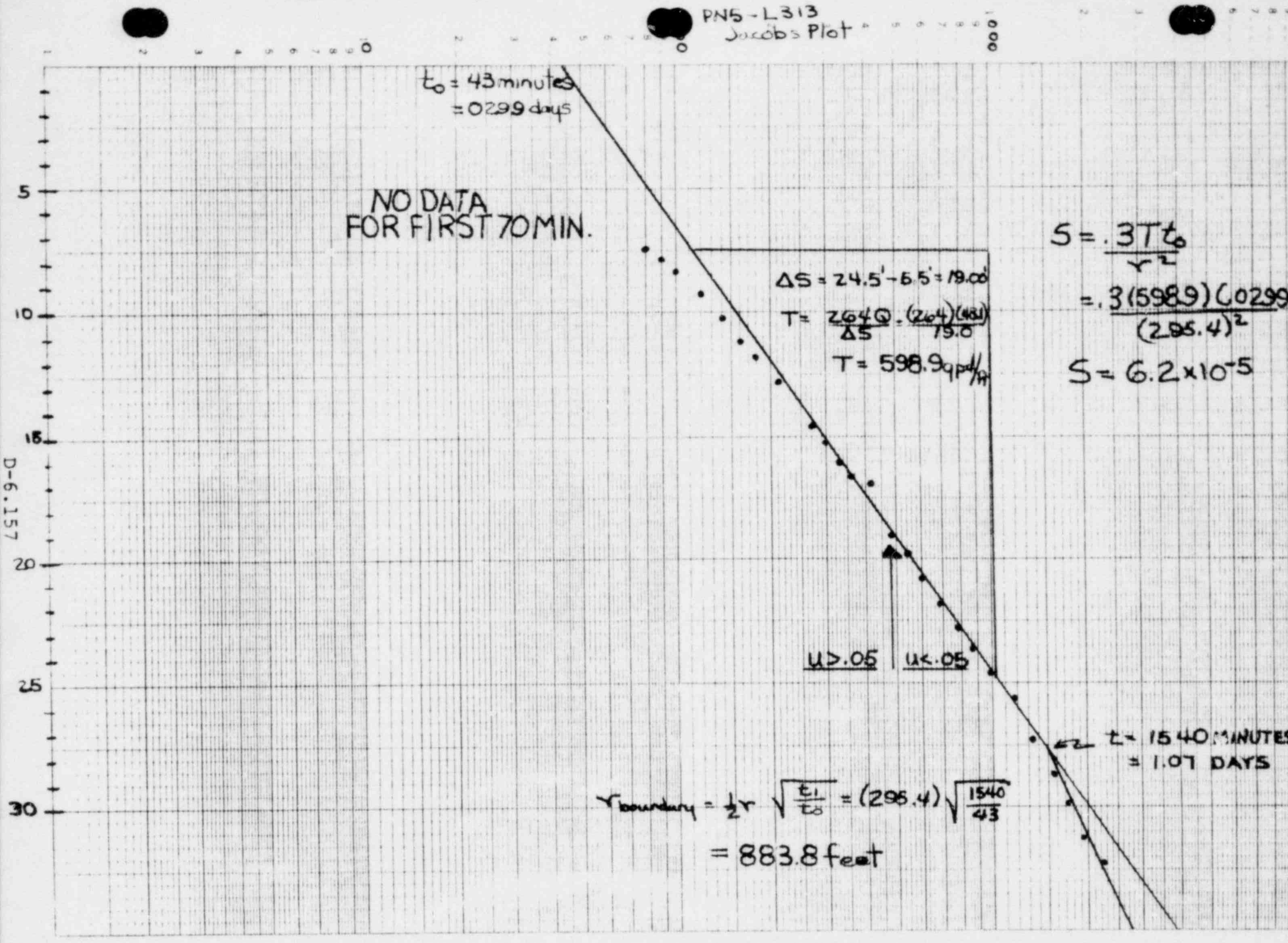
46 7522

POOR ORIGINAL

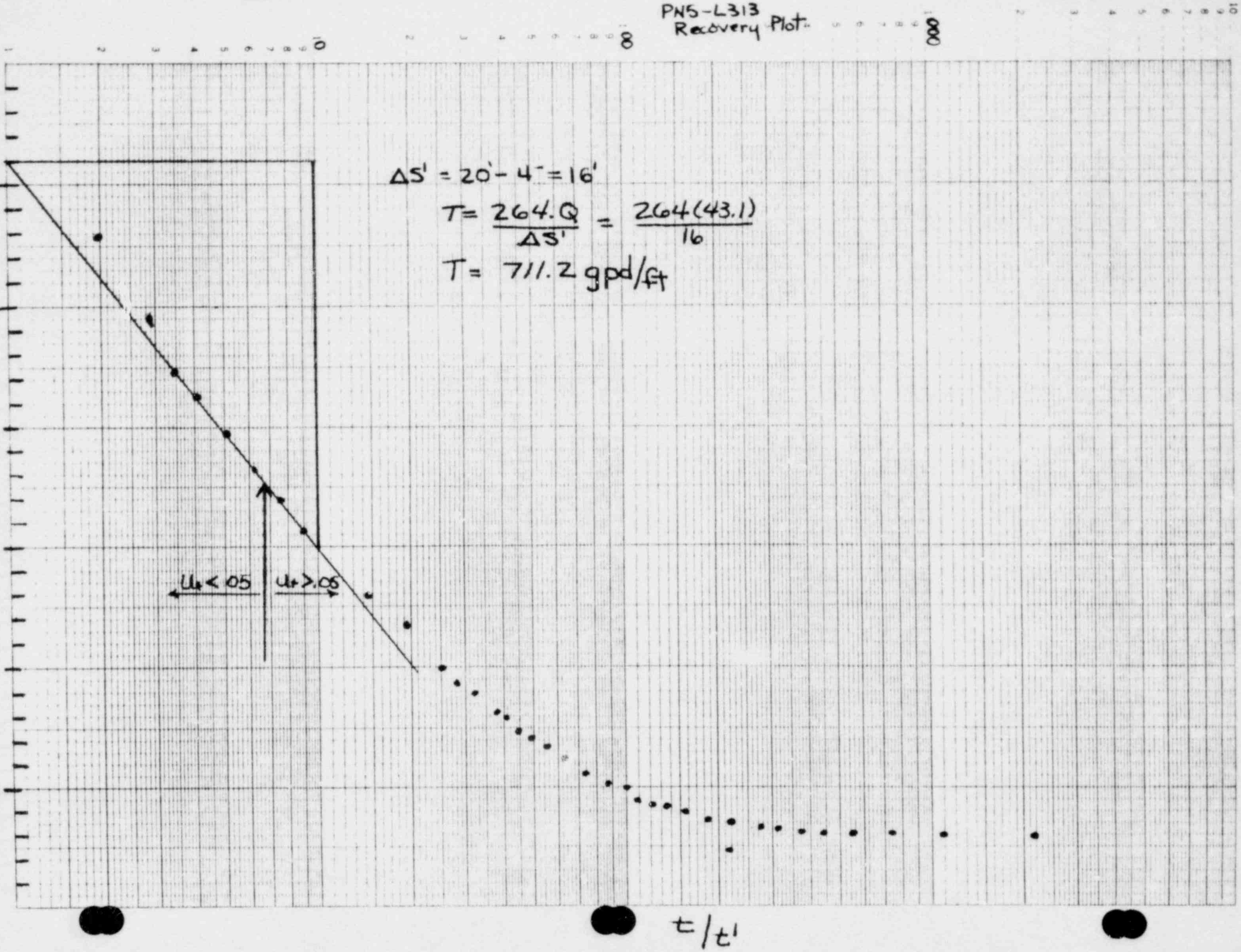
Well PNS-L313



D-6.156


PN5 - L313
Jacobs Plot
t_0 = 43 minutes
= .0299 days
NO DATA
FOR FIRST 70 MIN.
ΔS = 24.5' - 5.5' = 19.00'
T = 264Q / ΔS = (264)(431) / 19.0
T = 598.9 gpd/ft
S = .3Tt₀ / r²
= .3(598.9)(.0299) / (295.4)²
S = 6.2×10⁻⁵
u>.05
u<.05
t = 1540 MINUTES
= 1.07 DAYS
r boundary = ½r √(t₁/t₀) = (295.4) √(1540/43)
= 883.8 feet
5
10
15
20
25
30
TIME IN MINUTES

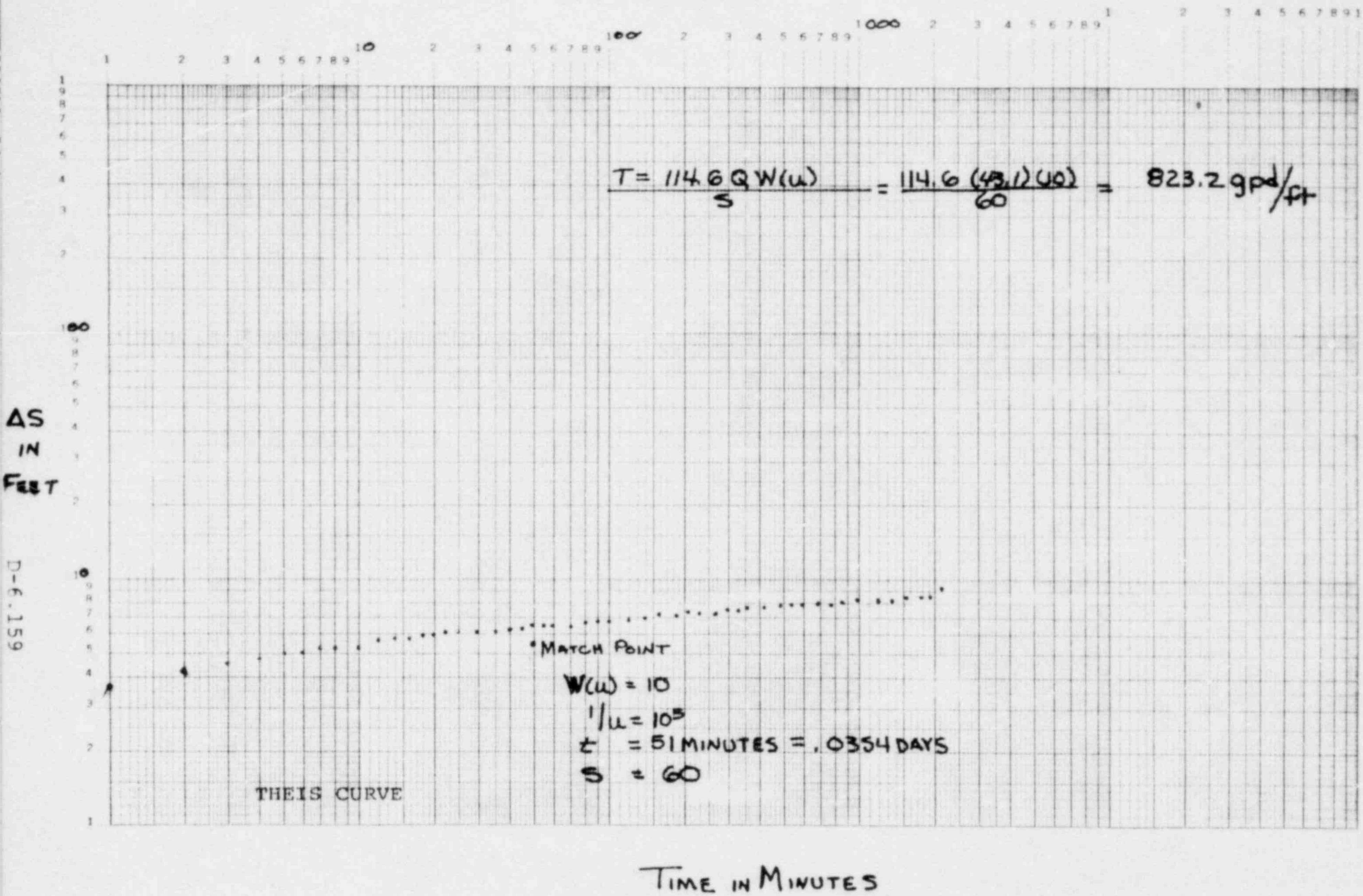
D-6.157


PNS-L313
Recovery Plot
$\Delta S' = 20' - 4' = 16'$
$T = \frac{264 \cdot Q}{\Delta S'} = \frac{264(43.1)}{16}$
$T = 711.2$ gpd/ft
u < .05
u > .05
t/t'
5
10
15
20
25
30

K+E LOGARITHMIC 3 x 5 CYCLES KEUFFEL & ESSER CO.

46 7522

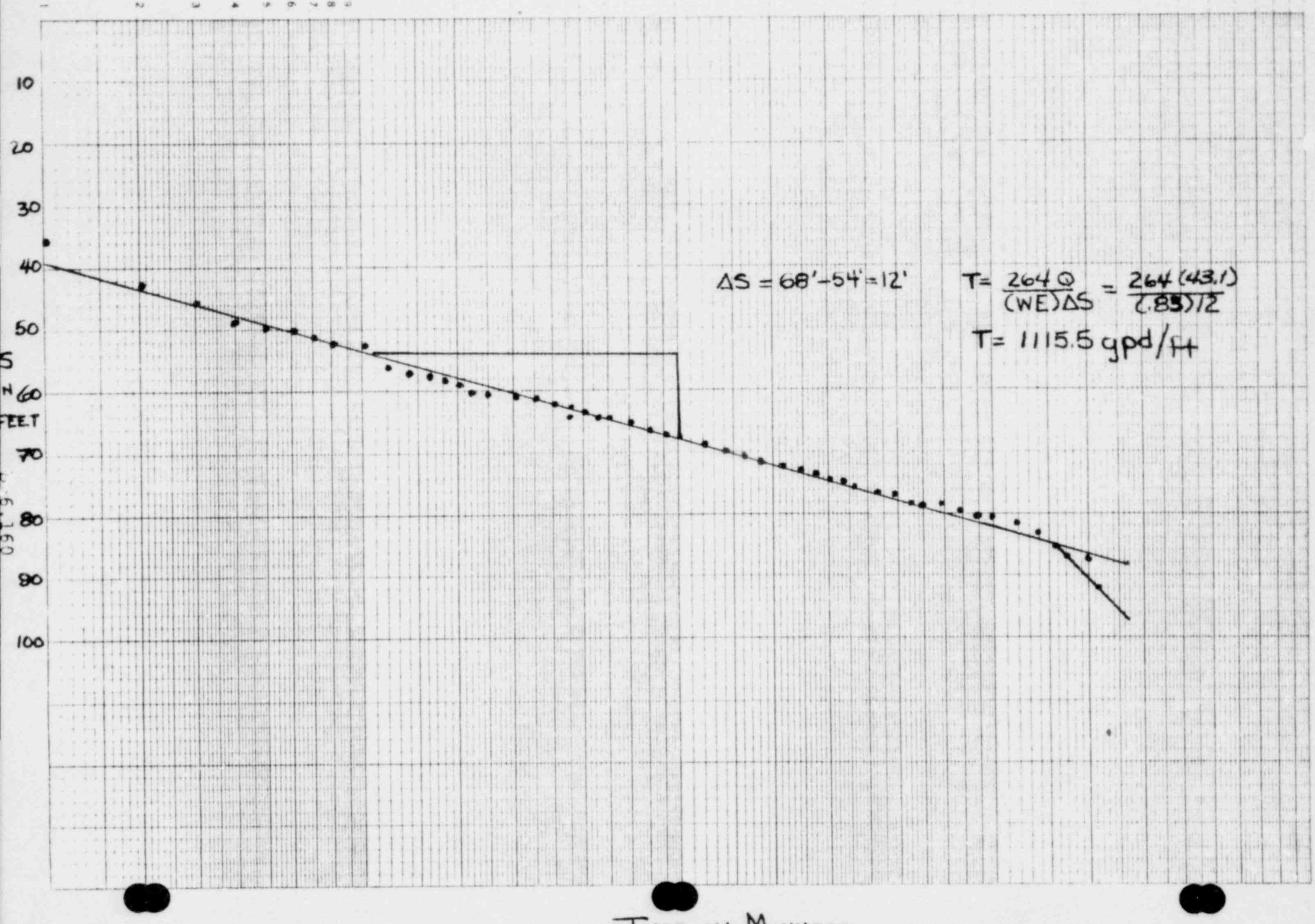
PN5-L317



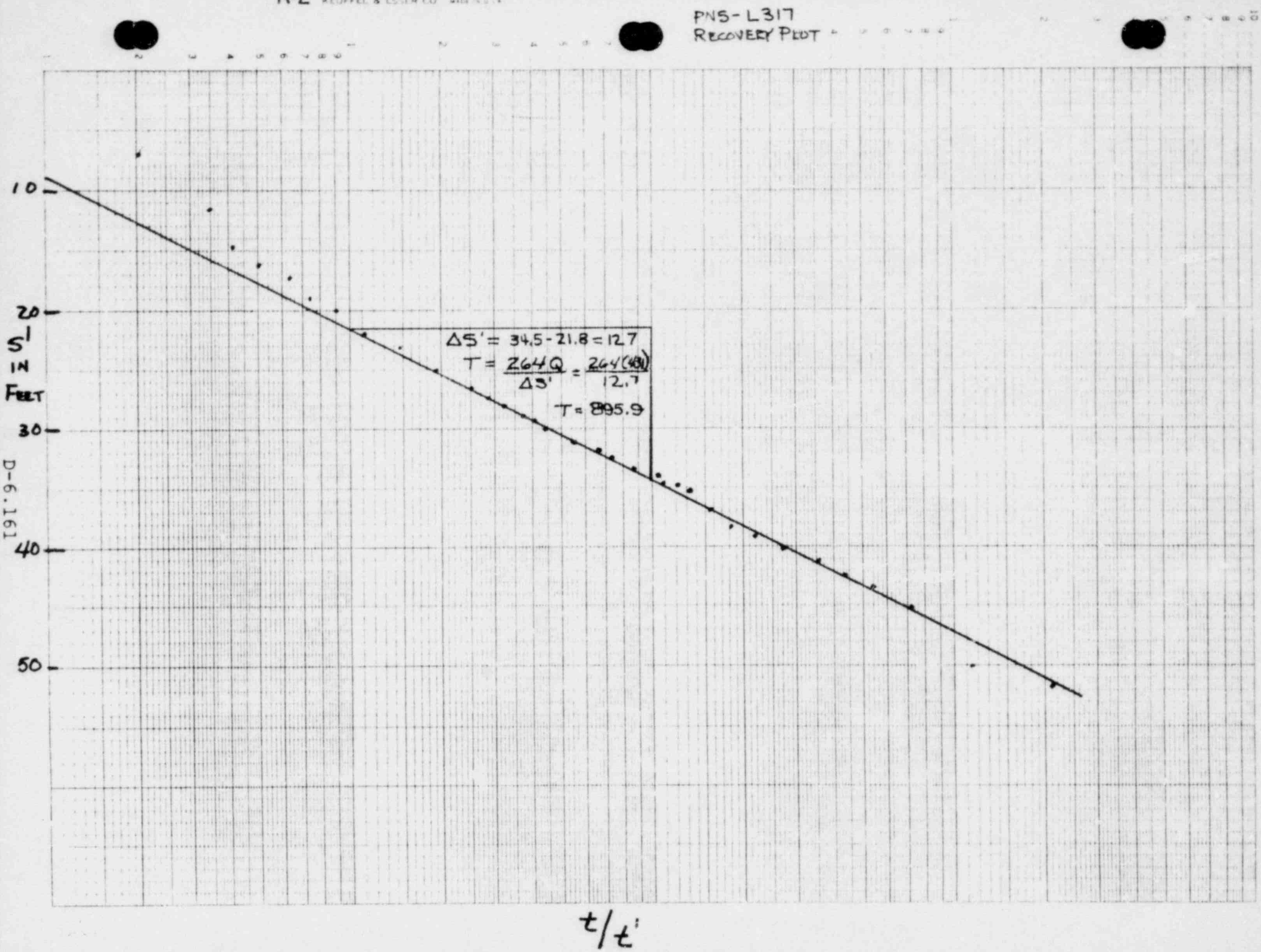
K•E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.

46 6012

PN5-L317
Jacob Plot

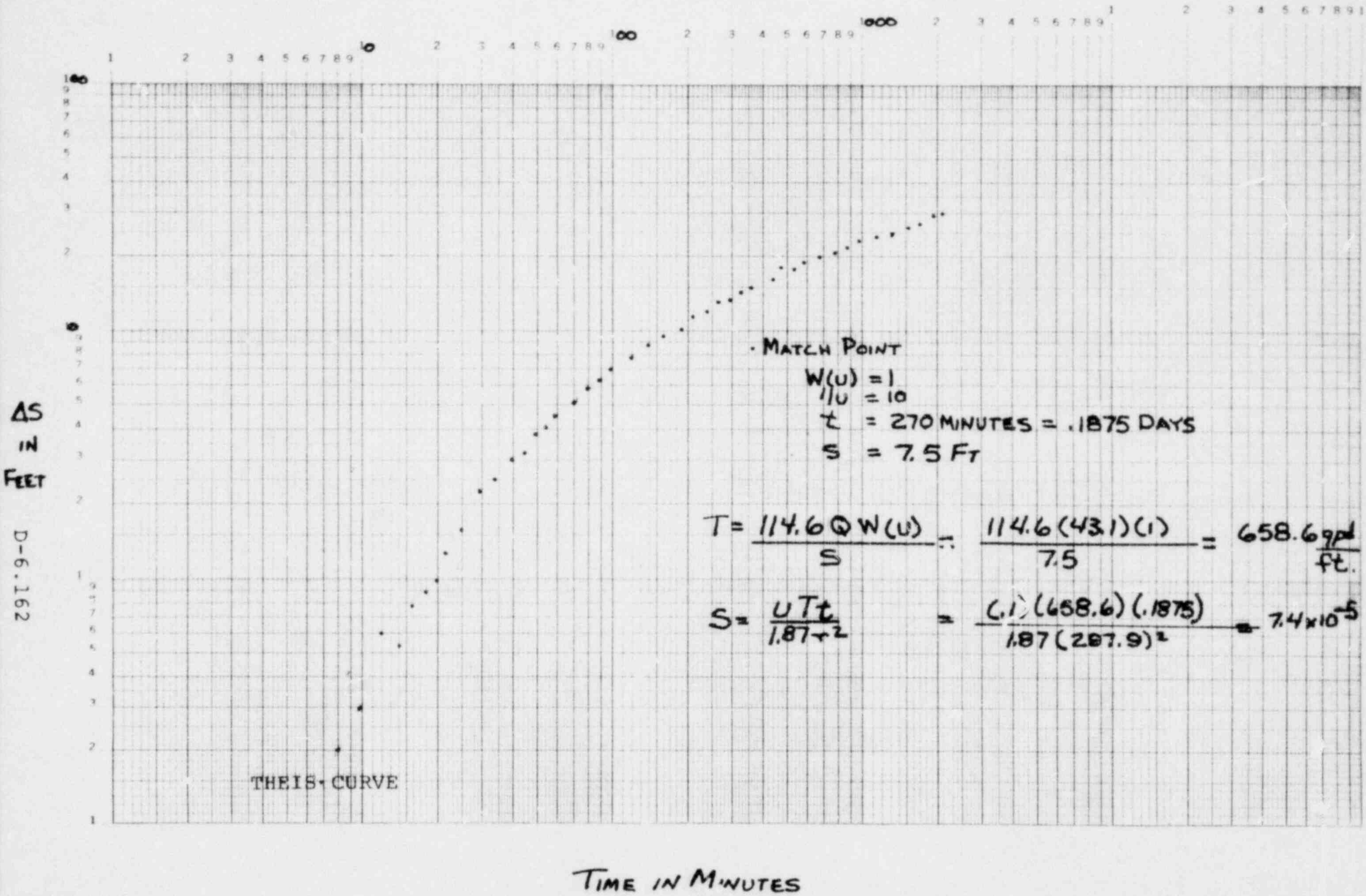


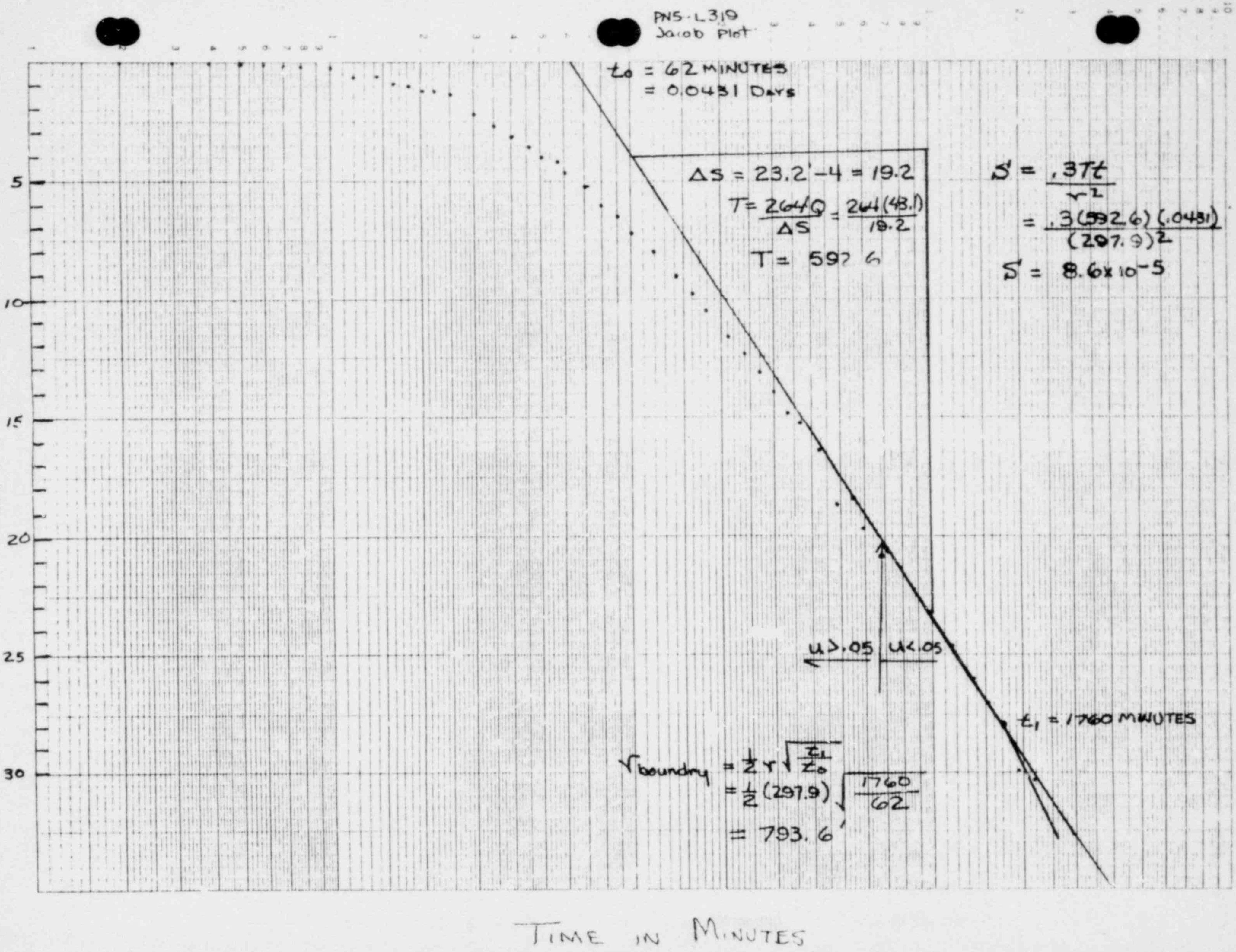
46 6012


PNS-L317
RECOVERY PLOT
ΔS' = 34.5 - 21.8 = 12.7
T = 264Q / ΔS' = 264(431) / 12.7
T = 895.9
10
20
30
40
50
S' IN FEET
t/t'

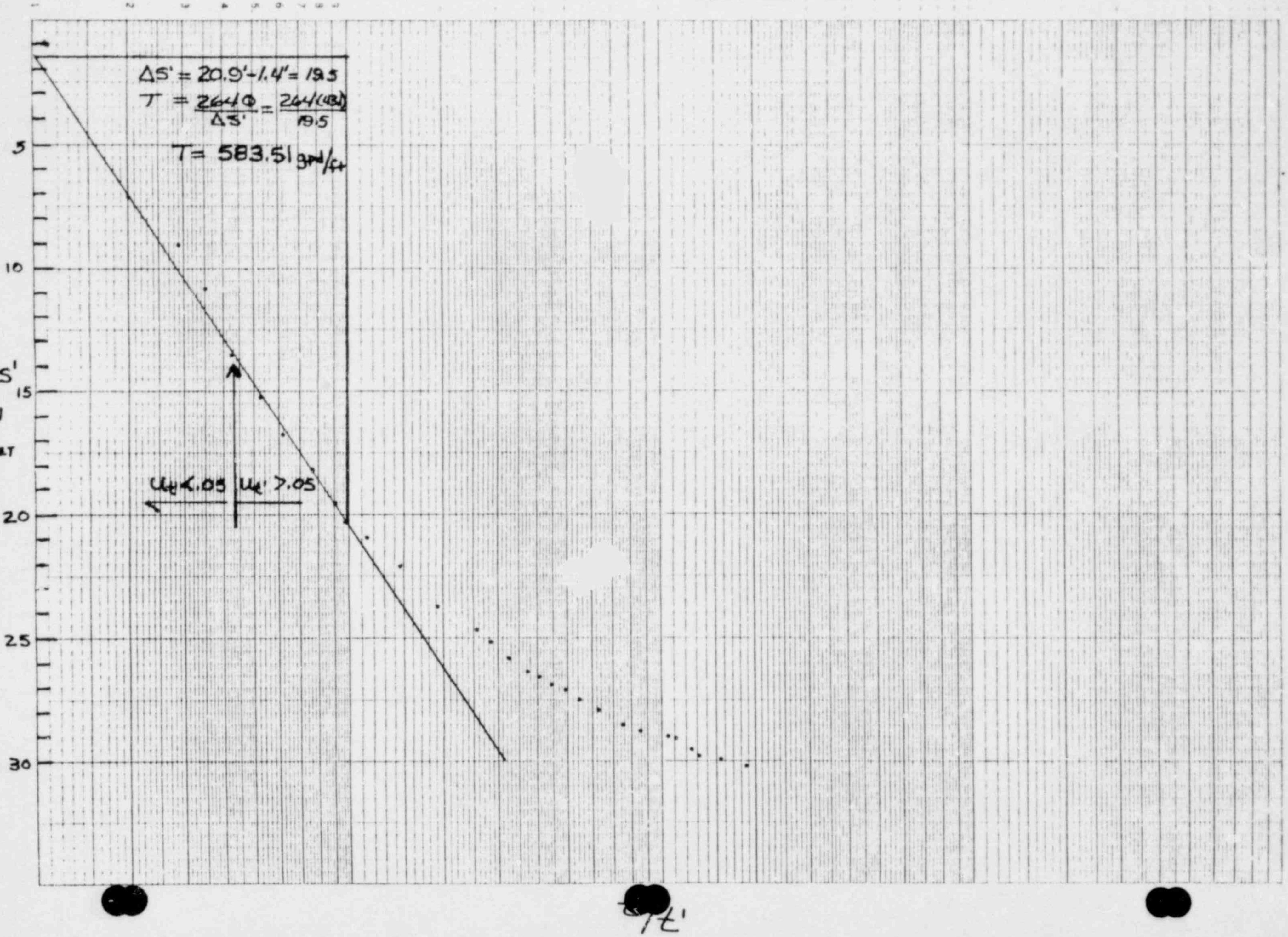
K·E LOGARITHMIC 3 x 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A. 46 7522

PN5-L319



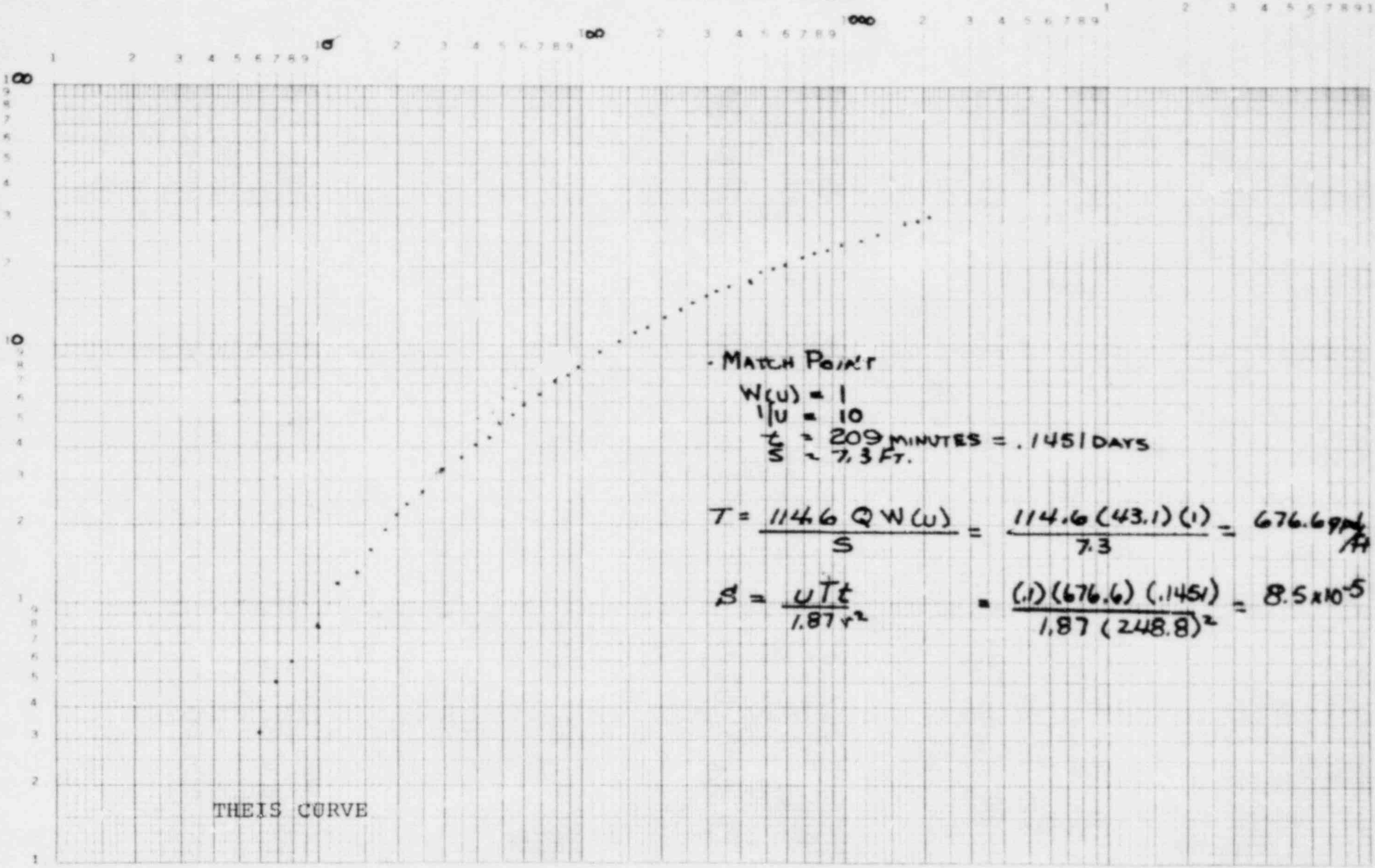

PNS-L319
Jacob Plot
t₀ = 62 MINUTES
= 0.0431 DAYS
ΔS = 23.2' - 4 = 19.2
T = 264Q / ΔS = 264(48.1) / 19.2
T = 592.6
S = .3Tt / r²
= .3(592.6)(.0431) / (297.9)²
S = 8.6x10⁻⁵
u>.05
u<.05
t₁ = 1760 MINUTES
r boundry = ½ r √(t₁/t₀)
= ½ (297.9) √(1760/62)
= 793.6
5
10
15
20
25
30
TIME IN MINUTES

PN5-L319
RECOVERY PLOT



D-6.164

PN5- L320



· MATCH POINT

$W(u) = 1$

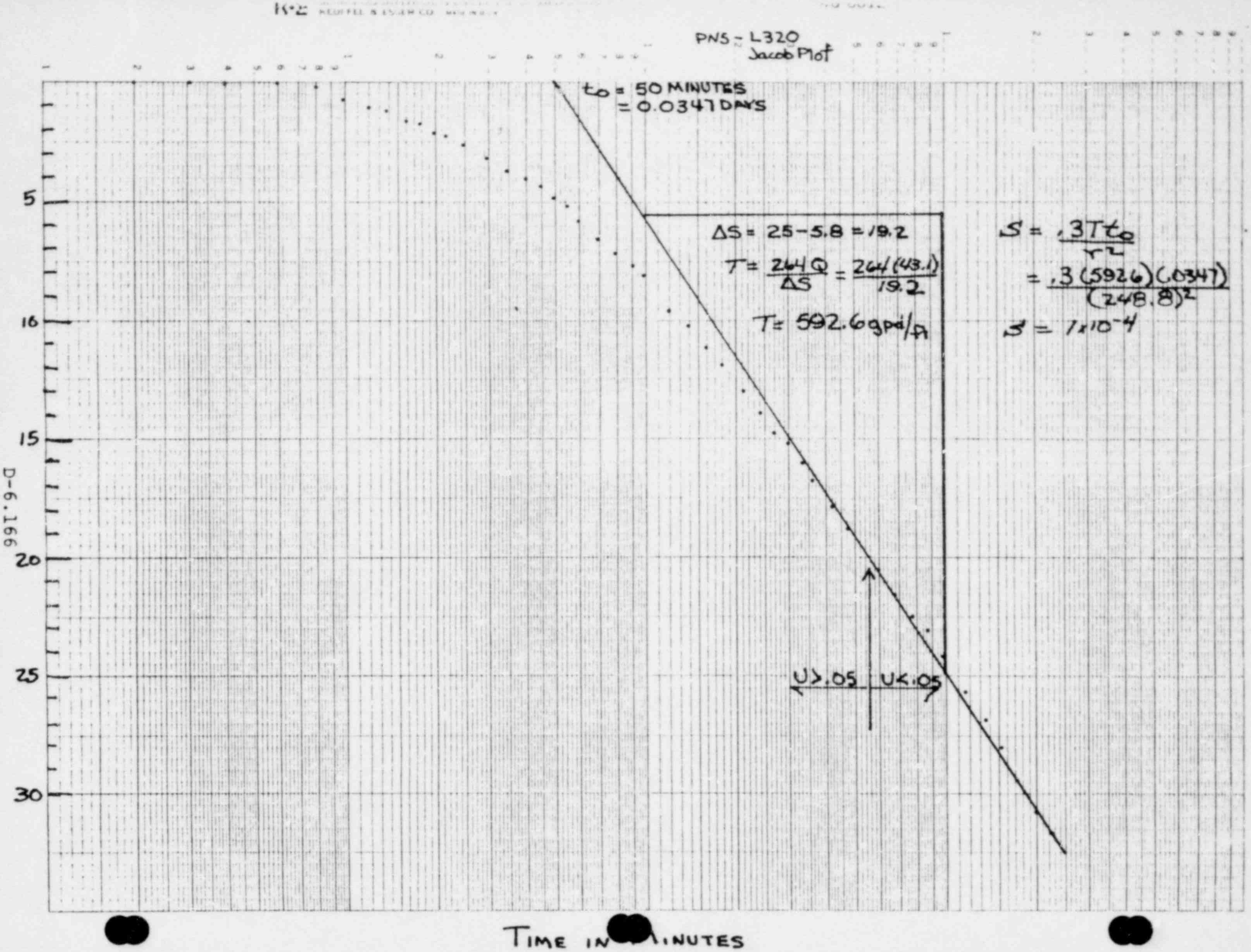
$1/u = 10$

$t = 209$ MINUTES $= .1451$ DAYS

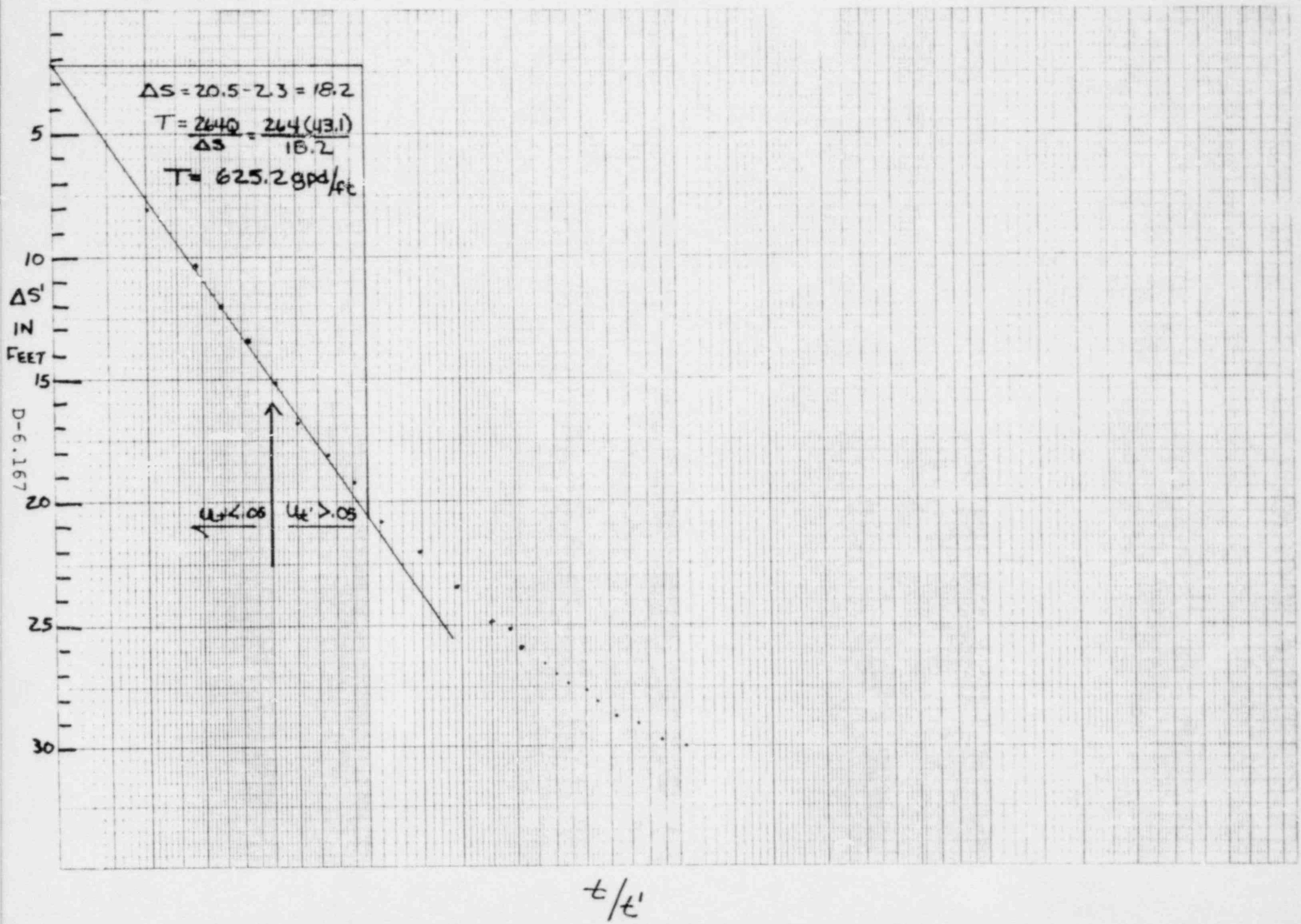
$s = 7.3$ FT.

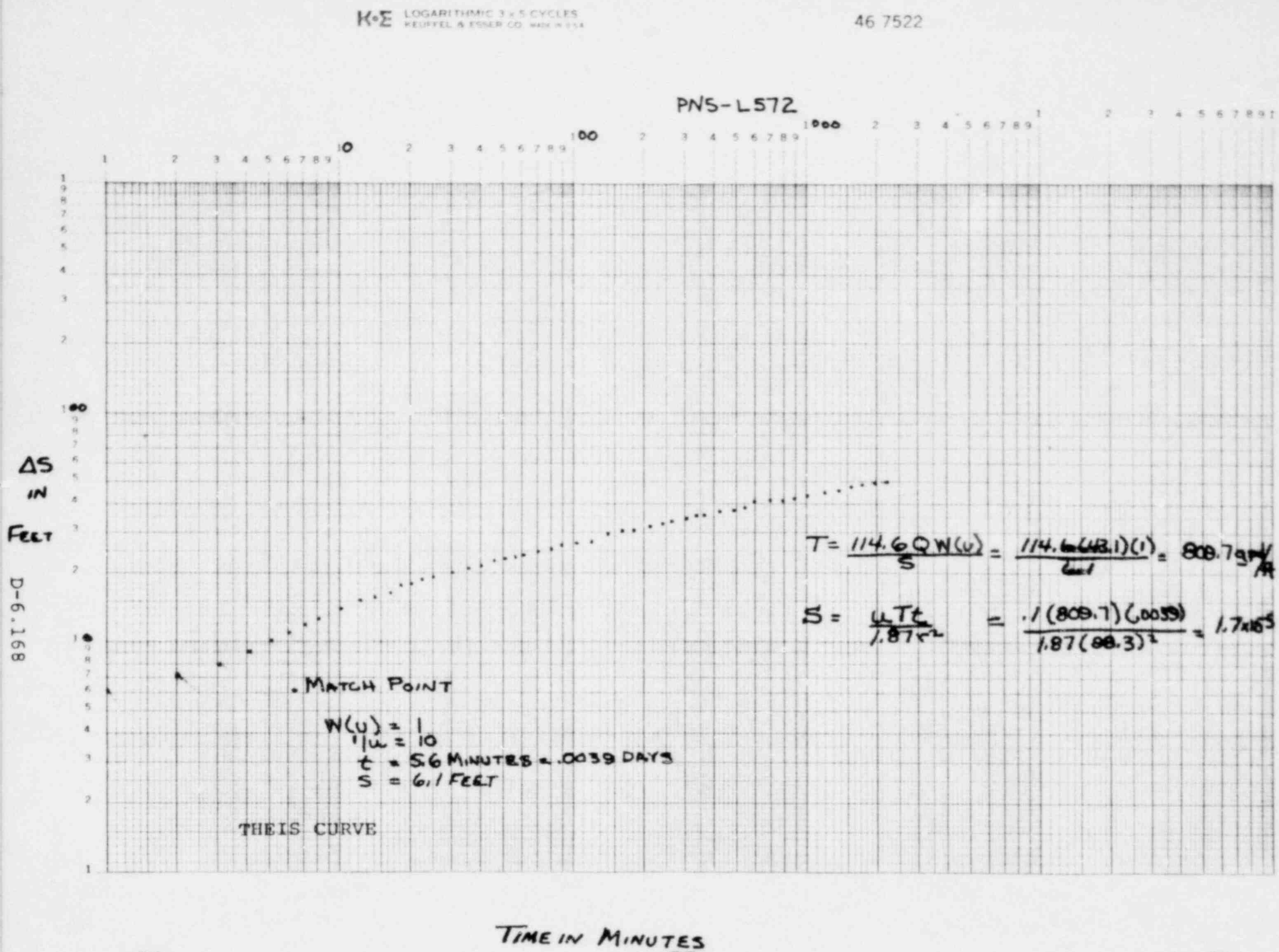
$$T = \frac{114.6\ Q\ W(u)}{s} = \frac{114.6\,(43.1)\,(1)}{7.3} = 676.6\ \text{gpd/ft}$$

$$S = \frac{uTt}{1.87\,r^2} = \frac{(.1)\,(676.6)\,(.1451)}{1.87\,(248.8)^2} = 8.5 \times 10^{-5}$$


K•E KEUFFEL & ESSER CO.
PNS - L320
Jacob Plot
t_0 = 50 MINUTES
= 0.0347 DAYS
ΔS = 25 - 5.8 = 19.2
T = 264Q/ΔS = 264(43.1)/19.2
T = 592.6 gpd/ft
S = .3Tt₀/r²
= .3(5926)(.0347)/(248.8)²
S = 1×10⁻⁴
U>.05
U<.05
5
10
15
20
25
30
TIME IN MINUTES

PNS-L320
RECOVERY PLOT



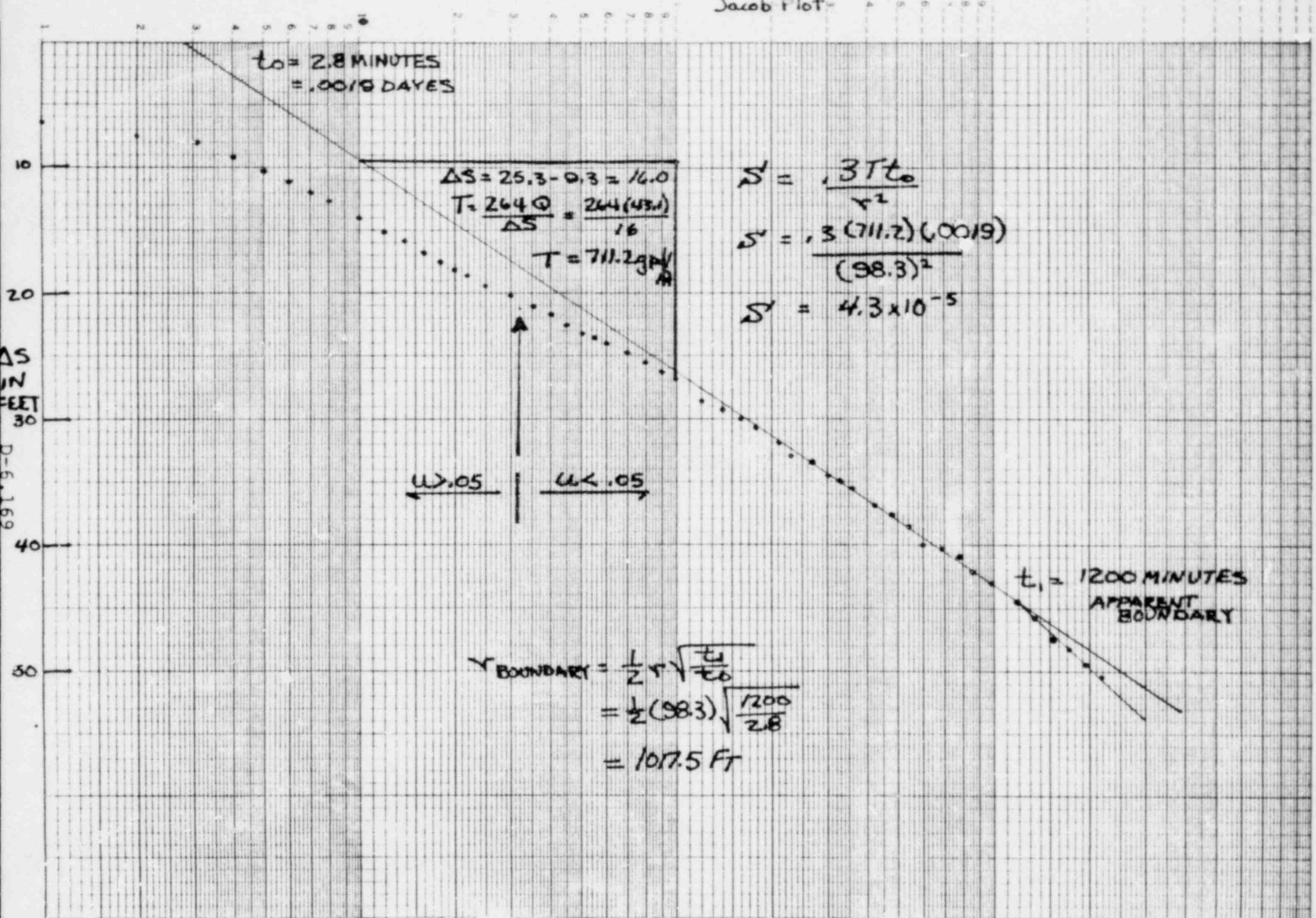


K•E LOGARITHMIC 3 x 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.
46 7522
PNS-L572
ΔS IN FEET
TIME IN MINUTES
. MATCH POINT
W(u) = 1
1/u = 10
t = 5.6 MINUTES = .0039 DAYS
S = 6.1 FEET
THEIS CURVE
T = 114.6QW(u)/S = 114.6(48.1)(1)/6.1 = 808.7 gpd/ft
S = uTt/1.87r² = .1(808.7)(.0039)/1.87(88.3)² = 1.7x10⁻⁵

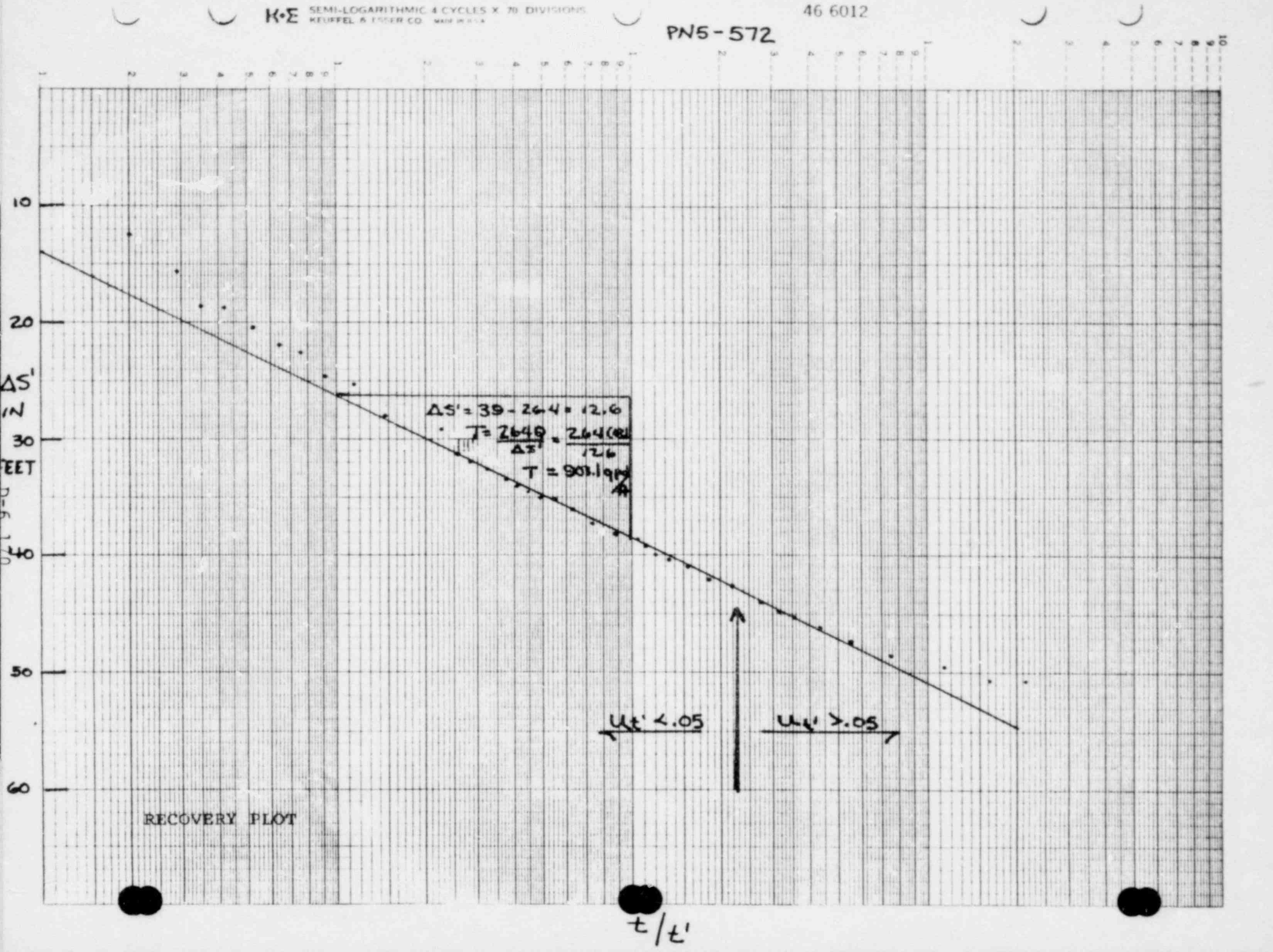
D-6.168

K+E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A. 46 6012

PNS-572.
Jacob Plot

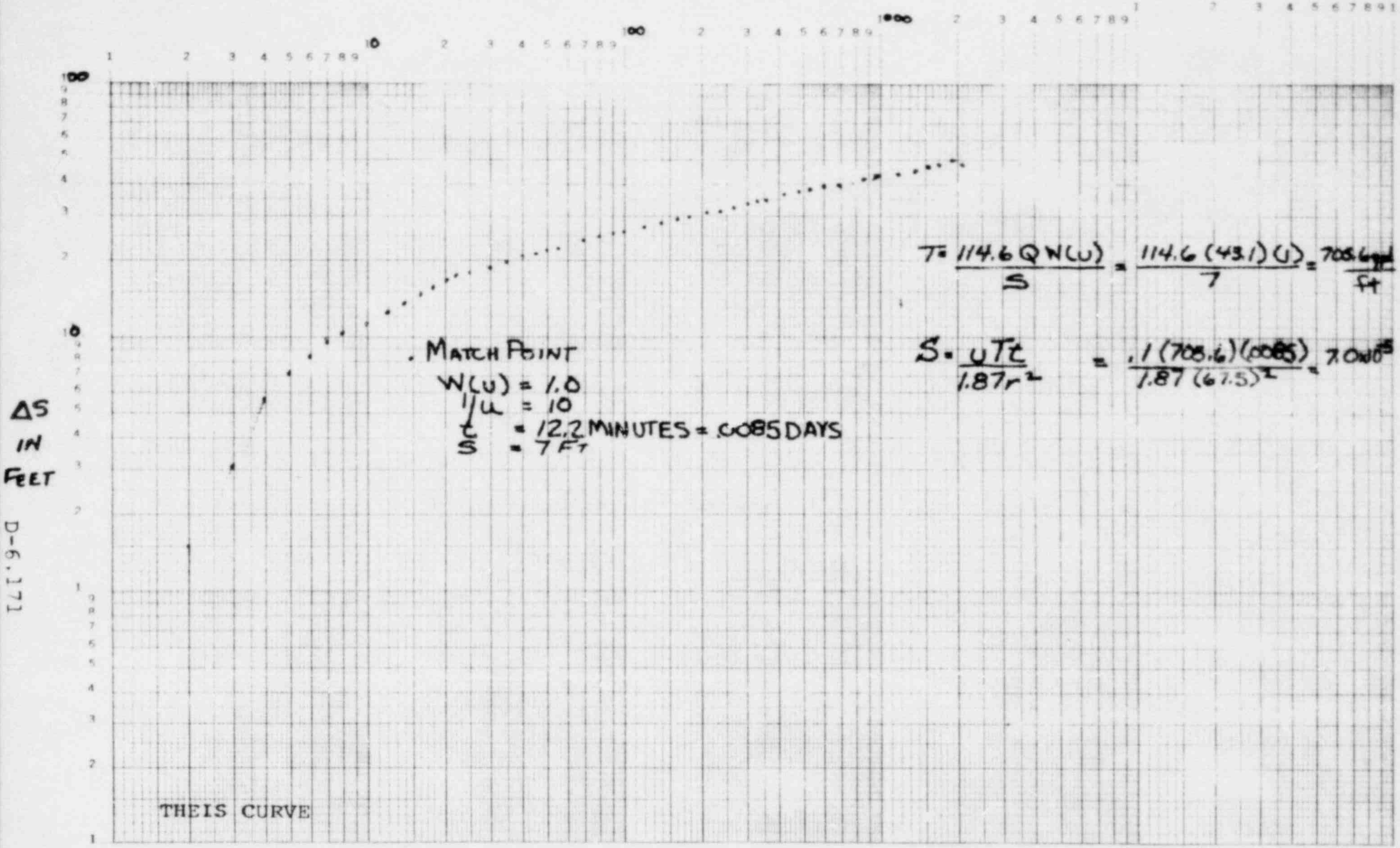


D-6.169


K•E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.
46 6012
PN5-572
ΔS' IN FEET
10
20
30
40
50
60
Δs' = 39 - 26.4 = 12.6
T = 264Q/Δs' = 264(43)/12.6
T = 903.1 gpd/ft
ut' < .05
ut' > .05
RECOVERY PLOT
t/t'

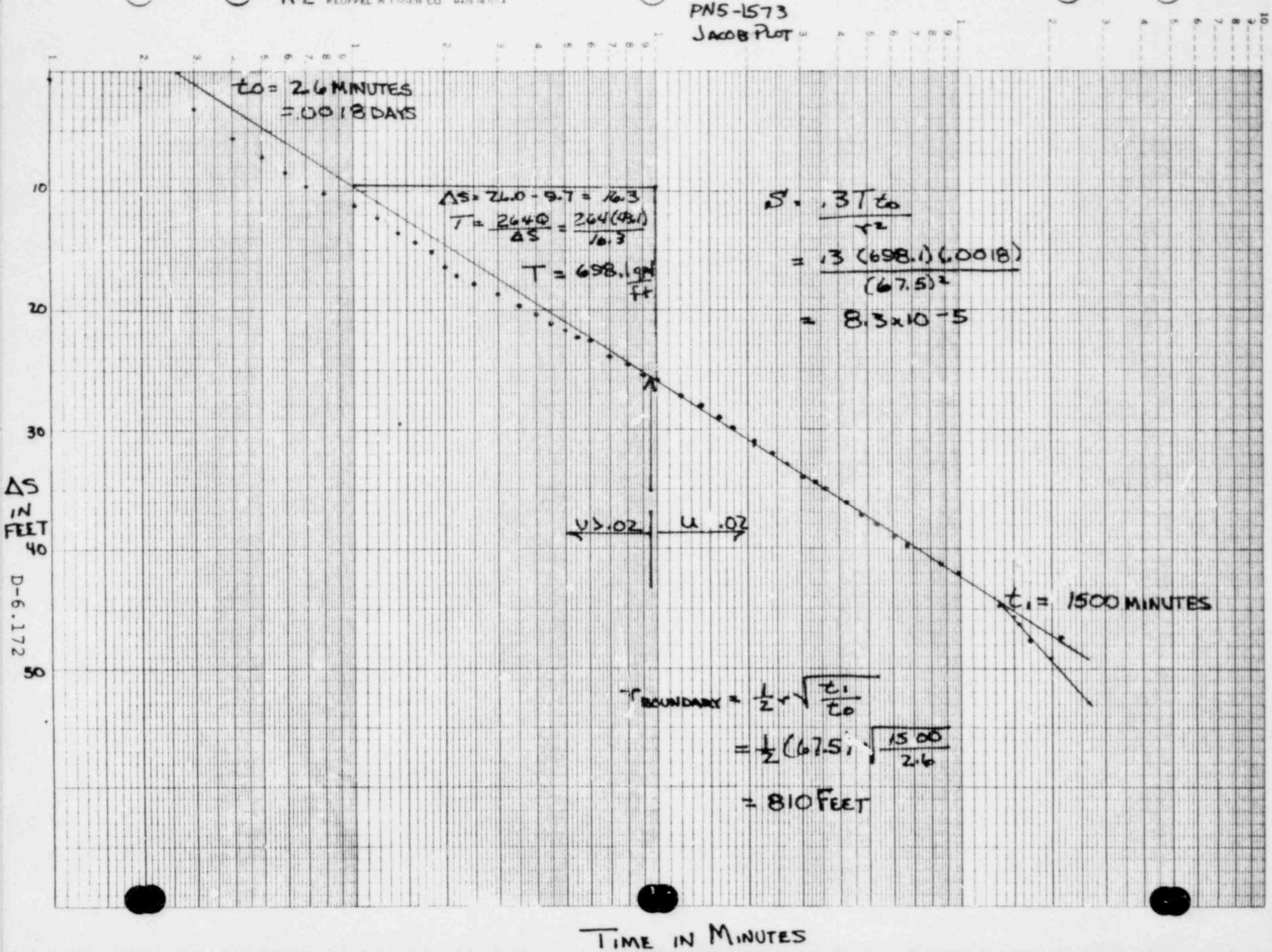
K+E 46 7522

PNS- L 573

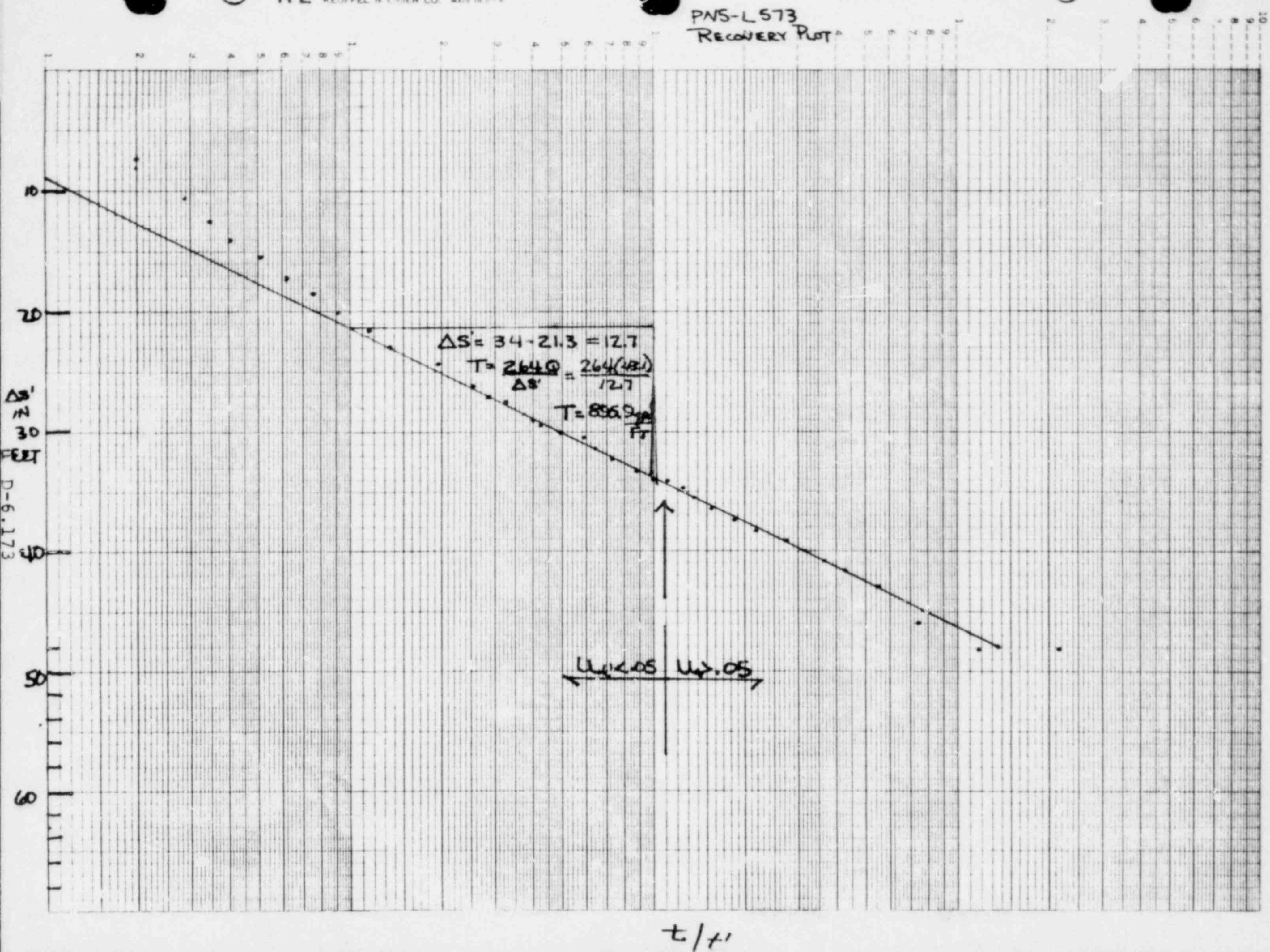


TIME IN MINUTES

K•E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS KEUFFEL & ESSER CO. 46 6012

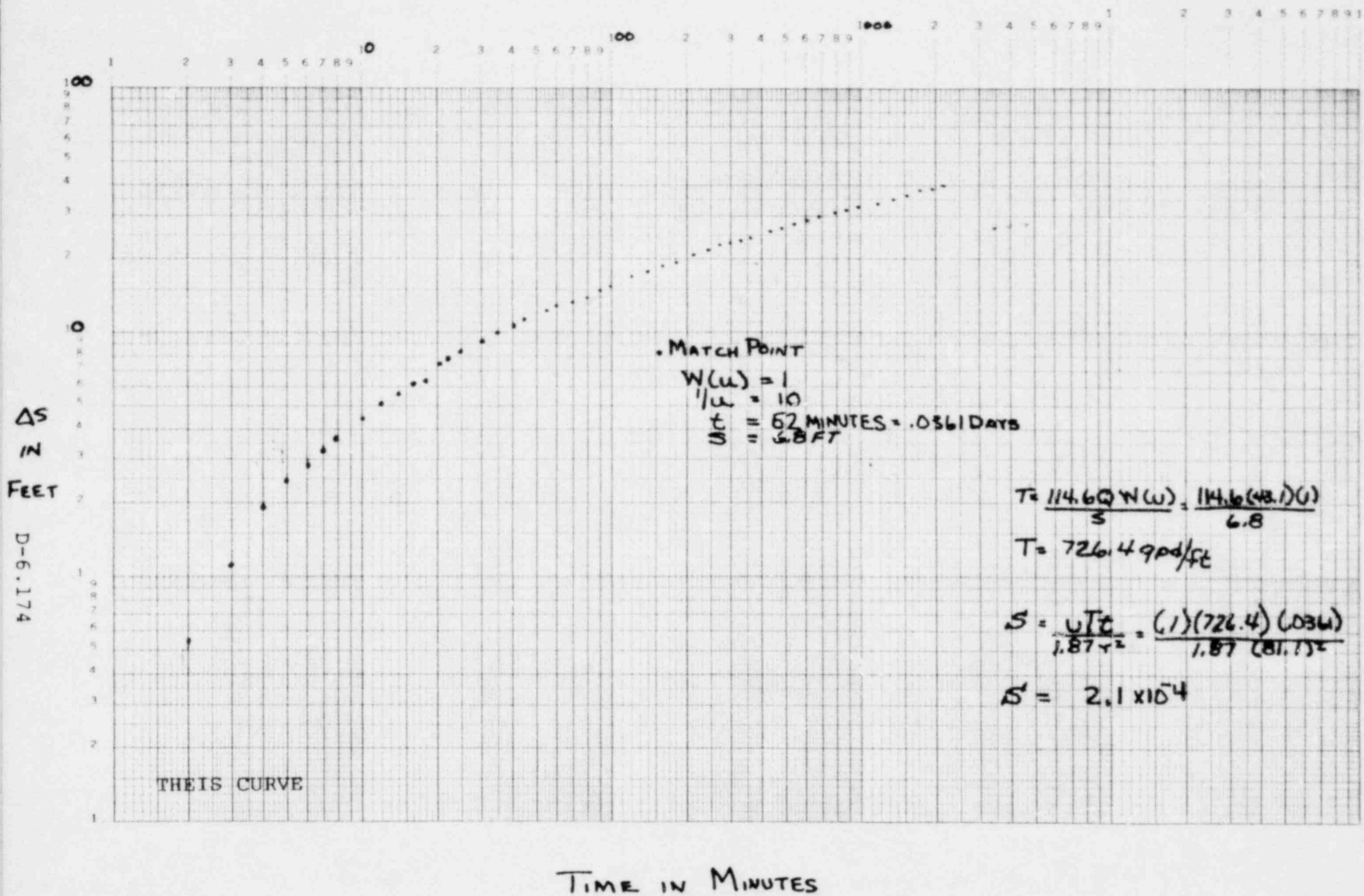


D-6.172

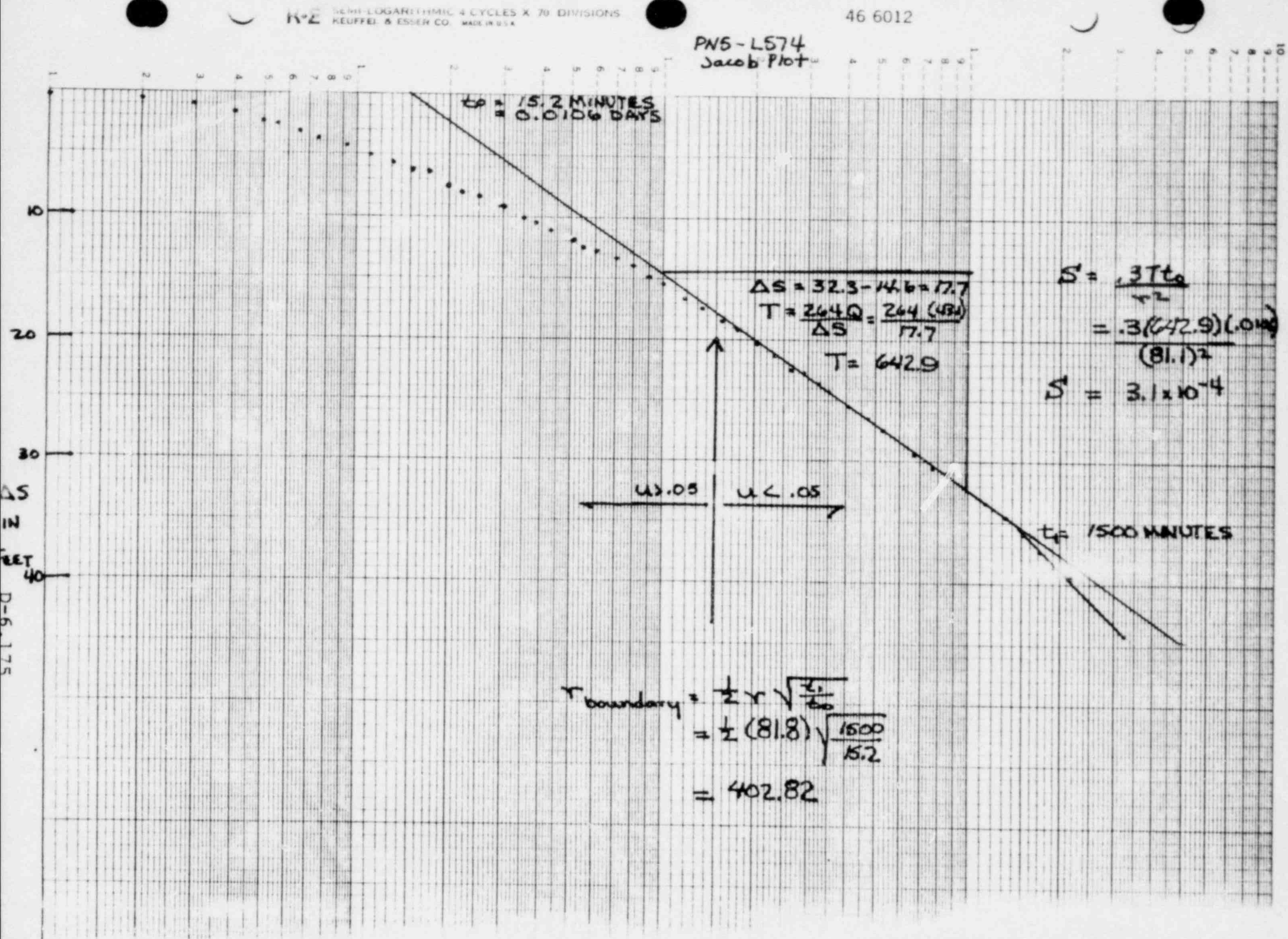

PNS-L573
RECOVERY PLOT
ΔS' = 34 - 21.3 = 12.7
T = 264Q/ΔS' = 264(43.1)/12.7
T = 896.9 gpd/ft
u < .05
u > .05
ΔS' IN FEET
10
20
30
40
50
60
t/t'

46 7522

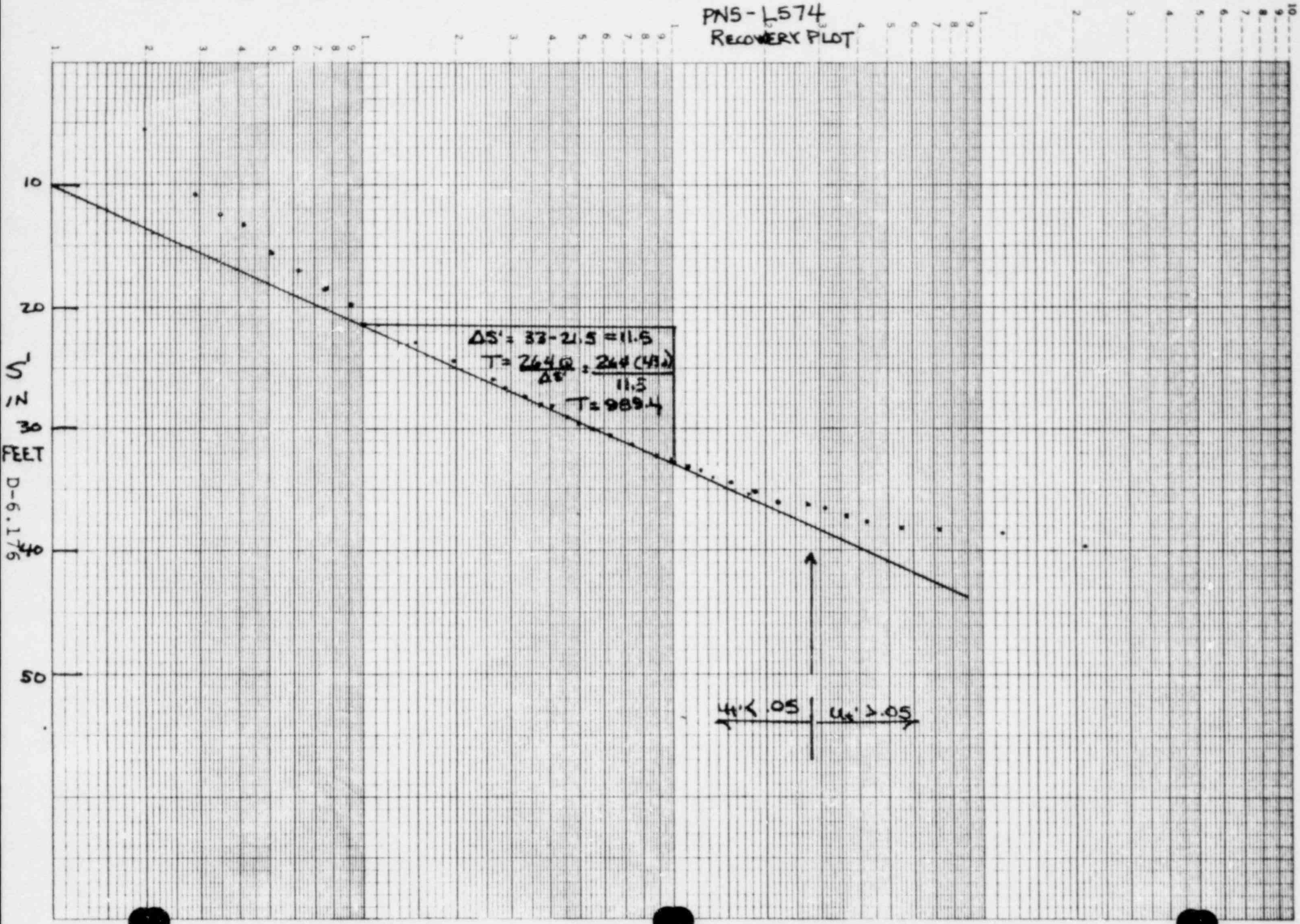
PN5-L574

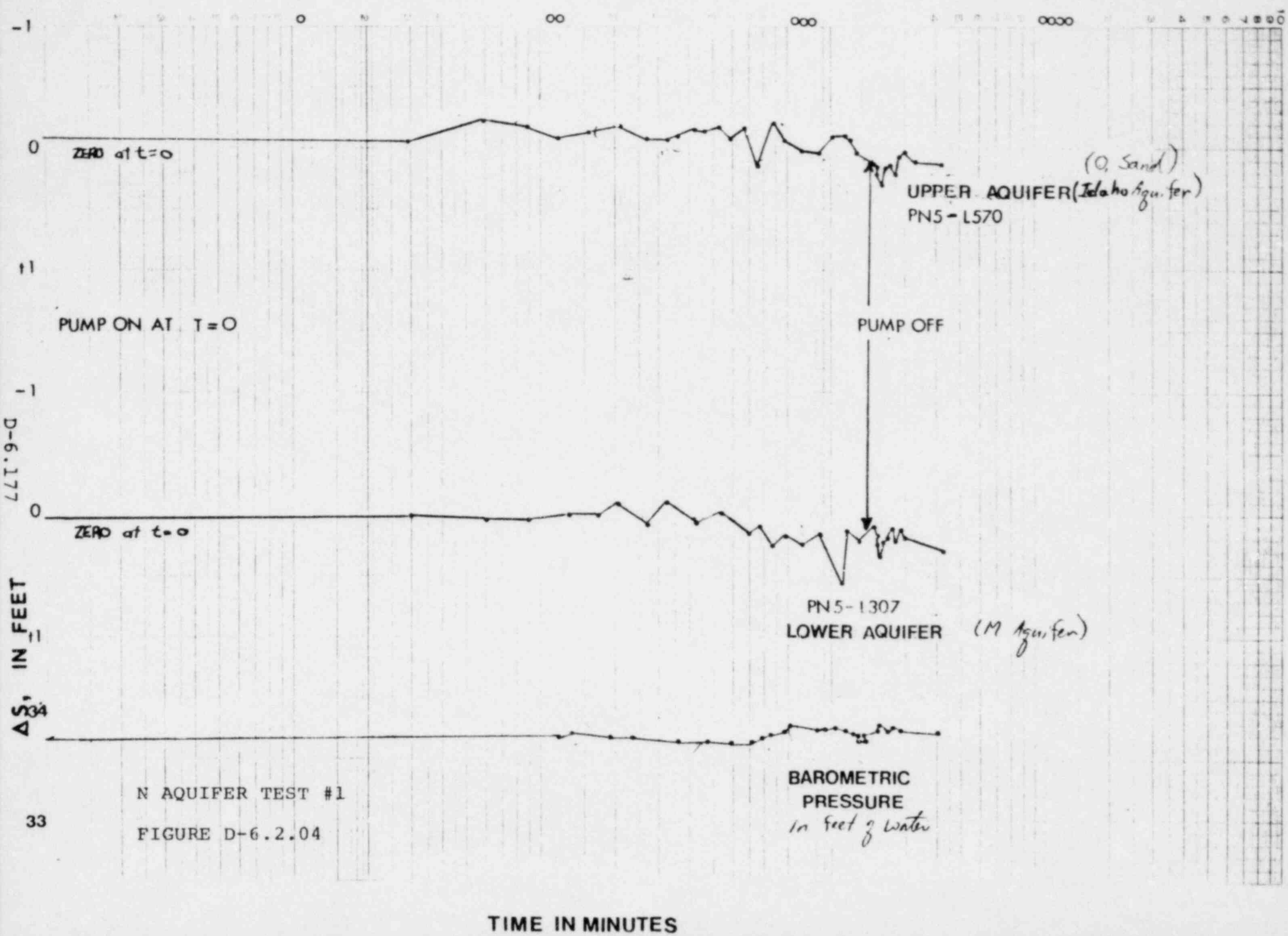


D-6.174


K-E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6012
PNS - L574
Jacob Plot
to = 15.2 MINUTES
= 0.0106 DAYS
ΔS = 32.3 - 14.6 = 17.7
T = 264Q / ΔS = 264 (434) / 17.7
T = 642.9
S = .3Tto / r²
= .3(642.9)(.0106) / (81.1)²
S = 3.1 x 10⁻⁴
u > .05
u < .05
tf 1500 MINUTES
r boundary = ½ r √(t₁/to)
= ½ (81.8) √(1500/15.2)
= 402.82
10
20
30
40
ΔS IN FEET

PNS-L574
RECOVERY PLOT





N AQUIFER TEST #1

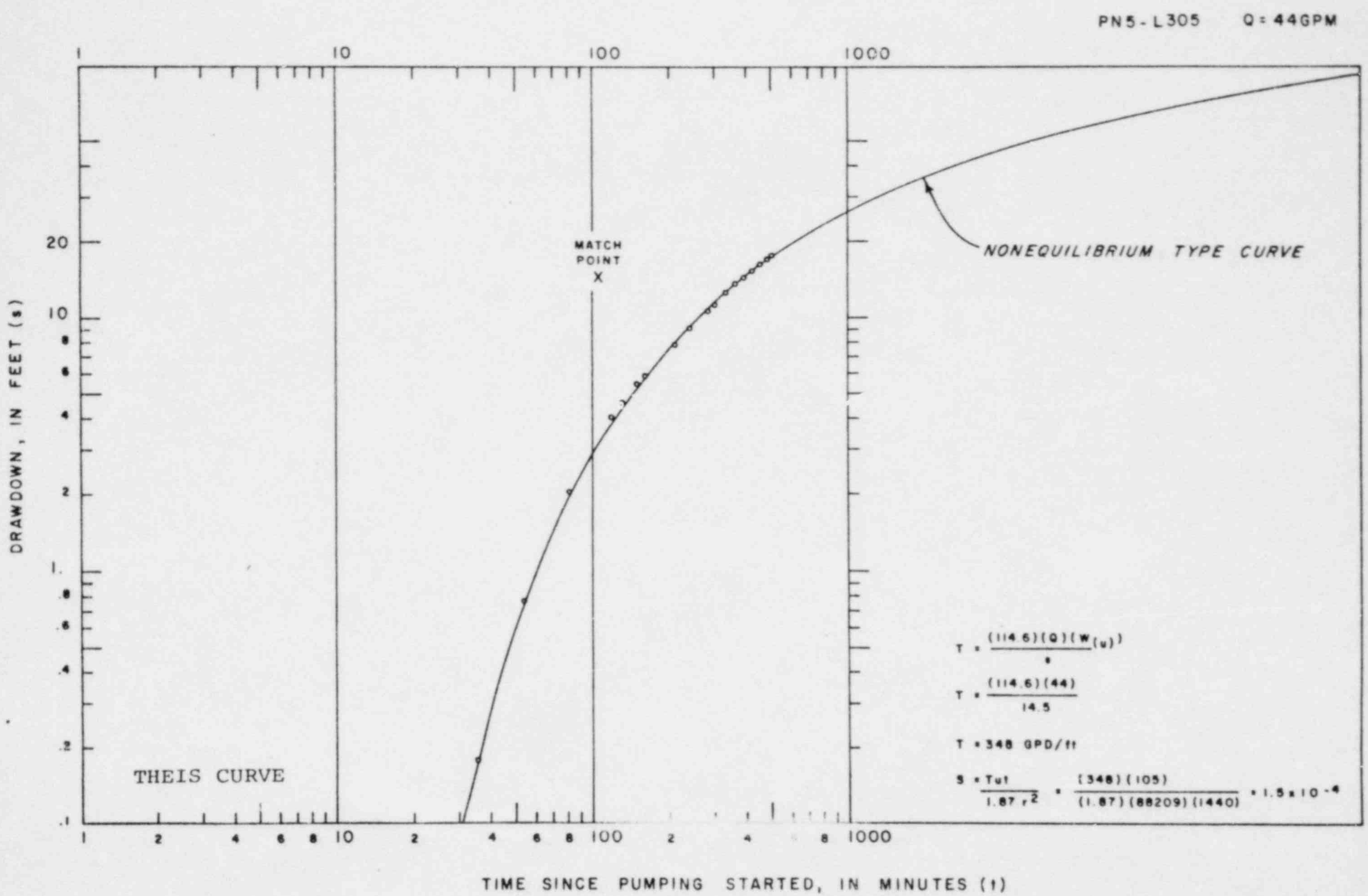
FIGURE D-6.2.04

FIGURE D-6.2.05

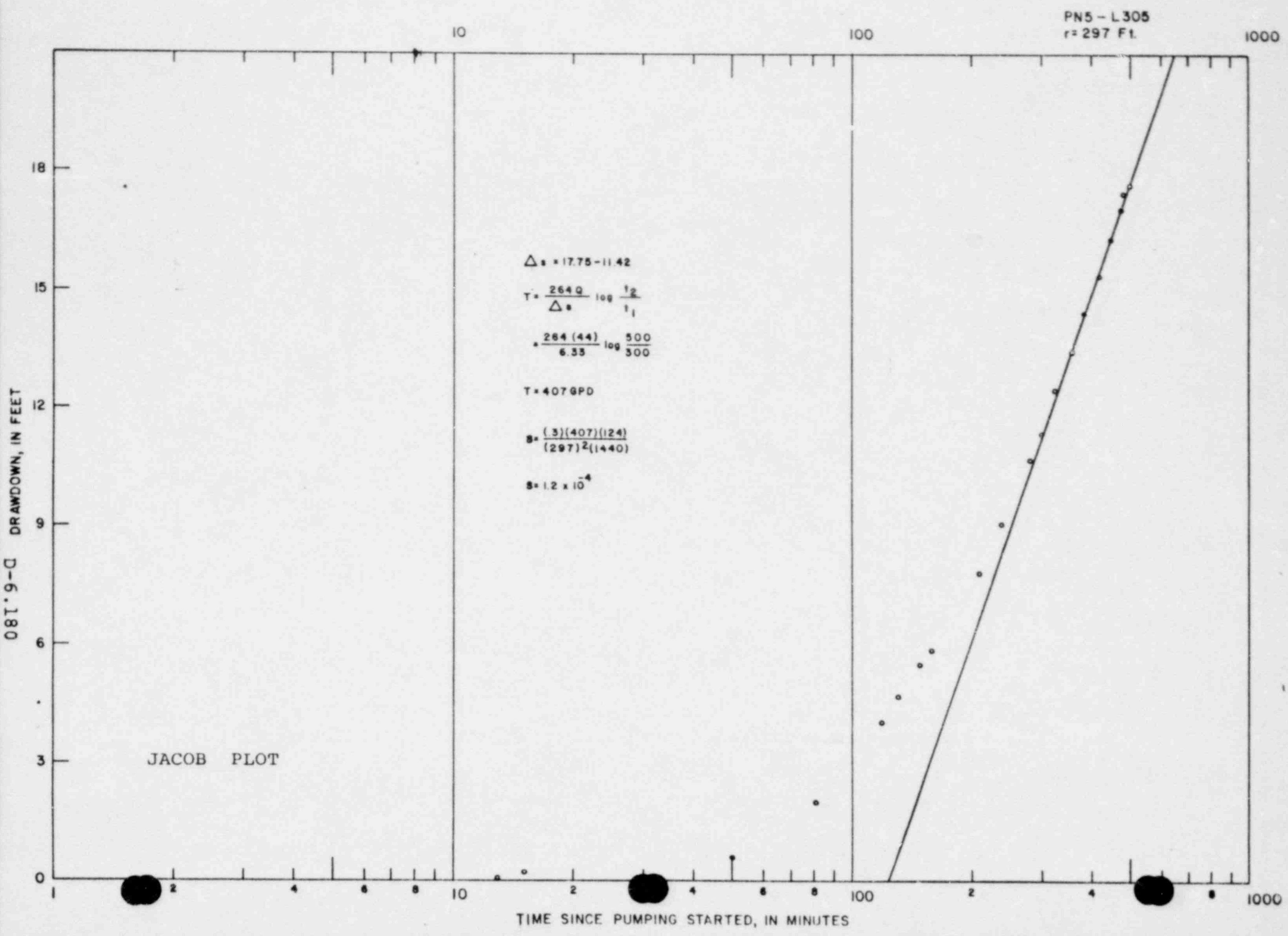
M AQUIFER TEST #1

THEIS CURVE, JACOB PLOT AND RECOVERY PLOT

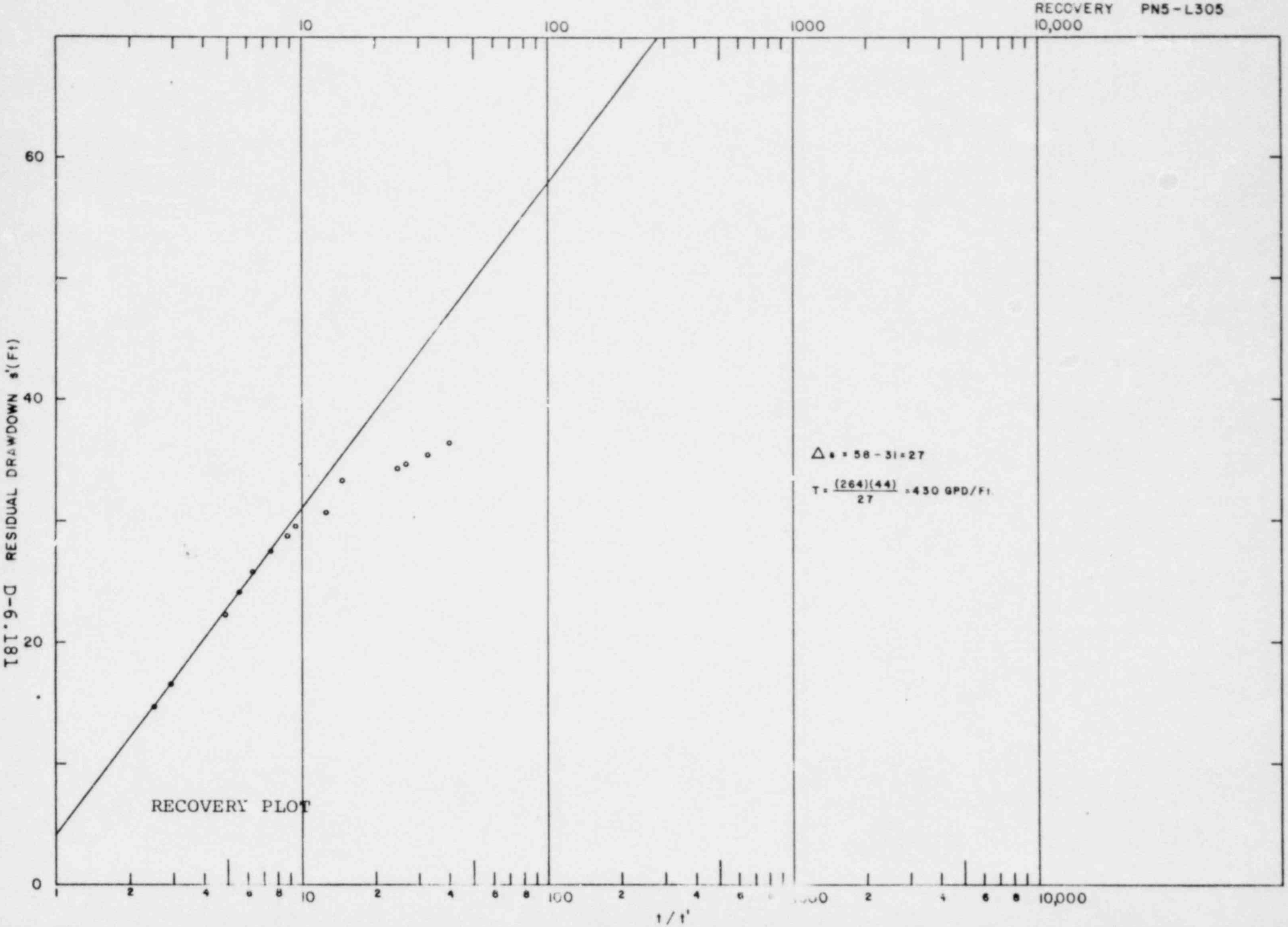
FOR WELLS PN5-L305, 306, 307 and 308



PN5-L305 Q=44GPM
NONEQUILIBRIUM TYPE CURVE
MATCH POINT X
THEIS CURVE
DRAWDOWN, IN FEET (s)
TIME SINCE PUMPING STARTED, IN MINUTES (t)
1 10 100 1000
20 10 8 6 4 2 1. .8 .6 .4 .2 .1
1 2 4 6 8 10 2 4 6 8 100 2 4 8 1000
T = (114.6)(Q)(W(u)) / s
T = (114.6)(44) / 14.5
T = 348 GPD/ft
S = Tut / 1.87 r² = (348)(105) / (1.87)(88209)(1440) = 1.5 x 10⁻⁴

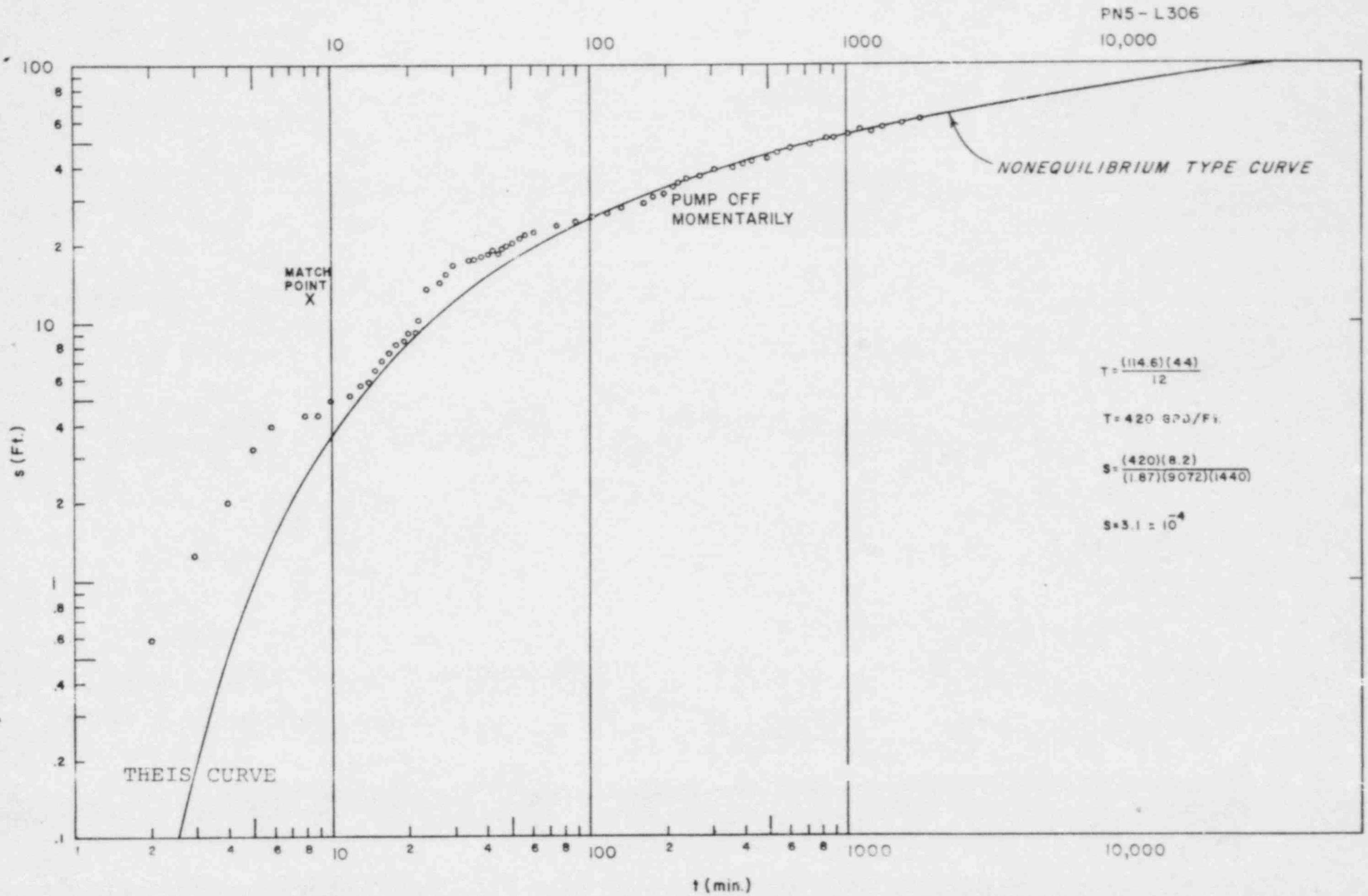

PN5 - L305
r = 297 Ft.
Δs = 17.75 - 11.42
T = 264Q/Δs log t2/t1
= 264 (44)/6.33 log 500/300
T = 407 GPD
S = (.3)(407)(124)/(297)^2(1440)
S = 1.2 x 10^-4
JACOB PLOT
DRAWDOWN, IN FEET
TIME SINCE PUMPING STARTED, IN MINUTES

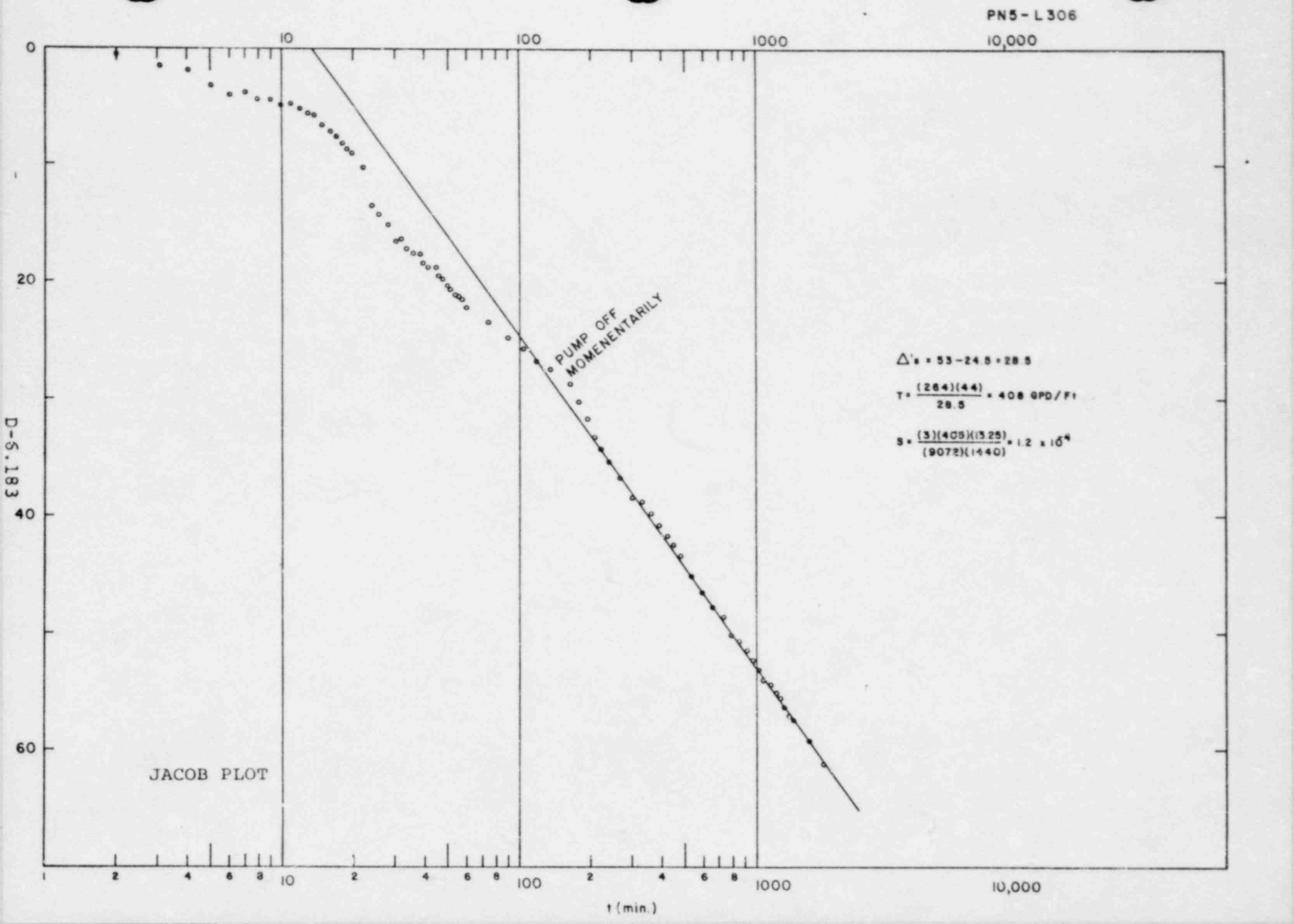
D-6.180

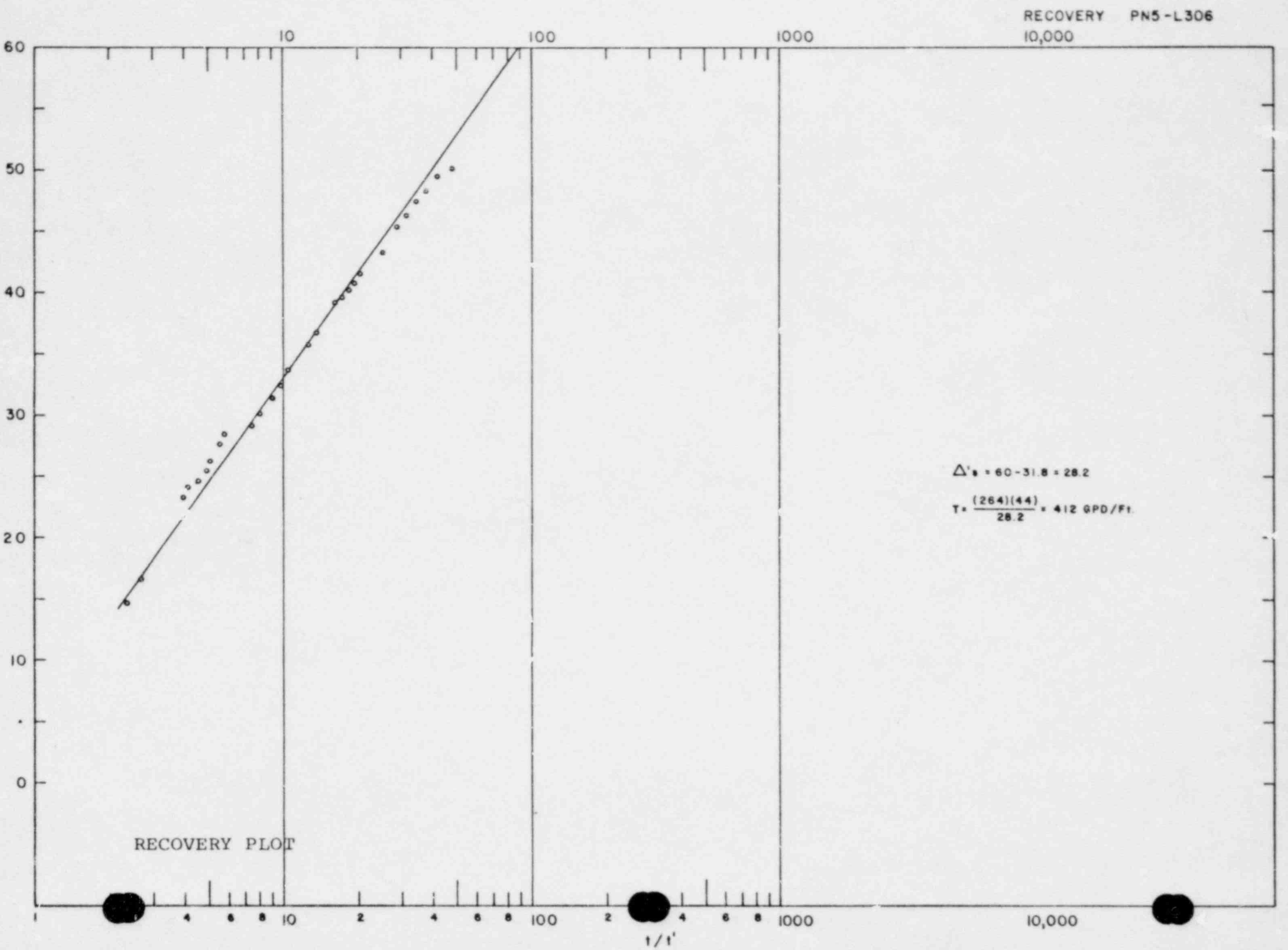


RECOVERY PN5-L305
RECOVERY PLOT
Δs = 58 - 31 = 27
T = (264)(44) / 27 = 430 GPD/Ft
RESIDUAL DRAWDOWN s'(Ft)
t / t'

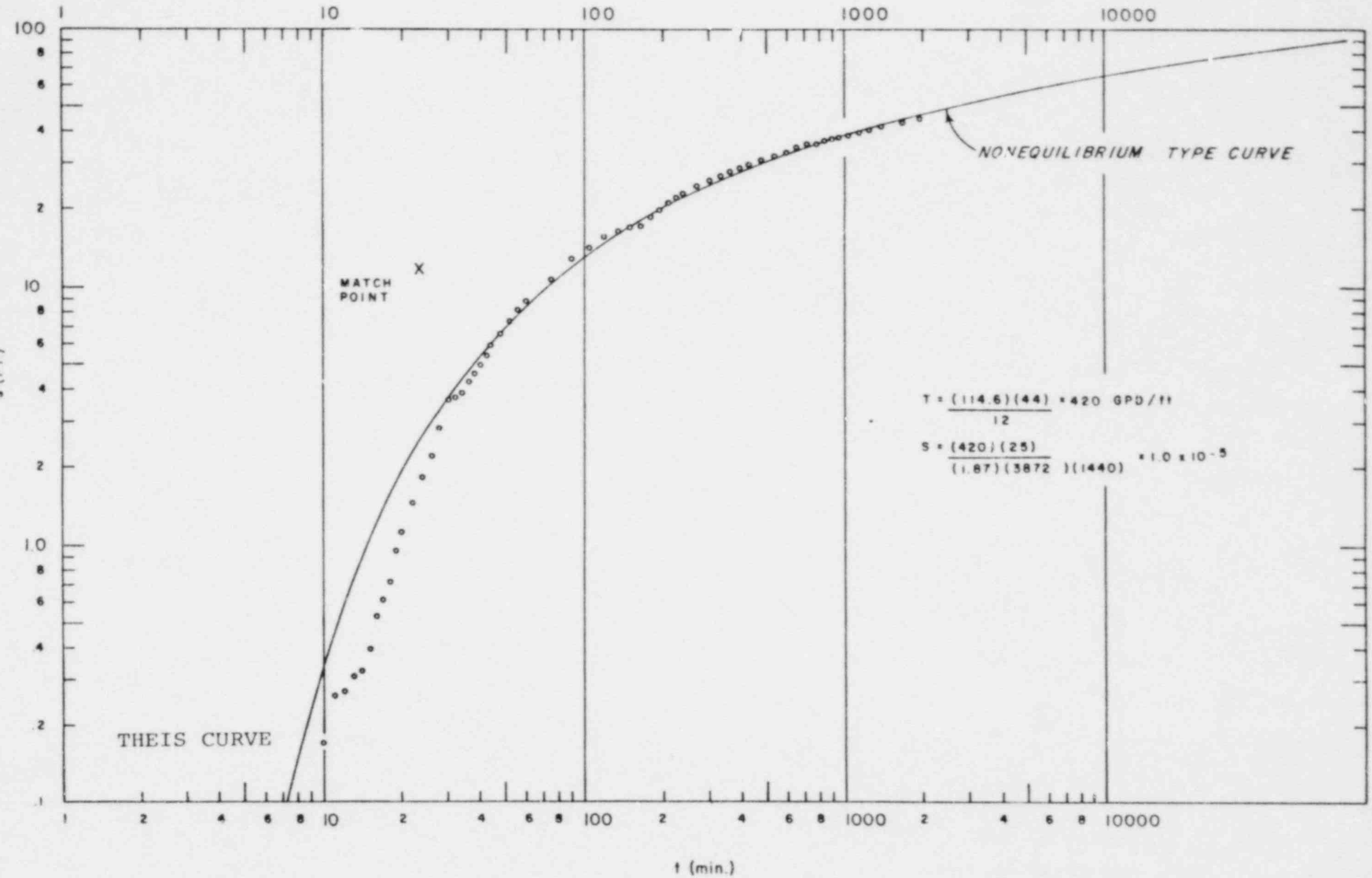
D-6.181


PN5 - L306
NONEQUILIBRIUM TYPE CURVE
PUMP CFF MOMENTARILY
MATCH POINT X
THEIS CURVE
T = (114.6)(44) / 12
T = 420 GPD/Ft.
S = (420)(8.2) / (1.87)(9072)(1440)
S = 3.1 x 10^-4
s (Ft.)
t (min.)

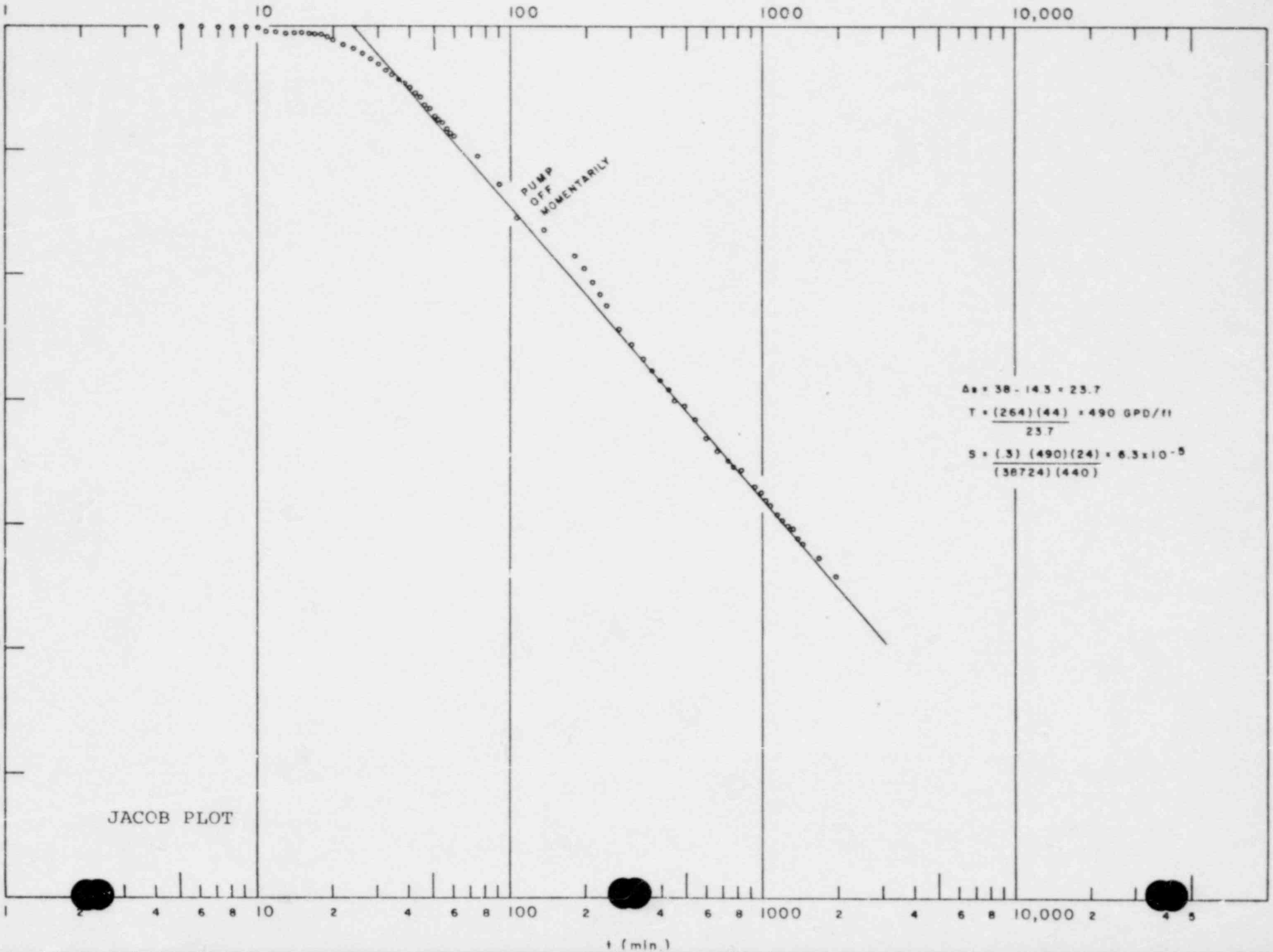

PN5-L306
JACOB PLOT
PUMP OFF MOMENENTARILY
Δ's = 53-24.5 = 28.5
T = (264)(44) / 28.5 = 408 GPD/Ft
S = (3)(405)(1325) / (9072)(1440) = 1.2 x 10^-4
t (min.)


RECOVERY PN5-L306
RECOVERY PLOT
$\Delta's = 60 - 31.8 = 28.2$
$T = \frac{(264)(44)}{28.2} = 412$ GPD/Ft.
s' (Ft)
t/t'
10
100
1000
10,000

PN5-L307

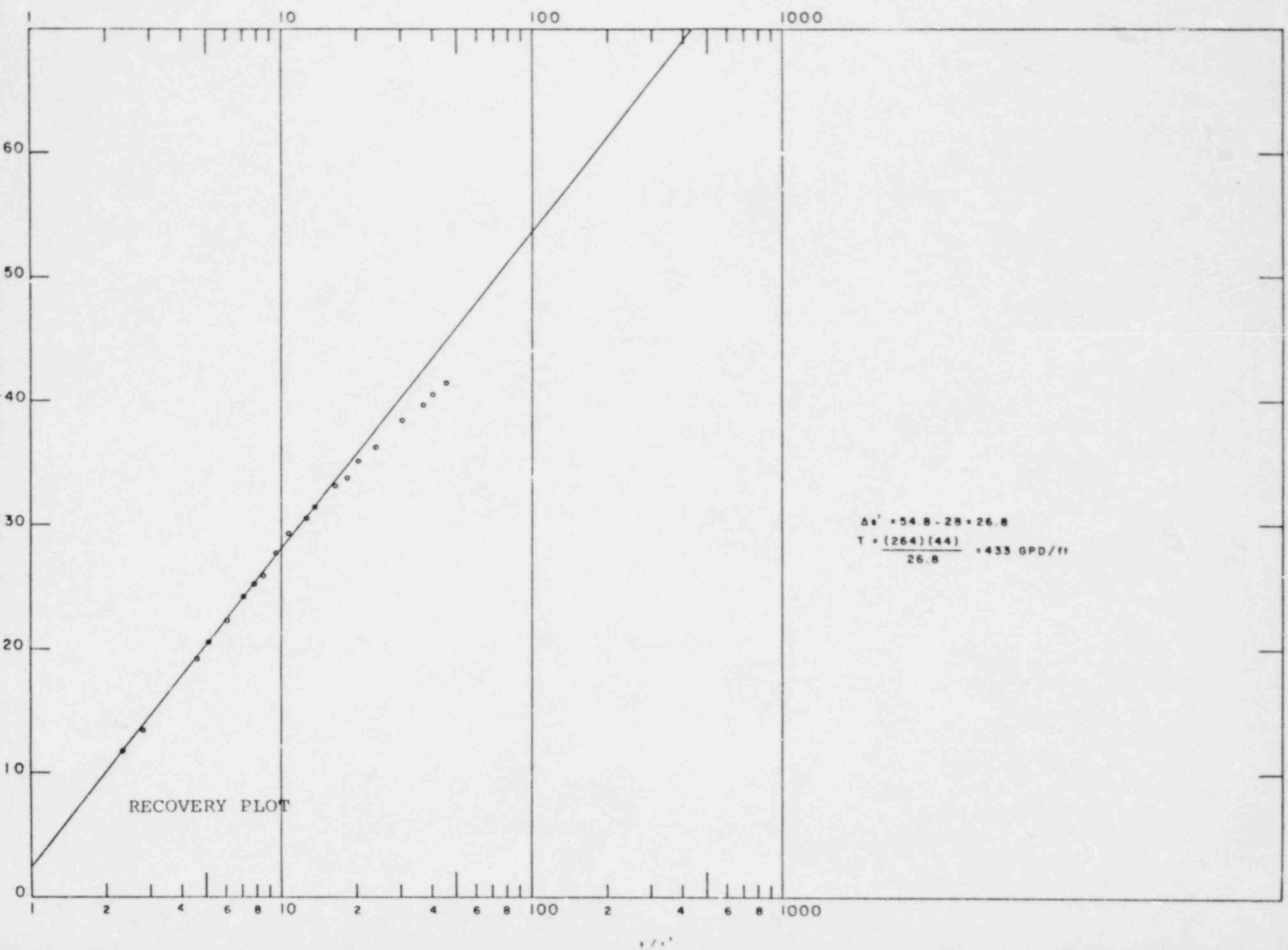

NONEQUILIBRIUM TYPE CURVE
MATCH POINT
X
T = (114.6)(44) / 12 = 420 GPD/ft
S = (420)(25) / (1.87)(3872)(1440) = 1.0 x 10^-5
THEIS CURVE
s (Ft)
t (min.)
100
10
1.0
.1
1
10
100
1000
10000

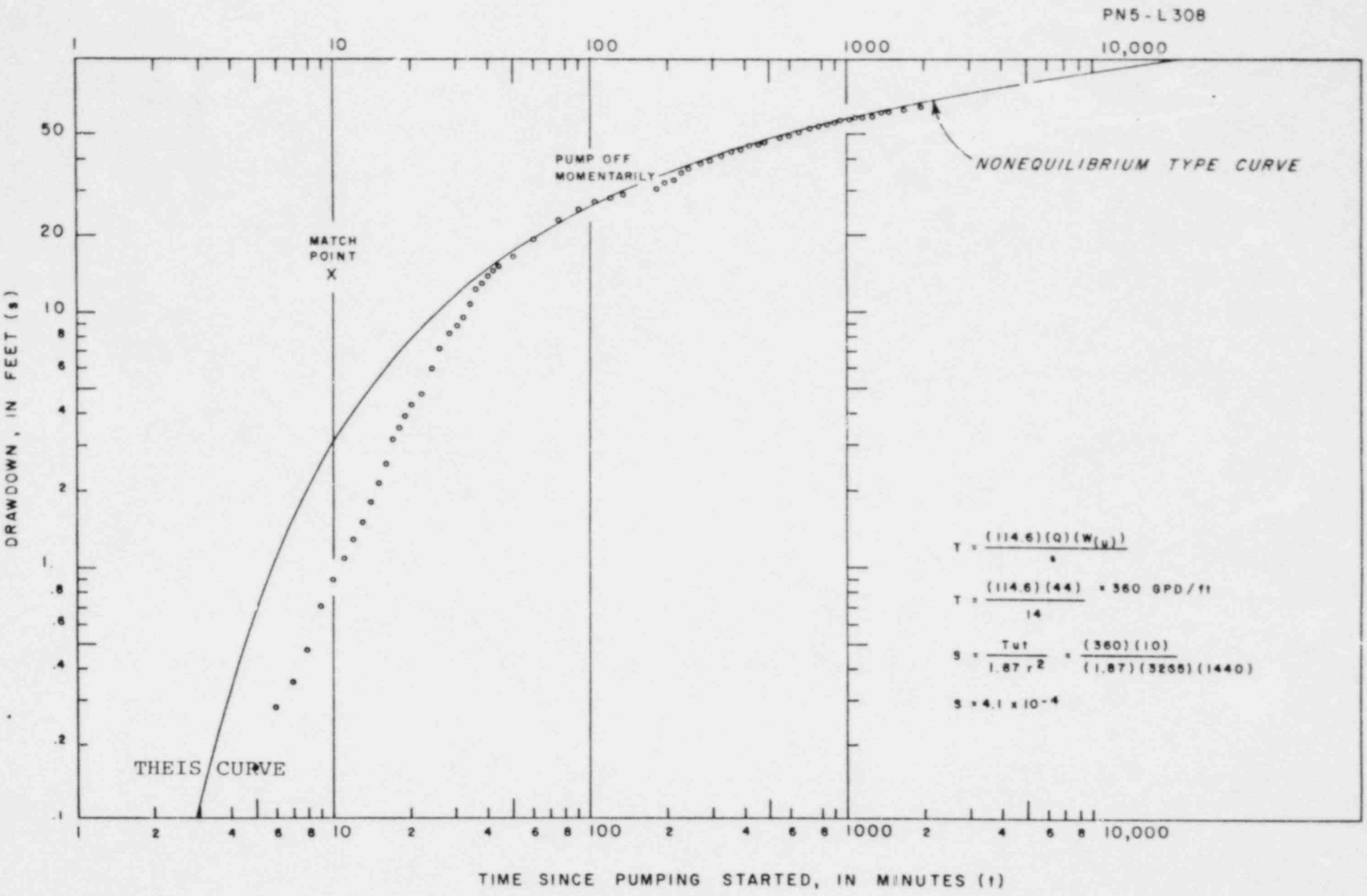
PN5-L307

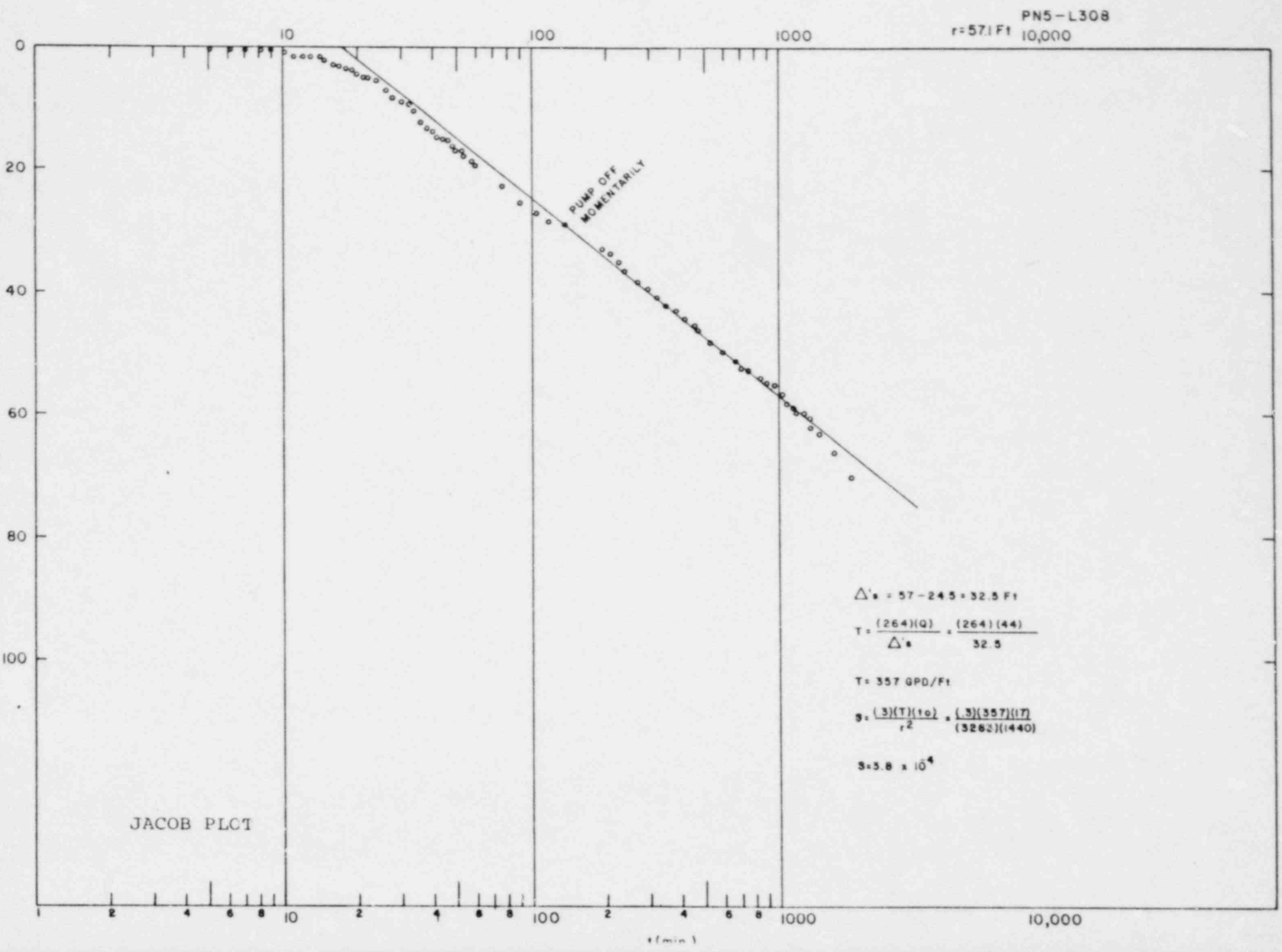


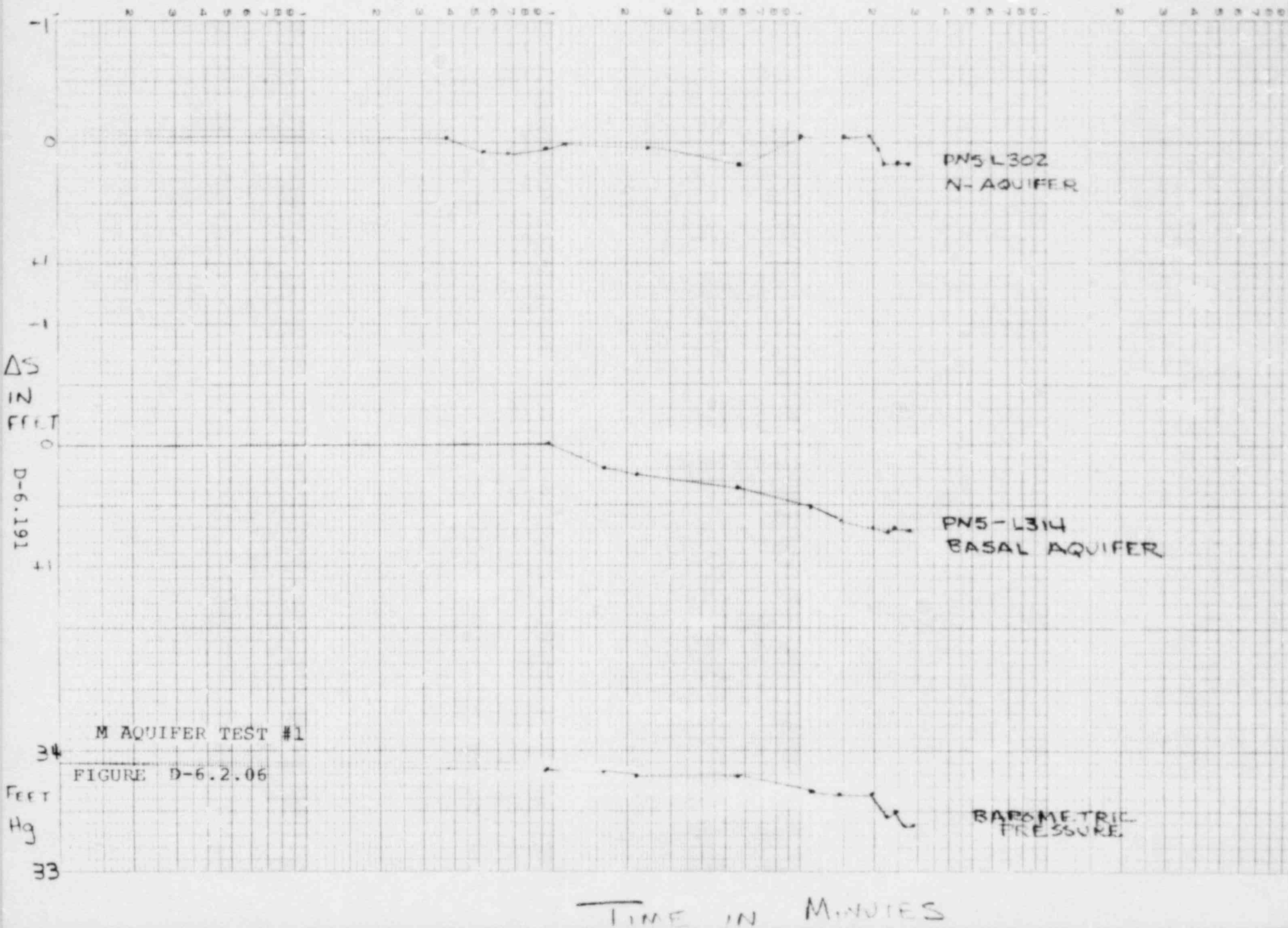
1
10
100
1000
10,000
PUMP OFF MOMENTARILY
Δs = 38 - 14.3 = 23.7
T = (264)(44) / 23.7 = 490 GPD/ft
S = (.3)(490)(24) / (38724)(440) = 6.3x10^-5
10
20
30
40
50
60
S' (FT.)
JACOB PLOT
1 2 4 6 8 10 2 4 6 8 100 2 4 6 8 1000 2 4 6 8 10,000 2 4 5
t (min.)

RECOVERY PN5-L307




PN5 - L 308
NONEQUILIBRIUM TYPE CURVE
PUMP OFF MOMENTARILY
MATCH POINT X
THEIS CURVE
T = (114.6)(Q)(W(u)) / s
T = (114.6)(44) / 14 = 360 GPD/ft
S = Tut / 1.87 r2 = (360)(10) / (1.87)(3255)(1440)
S = 4.1 x 10-4
DRAWDOWN, IN FEET (s)
TIME SINCE PUMPING STARTED, IN MINUTES (t)


PN5-L308
r=57.1 Ft
JACOB PLCT
PUMP OFF MOMENTARILY
Δ's = 57-24.5 = 32.5 Ft
T = (264)(Q)/Δ's = (264)(44)/32.5
T = 357 GPD/Ft
S = (.3)(T)(to)/r² = (.3)(357)(17)/(3262)(1440)
S = 3.8 x 10⁻⁴
s (Ft)
t (min)
0
20
40
60
80
100
10
100
1000
10,000



M AQUIFER TEST #1

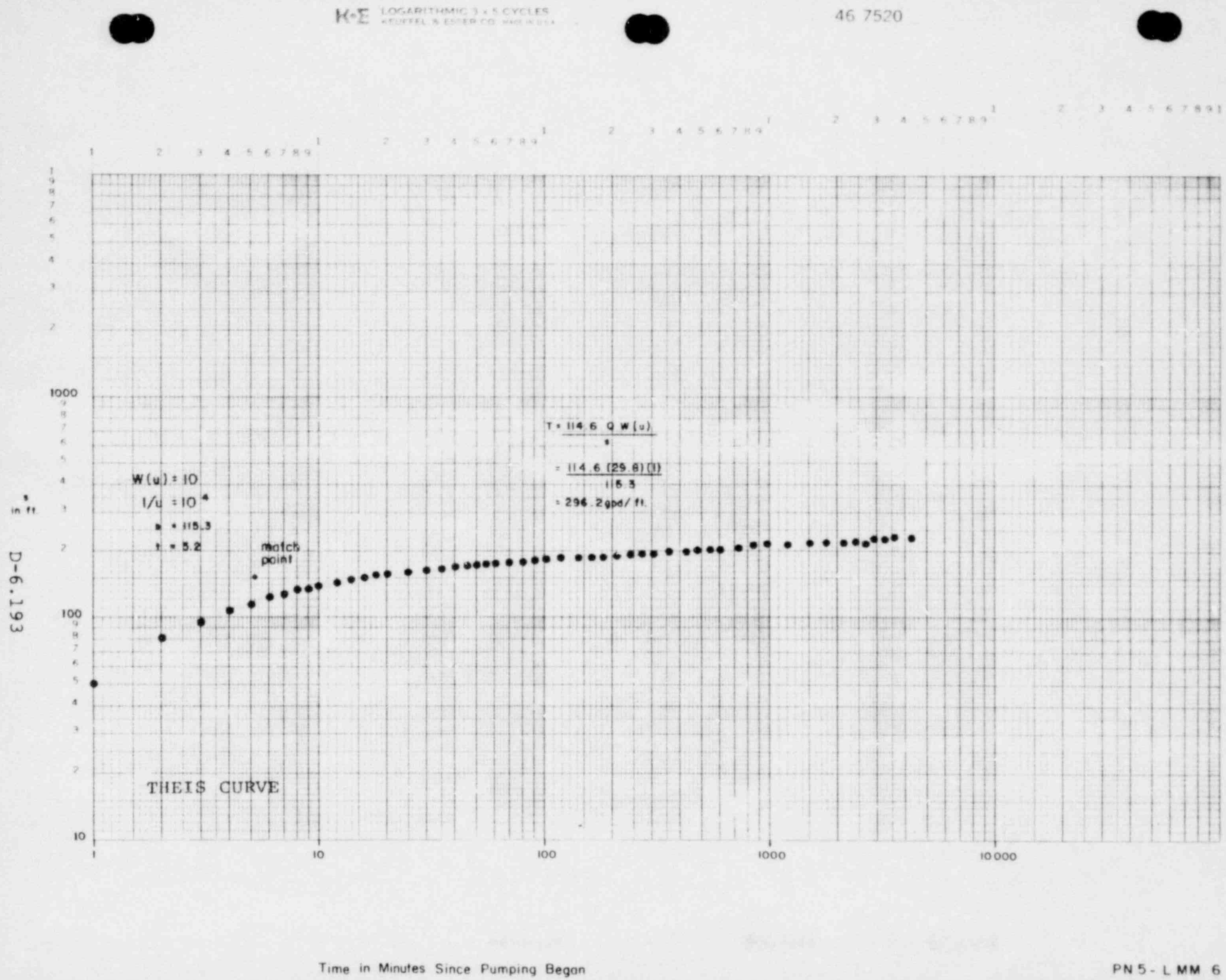
FIGURE D-6.2.06

FIGURE D-6.2.07

M AQUIFER TEST #2

THEIS CURVE, JACOB PLOT AND RECOVERY PLOT

FOR WELLS MM-6, MM-8 AND MM-9

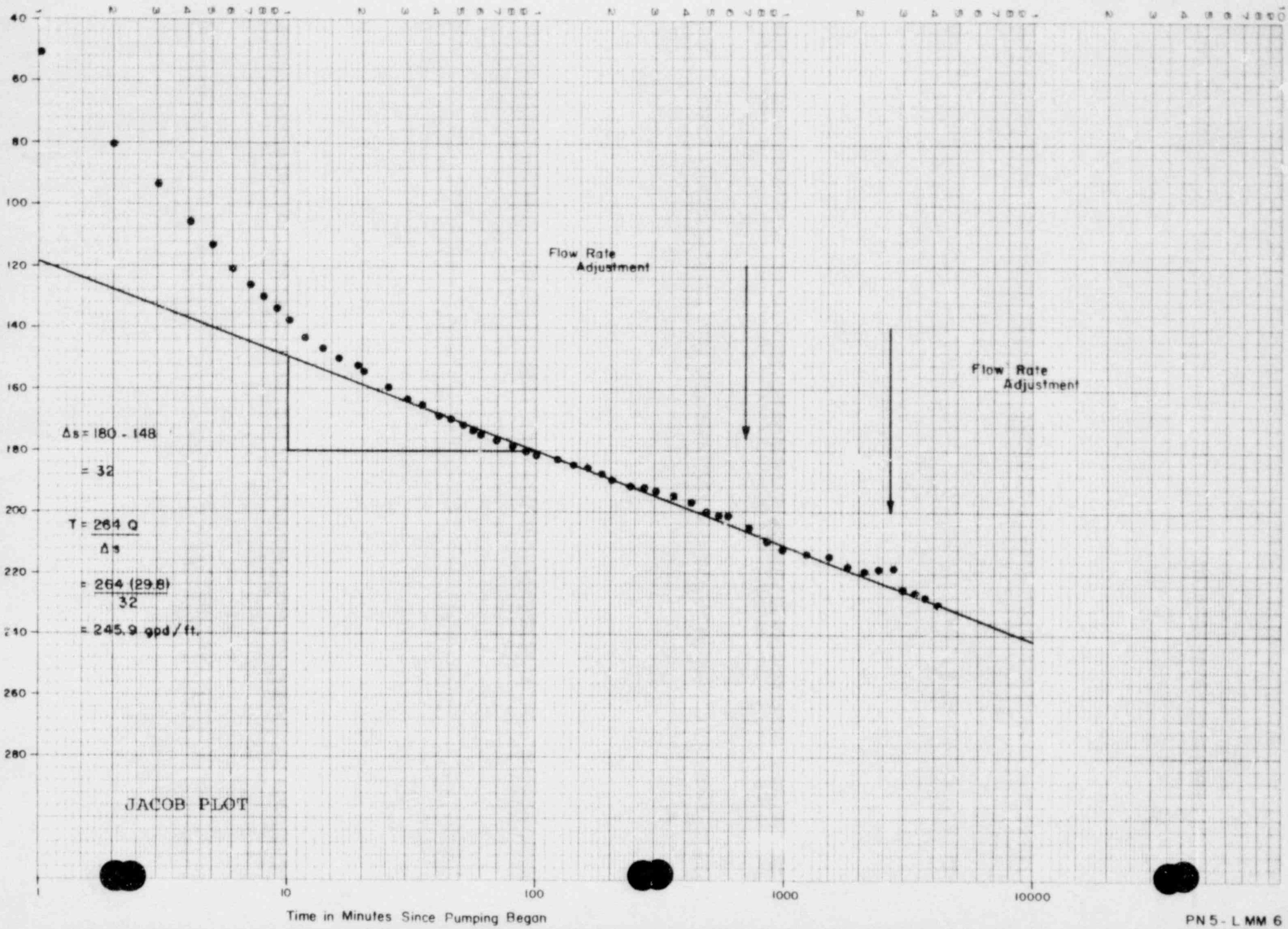


D-6.193

PN5-LMM 6

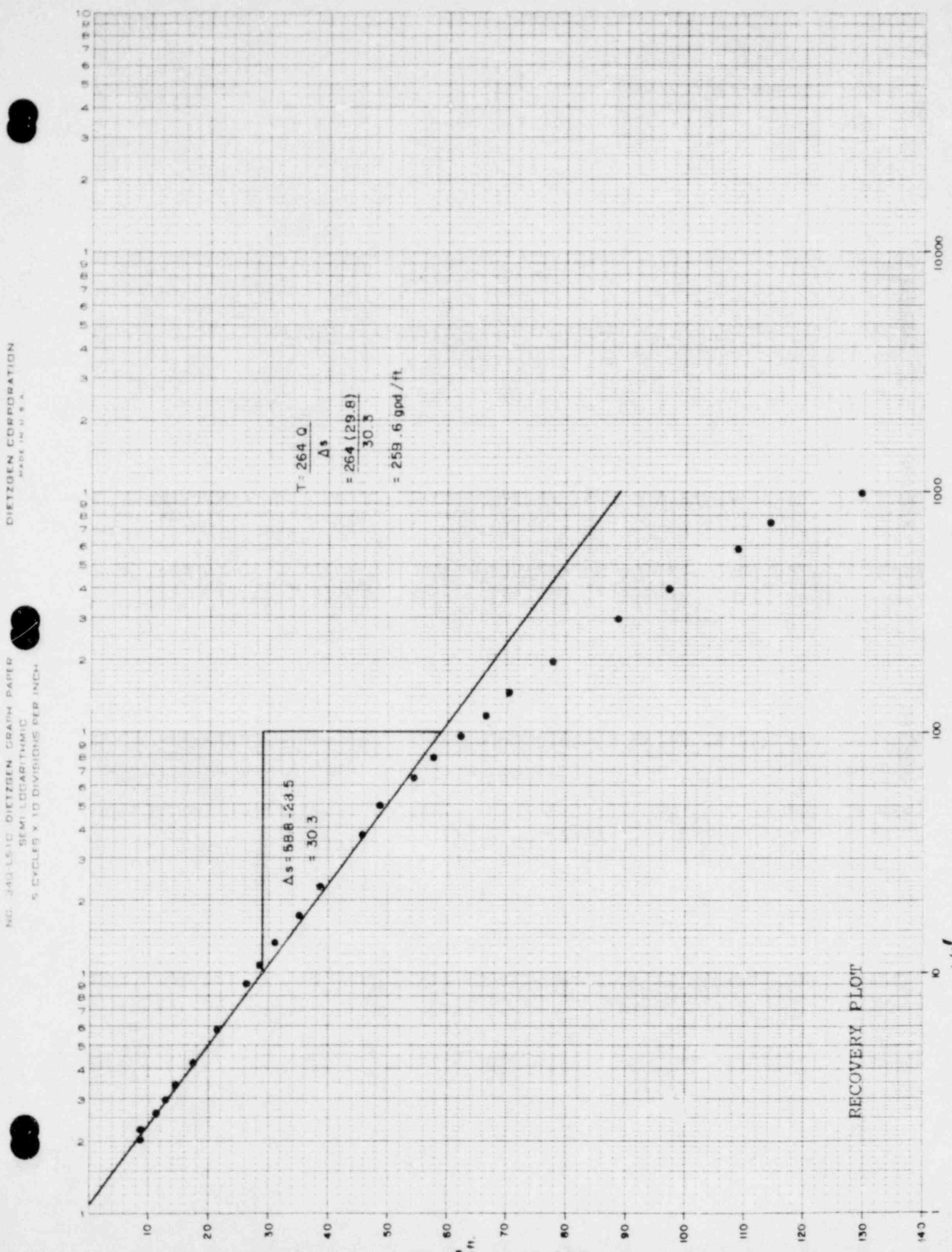
NO. 340-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.



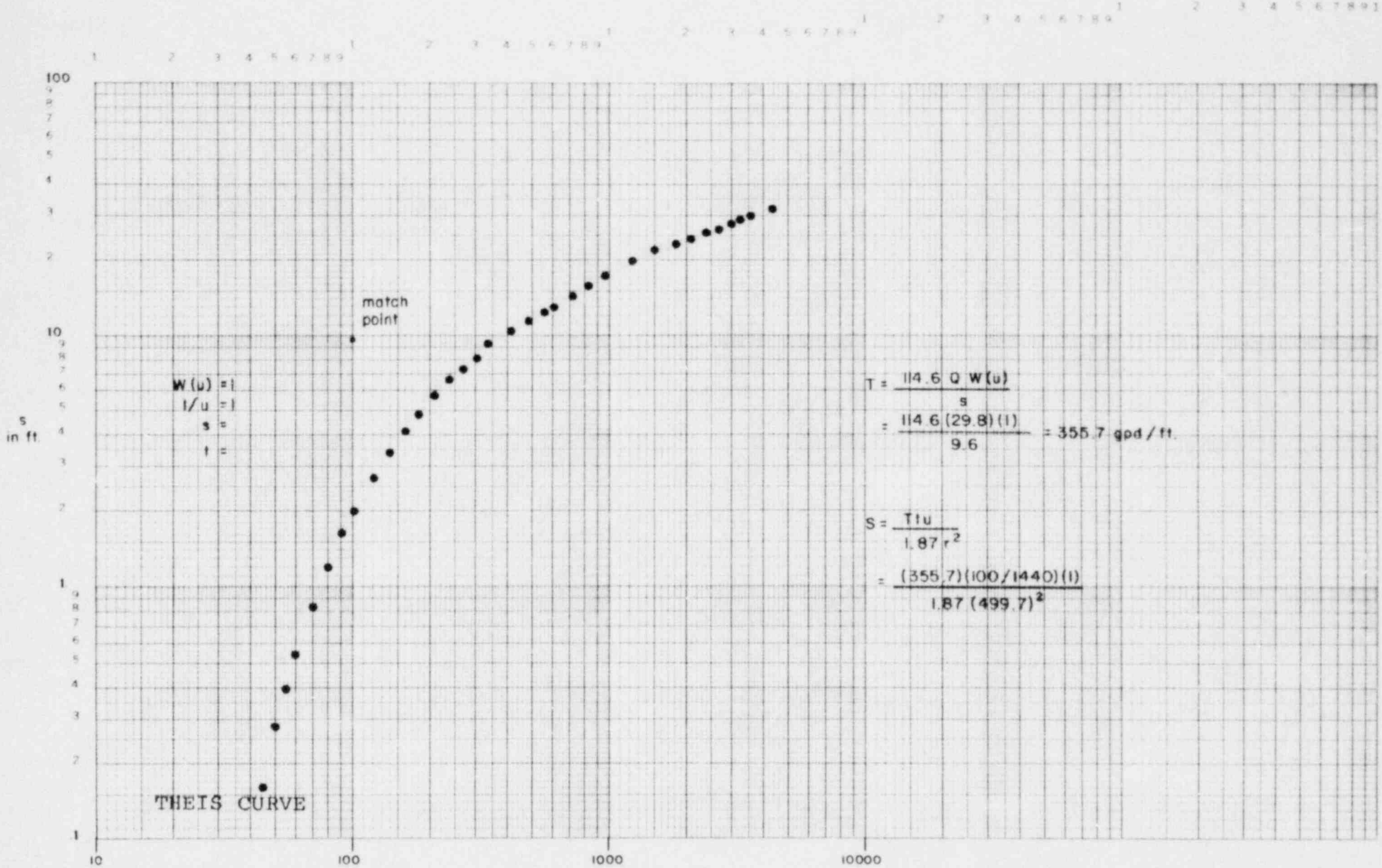
D-6.194

PN 5 - L MM 6

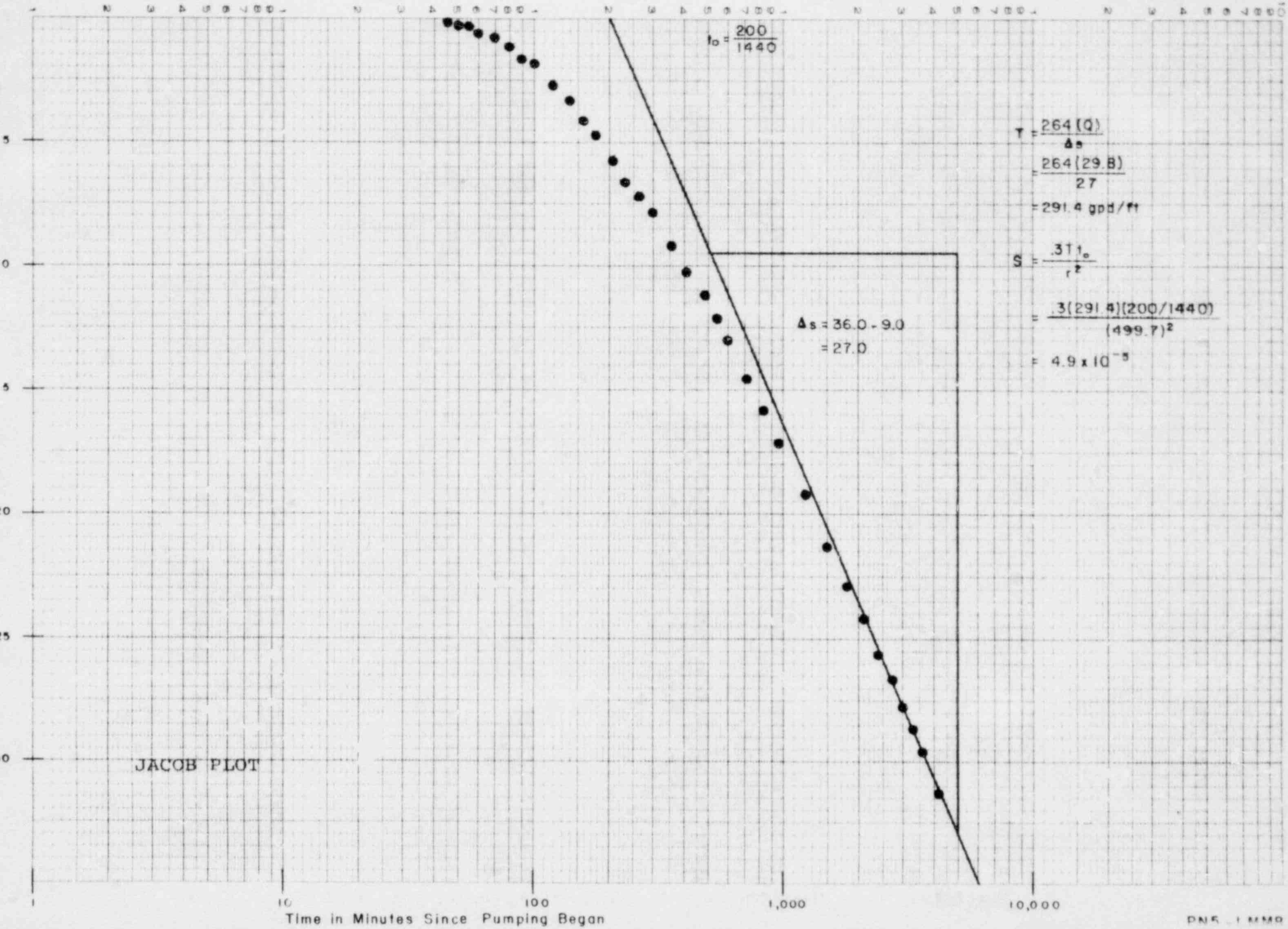


RECOVERY PLOT
t/t'
s' in ft.
Δs = 58.8 - 28.5
= 30.3
T = 264 Q / Δs
= 264 (29.8) / 30.3
= 259.6 gpd/ft
NO. 340-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES x 10 DIVISIONS PER INCH
DIETZGEN CORPORATION
MADE IN U.S.A.

D-6.196



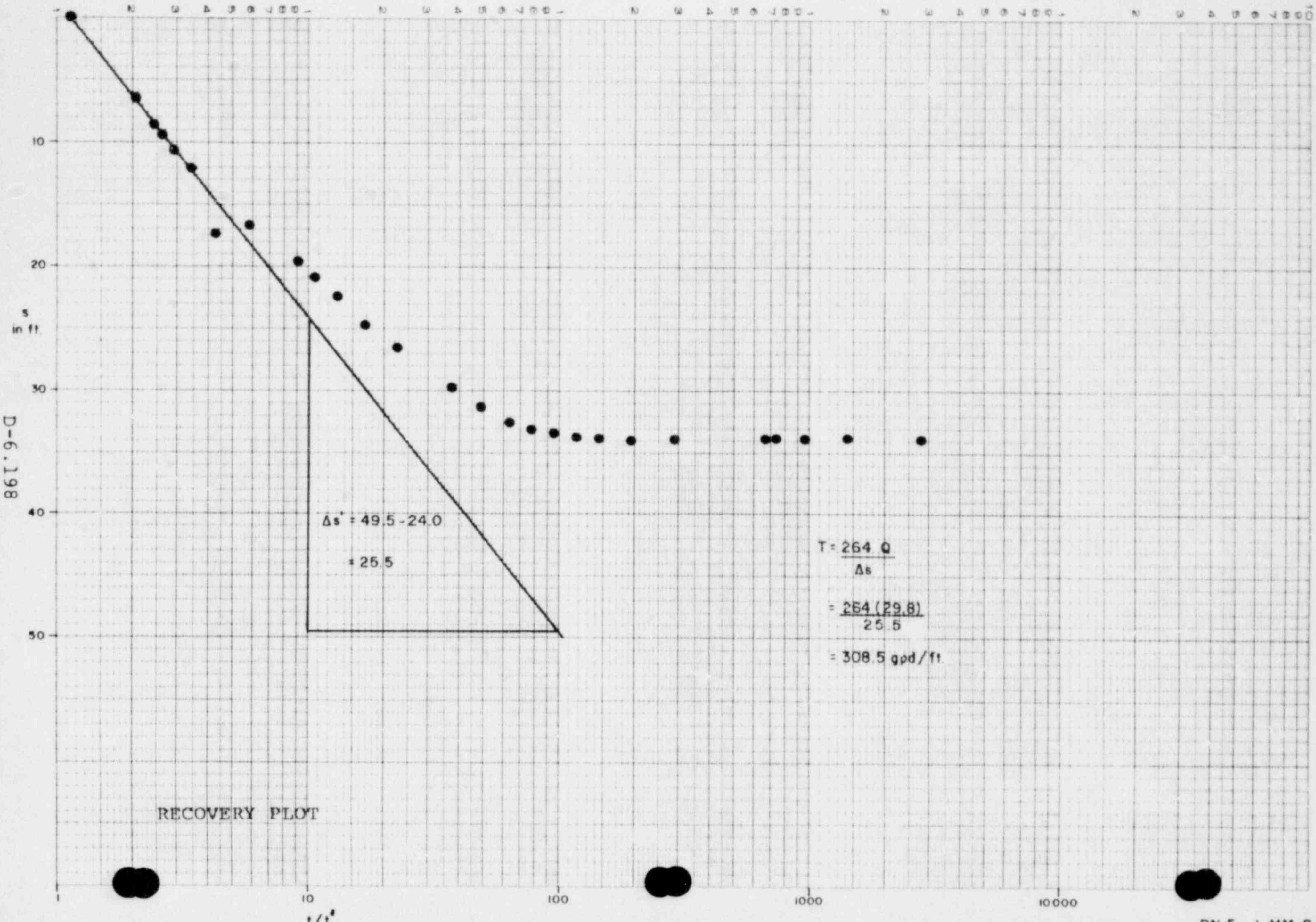
Time in Minutes Since Pumping Began



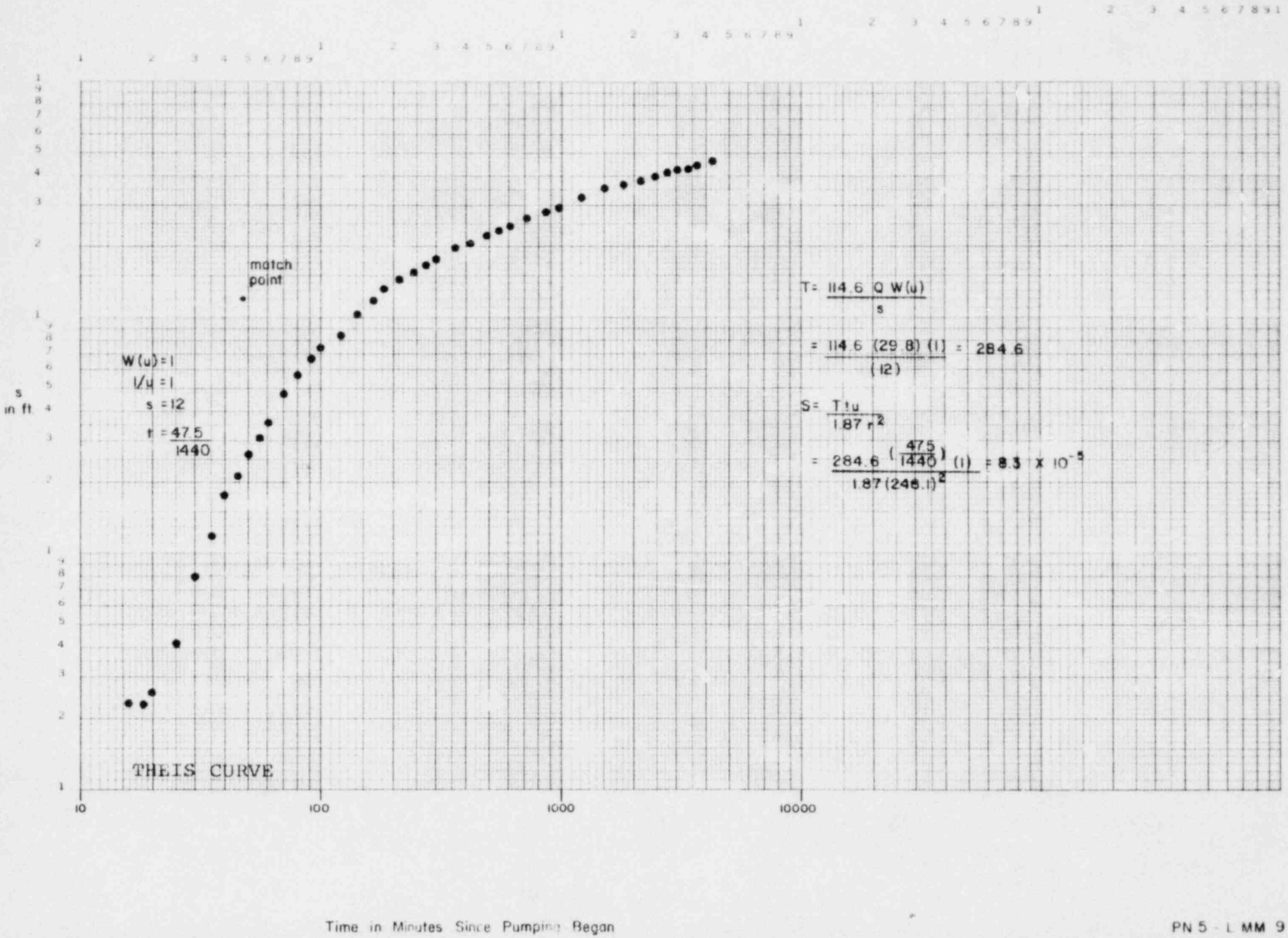
D-6.197

PN5 - LMMP

D-6.198

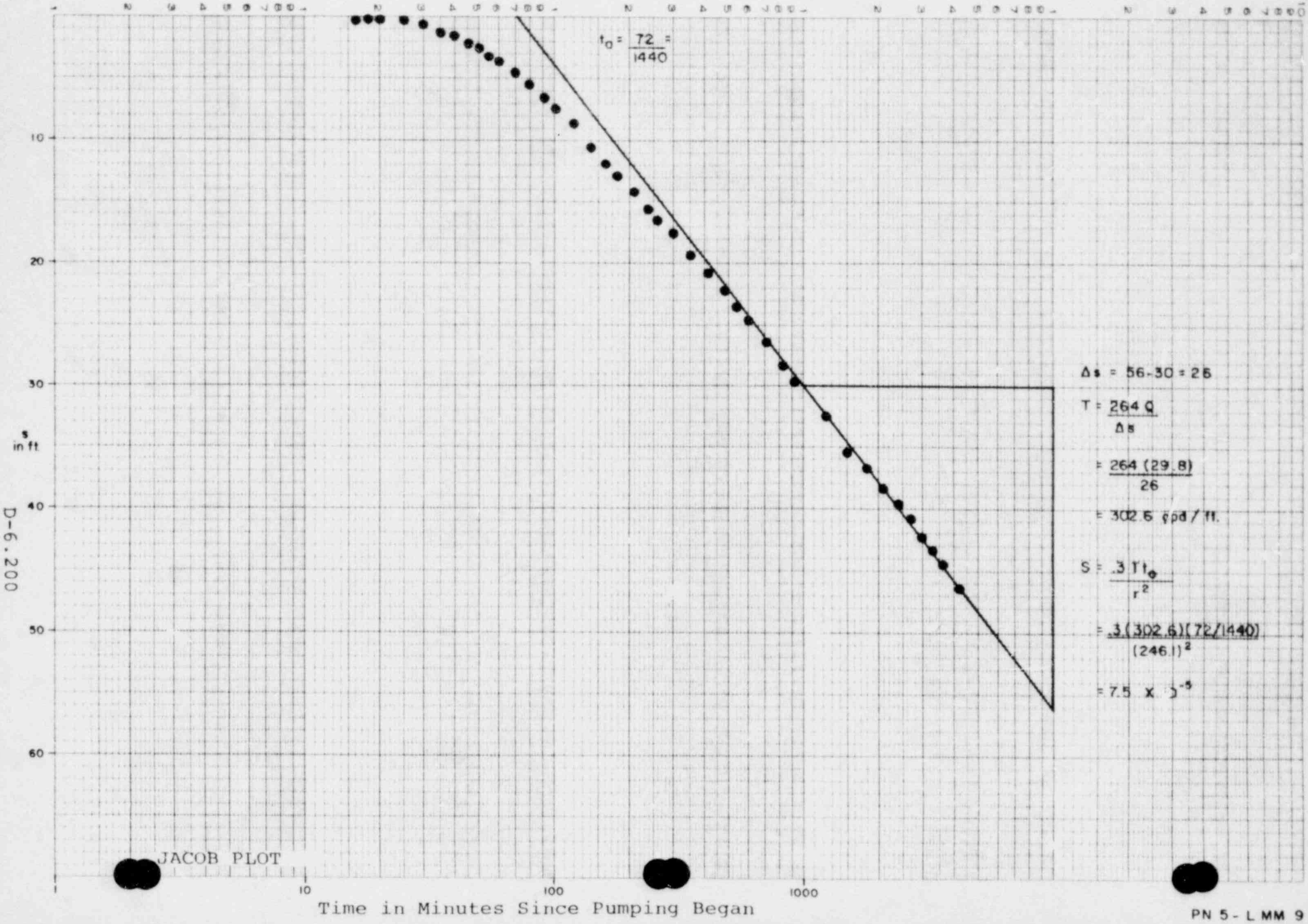

s
in ft.
10
20
30
40
50
1
10
100
1000
10000
t/t'
Δs' = 49.5 - 24.0
= 25.5
T = 264 Q / Δs
= 264 (29.8) / 25.5
= 308.5 gpd/ft.
RECOVERY PLOT

D-6.199


match point
W(u) = 1
1/u = 1
s = 12
t = 47.5 / 1440
T = 114.6 Q W(u) / s
= 114.6 (29.8) (1) / (12) = 284.6
S = Ttu / 1.87 r²
= 284.6 (47.5/1440) (1) / 1.87 (248.1)² = 8.3 X 10⁻⁵
s in ft.
THEIS CURVE
10
100
1000
10000
Time in Minutes Since Pumping Began

NO. 340-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 10 DIVISIONS PER INCH

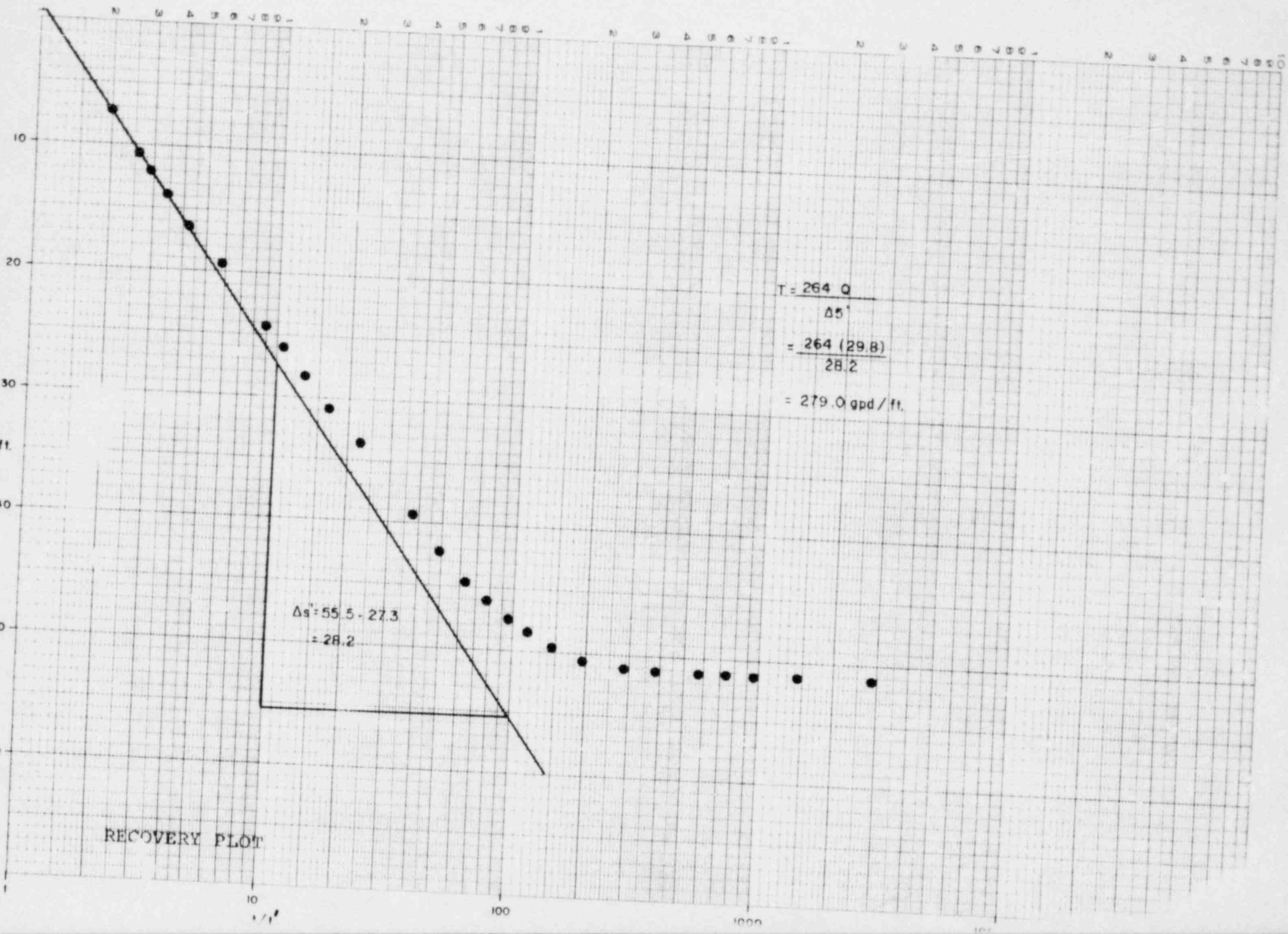
DIETZGEN CORPORATION
MADE IN U.S.A.



PN 5-L MM 9

NO. 340-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.



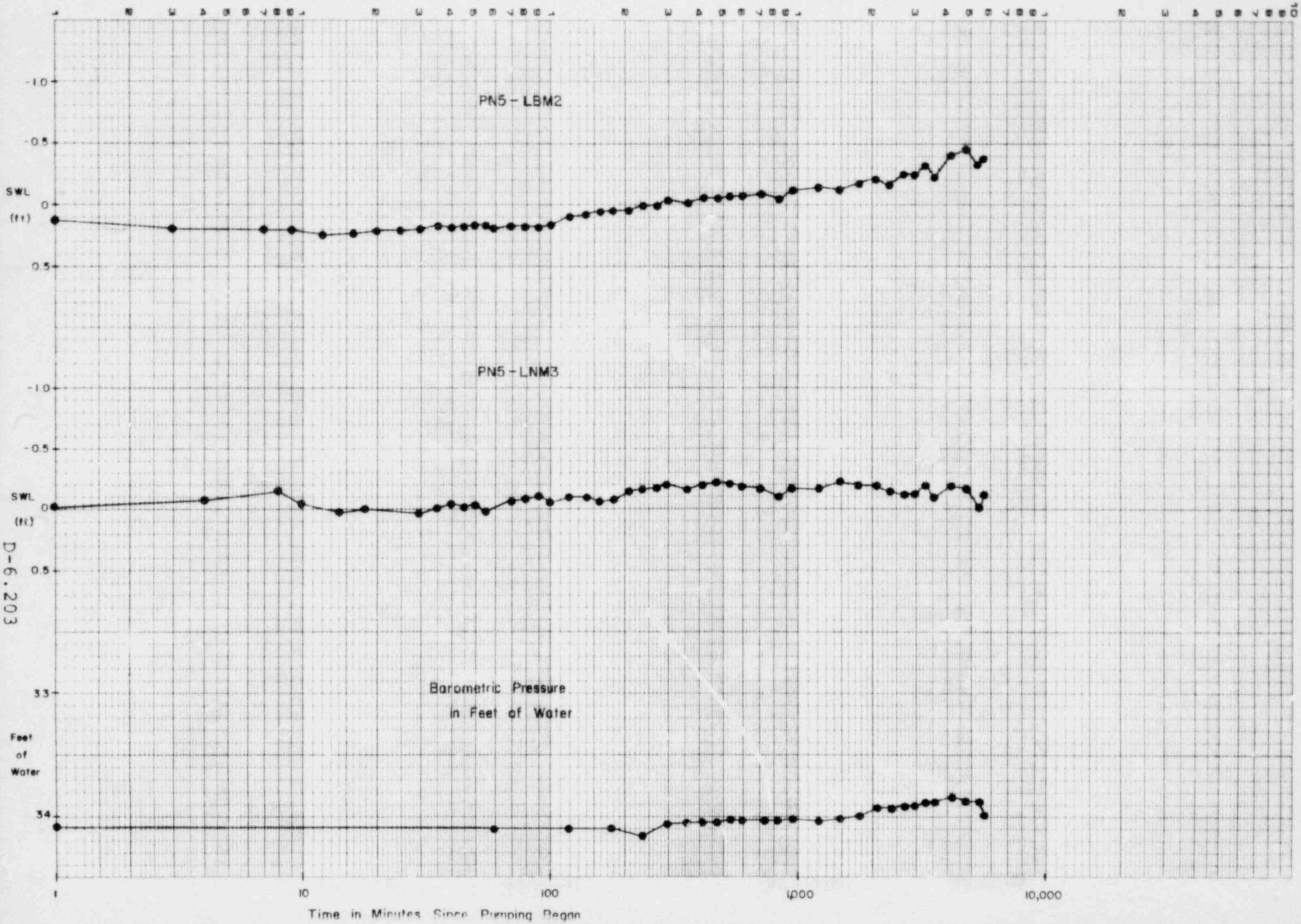
RECOVERY PLOT

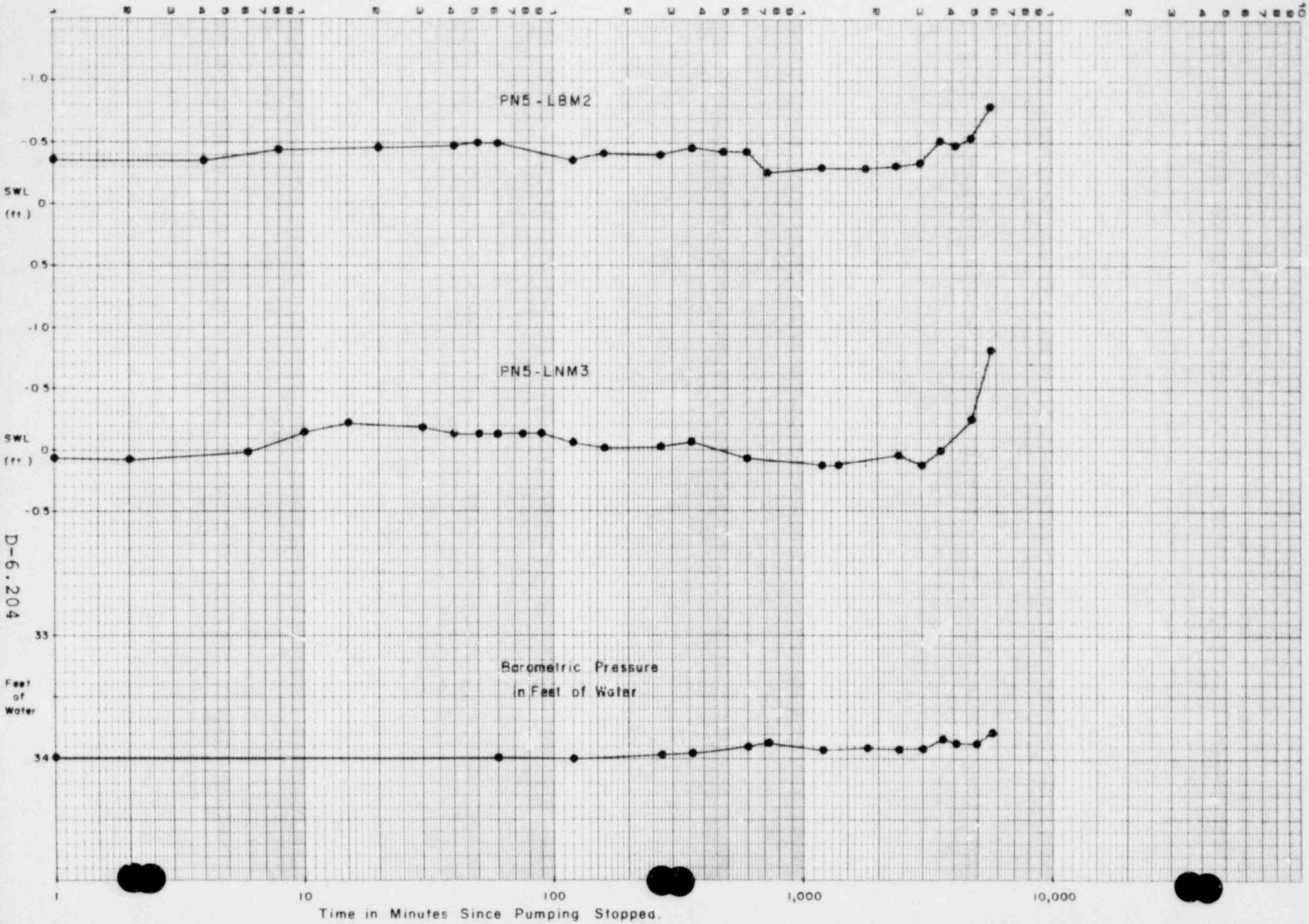
FIGURE D-6.2.08

M AQUIFER TEST #2

BAROMETRIC PRESSURE

WELLS PN5-LBM2 AND NM3


PN5 - LBM2
PN5 - LNM3
Barometric Pressure
in Feet of Water
SWL
(ft)
-1.0
-0.5
0
0.5
33
34
Feet
of
Water
1
10
100
1000
10,000
Time in Minutes Since Pumping Began


PN5-LBM2
PN5-LNM3
Barometric Pressure
in Feet of Water
SWL
(ft.)
SWL
(ft.)
Feet
of
Water
-1.0
-0.5
0
0.5
-1.0
-0.5
0
-0.5
33
34
1
10
100
1,000
10,000
Time in Minutes Since Pumping Stopped.

D-6.204

FIGURE D-6.2.09

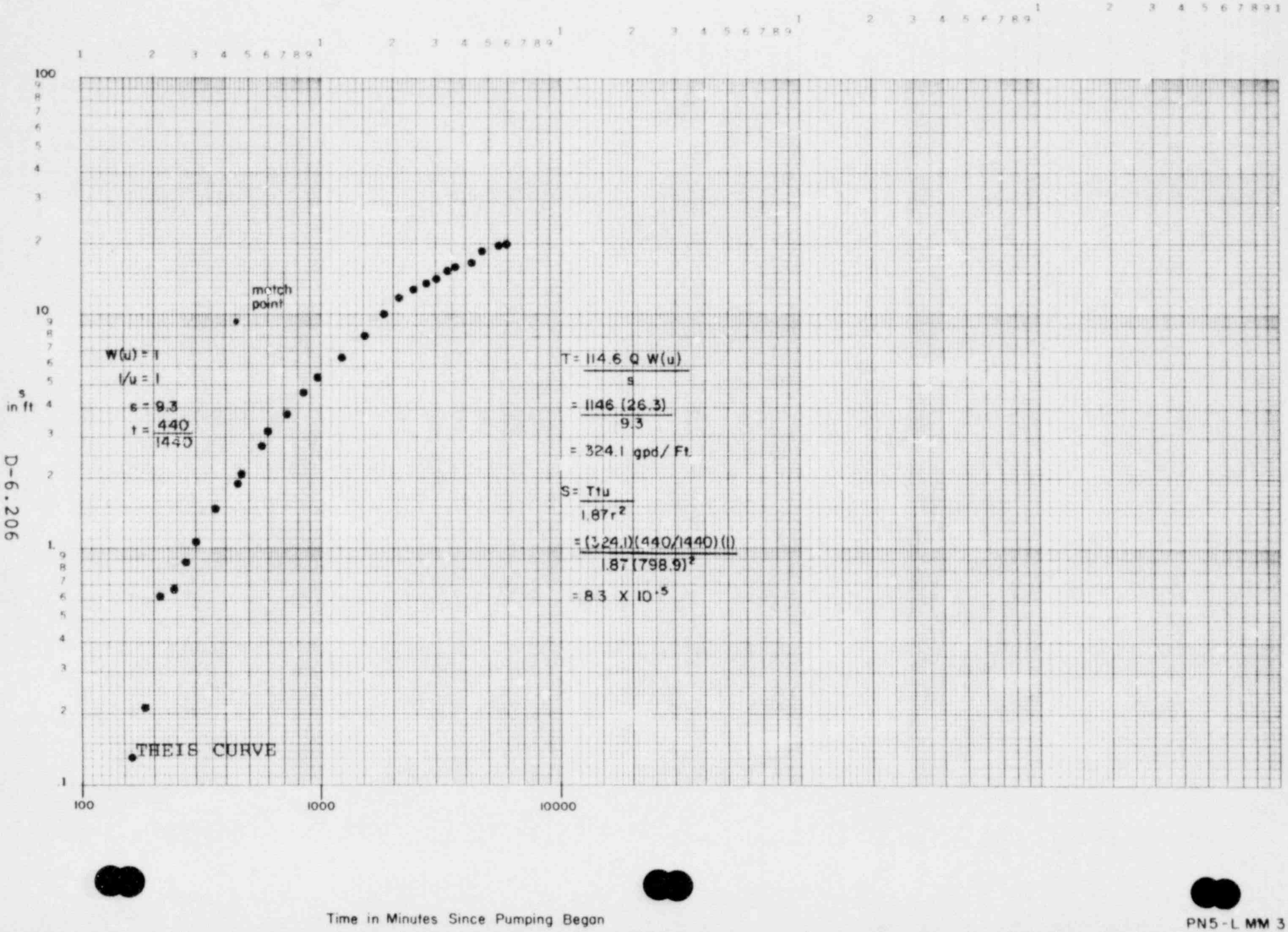
M AQUIFER TEST #3

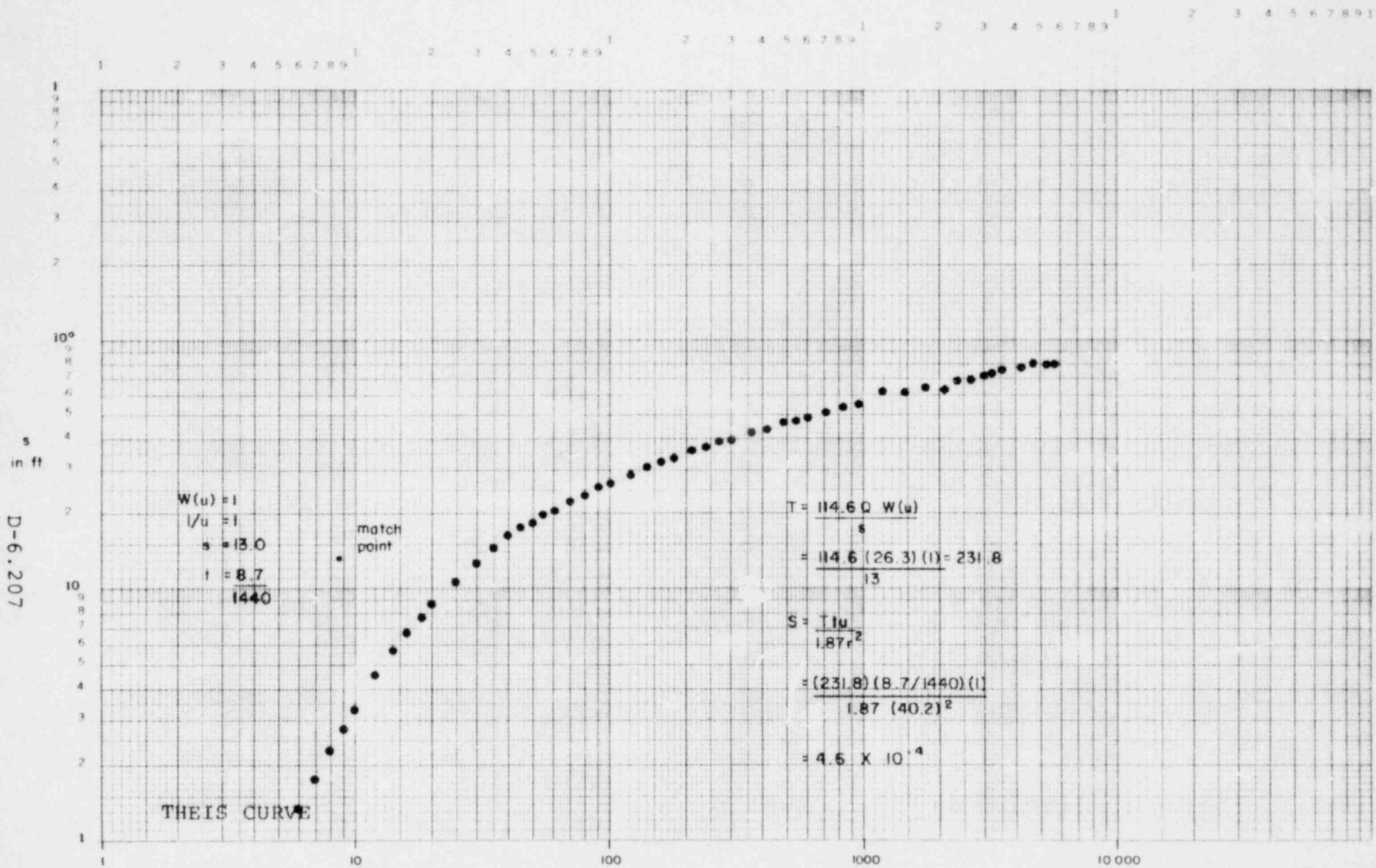
THEIS CURVE, JACOB PLOT AND RECOVERY PLOT

FOR WELLS PN5-LMM3, MM4, MM7 AND MM10

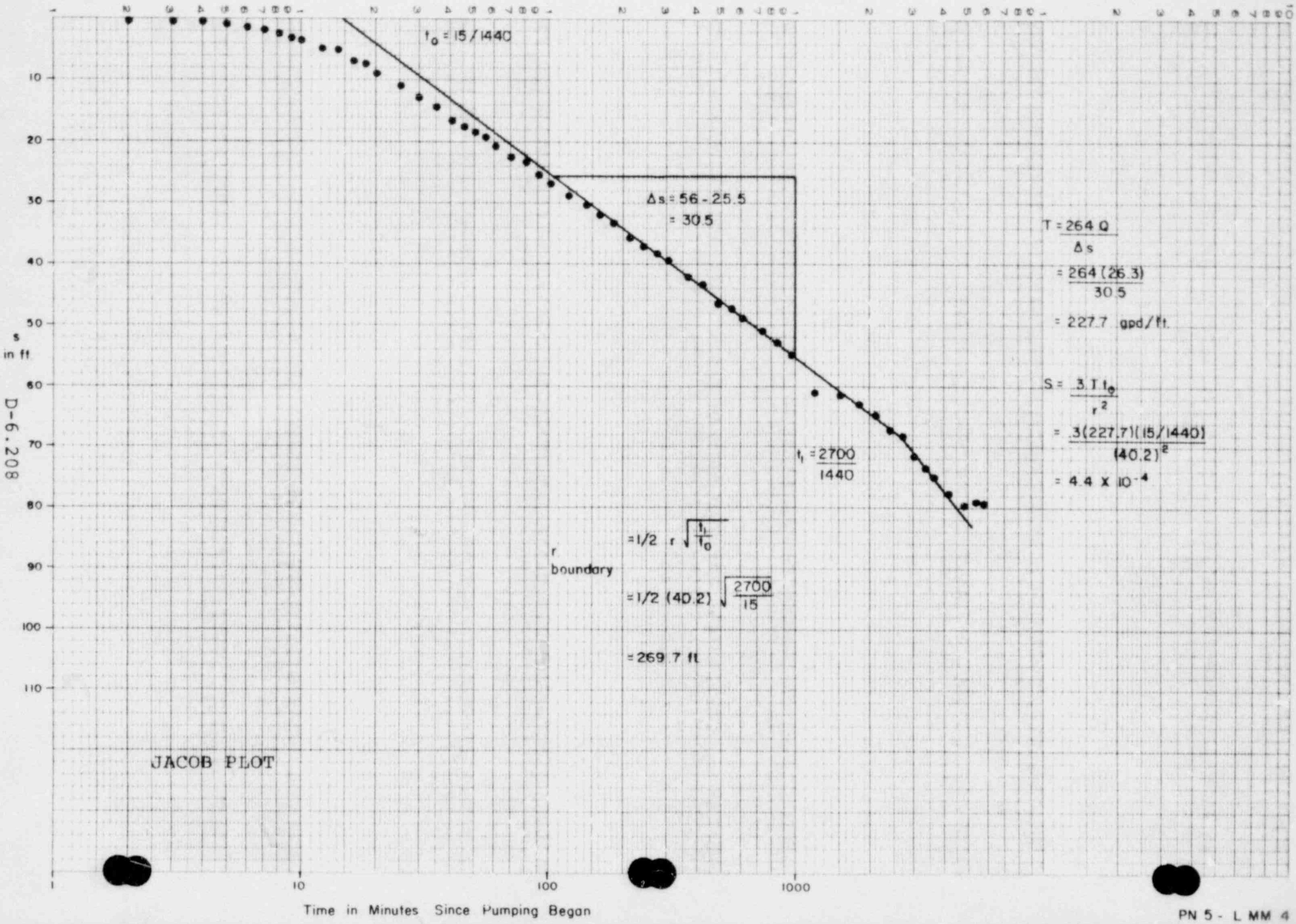
K•E LOGARITHMIC 3 x 5 CYCLES KEUFFEL & ESSER CO.

46 7520



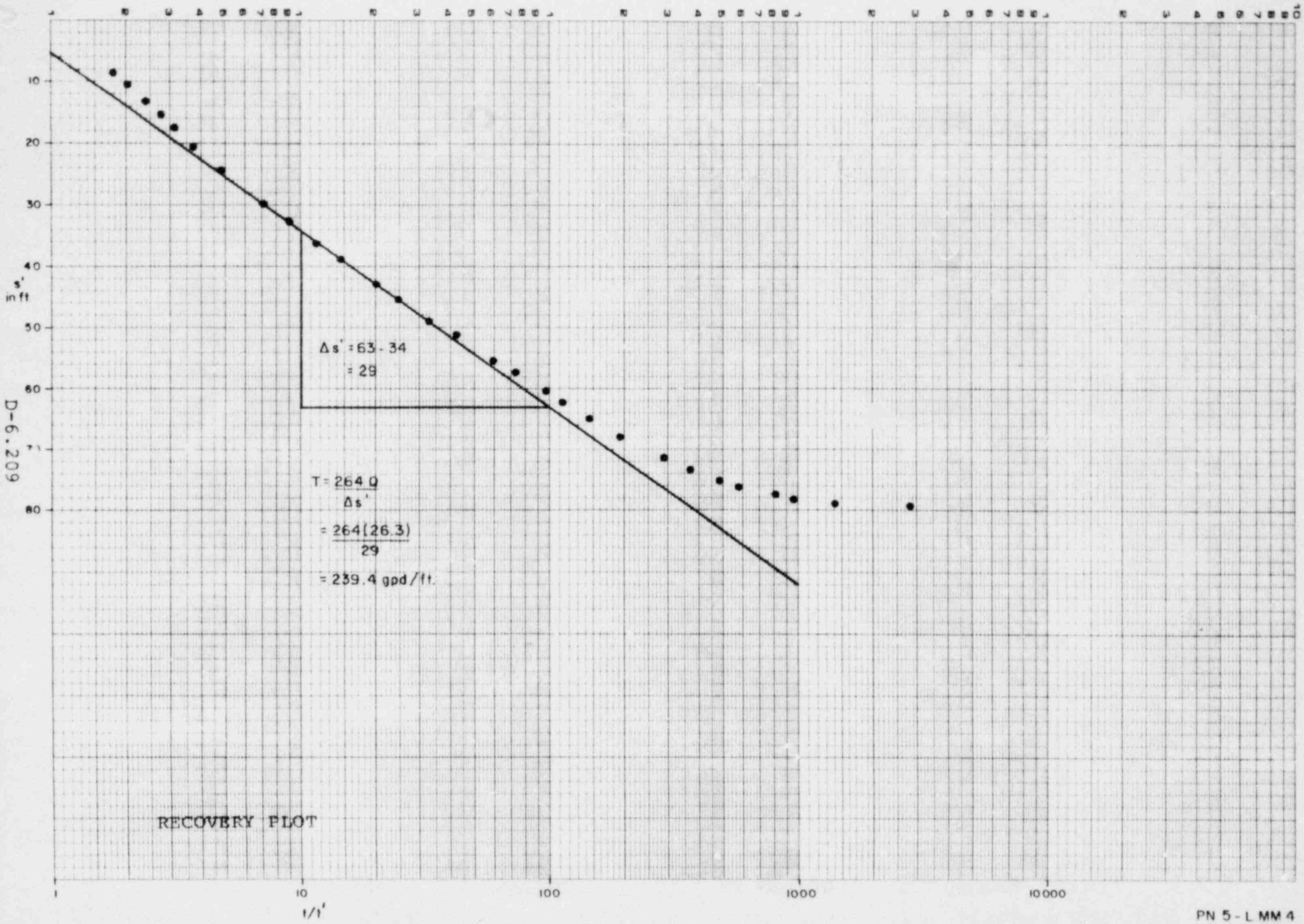

s in ft
Time in Minutes Since Pumping Began
1
10
100
1000
10 000
10^0
10
W(u) = 1
1/u = 1
s = 13.0
t = 8.7/1440
match point
THEIS CURVE
T = 114.6 Q W(u) / s
= 114.6 (26.3) (1) / 13 = 231.8
S = T t u / 1.87 r²
= (231.8) (8.7/1440) (1) / 1.87 (40.2)²
= 4.6 X 10⁻⁴

D-6.207



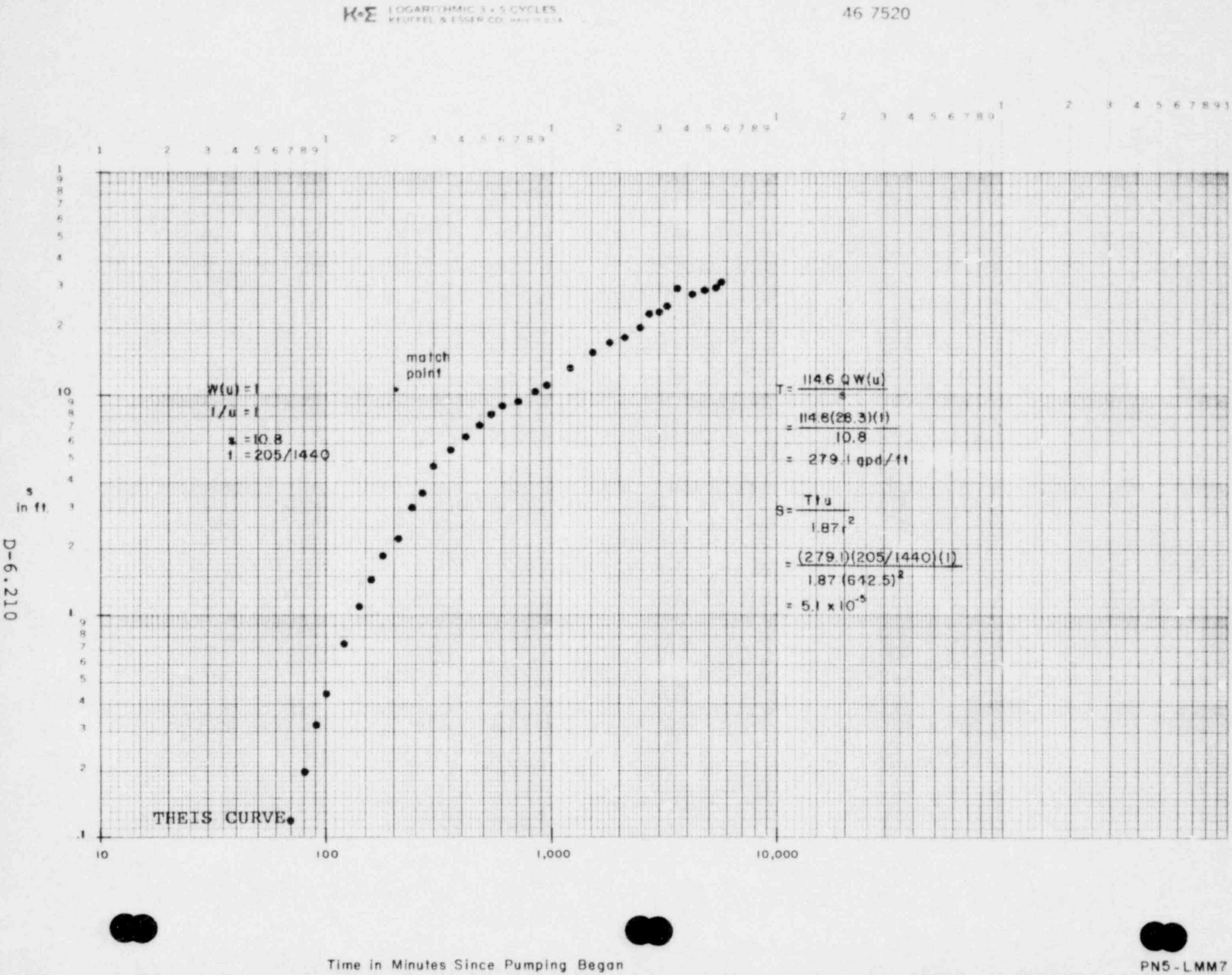
D-6.208

PN 5 - L MM 4



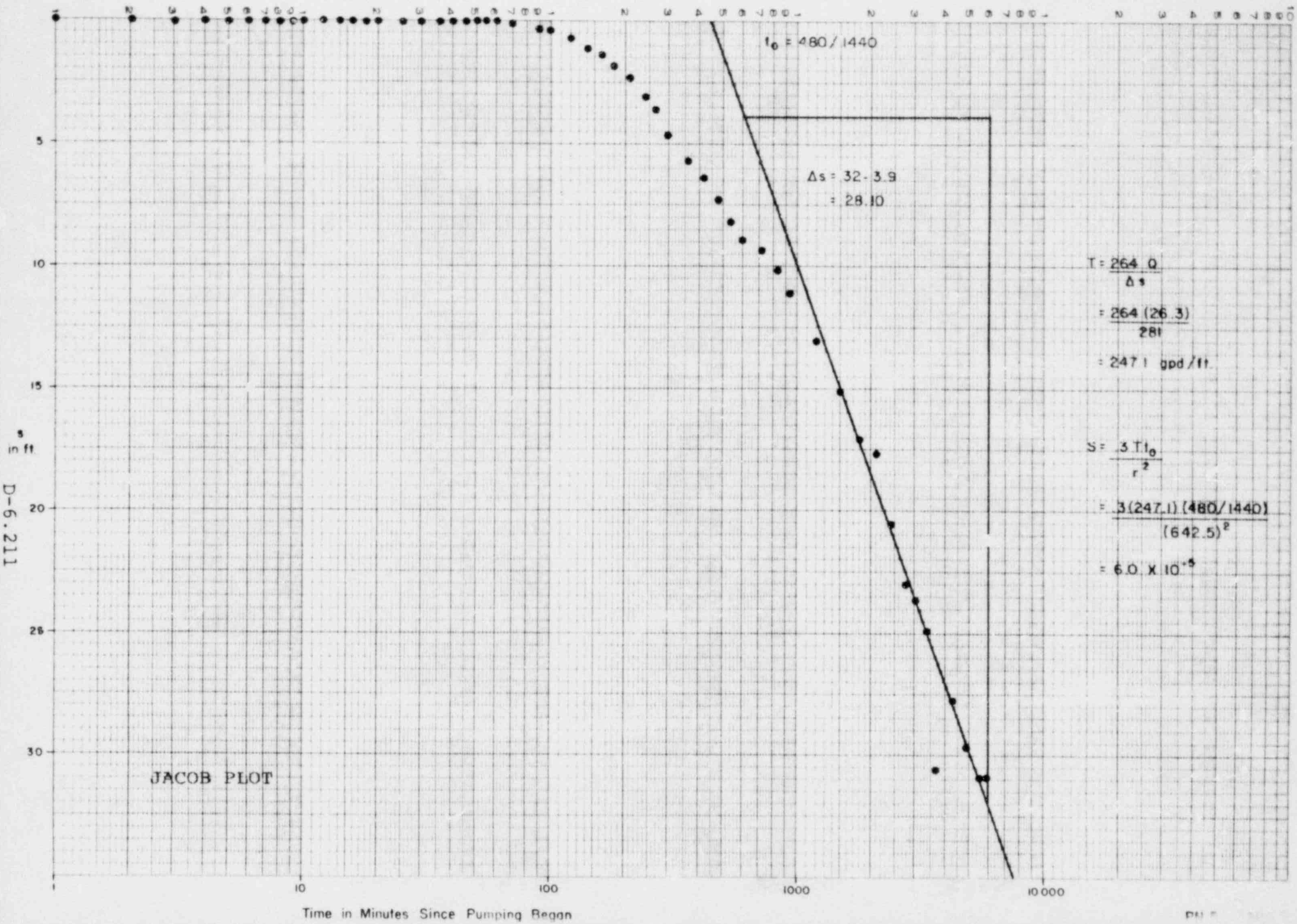
D-6.209

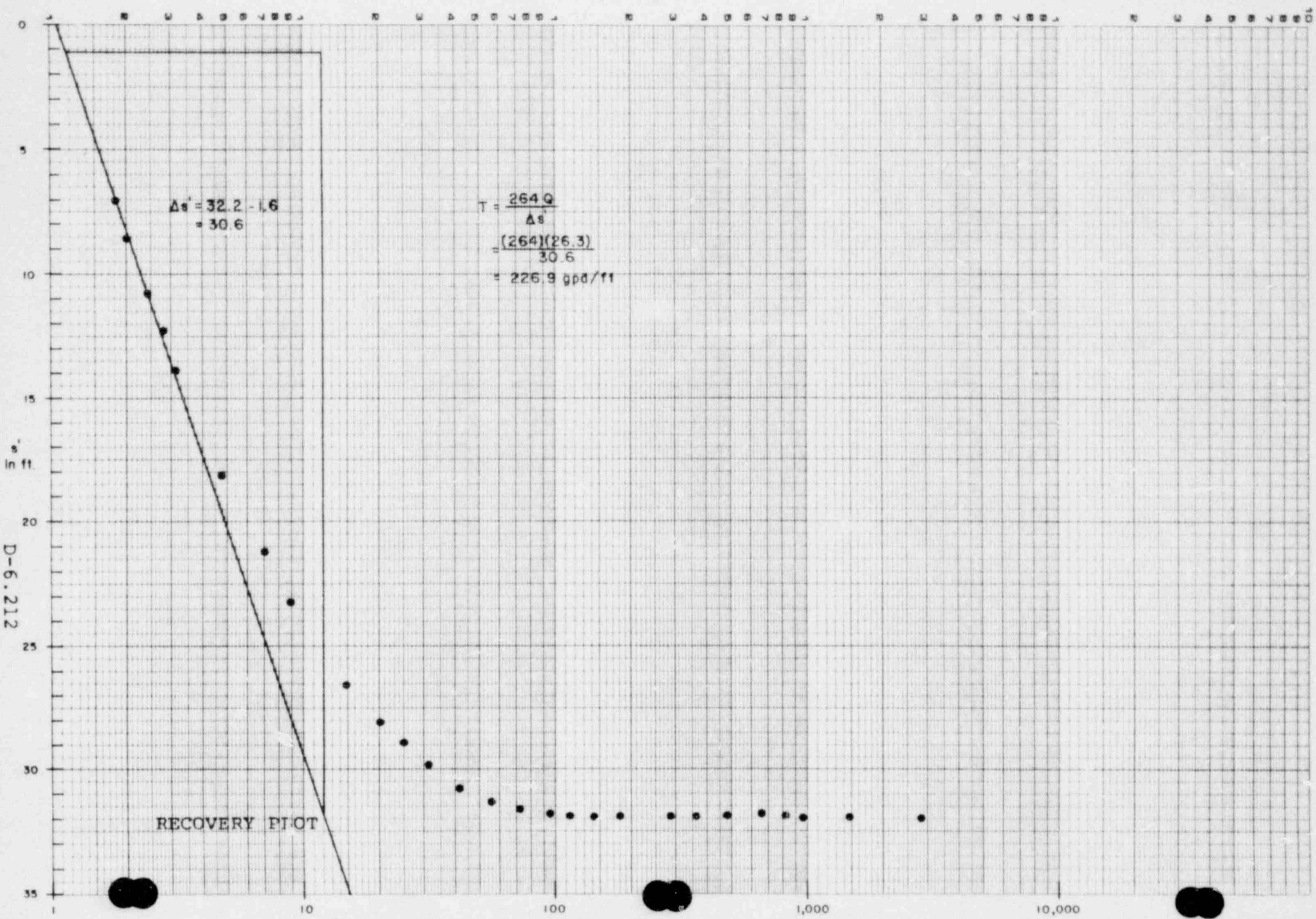
PN 5 - L MM 4



D-6.210

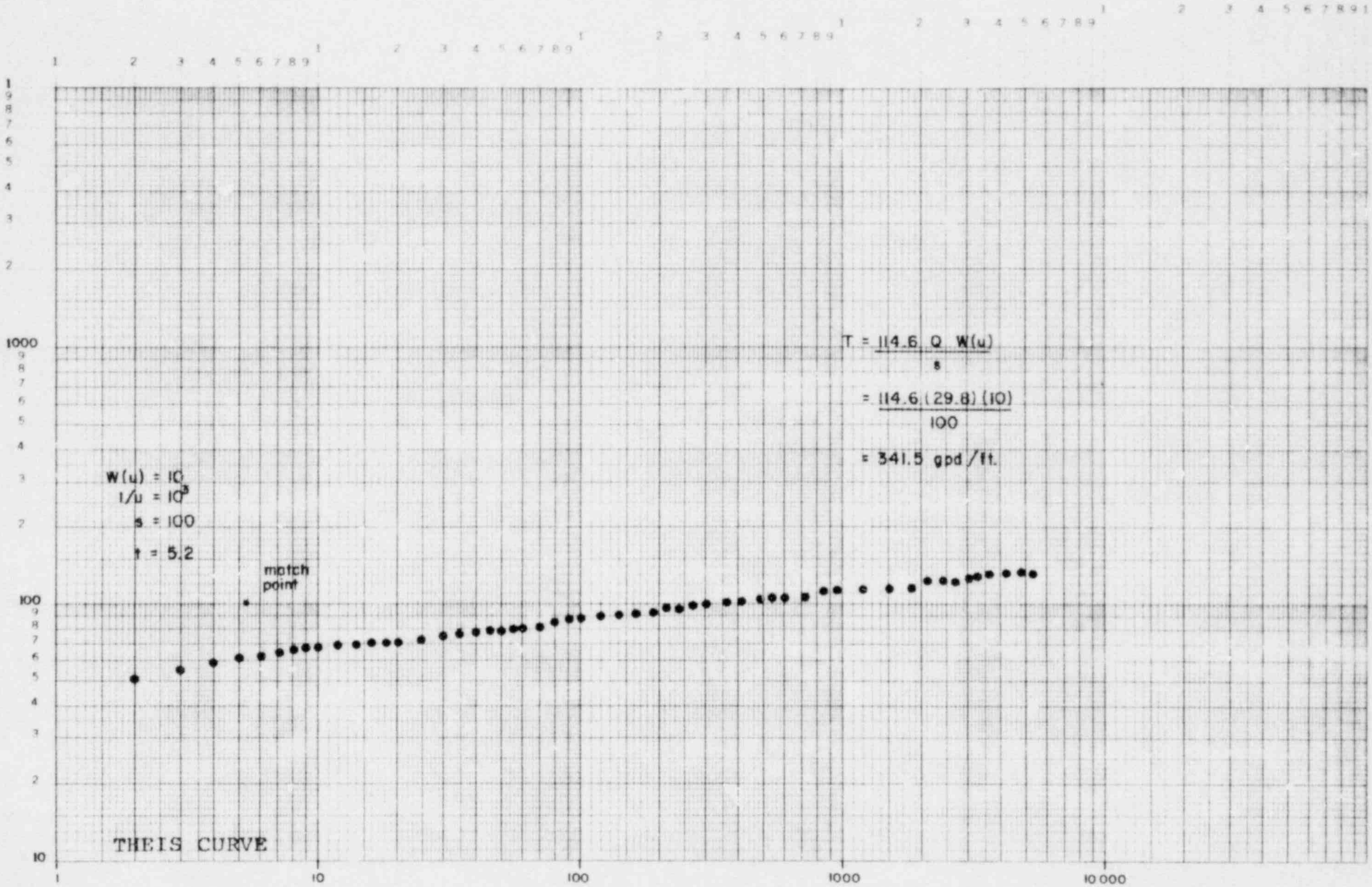
PN5-LMM7


t_0 = 480/1440
Δs = 32 - 3.9
= 28.10
T = 264 Q / Δs
= 264 (26.3) / 281
= 247.1 gpd/ft.
S = .3 T t_0 / r^2
= .3(247.1)(480/1440) / $(642.5)^2$
= 6.0 X 10^{-5}
JACOB PLOT
s in ft
Time in Minutes Since Pumping Began
1
10
100
1000
10,000
5
10
15
20
25
30

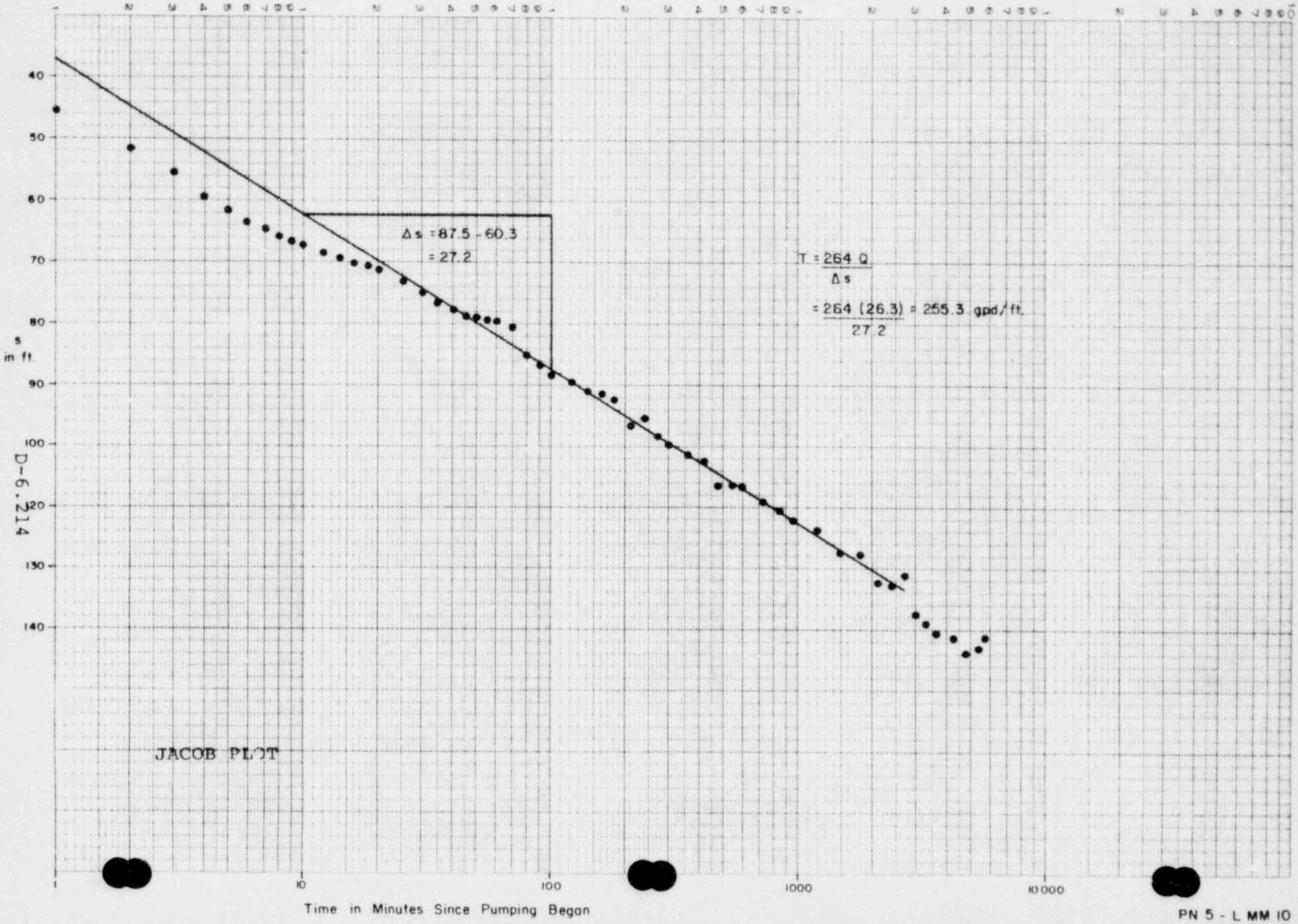


D-6.212

PN5-LMM7



Time in Minute Since Pumping Began


Δs = 87.5 - 60.3
= 27.2
T = 264 Q / Δs
= 264 (26.3) / 27.2 = 255.3 gpd/ft.
s in ft.
JACOB PLOT
Time in Minutes Since Pumping Began

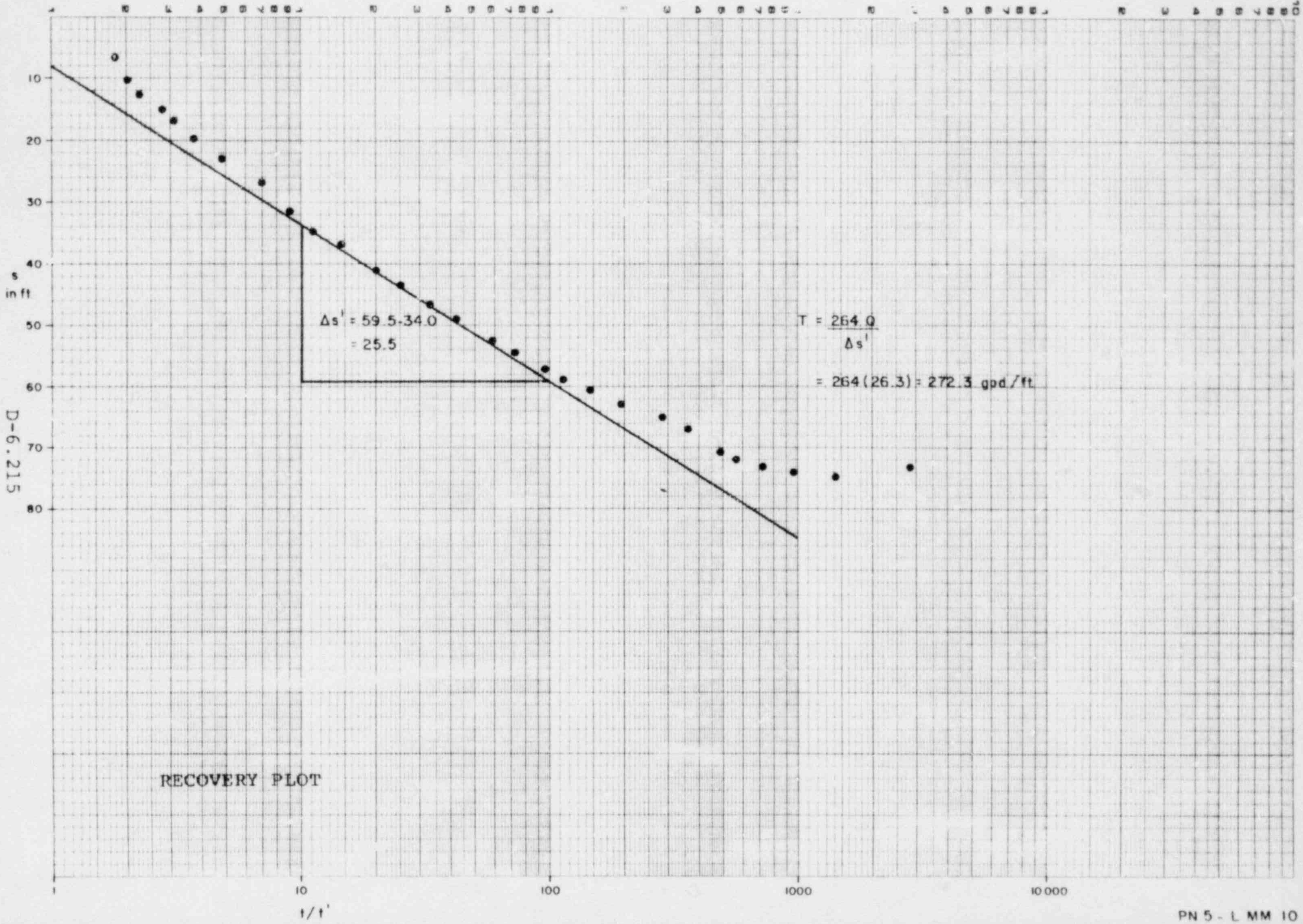
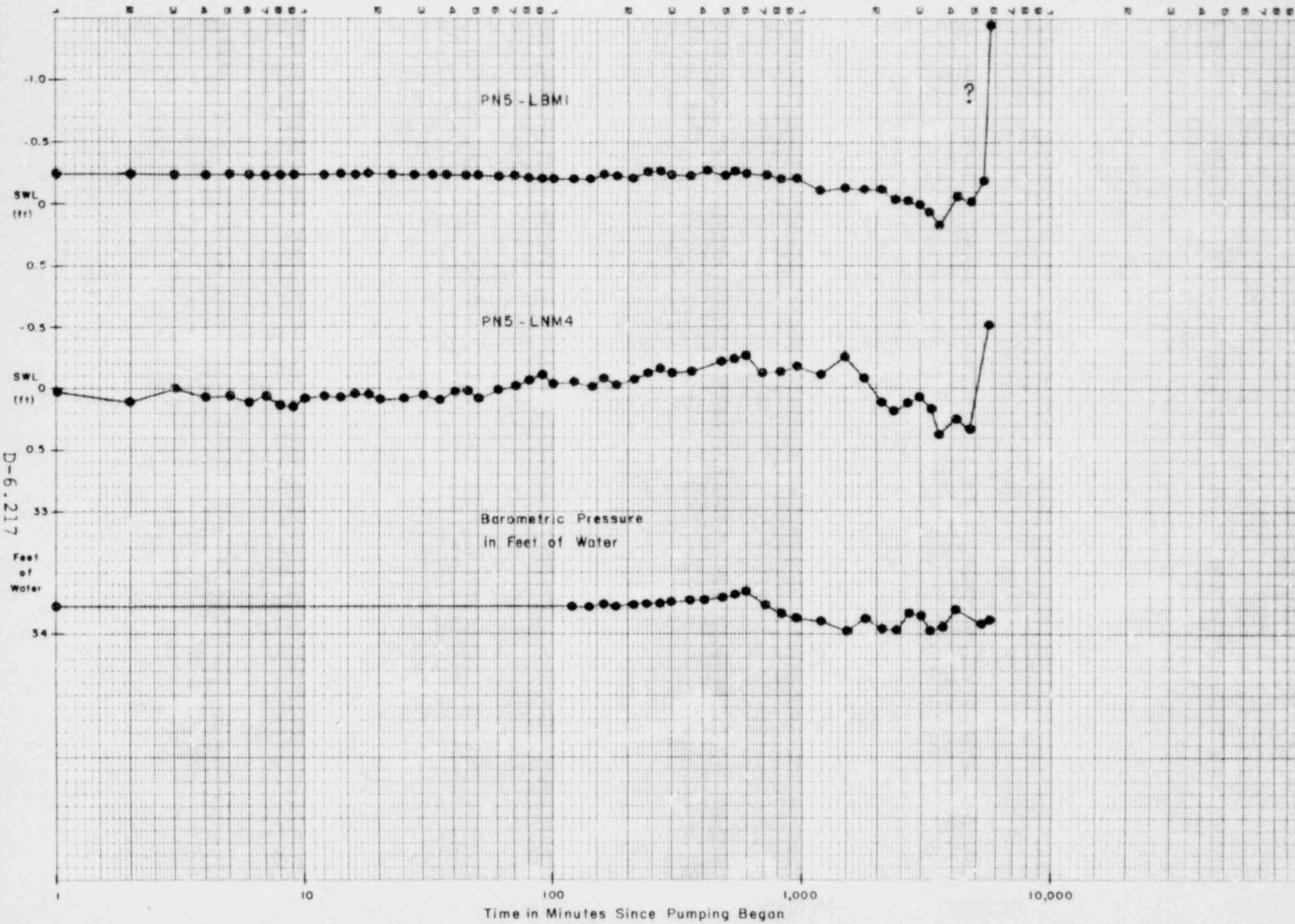

s
in ft
10
20
30
40
50
60
70
80
Δs' = 59.5-34.0
= 25.5
T = 264 Q / Δs'
= 264(26.3) = 272.3 gpd/ft
RECOVERY PLOT
1
10
100
1000
10 000
t/t'

FIGURE D-06.2.10

BAROMETRIC PRESSURE

PN5-LBM1 AND NM4


-1.0
-0.5
SWL 0 (ft)
0.5
PN5 - LBMI
?
-0.5
SWL 0 (ft)
0.5
PN5 - LNM4
33
Feet of Water
34
Barometric Pressure
in Feet of Water
1
10
100
1,000
10,000
Time in Minutes Since Pumping Began

NO. 340R-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.

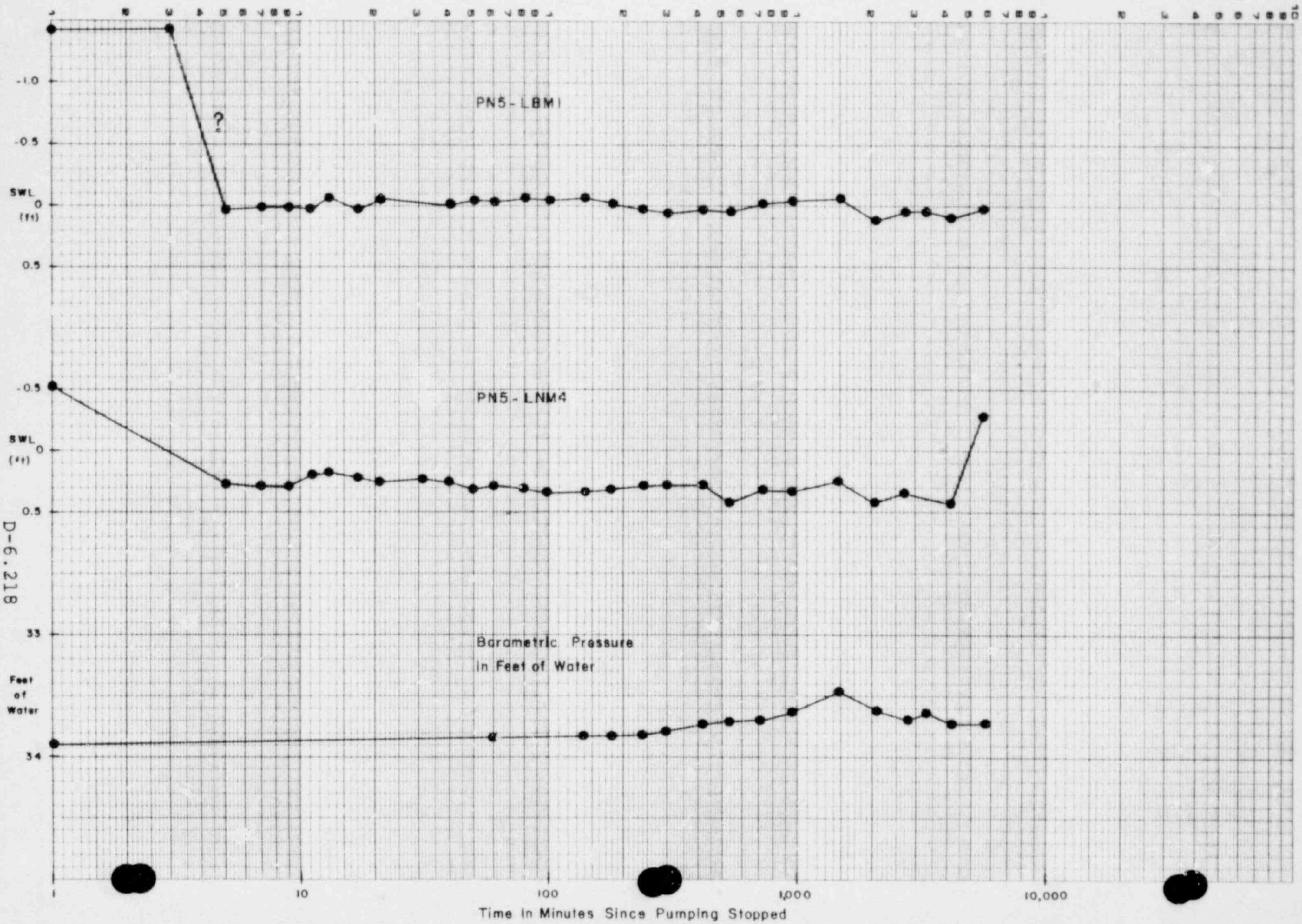
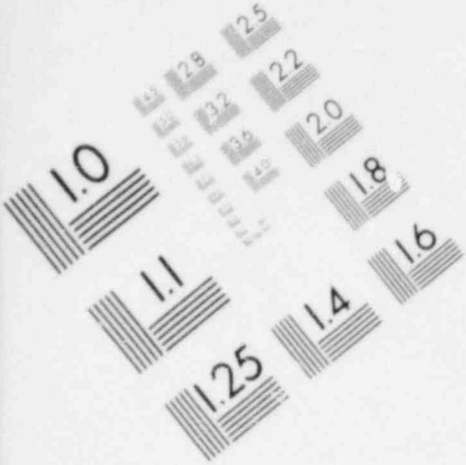


IMAGE EVALUATION TEST TARGET (MT-3)

6"

MICROCOPY RESOLUTION TEST CHART



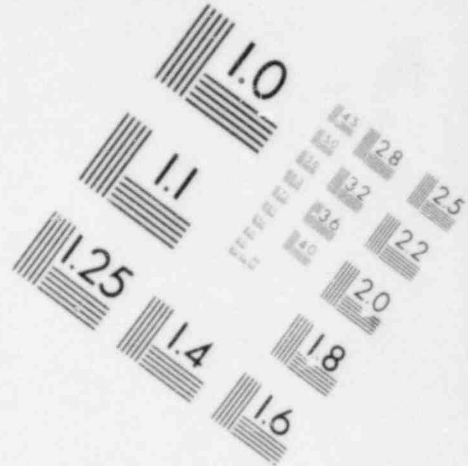
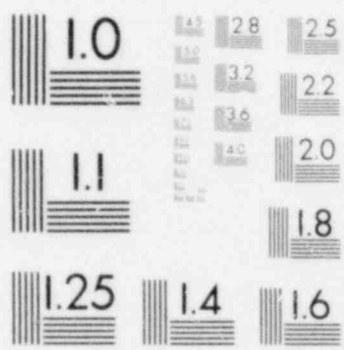
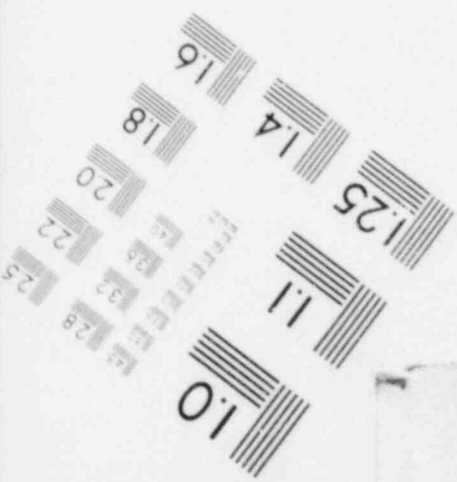


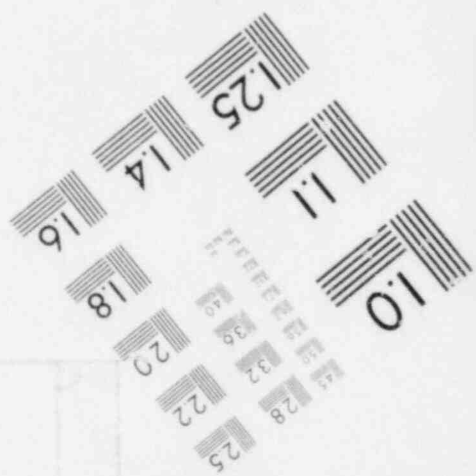
IMAGE EVALUATION TEST TARGET (MT-3)

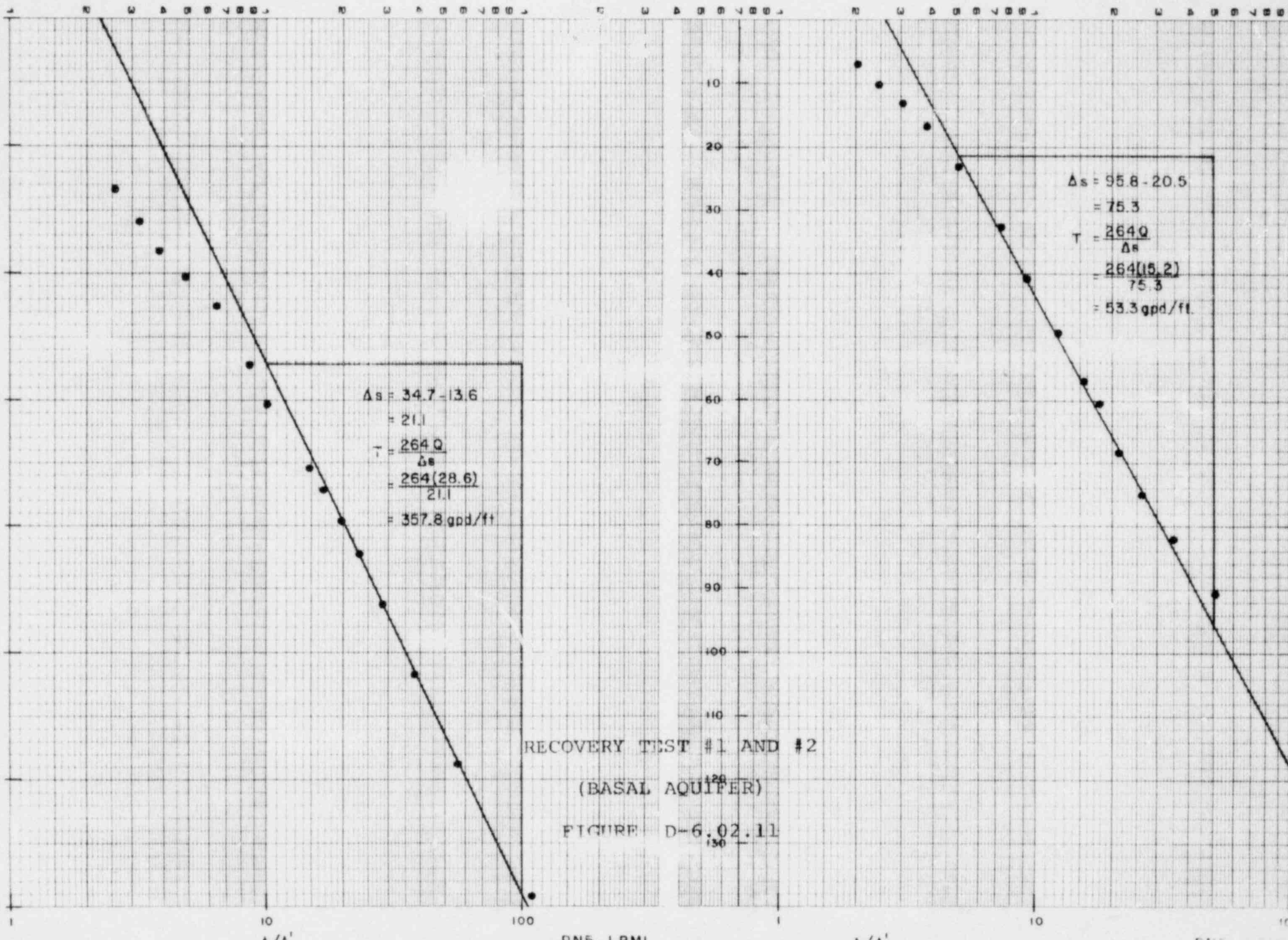


6″

MICROCOPY RESOLUTION TEST CHART







RECOVERY TEST #1 AND #2

(BASAL AQUIFER)

FIGURE D-6.02.11

APPENDIX D-6.3

GROUND WATER QUALITY

Sampling Method

Two sampling methods were generally used to collect ground water quality samples. Using the first method a submersible pump was lowered into the well casing and placed immediately above the screened interval for the well. In some instances, a pump is permanently installed in a well.

The second method consisted of air-lifting the water using an air compressor and one-inch flexible plastic tubing. The plastic tubing was lowered approximately 180 feet below the well collar except for shallow wells where a depth of approximately 80 feet was used.

For both methods, one to two casing bore volumes were pumped from the well before the sample was taken. Electrical conductivity, temperature and pH were normally tested in the field.

Whenever possible, samples were collected and delivered to the laboratory within a twenty-four hour period to begin alkalinity analyses. Sample bottles used to analyze trace metals are pre-acidified in the laboratory to avoid field contamination. Chemical analyses were performed using standard methods.

Water Quality Data

The ground water chemical analyses for the O Aquifer (O_2 member) are reported in Table D-6.3.01. Most of the wells sampled exist outside the permit area. Table D-6.3.02 lists the chemical data for wells penetrating the O Aquifer and completed in the O_1 sand within the permit area. Tables D-6.3.03 through D-6.3.07 represent data from wells completed in the N Aquifer, M Aquifer and Basal Aquifers within the permit area.

The location of the wells sampled within the permit area is shown on Figure D-6.2.01 (Appendix D-6.2). The location of wells sampled outside the permit area is given on Figure II.4.3.01 in Section II.4.3. Table D-6.1.02 (Appendix D-6.1) lists the well data to the extent the information is available for wells sampled outside the permit area. Table D-6.2.01 (Appendix D-6.2) lists the well completion data for wells sampled within the permit area.

DEFINITION OF TERMS FOR FOLLOWING TABLE(S)

LAB = Laboratory performing the analyses
JOB = Job ID number assigned by laboratory
DS = Date sample was taken
DA = Date chemical analyses started for the sample
WN = Computer well number
SPN = Computer sample number

Parameter			Units
PH	=	-log[H+]	
TC	=	Temperature	degrees centigrade
CD	=	Electrical conductivity	μmhos/cm
NH3	=	Ammonia	mg/l
NO3	=	Nitrite/Nitrate total	"
HCO3	=	Bicarbonate	"
CO_3	=	Carbonate	"
CA	=	Calcium	"
CL	=	Chloride	"
B	=	Boron	"
F	=	Fluoride	"
MG	=	Magnesium	"
K	=	Potassium	"
NA	=	Sodium	"
SO4	=	Sulfate	"
AL	=	Aluminium	"
AS	=	Arsenic	"
BA	=	Barium	"
CD	=	Cadmium	"
CR	=	Chromium	"
CU	=	Copper	"
FE	=	Iron	"
PB	=	Lead	"
MN	=	Manganese	"
HG	=	Mercury	"
MO	=	Molybdenum	"
NI	=	Nickel	"
RA	=	Radium 226	pCi/l
RAER	=	Radium 226 error associated w/analysis	pCi/l
SE	=	Selenium	mg/l
TH	=	Thorium	pCi/l
U	=	Uranium	mg/l
V	=	Vanadium	"
ZN	=	Zinc	"
TDS	=	Total Dissolved Solids	"
CTDS	=	Total Dissolved Solids calculated by summation of Ca+Mg+Na+K+HCO3+CO3+SO4+Cl	"
CAT	=	# of milliequivalents of Ca+Na+Mg+Na	meq/l
AN	=	# of milliequivalents of $HCO_3+CO_3+SO_4+Cl$	"
CB	=	Charge balance calculated as: [(CAT-AN)/CAT+AN]100	%

USER CODE = computer operators code for selecting analyses to use in statistical computation (100 means use all analyses)

MEAN = mean of all samples listed for a given well (well mean). Mean reported on "Water Quality Analysis for Selected Wells" table is calculated by averaging the means for each parameter using the wells printed on the bottom of the table (population mean)
STDV = Standard deviation for respective mean
NSMP = Number of samples used to calculate well mean
NWEL = Number of wells used to calculate population mean
MAX = Maximum value listed for a given parameter for a given well
MIM = Minimum value listed for a given parameter for a given well
MXOBS = Maximum value for a parameter observed in any sample used to calculate a well mean
MNOBS = Minimum value for a parameter observed in any sample used to calculate a well mean
NA = Not available or not analyzed
minus sign = A minus sign after a number indicates the detection limit for the analysis and that the parameter concentration is at below detectable levels.

TABLE D-6.3.01

WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.69	Ø.26	14	7	8.9Ø
TC	11.37	4.78	1Ø	9	36
CD	981.65	26Ø.98	14	62Ø	325Ø
NH3	Ø.5Ø	Ø.73	14	Ø.01	16
NO3	Ø.6Ø	Ø.32	14	Ø.04	1.85
HCO3	251.38	12.85	14	187	285
CO3	Ø.36	Ø.29	14	Ø	2
CA	117.31	17.25	14	66	154
CL	3.7Ø	1.Ø7	14	Ø.5Ø	1Ø
B	Ø.Ø6	Ø.Ø3	14	Ø	Ø.22
F	Ø.69	Ø.13	14	Ø.37	Ø.95
MG	19.57	5.32	14	Ø.2Ø	32
K	9.66	2.59	14	7	25.6Ø
NA	32.Ø2	1.61	14	22	56
SO4	235.16	46.13	14	1Ø8	325
AL	Ø.14	Ø.11	14	Ø.Ø5	Ø.4Ø
AS	Ø.Ø1	Ø.ØØ	14	Ø.ØØ	Ø.Ø1
BA	Ø.Ø8	Ø.Ø6	14	Ø.Ø3	Ø.55
CD	Ø.Ø2	Ø.Ø2	14	Ø.Ø1	Ø.Ø5
CR	Ø.Ø4	Ø.ØØ	14	Ø.Ø1	Ø.Ø6
CU	Ø.Ø5	Ø.ØØ	14	Ø.Ø1	Ø.Ø5
FE	Ø.22	Ø.24	14	Ø.Ø1	Ø.84
PB	Ø.Ø5	Ø.Ø1	14	Ø.Ø1	Ø.14
MN	Ø.19	Ø.13	14	Ø.Ø1	Ø.68
HG	.ØØ129	.ØØØ83	14	.ØØ1ØØ	.ØØ4ØØ
MO	Ø.37	Ø.Ø1	14	Ø.Ø5	Ø.1Ø
NI	Ø.Ø5	Ø.ØØ	14	Ø.Ø2	Ø.Ø5
RA	2.42	2.Ø4	13	Ø.Ø5	8.5Ø
RAER	Ø	Ø.ØØØ	Ø	Ø	Ø
SE	Ø.Ø1	Ø.ØØ	14	Ø.Ø1	Ø.Ø4
TH	1.Ø2	Ø.98	11	Ø	3
U	Ø.1Ø	Ø.Ø7	14	Ø.Ø1	1.ØØ
V	Ø.35	Ø.14	14	Ø.Ø1	1.ØØ
ZN	Ø.14	Ø.16	14	Ø.Ø3	Ø.82
TDS	6Ø2.Ø5	4Ø.19	14	484	7ØØ
CTDS	674.Ø5	61.68	14	498	768
CAT	9.12	Ø.7Ø	14	7.Ø4	1Ø.16
AN	9.21	1.Ø3	14	6.42	11.14
CB	4.15	2.73	14	Ø.13	18.6Ø
USER CODE		1ØØ.ØØ			

Wells used in this summary are: PN5-LOM1 PN5-LOM3 PN5-LAY3 PN5-NEG2 PN5-NEG3 PN5-DEV1 PN5-HC-1 PN5-HC-2 PN5-LUC1 PN5-LUC2 PN5-HIC1 PN5-KT-1 PN5-KT-2 PN5-LAP1

TABLE [illegible].01 (Continued)

W TER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-LOM1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON						
JOB	274	1102						
DS	012080	051580						
DA	012180	051580						
WN	1	1	MEAN	STDV	NSMP	MIN	MAX	
SPN	1	2						
PH	7.20	7.48	7.34	0.20	2	7.20	7.48	
TC	NA	NA	0	0	0	0	0	
CD	800	655	727.50	102.53	2	655	800	
NH3	1.001-	0.13	0.57	0.62	2	0.13	1.00	
NO3	1.40	0.100-	0.75	0.92	2	0.10	1.40	
HCO3	253	274	263.50	14.85	2	253	274	
CO3	0.000	0.000	0	0	2	0	0	
CA	151	100	125.50	36.06	2	100	151	
CL	2.60	4	3.30	0.99	2	2.60	4	
B	0.050-	0.050-	0.05	0	2	0.05	0.05	
F	0.40	0.58	0.49	0.13	2	0.40	0.58	
MG	0.20	25.80	13	18.10	2	0.20	25.80	
K	9	7.50	8.25	1.06	2	7.50	9	
NA	31	33	32	1.41	2	31	33	
SO4	275	236	255.50	27.58	2	236	275	
AL	0.100-	0.15	0.13	0.04	2	0.10	0.15	
AS	0.005-	0.005-	0.01	0	2	0.01	0.01	
BA	0.050-	0.050-	0.05	0	2	0.05	0.05	
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05	
CR	0.050-	0.050-	0.05	0	2	0.05	0.05	
CU	0.050-	0.050-	0.05	0	2	0.05	0.05	
FE	0.10	0.15	0.13	0.04	2	0.10	0.15	
PB	0.050-	0.050-	0.05	0	2	0.05	0.05	
MN	0.16	0.54	0.35	0.27	2	0.16	0.54	
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100	
MO	0.100-	0.050-	0.08	0.04	2	0.05	0.10	
NI	0.050-	0.050-	0.05	0	2	0.05	0.05	
RA	NA	6.31	6.31	0	1	6.31	6.31	
RAER	NA	0.52						
SE	0.005-	0.005-	0.01	0	2	0.01	0.01	
TH	NA	3	3	0	1	3	3	
U	0.100-	0.100-	0.10	0	2	0.10	0.10	
V	0.500-	0.050-	0.28	0.32	2	0.05	0.50	
ZN	0.050-	0.080	0.07	0.02	2	0.05	0.08	
TDS	568	586	577	12.73	2	568	586	
CTDS	721.80	680.30	701.05	29.34	2	680.30	721.80	
CAT	9.13	8.74	8.93	0.28	2	8.74	9.13	
AN	9.95	9.52	9.73	0.30	2	9.52	9.95	
CB	4.275-	4.259-	4.27	0.01	2	4.26	4.28	
USER CODE		100.00						

TABLE D-6.3.01 (Continued)

WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-LOM3

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	359	1109
DS	020480	051980
DA	020680	051980

WN	2	2	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	NA	7.18	7.18	0	1	7.18	7.18
T[illegible]	NA	NA	0	0	0	0	0
CD	900	620	760	197.99	2	620	900
NH3	1.001-	0.54	0.77	0.33	2	0.54	1.00
NO3	0.56	0.100-	0.33	0.33	2	0.10	0.56
HCO3	266	264	265	1.41	2	264	266
CO3	0.000	0.000	0	0	2	0	0
CA	119	115	117	2.83	2	115	119
CL	6.40	4	5.20	1.70	2	4	6.40
B	0.050-	0.050-	0.05	0	2	0.05	0.05
F	0.72	0.73	0.73	0.01	2	0.72	0.73
MG	30	24.30	27.15	4.03	2	24.30	30
K	9.30	9.50	9.40	0.14	2	9.30	9.50
NA	32	31	31.50	0.71	2	31	32
SO4	230	236	233	4.24	2	230	236
AL	0.050-	0.050-	0.05	0	2	0.05	0.05
AS	0.007	0.007	0.01	0	2	0.01	0.01
BA	0.550-	0.050-	0.30	0.35	2	0.05	0.55
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.25	0.40	0.33	0.11	2	0.25	0.40
PB	0.12	0.050-	0.09	0.05	2	0.05	0.12
MN	0.40	0.68	0.54	0.20	2	0.40	0.68
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.100-	0.050	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050	0.05	0	2	0.05	0.05
RA	NA	1.32	1.32	0	1	1.32	1.32
RAER	NA	0.46					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	0.20	0.20	0	1	0.20	0.20
U	0.100-	0.100-	0.10	0	2	0.10	0.10
V	0.500-	0.050-	0.28	0.32	2	0.05	0.50
ZN	0.050-	0.050-	0.05	0	2	0.05	0.05
TDS	614	631	622.50	12.02	2	614	631
CTDS	692.70	683.80	688.25	6.29	2	683.80	692.70
CAT	10.04	9.33	9.68	0.50	2	9.33	10.04
AN	9.33	9.35	9.34	0.02	2	9.33	9.35
CB	3.65	0.131-	1.89	2.49	2	0.13	3.65

USER CODE 100.00

TABLE [illegible].01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-LAY3

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	NA	NA	NA	CDM	PALS	TETON
JOB	NA	NA	NA	NA	1300	7
DS	100278	112778	112778	060879	081779	110579
DA	NA	NA	NA	NA	083179	110679

WN	21	21	21	21	21	21	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6					
PH	NA	NA	NA	NA	7.90	NA	7.90	0	1	7.90	7.90
TC	36	23	NA	NA	15	NA	24.67	10.60	3	15	36
CD	NA	NA	NA	NA	870	NA	870	0	1	870	870
NH3	0.18	0.010-	NA	1.50	0.010-	0.090	0.36	0.64	5	0.01	1.50
NO3	NA	NA	NA	NA	0.80	1.71	1.26	0.64	2	0.80	1.71
HCO3	NA	187	NA	220	232	233	218	21.49	4	187	233
CO3	NA	NA	NA	NA	2-	0.000	1	1.41	2	0	2
CA	66	90	NA	88.90	94	102	88.18	13.42	5	66	102
CL	0.50	2	NA	3	7	7.10	3.92	2.99	5	0.50	7.10
B	NA	NA	NA	NA	0.150-	0.000	.0.08	0.11	2	0	0.15
F	NA	NA	NA	NA	0.64	0.85	0.75	0.15	2	0.64	0.85
MG	NA	NA	NA	NA	11	16	13.50	3.54	2	11	16
K	NA	NA	NA	NA	11	25.60	18.30	10.32	2	11	25.60
NA	22	26	NA	27.60	30	56	32.32	13.55	5	22	56
SO4	NA	NA	NA	NA	200	120	160	56.57	2	120	200
AL	NA	NA	NA	NA	0.100-	0.100-	0.10	0	2	0.10	0.10
AS	0.005-	0.005-	NA	0.006	0.010-	0.005-	0.01	0.00	5	0.01	0.01
BA	NA	NA	NA	NA	0.030-	0.100-	0.07	0.05	2	0.03	0.10
CD	NA	NA	NA	NA	0.005-	0.005-	0.01	0	2	0.01	0.01
CR	NA	NA	NA	NA	0.020-	0.050-	0.04	0.02	2	0.02	0.05
CU	NA	NA	NA	NA	0.030	0.050-	0.04	0.01	2	0.03	0.05
FE	0.060	0.050-	NA	0.16	0.090	0.040	0.08	0.05	5	0.04	0.16
PB	0.020-	0.020-	NA	0.060	0.010	0.050-	0.03	0.02	[illegible]	0.01	0.06
MN	NA	NA	NA	NA	0.010-	0.050-	0.03	0.03	2	0.01	0.05
HG	NA	NA	NA	NA	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	NA	NA	NA	NA	0.050-	0.100-	0.08	0.04	2	0.05	0.10
NI	NA	NA	NA	NA	0.050	0.050-	0.05	0	2	0.05	0.05
RA	NA	4.10	0.50	NA	1.20	2.39	2.05	1.58	4	0.50	4.10
RAER	NA	0.60	1	NA	NA	NA					
SE	0.005-	0.005-	NA	0.006	0.010-	0.005-	0.01	[illegible]	5	0.01	0.01
TH	NA	NA	NA	NA	NA	NA	0	0	0	0	0
U	NA	NA	NA	NA	0.017	0.100-	0.06	0.06	2	0.02	0.10
V	1.001-	1.001-	NA	0.005-	NA	0.500-	0.63	0.48	4	0.01	1.00
ZN	NA	NA	NA	NA	0.19	0.080	0.14	0.08	2	0.08	0.19
TDS	NA	NA	NA	NA	484	526	505	29.70	2	484	526
CTDS	NA	NA	NA	NA	587	559.70	573.35	19.30	2	559.70	587
CAT	NA	NA	NA	NA	7.18	9.50	8.34	1.64	2	7.18	9.50
AN	NA	NA	NA	NA	8.23	6.52	7.37	1.21	2	6.52	8.23
CB	NA	NA	NA	NA	6.805-	18.60	12.70	8.34	2	6.81	18.60

USER CODE 100.00

TABLE D-6.3.01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-NEG2

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	NA	NA	CDM	PALS	TETON	TETON	TETON					
JOB	NA	NA	NA	1282	25	379	1047					
DS	101778	112878	080879	081679	110779	021280	050580					
DA	NA	NA	NA	083179	110879	021280	050580					
WN	23	23	23	23	23	23	23	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6	7					
PH	NA	7.20	NA	7.81	NA	7.60	7.40	7.50	0.26	4	7.20	81
TC	NA	NA	NA	9	NA	NA	NA	9	0	1	9	9
CD	NA	NA	NA	924	NA	850	665	813	133.41	3	665	924
NH3	0.020	0.010-	0.1	0.010-	0.070	0.26	NA	0.09	0.10	6	0.01	0.26
NO3	NA	NA	NA	0.90	0.51	1.85	0.33	0.90	0.68	4	0.33	1.85
HCO3	276	285	240	268	244	272	276	265.86	17.13	7	240	285
CO3	NA	0.000	NA	2-	0.000	0.000	0.000	0.40	0.89	5	0	2
CA	118	124	129	123	138	116	114	123.14	8.34	7	114	138
CL	3	5	3	8	3.50	10	5	5.36	2.69	7	3	10
B	NA	NA	NA	0.150-	0.000	0.050-	0.050	0.06	0.06	4	0	0.15
F	NA	NA	NA	0.48	0.93	0.60	0.63	0.66	0.19	4	0.48	0.93
MG	NA	NA	NA	17	12	19	25.20	18.30	5.46	4	12	25.20
K	NA	NA	NA	10	8.80	7	8.50	8.58	1.23	4	7	10
NA	40	31	28.80	33	35	34	29	32.97	3.91	7	28.80	40
SO4	NA	NA	NA	213	235	230	260	234.50	19.43	4	213	260
AL	NA	NA	NA	0.100-	0.100-	0.100-	0.090	0.10	0.01	4	0.09	0.10
AS	0.005-	0.005-	0.004	0.010-	0.005-	0.005-	0.005-	0.01	0.00	7	0.00	0.01
BA	NA	NA	NA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	NA	NA	NA	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	NA	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	NA	NA	NA	0.040	0.050-	0.050-	0.050-	0.05	0.01	4	0.04	0.05
FE	0.050	0.050	0.18	0.28	0.34	0.22	0.090	0.17	0.11	7	0.05	0.34
PB	0.020-	0.020-	0.14	0.010-	0.050-	0.050-	0.050-	0.05	0.04	7	0.01	0.14
MN	NA	NA	NA	0.040	0.31	0.050-	0.050-	0.11	0.13	4	0.04	0.31
HG	NA	NA	NA	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	NA	NA	NA	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	NA	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
PA	5.20	4.60	NA	NA	3.69	NA	0.88	3.59	1.91	4	0.88	5.20
RAER	1.50	0.60	NA	NA	0.005-	NA	0.37					
SE	0.005-	0.005-	0.007	0.010-	0.005-	0.005-	0.005-	0 01	0.00	7	0.01	0.01
TH	NA	NA	NA	NA	NA	NA	0.000	0	0	1	0	0
U	NA	NA	NA	0.016	0.100-	0.100-	0.100-	0.08	0.04	4	0.02	0.10
V	1.001-	1.001-	0.005-	NA	0.500-	0.100-	0.050-	0.44	0.47	6	0.01	1.00
ZN	NA	NA	NA	0.34	0.10	0.32	0.48	0.31	0.16	4	0.10	0.48
TDS	NA	NA	NA	586	564	580	616	586.50	21.75	4	564	616
CTDS	NA	NA	NA	674	676.30	688	717.70	689	20.09	4	674	717.70
CAT	NA	NA	NA	9.23	9.62	9.01	9.24	9.27	0.25	4	9.01	9.62
AN	NA	NA	NA	9.12	8.99	9.53	10.08	9.43	0.49	4	8.99	10.08
CB	NA	NA	NA	0.59	3.39	2.802-	4.335-	2.78	1.59	4	0.59	4.33

USER CODE 100.00

TABLE D[illegible].01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-NEG3

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	NA	CDM	PALS	TETON	TETON	TETON
OB	NA	NA	1283	11	380	1048
JS	101778	060879	081679	110679	021280	050580
DA	NA	NA	083179	110779	021280	050580

WN	24	24	24	24	24	24	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6					
PH	NA	NA	7.80	NA	7.50	7.33	7.54	0.24	3	7.33	7.80
TC	NA	NA	9	NA	NA	NA	9	0	1	9	9
CD	NA	NA	1430	NA	875	655	986.67	399.38	3	655	1430
NH3	0.040	0.22	0.010-	0.050	0.15	NA	0.09	0.09	5	0.01	0.22
NO3	NA	NA	0.60	0.39	0.56	0.13	0.42	0.21	4	0.13	0.60
HCO3	243	240	268	262	266	259	256.33	11.94	6	240	268
CO3	NA	NA	2-	0.000	0.000	0.000	0.50	1	4	0	2
CA	116	136	121	125	112	102	118.67	11.62	6	102	136
CL	1	2	8	7.10	4.40	3	4.25	2.81	6	1	8
B	NA	NA	0.19	0.22	0.050-	0.050-	0.13	0.09	4	0.05	0.22
F	NA	NA	0.46	0.82	0.66	0.62	0.64	0.15	4	0.46	0.82
MG	NA	NA	20	21	29	28.10	24.53	4.68	4	20	29
K	NA	NA	10	10.60	8	9.50	9.53	1.11	4	8	10.60
NA	36	32.10	35	35	36	31.50	34.27	1.97	6	31.50	36
SO4	NA	NA	233	250	287	258	257	22.55	4	233	287
AL	NA	NA	0.10	0.10	0.100-	0.10	0.10	0	4	0.10	0.10
AS	0.005-	0.009	0.010-	0.005-	0.005-	0.005-	0.01	0.00	6	0.01	0.01
BA	NA	NA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	NA	NA	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	NA	NA	0.050	0.050-	0.050-	0.050-	0.05	0	4	0.05	0.05
FE	0.050	0.29	0.24	0.090	0.080	0.070	0.14	0.10	6	0.05	0.29
PB	0.020-	0.040	0.010-	0.050-	0.050-	0.050-	0.04	0.02	6	0.01	0.05
MN	NA	NA	0.14	0.050-	0.050	0.050-	0.07	0.05	4	0.05	0.14
HG	NA	NA	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	NA	NA	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	1.10	NA	NA	1.37	NA	0.58	1.02	0.40	3	0.58	1.37
RAER	0.70	NA	NA	NA	NA	0.29					
SE	0.005-	0.005	0.010-	0.005-	0.005-	0.005-	0.01	0.00	6	0.01	0.01
TH	NA	NA	NA	NA	NA	1	1	0	1	1	1
U	NA	NA	0.022	0.20	0.100-	0.100-	0.11	0.07	4	0.02	0.20
V	1.001-	0.005-	NA	0.500-	0.100-	0.050-	0.33	0.42	5	0.01	1.00
ZN	NA	NA	0.10	0.030	0.050-	0.030	0.05	0.03	4	0.03	0.10
TDS	NA	NA	554	590	616	632	598	34.06	4	554	[illegible]
CTDS	NA	NA	697	710.70	742.40	691.10	710.30	22.92	4	691.10	742.40
CAT	NA	NA	9.46	9.76	9.74	9.01	9.49	0.35	4	9.01	9.76
AN	NA	NA	9.54	9.70	10.46	9.70	9.85	0.41	4	9.54	10.46
CB	NA	NA	0.392-	0.30	3.535-	3.669-	1.98	1.88	4	0.30	3.67

USER CODE 100.00

TABLE D-6.3.01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-DEV1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	NA	CDM	CDM	PALS	TETON	TETON	TETON
JOB	NA	NA	8049	1289	24	381	1049
DS	092978	112778	060879	081679	110779	021280	050580
DA	NA	NA	NA	083179	110879	021280	050680

WN	25	25	25	25	25	25	25	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6	7					
PH	NA	NA	NA	7.90	NA	8.10	7.53	7.84	0.29	3	7.53	8.10
TC	NA	NA	NA	12	NA	NA	NA	12	0	1	12	12
CD	NA	NA	NA	1273	NA	850	665	929.33	311.67	3	665	1273
NH3	0.090	0.010-	0.17	0.010-	0.050-	0.100-	0.37	0.11	0.13	7	0.01	0.37
NO3	NA	NA	NA	0.60	0.63	0.45	0.12	0.45	0.23	4	0.12	0.63
HCO3	235	192	230	256	254	263	251	240.14	24.26	7	192	263
CO3	0.000	0.000	0.000	2-	0.000	0.000	0.000	0.29	0.76	7	0	2
CA	121	120	134	119	136	96	114	120	13.33	7	96	136
CL	3	1	3	4	3.50	6	2	3.21	1.58	7	1	6
B	NA	NA	NA	0.010-	0.000	0.050	0.050-	0.03	0.03	4	0	0.05
F	NA	NA	NA	0.64	0.87	0.75	0.76	0.76	0.09	4	0.64	0.87
MG	NA	NA	NA	22	15	32	11	20	9.20	4	11	32
K	NA	NA	NA	10	9.10	8	9.50	9.15	0.85	4	8	10
NA	30	30	30	34	35	34	29	31.71	2.50	7	29	35
SO4	NA	NA	NA	275	275	286	266	275.50	8.19	4	266	286
AL	NA	NA	NA	0.100-	0.100-	0.100-	0.090	0.10	0.01	4	0.09	0.10
AS	0.005-	0.005-	0.002	0.010-	0.005-	0.005-	0.005-	0.01	0.00	7	0.00	0.01
BA	NA	NA	NA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	NA	NA	NA	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	NA	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	NA	NA	NA	0.010	0.050-	0.050-	0.050-	0.04	0.02	4	0.01	0.05
FE	0.080	0.050	0.060	0.23	0.060	0.10	0.10	0.10	0.06	7	0.05	0.23
PB	0.020-	0.020-	NA	0.010-	0.050-	0.11	0.050-	0.04	0.04	6	0.01	0.11
MN	NA	NA	0.10	0.10	0.080	0.060	0.10	0.09	0.02	5	0.06	0.10
HG	NA	NA	NA	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	NA	NA	NA	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	NA	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	5.40	2.20	NA	0.27	0.92	NA	0.71	1.90	2.08	5	0.27	5.40
RAER	2.10	0.50	NA	NA	NA	NA	0.39					
SE	0.005-	0.005-	0.006	0.015	0.005-	0.005-	0.005-	0.01	0.00	7	0.01	0.02
TH	NA	NA	NA	NA	NA	NA	0.000	0	0	1	0	0
U	NA	NA	NA	0.015	0.100-	0.100-	0.100-	0.08	0.04	4	0.02	0.10
V	1.001-	1.001-	0.005-	NA	0.500-	0.100-	0.050-	0.44	0.47	6	0.01	1.00
ZN	NA	NA	NA	0.090	0.030-	0.050	0.040	0.05	0.03	4	0.03	0.09
TDS	NA	NA	NA	670	574	592	629	616.25	42.52	4	574	670
CTDS	NA	NA	NA	722	727.60	725	682.50	714.28	21.31	4	682.50	727.60
CAT	NA	NA	NA	9.48	9.78	9.11	8.10	9.12	0.73	4	8.10	9.78
AN	NA	NA	NA	10.10	9.99	10.43	9.71	10.06	0.30	4	9.71	10.43
CB	NA	NA	NA	3.157-	1.072-	6.796-	9.045-	5.02	3.58	4	1.07	9.04

USER CODE 100.00

TABLE D[illegible].01 (Continued)

WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-HC-1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	NA	NA	CDM	PALS	TETON	TETON	TETON					
JOB	NA	NA	1287	18	382	1050						
DS	100278	112778	060879	081679	110779	021280	050580					
DA				083179	110879	021280	050580					
WN	26	26	26	26	26	26	26	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6	7					
PH	NA	NA	NA	7.99	NA	8.20	7.45	7.88	0.39	3	7.45	8.20
TC	NA	NA	NA	9	NA	NA	NA	9	0	1	9	9
CD	NA	NA	NA	2112	NA	890	650	1217.33	784.04	3	650	2112
NH3	0.080	0.010-	0.12	0.010-	0.050-	0.22	NA	0.08	0.08	6	0.01	0.22
NO3	NA	NA	NA	0.80	0.45	0.60	0.100-	0.49	0.30	4	0.10	0.80
HCO3	243	211	230	256	233	263	261	242.43	19.08	7	211	263
CO3	NA	0.000	NA	2-	0.000	0.000	0.000	0.40	0.89	5	0	2
CA	152	125	132	117	140	116	112	127.71	14.52	7	112	152
CL	2	1	3	4	3.50	4.80	2	2.90	1.32	7	1	4.80
B	NA	NA	NA	0.11	0.050	0.050	0.050-	0.07	0.03	4	0.05	0.11
F	NA	NA	NA	0.60	0.92	0.74	0.72	0.75	0.13	4	0.60	0.92
MG	NA	NA	NA	20	15	27	22	21	4.97	4	15	27
K	NA	NA	NA	10	9.10	8	9.60	9.18	0.87	4	8	10
NA	30	31	28.80	34	32	33	29	31.11	1.99	7	28.80	34
SO4	NA	NA	NA	325	250	281	251	276.75	35.24	4	250	325
AL	NA	NA	NA	0.100-	0.100-	0.100-	0.090	0.10	0.01	4	0.09	0.10
AS	0.005-	0.005-	0.007	0.010-	0.005-	0.005-	0.005-	0.01	0.00	7	0.01	0.01
BA	NA	NA	NA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	NA	NA	NA	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	NA	NA	NA	0.020-	0.050	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	NA	NA	NA	0.020	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
FE	0.010	0.060	0.050-	0.13	0.040	0.070	0.090	0.06	0.04	7	0.01	0.13
PB	0.020-	0.020-	0.14	0.010-	0.050-	0.050-	0.0⁵0-	0.05	0.04	7	0.01	0.14
MN	NA	NA	NA	0.24	0.21	0.090	[illegible]	0.17	0.07	4	0.09	0.24
HG	NA	NA	NA	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	NA	NA	NA	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	NA	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	8.50	2.20	NA	0.20	0.95	NA	1.16	2.60	3.37	5	0.20	8.50
RAER	2.10	0.50	NA	NA	NA	NA	0.41					
SE	0.005-	0.005-	[illegible]	0.010-	0.005-	0.005-	0.005-	0.01	0.00	7	0.01	0.01
TH	NA	NA	1	NA	NA	NA	1	1	0	1	1	1
U	1.001-	1.001-	0. 5-	0.016	0.100-	0.100-	0.100-	0.33	0.46	7	0.01	1.00
V	NA	NA	A	NA	0.500-	0.100-	0.050-	0.22	0.25	3	0.05	0.50
ZN	NA	NA	NA	0.27	0.15	0.73	0.82	0.49	0.33	4	0.15	0.82
TDS	NA	NA	NA	700	638	636	634	652	32.04	4	634	700
CTDS	NA	NA	NA	768	682.60	732.80	686.60	717.50	40.65	4	682.60	768
CAT	NA	NA	NA	9.22	9.84	9.65	8.91	9.40	0.42	4	8.91	9.84
AN	NA	NA	NA	11.14	9.12	10.30	9.56	10.03	0.89	4	9.12	11.14
CB	NA	NA	NA	9.448-	3.81	3.243-	3.545-	5.01	2.97	4	3.24	9.45

USER CODE 100.00

TABLE D-6.3.01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-HC-2

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	PALS	TETON	TETON	TETON
JOB	1286	19	383	1051
DS	081679	110779	021280	050580
DA	083179	110879	021280	050580

WN	27	27	27	27	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	8.12	NA	8.10	7.45	7.89	0.38	3	7.45	8.12
TC	10	NA	NA	NA	10	0	1	10	10
CD	3250	NA	890	620	1586.67	1446.80	3	620	3250
NH3	0.010-	0.050-	0.100-	NA	0.05	0.05	3	0.01	0.10
NO3	0.50	0.51	0.38	0.100-	0.37	0.19	4	0.10	0.51
HCO3	256	256	246	256	253.50	5.00	4	246	256
CO3	2-	0.000	0.000	0.000	0.50	1	4	0	2
CA	117	135	124	110	121.50	10.66	4	110	135
CL	6	3.50	4	3	4.13	1.31	4	3	6
B	0.090	0.000	0.050-	0.060	0.05	0.04	4	0	0.09
F	0.56	0.92	0.78	0.76	0.76	0.15	4	0.56	0.92
MG	21	17	22	28.10	22.03	4.59	4	17	28.10
K	10	10.40	8.50	9	9.48	0.88	4	8.50	10.40
NA	34	38	34	29	33.75	3.69	4	29	38
SO4	290	180	280	263	253.25	50.09	4	180	290
AL	0.100-	0.100-	0.100-	0.10	0.10	0	4	0.10	0.10
AS	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
BA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	0.020	0.060	0.050-	0.050-	0.05	0.02	4	0.02	0.06
CU	0.030	0.050-	0.050-	0.050-	0.05	0.01	4	0.03	0.05
FE	0.060	0.21	0.050-	0.030	0.09	0.08	4	0.03	0.21
PB	0.010-	0.050-	0.050	0.050-	0.04	0.02	4	0.01	0.05
MN	0.22	0.19	0.090	0.10	0.15	0.06	4	0.09	0.22
HG	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	0.050-	0.050-	0.050	0.050-	0.05	0	4	0.05	0.05
RA	0.050	1.09	NA	0.63	0.59	0.52	3	0.05	1.09
RAER	NA	NA	NA	0.31					
SE	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
TH	NA	NA	NA	2	2	0	1	2	2
U	0.014	0.100-	0.100-	0.100-	0.08	0.04	4	0.01	0.10
V	NA	0.500-	0.100-	0.050-	0.22	0.25	3	0.05	0.50
ZN	0.15	0.58	0.46	0.70	0.47	0.24	4	0.15	0.70
TDS	700	610	584	635	632.25	49.74	4	584	700
CTDS	736	639.90	718.50	698.10	698.13	41.79	4	639.90	736
CAT	9.30	10.05	9.69	9.29	9.59	0.76	4	9.29	10.05
AN	10.47	8.04	9.97	9.76	9.56	1.15	4	8.04	10.47
CB	5.913-	11.12	1.427-	2.436-	5.22	4.3[illegible]	4	1.43	11.12

USER CODE 100.00 •

TABLE D[illegible].01 (Continued)

WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-LUC1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	PALS	TETON	TETON	TETON
JOB	1284	22	384	1052
DS	081679	110779	021280	050580
DA	083179	110879	021280	050580

WN	28	28	28	28	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	7.20	NA	7.60	7.40	7.40	0.20	3	7.20	7.60
TC	11	NA	NA	NA	11	0	1	11	11
CD	954	NA	850	620	808	170.92	3	620	954
NH3	0.010-	0.090	0.100-	NA	0.07	0.05	3	0.01	0.10
NO3	0.50	0.040	0.37	0.100-	0.25	0.22	4	0.04	0.50
HCO3	256	276	255	254	260.25	10.53	4	254	276
CO3	2-	0.000	0.000	0.000	0.50	1	4	0	2
CA	117	144	108	102	117.75	18.55	4	102	144
CL	6	3.50	4	2	3.88	1.65	4	2	6
B	0.010-	0.20	0.050-	0.050-	0.08	0.08	4	0.01	0.20
F	0.60	0.95	0.82	0.76	0.78	0.15	4	0.60	0.95
MG	23	12	32	28.10	23.78	8.67	4	12	32
K	10	13.20	8	9	10.05	2.25	4	8	13.20
NA	33	38	33	29	33.25	3.69	4	29	38
SO4	280	240	264	248	258	17.74	4	240	280
AL	0.100-	0.10	0.100-	0.12	0.11	0.01	4	0.10	0.12
AS	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
BA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	0.040	0.050-	0.050-	0.050-	0.05	0.01	4	0.04	0.05
FE	0.090	0.080	0.10	0.21	0.12	0.06	4	0.08	0.21
PB	0.010-	0.050-	0.050-	0.050-	0.04	0.02	4	0.01	0.05
MN	0.24	0.30	0.15	0.20	0.22	0.06	4	0.15	0.30
HG	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	0.51	1.01	NA	0.69	0.74	0.25	3	0.51	1.01
RAER	NA	NA	NA	0.41					
SE	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
TH	NA	NA	NA	0.000	0	0	1	0	0
U	0.014	0.100-	0.100-	0.100	0.08	0.04	4	0.01	0.10
V	NA	0.500-	0.100-	0.050-	0.22	0.25	3	0.05	0.50
ZN	0.17	0.030-	0.050-	0.060	0.08	0.06	4	0.03	0.17
TDS	660	670	614	621	641.25	[illegible]	4	614	670
CTDS	727	726.70	704	672.10	707.45	25.91	4	672.10	727
CAT	9.42	10.16	9.66	8.89	9.53	0.53	4	8.89	10.16
AN	10.26	9.62	9.79	9.38	9.76	0.37	4	9.38	10.26
CB	4.267-	2.75	0.654-	2.681-	2.59	1.48	4	0.65	4.27

USER CODE 100.00

TABLE D-6.3.01 (Continued)

WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-LUC2

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	PALS	TETON	TETON	TETON
JOB	1288	23	385	1053
DS	081679	110779	021280	050580
DA	083179	110879	021280	050580

WN	29	29	29	29	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	7.96	NA	7.60	7.45	7.67	0.26	3	7.45	7.96
TC	10	NA	NA	NA	10	0	1	10	10
CD	1573	NA	875	655	1034.33	479.29	3	655	1573
NH3	0.010	0.10	0.100-	NA	0.07	0.05	3	0.01	0.10
NO3	0.50	0.34	0.35	0.100-	0.32	0.17	4	0.10	0.50
HCO3	244	250	240	254	247	6.22	4	240	254
CO3	2-	0.000	0.000	0.000	0.50	1	4	0	2
CA	111	141	117	108	119.25	14.97	4	108	141
CL	6	3.50	4	2	3.88	1.65	4	2	6
B	0.010-	0.22	0.050-	0.070	0.09	0.09	4	0.01	0.22
F	0.64	0.93	0.82	0.78	0.79	0.12	4	0.64	0.93
MG	23	10	29	25.60	21.90	8.31	4	10	29
K	10	9.40	7.80	9.20	9.10	0.93	4	7.80	10
NA	33	35	33	29	32.50	2.52	4	29	35
SO4	275	230	249	254	252	18.49	4	230	275
AL	0.100-	0.100-	0.100-	0.10	0.10	0	4	0.10	0.10
AS	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
BA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	0.020	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
FE	0.10	0.18	0.050-	0.050-	0.10	0.06	4	0.05	0.18
PB	0.010-	0.050-	0.050-	0.050-	0.04	0.02	4	0.01	0.05
MN	0.20	0.20	0.18	0.21	0.20	0.01	4	0.18	0.21
HG	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	0.050-	2.29	NA	0.75	1.03	1.15	3	0.05	2.29
RAER	NA	NA	NA	0.31					
SE	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
TH	NA	NA	NA	2	2	0	1	2	2
U	0.013	0.100-	0.100-	0.100-	0.08	0.04	4	0.01	0.10
V	NA	0.500-	0.100-	0.050-	0.22	0.25	3	0.05	0.50
ZN	0.060	0.10	0.050-	0.050-	0.07	0.02	4	0.05	0.10
TDS	652	580	594	616	610.50	31.38	4	580	652
CTDS	704	678.90	679.80	681.80	686.13	11.98	4	678.90	704
CAT	9.12	9.62	9.86	8.99	9.40	0.41	4	8.99	9.86
AN	9.96	8.98	9.23	9.51	9.42	0.42	4	8.98	9.96
CB	4.394-	3.42	3.29	2.789-	3.47	0.67	4	2.79	4.39
USER CODE	100.00								

TABLE D[illegible]01 (Continued)

WATER QU[illegible]ITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-HIC1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	PALS	TETON	TETON	TETON
JOB	1285	17	386	1054
DS	081679	110679	021280	050580
DA	083179	110779	021280	050580

WN	31	31	31	31	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	8	NA	7.50	7.53	7.68	0.28	3	7.50	8
TC	10	NA	NA	NA	10	0	1	10	10
CD	2730	NA	850	640	1406.67	1150.84	3	640	2730
NH3	0.010-	0.12	0.100-	NA	0.08	0.06	3	0.01	0.12
NO3	0.70	0.67	0.34	0.100-	0.45	0.29	4	0.10	0.70
HCO3	256	251	232	258	249.25	11.87	4	232	258
CO3	2-	0.000	0.000	0.000	0.50	1	4	0	2
CA	113	126	104	101	111	11.22	4	101	126
CL	6	7.10	4.80	2	4.98	2.19	4	2	7.10
B	0.010	0.10	0.050-	0.050-	0.05	0.04	4	0.01	0.10
F	0.52	0.94	0.76	0.74	0.74	0.17	4	0.52	0.94
MG	23	8	28	31.80	22.70	10.44	4	8	31.80
K	10	8.50	8	8.50	8.75	0.87	4	8	10
NA	33	30	33	28	31	2.45	4	28	33
SO4	276	210	259	236	245.25	28.65	4	210	276
AL	0.30	0.100-	0.100-	0.15	0.16	0.09	4	0.10	0.30
AS	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
BA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	0.010	0.050-	0.050-	0.050-	0.04	0.02	4	0.01	0.05
CU	0.030	0.050-	0.050-	0.050-	0.05	0.01	4	0.03	0.05
FE	0.40	0.040	0.19	0.070	0.18	0.16	4	0.04	0.40
PB	0.010-	0.050-	0.080	0.050-	0.05	0.03	4	0.01	0.08
MN	0.28	0.22	0.15	0.19	0.21	0.05	4	0.15	0.28
HG	.00100	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	0.050-	0.050-	0.050-	0.050-	0.05	0	4	0.05	0.05
RA	0.050-	1.04	NA	1.03	0.71	0.57	3	0.05	1.04
RAER	NA	NA	NA	0.41					
SE	0.010-	0.005-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
TH	NA	NA	NA	1	1	0	1	1	1
U	0.017	0.100-	0.100-	0.100-	0.08	0.04	4	0.02	0.10
V	NA	0.500-	0.100-	0.050-	0.22	0.25	3	0.05	0.50
ZN	0.090	0.030-	0.050	0.050	0.06	0.03	4	0.03	0.09
TDS	688	602	584	600	618.50	47.03	4	584	688
CTDS	719	640.60	668.80	665.30	673.43	32.87	4	640.60	719
CAT	9.22	8.47	9.13	9.09	8.98	0.34	4	8.47	9.22
AN	10.18	8.69	9.33	9.20	9.35	0.62	4	8.69	10.18
CB	4.929-	1.274-	1.069-	0.587-	1 [illegible]	[illegible].00	4	0.59	4.93

USER CODE 100.00 *

D-6.234

TABLE D-6.3.01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-KT-1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	NA	NA	CDM	PALS	TETON	TETON	TETON					
JOB	NA	NA	NA	1290	26	388	1056					
DS	092978	112778	060879	081679	110779	021280	050580					
DA	NA	NA	NA	083179	110879	021280	050580					
WN	32	32	32	32	32	32	32	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6	7					
PH	NA	7	NA	8.90	NA	8.30	7.35	7.89	0.87	4	7	8.90
TC	NA	NA	NA	9	NA	NA	NA	9	0	1	9	9
CD	NA	NA	NA	1571	NA	875	640	1028.67	484.15	3	640	1571
NH3	0.11	0.010-	16	0.010-	0.070	0.100-	NA	2.72	6.51	6	0.01	16
NO3	NA	NA	NA	0.50	0.51	0.56	0.100-	0.42	0.21	4	0.10	0.56
HCO3	237	240	230	256	244	254	254	245	9.98	7	230	256
CO3	NA	0.000	NA	2-	0.000	0.000	0.000	0.40	0.89	5	0	2
CA	117	120	129	113	138	108	105	118.57	11.67	7	105	138
CL	2	1	3	4	3.50	2.40	4	2.84	1.11	7	1	4
B	NA	NA	NA	0.010	0.000	0.050	0.080	0.04	0.04	4	0	0.08
F	NA	NA	NA	0.70	0.93	0.90	0.80	0.83	0.10	4	0.70	0.93
MG	NA	NA	NA	22	12	22	28.70	21.18	6.88	4	12	28.70
K	NA	NA	NA	10	8.80	8	9.20	9	0.83	4	8	10
NA	30	30	37.40	33	35	33	28	32.34	3.25	7	28	37.40
SO4	NA	NA	NA	287	235	235	257	253.50	24.62	4	235	287
AL	NA	NA	NA	0.100-	0.100-	0.100-	0.050	0.09	0.02	4	0.05	0.10
AS	0.005-	0.005-	0.002	0.010-	0.005-	0.005-	0.005-	0.01	0.00	7	0.00	0.01
BA	NA	NA	NA	0.030-	0.100-	0.050-	0.050-	0.06	0.03	4	0.03	0.10
CD	NA	NA	NA	0.005-	0.005-	0.010-	0.010-	0.01	0.00	4	0.01	0.01
CR	NA	NA	NA	0.020	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
CU	NA	NA	NA	0.020	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
FE	0.080	0.070	0.17	0.090	0.34	0.10	0.050-	0.13	0.10	7	0.05	0.34
PB	0.020-	0.020-	0.030	0.010-	0.050-	0.050-	0.050-	0.03	0.02	7	0.01	0.05
MN	NA	NA	NA	0.33	0.31	0.16	0.20	0.2[illegible]	0.08	4	0.16	0.33
HG	NA	NA	NA	.00100-	.00100-	.00100-	.00100-	.00100	.00000	4	.00100	.00100
MO	NA	NA	NA	0.050-	0.100-	0.050-	0.050-	0.06	0.03	4	0.05	0.10
NI	NA	NA	NA	0.020-	0.050-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	5.80	2.80	NA	0.49	3.69	NA	1.44	2.84	2.06	5	0.49	5.80
RAER	2.40	0.80	NA	NA	NA	NA	0.42					
SE	0.005-	0.005-	0.043	0.010-	0.005-	0.005-	0.005-	0.01	0.01	7	0.01	0.04
TH	NA	NA	NA	NA	NA	NA	1	1	0	1	1	1
U	NA	NA	NA	0.013	0.100-	0.100-	0.100-	0.08	0.04	4	0.01	0.10
V	1.001-	1.001-	0.005-	NA	0.500-	0.100-	0.050-	0.44	0.47	6	0.01	1.00
ZN	NA	NA	NA	0.030	0.10	0.050-	0.050-	0.06	0.03	4	0.03	0.10
TDS	NA	NA	NA	680	564	600	616	615	48.48	4	564	680
CTDS	NA	NA	NA	727	676.30	662.40	685.90	687.90	27.79	4	662.40	727
CAT	NA	NA	NA	9.14	9.62	8.84	9.05	9.16	0.33	4	8.84	9.62
AN	NA	NA	NA	10.3[illegible]	8.79	9.12	9.63	9.52	0.62	4	8.99	10.35
CB	NA	NA	NA	6.21	3.39	1.584-	3.067-	3.56	1.93	4	1.58	6.21

USER CODE 100.00

TABLE D-[illegible]3.01 (Continued)

WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-KT-2

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB TETON
JOB 98
DS 120479
DA NA

WN	36	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.95	7.95	0	1	7.95	7.95
TC	NA	0	0	0	0	0
CD	875	875	0	1	875	875
NH3	1.001-	1.00	0	1	1.00	1.00
NO3	1.001-	1.00	0	1	1.00	1.00
HCO3	251	251	0	1	251	251
CO3	0.000	0	0	1	0	0
CA	80	80	0	1	80	80
CL	2	2	0	1	2	2
B	0.050-	0.05	0	1	0.05	0.05
F	0.59	0.59	0	1	0.59	0.59
MG	18	18	0	1	18	18
K	7	7	0	1	7	7
NA	32	32	0	1	32	32
SO4	108	108	0	1	108	108
AL	0.40	0.40	0	1	0.40	0.40
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.050-	0.05	0	1	0.05	0.05
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.84	0.84	0	1	0.84	0.84
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.18	0.18	0	1	0.18	0.18
HG	.00200	.00200	.00000	1	.00200	.00200
MO	0.100-	0.10	0	1	0.10	0.10
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0 .00-	0.10	0	1	0.10	0.10
V	0.500-	0.50	0	1	0.50	0.5[illegible]
ZN	0.050-	0.05	0	1	0.05	0.05
TDS	618	618	0	1	618	618
CTDS	498	498	0	1	498	498
CAT	7.04	7.04	0	1	7.04	[illegible]04
AN	6.42	6.42	0	1	6.42	[illegible]42
CB	4.64	4.64	0.03	1	4.64	4.64

USER CODE 100.00

D-6.236

TABLE D-6.3.01 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_2 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-LAP1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 52
DS 111879
DA NA

WN	37	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	8.01	8.01	0	1	8.01	8.01
TC	NA	0	0	0	0	0
CD	700	700	0	1	700	700
NH3	1.001-	1.00	0	1	1.00	1.00
NO3	1.001-	1.00	0	1	1.00	1.00
HCO3	262	262	0	1	262	262
CO3	0.000	0	0	1	0	0
CA	154	154	0	1	154	154
CL	2	2	0	1	2	2
B	0.000	0	0	1	0	0
F	0.37	0.37	0	1	0.37	0.37
MG	7	7	0	1	7	7
K	9.50	9.50	0	1	9.50	9.50
NA	27.50	27.50	0	1	27.50	27.50
SO4	230	230	0	1	230	230
AL	0.40	0.40	0	1	0.40	0.40
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.050-	0.05	0	1	0.05	0.05
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.68	0.68	0	1	0.68	0.68
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.15	0.15	0	1	0.15	0.15
HG	.00400	.00400	.00000	1	.00400	.00400
MO	0.100-	0.10	0	1	0.10	0.10
NI	0.050-	0.05	0	1	0.05	0.05
RA	6.75	6.75	0	1	6.75	6.75
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.500-	0.50	0	1	0.50	0.50
ZN	0.050-	0.05	0	1	0.05	0.05
TDS	536	536	0	1	536	536
CTDS	692	692	0	1	692	692
CAT	9.70	9.70	0	1	9.70	9.70
AN	9.14	9.14	0	1	9.14	9.14
CB	2.97	2.97	0.03	1	2.97	2.97

USER CODE 100.00

TABLE D-[illegible]1

WATER QUALITY DATA FOR O AQUIFER (O_1 MEMBER)

(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.53	0.15	3	7.12	8.01
TC	11.30	0.42	2	11	12.80
CD	845.33	50.84	3	510	1100
NH3	0.57	0.42	3	0.01	1.13
NO3	0.78	0.25	3	0.04	1.62
HCO3	233.76	7.04	3	159	266
CO3	0.13	0.23	3	0	2
CA	143.63	24.16	3	88.50	193
CL	5.08	1.57	3	2	9
B	0.06	0.01	3	0.01	0.15
F	0.52	0.06	3	0.40	0.74
MG	17.24	7.12	3	0	35.40
K	10.69	0.37	3	8.50	14
NA	37.63	4.56	3	25	52.40
SO4	327.38	73.64	3	65	480
AL	0.20	0.12	3	0.05	0.50
AS	0.01	0.00	3	0.00	0.02
BA	0.07	0.05	3	0.03	0.40
CD	0.02	0.01	3	0.00	0.05
CR	0.04	0.01	3	0.01	0.10
CU	0.10	0.10	3	0.01	0.90
FE	0.18	0.09	3	0.02	0.46
PB	0.04	0.01	3	0.01	0.05
MN	0.07	0.03	3	0.01	0.16
HG	.00085	.00015	3	.00005	.00100
MO	0.10	0.04	3	0.00	0.50
NI	0.05	0.01	3	0.02	0.10
RA	7.93	7.83	3	1.21	38
RAER	0	0.000	0	0	0
SE	0.01	0.000	3	0.01	0.01
TH	2.50	2.49	3	0.30	5.20
U	0.09	0.01	3	0.04	0.10
V	0.25	0.09	3	0.05	0.50
ZN	0.06	0.03	3	0.01	0.16
TDS	710.87	101.16	3	580	883
CTDS	771.10	88.82	3	355.40	992.20
CAT	10.40	0.79	3	5.94	12.34
AN	10.73	1.47	3	4.08	14.61
B	5.36	2.67	3	2.67	18.51
USER CODE		100.00			

Wells used in this summary are: PN5-L304 PN5-L570 PN5-L583

TABLE D-6.3.02 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_1 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-L304

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	CDM	WAMCO	PALS	TETON	TETC.					
JOB	NA	NA	NA	251	1076					
DS	032279	060679	060779	011580	051380					
DA	NA	NA	NA	011680	051380					
WN	3	3	3	3	3	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5					
PH	7.80	8.01	8	7.12	7.43	7.67	0.39	5	7.12	8.01
TC	12.80	11	11	NA	NA	11.60	1.04	3	11	12.80
CD	1100	1010	1000	575	745	886	218.39	5	575	1100
NH3	0.100-	0.010-	0.010-	1.001-	0.31	0.29	0.42	5	0.01	1.00
NO3	0.040-	0.070-	0.500-	1.62	0.25	0.50	0.65	5	0.04	1.62
HCO3	266	234	232	159	242	226.60	40.[illegible]3	5	159	266
CO3	0.000	0.000	2	0.000	0.000	0.40	0.89	5	0	2
CA	137	142	127	88.50	140	126.90	22.23	5	88.50	142
CL	9	NA	8	4.40	3	6.10	2.86	4	3	9
B	0.13	0.010-	0.010-	0.050-	0.15	0.07	0.07	5	0.01	0.15
F	0.70	0.57	0.41	0.40	0.54	0.52	0.12	5	0.40	0.70
MG	35.40	32	32	0.000	26	25.08	14.42	5	0	35.40
K	12.40	9	14	8.50	11.50	11.08	2.31	5	8.50	14
NA	52.40	39	51	30	42	42.88	9.20	5	30	52.40
SO4	480	348	320	65	376	317.80	153.72	5	65	480
AL	0.20	0.050-	0.500-	0.30	0.10	0.23	0.18	5	0.05	0.50
AS	0.002	0.005-	0.010	0.022	0.005-	0.01	0.01	5	0.00	0.02
BA	0.10	0.030-	0.400-	0.050-	0.050-	0.13	0.16	5	0.03	0.40
CD	0.005	0.002-	0.020-	0.050-	0.010-	0.02	0.02	5	0.00	0.05
CR	0.010-	0.010-	0.100-	0.050-	0.050-	0.04	0.04	5	0.01	0.10
CU	0.040	0.010-	0.900-	0.050-	0.050-	0.21	0.39	5	0.01	0.90
FE	0.33	0.10	0.10	0.46	0.030	0.20	0.18	5	0.03	0.46
PB	0.030	0.010-	0.010-	0.050-	0.050-	0.03	0.02	5	0.01	0.05
MN	0.16	0.010-	0.040	0.050	0.050-	0.06	0.06	5	0.01	0.16
HG	.00005	.00050-	.00100-	.00100-	.00100-	.00071	.00043	5	.00005	.00100
MO	0.003	0.050-	0.500-	0.100-	0.050-	0.14	0.20	5	0.00	0.50
NI	0.040	0.020-	0.100-	0.050-	0.050-	0.05	0.03	5	0.02	0.10
RA	NA	10.20	38	NA	1.38	16.53	19.11	3	1.38	38
RAER	NA	0.90	NA	NA	0.50					
SE	0.005-	0.005-	0.005	0.005-	0.005-	0.01	0	5	0.01	0.01
TH	NA	NA	NA	NA	0.30	0.30	0	1	0.30	0.30
U	NA	0.039	0.090	0.100-	0.100-	0.08	0.03	4	0.04	0.10
V	NA	0.050-	NA	0.500-	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.16	0.010	0.16	0.050-	0.050-	0.09	0.07	5	0.[illegible]	0.16
TDS	883	724	812	750	739	781.60	65.84	5	724	883
CTDS	992.20	NA	786	355.40	840.50	743.53	273.06	4	355.40	992.20
CAT	12.34	NA	11.55	5.94	11.25	10.27	2.92	4	5.94	12.34
AN	14.61	NA	10.76	4.08	11.88	10.33	4.47	4	4.08	14.61
CB	8.394-	NA	3.54	18.51	2.739-	8.30	[illegible]25	4	2.74	18.51

USER CODE 100.00

TABLE D-6.3.02 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_1 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-L570

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	TETON	TETON
JOB	NA	263	570
DS	061579	011780	051380
DA	HA	011880	051380

WN	5	5	5	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.53	7.58	7.49	7.53	0.05	3	7.49	7.58
TC	11	NA	NA	11	0	1	11	11
CD	900	850	615	788.33	152.18	3	615	900
NH3	0.010-	1.001-	0.100-	0.37	0.55	3	0.01	1.00
NO3	0.260-	1.60	0.87	0.91	0.67	3	0.26	1.60
HCO3	244	234	244	240.67	5.77	3	234	244
CO3	0.000	0.000	0.000	0	0	3	0	0
CA	135	152	111	132.67	20.60	3	111	152
CL	6	6.60	5	5.87	0.81	3	5	6.60
B	0.020	0.050-	0.090	0.05	0.04	3	0.02	0.09
F	0.74	0.40	0.61	0.58	0.17	3	0.40	0.74
MG	20	1.40	25	15.47	12.44	3	1.40	25
K	10	10	11	10.33	0.58	3	10	11
NA	42	25	39	35.33	9.07	3	25	42
SO4	270	270	237	259	19.05	3	237	270
AL	0.050-	0.100-	0.050-	0.07	0.03	3	0.05	0.10
AS	0.005-	0.007	0.005-	0.01	0.00	3	0.01	0.01
BA	0.030-	0.050-	0.050-	0.04	0.01	3	0.03	0.05
CD	0.002-	0.050-	0.010-	0.02	0.03	3	0.00	0.05
CR	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
CU	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
FE	0.020	0.19	0.050-	0.09	0.09	3	0.02	0.19
PB	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
MN	0.010-	0.070	0.050-	0.04	0.03	3	0.01	0.07
HG	.00050-	.00100-	.00100-	.00083	.00029	3	.00050	.00100
MO	0.050-	0.100-	0.050-	0.07	0.03	3	0.05	0.10
NI	0.020-	0.050-	0.050-	0.04	0.02	3	0.02	0.05
RA	6.20	NA	5.89	6.05	0.22	2	5.89	6.20
RAER	0.70	NA	0.88					
SE	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	5.20	5.20	0	1	5.20	5.20
U	0.036	0.100-	0.100-	0.08	0.04	3	0.04	0.10
V	0.050-	0.500-	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.005	0.050-	0.050-	0.04	0.03	3	0.01	0.05
TDS	601	604	580	595	13.08	3	580	604
CTDS	727	699	672	699.33	27.50	3	672	727
CAT	10.46	9.04	9.57	9.69	0.72	3	9.04	10.46
AN	9.79	9.64	9.07	9.50	0.38	3	9.07	9.79
CB	3.33	3.209-	2.67	3.07	0.35	3	2.67	3.33

USER CODE 100.00

TABLE D-6.3.02 (Continued)
WATER QUALITY DATA FOR O AQUIFER (O_1 MEMBER)

ANALYSES FOR WELL
MAP NUMBER PN5-L583

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON	TETON					
JOB	268	275	1108					
DS	011880	012080	052080					
DA	011880	012180	052080					
WN	6	6	6	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.48	7.25	7.39	7.37	0.12	3	7.25	7.48
TC	NA	NA	NA	0	0	0	0	0
CD	1050	1025	510	861.67	304.81	3	510	1050
NH3	1.001-	1.001-	1.13	1.04	0.07	3	1.00	1.13
NO3	1.40	1.30	0.100-	0.93	0.72	3	0.10	1.40
HCO3	222	236	244	234	11.14	3	222	244
CO3	0.000	0.000	0.000	0	0	3	0	0
CA	193	188	133	171.33	33.29	3	133	193
CL	4.60	3.20	2	3.27	1.30	3	2	4.60
B	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
F	0.40	0.40	0.59	0.46	0.11	3	0.40	0.59
MG	0.20	4.30	29	11.17	15.58	3	0.20	29
K	11	11	10	10.67	0.58	3	10	11
NA	35	32	37	34.67	2.52	3	32	37
SO4	430	415	371	405.33	30.66	3	371	430
AL	0.30	0.30	0.30	0.30	0	3	0.30	0.30
AS	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
BA	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
CD	0.050-	0.050-	0.010-	0.04	0.02	3	0.01	0.05
CR	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
CU	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
FE	0.40	0.080	0.300-	0.26	0.16	3	0.08	0.40
PB	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
MN	0.10	0.10	0.11	0.10	0.01	3	0.10	0.11
HG	.00100-	.00100-	.00100-	.00100	.00000	3	.06.00	.00100
MO	0.100-	0.100-	0.050-	0.08	0.03	3	0.05	0.10
NI	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
RA	NA	NA	1.21	1.21	0	1	1.21	1.21
RAER	NA	NA	0.54					
SE	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	2	2	0	1	2	2
U	0.100-	0.100-	0.100-	0.10	0.00	3	0.10	0.10
V	0.500-	0.500-	0.050-	0.35	0.26	3	0.05	0.50
ZN	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
TDS	704	770	794	756	46.60	3	704	794
CTDS	895.80	889.50	826	870.43	38.61	3	826	895.80
CAT	11.45	11.41	10.89	11.25	0.31	3	10.89	11.45
AN	12.72	12.60	11.78	12.37	0.51	3	11.78	12.72
CB	5.254-	4.959-	3.937-	4.72	0.69	3	3.94	5.25

USER CODE 100.00

TABLE D-[illegible]03

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE
(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	8.39	Ø.84	8	7.1Ø	12.28
TC	45.89	93.24	7	7.8Ø	75Ø
CD	848.34	227.34	8	39Ø	2245
NH3	Ø.35	Ø.34	9	Ø.Ø1	2
NO3	Ø.51	Ø.57	9	Ø.Ø1	2.8Ø
HCO3	155.88	36.1Ø	8	17	22Ø
CO3	48.25	85.79	8	Ø	624
CA	1Ø4.5Ø	16.54	9	19	2Ø8
CL	2Ø.65	27.Ø6	8	1	123
B	Ø.Ø7	Ø.Ø7	9	Ø.Ø1	Ø.3Ø
F	Ø.45	Ø.Ø8	9	Ø.26	Ø.9Ø
MG	17.68	6.29	9	Ø	34
K	19.9Ø	18.57	9	7.7Ø	1ØØ
NA	37.95	5.6Ø	9	25	63
SO4	238.78	28.31	8	138	38Ø
AL	Ø.35	Ø.71	9	Ø.Ø1	7.6Ø
AS	Ø.Ø1	Ø.Ø2	9	Ø.ØØ	Ø.5Ø
BA	Ø.Ø7	Ø.Ø4	9	Ø.Ø3	Ø.5Ø
CD	Ø.Ø2	Ø.Ø1	9	Ø.ØØ	Ø.Ø5
CR	Ø.Ø4	Ø.Ø2	9	Ø.Ø1	Ø.1Ø
CU	Ø.Ø3	Ø.Ø1	9	Ø.Ø1	Ø.Ø9
FE	Ø.46	Ø.48	9	Ø.Ø1	3.79
PB	Ø.Ø4	Ø.Ø2	9	Ø.ØØ	Ø.3Ø
MN	Ø.Ø8	Ø.1Ø	9	Ø.Ø1	1.21
HG	.ØØ5Ø6	.Ø126Ø	9	.ØØØØ4	.11ØØØ
MO	Ø.Ø7	Ø.Ø4	9	Ø.ØØ	Ø.5Ø
NI	Ø.Ø4	Ø.Ø2	9	Ø.Ø1	Ø.1Ø
RA	194.28	232.81	7	Ø.5Ø	1389
RAER	Ø	Ø.ØØØ	Ø	Ø	Ø
SE	Ø.Ø1	Ø.ØØ	9	Ø.Ø1	Ø.Ø1
TH	4.93	7.64	7	Ø	22
U	Ø.31	Ø.48	8	Ø.ØØ	3.55
V	Ø.19	Ø.21	9	Ø.Ø1	1.ØØ
ZN	Ø.32	Ø.85	9	Ø.Ø1	9.Ø7
TDS	545.13	59.18	8	322	896
CTDS	644.4Ø	85.51	8	343.6Ø	1217.5Ø
CAT	8.81	1.Ø6	8	4.59	14.54
AN	9.72	2.56	8	5.Ø3	27.75
CB	5.51	4.73	8	Ø.18	31.23
USER CODE		1ØØ.ØØ			

Wells used in this summary are: PN5-LNR1 PN5-L302 PN5-L309 PN5-L317 PN5-L319
PN5-L572 PN5-L573 PN5-L574 PN5-LNM2

TABLE D-6.3.03 (Continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LNR1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 260
DS 011780
DA 011880

WN	2	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.78	7.78	0	1	7.78	7.78
TC	NA	0	0	0	0	0
CD	780	780	0	1	780	780
NH3	1.001-	1.00	0	1	1.00	1.00
NO3	1.80	1.80	0	1	1.80	1.80
HCO3	192	192	0	1	192	192
CO3	0.000	0	0	1	0	0
CA	134	134	0	1	134	134
CL	4.40	4.40	0	1	4.40	4.40
B	0.050-	0.05	0	1	0.05	0.05
F	0.30	0.30	0	1	0.30	0.30
MG	3.10	3.10	0	1	3.10	3.10
K	9.20	9.20	0	1	9.20	9.20
NA	29	29	0	1	29	29
SO4	255	255	0	1	255	255
AL	0.100-	0.10	0	1	0.10	0.10
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.050-	0.05	0	1	0.05	0.05
CD	0.050-	0.05	0	1	0.05	0.05
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.58	0.58	0	1	0.58	0.58
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.100-	0.10	0	1	0.10	0.10
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.500-	0.50	0	1	0.50	0.50
ZN	0.050-	0.05	0	1	0.05	0.05
TDS	548	548	0	1	548	548
CTDS	626.70	626.70	0	1	626.70	626.70
CAT	8.44	8.44	0	1	8.44	8.44
AN	8.58	8.58	0	1	8.58	8.58
CB	0.833-	0.83	5.04	1	0.83	0.83

USER CODE 130.00

TABLE D-6.3.03 (Continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L302

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	CDM	CDM	NRTHRN	NRTHRN	CDM	NRTHRN					
JOB											
DS	011079	011079	011079	011079	022879	022879					
DA	NA	NA				NA					
WN	3	3	3	3	3	3	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6					
PH	8	8	NA	NA	7.50	NA	7.83	0.29	3	7.50	8
TC	7.80	7.80	NA	NA	11	NA	8.87	1.85	3	7.80	11
CD	760	750	NA	NA	720	NA	743.33	20.82	3	720	760
NH3	0.20	0.10	0.24	1.08	0.14	0.77	0.42	0.40	6	0.10	1.08
NO3	0.020-	0.020-	0.010-	0.010-	0.040	0.010	0.02	0.01	6	0.01	0.04
HCO3	190	193	187	187	184	101	173.67	35.73	6	101	193
CO3	0.000	0.000	0.000	0.000	0.000	0.000	0	0	6	0	0
CA	137	152	98	99	129	98	118.83	23.64	6	98	152
CL	4	2	1	1	3	1	2	1.26	6	1	4
B	0.050-	0.050-	0.10	0.10	0.14	0.30	0.12	0.09	6	0.05	0.30
F	0.90	0.90	0.43	0.44	0.50	0.48	0.61	0.23	6	0.43	0.90
MG	20.70	21.70	24	25	20.60	25	22.83	2.08	6	20.60	25
K	9.80	8.70	9	9	13	9	9.75	1.63	6	8.70	13
NA	31	31	37	37	34	36	34.33	2.80	6	31	37
SO4	241	254	268	269	269	266	261.17	11.41	6	241	269
AL	0.090-	0.090-	0.50	0.10	0.20	0.100-	0.18	0.16	6	0.09	0.50
AS	0.006	0.005	0.005-	0.005-	0.002	0.500-	0.09	0.20	6	0.00	0.50
BA	0.050	0.050-	0.050-	0.500-	0.20	0.050-	0.15	0.18	6	0.05	0.50
CD	0.003	0.003	0.005-	0.005-	0.005	0.005-	0.00	0.00	6	0.00	0.01
CR	0.007-	0.007	0.020-	0.020-	0.009	0.020-	0.01	0.01	6	0.00	0.02
CU	0.020-	0.020-	0.010-	0.010-	0.016	0.010-	0.01	0.00	6	0.01	0.02
FE	0.69	0.74	0.980-	0.69	0.60	0.64	0.72	0.13	6	0.60	0.98
PB	0.001-	0.001-	0.020-	0.020-	0.020	0.020-	0.01	0.01	6	0.00	0.02
MN	0.048	0.048	0.060-	0.050	0.0[illegible]0	0.070	0.06	0.02	6	0.05	0.09
HG	.00006-	.00006-	.00100-	.00100-	.00004-	.00100-	.00053	.00052	6	.00004	.00100
MO	0.005-	0.005-	0.020-	0.020-	0.002	0.020-	0.01	0.01	6	0.00	0.02
NI	0.016	0.016	0.010-	0.010-	0.020	0.010-	0.01	0.00	6	0.01	0.02
RA	156	145	146	178	170	172	161.17	14.12	6	145	178
RAER	15	15	5	6	15	3					
SE	0.008	0.008	0.005-	0.005-	0.005-	0.005-	0.01	0.00	6	0.01	0.01
TH	0.000	NA	NA	NA	NA	NA	0	0	1	0	0
U	0.021	0.028	0.025-	0.018	0.007	0.008	0.02	0.01	6	0.01	0.03
V	0.005-	0.005-	1.001-	1.001-	NA	1.001-	0.60	0.55	5	0.01	1.00
ZN	0.054	0.021	0.030	0.020	0.054	0.030	0.03	0.02	6	0.02	0.05
TDS	NA	NA	NA	NA	530	540	535	7.07	2	530	540
CTDS	633.50	662.40	624	627	652.60	536	622.58	45.00	6	536	662.40
CAT	10.14	10.94	8.70	8.84	9.94	8.74	9.55	0.93	6	8.70	10.94
AN	8.24	8.51	8.67	8.69	8.70	7.22	8.34	0.58	6	7.22	8.70
CB	10.30	12.51	0.18	0.81	6.66	9.53	6.67	5.14	6	0.18	12.51

USER CODE 100.00

TABLE D-6.3.03 (Continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L309

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	PALS	TETON	TETON					
JOB			267	1080					
DS	060179	060779	011880	051380					
DA	NA	NA	011880	051380					
WN	4	4	4	4	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	8.11	8.10	7.30	10.20	8.43	1.24	4	7.30	10.20
TC	11	11	NA	NA	11	0	2	11	11
CD	835	950	650	390	706.25	244.39	4	390	950
NH3	0.010-	0.060	1.001-	0.25	0.33	0.46	4	0.01	1.00
NO3	0.050-	0.71	2.80	0.12	0.92	1.29	4	0.05	2.80
HCO3	220	207	201	17	161.25	96.49	4	17	220
CO3	0.000	2	0.000	12	3.50	5.74	4	0	12
CA	122	127	79	36	91	42.53	4	36	127
CL	6	2	10.40	9	6.85	3.72	4	2	10.40
B	0.010-	0.20	0.050-	0.070	0.08	0.08	4	0.01	0.20
F	0.61	0.40	0.40	0.42	0.46	0.10	4	0.40	0.61
MG	24	34	8.40	6	18.10	13.27	4	6	34
K	10	15	16	17.80	14.70	3.34	4	10	17.80
NA	30	39	36	60	41.25	13.05	4	30	60
SO4	274	380	245	197	274	77.47	4	197	380
AL	0.060	1.10	7.60	0.15	2.23	3.61	4	0.06	7.60
AS	0.005-	0.012	0.005-	0.005-	0.01	0.00	4	0.01	0.01
BA	0.030	0.400-	0.070	0.050-	0.14	0.18	4	0.03	0.40
CD	0.002-	0.020-	0.050-	0.010-	0.02	0.02	4	0.00	0.05
CR	0.010-	0.100-	0.050-	0.050-	0.05	0.04	4	0.01	0.10
CU	0.010	0.090-	0.070	0.050-	0.06	0.03	4	0.01	0.09
FE	0.10	2.10	3.79	0.16	1.54	1.77	4	0.10	3.79
PB	0.010	0.010-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
MN	0.040	0.090	1.21	0.050-	0.35	0.58	4	0.04	1.21
HG	.00005-	.00100-	.00100-	.00100-	.00076	.00047	4	.00005	.00100
MO	0.050-	0.50	0.100-	0.050-	0.18	0.22	4	0.05	0.50
NI	0.020-	0.100-	0.10	0.050-	0.07	0.04	4	0.02	0.10
RA	99.20	52	NA	37.40	62.87	32.30	3	37.40	99.20
RAER	2.60	NA	NA	2.50					
SE	0.005-	0.010-	0.005-	0.005-	0.01	0.00	4	0.01	0.01
TH	NA	NA	NA	1.70	1.70	0	1	1.70	1.70
U	0.76	0.43	0.100-	0.100-	0.35	0.32	4	0.10	0.76
V	0.050-	NA	0.500-	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.10	9.07	1.07	0.080	2.58	4.35	4	0.08	9.07
TDS	601	764	508	347	555	174.42	4	347	764
CTDS	686	806	595.80	354.80	610.65	191.07	4	354.80	806
CAT	9.62	11.21	6.61	5.36	8.20	2.69	4	5.36	11.21
AN	9.48	11.43	8.69	5.03	8.66	2.68	4	5.03	11.43
CB	0.75	0.942-	%13.600-	3.09	4.60	6.10	4	0.75	13.60

USER CODE 100.00

TABLE D-6.3.([illegible]continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L317

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	WAMCO	WAMCO	WAMCO	WAMCO					
JOB										
DS	061579	062679	062679	062779	062779					
DA	NA	NA	NA	NA	NA					
WN	7	7	7	7	7	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5					
PH	7.75	7.47	7.47	7.45	7.67	7.56	0.14	5	7.45	7.75
TC	11	11	11	11	11	11	0	5	11	11
CD	770	748	745	740	740	748.60	12.44	5	740	770
NH3	0.10	0.070	0.10	0.10	0.10	0.09	0.01	5	0.07	0.10
NO3	0.050-	0.910	0.020	0.030	0.050-	0.03	0.02	5	0.01	0.05
HCO3	195	171	195	195	200	191.20	11.50	5	171	200
CO3	0.000	0.000	0.000	0.000	0.000	0	0	5	0	0
CA	93	108	92	92	98	96.60	6.84	5	92	108
CL	14	8	4	8	6	8	3.74	5	4	14
B	0.010-	0.020	0.010-	0.010-	NA	0.01	0.00	4	0.01	0.02
F	0.61	0.40	0.35	0.53	NA	0.47	0.12	4	0.35	0.61
MG	25	17	29	24	23	23.60	4.34	5	17	29
K	18	11	10	10	9	11.60	3.65	5	9	18
NA	25	30	30	28	32	29	2.65	5	25	32
SO4	225	247	242	220	231	233	11.34	5	220	247
AL	0.070	0.060	0.27	0.020	NA	0.11	0.11	4	0.02	0.27
AS	0.005-	0.005-	0.005-	0.005-	NA	0.01	0	4	0.01	0.01
BA	0.030	0.030-	0.040	0.030-	NA	0.03	0.00	4	0.03	0.04
CD	0.002-	0.002-	0.002-	0.002-	NA	0.00	0	4	0.00	0.00
CR	0.010-	0.010-	0.010-	0.010-	NA	0.01	0	4	0.01	0.01
CU	0.010-	0.010	0.010-	0.010-	0.070	0.02	0.03	5	0.01	0.07
FE	0.070-	0.37	0.13	0.31	NA	0.22	0.14	4	0.07	0.37
PB	0.010-	0.010	0.010-	0.010-	NA	0.01	0	4	0.01	0.01
MN	0.020	0.090	0.050	0.050	NA	0.05	0.03	4	0.02	0.09
HG	.00050-	.00050-	.00500-	.00050-	NA	.00163	.00225	4	.00050	.00500
MO	0.050-	0.050-	0.050-	0.050-	NA	0.05	0	4	0.05	0.05
NI	0.020-	0.020-	0.020-	0.020-	NA	0.02	0	4	0.02	0.02
RA	954	394	591	434	NA	593.25	255.09	4	394	954
RAER	12	5.50	6.70	5.80	NA					
SE	0.005-	0.005-	0.005-	0.005-	NA	0.01	0	4	0.01	0.01
TH	NA	NA	NA	NA	NA	0	0	0	0	0
U	3.55	0.014	0.013	3.55	NA	1.78	2.04	4	0.01	3.55
V	0.050-	0.050-	0.050-	0.050-	NA	0.05	0	4	0.05	0.05
ZN	0.005-	0.005-	0.005-	0.005-	NA	0.01	0	4	0.01	0.01
TDS	515	511	513	515	513	513.40	1.67	5	511	515
CTDS	595	592	602	577	599	593	9.72	5	577	602
CAT	8.24	8.37	8.54	8.04	8.40	8.32	0.19	5	8.04	8.54
AN	8.28	8.17	8.35	8.00	8.26	8.21	0.13	5	8.00	8.35
CB	0.184-	1.23	1.12	0.23	0.89	0.73	0.49	5	0.18	1.23

USER CODE 100.00

TABLE D-6.3.03 (Continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L319

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	WAMCO	TETON	TETON
JOB			224	1082
DS	062179	062979	011480	051380
DA	NA	NA	011580	051380

WN	8	8	8	8	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	7.56	8.06	7.10	7.58	7.58	0.39	4	7.10	8.06
TC	11	11	NA	NA	11	0	2	11	11
CD	755	755	900	600	752.50	122.51	4	600	900
NH3	0.10	2	1.001-	0.100-	0.80	0.91	4	0.10	2
NO3	0.050	0.030	1.40	0.100-	0.40	0.67	4	0.03	1.40
HCO3	195	195	185	198	193.25	5.68	4	185	198
CO3	0.000	0.000	0.000	0.000	0	0	4	0	0
CA	96	92	144	85	104.25	26.89	4	85	144
CL	18	18	19.20	6	15.30	6.23	4	6	19.20
B	0.010-	0.020-	0.050-	0.080	0.04	0.03	4	0.01	0.08
F	0.54	0.51	0.30	0.43	0.45	0.11	4	0.30	0.54
MG	22	24	4.70	28.70	19.85	10.48	4	4.70	28.70
K	11	13	13.50	11	12.13	1.31	4	11	13.50
NA	36	36	37	36	36.25	0.50	4	36	37
SO4	225	226	355	258	266	61.28	4	225	355
AL	0.020	0.060	0.80	0.10	0.25	0.37	4	0.02	0.80
AS	0.005-	0.005-	0.018	0.005-	0.01	0.01	4	0.01	0.02
BA	0.030	0.030	0.050-	0.050-	0.04	0.01	4	0.03	0.05
CD	0.002-	0.002-	0.050-	0.010-	0.02	0.02	4	0.00	0.05
CR	0.010-	0.010-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
CU	0.010-	0.010-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
FE	0.14	0.030	1.60	0.56	0.58	0.72	4	0.03	1.60
PB	0.010-	0.010-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
MN	0.010-	0.060	0.060	0.050-	0.05	0.02	4	0.01	0.06
HG	.00050-	.00050-	.00100-	.00100-	.00075	.00029	4	.00050	.00100
MO	0.050-	0.050-	0.100-	0.050-	0.06	0.03	4	0.05	0.10
NI	0.020-	0.020-	0.050-	0.050-	0.04	0.02	[illegible]	0.02	0.05
RA	337	0.500-	NA	1389	575.50	724.32	3	0.50	1389
RAER	5	NA	NA	16					
SE	0.005-	0.005-	0.005-	0.005-	0.01	0	4	0.01	0.01
TH	NA	NA	NA	3.60	3.60	0	1	3.60	3.60
U	0.014	0.017	0.100-	0.100-	0.06	0.05	4	0.01	0.10
V	0.050-	0.050-	0.500-	0.050-	0.16	0.23	4	0.05	0.50
ZN	0.005-	0.005	0.050-	0.090	0.04	0.04	4	0.01	0.09
TDS	525	515	650	544	558.50	62.17	4	515	650
CTDS	603	604	758.40	622.70	647.03	74.80	4	603	758.40
CAT	8.45	8.46	[illegible].53	8.45	8.72	0.54	4	8.45	9.53
AN	8.39	8.41	10.96	8.77	9.14	1.23	4	8.39	10.96
CB	0.35	0.32	7.016-	1.951-	2.41	3.16	4	0.32	7.02

USER CODE 100.00

TABLE D-6.3.[illegible]ontinued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L572

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	PALS	WAMCO
JOB			
DS	062079	070279	062979
DA	NA	NA	NA

WN	10	10	10	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	8.63	8.50	NA	8.57	0.09	2	8.50	8.63
TC	11	11	11	11	0	3	11	11
CD	920	850	NA	885	49.50	2	850	920
NH3	0.035	NA	0.10	0.07	0.05	2	0.04	0.10
NO3	0.030	0.72	NA	0.37	0.49	2	0.03	0.72
HCO3	122	110	NA	116	8.49	2	110	122
CO3	5	12	NA	8.50	4.95	2	5	12
CA	56	61	NA	58.50	3.54	2	56	61
CL	92	62	66	73.33	16.29	3	62	92
B	0.010-	0.010-	NA	0.01	0	2	0.01	[illegible].01
F	0.51	0.32	NA	0.42	0.13	2	0.32	0.51
MG	22	23	NA	22.50	0.71	2	22	23
K	100	91	NA	95.50	6.36	2	91	100
NA	48	47	40	45	4.36	3	40	48
S04	206	202	218	208.67	8.[illegible]	3	202	218
AL	0.020	0.010-	NA	0.01	0.01	2	0.01	0.02
AS	0.005-	0.010-	NA	0.01	0.00	2	0.01	0.01
BA	0.050	0.100-	NA	0.08	0.04	2	0.05	0.10
CD	0.002-	0.040-	NA	0.02	0.03	2	0.00	0.04
CR	0.016-	0.100-	NA	0.06	0.06	2	0.01	0.10
CU	0.010-	0.050-	NA	0.03	0.03	2	0.01	0.05
FE	0.17	0.020-	0.030	0.07	0.08	3	0.02	0.17
PB	0.010-	0.010-	NA	0.01	0	2	0.01	0.01
MN	0.010-	0.010-	NA	0.01	0	2	0.01	0.01
HG	.00500-	.11000-	NA	.05750	.07425	2	.00500	.11000
MO	0.050-	0.100-	NA	0.08	0.04	2	0.05	0.10
NI	0.020-	0.050-	NA	0.04	0.02	2	0.02	0.05
RA	61	NA	NA	61	0	1	61	61
RAER	22	NA	NA					
SE	0.005-	0.009	NA	0.01	0.00	2	0.01	0.01
TH	NA	NA	NA	0	0	0	0	0
U	0.77	NA	NA	0.77	0	1	0.77	0.77
V	0.050-	NA	NA	0.05	0	1	0.05	0.05
ZN	0.020	0.050-	NA	0.04	0.02	2	0.02	0.05
TDS	615	598	532	581.67	43.84	3	532	615
CTDS	651	608	NA	629.50	30.41	2	608	651
CAT	9.25	9.31	NA	9.28	0.04	2	9.25	9.31
AN	9.05	8.16	NA	8.60	0.63	2	8.16	9.05
CB	1.09	6.59	NA	3.84	3.89	2	1.09	6.59

USER CODE 100.00

TABLE D-6.3.03 (Continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

POOR ORIGINAL

ANALYSES FOR WELL
MAP NUMBER PN5-L573

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	WAMCO	WAMCO					
JOB								
DS	062079	062179	062979					
DA	NA	NA	NA					
WN	11	11	11	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.91	7.85	NA	7.88	0.04	2	7.85	7.91
TC	11	11	750	257.33	426.66	3	11	750
CD	820	760	NA	790	42.43	2	760	820
NH3	0.10	0.10	NA	0.10	0	2	0.10	0.10
NO3	0.040	0.051	NA	0.05	0.01	2	0.04	0.05
HCO3	183	146	NA	164.50	26.16	2	146	183
CO3	0.000	0.000	NA	0	0	2	0	0
CA	79	76	NA	77.50	2.12	2	76	79
CL	20	16	12	16	4	3	12	20
B	0.010-	0.010-	NA	0.01	0	2	0.01	0.01
F	0.57	0.57	NA	0.57	0	2	0.57	0.57
MG	21	22	NA	21.50	0.71	2	21	22
K	21	18	NA	19.50	2.12	2	18	21
NA	29	35	32	32	3	3	29	35
SO4	256	224	228	236	17.44	3	224	256
AL	0.050	0.050-	NA	0.05	0	2	0.05	0.05
AS	0.005-	0.005-	NA	0.01	0	2	0.01	0.01
BA	0.040	0.040	NA	0.04	0	2	0.04	0.04
CD	0.002-	0.002-	NA	0.00	0	2	0.00	0.00
CR	0.010-	0.010-	0.010-	0.01	0	3	0.01	0.01
CU	0.010-	0.010-	0.010-	0.01	0	3	0.01	0.01
FE	0.030	0.010-	0.013-	0.02	0.01	3	0.01	0.03
PB	0.010-	0.010-	0.010-	0.01	0	3	0.01	0.01
MN	0.050	0.060	0.030	0.05	0.02	3	0.03	0.06
HG	.00050-	.00050-	.00050-	.00050	.00000	3	.00050	.00050
MO	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
NI	0.020-	0.020-	0.020-	0.02	0	3	0.02	0.02
RA	40	43.80	0.500-	28.10	23.98	3	0.50	43.80
RAER	1.80	1.80	NA					
SE	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	NA	0	0	0	0	0
U	0.042	0.021	0.018	0.03	0.01	3	0.02	0.04
V	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
ZN	0.010	0.010	0.020	0.01	0.01	3	0.01	0.02
TDS	565	521	502	529.33	32.32	3	502	565
CTDS	609	537	NA	573	50.91	2	537	609
CAT	7.47	7.58	NA	7.53	0.08	2	7.47	7.58
AN	8.89	7.51	NA	8.20	0.98	2	7.51	8.89
CB	8.711-	0.51	NA	4.61	5.80	2	0.51	8.71

USER CODE 100.00 .

TABLE D-6.3.03 (Continued)
WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L574

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	WAMCO	WAMCO					
JOB								
DS	062079	062179	062979					
DA	NA	NA	NA					
WN	12	12	12	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.99	8	8.05	8.01	0.03	3	7.99	8.05
TC	11	11	11	11	0	3	11	11
CD	920	720	NA	820	141.42	2	720	920
NH3	0.10	0.10	0.10	0.10	0.00	3	0.10	0.10
NO3	0.050-	0.031	0.050-	0.04	0.01	3	0.03	0.05
HCO3	195	195	207	199	6.93	3	195	207
CO3	0.000	0.000	0.000	0	0	3	0	0
CA	103	96	96	98.33	4.04	3	96	103
CL	30	14	10	18	10.58	3	10	30
B	0.010-	0.020	0.010-	0.01	0.01	3	0.01	0.02
F	0.61	0.57	0.51	0.56	0.05	3	0.51	0.61
MG	23	22	22	22.33	0.58	3	22	23
K	24	18	14	18.67	5.03	3	14	24
NA	35	32	32	33	1.73	3	32	35
SO4	236	226	226	229.33	5.77	3	226	236
AL	0.080	0.050	0.070	0.07	0.02	3	0.05	0.08
AS	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
BA	0.040	0.030-	0.030-	0.03	0.01	3	0.03	0.04
CD	0.002-	0.002-	0.002-	0.00	0.00	3	0.00	0.00
CR	0.010-	0.010-	NA	0.01	0	2	0.01	0.01
CU	0.010-	0.010-	NA	0.01	0	2	0.01	0.01
FE	0.21	0.090	0.010	0.10	0.10	3	0.01	0.21
PB	0.010-	0.010-	NA	0.01	0	2	0.01	0.01
MN	0.040	0.020	NA	0.03	0.01	2	0.02	0.04
HG	.00050-	.00050-	NA	.00050	.00000	2	.00050	.00050
MO	0.050-	0.050-	NA	0.05	0	2	0.05	0.05
NI	0.020-	0.020-	NA	0.02	0	2	0.02	0.02
RA	17.50	29.60	NA	23.55	8.56	2	17.50	29.60
RAER	1.30	1.50	NA					
SE	0.005-	0.005-	NA	0.01	0	2	0.01	0.01
TH	NA	NA	NA	0	0	0	0	0
U	0.021	0.003	NA	0.01	0.01	2	0.00	0.02
V	0.050-	0.050-	NA	0.05	0	2	0.05	0.05
ZN	0.005-	0.010	NA	0.01	0.00	2	0.01	0.01
TDS	470	490	468	476	12.17	3	468	490
CTDS	646	603	607	618.67	23.76	3	603	646
CAT	9.17	8.45	8.35	8.66	0.45	3	8.35	9.17
AN	8.96	8.30	8.38	8.54	0.36	3	8.30	8.96
CB	1.17	0.93	0.179-	0.76	0.52	3	0.18	1.17

USER CODE 100.00

TABLE D-6.3.03 (Continued)

WATER QUALITY DATA FOR N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LNM2

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 1227
DS 061980
DA 062080

WN	14	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	NA	0	0	0	0	0
TC	NA	0	0	0	0	0
CD	NA	0	0	0	0	0
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.69	0.69	0	1	0.69	0.69
HCO3	NA	0	0	0	0	0
CO3	NA	0	0	0	0	0
CA	104	104	0	1	104	104
CL	NA	0	0	0	0	0
B	0.250-	0.25	0	1	0.25	0.25
F	0.40	0.40	0	1	0.40	0.40
MG	26	26	0	1	26	26
K	7.70	7.70	0	1	7.70	7.70
NA	38.70	38.70	0	1	38.70	38.70
SO4	NA	0	0	0	0	0
AL	0.050-	0.05	0	1	0.05	0.05
AS	0.014	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.32	0.32	0	1	0.32	0.32
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.060	0.06	0	1	0.06	0.06
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	NA	0	0	0	0	0
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	NA	0	0	0	0	0
CTDS	NA	0	0	0	0	0
CAT	NA	0	0	0	0	0
AN	NA	0	0	0	0	0
CB	NA	0	1.22	0	0	0

USER CODE 100.00*

TABLE D-6.3.04

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE
(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.61	0.20	7	7.10	8.20
TC	11.67	1.15	3	11	13
CD	667	82.85	7	475	810
NH3	0.38	0.32	7	0.01	1.00
NO3	0.44	0.31	7	0.01	1.70
HCO3	183.27	23.42	7	90	232
CO3	1.73	3.55	7	0	12
CA	92.27	18.43	7	50	139
CL	4.00	2.22	7	0.20	8
B	0.09	0.08	7	0.01	0.25
F	0.42	0.03	7	0.27	0.65
MG	49.56	85.40	7	0.50	243
K	10.08	0.64	7	8.50	14
NA	38.51	5.83	7	26	61
SO4	222.27	50.03	7	28	298
AL	0.18	0.14	7	0.05	0.90
AS	0.01	0.00	7	0.00	0.02
BA	0.10	0.06	7	0.03	0.40
CD	0.02	0.01	7	0.00	0.05
CR	0.05	0.00	7	0.01	0.10
CU	0.05	0.01	7	0.01	0.09
FE	0.88	0.55	7	0.06	2.80
PB	0.04	0.01	7	0.01	0.08
MN	0.07	0.03	7	0.01	0.50
HG	.00492	.00693	7	.00040	.10000
MO	0.16	0.18	7	0.00	3
NI	0.04	0.01	7	0.01	0.10
RA	26.92	45.71	5	0.50	211
RAER	0	0.000	0	0	0
SE	0.01	0.02	7	0.00	0.05
TH	4.43	1.96	4	2.40	7
U	0.09	0.01	7	0.00	0.25
V	0.20	0.15	7	0.05	1.00
ZN	0.05	0.03	7	0.01	0.15
TDS	545.01	74.40	7	328	764
CTDS	614.52	135.35	7	380.90	873.20
CAT	10.65	7.32	7	4.94	27.04
AN	8.05	1.14	7	4.96	9.54
CB	9.09	17.52	7	0.01	48.69
USER CODE		100.00			

Wells used in this summary: PN5-LNM1 PN5-L312 PN5-L313 PN5-L320 PN5-L578
PN5-LNM3 PN5-LNM4

TABLE D-6.3.04 (Continued)

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LNM1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	220	1092
DS	011280	051380
DA	011480	051380

WN	1	1	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.35	7.55	7.45	0.14	2	7.35	7.55
TC	NA	NA	0	0	0	0	0
CD	740	590	665	106.07	2	590	740
NH3	1.001-	0.66	0.83	0.24	2	0.66	1.00
NO3	1.40	0.100-	0.75	0.92	2	0.10	1.40
HCO3	169	198	183.50	20.51	2	169	198
CO3	0.000	0.000	0	0	2	0	0
CA	125	96	110.50	20.51	2	96	125
CL	0.20	1.50	0.85	0.92	2	0.20	1.50
B	0.050-	0.050-	0.05	0	2	0.05	0.05
F	0.40	0.46	0.43	0.04	2	0.40	0.46
MG	6.10	20	13.05	9.83	2	6.10	20
K	8.70	11	9.85	1.63	2	8.70	11
NA	35	47	41	8.49	2	35	47
SO4	210	275	242.50	45.96	2	210	275
AL	0.100-	0.12	0.11	0.01	2	0.10	0.12
AS	0.005-	0.005-	0.01	0	2	0.01	0.01
BA	0.050-	0.050-	0.05	0	2	0.05	0.05
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.70	0.40	0.55	0.21	2	0.40	0.70
PB	0.050-	0.050	0.05	0	2	0.05	0.05
MN	0.050-	0.050-	0.05	0	2	0.05	0.05
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.100-	0.050-	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	3.76	3.76	0	1	3.76	3.76
RAER	NA	0.99					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	2.40	2.40	0	1	2.40	2.40
U	0.100-	0.100-	0.10	0	2	0.10	0.10
V	0.500-	0.050-	0.28	0.32	2	0.05	0.50
ZN	0.050-	0.050-	0.05	0	2	0.05	0.05
TDS	576	546	561	21.21	2	546	576
CTDS	554.00	648.50	601.25	66.82	2	554.00	648.50
CAT	8.48	8.76	8.62	0.20	2	8.48	8.76
AN	7.15	9.01	8.08	1.32	2	7.15	9.01
CB	8.55	1.416-	4.98	5.04	2	1.42	8.55

USER CODE 100.00

TABLE D-6.3.04 (Continued)
WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L312

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	PALS					
JOB							
DS	060579	061279					
DA	NA	NA					
WN	5	5	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	8.01	NA	8.01	0	1	8.01	8.01
TC	NA	NA	0	0	0	0	0
CD	755	NA	755	0	1	755	755
NH3	0.011	0.13	0.07	0.08	2	0.01	0.13
NO3	0.050-	NA	0.05	0	1	0.05	0.05
HCO3	195	NA	195	0	1	195	195
CO3	0.000	NA	0	0	1	0	0
CA	83	76	79.50	4.95	2	76	83
CL	8	NA	8	0	1	8	8
B	0.010	0.010-	0.01	0	2	0.01	0.01
F	0.51	0.27	0.39	0.17	2	0.27	0.51
MG	20	27	23.50	4.95	2	20	27
K	9	13	11	2.83	2	9	13
NA	61	39	50	15.56	2	39	61
SO4	242	28	135	151.32	2	28	242
AL	0.060	0.90	0.48	0.59	2	0.06	0.90
AS	0.005-	0.006	0.01	0.00	2	0.01	0.01
BA	0.030-	0.400-	0.22	0.26	2	0.03	0.40
CD	0.002-	0.020-	0.01	0.01	2	0.00	0.02
CR	0.010-	0.100-	0.06	0.06	2	0.01	0.10
CU	0.040	0.090-	0.07	0.04	2	0.04	0.09
FE	0.060	2.80	1.43	1.94	2	0.06	2.80
PB	0.020	0.010	0.01	0.01	2	0.01	0.02
MN	0.010	0.13	0.07	0.08	2	0.01	0.13
HG	.00050-	.00100-	.00075	.00035	2	.00050	.00100
MO	0.050-	0.500-	0.28	0.32	2	0.05	0.50
NI	0.020-	NA	0.02	0	1	0.02	0.02
RA	211	5.60	108.30	145.24	2	5.60	211
RAER	5	NA					
SE	0.005-	0.010-	0.01	0.00	2	0.01	0.01
TH	NA	NA	0	0	0	0	0
U	0.16	0.025	0.09	0.10	2	0.03	0.16
V	0.050	NA	0.05	0	1	0.05	0.05
ZN	0.010	0.15	0.08	0.10	2	0.01	0.15
TDS	534	764	[illegible]	162.63	2	534	764
CTDS	618	NA	618	0	1	618	618
CAT	8.67	NA	8.67	0	1	8.67	8.67
AN	8.46	NA	8.46	0	1	8.46	8.46
CB	1.23	NA	1.23	6.10	1	1.23	1.23
USER CODE	100.00						

TABLE D-6.3.04 (Continued)

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L313

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	CDM	NRTHRN	WAMCO	PALS	TETON	TETON					
JOB					261	1081					
DS	031379	031379	060679	061379	011780	051380					
DA	NA	NA	NA	NA	011880	051380					
WN	6	6	6	6	6	6	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6					
PH	NA	NA	8.01	8.20	7.30	7.53	7.76	0.42	4	7.30	8.20
TC	NA	NA	11	11	NA	NA	11	0	2	11	11
CD	NA	NA	750	750	725	600	706.25	71.81	4	600	750
NH3	0.26	0.73	0.15	0.35	1.001-	0.12	0.44	0.35	6	0.12	1.00
NO3	0.11	0.010-	0.050-	0.40	1	0.100-	0.28	0.38	6	0.01	1
HCO3	186	185	205	134	191	195	182.67	24.92	6	134	205
CO3	0.000	0.000	0.000	12	0.000	0.000	2	4.90	6	0	12
CA	95.50	100	96	99	139	100	104.92	16.81	6	95.50	139
CL	2-	1	6	4	6	5	4	2.10	6	1	6
B	0.10	0.100-	0.040	0.010-	0.050-	0.050-	0.06	0.04	6	0.01	0.10
F	0.60	0.64	0.51	0.27	0.30	0.46	0.46	0.15	6	0.27	0.64
MG	26.30	23	24	20	0.50	22	19.30	9.44	6	0.50	26.30
K	14	9	9	11	10.50	11	10.75	1.84	6	9	14
NA	36.70	37	30	40	27	49	36.62	7.76	6	27	49
SO4	270	272	225	240	255	298	260	25.84	6	225	298
AL	0.100-	0.100-	0.070	0.50	0.100-	0.050-	0.15	0.17	6	0.05	0.50
AS	0.003	0.005	0.005-	0.004	0.006	0.005-	0.00	0.00	6	0.00	0.01
BA	0.10	0.050-	0.030-	0.400-	0.050-	0.050-	0.11	0.14	6	0.03	0.40
CD	0.010	0.005-	0.002-	0.020-	0.050-	0.010-	0.02	0.02	6	0.00	0.05
CR	0.012	0.020-	0.010-	0.100-	0.050-	0.050-	0.04	0.03	6	0.01	0.10
CU	0.020	0.010-	0.010	0.090-	0.050-	0.050-	0.04	0.03	6	0.01	0.09
FE	0.76	0.81	0.070	0.70	0.66	0.40	0.57	0.28	6	0.07	0.81
PB	0.070	0.020-	0.010-	0.010-	0.070	0.050-	0.04	0.03	6	0.01	0.07
MN	0.070	0.070	0.010-	0.500-	0.070	0.070	0.13	0.18	6	0.01	0.50
HG	.00040-	.00100-	.00050-	.10000-	.00100-	.00100-	.01732	.04051	6	.00040	.10000
MO	0.00[illegible]-	0.020-	0.050	3	0.100-	0.050-	0.54	1.21	6	0.00	3
NI	0.018	0.010-	0.020-	0.100-	0.050-	0.050-	0.04	0.03	6	0.01	0.10
RA	5	NA	5.20	3	NA	2.85	4.01	1.26	4	2.85	5.20
RAER	2.10	NA	0.70	NA	NA	0.62					
SE	0.005-	0.005-	0.005-	0.004	0.005-	0.005-	0.00	0.00	6	0.00	0.01
TH	NA	NA	NA	NA	NA	4.70	4.70	0	1	4.70	4.70
U	0.002	NA	0.003	0.25	0.100-	0.100-	0.09	0.10	5	0.00	0.25
V	NA	1.001-	0.050-	NA	0.500-	0.050-	0.40	0.45	4	0.05	1.00
ZN	0.073	0.040	0.005	0.030	0.050-	0.10	0.05	0.03	6	0.01	0.10
TDS	538	555	518	550	574	543	546.33	18.64	6	518	574
CTDS	630.50	627	595	560	629	680	620.25	40.16	6	560	680
CAT	8.88	8.72	8.30	8.61	8.42	9.21	8.69	0.33	6	8.30	9.21
AN	8.73	8.72	8.21	7.71	8.61	9.54	8.59	0.61	6	7.71	9.54
CB	0.89	0.010	0.52	5.52	1.107-	1.754-	1.63	1.99	6	0.01	5.52
USER CODE	100.00										

TABLE D-6.3.0[illegible]ntinued)

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L320

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	PALS	WAMCO	TETON	TETON
JOB			218	1083
DS	060279	062979	011080	051380
DA	NA	NA	011180	051380

WN	9	9	9	9	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	7.60	7.60	7.10	7.55	7.46	0.24	4	7.10	7.60
TC	11	11	NA	NA	11	0	2	11	11
CD	710	760	810	575	713.75	101.11	4	575	810
NH3	0.10	0.[illegible]0	1.001-	0.100-	0.33	0.45	4	0.10	1.00
NO3	0.40	0.[illegible]30	1.50	0.100-	0.51	0.68	4	0.03	1.50
HCO3	232	195	194	198	204.75	1[illegible].25	4	194	232
CO3	2	0.000	0.000	0.000	0.50	1	4	0	2
CA	94	92	126	90	100.50	1[illegible].08	4	90	126
CL	6	8	4.20	2	5.05	[illegible].56	4	2	8
B	0.1[illegible]	0.010	0.050-	0.060	0.07	0.06	4	0.01	0.16
F	0.38	0.65	0.30	0.42	0.44	0.15	4	0.30	0.65
MG	29	22	6.60	23	20.15	9.55	4	6.60	29
K	11	9	9	11	10	1.15	4	9	11
NA	40	36	34	49	39.75	6.65	4	34	49
SO4	240	228	205	246	229.75	18.12	4	205	246
AL	0.100-	0.33	0.100-	0.050-	0.14	0.13	4	0.05	0.33
AS	0.010-	0.005-	0.007	0.005-	0.01	0.00	4	0.01	0.01
BA	0.100-	0.030	0.050-	0.050-	[illegible]06	0.03	4	0.03	0.10
CD	0.040-	0.002	0.050-	0.010-	0.03	0.02	4	0.00	0.05
CR	0.100-	0.010-	0.050-	0.050-	0.05	0.04	4	0.01	0.10
CU	0.050-	0.010-	0.050-	0.050-	0.04	[illegible].02	4	0.01	0.05
FE	0.13	0.060	0.66	0.45	0.33	.28	4	0.06	0.66
PB	0.010-	0.010-	0.060	0.050-	0.03	[illegible].03	4	0.01	0.06
[illegible]N	0.060	0.050	0.050-	0.070	0.06	0.01	4	0.05	0.07
[illegible]G	.04700	.0[illegible]-	.00100-	.00100-	.01238	.02308	4	.00050	.04700
[illegible]O	0.100-	0.050-	0.100-	0.050-	0.08	0.03	4	0.05	0.10
NI	0.050-	0.020-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	NA	0.50	NA	7.96	4.23	5.28	2	0.50	7.96
RAER	NA	NA	NA	1.20					
SE	0.010	0.005	0.005-	0.005-	0.01	0.00	4	0.01	0.01
TH	NA	NA	NA	3.60	3.60	0	1	3.60	3.60
U	NA	0.014	0.100-	0.100-	0.07	0.05	3	0.01	0.10
V	NA	0.050-	0.500-	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.050-	0.005-	0.050-	0.050-	0.04	0.02	4	0.01	0.05
TDS	542	496	540	537	528.75	21.93	4	496	542
CTDS	654	590	578.80	619	610.45	33.61	4	578.80	654
CAT	9.10	8.20	8.54	8.80	8.66	0.38	4	8.20	9.10
AN	9.04	8.17	7.57	8.42	8.30	0.61	4	7.57	9.04
CB	0.34	0.17	6.04	2.16	2.18	2.73	4	0.17	6.04

USER CODE 100.00

TABLE D-6.3.04 (Continued)
WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L578

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON	TETON
JOB	344	226	1101
DS	012980	011480	051580
DA	013080	011580	051580

WN	13	13	13	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.40	7.15	8.10	7.55	0.49	3	7.15	8.10
TC	NA	NA	NA	0	0	0	0	0
CD	700	550	475	575	114.56	3	475	700
NH3	1.001-	1.001-	0.40	0.80	0.35	3	0.40	1.00
NO3	1.001-	1.70	0.100-	0.93	0.80	3	0.10	1.70
HCO3	129	185	90	134.67	47.75	3	90	[illegible]
CO3	0.000	0.000	0.000	0	0	3	0	0
CA	NA	69	50	59.50	13.44	2	50	69
CL	1.60	5.60	4	3.73	2.01	3	1.60	5.60
B	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
F	0.40	0.40	0.35	0.38	0.03	3	0.35	0.40
MG	NA	1.80	20.70	11.25	13.36	2	1.80	20.70
K	11.20	8.50	11	10.23	1.50	3	8.50	11.20
NA	37	26	39	34	7.00	3	26	39
SO4	243	85	232	186.67	88.22	3	85	243
AL	0.10	0.30	0.19	0.20	0.10	3	0.10	0.30
AS	0.005-	0.022	0.005-	0.01	0.01	3	0.01	0.02
BA	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
CD	0.050-	0.050-	0.010-	0.04	0.02	3	0.01	0.05
CR	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
CU	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
FE	0.15	0.39	0.46	0.33	0.16	3	0.15	0.46
PB	0.050-	0.050-	0.080	0.06	0.02	3	0.05	0.08
MN	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
HG	.00100-	.00100-	00100-	.00100	.00000	3	.00100	.00100
MO	0.10	0.100-	0.050-	0.08	0.03	3	0.05	0.10
NI	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
RA	NA	NA	14.30	14.30	0	1	14.30	14.30
RAER	NA	NA	1.70					
SE	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	7	7	0	1	7	7
U	0.100-	0.100-	0.100-	0.10	0.00	3	0.10	0.10
V	0.500-	0.500-	0.050-	0.35	0.26	3	0.05	0.50
ZN	0.090	0.050-	0.14	0.09	0.05	3	0.05	0.14
TDS	504	328	428	420	88.27	3	328	504
CTDS	NA	380.90	446.70	413.80	46.53	2	380.90	446.70
CAT	NA	4.94	6.18	5.56	0.87	2	4.94	6.18
AN	NA	4.96	6.42	5.69	1.03	2	4.96	6.42
CB	NA	0.205-	1.926-	1.07	1.22	2	0.20	1.93

USER CODE 100.00

TABLE D-6.3.04 (Continued)

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LNM3

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 1338
DS 070880
DA 071080

WN	15	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.50	7.50	0	1	7.50	7.50
TC	13	13	0	1	13	13
CD	532	532	0	1	532	532
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.27	0.27	0	1	0.27	0.27
HCO3	181	181	0	1	181	181
CO3	9.60	9.60	0	1	9.60	9.60
CA	106	106	0	1	106	106
CL	2.40	2.40	0	1	2.40	2.40
B	0.250-	0.25	0	1	0.25	0.25
F	0.45	0.45	0	1	0.45	0.45
MG	243	243	0	1	243	243
K	9.20	9.20	0	1	9.20	9.20
NA	35	35	0	1	35	35
SO4	287	287	0	1	287	287
AL	0.050-	0.05	0	1	0.05	0.05
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	1.40	1.40	0	1	1.40	1.40
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.070	0.07	0	1	0.07	0.07
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.050-	0.05	0	1	0.05	0.05
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	610	610	0	1	610	610
CTDS	873.20	873.20	0	1	873.20	873.20
CAT	27.04	27.04	0	1	27.04	27.04
AN	9.33	9.33	0	1	9.33	9.33
CB	48.69	48.69	1.22	1	48.69	48.69
USER CODE		100.00				

TABLE D-6.3.04 (Continued)

WATER QUALITY DATA OUTSIDE N AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LNM4

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 1313
DS 070780
DA 070880

WN	16	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.55	7.55	0	1	7.55	7.55
TC	NA	0	0	0	0	0
CD	722	722	0	1	722	722
NH3	0.12	0.12	0	1	0.12	0.12
NO3	0.27	0.27	0	1	0.27	0.27
HCO3	201.30	201.30	0	1	201.30	201.30
CO3	0.000	0	0	1	0	0
CA	85	85	0	1	85	85
CL	4	4	0	1	4	4
B	0.14	0.14	0	1	0.14	0.14
F	0.42	0.42	0	1	0.42	0.42
MG	16.70	16.70	0	1	16.70	16.70
K	9.50	9.50	0	1	9.50	9.50
NA	33.20	33.20	0	1	33.20	33.20
SO4	215	215	0	1	215	215
AL	0.090	0.09	0	1	0.09	0.09
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	1.55	1.55	0	1	1.55	1.55
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	500	500	0	1	500	500
CTDS	564.70	564.70	0	1	564.70	564.70
CAT	7.30	7.30	0	1	7.30	7.30
AN	7.89	7.89	0	1	7.89	7.89
CB	3.858-	3.86	1.22	1	3.86	3.86
USER CODE		100.00				

TABLE D-[illegible].05

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTAPLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.68	0.24	12	7.30	8.43
TC	13.50	2.75	11	10	20
CD	548.94	126.67	13	345	1000
NH3	0.27	0.28	13	0.04	1.80
NO3	0.48	0.45	13	0.01	1.80
HCO3	221.10	21.99	12	142	281
CO3	0.81	1.59	12	0	12
CA	76.62	23.74	13	45	180
CL	4.46	1.18	12	1.80	10
B	0.15	0.10	13	0.01	0.25
F	0.48	0.09	13	0.32	1.30
MG	14.89	3.95	13	0	29
K	8.76	1.40	13	6	12.50
NA	27.78	5.79	13	22	60
SO4	134.67	76.64	12	50	340
AL	0.22	0.20	13	0.01	1.50
AS	0.01	0.01	13	0.00	0.06
BA	0,13	0.08	13	0.03	0.50
CD	0.02	0.01	13	0.00	0.05
CR	0.05	0.01	13	0.01	0.10
CU	0.05	0.01	13	0.01	0.10
FE	0.71	0.45	13	0.04	3.60
PB	0.05	0.03	13	0.00	0.43
MN	0.06	0.02	13	0.04	0.21
HG	.00092	.00014	13	.00006	.00100
MO	0.09	0.08	13	0.00	0.50
NI	0.05	0.01	13	0.01	0.10
RA	184.23	227.29	5	3.24	864
RAER	0	0.000	0	0	0
SE	0.01	0.00	13	0.01	0.03
TH	1.88	1.37	6	0.10	3.20
U	0.13	0.12	12	0.01	0.50
V	0.11	0.14	13	0.01	1.00
ZN	0.05	0.07	12	0.01	0.24
TDS	403.08	112.43	12	197	766
CTDS	490.42	105.91	12	379.30	811
CAT	6.55	1.53	12	5.09	11.89
AN	6.58	1.59	12	4.59	11.38
CB	3.83	4.40	12	0.04	21.65
USER CODE		100.00			

Wells used in this summary are: PN5-LMM2 PN5-LMR1 PN5-L301 PN5-L306 PN5-L307 PN5-L308 PN5-LMM3 PN5-LMM4 PN5-LMM5 PN5-LMM6 PN5-LMM7 PN5-LMM9 PN5-LMM1

TABLE D-6.3.05 (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM2

IF A PA'AMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	258	1091
DS	011780	051380
DA	011880	051380

WN	2	2	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.80	8.43	8.12	0.45	2	7.80	8.43
TC	NA	NA	0	0	0	0	0
CD	525	345	435	127.28	2	345	525
NH3	1.001-	0.19	0.60	0.57	2	0.19	1.00
NO3	1.50	0.100-	0.80	0.99	2	0.10	1.50
HCO3	205	150	177.50	38.89	2	150	205
CO3	0.000	10	5	7.07	2	0	10
CA	86	45	65.50	28.99	2	45	86
CL	6.60	2	4.30	3.25	2	2	6.60
B	0.050-	0.050-	0.05	0	2	0.05	0.05
F	0.40	0.48	0.44	0.06	2	0.40	0.48
MG	0.000	11	5.50	7.78	2	0	11
K	8.70	12.50	10.60	2.69	2	8.70	12.50
NA	23	41	32	12.73	2	23	41
SO4	50	255	152.50	144.96	2	50	255
AL	0.100-	0.050	0.08	0.04	2	0.05	0.10
AS	0.061	0.005-	0.03	0.04	2	0.01	0.06
BA	0.050-	0.050-	0.05	0	2	0.05	0.05
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.050-	0.13	0.09	0.06	2	0.05	0.13
PB	0.050-	0.050	0.05	0	2	0.05	0.05
MN	0.050-	0.050-	0.05	0	2	0.05	0.05
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.100-	0.050-	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	3.24	3.24	0	1	3.24	3.24
RAER	NA	0.75					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	[illegible]	3.20	0	1	3.20	3.20
U	0.100-	0 [illegible]0-	0.10	0	2	0.10	0.10
V	0.500-	0.[illegible]0-	0.28	0.32	2	0.05	0.50
ZN	0.050-	0.050-	0.05	0	2	0.05	0.05
TDS	334	279	306.50	38.89	2	279	334
CTDS	379.30	526.50	452.90	104.09	2	379.30	526.50
CAT	5.51	5.25	5.38	0.18	2	5.25	5.51
AN	4.59	8.16	6.37	2.52	2	4.59	8.16
CB	9.18	%21.653-	15.42	8.82	2	9.18	21.65
USER CODE		100.00					

TABLE D-6.3.0[illegible] (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMR1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 259
DS 011780
DA 011880

WN	3	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.48	7.48	0	1	7.48	7.48
TC	NA	0	0	0	0	0
CD	550	550	0	1	550	550
NH3	1.001-	1.00	0	1	1.00	1.00
NO3	1.80	1.80	0	1	1.80	1.80
HCO3	223	223	0	1	223	223
CO3	0.000	0	0	1	0	0
CA	80	80	0	1	80	80
CL	4	4	0	1	4	4
B	0.050-	0.05	0	1	0.05	0.05
F	0.40	0.40	0	1	0.40	0.40
MG	8.40	8.40	0	1	8.40	8.40
K	7.50	7.50	0	1	7.50	7.50
NA	24	24	0	1	24	24
SO4	60	60	0	1	60	60
AL	0.40	0.40	0	1	0.40	0.40
AS	0.009	0.01	0	1	0.01	0.01
BA	0.050-	0.05	0	1	0.05	0.05
CD	0.050-	0.05	0	1	0.05	0.05
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.57	0.57	0	1	0.57	0.57
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.100-	0.10	0	1	0.10	0.10
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	0.100-	0.10	0	1	0.10	0.10
U	0.500-	0.50	0	1	0.50	0.50
V	0.050-	0.05	0	1	0.05	0.05
ZN	NA	0	0	0	0	0
TDS	358	358	0	1	358	358
CTDS	406.90	406.90	0	1	406.90	406.90
CAT	5.92	5.92	0	1	5.92	5.92
AN	5.02	5.02	0	1	5.02	5.02
CB	8.25	8.25	8.82	1	8.25	8.25
USER CODE		100.00 *				

TABLE D-6.3.05 (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L301

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	CDM	CDM	NORTHERN	NORTHERN	CDM	NORTHERN	CDM					
JOB				NA	NA							
DS	011079	011079	011080	01/10/79	021679	021679	032479					
DA	011880	011880	011880	011880	NA	NA	NA					
WN	4	4	4	4	4	4	4	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6	7					
PH	7.90	8.10	NA	NA	8	NA	7.30	7.83	0.36	4	7.30	8.10
TC	10	10	NA	NA	11	NA	11.70	10.68	0.83	4	10	11.70
CD	520	510	NA	NA	480	NA	460	492.50	27.54	4	460	520
NH3	0.30	0.100-	0.3	1.80	0.060	1.37	0.10	0.58	0.70	7	0.06	1.80
NO3	0.020-	0.020-	0.01	0.020	0.050	0.010	0.040	0.02	0.02	7	0.01	0.05
HCO3	201	201	211	212	281	192	221	217	29.75	7	192	281
CO3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	7	0	0
CA	112	92.60	63	64	50.70	57	49.80	69.87	23.48	7	49.80	112
CL	4	6	2	2	2-	3	4	3.29	1.50	7	2	6
B	0.050-	0.050-	0.100-	0.010-	0.100-	0.20	0.080	0.08	0.06	7	0.01	0.20
F	1.30	1.10	0.52	0.48	0.70	0.52	0.70	0.76	0.32	7	0.48	1.30
MG	15.80	15	16	16	20.80	16	16.70	16.61	1.91	7	15	20.80
K	7	6	7	7	7.89	7	7.14	7.00	0.55	7	6	7.89
NA	24	23	28	27	35.90	25	25	26.84	4.34	7	23	35.90
SO4	97	86	107	106	93	106	138	104.71	16.65	7	86	138
AL	0.44	0.090-	0.10	0.100-	0.200-	0.100-	0.100-	0.16	0.13	7	0.09	0.44
AS	0.008	0.007	0.005-	0.005-	0.002	0.005-	0.002-	0.00	0.00	7	0.00	0.01
BA	0.15	0.050	0.500-	0.500-	0.20	0.500-	0.100-	0.29	0.21	7	0.05	0.50
CD	0.006	0.003	0.005-	0.005-	0.004	0.005-	0.007	0.01	0.00	7	0.00	0.01
CR	0.007	0.007-	0.020-	0.020-	0.012	0.020-	0.010-	0.01	0.01	7	0.01	0.02
CU	0.020-	0.020-	0.010-	0.010-	0.010-	0.010-	0.007	0.01	0.01	7	0.01	0.02
FE	1.68	0.71	0.12	0.050-	0.040	0.61	0.18	0.48	0.59	7	0.04	1.68
PB	0.001-	0.001-	0.020-	0.020-	0.030	0.020-	0.020-	0.02	0.01	7	0.00	0.03
MN	0.057	0.047	0.050	0.050	0.052	0.050	0.063	0.05	0.01	7	0.05	0.07
HG	.00011	.00006-	.00100-	.00100-	.00012	.00100-	.00007	.00048	.00049	7	.00006	.00100
MO	0.005-	0.005-	0.020-	0.002-	0.020-	0.006	0.006	0.01	0.01	7	0.00	0.02
NI	0.035	0.006	0.010-	0.010-	0.040	0.010-	0.030	0.02	0.01	7	0.01	0.04
RA	345	385	496	248	670	376	NA	420	146.05	6	248	670
RAER	15	30	10	4	80	4	NA					
SE	0.005-	0.005	0.005-	0.005-	0.005-	0.005-	0.005	0.01	0	7	0.01	0.01
TH	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
U	0.064	0.005	0.005-	0.005-	0.005-	0.005-	NA	0.01	0.02	6	0.01	0.06
V	0.005-	0.005-	1.001-	1.001-	NA	1.001-	NA	0.60	0.55	5	0.01	1.00
ZN	0.11	0.070	0.010-	0.010	0.015	0.057	0.21	0.07	0.07	7	0.01	0.21
TDS	NA	NA	NA	NA	320	330	463	371	79.83	3	320	463
CTDS	460.80	429.60	434	434	491.29	406	461.64	445.33	27.89	7	406	491.29
CAT	8.11	7.01	5.86	5.86	6.00	5.43	5.13	6.20	1.03	7	5.13	8.11
AN	5.43	5.25	5.74	5.74	6.60	5.44	6.61	5.83	0.56	7	5.25	6.61
CB	19.83	14.31	0.99	1.08	4.713	0.105-	%12.604-	7.66	7.86	7	0.11	19.83

USER CODE 100.00

TABLE D-6.3.0[illegible] (continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L306

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	PALS	TETON					
JOB			1078					
DS	061179	061179	051380					
DA	NA	NA	051380					
WN	6	6	6	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.96	7.90	7.69	7.85	0.14	3	7.69	7.96
TC	11	11	NA	11	0	2	11	11
CD	510	470	410	463.33	50.33	3	410	510
NH3	0.13	0.060	0.17	0.12	0.06	3	0.06	0.17
NO3	0.050-	1.20	0.11	0.45	0.65	3	0.05	1.20
HCO3	229	244	229	234	8.66	3	229	244
CO3	0.000	2-	0.000	0.67	1.15	3	0	2
CA	64	57	55	58.67	4.73	3	55	64
CL	10	2	6	6	4	3	2	10
B	0.010	0.14	0.090	0.08	0.07	3	0.01	0.14
F	0.57	0.37	0.51	0.48	0.10	3	0.37	0.57
MG	17	17	18.20	17.40	0.69	3	17	18.20
K	8	10	7	8.33	1.53	3	7	10
NA	22	34	31	29	6.24	3	22	34
SO4	83	100	101	94.67	10.12	3	83	101
AL	0.060	0.90	0.12	0.36	0.47	3	0.06	0.90
AS	0.005-	0.010	0.005-	0.01	0.00	3	0.01	0.01
BA	0.41	0.400-	0.050-	0.29	0.21	3	0.05	0.41
CD	0.002-	0.020-	0.010-	0.01	0.01	3	0.00	0.02
CR	0.010-	0.100-	0.050-	0.05	0.05	3	0.01	0.10
CU	0.010	0.090-	0.050-	0.05	0.04	3	0.01	0.09
FE	0.12	3.600-	0.33	1.35	1.95	3	0.12	3.60
PB	0.12	0.010-	0.050-	0.06	0.06	3	0.01	0.12
MN	0.050	0.100-	0.080	0.08	0.03	3	0.05	0.10
HG	.00050-	.00100-	.00100-	.00083	.00029	3	.00050	.00100
MO	0.050-	0.500-	0.050-	0.20	0.26	3	0.05	0.50
NI	0.020-	0.100-	0.050-	0.06	0.04	3	0.02	0.10
RA	649	29.98	442	373.66	315.12	3	29.98	649
RAER	7	NA	8					
SE	0.005-	0.010-	0.005-	0.01	0.00	3	0.01	0.01
TH	NA	NA	2.80	2.80	0	1	2.80	2.80
U	0.088	0.26	0.100-	0.15	0.09	3	0.09	0.26
V	0.050	NA	0.050-	0.05	0	2	0.05	0.05
ZN	0.030	0.020	0.050-	0.03	0.02	3	0.02	0.05
TDS	324	360	340	341.33	18.04	3	324	360
CTDS	433	466	447.20	448.73	16.55	3	433	466
CAT	5.75	5.98	5.77	5.83	0.13	3	5.75	5.98
AN	5.76	6.20	6.03	6.00	0.22	3	5.76	6.20
CB	0.085-	1.862-	2.172-	1.37	1.13	3	0.09	2.17

USER CODE 100,00

TABLE D-6.3.05 (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L307

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	PALS	TETON	TETON					
JOB			302	1079					
DS	060179	061279	012280	051380					
DA	NA	NA	NA	051380					
WN	7	7	7	7	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	8.20	8.04	7.40	7.63	7.82	0.37	4	7.40	8.20
TC	11	11	NA	NA	11	0	2	11	11
CD	875	890	1000	740	876.25	106.57	4	740	1000
NH3	0.100-	0.040	1.001-	0.50	0.41	0.44	4	0.04	1.00
NO3	0.050	0.084	1.48	0.26	0.47	0.68	4	0.05	1.48
HCO3	244	232	194	259	232.25	27.79	4	194	259
CO3	0.000	12	0.000	0.000	3	6	4	0	12
CA	136	132	180	133	145.25	23.23	4	132	180
CL	10	4	4	2	5	3.46	4	2	10
B	0.010	0.010-	0.050-	0.070	0.04	0.03	4	0.01	0.07
F	0.45	0.32	0.38	0.55	0.43	0.10	4	0.32	0.55
MG	26	29	3.20	5	15.80	13.59	4	3.20	29
K	9	12	11	12.50	11.13	1.55	4	9	12.50
NA	30	60	34	57	45.25	15.4[illegible]	4	30	60
SO4	294	330	338	340	325.50	21.44	4	294	340
AL	0.010	0.60	0.30	0.050	0.24	0.27	4	0.01	0.60
AS	0.005-	0.004	0.005-	0.005-	0.00	0.00	4	0.00	0.01
BA	0.030	0.40	0.050-	0.050-	0.13	0.18	4	0.03	0.40
CD	0.002-	0.020-	0.050-	0.010-	0.02	0.02	4	0.00	0.05
CR	0.010-	0.100-	0.050-	0.050-	0.05	0.04	4	0.01	0.10
CU	0.020	0.10	0.050-	0.050-	0.06	0.03	4	0.02	0.10
FE	0.10	1.20	0.50	0.080	0.47	0.52	4	0.08	1.20
PB	0.020	0.030	0.43	0.050-	0.13	0.20	4	0.02	0.43
MN	0.040	0.12	0.21	0.050-	0.11	0.08	4	0.04	0.21
HG	.00050-	.00100-	.00100-	.00100-	.00088	.00025	4	.00050	.00100
MO	0.050-	0.50	0.100-	0.050-	0.18	0.22	4	0.05	0.50
NI	0.020-	0.100-	0.050-	0.050-	0.06	0.03	4	0.02	0.10
RA	8	5.60	NA	5.26	6.29	1.49	3	5.26	8
RAER	0.70	NA	NA	0.82					
SE	0.005-	0.005	0.005-	0.005-	0.01	0	4	0.01	0.01
TH	NA	NA	NA	0.20	0.20	0	1	0.20	0.20
U	0.022	0.0[illegible]	0.100-	0.100-	0.07	0.04	4	0.02	0.10
V	0.050-	NA	0.50	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.010	0.060	0.19	0.050-	0.08	0.08	4	0.01	0.19
TDS	658	758	724	766	726.50	49.16	4	658	766
CTDS	749	811	764.20	808.50	783.18	31.32	4	749	811
CAT	10.46	11.89	11.01	9.85	10.80	0.87	4	9.85	11.89
AN	10.40	11.19	10.33	11.38	10.82	0.54	4	10.33	11.38
CB	0.28	3.05	3.17	7.222-	3.43	2.86	4	0.28	7.22

USER CODE 100.00

TABLE D-6.3.05 (Continued)
WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L308

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	PALS					
JOB							
DS	053179	061179					
DA	NA	NA					
WN	8	8	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	8.04	8	8.02	0.03	2	8	8.04
TC	11	11	11	0	2	11	11
CD	715	720	717.50	3.54	2	715	720
NH3	0.100-	0.15	0.13	0.04	2	0.10	0.15
NO3	0.050-	1.40	0.73	0.96	2	0.05	1.40
HCO3	142	232	187	63.64	2	142	232
CO3	0.000	2-	1	1.41	2	0	2
CA	95	109	102	9.90	2	95	109
CL	8	4	6	2.83	2	4	8
B	0.010	0.10	0.06	0.06	2	0.01	0.10
F	0.51	0.32	0.42	0.13	2	0.32	0.51
MG	21	20	20.50	0.71	2	20	21
K	10	12	11	1.41	2	10	12
NA	22	30	26	5.66	2	22	30
SO4	246	260	253	9.90	2	246	260
AL	0.040	1.50	0.77	1.03	2	0.04	1.50
AS	0.005-	0.010-	0.01	0.00	2	0.01	0.01
BA	0.050	0.400-	0.23	0.25	2	0.05	0.40
CD	0.002	0.020-	0.01	0.01	2	0.00	0.02
CR	0.020	0.100-	0.06	0.06	2	0.02	0.10
CU	0.010-	0.090-	0.05	0.06	2	0.01	0.09
FE	0.10	1.30	0.70	0.85	2	0.10	1.30
PB	0.020	0.010-	0.01	0.01	2	0.01	0.02
MN	0.040	0.12	0.08	0.06	2	0.04	0.12
HG	.00050-	.00100-	.00075	.00035	2	.00050	.00100
MO	0.050-	0.500-	0.28	0.32	2	0.05	0.50
NI	0.020-	0.100-	0.06	0.06	2	0.02	0.10
RA	102.0	7.10	54.55	67.10	2	7.10	102
RAER	2.80	NA					
SE	0.005-	0.025	0.02	0.01	2	0.01	0.03
TH	2.40	NA	2.40	0	1	2.40	2.40
U	0.072	0.26	0.16	0.13	2	0.07	0.26
V	0.050-	0.050-	0.05	0	2	0.05	0.05
ZN	0.030	0.11	0.07	0.06	2	0.03	0.11
TDS	197	616	406.50	296.28	2	197	616
CTDS	544	669	606.50	68.39	2	544	669
CAT	7.68	8.70	8.19	0.72	2	7.68	8.70
AN	7.67	9.40	8.53	1.22	2	7.67	9.40
CB	0.039	3.864-	1.95	2.70	2	0.04	3.86

USER CODE 100.00

TABLE D-6.3.05 (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM3

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB TETON
JOB 1202
DS 061680
DA 061380

WN	13	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	NA	0	0	0	0	0
TC	15	15	0	1	15	15
CD	420	420	0	1	420	420
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.39	0.39	0	1	0.39	0.39
HCO3	NA	0	0	0	0	0
CO3	NA	0	0	0	0	0
CA	68	68	0	1	68	68
CL	NA	0	0	0	0	0
B	0.080	0.08	0	1	0.08	0.08
F	0.44	0.44	0	1	0.44	0.44
MG	13.60	13.60	0	1	13.60	13.60
K	8.50	8.50	0	1	8.50	8.50
NA	22	22	0	1	22	22
SO4	NA	0	0	0	0	0
AL	0.050-	0.05	0	1	0.05	0.05
AS	0.016	0.02	0	1	0.02	0.02
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.25	0.25	0	1	0.25	0.25
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	NA	0	0	0	0	0
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	NA	0	0	0	0	0
CTDS	NA	0	0	0	0	0
CAT	NA	0	0	0	0	0
AN	NA	0	0	0	0	0
÷B	NA	0	10.33	0	0	0
÷ER CODE	100.00	*				

TABLE D-6.3.0[illegible]ontinued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM4

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB TETON
JOB 1311
DS 070580
DA 070880

WN	14	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.40	7.40	0	1	7.40	7.40
TC	13	13	0	1	13	13
CD	519	519	0	1	519	519
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.30	0.30	0	1	0.30	0.30
HCO3	213.50	213.50	0	1	213.50	213.50
CO3	0.000	0	0	1	0	0
CA	58	58	0	1	58	58
CL	4	4	0	1	4	4
B	0.250-	0.25	0	1	0.25	0.25
F	0.50	0.50	0	1	0.50	0.50
MG	15.20	15.20	0	1	15.20	15.20
K	9.50	9.50	0	1	9.50	9.50
NA	27	27	0	1	27	27
SO4	97	97	0	1	97	97
AL	0.18	0.18	0	1	0.18	0.18
AS	0.011	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.070	0.07	0	1	0.07	0.07
CU	0.050-	0.05	0	1	0.05	0.05
FE	1.12	1.12	0	1	1.12	1.12
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.24	0.24	0	1	0.24	0.24
TDS	324	324	0	1	324	324
CTDS	424.20	424.20	0	1	424.20	424.20
CAT	5.56	5.56	0	1	5.56	5.56
AN	5.63	5.63	0	1	5.63	5.63
CB	0.622-	0.62	10.33	1	0.62	0.62

USER CODE 100.00

TABLE D-6.3.05 (Continued)
WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM5

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 1335
DS 070880
DA 070980

WN	15	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.75	7.75	0	1	7.75	7.75
TC	13	13	0	1	13	13
CD	615	615	0	1	615	615
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.37	0.37	0	1	0.37	0.37
HCO3	234.20	234.20	0	1	234.20	234.20
CO3	0.000	0	0	1	0	0
CA	75	75	0	1	75	75
CL	3.60	3.60	0	1	3.60	3.60
B	0.250-	0.25	0	1	0.25	0.25
F	0.48	0.48	0	1	0.48	0.48
MG	15.40	15.40	0	1	15.40	15.40
K	8.50	8.50	0	1	8.50	8.50
NA	25	25	0	1	25	25
SO4	112	112	0	1	112	112
AL	0.080	0.08	0	1	0.08	0.08
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.070	0.07	0	1	0.07	0.07
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.80	0.80	0	1	0.80	0.80
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.080	0.08	0	1	0.08	0.08
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	398	398	0	1	398	398
CTDS	473.70	473.70	0	1	473.70	473.70
CAT	6.31	6.31	0	1	6.31	6.31
AN	6.27	6.27	0	1	6.27	6.27
CB	0.34	0.34	10.33	1	0.34	0.34

USER CODE 100.00.

TABLE D-6.3.05 [illegible]ntinued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM6

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON	TETON
JOB	1347	1380	1381
DS	071180	072180	072280
DA	071480	072280	072280

WN	16	16	16	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.62	7.32	7.30	7.41	0.18	3	7.30	7.62
TC	17	13	13	14.33	2.31	3	13	17
CD	560	502	479	513.67	41.74	3	479	560
NH3	0.100-	0.15	0.100-	0.12	0.03	3	0.10	0.15
NO3	0.11	0.29	0.29	0.23	0.10	3	0.11	0.29
HCO3	251	257	257	255	3.46	3	251	257
CO3	0.000	0.000	0.000	0	0	3	0	0
CA	75.90	76	76	75.97	0.06	3	75.90	76
CL	4.40	5	4.60	4.67	0.31	3	4.40	5
B	0.250-	0.250-	0.250-	0.25	0	3	0.25	0.25
F	0.44	0.45	0.45	0.45	0.01	3	0.44	0.45
MG	17.50	18.20	18.90	18.20	0.70	3	17.50	18.90
K	9.10	8.70	8.50	8.77	0.31	3	8.50	9.10
NA	27.50	26	25	26.17	1.26	3	25	27.50
SO4	96	121	110	109	12.53	3	96	121
AL	0.500-	0.050-	0.050-	0.20	0.26	3	0.05	0.50
AS	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
BA	0.14	0.100-	0.100-	0.11	0.02	3	0.10	0.14
CD	0.010-	0.010-	0.010-	0.01	0	3	0.01	0.01
CR	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
CU	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
FE	0.40	0.72	0.57	0.56	0.16	3	0.40	0.72
PB	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
MN	0.060	0.050-	0.050-	0.05	0.01	3	0.05	0.06
HG	.00100-	.00100-	.00100-	.00100	.00000	3	.00100	.00100
MO	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
NI	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
RA	NA	NA	NA	0	0	0	0	0
RAER	NA	NA	NA					
SE	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	NA	0	0	0	0	0
U	0.100-	0.100-	0.100-	0.10	0.00	3	0.10	0.10
V	0.050-	0.050-	0.050-	0.05	0.00	3	0.05	0.05
ZN	0.010-	0.019	0.018	0.02	0.00	3	0.01	0.02
TDS	390	393	401	394.67	5.69	3	390	401
CTDS	481.40	511.90	500	497.77	15.37	3	481.40	511.90
CAT	6.66	6.64	6.65	6.65	0.01	3	6.64	6.66
AN	6.24	6.87	6.63	6.58	0.32	3	6.24	6.87
CB	3.25	1.698-	0.15	1.70	1.55	3	0.15	3.25

USER CODE 100.00

TABLE D-6.3.05 (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM7

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB TETON
JOB 1312
DS 070780
DA 070880

WN	17	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.60	7.60	0	1	7.60	7.60
TC	13	13	0	1	13	13
CD	530	530	0	1	530	530
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.29	0.29	0	1	0.29	0.29
HCO3	219.60	219.60	0	1	219.60	219.60
CO3	0.000	0	0	1	0	0
CA	70	70	0	1	70	70
CL	5	5	0	1	5	5
B	0.250-	0.25	0	1	0.25	0.25
F	0.52	0.52	0	1	0.52	0.52
MG	15.20	15.20	0	1	15.20	15.20
K	7.70	7.70	0	1	7.70	7.70
NA	24.30	24.30	0	1	24.30	24.30
SO4	99	99	0	1	99	99
AL	0.20	0.20	0	1	0.20	0.20
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	1.72	1.72	0	1	1.72	1.72
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	402	402	0	1	402	402
CTDS	440.80	440.80	0	1	440.80	440.80
CAT	6.00	6.00	0		6.00	6.00
AN	5.80	5.80	0	1	5.80	5.80
CB	1.66	1.66	1.55	1	1.66	1.66
USER CODE		100.00	.			

TABLE D-6.3.0[illegible]ontinued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM9

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 1344
DS 071080
DA 071180

WN	19	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.55	7.55	0	1	7.55	7.55
TC	18	18	0	1	18	18
CD	560	560	0	1	560	560
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.12	0.12	0	1	0.12	0.12
HCO3	244	244	0	1	244	244
CO3	0.000	0	0	1	0	0
CA	72	72	0	1	72	72
CL	5.60	5.60	0	1	5.60	5.60
B	0.250-	0.25	0	1	0.25	0.25
F	0.42	0.42	0	1	0.42	0.42
MG	16.50	16.50	0	1	16.50	16.50
K	8.30	8.30	0	1	8.30	8.30
NA	25.90	25.90	0	1	25.90	25.90
SO4	110	110	0	1	110	110
AL	0.070	0.07	0	1	0.07	0.07
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.100-	0.10	0	1	0.10	0.10
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	0.55	0.55	0	1	0.55	0.55
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	482	482	0	1	482	482
CTDS	482.30	482.30	0	1	482.30	482.30
CAT	6.29	6.29	0	1	6.29	6.29
AN	6.45	6.45	0	1	6.45	6.45
CB	1.243-	1.24	1.55	1	1.24	1.24

USER CODE 100.00

TABLE D-6.3.05 (Continued)

WATER QUALITY DATA FOR M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM10

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

L[illegible]	TETON	TETON
[illegible]	1337	1429
DS	070780	073080
DA	071080	073180

WN	20	20	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.50	~.30	7.40	0.14	2	7.30	7.50
TC	20	17	18.50	2.12	2	17	20
CD	480	445	462.50	24.75	2	445	480
NH3	0.100-	0.100-	0.10	0	2	0.10	0.10
NO3	0.30	0.18	0.24	0.08	2	0.18	0.30
HCO3	221	207	214	9.90	2	207	221
CO3	0.000	0.000	0	0	2	0	0
CA	55	58	56.50	2.12	2	55	58
CL	1.80	2	1.90	0.14	2	1.80	2
B	0.250-	0.250-	0.25	0	2	0.25	0.25
F	0.49	0.49	0.49	0	2	0.49	0.49
MG	20.40	10.20	15.30	7.21	2	10.20	20.40
K	7.20	7	7.10	0.14	2	7	7.20
NA	27	27	27	0	2	27	27
SO4	93	101	97	5.66	2	93	101
AL	0.050-	0.050-	0.05	0	2	0.05	0.05
AS	0.005-	0.005-	0.01	0	2	0.01	0.01
BA	0.11	0.100-	0.11	0.01	2	0.10	0.11
CD	0.010-	0.010-	0.01	0	2	0.01	0.01
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	1	0.050-	0.53	0.67	2	0.05	1
PB	0.050-	0.050-	0.05	0	2	0.05	0.05
MN	0.070	0.050-	0.06	0.01	2	0.05	0.07
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.050-	0.050-	0.05	0	2	0.05	0.05
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	NA	0	0	0	0	0
RAER	NA	NA					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	NA	0	0	0	0	0
U	0.100-	0.100-	0.10	0	2	0.10	0.10
V	0.050-	0.050-	0.05	0	2	0.05	0.05
ZN	0.010-	0.010-	0.01	0	2	0.01	0.01
TDS	328	330	329	1.41	2	328	330
CTDS	425.40	412.20	418.80	9.33	2	412.20	425.40
CAT	5.78	5.09	5.43	0.49	2	5.09	5.78
AN	5.61	5.55	5.58	0.04	2	5.55	5.61
CB	1.51	4.373-	2.94	2.02	2	1.51	4.37

USER CODE 100.00

TABLE D-[illegible]06

WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE
(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.76	0.40	7	7.12	9.56
TC	12.25	2.50	4	11	16
CD	532.26	65.64	7	295	710
NH3	0.46	0.32	7	0.01	1.00
NO3	0.53	0.28	7	0.01	1.90
HCO3	217.36	26.33	7	66	400
CO3	3.49	5.96	7	0	19
CA	66.46	21.52	7	18	120
CL	6.20	1.90	7	1.80	16
B	0.08	0.08	7	0.01	0.25
F	0.48	0.04	7	0.30	0.80
MG	12.71	4.38	7	0	32
K	9.76	2.48	7	7	20
NA	29.90	2.76	7	23	40
SO4	119.85	36.68	7	65	255
AL	0.92	2.07	7	0.02	11
AS	0.02	0.02	7	0.00	0.12
BA	0.08	0.05	7	0.03	0.50
CD	0.02	0.01	7	0.00	0.05
CR	0.05	0.01	7	0.01	0.10
CU	0.05	0.01	7	0.01	0.09
FE	0.80	0.82	7	0.01	3.90
PB	0.05	0.02	7	0.01	0.1[illegible]
MN	0.07	0.02	7	0.05	0.20
HG	.00092	.00010	7	.00004	.00100
MO	0.08	0.02	7	0.00	0.50
NI	0.05	0.01	7	0.01	0.05
RA	10.2[illegible]	5.48	6	0.05	32.80
RAER	0	0.000	0	0	0
SE	0.01	0.00	7	0.01	0.01
TH	3.08	2.12	6	0.90	6
U	3.01	7.73	7	0.01	41
V	0.40	0.50	7	0.05	5
ZN	0.07	0.05	7	0.01	0.34
TDS	383.05	44.50	7	250	558
CTDS	451.55	90.86	7	272.70	742
CAT	5.96	1.15	7	3.47	9.96
AN	6.12	1.21	7	4.08	9.92
CB	5.09	2.11	7	0.07	19.59
USER CODE		100.00			

Wells used in this summary are: PN5-LMM1 PN5-L305 PN5-L571 PN5-L575 PN5-L576 PN5-L581 PN5-LMM8

TABLE D-6.3.06 (Continued)

WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	223	1090
DS	011180	051380
DA	011480	051380

WN	1	1	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.30	7.66	7.48	0.25	2	7.30	7.66
TC	NA	NA	0	0	0	0	0
CD	575	420	497.50	109.60	2	420	575
NH3	1.001-	0.48	0.74	0.37	2	0.48	1.00
NO3	1.30	0.100-	0.70	0.85	2	0.10	1.30
HCO3	213	220	216.50	4.95	2	213	220
CO3	0.000	0.000	0	0	2	0	0
CA	91	63	77	19.80	2	63	91
CL	1.80	6	3.90	2.97	2	1.80	6
B	0.050-	0.050-	0.05	0	2	0.05	0.05
F	0.50	0.50	0.50	0	2	0.50	0.50
MG	0.000	14	7	9.90	2	0	14
K	7	9	8	1.41	2	7	9
NA	25	35	30	7.07	2	25	35
SO4	100	102	101	1.41	2	100	102
AL	0.100-	0.45	0.28	0.25	2	0.10	0.45
AS	0.034	0.005-	0.02	0.02	2	0.01	0.03
BA	0.050-	0.050-	0.05	0	2	0.05	0.05
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.10	0.79	0.45	0.49	2	0.10	0.79
PB	0.050-	0.050-	0.05	0	2	0.05	0.05
MN	0.050-	0.050-	0.05	0	2	0.05	0.05
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.100-	0.050-	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	15.90	15.90	0	1	15.90	15.90
RAER	NA	1.70					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	6	6	0	1	6	6
U	0.100-	0.100-	0.10	0	2	0.10	0.10
V	0.500-	0.050-	0.28	0.32	2	0.05	0.50
ZN	0.050-	0.050-	0.05	0	2	0.05	0.05
TDS	356	332	344	16.97	2	332	356
CTDS	437.80	449	443.40	7.92	2	437.80	449
CAT	5.81	6.05	5.93	0.17	2	5.81	6.05
AN	5.62	5.90	5.76	0.19	2	5.62	5.90
CB	1.61	1.25	1.43	0.25	2	1.25	1.61

USER CODE 100.00

TABLE D-6.3.06 (Continued)
WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L305

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	CDM	NORTHERN	WAMCO	PALS	TETON	TETON					
JOB					225	1077					
DS	031379	031379	060579	061279	011480	051380					
DA	NA	NA	NA	NA	NA	051380					
WN	5	5	5	5	5	5	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4	5	6					
PH	NA	NA	8.06	NA	7.45	7.70	7.74	0.31	3	7.45	8.06
TC	NA	NA	11	11	NA	NA	11	0	2	11	11
CD	NA	NA	510	NA	550	425	495	63.84	3	425	550
NH3	0.006	0.43	0.100-	0.14	1.001-	0.100-	0.30	0.37	6	0.01	1.00
NO3	0.12	0.010	0.050-	0.040	1.40	0.100-	0.29	0.55	6	0.01	1.40
HCO3	221	220	400	NA	211	217	253.80	81.82	5	211	400
CO3	0.000	0.000	0.000	0.000	0.000	0.000	0	0	6	0	0
CA	34.50	72	120	60	84	60	75.08	24.43	6	54.50	120
CL	2	3	16	NA	3.60	4	5.72	5.80	5	2	16
B	0.10	0.20	0.010-	0.010-	0.050-	0.060	0.07	0.07	6	0.01	0.20
F	0.80	0.72	0.48	0.33	0.40	0.50	0.54	0.18	6	0.33	0.80
MG	20.30	17	32	18	2.30	16	17.60	9.51	6	2.30	32
K	12	8	8	9	7.50	8	8.75	1.67	6	7.50	12
NA	35.30	33	26	33	26	35	31.38	4.28	6	26	35.30
SO4	134	13[illegible]	140	NA	85	255	150	62.85	5	85	255
AL	0.100-	0.100-	0.050-	0.100-	0.100-	0.050-	0.08	0.03	6	0.05	0.10
AS	0.007	0.003-	0.005	0.004	0.005-	0.005-	0.01	0.00	6	0.00	0.01
BA	0.10	0.500-	0.030	0.400-	0.050-	(350-	0.19	0.21	6	0.03	0.50
CD	0.008	0.005-	0.002-	0.020-	0.050-	0.010-	0.02	0.02	6	0.00	0.05
CR	0.006-	0.020-	0.010-	0.100-	0.050-	0.050-	0.04	0.04	6	0.01	0.10
CU	0.010	0.090	0.040	0.090	0.050-	0.050-	0.06	0.03	6	0.01	0.09
FE	0.15	1.34	0.070-	0.30	0. 8	0.31	0.41	0.47	6	0.07	1.34
PB	0.060	0.020-	0.010-	0.010-	0.050-	0.050-	0.03	0.02	6	0.01	0.06
MN	0.099	0.11	0.050-	0.050	0.050-	0.050-	0.07	0.03	6	0.05	0.11
HG	.00004	.00100-	.00050-	.00100-	.00100-	.00100-	.00076	.00040	6	.00004	.00100
MO	0.002	0.020-	0.050-	0.500-	0.100-	0.050-	0.12	0.19	6	0.00	0.50
NI	0.027	0.050	0.020-	0.010-	0.050-	0.050-	0.03	0.02	6	0.01	0.05
RA	10	NA	5	11.50	NA	10.50	9.25	2.90	4	5	11.50
RAER	26	NA	0.60	NA	NA	1.10					
SE	0.006-	0.005-	0.005-	0.010-	0.005-	0.005-	0.01	0.00	6	0.01	0.01
TH	NA	NA	NA	NA	NA	2.30	2.30	0	1	2.30	2.30
U	0.012	NA	0.015	0.061	0.100-	0.100-	0.06	0.04	5	0.01	0.10
[illegible]	NA	1.001-	0.050-	NA	5-	0.050-	1.53	2.36	4	0.05	5
ZN	0.21	0.340-	0.020	0.10	0.050-	0.050-	0.13	0.12	6	0.02	0.34
TDS	463	392	558	NA	330	334	415.40	96.26	5	330	558
CTDS	479.10	489	742	NA	419.40	595	544.90	127.05	5	419.40	742
CAT	6.23	6.63	9.96	NA	5.70	6.04	6.91	1.73	5	5.70	9.96
AN	6.47	6.52	9.92	NA	5.33	8.98	7.44	1.92	5	5.33	9.92
CB	1.863-	0.83	0.17	NA	3.39	%19.588-	5.17	8.15	5	0.17	19.59
USER CODE	100.00										

TABLE D-6.3.06 (Continued)

WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L571

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	343	1106
DS	012980	052080
DA	NA	052080

WN	9	9	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.45	7.69	7.57	0.17	2	7.45	7.69
TC	NA	NA	0	0	0	0	0
CD	625	710	667.50	60.10	2	625	710
NH3	1.001-	0.15	0.58	0.60	2	0.15	1.00
NO3	1.001-	0.100-	0.55	0.64	2	0.10	1.00
HCO3	194	195	194.50	0.71	2	194	195
CO3	0.000	0.000	0	0	2	0	0
CA	80	77	78.50	2.12	2	77	80
CL	4	4	4	0	2	4	4
B	0.050-	0.050-	0.05	0	2	0.05	0.05
F	0.48	0.45	0.47	0.02	2	0.45	0.48
MG	5	16.50	10.75	8.13	2	5	16.50
K	10.20	8	9.10	1.56	2	8	10.20
NA	30	40	35	7.07	2	30	40
SO4	170	208	189	26.87	2	170	208
AL	0.30	0.050-	0.18	0.18	2	0.05	0.30
AS	0.005-	0.005-	0.01	0	2	0.01	0.01
BA	0.050-	0.050-	0.05	0	2	0.05	0.05
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.57	0.50	0.54	0.05	2	0.50	0.57
PB	0.050-	0.050	0.05	0	2	0.05	0.05
MN	0.050-	0.060	0.06	0.01	2	0.05	0.06
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.100-	0.050-	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	1.66	1.66	0	1	1.66	1.66
RAER	NA	0.54					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	2.50	2.50	0	1	2.50	2.50
U	0.10	0.100-	0.10	0	2	0.10	0.10
V	0.500-	0.050-	0.28	0.32	2	0.05	0.50
ZN	0.050-	0.050-	0.05	0	2	0.05	0.05
TDS	434	498	466	45.25	2	434	498
CTDS	493.20	548.50	520.85	39.10	2	493.20	548.50
CAT	5.97	7.14	6.56	0.83	2	5.97	7.14
AN	6.83	7.64	7.24	0.57	2	6.83	7.64
CB	6.740-	3.350-	5.04	2.40	2	3.35	6.74

USER CODE 100.00

TABLE D-6.3.0[illegible]ntinued)

WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L575

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	PALS	WAMCO	TETON	TETON					
JOB			262	1088					
DS	060279	022979	011780	051380					
DA	NA	NA	NA	051380					
WN	10	10	10	10	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	9	7.62	7.58	7.52	7.93	0.71	4	7.52	9
TC	11	11	NA	NA	11	0	2	11	11
CD	510	525	640	425	525	88.41	4	425	640
NH3	0.031	0.100-	0.100-	0.24	0.12	0.09	4	0.03	0.24
NO3	0.20	0.050-	1.40	0.100-	0.44	0.64	4	0.05	1.40
HCO3	232	229	222	220	225.75	5.68	4	220	232
CO3	2-	0.000	0.000	0.000	0.50	1	4	0	2
CA	66	64	94	62	71.50	15.09	4	62	94
CL	8	14	8.40	7	9.35	3.16	4	7	14
B	0.12	0.010-	0.050-	0.050-	0.06	0.05	4	0.01	0.12
F	0.38	0.65	0.30	0.46	0.45	0.15	4	0.30	0.65
MG	23	16	7.60	17	15.90	6.34	4	7.60	23
K	9	11	11	10.80	10.45	0.97	4	9	11
NA	32	24	23	36	28.75	6.29	4	23	36
SO4	77	84	80	122	90.75	21.03	4	77	122
AL	0.10	0.050	0.100-	0.050	0.08	0.03	4	0.05	0.10
AS	0.010-	0.005-	0.015	0.005-	0.01	0.00	4	0.01	0.01
BA	0.100-	0.040	0.050-	0.050-	0.06	0.03	4	0.04	0.10
CD	0.040-	0.002-	0.050-	0.010-	0.03	0.02	4	0.00	0.05
CR	0.100-	0.010-	0.050-	0.050-	0.05	0.04	4	0.01	0.10
CU	0.050-	0.010-	0.050-	0.050-	0.04	0.02	4	0.01	0.05
FE	0.050	0.010-	0.13	0.16	0.09	0.07	4	0.01	0.16
PB	0.010-	0.010-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
MN	0.060	0.200-	0.060	0.050-	0.09	0.07	4	0.05	0.20
HG	.00100-	.00050-	.00100-	.00100-	.00088	.00025	4	.00050	.00100
MO	0.100-	0.050-	0.100-	0.050-	0.08	0.03	4	0.05	0.10
NI	0.050-	0.020-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
RA	NA	0.200-	NA	19.90	10.05	13.93	2	0.20	19.90
RAER	NA	NA	NA	2.10					
SE	NA	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	NA	5.40	5.40	0	1	5.40	5.40
U	NA	0.032	0.100-	0.100-	0.08	0.04	3	0.03	0.10
V	NA	0.050	0.500-	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.050-	0.005	0.050-	0.050-	0.04	0.02	4	0.01	0.05
TDS	384	331	412	322	362.25	42.99	4	322	412
CTDS	449	442	446	474.80	452.95	14.85	4	442	474.80
CAT	6.81	5.84	6.60	6.33	6.39	0.42	4	5.84	6.81
AN	5.70	5.90	5.54	6.34	5.87	0.35	4	5.54	6.34
CB	8.87	0.528-	8.70	0.070-	*4.54	4.91	4	0.07	8.87

USER CODE 100.00

TABLE D-6.3.06 (Continued)
WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L576

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	WAMCO	TETON	TETON
JOB		250	1089
DS	062979	011580	051380
DA	NA	NA	051380

WN	11	11	11	MEAN	STD	NSMP	MIN	MAX
SPN	1	2	3					
PH	7.79	7.12	7.59	7.50	0.34	3	7.12	7.79
TC	11	NA	NA	11	0	1	11	11
CD	520	575	430	508.33	73.20	3	430	575
NH3	0.100-	1.001-	0.100-	0.40	0.52	3	0.10	1.00
NO3	0.050-	1.62	0.13	0.60	0.88	3	0.05	1.62
HCO3	220	159	227	202	37.40	3	159	227
CO3	0.000	0.000	0.000	0	0	3	0	0
CA	64	88.50	67	73.17	13.36	3	64	88.50
CL	10	4.40	6	6.80	2.88	3	4.40	10
B	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
F	0.65	0.40	0.50	0.52	0.13	3	0.40	0.65
MG	16	0.000	14	10	8.72	3	0	16
K	8	8.50	8.80	8.43	0.40	3	8	8.80
NA	24	30	36	30	6	3	24	36
SO4	93	65	111	89.67	23.18	3	65	111
AL	0.020	0.30	0.080	0.13	0.15	3	0.02	0.30
AS	0.005-	0.022	0.005-	0.01	0.01	3	0.01	0.02
BA	0.040	0.050-	0.050-	0.05	0.01	3	0.04	0.05
CD	0.002-	0.050-	0.010-	0.02	0.03	3	0.00	0.05
CR	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
CU	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
FE	0.010-	0.46	0.080	0.18	0.24	3	0.01	0.46
PB	0.010-	0.050-	0.050-	0.04	0.02	3	0.01	0.05
MN	0.050-	0.050	0.050-	0.05	0.00	3	0.05	0.05
HG	.00050-	.00100-	.00100-	.00083	.00029	3	.00050	.00100
MO	0.050-	0.100-	0.050-	0.07	0.03	3	0.05	0.10
NI	0.020-	0.050-	0.050-	0.04	0.02	3	0.02	0.05
RA	0.050-	NA	32.80	16.43	23.16	2	0.05	32.80
RAER	NA	NA	2.10					
SE	0.005-	0.005-	0.005-	0.01	0	3	0.01	0.01
TH	NA	NA	1.40	1.40	0	1	1.40	1.40
U	0.039	0.100-	0.100-	0.08	0.04	3	0.04	0.10
V	0.050	0.500-	0.050-	0.20	0.26	3	0.05	0.50
ZN	0.005-	0.050-	0.050-	0.04	0.03	3	0.01	0.05
TDS	328	382	345	351.67	27.61	3	328	382
CTDS	435	355.40	469.80	420.07	58.64	3	355.40	469.80
CAT	5.76	5.94	6.29	5.99	0.27	3	5.76	6.29
AN	5.82	4.08	6.20	5.37	1.13	3	4.08	6.20
CB	0.568-	18.51	0.68	6.59	10.33	3	0.57	18.51

USER CODE 100.00

TABLE D-6.3.06 (continued)

WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-L581

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	345	1107
DS	012980	051980
DA	NA	051980

WN	12	12	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.60	9.56	8.58	1.39	2	7.60	9.56
TC	NA	NA	0	0	0	0	0
CD	650	295	472.50	251.02	2	295	650
NH3	1.001-	0.94	0.97	0.04	2	0.94	1.00
NO3	1.90	0.100-	1	1.27	2	0.10	1.90
HCO3	300	66	183	165.46	2	66	300
CO3	0.000	19	9.50	13.44	2	0	19
CA	NA	18	18	0	1	18	18
CL	4.40	10	7.20	3.96	2	4.40	10
B	0.050-	0.050-	0.05	0	2	0.05	0.05
F	0.52	0.38	0.45	0.10	2	0.38	0.52
MG	NA	9.70	9.70	0	1	9.70	9.70
K	10.20	20	15.10	6.93	2	10.20	20
NA	26	29	27.50	2.12	2	26	29
SO4	108	101	104.50	4.95	2	101	108
AL	11	0.20	5.60	7.64	2	0.20	11
AS	0.12	0.024	0.07	0.07	2	0.02	0.12
BA	0.10	0.050-	0.08	0.04	2	0.05	0.10
CD	0.050-	0.010-	0.03	0.03	2	0.01	0.05
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	3.90	0.34	2.12	2.52	2	0.34	3.90
PB	0.050-	0.10	0.08	0.04	2	0.05	0.10
MN	0.17	0.050-	0.11	0.08	2	0.05	0.17
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.100-	0.050-	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	18.0	8	0	1	8	8
RAER	NA	1.60					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	0.90	0.90	0	1	0.90	0.90
U	41	0.100-	20.55	28.92	2	0.10	41
V	0.500-	0.050-	0.28	0.32	2	0.05	0.50
ZN	0.23	0.090	0.16	0.10	2	0.09	0.23
TDS	454	250	352	144.25	2	250	454
CTDS	NA	272.70	272.70	0	1	272.70	272.70
CAT	NA	3.47	3.47	0	1	3.47	3.47
AN	NA	4.10	4.10	0	1	4.10	4.10
CB	NA	8.334-	8.33	10.33	1	8.33	8.33

USER CODE 100.00.

TABLE D-6.3.06 (Continued)
WATER QUALITY DATA OUTSIDE M AQUIFER PRODUCTION ZONE

ANALYSES FOR WELL
MAP NUMBER PN5-LMM8

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS
LAB TETON
JOB 1343
DS 071080
DA 071180

WN	18	MEAN	STDV	NSMP	MIN	MAX
SPN	1					
PH	7.49	7.49	0	1	7.49	7.49
TC	16	16	0	1	16	16
CD	560	560	0	1	560	560
NH3	0.100-	0.10	0	1	0.10	0.10
NO3	0.14	0.14	0	1	0.14	0.14
HCO3	246	246	0	1	246	246
CO3	14.40	14.40	0	1	14.40	14.40
CA	72	72	0	1	72	72
CL	6.40	6.40	0	1	6.40	6.40
B	0.250-	0.25	0	1	0.25	0.25
F	0.46	0.46	0	1	0.46	0.46
MG	18	18	0	1	18	18
K	8.50	8.50	0	1	8.50	8.50
NA	26.70	26.70	0	1	26.70	26.70
SO4	114	114	0	1	114	114
AL	0.070	0.07	0	1	0.07	0.07
AS	0.005-	0.01	0	1	0.01	0.01
BA	0.12	0.12	0	1	0.12	0.12
CD	0.010-	0.01	0	1	0.01	0.01
CR	0.050-	0.05	0	1	0.05	0.05
CU	0.050-	0.05	0	1	0.05	0.05
FE	1.83	1.83	0	1	1.83	1.83
PB	0.050-	0.05	0	1	0.05	0.05
MN	0.050-	0.05	0	1	0.05	0.05
HG	.00100-	.00100	.00000	1	.00100	.00100
MO	0.050-	0.05	0	1	0.05	0.05
NI	0.050-	0.05	0	1	0.05	0.05
RA	NA	0	0	0	0	0
RAER	NA					
SE	0.005-	0.01	0	1	0.01	0.01
TH	NA	0	0	0	0	0
U	0.100-	0.10	0	1	0.10	0.10
V	0.050-	0.05	0	1	0.05	0.05
ZN	0.010-	0.01	0	1	0.01	0.01
TDS	390	390	0	1	390	390
CTDS	506	506	0	1	506	506
CAT	6.45	6.45	0	1	6.45	6.45
AN	7.07	7.07	0	1	7.07	7.07
CB	4.539-	4.54	1.55	1	4.54	4.54
USER CODE		100.00				

TABLE D-[illegible]07
WATER QUALITY DATA FOR BASAL AQUIFER
(SUMMARY)

WATER QUALITY ANALYSIS FOR SELECTED WELLS
IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

	MEAN	STDV	NWEL	MNOBS	MXOBS
PH	7.77	0.19	3	7.30	8.10
TC	12.83	1.76	3	11	16
CD	445.61	76.36	3	389	590
NH3	0.24	0.20	3	0.10	1.00
NO3	0.40	0.17	3	0.01	2.20
HCO3*	229.75	5.52	3	203	251
CO3	3.28	5.05	3	0	13
CA	44.35	9.66	3	35	61
CL	5.52	1.11	3	4.40	8
B	0.19	0.10	3	0.05	0.25
F	0.50	0.06	3	0.40	1
MG	13.70	2.86	3	0	24.30
K	7.79	0.86	3	7	9.60
NA	43.62	4.26	3	39	55
SO4	81.58	49.56	3	41	176
AL	0.26	0.37	3	0.05	2.50
AS	0.01	0.00	3	0.01	0.01
BA	0.14	0.03	3	0.05	0.50
CD	0.01	0.00	3	0.01	0.05
CR	0.04	0.01	3	0.01	0.05
CU	0.04	0.01	3	0.01	0.05
FE	0.84	0.25	3	0.05	3.85
PB	0.05	0.01	3	0.02	0.05
MN	0.09	0.02	3	0.06	0.16
HG	.00092	.00014	3	.00004	.00100
MO	0.06	0.02	3	0.00	0.10
NI	0.05	0.00	3	0.04	0.05
RA	6.81	0.000	1	2.02	14.70
RAER	0	0.000	0	0	0
SE	0.01	0.000	3	0.01	0.01
TH	0.25	0.000	1	0	0.50
U	0.08	0.03	3	0.00	0.10
V	0.17	0.20	3	0.00	1.00
ZN	0.08	0.06	3	0.01	0.44
TDS	313.83	57.54	3	264	450
CTDS	429.59	62.97	3	384.30	580.80
CAT	5.44	0.76	3	4.87	7.63
AN	5.73	0.99	3	4.92	7.95
CB	2.76	2.14	3	0.38	11.10
USER CODE		100.00			

Wells used in this summary are: PN5-L314 PN5-LBM1 PN5-LBM2

TABLE D-6.3.07 (Continued)
WATER QUALITY DATA FOR BASAL AQUIFER

ANALYSES FOR WELL
MAP NUMBER PN5-L314

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	CDM	NRTHRN	TETON	TETON					
JOB	NA	NA	266	1099					
DS	021679	021679	011880	051580					
DA	NA	NA	011880	051580					
WN	4	4	4	4	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2	3	4					
PH	8.10	NA	7.70	7.79	7.86	0.21	3	7.70	8.10
TC	11	NA	NA	NA	11	0	1	11	11
CD	590	NA	450	560	533.33	73.71	3	450	590
NH3	0.13	0.54	1.001-	0.23	0.48	0.39	4	0.13	1.00
NO3	0.080	0.010-	2.20	0.11	0.60	1.07	4	0.01	2.20
HCO3	228	235	203	251	229.25	19.97	4	203	251
CO3	0.000	3	0.000	0.000	0.75	1.50	4	0	3
CA	41	61	59	61	55.50	9.71	4	41	61
CL	7	6	8	6	6.75	0.96	4	6	8
B	0.10	0.10	0.050-	0.080	0.08	0.02	4	0.05	0.10
F	1	0.47	0.40	0.42	0.57	0.29	4	0.40	1
MG	15.90	19	0.000	24.30	14.80	10.46	4	0	24.30
K	9.60	9	9	7.50	8.78	0.90	4	7.50	9.60
NA	44	49	44	55	48	5.23	4	44	55
SO4	142	133	100	176	137.75	31.25	4	100	176
AL	0.090-	0.100-	2.50	0.050	0.69	1.21	4	0.05	2.50
AS	0.005-	0.005-	0.005-	0.005-	0.01	0	4	0.01	0.01
BA	0.100-	0.500-	0.050-	0.050-	0.18	0.22	4	0.05	0.50
CD	0.005-	0.005-	0.050-	0.010-	0.02	0.02	4	0.01	0.05
CR	0.010-	0.020-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
CU	0.010-	0.010-	0.050-	0.050-	0.03	0.02	4	0.01	0.05
FE	0.090	0.050-	3.85	0.31	1.08	1.65	4	0.05	3.85
PB	0.020-	0.020-	0.050-	0.050-	0.04	0.02	4	0.02	0.05
MN	0.065	0.10	0.16	0.11	0.11	0.04	4	0.07	0.16
HG	.00004-	.00100	.00100-	.00100-	.00076	.00048	4	.00004	.00100
MO	0.001	0.020-	0.100-	0.050-	0.04	0.04	4	0.00	0.10
NI	0.040	NA	0.050-	0.050-	0.05	0.01	3	0.04	0.05
RA	3.70	14.70	NA	2.02	6.81	6.89	3	2.02	14.70
RAER	0.90	2.70	NA	0.65					
SE	0.005-	0.005-	0.005-	0.005-	0.01	0	4	0.01	0.01
TH	0.000	NA	NA	0.50	0.25	0.35	2	0	0.50
U	0.002-	0.001-	0.100-	0.100-	0.05	0.06	4	0.00	0.10
V	0.002-	0.001-	0.500-	0.060-	0.39	0.46	4	0.00	1.00
ZN	0.01[illegible]	0.[illegible]50	0.44	0.050-	0.14	0.20	4	0.01	0.44
TDS	NA	NA	310	450	380	98.99	2	310	450
CTDS	487.50	515	423	580.80	501.58	65.39	4	423	580.80
CAT	5.51	6.97	5.09	7.63	6.30	1.20	4	5.09	7.63
AN	6.89	6.89	5.63	7.95	6.84	0.95	4	5.63	7.95
CB	%11.105-	0.57	5.097-	2.057-	4.71	4.66	4	0.57	11.10

USER CODE 100.00 .

TABLE D-6.3.07 (continued)
WATER QUALITY DATA FOR BASAL AQUIFER

ANALYSES FOR WELL
MAP NUMBER PN5-LBM1

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON
JOB	1336	1410
DS	070280	071880
DA	070980	071880

WN	34	34	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	8	7.81	7.91	0.13	2	7.81	8
TC	16	13	14.50	2.12	2	13	16
CD	410	409	409.50	0.71	2	409	410
NH3	0.15	0.100-	0.12	0.03	2	0.10	0.15
NO3	0.35	0.31	0.33	0.03	2	0.31	0.35
HCO3	222	227	224.50	3.54	2	222	227
CO3	5.20	13	9.10	5.52	2	5.20	13
CA	42	35	38.50	4.95	2	35	42
CL	4.40	4.80	4.60	0.28	2	4.40	4.80
B	0.250-	0.250-	0.25	0	2	0.25	0.25
F	0.50	0.48	0.49	0.01	2	0.48	0.50
MG	14.90	16.80	15.85	1.34	2	14.90	16.80
K	7.20	7.70	7.45	0.35	2	7.20	7.70
NA	40	39	39.50	0.71	2	39	40
SO4	61	65	63	2.83	2	61	65
AL	0.050-	0.050-	0.05	0	2	0.05	0.05
AS	0.005-	0.009	0.01	0.00	2	0.01	0.01
BA	0.13	0.100-	0.12	0.02	2	0.10	0.13
CD	0.010-	0.010-	0.01	0	2	0.01	0.01
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.40	0.75	0.58	0.25	2	0.40	0.75
PB	0.050-	0.050-	0.05	0	2	0.05	0.05
MN	0.080	0.060	0.07	0.01	2	0.06	0.08
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.050-	0.10	0.08	0.04	2	0.05	0.10
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	NA	0	0	0	0	0
RAER	NA	NA					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	NA	0	0	0	0	0
U	0.100-	0.100-	0.10	0	2	0.10	0.10
V	0.050-	0.050-	0.05	0	2	0.05	0.05
ZN	0.010-	0.18	0.09	0.12	2	0.01	0.18
TDS	264	287	275.50	16.26	2	264	287
CTDS	396.70	408.30	402.50	8.20	2	396.70	408.30
CAT	5.25	5.02	5.13	0.16	2	5.02	5.25
AN	5.21	5.64	5.42	0.31	2	5.21	5.64
CB	0.38	5.820-	3.10	3.85	2	0.38	5.82

USER CODE 100.00

TABLE D-6.3.07 (Continued)
WATER QUALITY DATA FOR BASAL AQUIFER

ANALYSES FOR WELL
MAP NUMBER PN5-LBM2

IF A PARAMETER IS PRESENT AT BELOW DETECTABLE LEVELS THEN
THE DETECTION LIMIT IS USED IN THE STATISTICAL CALCULATIONS

LAB	TETON	TETON					
JOB	1349	1365					
DS	071380	071480					
DA	071480	071680					
WN	35	35	MEAN	STDV	NSMP	MIN	MAX
SPN	1	2					
PH	7.81	7.30	7.56	0.36	2	7.30	7.81
TC	13	13	13	0	2	13	13
CD	389	399	394	7.07	2	389	399
NH3	0.100-	0.17	0.14	0.05	2	0.10	0.17
NO3	0.30	0.25	0.28	0.04	2	0.25	0.30
HCO3	232	239	235.50	4.95	2	232	239
CO3	0.000	0.000	0	0	2	0	0
CA	39.10	39	39.05	0.07	2	39	39.10
CL	4.80	5.60	5.20	0.57	2	4.80	5.60
B	0.250-	0.250-	0.25	0	2	0.25	0.25
F	0.45	0.45	0.45	0	2	0.45	0.45
MG	9.70	11.20	10.45	1.06	2	9.70	11.20
K	7	7.30	7.15	0.21	2	7	7.30
NA	44.70	42	43.35	1.91	2	42	44.70
SO4	47	41	44	4.24	2	41	47
AL	0.050-	0.050-	0.05	0	2	0.05	0.05
AS	0.005-	0.005-	0.01	0	2	0.01	0.01
BA	0.18	0.050-	0.12	0.09	2	0.05	0.18
CD	0.010-	0.010-	0.01	0	2	0.01	0.01
CR	0.050-	0.050-	0.05	0	2	0.05	0.05
CU	0.050-	0.050-	0.05	0	2	0.05	0.05
FE	0.69	1.03	0.86	0.24	2	0.69	1.03
PB	0.050-	0.050-	0.05	0	2	0.05	0.05
MN	0.080	0.080	0.08	0	2	0.08	0.08
HG	.00100-	.00100-	.00100	.00000	2	.00100	.00100
MO	0.050-	0.050-	0.05	0	2	0.05	0.05
NI	0.050-	0.050-	0.05	0	2	0.05	0.05
RA	NA	NA	0	0	0	0	0
RAER	NA	NA					
SE	0.005-	0.005-	0.01	0	2	0.01	0.01
TH	NA	NA	0	0	0	0	0
U	0.100-	0.100-	0.10	0	2	0.10	0.10
V	0.050-	0.060	0.06	0.01	2	0.05	0.06
ZN	0.010-	0.032	0.02	0.02	2	0.01	0.03
TDS	270	302	286	22.63	2	270	302
CTDS	384.30	385.10	384.70	0.59	2	384.30	385.10
CAT	4.87	4.88	4.88	0.01	2	4.87	4.88
AN	4.92	4.93	4.92	0.01	2	4.92	4.93
CB	0.449-	0.486-	0.47	0.03	2	0.45	0.49

USER CODE 100.00

TABLE D-6.3.08

LABORATORIES USED

Abbreviation	Address
CDM	CDM-ACCU Lab 11455 West 48th Ave. Wheat Ridge, CO 80033 (303) 422-0469
NRTHRN	Northern Testing Laboratory 600 South 25th Street Billings, MT 59107 (406) 248-9161
PALS	Petroleum Analytical Laboratories WPC, Inc. P. O. Box 2052 Casper, WY 82602 (307) 266-1616
WAMCO	WAMCO Laboratory 705 Elma St. P. O. Box 3632 Casper, WY 82602 (307) 266-3252
TETON	Teton Research Laboratory P. O. Drawer A-1 Casper, WY 82602

APPENDIX D-7

Soils Inventory

APPENDIX D-7

SOILS INVENTORY

Introduction

Soils information for the proposed permit area is a combination of data developed from three different investigations. The low-intensity survey of the permit area was accomplished by the Soil Conservation Service Office in Douglas, Wyoming. Consultants from Ecology Audit Inc., Casper office, developed the detailed soil information for the research and development site, and C. J. Fowkes, soil consultant, assisted by Teton personnel surveyed additional areas where disturbances for the commercial mine facility such as additional evaporate pond locations could affect the soils.

Methodology

The soils map of the permit area (Figure D-7.1) gives both the general low intensity soil survey and detailed soils information. Soils from the low intensity survey are designated by map unit number while soils which were detailed within a map unit are shown by name. Test pit locations and type location where samples were taken or profiles described are also shown on this figure.

Characteristics of each soil unit were determined by inspection and desciption of soil profiles exposed in backhoe trenches and auger holes. These sample points were taken to a depth of at least sixty (60) inches or to bedrock. The profile at each location was described and sampled, using standard methods as outlined in U.S.D.A. Handbook 18.

Test pits and type locations were concentrated in areas to be most intensively disturbed.

LOW-INTENSITY SOILS SURVEY

The general distribution of soil complexes in the permit area were developed from information supplied by the S.C.G. The following soil-complex descriptions are based on descriptions supplied by the S.C.S.

Unit 331 Fort Collins - Ulm Complex, 0-6% Slopes:

These soils occur on nearly level to undulating toeslopes and footslopes of uplands. They are developing in residuum from calcareous shale at elevations between 4,200 and 5,600 feet. The mean annual precipitation is about twelve inches and the mean annual air temperature is about forty-six degrees Fahrenheit. Fort Collins sandy loam makes up about fifty percent of the map unit, and Ulm loam about thirty-five percent. The Fort Collins soils occur on the concave portions of slope summits, and the Ulm soils occur on sideslopes and in depressions.

Small amounts of Bidman sandy loam, Stoneham fine sandy loam, and Olney sandy loam make up about fifteen percent of this mapping unit.

The Fort Collins sandy loam is a very deep, well-drained soil forming in loamy residuum from calcareous shale. In a typical profile, the surface layer is grayish brown, neutral sandy loam about two inches thick. The upper part of the subsoil is grayish brown, neutral clay loam about six inches thick. The middle part of the subsoil is brown, neutral clay loam about six inches thick. The middle part of the subsoil is brown, mildly alkaline clay loam about sixteen inches thick. The lower part of the subsoil is light brownish gray, strongly alkaline clay loam to depths of sixty inches or more.

Permeability of this soil is moderate and available water capacity is high. Effective rooting depth is sixty inches or more. Surface runoff is slow and the hazard of erosion is slight to moderate.

The Ulm loam is a very deep, well-drained soil forming in alluvium. In a typical profile, the surface layer is brown, neutral loam about five inches thick. The upper part of the subsoil is brown, neutral clay loam about four inches thick. The lower part of the subsoil is brown, mildly alkaline clay about twelve inches thick. The substratum is light yellowish brown, moderately alkaline sandy clay loam to depths of sixty inches or more.

The permeability of this soil is moderate to slow and available water capacity is moderate to high. Effective rooting depth is sixty inches or more. Surface runoff is slow and the erosion hazard is moderate.

Unit 380 Olney-Bowback-Decloney Complex, 06% Slopes:
These soils occur on nearly level to undulating toeslopes and footslopes. They are developing is residuum and eolian material from calcareous and non-calcareous sandstones at elevations between 4,200 and 5,600 feet. The mean annual precipitation is about twelve inches and the mean annual air temperature is about forty-six degrees Fahrenheit. Olney sandy loam makes up about thirty-five percent of the mapping unit; Bowbac sandy loam about thirty percent; and Decloney sandy loam about fifteen percent.

Small areas of Ulm loam, Vona sandy loam, Terry fine sandy loam, Rauzi fine sandy loam, Pugsley very fine sandy loam, Fort Collins loam, Cushman loam, and soils similiar to Olney and Decolney, except that they have bedrock between forty and sixty inches, make up twenty percent of this mapping unit.

Olney sandy loam is a very deep, well-drained soil developing in residuum from calcareous sandstone. In a typical profile, the surface layer is a brown, neutral sandy loam three inches thick. The subsoil is brown, neutral sandy loam seven inches thick in the upper part, a brown, mildly alkaline sandy clay loam nine inches thick in the middle part, and a grayish brown, moderately alkaline sandy clay loam five inches thick in the lower part. The substratum is a grayish brown, moderately alkaline sandy clay loam twelve inches thick in the upper part, and a brownish gray, moderately alkaline sandy clay loam in the lower part to a depth of sixty inches or more.

The permeability of this soil is moderate and available water capacity is moderate. Surface runoff is slow and the hazard of erosion is severe.

Bowbac sandy loam is a moderately deep, well-drained soil developing from calcareous sandstone. In a typical profile, the surface layer is a brown, neutral sandy loam three inches. The subsoil is a brown, neutral sandy clay loam fifteen inches thick in the upper part, and a brown, mildly alkaline sandy loam eight inches thick in the lower part. The substratum is a light yellowish brown, moderately alkaline loam to a depth of thirty-seven inches.

The permeability of this soil is moderate and the available water capacity is moderate. Effective rooting depth is twenty-four to thirty-seven inches. Surface runoff is moderate and the hazard of erosion is severe.

Decolney sandy loam is a very deep, well-drained soil developing in non-calcareous eolian sand. In a typical profile, the surface layer is a brown, mildly alkaline sandy clay loam eleven inches thick. The substratum is a brown, moderately alkaline sandy loam to depths of sixty inches or more.

The permeability of this soil is moderately rapid and available water capacity is moderate. Effective rooting depth is sixty inches. Surface runoff is slow and the hazard of erosion is severe.

Unit 380C, Olney-Bowback-Decolney Complex, 615% Slopes:

These soils occur on ridges and backslopes. They are developing in residuum and eolian material from calcareous and non-calcareous sandstone at elevations between 4,200 and 5,600 feet. The mean annual precipitation is about twelve inches, and the mean annual air temperature is about forty-six degrees Fahrenheit. Olney sandy loam makes up about thirty-five percent of the mapping unit; Bowbac sandy loam about thirty-five percent; and Decolney sandy loam about fifteen percent.

Included in this mapping unit, and making up about fifteen percent of the units area, are small patches of Vona sandy loam, Rauzi fine sandy loam, Fort Collins loam, Renohill sandy loam, Pugsley very fine sandy loam, Cushman loam, Terry fine sandy loam, Worf loam, Tullock loamy sand, and soils similiar to Olney and Decolney, except they have bedrock between forty and sixty inches.

Other than percent slope, these soils are the same as those described about under Unit 380.

Unit 393, Renohill-Worfka-Shingle Complex, 615% Slopes:
These soils occur on backslopes of rolling uplands. They are developing in residuum from soft, calcareous shale and sandstone at elevations between 4,200 and 5,600 feet. The mean annual precippitation is about twelve inches and the mean annual air temperature is about forty-six degrees Fahrenheit. Renohill sandy loam makes up about thirty percent of the mapping unit; Worfka fine sandy loam about thirty percent and Shingle clay loam about twenty percent.

Included in this unit, and making up about twenty percent of the units area, are patches of Samsil clay loam, Worf loam, Cushman loam, Briggsdale sandy loam, and Ulm clay loam.

Renohill sandy loam is moderately deep, well-drained soil forming in residuum and locally transported sediments of soft, calcareous shale. In a typical profile, the surface layer is a pale brown, neutral sandy loam about five inches thick. The substratum is a pale brown, moderately alkaline clay loam underlain by soft, calcareous shale at a depth of about twenty-six inches.

Permeability of this soil is slow and available water capacity is moderate. Effective rooting depth is twenty-one to thirty-six inches. Surface runoff is moderate and the hazard of erosion is severe.

Worfka fine sandy loam is a shallow, well-drained soil forming in residuum from interbedded shale and sandstone. In a typical profile, the surface layer is a grayish brown, neutral fine sandy loam about three inches thick. The substratum is a light yellowish brown, moderately alkaline clay loam underlain by soft, calcareous shale at a depth of about fourteen inches.

The permeability of this soil is slow and the available water capacity is low. Effective rooting depth is twelve to nineteen inches. Surface runoff is moderate and the hazard of erosion is severe.

Shingle clay loam is a shallow, well-drained soil forming in residuum from soft, calcareous shale. In a typical profile, the surface layer is a light brownish gray, moderately alkaline clay loam four inches thick. The underlying material is a light brownish gray, moderately alkaline clay loam fourteen inches thick underlain by soft, calcareous shale bedrock at a depth of eighteen inches.

The permeability of this soil is moderate and available water capacity is low. Effective rooting depth is twelve to nineteen inches. Surface runoff is rapid and the hazard of erosion is severe.

<u>Unit 401, Worf-Shingle-Tassel Complex, 330% Slopes:</u>

These soils occur on undulating to hilly, moderately steep to steep upland ridges and backslopes. They are forming in residuum from soft, calcareous interbedded shales and sandstones at elevations between 4,200 and 5,600 feet. The mean annual precipitation is about twelve inches and the mean annual air temperature is about forty-six degrees Fahrenheit. Worf fine sandy loam makes up about thirty-five percent of the unit; Shingle clay loam about thirty percent; and Tassel sandy loam about twenty percent.

Included in this mapping unit, and making up about fifteen percent of the unit, are areas of Thedalund loam, Bowback fine sandy loam, Cushman loam, Samsil clay, Worfka clay loam, and Lesset sandy loam.

Worf fine sandy loam is a shallow, well-drained soil forming in residuum from soft, calcareous interbedded shale and sandstone. In a typical profile, the surface layer is grayish brown, neutral fine sandy loam about two inches thick. The subsoil is light yellowish brown, moderately alkaline sandy clay loam about four inches thick underlain by soft, calcareous shale at a depth of eighteen inches.

The permeability of this soil is moderate and available water capacity is low. Effective rooting depth is fourteen to nineteen inches. Surface runoff is moderate to rapid and the hazard of erosion is severe.

The Shingle clay loam is a shallow, well-drained soil forming in soft, calcareous interbedded shale and sandstone. In a typical profile, the surface layer is a light brownish gray, moderately alkaline clay loam about four inches thick. The substratum is a light brownish gray, moderately alkakline clay loam about fourteen inches thick underlain with soft, calcareous shale at a depth of eighteen inches.

The permeability of this soil is moderate and available water capacity is low. Effective rooting depth is twelve to nineteen inches. Surface runoff is rapid and the hazard of erosion is severe.

The Tassel sandy loam is a shallow, well-drained soil forming in residuum from soft, calcareous sandstone. In a typical profile, the surface layer is brown, moderately alkaline sandy loam about four inches thick. The substratum is yellowish brown, moderately alkaline sandy loam about thirteen inches thick underlain by soft, calcareous sandstone at a depth of seventeen inches.

The permeability of this soil is moderate and available water capacity is low. Effective rooting depth is fourteen to nineteen inches. Surface runoff is rapid and the hazard of erosion is severe.

Detailed Soils Survey

The following Soil Conservation Service general descriptions of soils in the detailed soils survey are accompanied by the profile description from the on site test pits and type location sample points.

Fort Collins loam, 0-6% Slopes:

This soil occurs on broad, gently sloping drainage bottoms and footslopes. Parent material for this soil is residuum and slopewash deposits from higher landforms. The surface layer is a brown, neutral clay loam about three inches thick underlain by a slightly alkaline brown clay loam twenty-two inches thick underlain by a light yellowish brown, slightly alkaline clay loam six inches thick. The subtratum is moderatley to highly alkaline calcareous light yellowish brown sandy clay loam to a depth of at least sixty inches.

The permeability of this soil is moderate and the available water capacity is high. Effective rooting depth is sixty inches or more. Surface runoff is slow and the hazard of erosion is slight to moderate.

The mean annual precipitation for this soil is about twelve inches and the mean annual air temperature is about forty-six degrees Fahrenheit.

A detailed profile of this soil is as follows:

Test Pit I
Fort Collins loam, 0-6% Slopes

0-2.5	A1	Brown (5/3 10 yr) loam, less than 1% coarse material; nonsticky, slightly plastic when wet, very friable when moist, soft when dry; moderate, fine, crumb sturcture; field pH 6.8; abrupt, smooth lower boundary.
2.5-6.0	AB	Light yellowish brown (5/4 10 yr) clay loam; slightly sticky, slightly plastic when wet, firm when moist, slightly hard when dry; moderate, coarse, platy sturcture; clay skins present on peds, field pH 6.8; abrupt, smooth lower boundary.
6.0-28	B21t	Brown (5/3 10 yr) clay loam; less than 1% coarse material; slightly sticky, plastic when wet, firm when moist, very hard when dry; strong, coarse, prismatic structure; clay skins present on peds; field pH 7.4; clear, wavy lower boundary.
28-34	B22t	Light yellowish brown (6/4 10 yr) clay loam; less than 1% coarse material; slightly sticky, plastic when wet, firm when moist, very hard when dry; strong, coarse, prismatic structure; clay skins present on peds; field pH 7.8; clear, wavy lower boundary.
34-75+	Cca	Light yellowish brown (6/4 10 yr) sandy clay loam, less than 1% coarse material; nonsticky, slightly plastic when wet, friable when moist, soft when dry; moderate, fine, crumb sturcture; field pH 7.8; very reactive to HCL (stringers and blebs of $CaCO_3$).

Bowbac sandy loam, 6-15% Slopes:

This soil is a well-drained, moderately deep soil developing in residuum and colluvium on moderately sloping (6-15%) side slopes. The surface layer is a brown, neutral sandy loam seven inches thick. The subsoil is a brown, neutral sandy loam three inches thick in the upper part and a slightly alkaline yellowish brown sandy loam twelve inches thick in the lower part. The substratum is a slightly alkaline, white sandy of variable thickness, overlying a soft, friable, fine-grained, slightly calcareous white sandstone. This soil is locally very stony, with fragments of limonite-cemented sandstone and siltstone concretions providing the coarse material. The extent of the stony portions of this soil is not great enough to establish a separate phase.

The permeability of this soil is moderate and the available water capacity is moderate. The effective rooting depth is twenty-four to thirty-eight inches. Surface runoff is moderate and the hazard of erosion is severe.

The mean annual precipitation is about twelve inches and the mean annual air temperature is about forty-six degrees Fahrenheit.

A detailed profile description of this soil is as follows:

Test Pit 2
Bowbac sandy loam, 6-15% Slopes

0-7	A1	Brown (5/3 10 yr moist) sandy loam, less than 1% coarse material; nonsticky, nonplastic when wet; very friable when moist, soft when dry; moderate, fine, crumb structure; field pH 7.4; abrupt, wavy lower boundary.
7-10	AB	Brown (5/3 10 yr moist) sandy loam, less than 1% coarse material; nonsticky, nonplastic when wet; very friable when moist. soft when dry, moderate, fine, crumb structure; field pH 7.4; abrupt, wavy lower boundary.
10-22	B2t	Yellowish brown (5/4 10 yr) sandy loam; 2-5% coarse material (angular fragments limonite cemented siltstone); moderately sticky, plastic when wet, firm when moist, very hard when dry; strong, medium, prismatic structure; clay skins present on peds, very slight reaction to HCL; field pH 7.8; clear, irregular lower boundary.
22-38	C	White (8/1 10 yr) sand, with many coarse light yellowish brown prominent mottles; less than 1% coarse material; nonsticky, nonplastic when wet, very friable when moist, soft when dry; moderate, fine, crumb structure; slight reaction to HCL; field pH 7.6, clear, irregular lower boundary.
38+	R	Soft, friable, fine grained, slighty calcareous, white (8/1 10 yr) sandstone.

Bowbac sandy loam, 06% Slopes:

This soil occurs on gently sloping to nearly horizontal ridge crests and toeslopes and is forming in residuum. The surface layer is a neutral, yellowish brown sandy loam three inches thick. The subsoil is a yellowish brown, neutral sandy loam three inches thick in the upper part, a moderately alkaline, light yellowish brown sandy clay loam eleven inches thick in the middle part, and a very pale brown sandy clay thirteen inches thick in the lower part. The substratum is a moderately alkaline, very pale brown loam to depths up to fifty-three inches. Bedrock is brownish yellow, soft, friable, fine grained sandstone, with some interbedded soft, gray, sandy shale. This soil may be locally stony due to limonite concretions.

The permeability of this soil is moderate and the available water capacity is moderate. Effective rooting depth is up to fifty-three inches. Surface runoff if moderate and the hazard of erosion is severe.

Mean annual precipitation is about twelve inches and mean annual air temperature is about forty-six degrees Fahrenheit.

A detailed profile description of this soil is as follows:

Test Pit 3
Bowbac sandy loam, 0-6% Slopes

0-3	AI	Yellowish brown (5/4 10 yr) sandy loam, less than 1% coarse material; nonsticky, nonplastic when wet, friable when moist, soft when dry; moderate, fine, crumb structure; field pH 7.6; abrupt, smooth lower boundary.
3-6	AB	Yellowish brown (5/4 10 yr) sandy loam; less than 1% coarse material; nonsticky, nonplastic when wet, firm when moist, slightly hard when dry; moderate, medium, platy structure; clay skins present; field pH 7.6; abrupt, smooth lower boundary.
6-17	B21t	Light yellowish brown (6/4 10 yr) sandy clay loam; less than 1% coarse material; slightly sticky, plastic when wet, very firm when moist, very hard when dry; strong, coarse prismatic structure; clay skins present on peds; field pH 7.8; clear, wavy lower boundary.
17-30	B22t	Very pale brown (6/4 10 yr) sandy clay loam; less than 1% coarse material; slightly sticky, plastic when wet, very firm when moist, very hard when dry; strong, coarse prismatic structure; clay skins present on peds; field pH 8.2; moderate reaction with HCL; clear, wavy lower boundary.
30-53	Cca	Very pale brown (7/3 10 yr) loam; less than 1% coarse material, nonplastic, slightly sticky when wet, friable when moist, soft when dry; moderate, fine, crumb structure; field pH 8.2; very reactive to HCL, stringers and blebs of $CaCO_3$ present; clear, smooth lower boundary.
53-63	R1	Dark gray (4/1 10 yr) soft, sandy shale, slightly calcareous.
63-67	R2	Limonite cemented siltstone/fine grained sandstone nodules.
67+	R3	Brownish yellow (6/8 10 yr) soft, friable, moderately calcareous, fine grained sandstone.

BOWBAC SERIES

Typical Pedon: Bowbac sandy loam. (Colors are for dry soil unless otherwise noted.)

A1--0 to 4 inches; pale brown (10 yr 6/3) sandy loam, brown (10 yr 5/3) moist; weak medium and fine subangular blocky structure; soft, very friable; noncalcareous; clear smooth boundary (1 to 4 inches thick).

B2t--4 to 20 inches; yellowish brown (10 yr 5/4) sandy clay loam, dark yellowish brown (10 yr 4/4) moist; moderate coarse prismatic structure; hard, very friable, sticky and slightly plastic; glossy coatings on faces of peds and clay bridging between sand grains; noncalcareous; clear smooth boundary (6 to 16 inches thick).

C1--20 to 30 inches; pale brown (10 yr 6/3) sandy loam, brown 10 yr 5/3) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky; weakly calcareous; clear smooth boundary (10 to 20 inches thick).

C2r--30 inches; very pale brown soft weathered weakly calcareous sandstone.

Type Location: TL-3

Shingle clay loam, 06% Slopes:

This soil occurs on gently sloping ridge crests and side slopes and is forming in residuum from soft, slightly calcareous, sandy shale. The surface layer is a brown to pale brown, slightly alkaline clay loam about five inches thick. The subsoil is a moderately alkaline, light brownish gray clay fifteen inches thick. The substratum is a slightly alkaline, gray silt loam, with up to seventy-five coarse, angular shale fragments. Bedrock is a gray, soft, sandy shale. The thickness of this soil varies considerably with slope and other factors, but it is generally thin.

The permeability of this soil is moderate and available water capacity is low. Effective rooting depth is twelve to thirty inches. Surface runoff is rapid and the hazard of erosion is severe.

Mean annual precipitation is about twelve inches and mean annual air temperature is about forty-six degrees Fahrenheit.

A detailed profile description of this soil is as follows:

Test Pit 4
Shingle clay loam, 0-6% Slopes

0-2.5	A1	Brown (5/3 10 yr moist) clay loam; 1% coarse material, slightly sticky, slightly plastic when wet; friable when moist; slightly hard when dry; moderate, fine, crumb structure; field pH 7.6; clear, smooth lower boundary.
2.5-5	AB	Pale brown (6/3 10 yr moist) clay loam with common, medium, distinct brownish yellow (6/8 10 yr moist) mottles; 1% coarse material, slightly sticky, slightly plastic when wet, friable when moist; slightly hard when dry; moderate medium platy sturcture; clay skins present on peds; field pH 7.8; clear, wavy lower boundary.
5-20	B2t	Light brownish gray (6/2 10 yr moist) clay; common, medium, distinct brownish yellow (6/8 10 yr moist) mottles; 1% coarse material; sticky, plastic when wet, very firm when moist, very hard when dry; strong, coarse, prismatic structure; clay skins present on peds; field pH 8.0; abrupt, wavy lower boundary.
20-25	B3	Light brownish gray (6/2 10 yr moist) silty clay loam; common, medium, distinct brownish yellow (6/8 10 yr moist) mottles; 1% coarse material; sticky, plastic when wet, very firm when moist, very hard when dry; strong, coarse angular blocky structure; clay skins present on peds; field pH 8.0; moderate reaction to HCL; abrupt, smooth lower boundary.
25-30	Cca	Gray (5/1 10 yr moist) silt loam; common, medium, distinct brownish yellow (6/8 10 yr moist) mottles; 50-75% coarse angular shale fragments; slightly sticky, slightly plastic when wet, firm when moist, slightly hard when dry; weak, medium, granular structure; clay skins present on peds; field pH 7.8; moderate reaction to HCL, calcite stringers present; abrupt, irregular lower boundary.
30+	R	(bedrock) gray (5/1 10 yr) soft, sandy shale.

SHINGLE SERIES

Typical Pedon: Shingle sandy loam, very shallow (Colors are for dry soil unless otherwise noted.)

A1--0 to 1 inch; pale brown (10 yr 6/3) coarse sandy loam, brown (10 yr 5/3) moist; single grained; loose; weakly calcareous; abrupt smooth boundary (1 to 3 inches thick).

C1--1 to 6 inches; very pale brown (10 yr 7/3) coarse sandy clay loam, pale brown (10 yr 6/3) moist; weak medium subangular blocky structure that parts to single grain; soft to loose, very friable to loose; weakly calcareous; clear smooth boundary (4 to 9 inches thick).

C2r--White weakly calcareous soft weathered sandstone.

Type Location: TL-1

Tassel sandy loam, 06% Slopes:

This soil is a shallow, well-drained soil forming in residuum from soft, calcareous sandstone. In a typical profile, the surface layer is a brown, moderately alkaline, sandy loam about four inches thick. The substratum is yellowish brown, moderately alkakline sandy loam about thirteen inches thick underlain by soft, calcareous sandstone at a depth of seventeen inches. The total thickness of this soil varies with local topographic conditions.

The permeability of this soil is moderate and available water capacity is low. Effective rooting depth is fourteen to nineteen inches. Surface runoff is rapid and the hazard of erosion is severe.

Mean annual precipitation is twelve inches and mean annual air temperature is approximately forty-six degrees Fahrenheit.

Due to the small areal extent of this soil, no soil test pit was

Olney sandy loam, 06% Slopes:

Olney sandy loam is a very deep, well-drained soil developing in residuum from calcareous sandstone. In a typical profile, the surface layer is a brown, neutral sandy loam three inches thick. The subsoil is a brown, neutral sandy loam seven inches thick in the upper part, a brown, mildly alkaline sandy clay loam nine inches thick in the middle part, and a grayish brown, moderately alkaline sandy clay loam five inches thick in the lower part. The substratum is a grayish brown, moderately alkaline sandy clay loam in the lower part to a depth of sixty inches or more.

Permeability of this soil is moderate and available water capacity is moderate. Surface runoff is slow and the hazard of erosion is severe.

Mean annual precipitation is about twelve inches per year and mean annual air temperature is about forty-six degrees Fahrenheit.

Due to the small areal extent of this soil in the detailed study area, no detailed soil profile description is presented.

Ulm loam, 0-6% Slopes:

The Ulm loam is a very deep, well-drained soil forming in alluvium. In a typical profile, the surface layer is a brown, neutral loam about five inches thick. The upper part of the subsoil is brown, neutral clay loam about four inches thick. The lower part of the subsoil is brown, mildly alkaline clay about twelve inches thick. The substratum is light yellowish brown, moderately alkaline sandy clay loam to depths of sixty inches or more.

The permeability of this soil is moderate to slow. The available water capacity is moderate to high. Effective rooting depth is sixty inches or more. Surface runoff is slow and the hazard of erosion is moderate.

The mean annual precipitation is about twelve inches and the mean annual air temperature is forty-six degrees Fahrenheit.

Due to the small areal extent of this soil, no detailed soil profile description is presented.

Worf Loam 3-30% Slopes

The worf loam is a shallow, well drained soil formed in material weathered from sedementary rocks. These soils occur on the upland hills and ridges. In a typical profile the surface layer is grayish brown loam about three inches thick. The subsoil is a brown mildly alkaline loam about nine inches thick. The substratum is light yellowish brown moderalty alkaline loam with interbedded calcarious shale and loamstone to a depth of fourteen to twenty inches.

Permeability of this soil is moderate above the beckrock.

Mean annual precipitation is ten to thirteen inches per year with peak periods of precipitation in spring and early summer. Mean annual temperature is forty-six degrees Fahrenheit.

A detailed profile description of this soil follows:

WORF SERIES

Typical Pedon: Worf sandy loam (Colors are for dry soil unless otherwise noted.)

A1--0 to 1 inch; pale brown (10 yr 6/3) sandy loam, brown (10 yr 5/3) moist; weak medium and fine subangular blocky structure; soft, very friable, noncalcareous; abrupt smooth boundary (1 to 3 inches thick).

B2t--1 to 6 inches; yellowish brown (10 yr 5/4) sandy clay loam, dark yellowish brown (10 yr 4/4) moist; moderate coarse and medium prismatic structure; hard, friable, sticky and slightly plastic; thin glossy coatings on faces of peds, clay bridging between sand grains; noncalcareous; clear smooth boundary (3 to 6 inches thick).

B3--6 to 9 inches; light yellowish brown (10 yr 6/4) coarse sandy clay loam, yellowish brown (10 yr 5/4) moist; weak coarse and medium prismatic structure; slightly hard, very friable, slightly sticky; patches of glossy coatings on faces of peds; some clay bridging between sand grains; weakly calcareous in spots; clear smooth boundary (2 to 4 inches thick).

C1--9 to 12 inches; pale brown (10 yr 6/3) coarse sandy loam, brown (10 yr 5/3) moist; weak medium and fine subangular blocky structure that parts to single grain; soft, very friable to loose; weakly calcareous; clear smooth boundary (3 to 10 inches thick).

C2r--12 to 20 inches; soft very pale brown weathered slightly calcareous sandstone.

Type Location: TL-2

QUALITATIVE SOIL ANALYSES

Soils in the entire permit area pose no special problems, with the possible exception of the Shingle clay loam, (Table D-7.1). Shingle clay loam is present in the area covered by the detailed soils survey. It is rated as poor for topsoiling purposes but may be used, if necessary, if precautions are taken to limit the amount of bedrock taken up in the stockpile. The consistency of this soil when dried is very hard and it could become difficult to work when dried.

Most other soils are rated as good for topsoiling purposes to depths ranging up to sixty inches. A few (Renohill, Worfka, Worf) are rated as fair to good for topsoiling purposes based on amounts of clay in the subsoil.

Most soils in the permit area and disturbed area are rated as severe for erosion. From observations made during field mapping, it appears as if soils in the study area can take some vehicular traffic without undue adverse effects; for example, several passes to and from a drill site. However, continued use of the same path can lead to destruction of stabilizing vegetation, disruption of the upper most portion of the soil profile and increased erosion hazard. The problem is at its worst when the soil is soft, from being wetted or saturated, as after spring thaw, a heavy rainfall, or a heavy snowfall. If contact traffic to and from well sites, etc., is necessary, such traffic should be restricted to well-engineered, established roadways. Reclamation would be easier and the hazard of erosion reduced, if vehicular traffic was restricted to such established roads during the periods of high soil moisture.

Analytical data for the Single, Worf and Bowbac soils samples taken at the type locations is presented in (Table D-7.2). All soil samples were analyized for selenium due to the presence of indicator plants. The sample taken at Type location TL-4 was a composite root zone sample taken from the areas of abundant indicator plants for selenium analysis only.

TABLE D-7.1
SUMMARY OF SOIL CHARACTERISTICS

SOIL COMPLEX AND PHASE	SURFACE RUNOFF	HAZARD OF EROSION	COMMENTS
331, 0-6% Slopes			
Fort Collins Sandy Loam	Slow	Slight to moderate	Good topsoiling material to depths of 60 inches. Restrict traffic during wet periods.
Ulm Loam	Slow	Moderate	Good topsoiling material to depths of 60 inches. Restrict traffic at all times.
380, 0-6% Slopes			
Olney Sandy Loam	Slow	Severe	Good topsoiling material to depths of 60 inches. Restrict traffic during wet periods.
Bowbac Sandy Loam	Moderate	Severe	Good topsoiling material to depths of 40 inches. Restrict traffic during wet periods.
Decolney Sandy Loam	Slow	Severe	Good topsoiling material to depths of 60 inches. Restrict traffic during wet periods.
380C, 6-15% Slopes			
Olney Sandy Loam	Slow	Severe	Good topsoiling material to depths of 60 inches. Restrict traffic during wet periods.
Bowbac Sandy Loam	Moderate	Severe	Good topsoiling material to depths of about 40 inches. Restrict traffic during wet periods.

Table D-7.1

SOIL COMPLEX AND PHASE	SURFACE RUNOFF	HAZARD OF EROSION	COMMENTS
380C, 6-15% Slopes			
Decolney Sandy Loam	Slow	Severe	Good topsoiling material to depths of 60 inches. Restrict traffic during wet periods.
393, 6-15% Slopes			
Renohill Sandy Loam	Moderate	Severe	Fair to good topsoiling material to depths of about 30 inches. Restrict traffic during wet periods.
Worfka Fine Sandy Loam	Moderate	Severe	Fair to good topsoiling material to depths of about 15 inches. Restrict traffic during wet periods.
Shingle Clay Loam	Rapid	Severe	Poor topsoiling material to depths of about 10 inches. restrict traffic whenever possible.
401, 3-30% Slopes			
Worf Fine Sandy Loam	Moderate to Rapid	Severe	Fair to good topsoiling material to depths of about 20 inches. Restrict traffic during wet periods.
Shingle Clay Loam	Rapid	Severe	Poor topsoiling material to depths of 10 inches. Restrict traffic whenever possible.

SOIL COMPLEX AND PHASE	SURFACE RUNOFF	HAZARD OF EROSION	COMMENTS
401, 3-30% Slopes			
Tassel Sandy Loam	Rapid	Severe	Very little topsoil material in this area. Usually associated with rocky out crops of Ride Tops. Restrict traffic during wet periods.

TABLE D-7.2

CORE LABORATORIES, INC.

104 GLENN ROAD • CASPER, WYOMING • 82601

ANALYTICAL REPORT

Page No. 1

Company TETON EXPLORATION DRILLING
Sample Identification
File 6303 - M -0458
Date Report August 7, 1980
Remarks Analysis according to Wyoming DEQ guideline 1
Analysts R. Gore

CLIENT IDENTIFICATION		INTERVAL	pH	Cond.	Na	Ca	Mg	SAR	%OM	Se
Shingle	TL-1	1" - 6"	6.9	0.8	0.6	0.4	1.8	0.6	0.7	0.2
Worf	TL-2	1" - 6"	7.3	0.4	0.4	1.0	0.8	0.4	0.7	0.2
Worf	TL-2 CL	9" - 12"	7.0	0.2	0.2	1.0	0.8	0.3	0.7	0.4
Bowbac	TL-3	1" - 4"	6.3	0.2	0.3	0.7	0.5	0.3	0.7	0.2
Bowbac	TL-3	4" - 20"	6.7	0.2	0.2	0.5	0.6	0.2	0.9	0.2
Bowbac	TL-3	20" - 30"	6.6	0.2	0.2	0.8	0.8	0.3	0.9	0.2
	TL-4	2" - 14"								0.2

CORE LABORATORIES, INC.

104 GLENN ROAD • CASPER, WYOMING • 82601

ANALYTICAL REPORT

Page No. 2

Company TETON EXPLORATION DRILLING

Sample Identification

File 6303 - M - G158

Date Report August 7, 1980

Remarks Analysis according to Wyoming DEQ guideline 1

Analysts R. Gore

CLIENT IDENTIFICATION		SAT %	% VFS	SAND %	SILT %	CLAY	TEXTURE
Shingle	TL-1	31.7	14.0	61.6	7.2	17.2	sandy loam
Worf	TL-2	37.8	15.7	51.9	9.2	23.2	sdy cly loam
Worf	TL-2 CL	29.6	6.6	70.6	7.6	15.2	sandy loam
Bowbac	TL-3	29.6	23.4	46.2	11.2	19.2	sandy loam
Bowbac	TL-3	27.5	24.1	35.5	25.2	15.2	sandy loam
Bowbac	TL-3	25.9	21.2	48.4	17.2	13.2	sandy loam
	TL-4						

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APPENDIX D-8

Vegetation Inventory

APPENDIX D-8

VEGETATION INVENTORY

Introduction

Vegetation data for the Leuenberger solution mining project were collected from May through September, 1979. Collections of plant species occurring on the permit area were made from May until late September. The vegetation on the project site was sampled for cover and productivity in control areas and areas to be affected. The data collection program was designed to meet the Wyoming Department of Environmental Quality (DEQ) Guideline No. 2, March, 1979.

The original vegetation studies were conducted by ecology audits. During the 1980 field season the general vegetation map was extended to conform to the permit area and potential problems such as selenium indicator and noxious weeds were field checked by Teton personnel.

General

The permit area is located in the Shortgrass Prairie region of the Northern Great Plains and is characterized by relatively low levels of annual precipitation (12.75 inches). The resultant mixture of plant species consists primarily of Blue Grama, Western Wheatgrass, Needlegrass and Sagebrush.

Methodology

The plant communities occuring in the Leuenberger permit area were divided into two types, grassland and sagebrush. The extent of the sagebrush vegetation type within the permit area was determined by inspection of the aerial photographs and field observations. Sagebrush areas were indicated when the vegetative cover appeared to be comprised of at least thirty (30) percent sagebrush. The distribution of the vegetation types on the permit area were field mapped on an aerial photograph which had a scale of one (1) inch to five hundred (500) feet. Field information was later transferred to the site base map of the same scale. The total acreage of each vegetation type was determined by planimeter. A list of the vascular plants occuring on the permit area was developed through specimen collection and field observation. Estimates of vegetation cover and productivity were made by field sampling techniques.

VEGETATION SAMPLING SITES

Control Areas

Vegetation sampling sites were established for affected and control areas and were delineated on an aerial photograph of the permit area. The control sites were located within the vegetation types, away from any in situ mining activity. Representative areas of grassland and sagebrush were selected and boundaries for the control sites were established that were three hundred (300) feet on a side, yielding an area of 90,000 square feet for each control site.

The vegetation sampling sites for the control areas were selected in the laboratory using a random number generator. The control areas were oriented north-south with the southern and western sides of the control areas used as the x and y axes, repectively, for the purpose of establishing a sample grid network, (Figure D-8.1 and D-8.2). The two axes were divided into one-meter intervals, having a total length of 91.4 meters. Random coordinate pairs were generated and plotted on the site grid. Within each one-meter square selected, the clipping site was placed in the western half of the square meter if the first digit of the axes coordinate was odd, and in the eastern half of the square meter if the first digit of the x axis coordinate was even.

The resultant clipping site dimensions were 0.5m x 1.0m, with the long axis oriented north-south. This selection system yielded fifteen $0.5m^2$ clipping sites located randomly within the grassland control site and ten $0.5m^2$ clipping sites located randomly within the sagebrush control site.

The corners of the exclosures were used as the points of orientation for the cover transects. For each transect, a three-digit number was generated from the random number generator. The three digits were used for the compass orientation of the transect, and orientation was started at the north-west corner and worked counter-clockwise around the exclosure. Five samples were also taken from random azimuths in the center of the exclosure. For example, for the grassland control area, the random number 103 was generated. The transect originated at the north-west corner oriented to 103 degrees. For each transect, a 50-meter tape was laid down along the compass orientation, and a data point collected at 5-meter intervals starting at 5 meters. Each data point consisted of the area of ground directly below the interval point which was classified as bare ground, and litter and rock, or when vegetation was present, classified as to species.

For each clipping site within the control areas, the emergent herbaceous vegetation was clipped, sorted as to species and placed in paper sacks. For woody vegetation, which consisted almost entirely of Artemisia sps., the year's production of succulent vegetation was clipped and placed in the sacks. When clipping grass species, any remnants of vegetation from the prior year's growth was discarded before sorting the plant material to species. When clipping Artemisis tridentata, the herbaceous material that was clipped consisted of all succulent leaves and the terminal nodes on the end of all stems.

The clipped vegetation was allowed to air-dry in the laboratory several days prior to being placed in a mechanical convection oven at a temperature of $105^{o}C$. The vegetation was dried overnight. The weights of the clipped vegetation samples were determined to the nearest 0.1 gram. The weights of the clipped vegetation samples were summed for each plot to give the total vegetation production for each 0.5^{2} clipped plot.

FIGURE D-8.1

Grassland Control Exclosure Locations

Site Location: SE Quarter Section 14
South 7600' West 6200'

Plot Number	Cover Transect Orientation	Plot Number	Cover Transect Orientation
1	118°	8	279°
2	304°	9	115°
3	132°	10	258°
4	317°	11	21°
5	9°	12	341°
6	2°	13	12°
7	266°		

Productivity		
Plot	X axis	Y axis
1	45	37
2	16	61
3	78	10
4	53	1
5	48	85
6	56	47
7	26	12
8	5	79
9	30	76
10	33	79
11	33	54
12	62	31
13	46	16
14	28	33
15	2	22

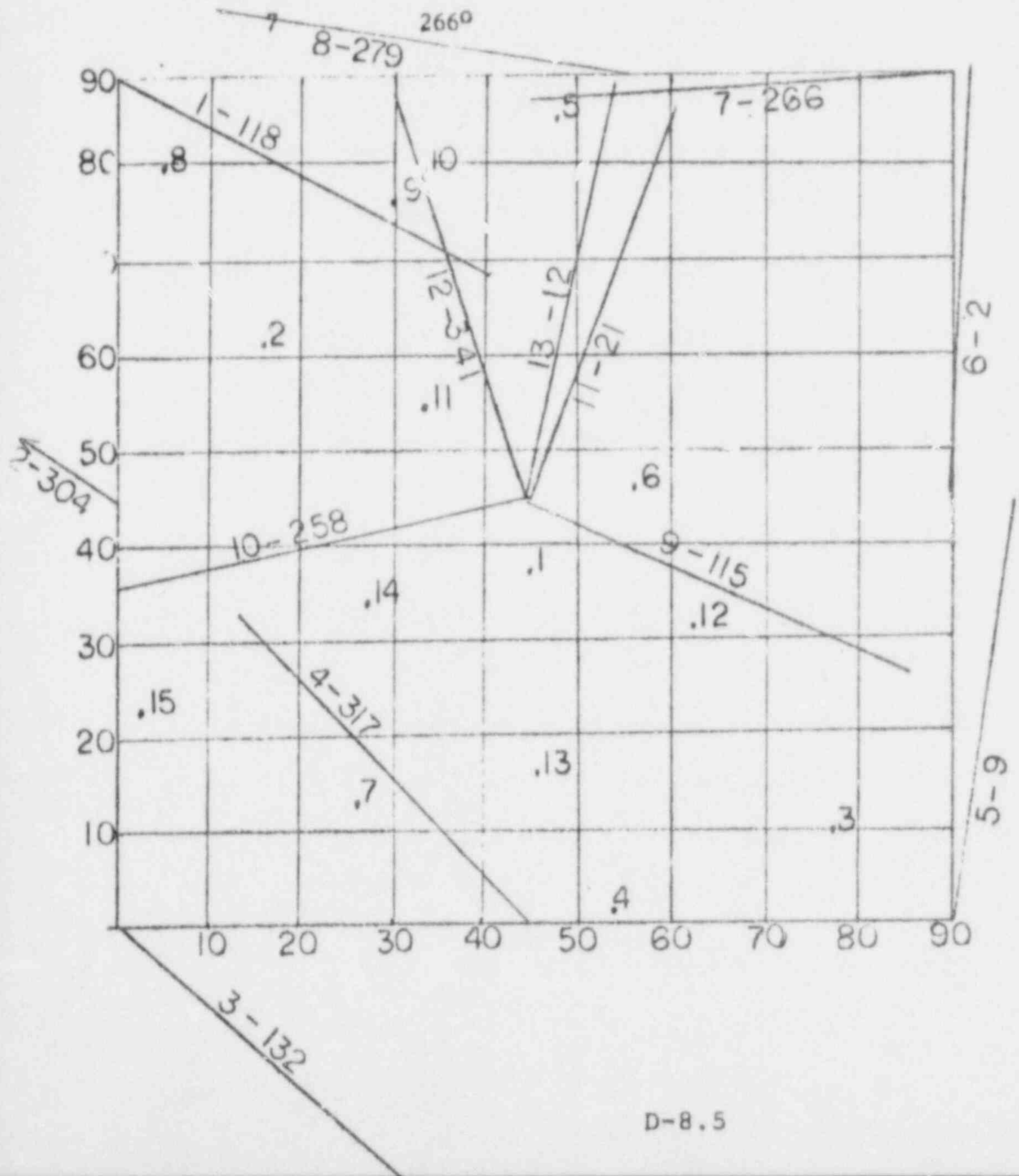
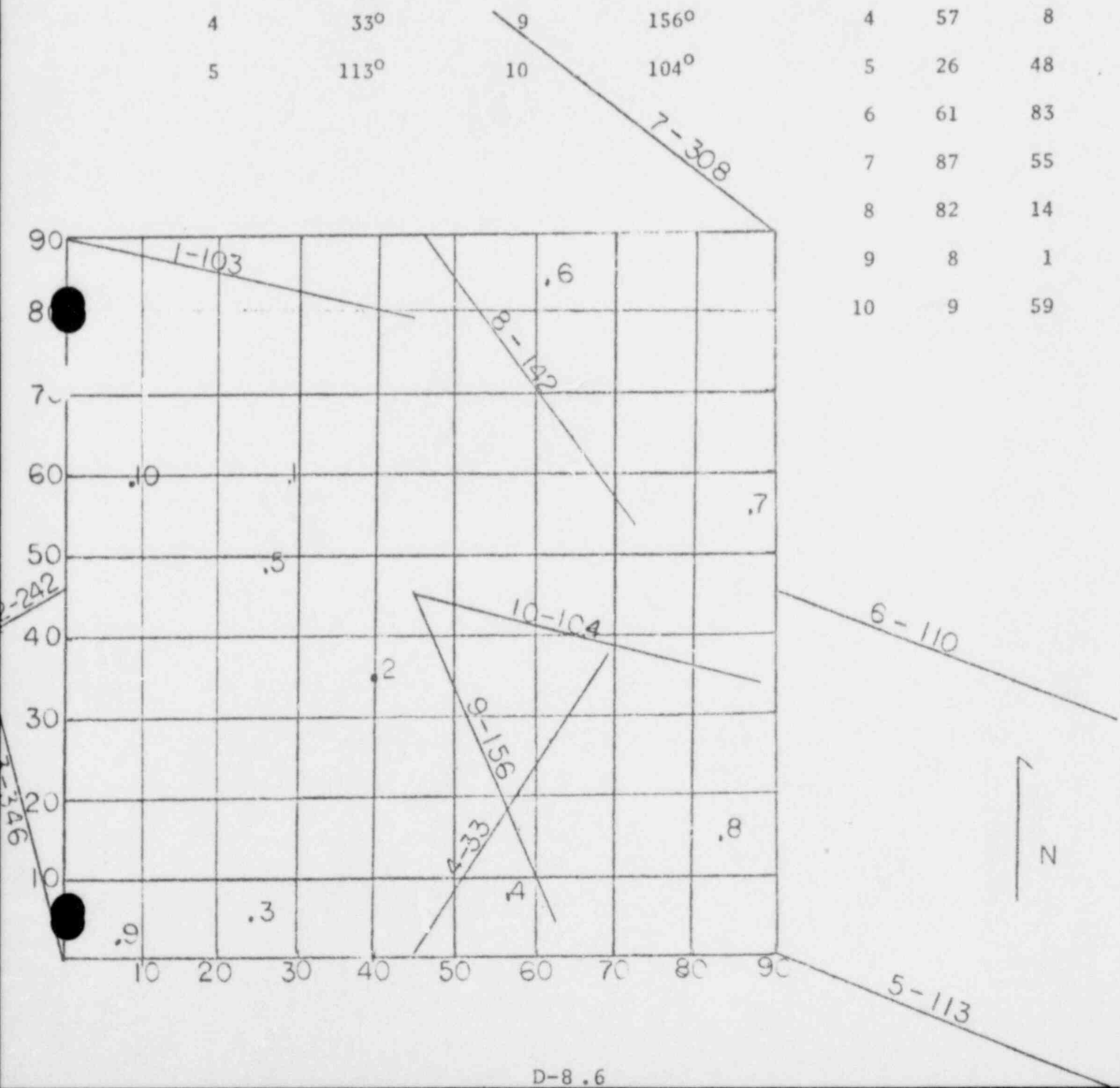


FIGURE D-8.2
Sagebrush Control Exclosure Locations

Site Location: SW Quarter Section 13
South 9500' West 3500'

Plot Number	Cover Transect Orientation	Plot Number	Cover Transect Orientation
1	103°	6	110°
2	242°	7	308°
3	346°	8	142°
4	33°	9	156°
5	113°	10	104°

Productivity		
Plot	X axis	Y axis
1	29	59
2	40	35
3	24	5
4	57	8
5	26	48
6	61	83
7	87	55
8	82	14
9	8	1
10	9	59



Exclosure Areas

A total of sixteen (16) exclosure sites were established within the permit area. The two vegetation types each had eight exclosures randomly located. This was done because the permit area was roughly one-half grassland and one-half sagebrush.

The grid system that was established for the permit area is shown on the vegetation map Figure D-8.3. The location coordinates for the exclosures are shown in Table D-8.1. The grid consists of 100-foot squares designated by letters from north to south and by numerals from west to east. The locations for the exclosures were determined by selecting coordinate pairs from containers holding slips of paper with numerals in one and letters in the other. By returning the slips to the respective container after each run, and shaking, there was a random chance of coordinates over the permit area. The grid was placed over the grassland permit area and also over the sagebrush area for the exclosure selection. Each exclosure measuring 30 ft x 30 ft was divided into one (1) meter intervals on the y axis and one-half (0.5) meter intervals on the x axis. A 0.5 meter strip was established on the inside of each side of the exclosure to remove the possible effects of grazing, etc. Deducting these borders from the effective size of the exclosure left a sampling site with an area of $64m^2$ (8m x 8m) Figure D-8.4. The exclosures and control area in the sagebrush vegetation type was fenced in with barbed wire because of grazing during parts of the year. The exclosures were removed after data were collected.

FIGURE D-8.4

Exclosure Plot Locations

Exclosure Number:

Vegetation Type:

Location:

Transect Orientations	Plot X axis	Y axis
Corner:	1-16	1-8
Corner:	2	
Corner:	3	
Corner:	4	

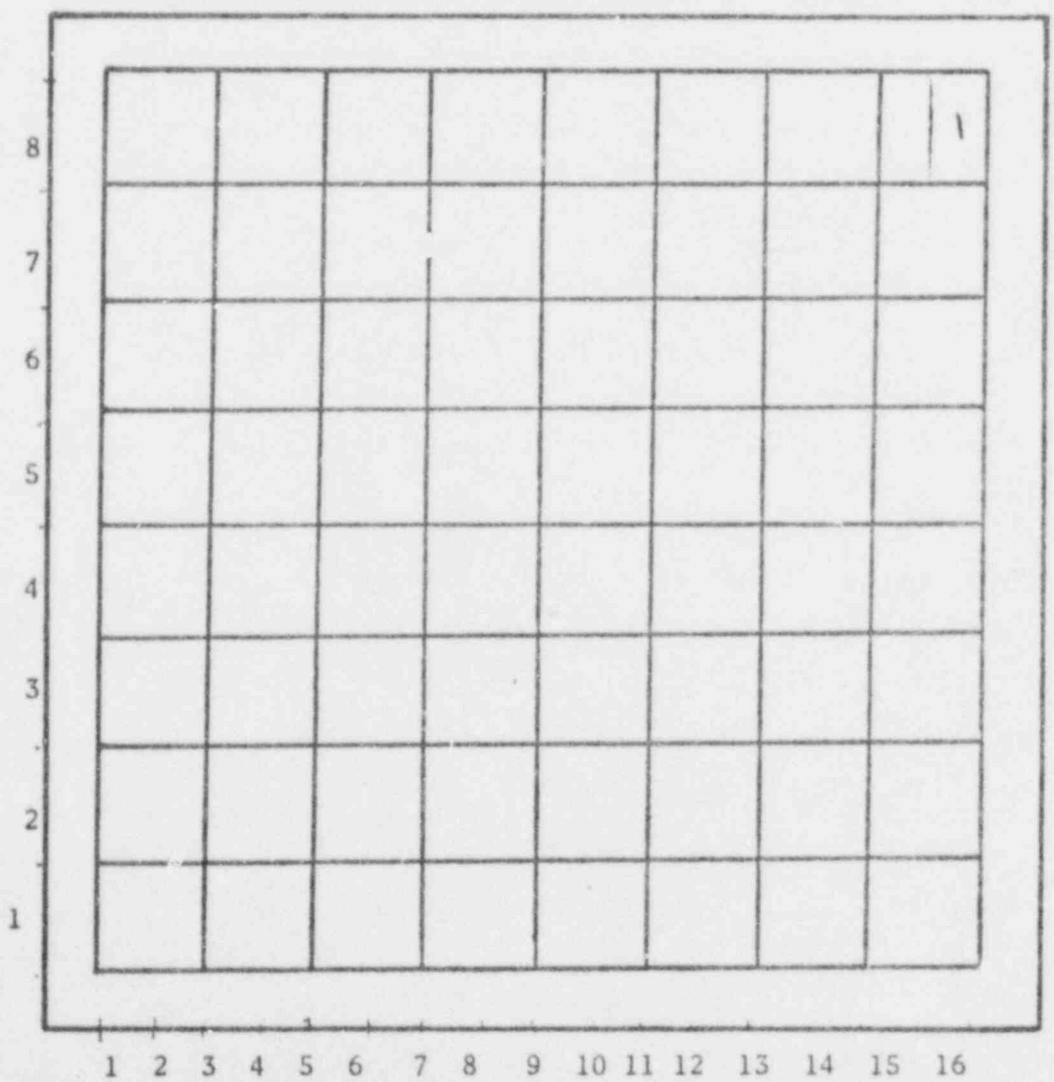


TABLE D-8.1

EXCLOSURE LOCATION

EXCLOSURE	GRID LOCATION	VEGETATION TYPE
1	X- 3	Grassland
2	W-16	Grassland
3	R- 5	Grassland
4	E-19	Grassland
5	A-32	Grassland
6	M-35	Grassland
7	U-33	Grassland
8	T-22	Grassland
1	A- 5	Sagebrush
2	B-33	Sagebrush
3	Z-43	Sagebrush
4	JJ-36	Sagebrush
5	M-27	Sagebrush
6	Z-19	Sagebrush
7	J- 9	Sagebrush
8	M- 7	Sagebrush

To locate the clipping plots within the exclosure, random numbers were generated with the upper boundary of 8 for the y axis and 16 for the x axis. Coordinate pairs were then generated to obtain the plot locations. Four plots were clipped in each exclosure, each plot covering an area of $0.5m^2$. The same technique utilized for sorting and weighing the vegetation production in the control areas was used for the affected area.

The points of orientation for the cover transects run in the areas consisted of the corner posts of the exclosures. The three-digit random numbers were generated for the compass orientation for each transect. A 100-foot tape was used with a data point interval of 16.4 feet starting with the first 16.4 feet. As in the control areas, each data point consisted of the area of ground directly below the interval point which was classified as bare ground, litter and rock, or when vegetation was present, classified as to species.

Results

The permit area for the proposed solution mine covers an area of approximately 760 acres, the sagebrush and grassland plant communities occupying 743 acres and 323 acres respectively. A list of the vascular plant species occurring in the permit area is presented in Table D-8.2. No rare or endangered plant species were observed.

Isolated specimens of Canadian Thistle were observed, but not in great enough abundance to call in the Weed Control Supervisor.

Selenium Indicators

The primary selenium indicator plant, *Astragalus bisulcatus*, is present in large clumps along the flood plane of Little Sand Creek as seen on the vegetation map Figure D-8-3. The excess of this plant continues up the drainage, north of the permit area. It occurs in areas which appear to be undistrubed as well as once disturbed sites such as spreader dikes and old vehicle trails.

Teton does not plan any soil disturbances other than well installations in the area of this plants abundance, however, all soil samples sent to the lab were analyzed for selenium. In addition to routine top soil sampling, one additional composite soil sample location TL-4 was taken from the drainage area where *Astragalus* occurs and analyzed for selenium, (see Appendix D-7, soil sample results).

A specimen of this plant was collected and will be presented to the reviewers along with photographs to confirm its identity and indicate its abundance.

Control Areas

The locations of the control sites are given in Table D-8.3. The average percent vegetative cover, percent litter and rock, and percent bare ground is also given in Table D-8.3. The locations of the vegetation production clipping plots and orientation of cover transects were presented in Figures D-8.1 and D-8.2. Data on the average height of shrub species occurring in the control areas are presented in Table D-8.4. The data collected for vegetative production and cover in the control areas were tested for sample adequacy, and are presented in Table D-8.5.

The results of the tests for sample adequacy for the production plots are presented in Tables D-8.13 and D-8.14. Sample adequacy was met for sagebrush control with ten plots. Fifteen clipping plots were needed to meet 84.7% sample adequacy for the grassland control area. The mean production of vegetation in the grassland control area was 91.07 gm/m^2 compared to 256.9 gm/m^2 in the affected grasslands. The control area was located in an upland grassland area, characterized by lower vegetation productivity than the lowland grassland, some of which were sampled for the affected grasslands vegetation type. This difference resulted in the higher net productivity for the affected grasslands vegetation type. The control area is also in an area of vegetation with low species diversification.

Affected Areas

In the grassland, vegetation type, the following species occurred in decreasing order of dominance; Western Wheatgrass, Blue Gamma, Big Sagebrush, Needle-and-Thread, Prairie Junegrass, and Threadleaf Sedge. The locations of the exclosures for the grassland vegetation type are given in Table D-8.6. Vegetation cover in the grassland vegetation type averaged 77.2 percent. Litter and rock averaged 4.9 percent, and bare ground averaged 17.9 percent. Sample adequacy for vegetative cover in the grassland vegetation type was met by running thirty-two transects Table D-8.7. Sample adequacy for productivity was satisfied by clipping thirty-two plots. The means for vegetation production in the affected grasslands vegetation type was 2286.6 lbs/acre (Table D-8.8). Data on the average height of all shrub species intersecting the cover transects are presented in Table D-8.9.

In the sagebrush vegetation type, the dominant species was Big Sagebrush. Other plant species which occurred in decreasing order of dominance included Blue Gamma, Threadleaf Sedge, Prairie Junegrass, Needle-and-Thread, and the Wheat grasses.

The locations of the exclosures for the sagebrush vegetation type are presented in Table D-8.10. Vegetative cover in the sagebrush vegetation type averaged 75.0 percent, litter and rock 5.6 percent, and bare ground 19.4 percent. Sample adequacy for vegetative cover in the sagebrush vegetation type was met by running two transects (Table D-8.7), while sampling adequacy for productivity was satisfied by clipping four plots at each of the eight exclosures. The mean for vegetation type was 2279.5 lbs/acre (Table D-8.8). Data on the average height of all shrub species intersection the cover transcets are given in Table D-8.9.

The primary forage species available to livestock within the permit area are Western Wheatgrass, Needle-and-Thread, Prairie Junegrass, and Blue Gamma. The primary forage species for Pronghorn within the permit area was Sagebrush (Artemisia sps.).

TABLE D-8.2

PLANT SPECIES LIST

SCIENTIFIC NAME	COMMON NAME
GRASSES	
Agropyron cristatum	Crested wheatgrass
Agropyron spicatum	Bluebunch wheatgrass
Agropyron smithii	Western wheatgrass
Aristida fendleriana	Fendler three-awn
Bromus tectorum	Cheatgrass
Dactylis glomerate	Orchard grass
Elymus junceus	Russian wild rye
Festuca idahoensis	Idaho fescue
Koeleria cristata	Prairie junegrass
Hordeum jubatum	Foxtail barley
Oryzopsis hymenoides	Indian ricegrass
Poa pratensis	Kentucky bluegrass
Poa secunda	Sandberg bluegrass
Sitanion hystrix	Bottlebrush squireltail
Sporobolus airoides	Alkali sacaton
Stipa comata	Needle-and-thread
Stipa viridula	Green needle-grass

TABLE D-8.2 CONTINUED

SCIENTIFIC NAME	COMMON NAME
FORBS	
Achillea millefolum	Western yarrow
Agoseris glauca	False dandelion
Antennaria dimorpha	Pussy-toes
Arenaria hookeri	Sand wart
Asclepias speciosa	Milkweed
Astragalus bisulceatus	Two-grooved milkvetch
Astragalus spatulatus	Tufted milkvetch
Aster xylorrhiza	Woodyaster
Atriplex canescens	Four-wing saltbush
Carex filifolia	Threadleaf sedge
Ceratoides lanata	Winterfat
Cirsium arvense	Canada thistle
Crepis modocensis	Hawksbeard
Cynoglossum officinale	Hounds tongue
Delphinium geyeri	Larkspur
Erigeron pumilus	Fleabane daisy
Erogonum ovalifolum	False buckwheat
Erysimum asperum	Wallflower
Gutierrezia sarothrae	Snakeweed
Hymenoxys acaulis	Actinea
Juncus balticus	Wire rush
Lappula occidentalis	Beggars-tick

TABLE D-8.2 CONTINUED

SCIENTIFIC NAME	COMMON NAME
FORBS	
Lathyrus sp	Sweet pea
Lepidium perfoliatum	Yellowflower pepper weed
Leptodactylon pungens	Prickly gilia
Lesquerella ludoviciana	Bladderpod
Leucocrinum montanum	Sand lily
Lithospermum incisum	Puccoon
Lomatium foeniculaceum	
Lupinus pusillus	Lupine
Lygodesmia juncea	Skeleton weed
Melilotus officinalis	Sweet yellow clover
Oenothera coronopifolia	Primrose
Oxytopis besseyi	Locoweed
Penstoemon angustifolius	Beard tongue
Phlox hoodii	Phlox
Rorippa sinuata	Cress
Salsola kali	Russian thistle
Spaeralcea coccinea	Scarelet globemallow
Taraxacum officinale	Dandelion
Thermopsis rhombifolia	Mountain goldenpea
Tragopogon dubius	Salsify
Viola nuttallii	Yellow Violet
Yucca glauca	Small soapweed

TABLE D-8 2 CONTINUED

SCIENTIFIC NAME	COMMON NAME
SHRUBS	
Artemisia frigida	Fringed sagewort
Artemisia tridentata wyomingensis	Wyoming big sagebrush
Atriplex canescens	Four-wing saltbush
Opuntia polyacantha	Plains prickly pear
Rhus trilobata	Squawbush
Chrysothamnus nauseosus	Rubber rabbitbush
TREES	
Populus sp.	Cottonwood

TABLE D-8.3

CONTROL AREAS

Control	Section	South	West	Percent Vegetation	Percent Litter and Rock	Percent Bare Ground
Grassland	SE 1/4 Section 14	7500	5800	78	3	19
Sagebrush	SW 1/4 Section 13	10500	4500	80	3	17

TABLE D-8.4

Shrub Height Data
for
Exclosures and Control Areas[1]

Grassland			Sagebrush		
Exclosure Number	Artemisia tridentata	Artemisia frigida	Exclosure Number	Artemisia tridentata	Artemisia frigida
-	--	--	1	28cm	--
2	20cm	--	2	28cm	--
--	--	--	3	17cm	--
--	--	--	4	18cm	--
5	22cm	--	5	37cm	--
--	--	--	6	28cm	--
--	--	--	7	28cm	8cm
8	18cm	--	8	17cm	20cm
ControlControl	20cm		Control	33cm	
	$\bar{x}$ = 20cm			$\bar{x}$ = 26cm	$\bar{x}$ = 15.3cm

[1]Number for each Exclosure and Control areas represent mean for all transects within the exclosure or control area.

TABLE D-8.5
VEGETATION DATA FOR CONTROL AREAS

Vegetation Production

Grassland

Plot Number	Grams/0.5m²	Grams/m²
1	39.3	78.6
2	45.2	91.4
3	37.6	75.2
4	49.4	98.8
5	43.3	86.6
6	60.7	121.4
7	59.3	118.6
8	37.7	75.4
9	48.5	97.0
10	47.1	94.2
11	40.2	80.4
12	48.6	97.2
13	34.3	68.6
14	46.8	93.6
15	44.4	88.8

Grams/0.5m²: $\bar{x}$ = 45.49; s_b = 7.47; $n_{min}^a \geq$ 17.67

Grams/m²: $\bar{x}$ = 91.07; $\bar{x}$ = 810.6 lbs/acre

Sagebrush

Plot Number	Grams/0.5m²	Grams/m²
1	35.7	71.4
2	47.5	95.0
3	25.0	50.0
4	40.0	80.0
5	57.6	115.2
6	35.6	71.2
7	35.5	71.0
8	33.0	66.0
9	64.3	128.6
10	32.0	64.0

Grams/0.5m²: $\bar{x}$ = 40.62; s^b = 12.24; $n_{min}^a \geq$ 6.4

Grams/m²: $\bar{x}$ = 81.24; $\bar{x}$ = 723.04 lbs/acre

Vegetative Cover

Grassland

Transect Number	Percent Cover
1	90
2	80
3	70
4	70
5	90
6	90
7	60
8	70
9	70
10	70
11	80
12	90
13	80

$\bar{x}$ = 77.7; s^b = 101.27; $n_{min}^a \geq$ 11.1

Sagebrush

Transect Number	Percent Cover
1	90
2	70
3	90
4	70
5	70
6	80
7	70
8	80
9	90
10	90

$\bar{x}$ = 80; s^b = 9.428; $n_{min}^a \geq$ 9.1

n_{min}^a - Minimum number of sampling units required to provide sample adequacy.

s^b - Sample Standard Deviation

TABLE D-8.6

GRASSLAND VEGETATION DATA

Exclosure	Section	South	West	Percent Vegetation	Percent Litter and Rock	Percent Bare Ground
1	SW 1/4 Section 14	8700	9500	77.5	10	12.5
2	NW 1/4 Section 14	9820	7775	70	4	26
3	NW 1/4 Section 14	6235	8750	77.5	10	12.5
4	NE 1/4 Section 14	5200	7800	77.5	5	17.5
5	NE 1/4 Section 14	6800	7500	82.5	10	7.5
6	SE 1/4 Section 14	7100	6500	85	0	15
7	SE 1/4 Section 14	8000	7100	77.5	2.5	20
8	SW 1/4 Section 14	7500	8500	70	2.5	27.5
				$\bar{X}$ = 77.18	$\bar{X}$ = 4.88	$\bar{X}$ = 17.31

TABLE D-8.7

VEGETATION COVER DATA FOR EXCLOSURE AREAS

Grassland			Sagebrush		
Exclosure Number	No. of Transects	Percent Cover[b]	Exclosure Number	No. of Transects	Percent Cover[b]
1	4	77.5	1	4	77.5
2	4	70	2	4	72.5
3	4	77.5	3	4	82.5
4	4	77.5	4	4	75.0
5	4	82.5	5	4	72.5
6	4	85	6	4	77.5
7	4	77.5	7	4	65
8	4	70	8	4	77.5
	32	$x = 77.19$		32	$x = 75$
		$s^c = 5.25$			$s^c = 5.18$
		$n_{min}^d = 3.03$			$n_{min}^d = 3.13$

Percent Cover[b] - Value for each exclosure represents the mean percent vegetative cover for the cover transects run at each exclosure.

s^c - Sample Standard Deviation.

n_{min}^d - Minimum number of sampling units required to provide sample adequacy.

TABLE D-8.8

VEGETATION PRODUCTION DATA FOR EXCLOSURE AREAS

Grassland					Sagebrush				
Exclosure Number	Number of Plots Clipped	Grams/$.5m^{2a}$	Grams/$1m^2$	lbs./acre	Exclosure Number	Number of Plots Clipped	Grams/$.5m^{2a}$	Grams/$1m^2$	lbs./acre
1	4	98.7	197.4	1756.9	1	4	131.4	262.8	2338.9
2	4	139.2	278.4	2477.8	2	4	145.1	290.2	2582.8
3	4	123.0	246.0	2189.4	3	4	123.0	246.0	2189.4
4	4	109.0	218.0	1940.2	4	4	115.9	231.8	2063.0
5	4	125.3	250.6	2230.3	5	4	174.8	359.6	3200.40
6	4	129.3	258.6	2301.5	6	4	93.1	186.2	1657.2
7	4	149.5	299.0	2661.1	7	4	120.2	240.4	2139.6
8	4	153.7	307.4	2735.9	8	4	116.0	232.0	2064.8
	32	x =115.6	x =256.9	x =2286.6		32	x =127.44	x =256.1	x =2279.5
		s_d^c = 14.6					s_d^c = 25.2		
		n_{min} ≥ 7.40					n_{min} ≥ 2.57		

Grams/$.5m^{2a}$ - Value for each exclosure represents the mean weight of the production plots clipped at each exclosure.

s_d^c - Sample Standard Deviation.

n_{min} - Minimum number of sampling units required to provide sample adequacy.

TABLE D-8.9

SHRUB HEIGHT DATA FOR EXCLOSURE AREAS[1]

Grassland			Sagebrush		
Exclosure Number	Artemisia tridentata	Artemisia frigida	Exclosure Number	Artemisia tridentata	Artemisia frigida
--	--	--	1	28.2cm	--
2	20cm	--	2	28.4cm	--
--	--	--	3	17.0cm	--
--	--	--	4	18.2cm	--
5	22cm	--	5	23.2cm	--
--	--	--	6	28.4cm	8cm
--	--	--	7	27.6cm	--
8	18cm	--	8	16.6cm	--
	$\bar{x}$ = 20cm			$\bar{x}$ = 23.5cm	$\bar{x}$ 8cm

[1]Number for each exclosure represents the mean height (cm) of all shrubs of each species which intersected the cover transects that were run at each exclosure site.

TABLE D-8.10

SAGEBRUSH VEGETATION DATA

Exclosure	Section	South	West	Percent Vegetation	Percent Litter and Rock	Percent Bare Ground
1	NW 1/4 Section 13	7500	4550	77.5	5	17.5
2	SE 1/4 Section 13	8000	1450	72.5	7.5	20
3	SE 1/4 Section 13	8900	990	82.5	2.5	15
4	SE 1/4 Section 13	11000	1100	75.0	7.5	17.5
5	SE 1/4 Section 13	8650	2555	72.5	5	22.5
6	SW 1/4 Section 13	9300	3125	77.5	2.5	20
7	SW 1/4 Section	8500	4400	65	7.5	27.5
8	SW 1/4 Section 13	9100	4990	77.5	7.5	15
				$\bar{x}$ = 75.0	$\bar{x}$ = 5.63	$\bar{x}$ = 19.38

Supporting data for the vegetation inventory are enclosed in the following section. These data include the following:

TABLES

D-8.11 and D-8.12	Tests of Sample Adequacy for Cover Transects (Control Areas)
D-8.13 and D-8.14	Tests of Sample Adequacy or roductivity Plots (Control Areas)
D-8.15 and D-8.17	Tests of Sample Adequacy for Cover Transects (Affected Areas)
D-8.16 and D-8.18	Tests of Sample Adequacy for Productivity Plots (Affected Areas)
	Exclosure Plot Data (Plots 1-16)
	Cover Data Sheets
	Shrub Height Data Sheets
	Productivity Exclosure Data Sheets

TABLE D-8.11

Tests of Sample Adequacy for Cover Transects

Grassland Control Area

Transect Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Vegetation Cover (%)	90	80	70	70	90	90	60	70	70	70	80	90	80

$\bar{x} = 77.7$

$$s = \sqrt{v} = \sqrt{\frac{\Sigma(xi-\bar{x})^2}{n-1)}} = \sqrt{\frac{(90-77.7)^2 + (80-77.7)^2 + (70-77.7)^2 + (70-77.7)^2 + (90-77.7)^2}{12}}$$

$$+ \frac{(90-77.7)^2 + (60-77.7)^2 + (70-77.7)^2 + (70-77.7)^2 + (70-77.7)^2}{12}$$

$$+ \frac{(80-77.7)^2 + (90-77.7)^2 + (80-77.7)^2}{12}$$

$$s = \sqrt{151.3 + 5.3 + 59.3 + 59.3 + 151.3 + 151.3 + 313.3 + 59.3 + 59.3 + 5.3}$$

$$= \overline{151.3 + 5.3 + 59.3} = \sqrt{\frac{1230.9}{12}} = \sqrt{102.6} = 10.13$$

$$n_{min} \geqslant \frac{2(sx\ z)^2}{(d\ \bar{x})^2} \ \frac{2(10.13x1.28)^2}{(0.1x77.7)^2} = \frac{672.5}{60.37} = 11.1$$

TABLE D-8.12

Tests of Sample Adequacy for Cover Transects

Sagebrush Control Area

Transect Number	1	2	3	4	5	6	7	8	9	10
Vegetation Cover (%)	90	70	90	70	70	80	70	80	90	90

$\bar{x} = 80$

$$s = \sqrt{v} = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}} = \sqrt{\frac{(90-80)^2 + (70-80)^2 + (90-80)^2 + (70-80)^2 + (70-80)^2 + (80-80)^2 + (70-80)^2 + (80-80)^2 + (90-80)^2 + (90-80)^2}{9}}$$

$$= \sqrt{\frac{100 + 100 + 100 + 100 + 100 + 0 + 100 + 0 + 100 + 100}{9}}$$

$$= \sqrt{\frac{800}{9}} = \sqrt{88.8} = 9.43$$

$$n_{min} \quad \frac{2(s\ z)^2}{(d\ \bar{x})^2} = \frac{2(9.43 \times 1.28)^2}{(0.1 \times 80)^2} = \frac{582.8}{64} = 9.1$$

TABLE D-8.13

Test of Sample Adequacy for Productivity Plots

in Grassland Control Area

Plot Number	1	2	3	4	5	6	7	8	9
Weight (grams/.5m^2)	39.3	45.2	37.6	49.4	43.3	60.7	59.3	37.7	48.5

Plot Number cont.	10	11	12	13	14	15
Weight cont.	47.1	40.2	48.6	34.3	46.8	44.4

$\bar{x} = 45.49$

$$s = \sqrt{V} = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}} = \sqrt{\frac{(39.3-45.49)^2 + (45.2-45.49)^2 + (37.6-45.49)^2 + (49.4-45.49)^2}{14}}$$

$$+ \frac{(43.3-45.49)^2 + (60.7-45.49)^2 + (59.3-45.49)^2 + (37.7-45.49)^2 + (48.5-45.49)^2}{14}$$

$$+ \frac{(47.1-45.49)^2 + (40.2-45.49)^2 + (48.6-45.49)^2 + (34.3-45.49)^2 + (46.8-45.49)^2}{14}$$

$$+ \frac{(44.4-45.49)^2}{14}$$

$$\Rightarrow \sqrt{38.3 + .08 + 62.3 + 15.3 + 4.8 + 231.3 + 190.7 + 60.7 + 9.1 + 2.6 + 28.0}$$

$$+ \overline{9.7 + 125.2 + 1.7 + 1.2}$$

$$\Rightarrow \sqrt{\frac{780.98}{14}} = \sqrt{55.78} = 7.47$$

$$n_{min} > \frac{2(s\ z)^2}{(d\ \bar{x})^2} = \frac{2(7.47 \times 1.28)^2}{(0.1 \times 45.49)^2} = 17.7$$

TABLE D-8.14

Test of Sample Adequacy for Productivity Plots

in Sagebrush Control Area

Plot Number	1	2	3	4	5	6	7	8	9
Weight (grams/.5m^2)	35.7	57.5	25.0	70.0	77.6	61.3	45.5	33.0	86.3

Plot Number cont.	1[illegible]
Weight Cont.	52.0

$\bar{x} = 54.4$

$$s = v = \sqrt{\frac{\Sigma(x-x)^2}{n-1}} = \sqrt{\frac{(35.7-54.4)^2 + (57.5-54.4)^2 + (25.0-54.4)^2 + (70-54.4)^2}{14}}$$

$$+ \frac{(77.6-54.4)^2 + (61.3-54.4)^2 + (45.5-54.4)^2 + (33.0-54.4)^2 + (86.3-54.4)^2}{14}$$

$$+ \frac{(52-54.4)^2}{14}$$

$$\Rightarrow \sqrt{\frac{349.7 + 9.6 + 864.4 + 243.4 + 538.2 + 47.6 + 79.2 + 457.9 + 1017.6 + 5.8}{14}}$$

$$\Rightarrow \sqrt{\frac{3613}{14}} = \sqrt{258} = 20.04$$

$$n_{min} > \frac{2(s\ z)^2}{(d\ \bar{x})^2} = \frac{2(0.84)^2}{(0.2)^2} = \frac{1133}{118} = 9.6$$

TABLE D-8.15

Test of Sample Adequacy for Cover Transects

in Grassland Areas

Exclosure[1]	1	2	3	4	5	6	7	8
Cover % ($\bar{y}i$)	77.5	70	77.5	77.5	82.5	85	77.5	70

$\bar{\bar{y}} = 77.19$

$$s_1^2 = \frac{\Sigma(\bar{y}i-\bar{\bar{y}})^2}{n} = \frac{(77.5-77.2)^2 + (70-77.2)^2 + (77.5-72.2)^2 + (77.5-77.2)^2}{7}$$

$$+ \frac{(82.5-77.2)^2 + (85-77.2)^2 + (77.5-77.2)^2 + (70-77.2)^2}{7}$$

$$\Rightarrow \frac{.09 + 51.8 + .09 + .09 + 28.1 + 60.8 + 0.09 + 51.8}{}$$

$$\Rightarrow \frac{192.9}{7} =$$

$$s = \sqrt{s_1^2} = \sqrt{27.6} = 5.25$$

$$n_{min} \geqslant \frac{2(s\ z)^2}{(d\ i)^2} = \frac{2(5.25x1.28)^2}{(0.1x77.19)^2} = \frac{180.6}{59.6} = 3.03$$

[1]Exclosure - Value for percent cover for each exclosure represents the mean percent cover of the four cover transects run at each exclosure.

TABLE D-8.16

Test of Sample Adequacy for Production Plots

in Grassland Vegetation Type

Exclosure		1	2	3	4	5	6	7	8
Plot	1	31.3	30.4	40.7	27.8	30.6	22.5	61.9	41.1
	2	31.4	36.0	27.6	30.2	55.2	27.3	40.3	42.3
	3	32.0	31.9	28.8	24.9	37.7	31.0	38.9	43.9
	4	30.0	40.8	25.9	26.1	27.6	48.5	28.4	26.4
	$\bar{y}$	124.7	139.1	123.0	109.0	151.1	129.3	169.5	153.7

$\bar{\bar{y}} = 137.4$

$$s_1^2 = \frac{\Sigma(\bar{y}i-\bar{\bar{y}})^2}{n(n-1)} = \frac{(124.7-137.4)^2 + (139.1-137.4)^2 + (123.0-137.4)^2 + (109-137.4)^2}{8(7)}$$

$$+ \frac{(151.1-137.4)^2 + (129.3-137.4)^2 + (169.5-137.4)^2 + (153.7-137.4)^2}{8(7)}$$

$$= \underline{161.3 + 2.9 + 207.4 + 806.6 + 187.7 + 65.6 + 1030.4 + 265.7}$$

$$= \frac{11997.6}{56} = 214.2$$

$$s = \sqrt{s_1^2} = \sqrt{214.2} = 14.6$$

$$n_{min} \geq \frac{2(s\ z)^2}{(d\ \bar{x})^2} = \frac{2(14.6x1.28)^2}{(0.1x137.4)^2} = 7.40$$

TABLE D-8.17

Test of Sample Adequacy for Cover Transects

in Sagebrush Affected Areas

Exclosure[1]	1	2	3	4	5	6	7	8
Cover % ($\bar{y}_i$)	77.5	72.5	82.5	75.0	72.5	77.5	65.0	77.5

$\bar{\bar{y}} = 75$

$$s_1^2 = \frac{\Sigma(\bar{y}i-\bar{\bar{y}})^2}{(n-1)} = \frac{(77.5-75)^2 + (72.5-75)^2 + 82.5-75)^2 + (75.0-75)^2 + (72.5-75)^2}{(7)}$$

$$\frac{(77.5-75)^2 + (65-75)^2 + (77.5-75)^2}{(7)}$$

$$\frac{6.3 + 6.3 + 56.3 + 6.3 + 6.3 + 6.3 + 100 + 6.3}{(7)}$$

$$= \frac{194.1}{7} = 27.7$$

$$s = \sqrt{s_1^2} = \sqrt{27.7} = 5.27$$

$$n_{min} \geq \frac{2(s\ z)^2}{(d\ \bar{x})^2} = \frac{2(5.27x1.28)^2}{(0.1x75)^2} = 3.24$$

[1]Exclosure - Value for percent cover for each exclosure represents the mean percent cover of the four cover transects run at each exclosure.

TABLE D-8.18

Test of Sample Adequacy for Production Plots

in Sagebrush Vegetation Type

Exclosure		1	2	3	4	5	6	7	8
Plot	1	26.0	14.7	40.5	26.9	28.5	16.9	29.7	57.3
	2	29.3	61.0	29.8	22.8	59.8	24.5	43.8	28.6
	3	19.7	34.3	27.0	34.7	32.9	17.5	21.1	29.7
	4	56.4	35.1	25.7	31.5	53.6	34.2	25.6	37.4
	$\bar{y}i$	131.4	145.1	123.0	115.9	174.8	93.1	120.2	153.0

$\bar{\bar{y}} = 132.1$

$$s_1^2 = \frac{\Sigma(\bar{y}i-\bar{\bar{y}})^2}{n} = \frac{(131.4-132.1)^2 + (145.1-132.1)^2 + (123.0-132.1)^2 + (115.9-132.1)^2}{(7)}$$

$$+ \frac{(174.8-132.1)^2 + (93.1-132.1)^2 + (120.2-132.1)^2 \ (153.0-132.1)^2}{(7)}$$

$$= \frac{5 + 169 + 82.8 + 262.4 + 1823.3 + 152.1 + 144 + 436.8}{(7)}$$

$$= \frac{4439.8}{7} = 634.3$$

$$s = \sqrt{s_1^2} = \sqrt{634.3} = 25.2$$

$$n_{min} \geqslant \frac{2(s\ z)^2}{(d\ \bar{x})^2} = \frac{2(25.2x.84)^2}{(0.2x132.1)^2} = 2.57$$

Exclosure Plot Locations

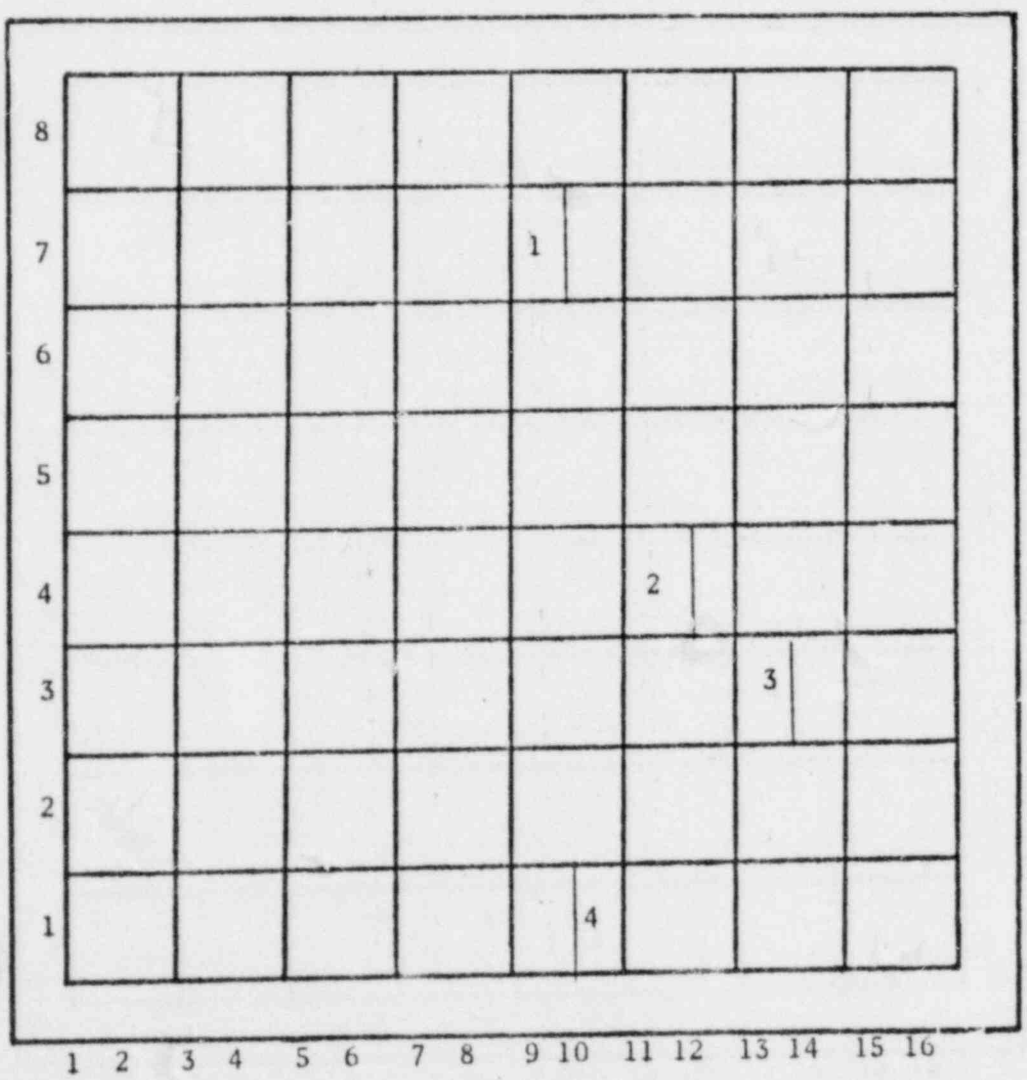
Exclosure Number: 1

Vegetation Type: Grassland

Location: SW Quarter Section S 8700 N 9500

Transect Orientations	
SE Corner:	181°
NE Corner:	148°
SW Corner:	62°
NW Corner:	244°

Plot	X axis	Y axis
1	9	7
2	11	4
3	14	3
4	10	1



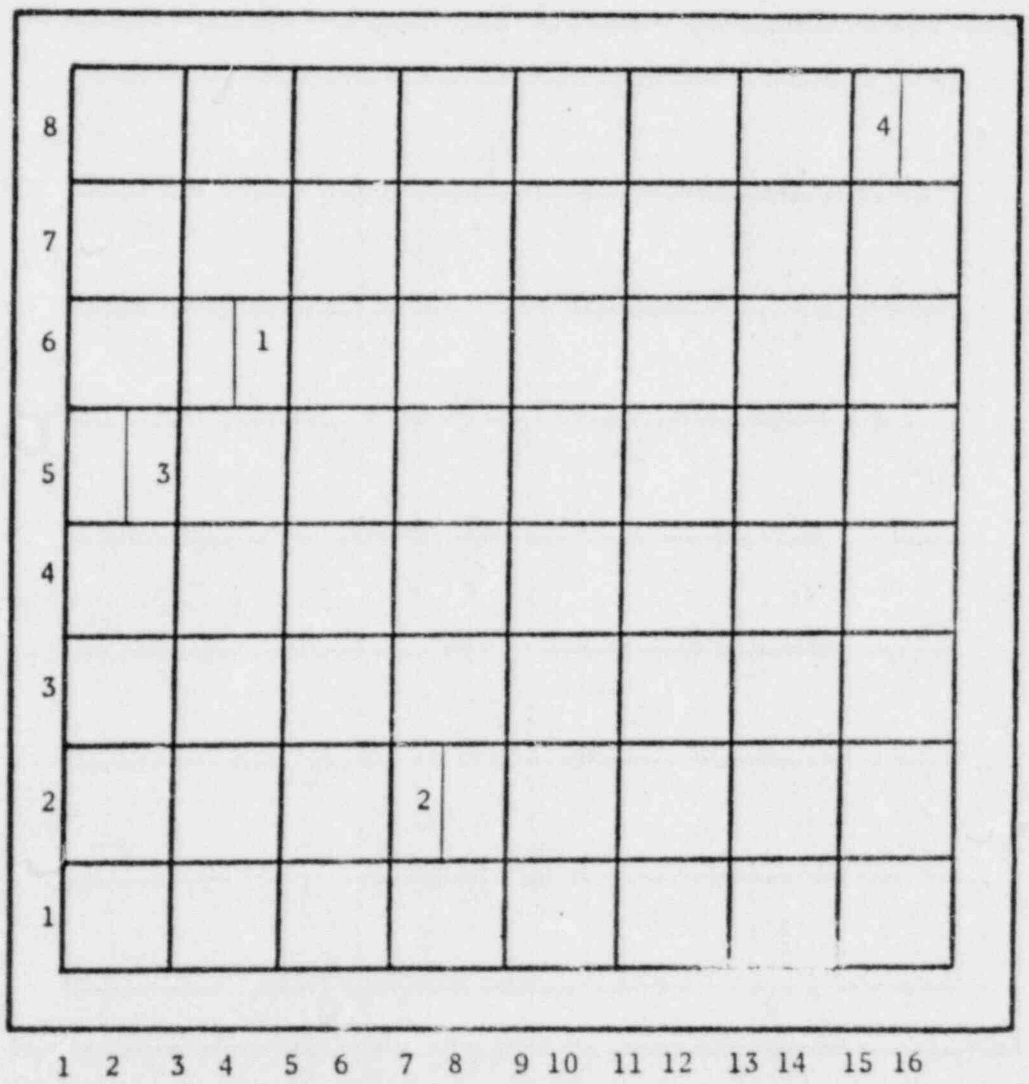
Exclosure Plot Locations

Exclosure Number: 7

Vegetation Type: Grassland

Location: SE Quarter Section S 8000 W 7100

Transect Orientations		Plot	X axis	Y axis
SE Corner:	110°	1	4	6
NE Corner:	358°	2	7	2
SW Corner:	142°	3	2	5
NW Corner:	256°	4	15	8



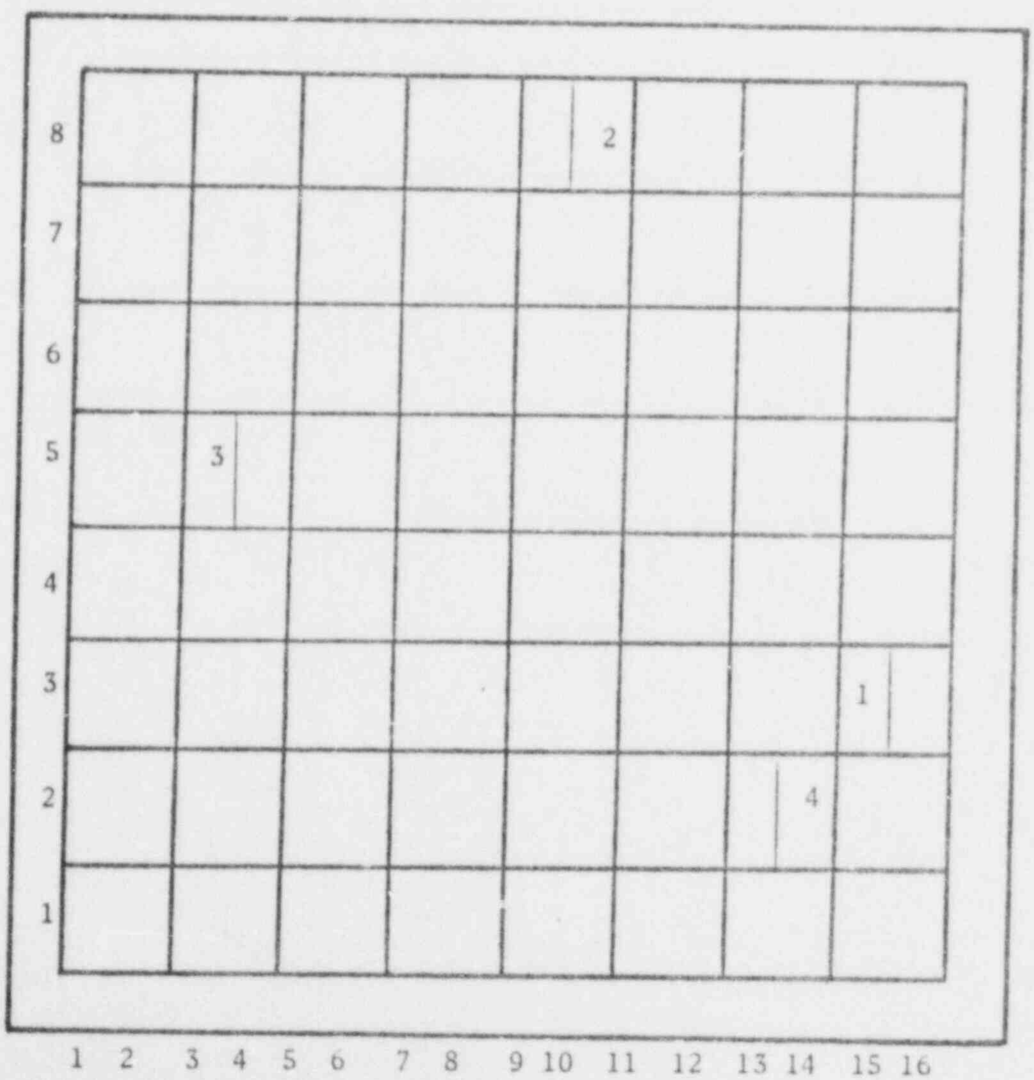
Exclosure Plot Locations

Exclosure Number: 2

Vegetation Type: Grassland

Location: SW Quarter Section S 9820 NW 7775

Transect Orientations		Plot	X axis	Y axis
NE Corner:	311°	1	15	3
SE Corner:	39°	2	10	5
NW Corner:	214°	3	3	5
SW Corner:	2°	4	14	2



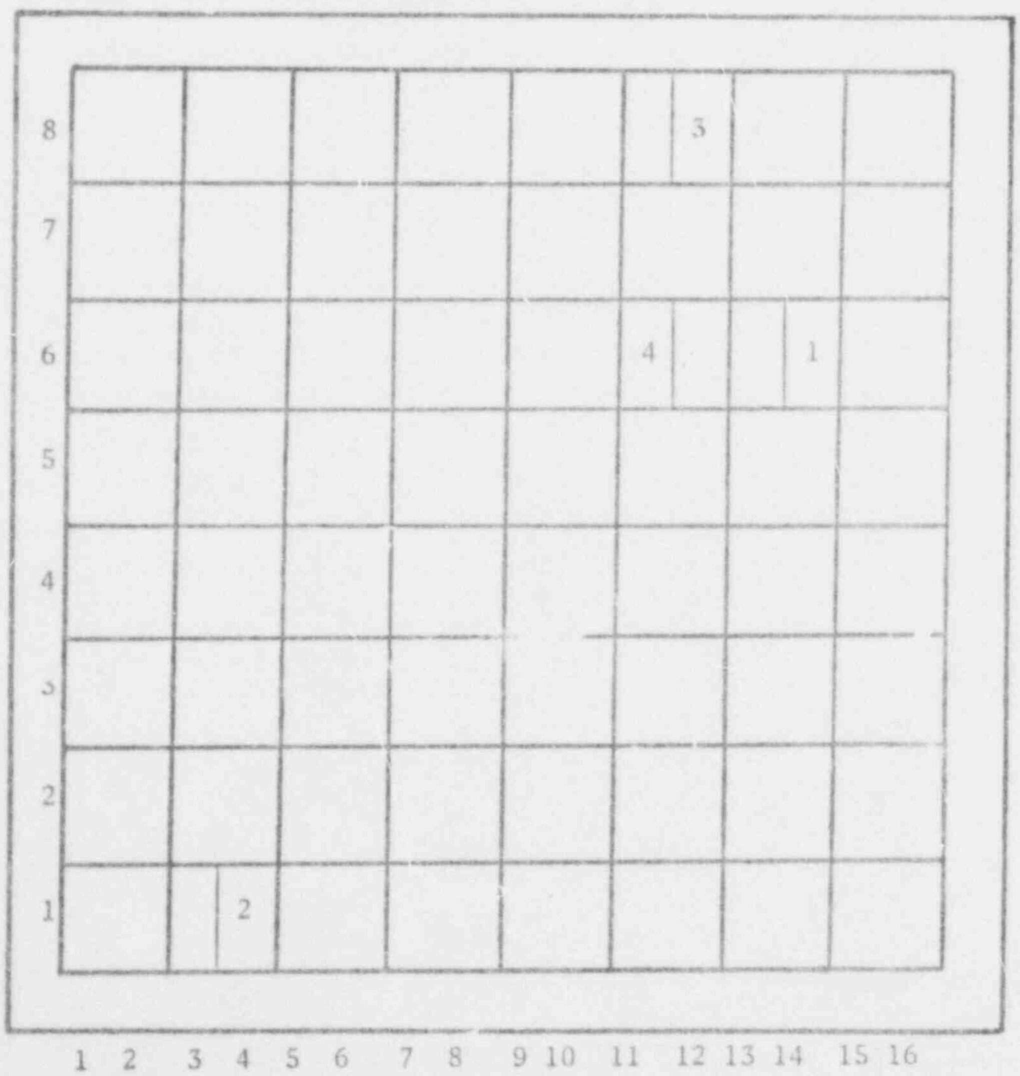
Exclosure Plot Locations

Exclosure Number: 3

Vegetation Type: Grassland

Location: NW Section S 6235 W 8750

Transect Orientations		Plot	X axis	Y axis
SE Corner:	192°	1	14	6
SW Corner:	341°	2	4	1
NW Corner:	244°	3	12	8
NE Corner:	188°	4	11	6



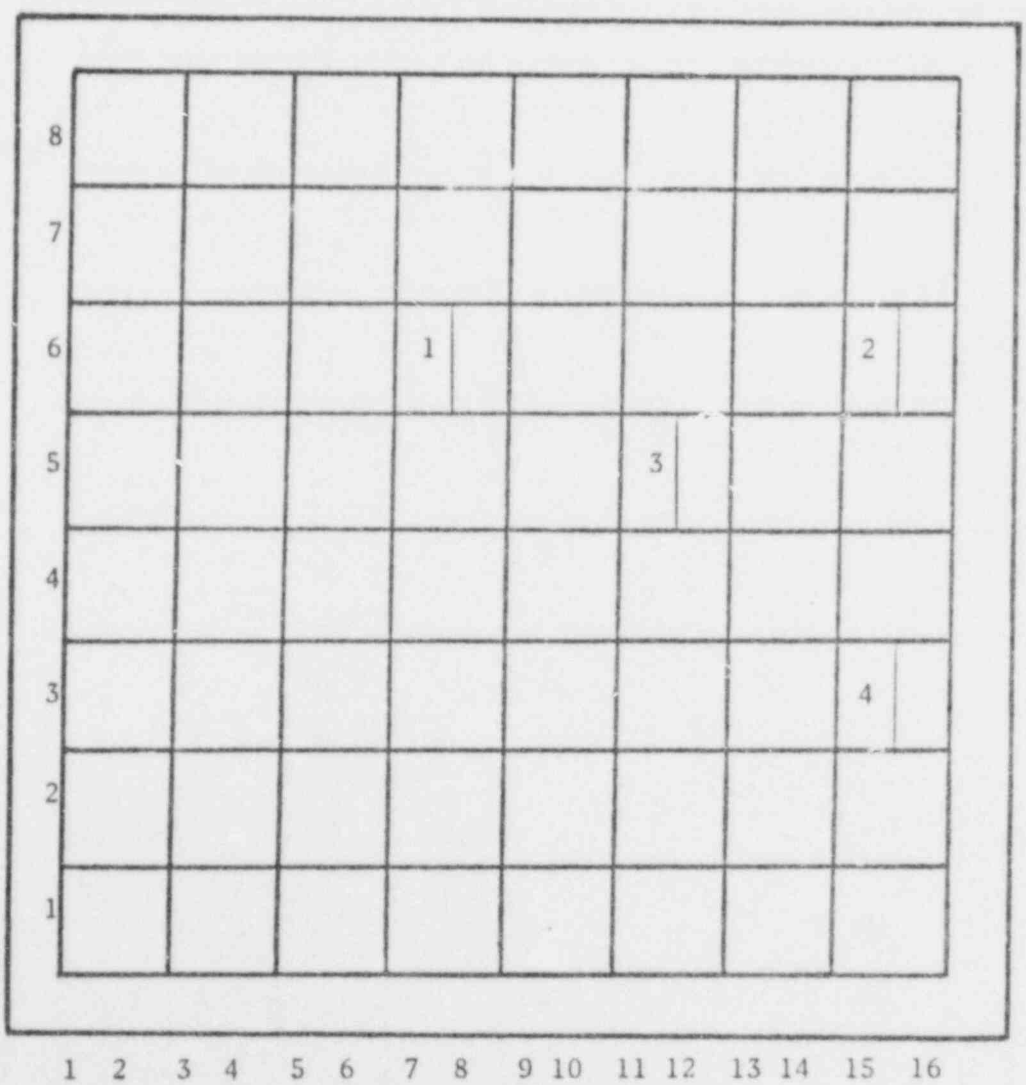
Exclosure Plot Locations

Exclosure Number: 4

Vegetation Type: Grassland

Location: NE Quarter Section S 5200 W 7800

Transect Orientations	Plot	X axis	Y axis
NW Corner: 104°	1	7	6
SE Corner: 49°	2	15	6
NE Corner: 21°	3	11	5
SW Corner: 317°	4	15	3



Exclosure Plot Locations

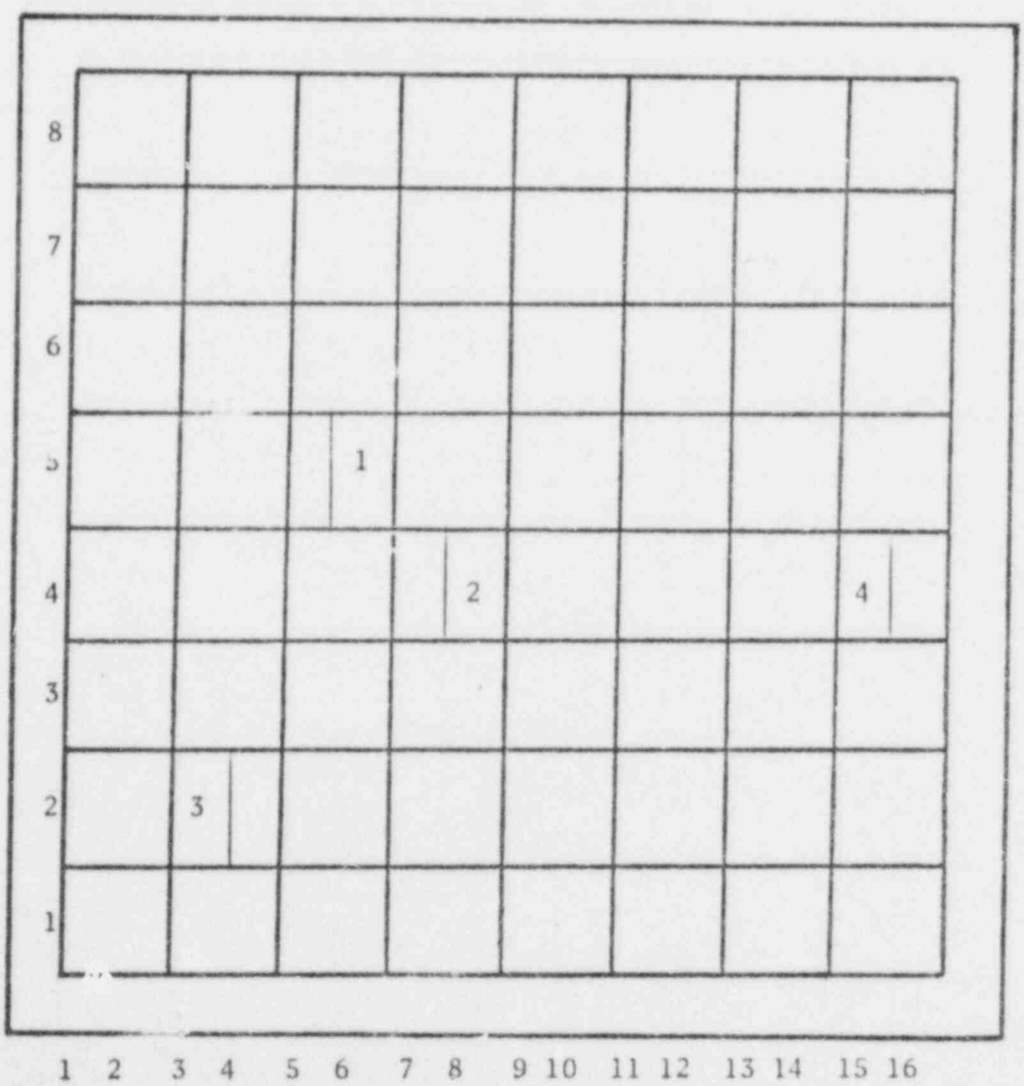
Exclosure Number: 5

Vegetation Type: Grassland

Location: NE Quarter Section S 6800 W 7500

Transect Orientations	
NW Corner:	355°
SE Corner:	15°
NE Corner:	95°
SW Corner:	231°

Plot	X axis	Y axis
1	6	5
2	8	4
3	3	2
4	15	4



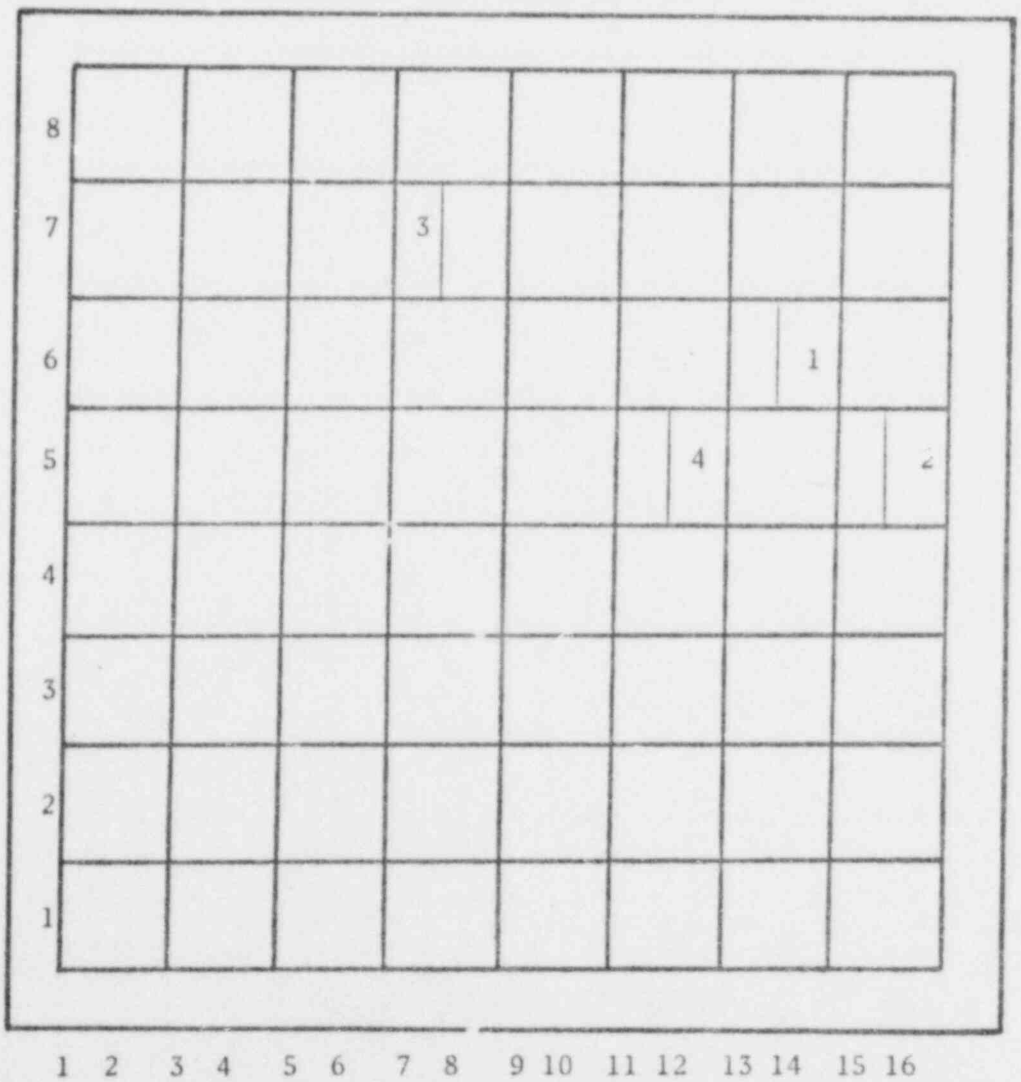
Exclosure Plot Locations

Exclosure Number: 6

Vegetation Type: Grassland

Location: SE Quarter Section S 7100 W 6500

Transect Orientations		Plot	X axis	Y axis
SW Corner:	327°	1	14	6
NE Corner:	49°	2	16	5
NW Corner:	131°	3	7	7
SE Corner:	218°	4	12	5



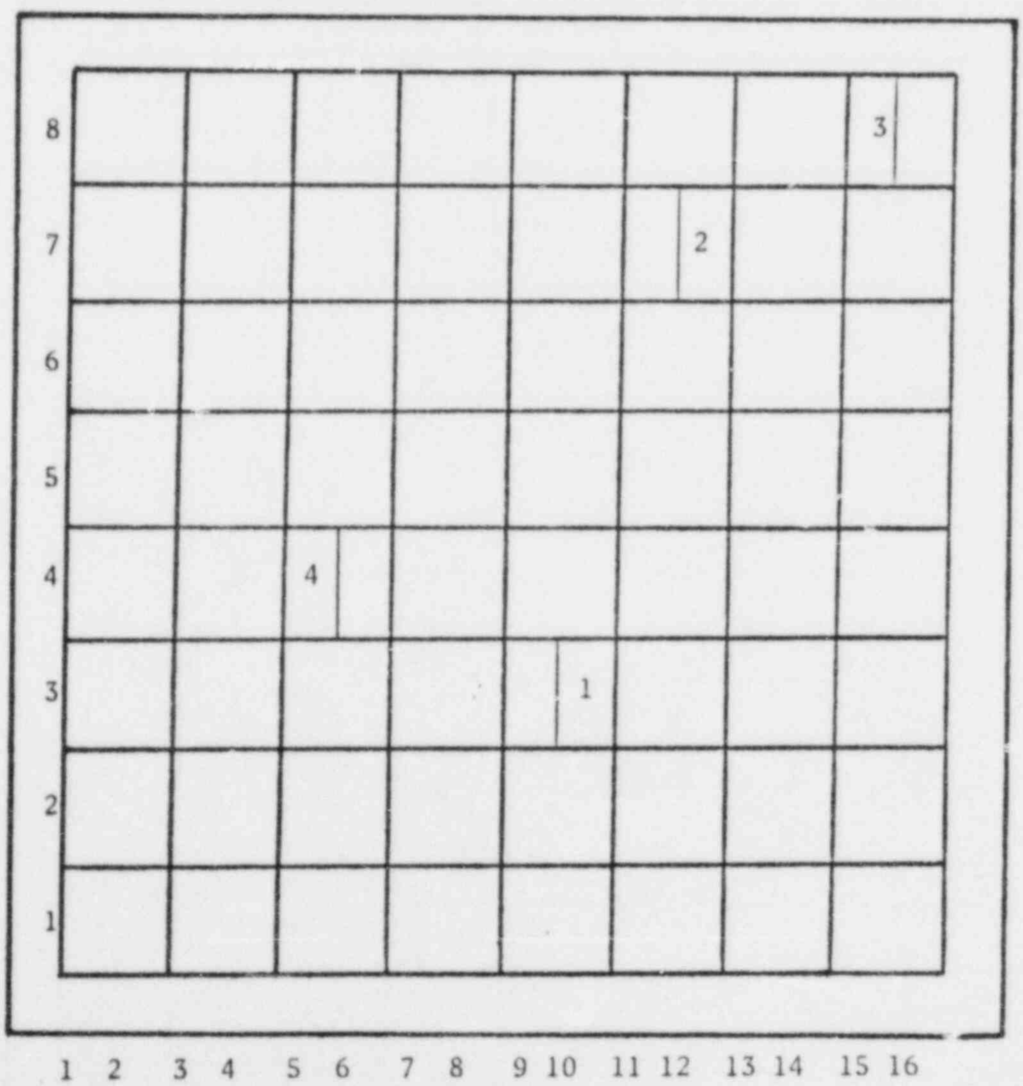
Exclosure Plot Locations

Exclosure Number: 8

Vegetation Type: Grassland

Location: SW Quarter Section S 7500 W 8500

Transect Orientations	Plot	X axis	Y axis
NE Corner: 208°	1	10	3
NW Corner: 3°	2	12	7
SW Corner: 173°	3	15	8
SE Corner: 210°	4	5	4



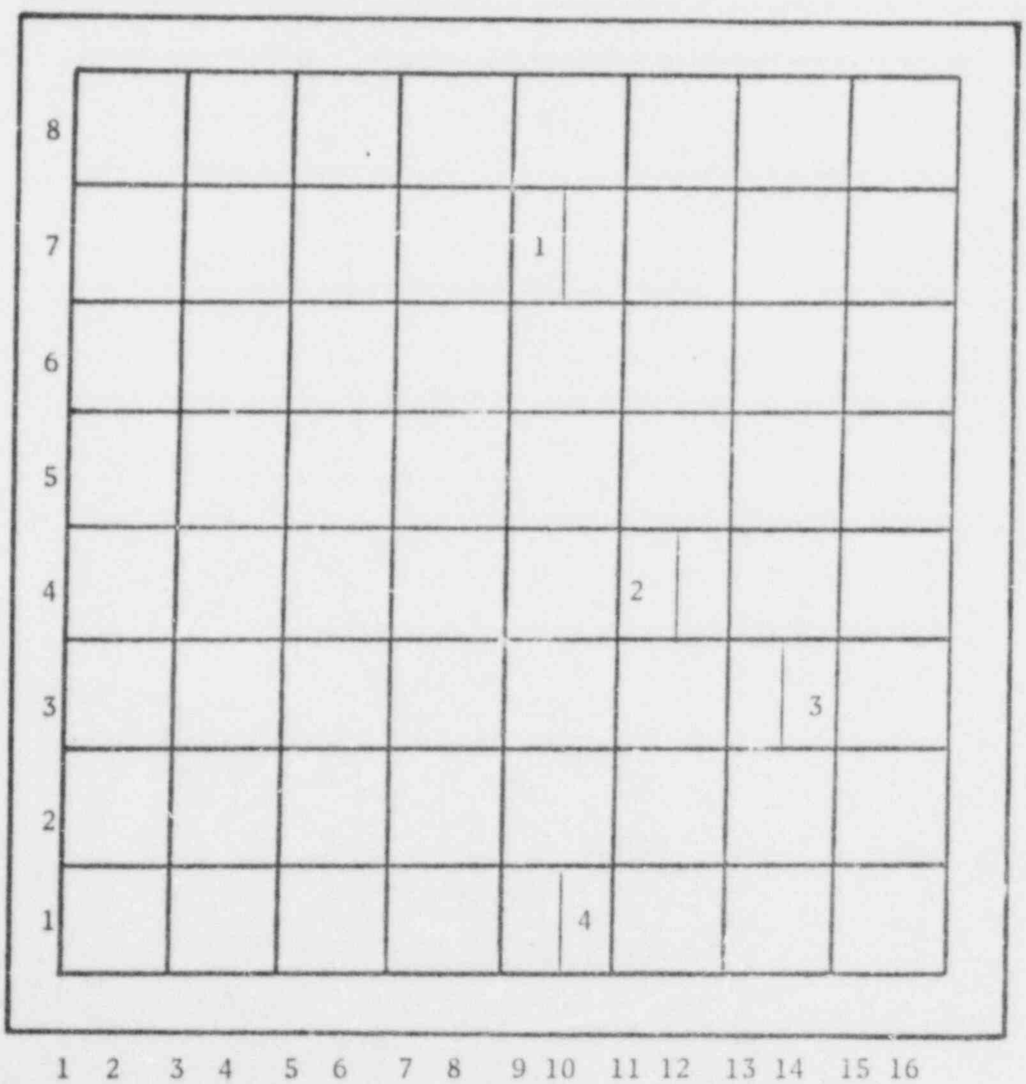
Exclosure Plot Locations

Exclosure Number: 1

Vegetation Type: Sagebrush

Location: NW Quarter Section S 7500 W 4550

Transect Orientations	Plot	X axis	Y axis
SW Corner: 131°	1	9	7
SE Corner: 118°	2	11	4
NW Corner: 162°	3	14	3
NE Corner: 95°	4	10	1



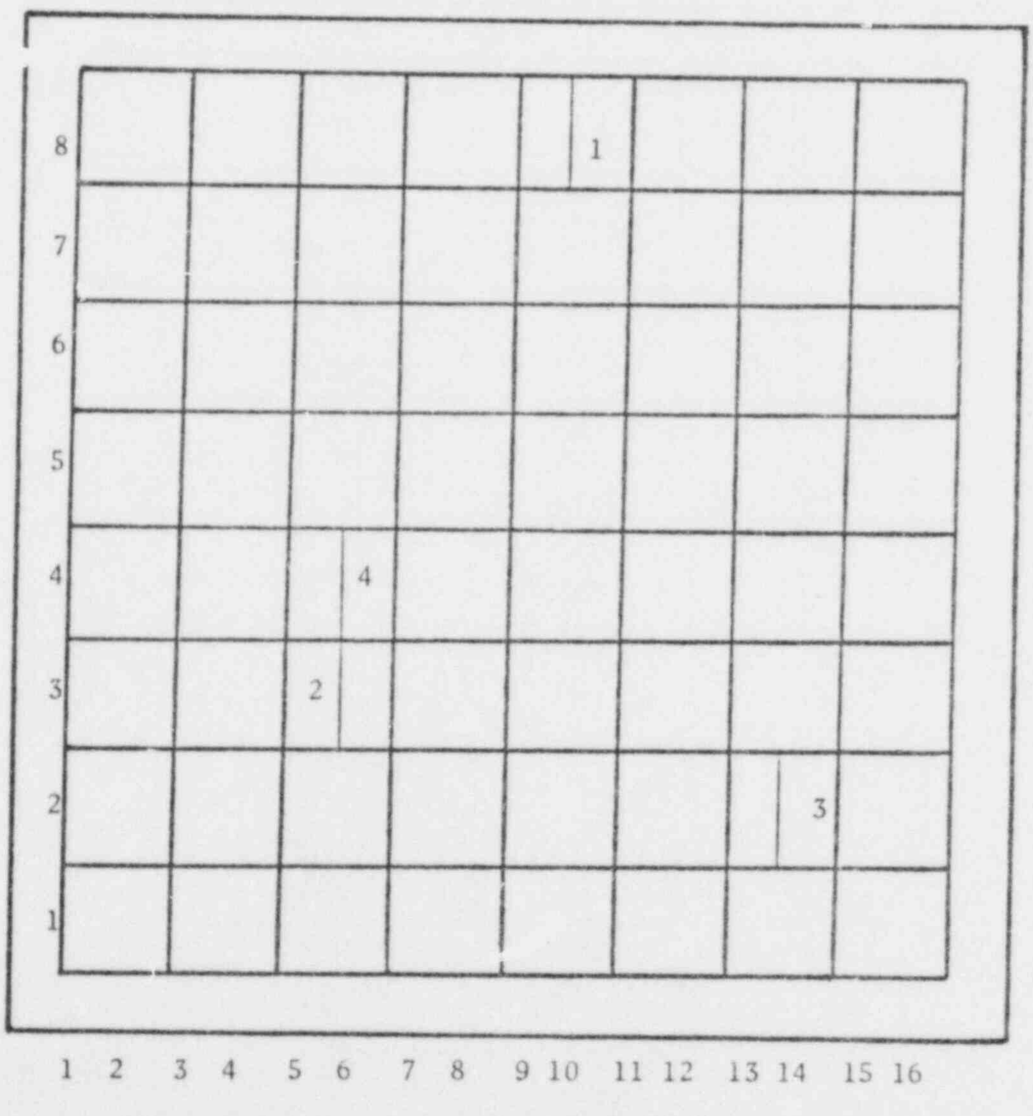
Exclosure Plot Locations

Exclosure Number: 2

Vegetation Type: Sagebrush

Location: SE Quarter Section S 8000 W 1450

Transect Orientations		Plot	X axis	Y axis
SE Corner:	226°	1	10	8
SW Corner:	103°	2	5	3
NW Corner:	245°	3	14	2
NE Corner:	346°	4	6	4



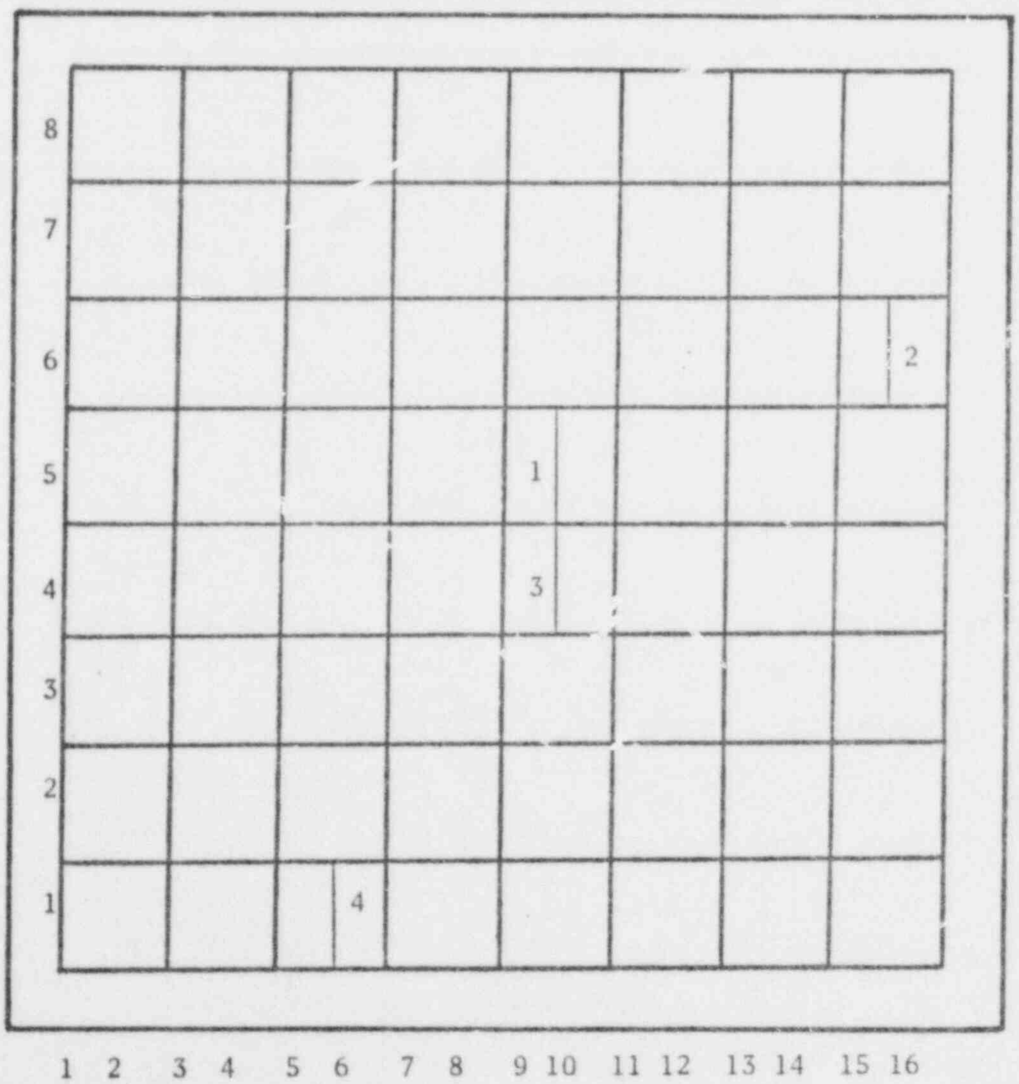
Exclosure Plot Locations

Exclosure Number: 4

Vegetation Type: Sagebrush

Location: SE Quarter Section S 11000 W [illegible]00

Transect Orientations		Plot	X axis	Y axis
SE Corner: 142°		1	9	5
SW Corner: 156°		2	16	6
NE Corner: 204°		3	9	4
NW Corner: 267°		4	6	1



Exclosure Plot Locations

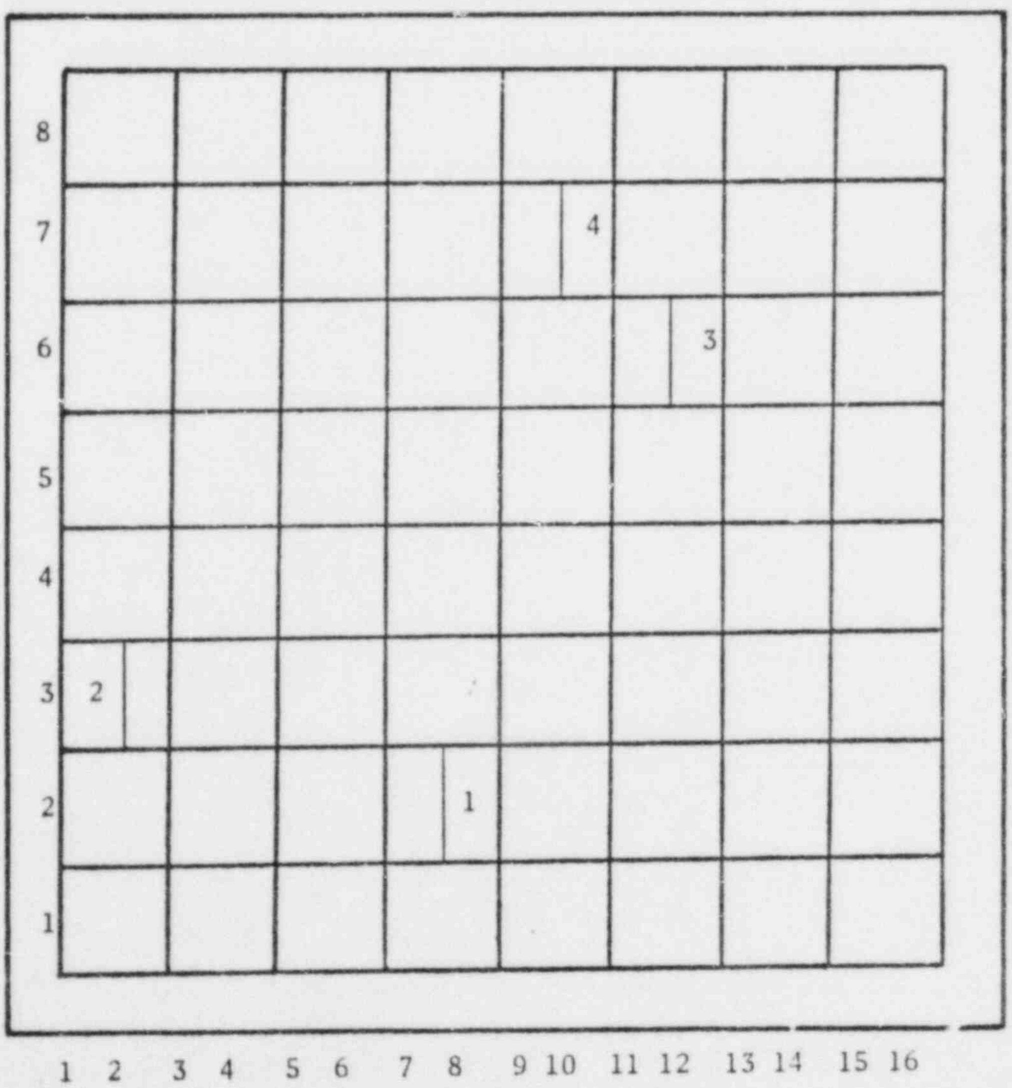
Exclosure Number: 3

Vegetation Type: Sagebrush

Location: SE Quarter Section S 8900 W 9980

Transect Orientations	
SW Corner:	330°
NE Corner:	113°
SE Corner:	110°
NW Corner:	358°

Plot	X axis	Y axis
1	8	2
2	1	3
3	12	6
4	10	7



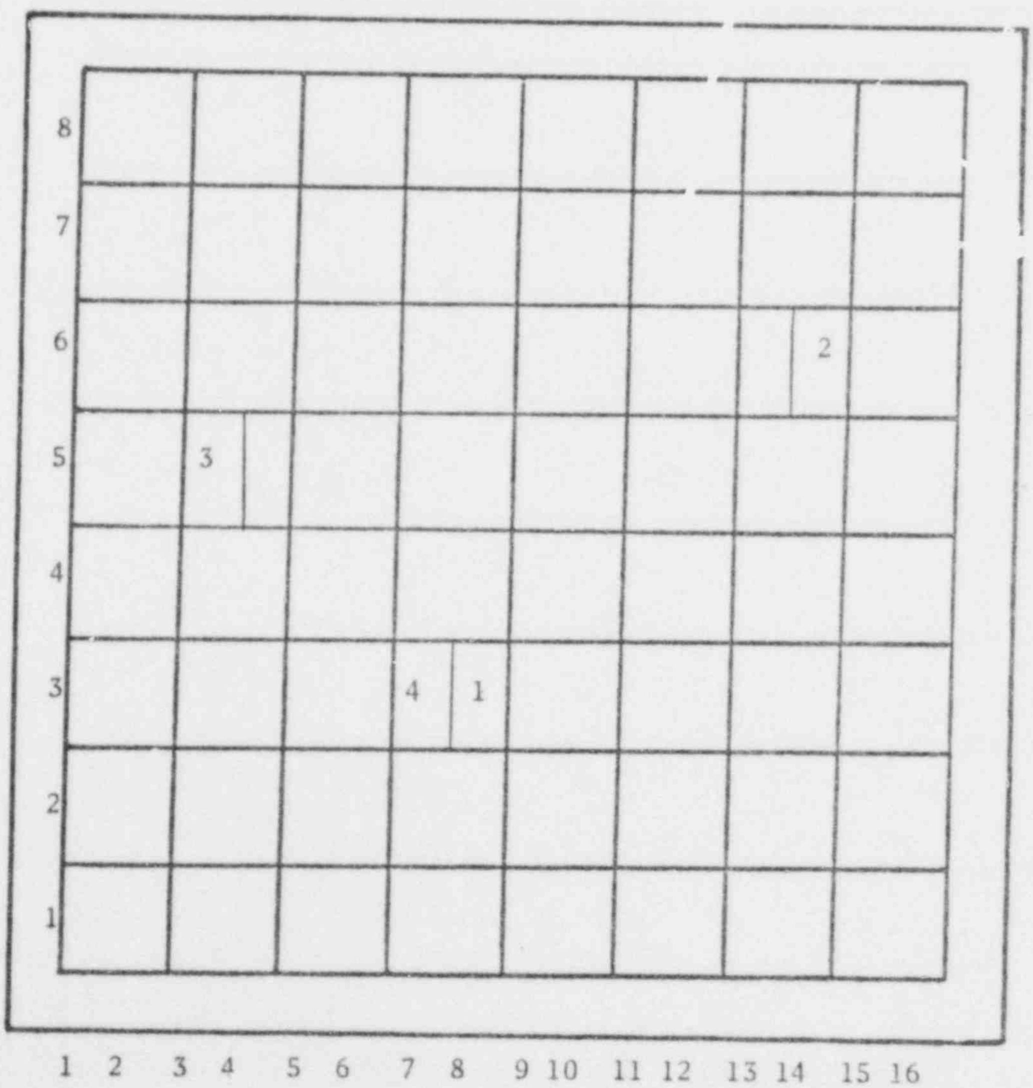
Exclosure Plot Locations

Exclosure Number: 5

Vegetation Type: Sagebrush

Location: SE Quarter Section S 8650 W 2555

Transect Orientations	Plot	X axis	Y axis
SE Corner: 86°	1	8	3
SW Corner: 114°	2	14	6
NW Corner: 24°	3	3	5
NE Corner: 119°	4	7	3



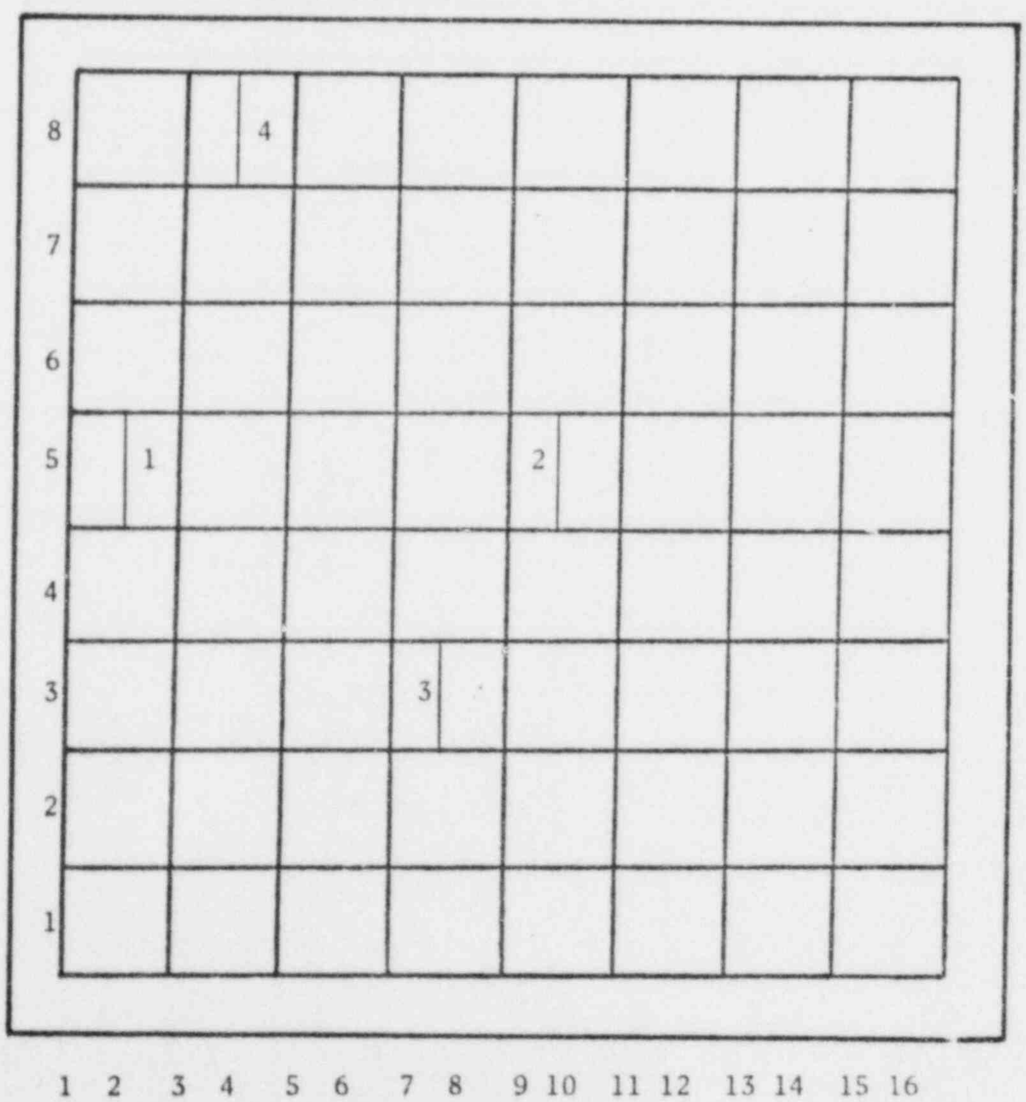
Exclosure Plot Locations

Exclosure Number: 6

Vegetation Type: Sagebrush

Location: SW Quarter Section S 9300 W 3125

Transect Orientations		Plot	X axis	Y axis
NW Corner:	28°	1	2	5
NE Corner:	98°	2	9	5
SE Corner:	143°	3	7	3
SW Corner:	219°	4	4	8



Exclosure Plot Locations

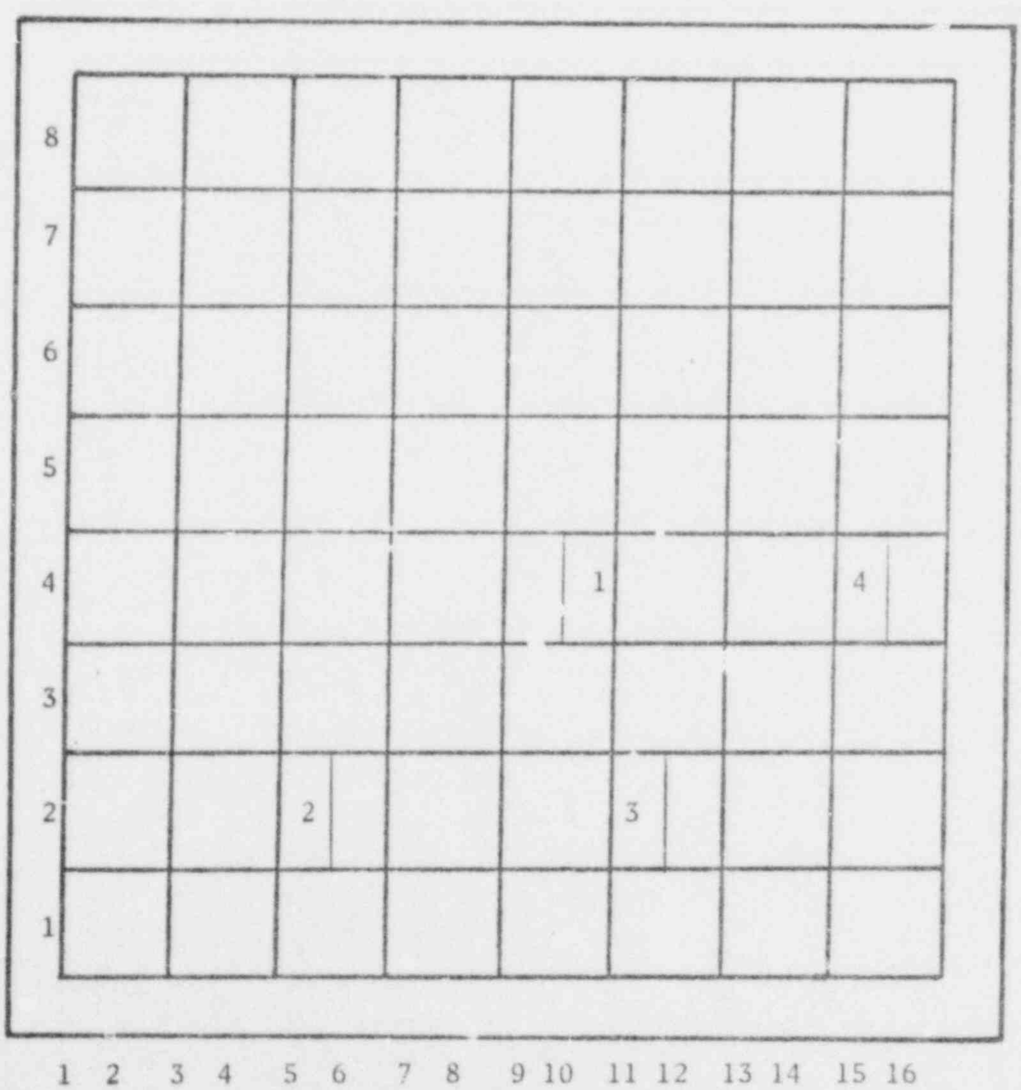
Exclosure Number: 7

Vegetation Type: Sagebrush

Location: SW Quarter Section S 8500 W 1400

Transect Orientations	
NW Corner:	113°
NE Corner:	252°
SE Corner:	302°
SW Corner:	7°

Plot	X axis	Y axis
1	10	4
2	5	2
3	11	2
4	15	4



Exclosure Plot Locations

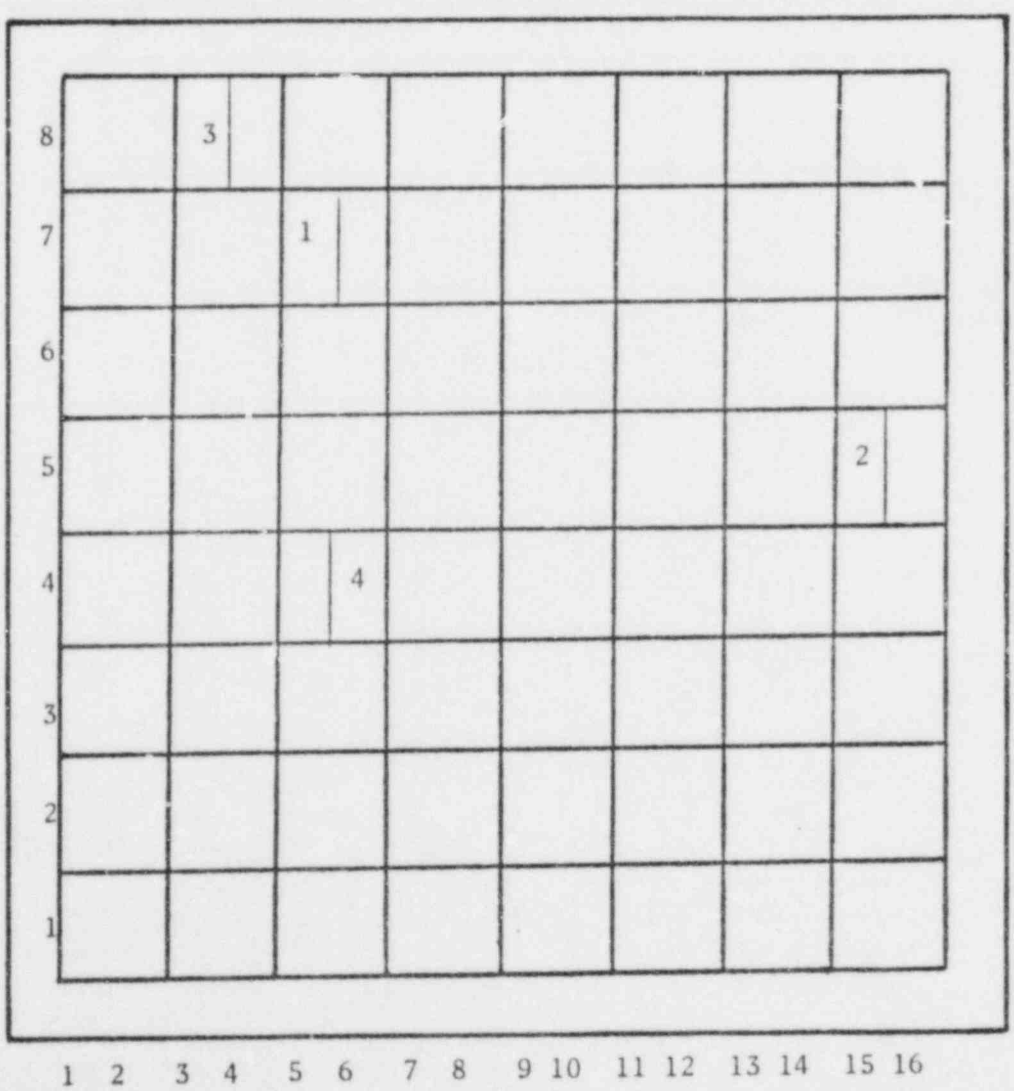
Exclosure Number:

Vegetation Type:

Location:

Transect Orientations	
NE Corner:	88°
NW Corner:	91°
SW Corner:	136°
SE Corner:	43°

Plot	X axis	Y axis
1	5	7
2	15	5
3	3	8
4	6	4



POOR ORIGINAL

DATA SHEET

Range Site Grassland

Affected or Control Control

Date 7/25/79

Transe

Species / Corner Direction	NW 118	W 304	SW 132	S 317	SE 9	E 2	NE 266	N 279	R 115	R 258		R 21	R 341	R 12	Mean (%)	
Agropyron c.	5	5	5	4	1	3	1	5	4	4		3	4	2		
Melolotus o.	2	1	2	1	1	2	2	2	1	2		1	2	3		
Aristida f.		1														
Agropyron s.				1	1				2	1		3	2	1		
Bouteloua g.				1		1								1		
Oryzopsis h.	1				2							2	1	1		
Stipa v.					1											
Bromus t.					1	1										
Stipa c.		1			2											
Artemisia c.						1										
Koeleria c.	1					1										
Opuntia p.							3									
Bare ground	1	2	3	3	1	1	4	3	2	1		1	1	1		
Litter - rock									1	2		1		1		
Total Hits	10	10	10	10	10	10	10	10	10	10		10	10	10		
															x̄	s
Plant Cover (%)	90	80	70	70	90	90	60	70	70	70		80	90	80	78	13.9
Litter and Rock (%)	-	-	-	-	-	-	-	-	10	20		10	-	10	315	—
Bare Ground (%)	10	20	30	30	10	10	40	30	20	10		10	10	10	1923.75	—
Plant-Litter-Rock (%)	90	80	70	70	90	90	60	70	80	80		90	90	90	80	13.3

$n_{min} = 5.26$

POOR ORIGINAL

DATA SHEET

Range Site Grassland

Affected or Control Affected

Date 7/25/79

Transect

Species / Corner Direction	Exclosure #1 SE 18[illegible]	NE 148	SW 62	NW 244	Exclosure #2 SE 39	NW 214	SW 2	NE 311	Exclosure #3 SE 192	SW 341	NW 244	NE 188	Exclosure #4 NW 104	SE 49	NE 21	SW 317	Exclosure #5 NW 355	SE 15	NE 95	SW 231	Exclosure #6 SW 327	NE 49	NW 131	SE 218	Mean (%)
Agropyron smithii	3	2	4	1	1	1	1	1					1			1	1		1		1	1	4	5	
Agropyron spicatum										1															
Poa p.	1	3	3	1	1			2	1				1												
Poa s.	2	1				1	1									2						4			
Aristida f.					1						3	2			1				1						
Bromus i.	2	1		2		1	1																		
Carex f.								1	1								1	3	1					1	
Koeleria c.		1		1	1	1			1	1							3			1	1				
Sporobulis a.				3																					
Melolotus o.							1		1		1				2	1									
Bromus t.				1								2		3		1					2	2			
Bouteloua g.					1	2	3	1		1					1		2	4	5	3	3	1	2	1	
Artimesia t.								1										1							
Agropyron c.					1	1		1	1	4	4	4	6	4	5	2				2					
Stipa v.									1														2		
Stipa c.					2				1								1	1		2		1	2	1	
Bare ground	2	1	1	1	2	3	2	4	2	1	1	1	2	2	1	2	1		1	1	3	1		2	
Litter - rock		2	2				1			2	1	1		1		1	1	1	1	1					
Total Hits	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
																									x̄
Plant Cover (%)	80	70	70	90	80	70	70	60	80	70	80	80	80	70	90	70	80	90	80	80	70	90	100	80	
Litter and Rock (%)	-	20	20	-	-	-	10	-	-	20	10	10	-	10	-	10	10	10	10	10	-	-	-	-	
Bare Ground (%)	20	10	10	10	20	30	20	40	20	10	10	10	20	20	10	20	10	-	10	10	30	10	-	20	
Plant-Litter-Rock (%)	80	80	80	90	80	70	80	60	80	90	90	90	80	80	90	80	90	100	90	80	70	90	100	80	

POOR ORIGINAL

DATA SHEET

Range Site Grassland

Affected or Control Affected

Date 7/25/79

Transect

Species	Exclosure #7 SE 110	NE 358	SW 142	NW 256	Exclosure #8 NE 208	NW 3	SW 173	SE 210	Mean (%)
Agropyron c.	1						1		
Melolotus o.			1						
Carex f.									
Aristida f.									
Agropyron s.				3				1	
Bouteloua	3	2	1	3	2	2		1	
Oryzopis h.									
Stipa v.							1		
Bromus t.	1	1					1		
Stipa c.	1	4	3	1			1	2	
Artemisia t.						1			
Poa s.			2		4	3			
Koeleria c.			1		2	2	2	1	
Opuntia p.	1		1				1		
Bare ground	3	3		2	2	2	3	4	
Litter - rock			1	1				1	
Total Hits	10	10	10	10	10	10	10	10	
									x̄
Plant Cover (%)	70	70	90	80	80	80	70	50	
Litter and Rock (%)	-	-	10	10	-	-	-	10	
Bare Ground (%)	30	30	-	20	20	20	30	40	
Plant-Litter-Rock (%)	70	70	100	90	80	80	70	60	

POOR ORIGINAL

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DATA SHEET

Range Site Sagebrush

Affected or Control Control

Date 7/26/79

Transect

Species Control	NW 103	W 242	SW 346	S 33	SE 113	E 110	NE 308	N 142	C 156	C [illegible]	Mean (%)
Artemisia t.	5	2	3	3	2	3	3	2	2	5	
Artemisia f.	1		1								
Bouteloua g.	3	1	2	2	2	3		2	3	2	
Carex f.			1				2		1		
Opuntia p.		1	1	1	1				1	1	
Poa s.		1		1	1	1		3	1	1	
Stipa c.			1								
Koeleria c.		2			1	1	1	1	1		
Stipa v.							1				
Bare ground	1	3	1	3	1	2	3	1	1	1	
Litter - rock					2			1			
Total Hits	10	10	10	10	10	10	10	10	10	10	
											$\bar{x}$
Plant Cover (%)	90	70	90	70	70	80	70	80	90	90	80 9.
Litter and Rock (%)	-	-	-	-	20	-	-	10	-	-	15
Bare Ground (%)	10	30	10	30	10	20	30	10	10	10	17
Plant-Litter-Rock (%)	90	70	90	70	90	80	70	90	90	90	83 9.

DATA SHEET

Range Site Sagebrush

Affected or Control Affected

Date 7/26/79

Transect

Species / Orientation direction	Exclosure #1 SW 131	SE 118	NW 162	NE 95	Exclosure #2 SE 226	SW 103	NW 245	NE 346	Exclosure #3 SW 330	NE 113	SE 110	NW 358
Artemisia t.	1		2	1	1	1	1	2	3	3	2	3
Artemisia f.					1							
Agropyron s.						1						
Bouteloua g.	3	4	3	4	1		3		1		2	
Carex f.	1						2	3	2	2	4	3
Flox h.						2	2					1
Koeleria c.		1	1		2	2			2	1	1	1
Stipa c.		1	1		1	1		2			1	1
Opuntia p.	1			1								
Poa s.	2	1	1	2								
Bare ground	1	3	1	2	3	2	2	2	2	3		1
Litter - rock	1		1		1	1		1		1		
Total Hits	10	10	10	10	10	10	10	10	10	10	10	10
Plant Cover (%)	80	70	80	80	60	70	80	80	80	60	100	90
Litter and Rock (%)	10	-	10	-	10	10	-	10	-	10	-	-
Bare Ground (%)	10	30	10	20	30	20	20	20	20	30	-	10
Plant-Litter-Rock (%)	90	70	90	80	7[illegible]	8[illegible]	80	90	80	70	100	90

Species / Orientation direction	Exclosure #4 SE 142	SW 156	NE 204	NW 267	Exclosure #5 SE 86	SW 114	NW 24	NE 119	Exclosure #6 NW 28	NE 98	SE 113	SW 219	Mean (%) $\bar{x}$	s
Artemisia t.	3	3	1	3	2	5	5	1	2	2	1	4		
Artemisia f.									1	1				
Agropyron s.														
Bouteloua g.		2				1		1	1	1	2	3		
Carex f.	2	2	2	3	2	2	2		1		4	1		
Flox h.	1		1							1				
Koeleria c.		1	2		1	1	1	1		2		1		
Stipa c.	1	1	1	1	2		1	1		1				
Opuntia p.											2			
Poa s.														
Bare ground	2	1	2	2	3		1	5	4	2	1	1		
Litter - rock	1		1	1		1		1	1					
Total Hits	10	10	10	10	10	10	10	10	10	10	10	10		
Plant Cover (%)	70	90	70	70	70	90	90	40	50	80	90	90	75	13.
Litter and Rock (%)	10	-	10	10	-	10	-	10	10	-	-	-	10	—
Bare Ground (%)	20	10	20	20	30	-	10	50	40	20	10	10	20.3	—
Plant-Litter-Rock (%)	80	90	80	80	70	100	90	50	60	80	90	90	80.6	11.

D-8.56

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DATA SHEET

Range Site Sagebrush

Affected or Control Affected

Date 7/26/79

Transect

Species	Exclosure #7 NW 113	NE 252	SE 302	SW 7	Exclosure #8 NE 88	NW 91	SW 136	SE 43	Mean (%) x̄	s
Artemisia t.	3	1	3		1		2			
Stipa v.					1	2				
Agropyron c.				1						
Agropyron s.						1		1		
Boutelzua g.		3	2		2			2		
Oryzopsis h.						1	1			
Carex f.	4	1	2	1	3	1		2		
Flox h.										
Koeleria c.				1	1		1	2		
Stipa c.	1			3			1	1		
Opuntia p.		1				1		1		
Poa s.						2	1			
Bare ground	1	4	2	3	1	1	3	1		
Litter - rock	1		1	1	1	1	1			
Total Hits	10	10	10	10	10	10	10	10		
Plant Cover (%)	70	60	70	60	80	80	60	90		
Litter and Rock (%)	10	-	10	10	10	10	10	-		—
Bare Ground (%)	10	40	20	30	10	10	30	10		—
Plant-Litter-Rock (%)	80	60	80	70	90	90	70	90		

SHRUB HEIGHT DATA SHEET

Range Site Grassland　　Affected or Control Affected and Control　　Mean for Range Site 20cm

Date 7/26/79　　Measurement Units cm　　Range for Range Site 18-20cm

Transect or Plot

Species	Exclosure #2 1	2	3	4	Exclosure #5 1	2	3	4	Exclosure #8 1	2	3	4	Control	x̄	range
Artemisia t.	20					22					18		20		20cm

SHRUB HEIGHT DATA SHEET

Range Site Sagebrush   Affected or Control Affected   Mean for Range Site 25.9 15.3

Date 7/26/79   Measurement Units cm   Range for Range Site 8-53cm

Transect or Plot

Species	Exclosure #1 1	2	3	4	Exclosure #2 1	2	3	4	Exclosure #3 1	2	3	4	Exclosure #4 1	2	3	4	Exclosure #5 1	2	3	4	Exclosure #6 1	2	3	4	x̄	range
Artemisia t.	43	22	32	31 13	28	29	22	36 27	11 14	16 18	28 14 21	14 17	18 12 12	33 17 13	28	14 17	8 6 36	29 20 24 17	7 36 38 32	14 35	24 26	33	36	40 11 21 36	25.9cm	
Artemisia f.																					8				15.3cm	

SHRUB HEIGH. ATA SHEET

Range Site Sagebrush　　Affected or Control Affected and Control　　Mean for Range Site ______

Date 7/26/79　　Measurement Units cm　　Range for Range Site ______

Species / Corner Direction	Exclosure #7 1	2	3	4	Exclosure #8 1	2	3	4	Transect or Plot Control Area 1	2	3	4	5	6	7	8	9	10	x̄	range
Artemisia t.	12 24 24	14	14 63 42		21		11 18		28 36 30 8 21	37	39 59 54	40 33 14	28 34 18	34 18 21	41 22 53 33 33	58 48	34 18 38	37 14	25.9cm	
Artemisia f.										18		22							15.3cm	

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
12	Grassland No. 1	1	Artemisia t.	3.8	
13	Grassland No.1	1	Stipa c.	2.7	
14	Grassland No.1	1	Bouteloua g.	10.0	
15	Grassland No.1	1	Agropyron s.	2.8	
16	Grassland No.1	1	Forbs	2.0	21.3
109	Grassland No.1	2	Agropyron s.	5.0	
110	Grassland No.1	2	Forbs	1.7	
111	Grassland No.1	2	Stipa c.	13.2	
112	Grassland No.1	2	Bromus t.	2.8	
113	Grassland No.1	2	Bouteloua g.	4.0	
114	Grassland No.1	2	Bromus i.	4.7	31.4
105	Grassland No.1	3	Forbs	1.3	
106	Grassland No.1	3	Bouteloua g.	2.5	
107	Grassland No.1	3	Agropyron s.	3.1	
108	Grassland No.1	3	Artemisia t.	4.1	
115	Grassland No.1	3	Poa s.	5.0	16
17	Grassland No.1	4	Bromus t.	3.9	
18	Grassland No.1	4	Poa s.	10.9	
19	Grassland No.1	4	Bromus i.	5.3	
20	Grassland No.1	4	Bouteloua g.	8.1	
21	Grassland No.1	4	Stipa c.	1.8	30.0
1	Grassland No.2	1	Koeleria c.	22.3	
2	Grassland No.2	1	Sporobolus a.	3.0	
3	Grassland No.2	1	Poa s.	5.1	30.4
4	Grassland No.2	2	Forbs	6.7	
5	Grassland No.2	2	Bromus i.	1.4	
6	Grassland No.2	2	Poa s.	2.9	

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
7	Grassland No.2	2	Agropyron s.	25.0	36.0
8	Grassland No.2	3	Poa s.	6.1	
9	Grassland No.2	3	Forbs	5.3	
10	Grassland No.2	3	Agropyron s.	15.9	
11	Grassland No.2	3	Bromus i.	4.6	31.9
100	Grassland No.2	4	Koeleria c.	2.1	
101	Grassland No.2	4	Bromus i.	9.2	
102	Grassland No.2	4	Agropyron s.	10.7	
103	Grassland No.2	4	Poa s.	18.9	40.9
22	Grassland No.3	1	Stipa c.	5.6	
23	Grassland No.3	1	Carex f.	18.3	
24	Grassland No.3	1	Bouteloua g.	14.0	
25	Grassland No.3	1	Agropyron s.	2.8	40.7
116	Grassland No.3	2	Stipa c.	9.9	
117	Grassland No.3	2	Agropyron s.	14.9	
118	[illegible]land No.3	2	Bouteloua g.	2.0	
119	Grassland No.3	2	Carex f.	0.8	27.6
26	Grassland No.3	3	Stipa c.	2.3	
27	Grassland No.3	3	Bouteloua g.	3.5	
28	Grassland No.3	3	Carex f.	13.0	28.8
120	Grassland No.3	4	Stipa c.	2.8	
121	Grassland No.3	4	Agropyron s.	7.1	
122	Grassland No.3	4	Poa s.	3.3	
123	Grassland No.3	4	Bromus t.	10.9	
124	Grassland No.3	4	Bouteloua g.	1.8	25.9
29	Grassland No.4	1	Agropyron s.	14.5	
30	Grassland No.4	1	Poa s.	10.5	

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
31	Grassland No.4	1	Forbs	2.8	27.8
125	Grassland No.4	2	Poa s.	30.2	30.2
32	Grassland No.4	3	Poa s.	9.4	
33	Grassland No.4	3	Forbs	2.7	
34	Grassland No.4	3	Agropyron s.	1.3	
35	Grassland No.4	3	Forbs	11.5	24.9
126	Grassland No.4	4	Poa s.	26.1	26.1
127	Grassland No.5	1	Agropyron s.	8.1	
128	Grassland No.5	1	Stipa c.	2.3	
129	Grassland No.5	1	Poa s.	12.2	
130	Grassland No.5	1	Bouteloua g.	8.0	30.6
36	Grassland No.5	2	Bromus t.	14.9	
38	Grassland No.5	2	Agropyron s.	6.2	
39	Grassland No.5	2	Poa s.	6.7	
40	Grassland No.5	2	Stipa c.	1.6	29.4
131	Grassland No.5	3	Poa s.	12.7	
132	Grassland No.5	3	Stipa c.	4.8	
133	Grassland No.5	3	Agropyron s.	8.4	
134	Grassland No.5	3	Bromus t.	11.8	37.7
41	Grassland No.5	4	Stipa c.	8.8	
42	Grassland No.5	4	Agropyron s.	2.5	
43	Grassland No.5	4	Bromus t.	12.8	
44	Grassland No.5	4	Bouteloua g.	3.5	27.6
46	Grassland No.6	1	Koeleria c.	6.5	
47	Grassland No.6	1	Bouteloua g.	1.9	
48	Grassland No.6	1	Stipa c.	10.9	
49	Grassland No.6	1	Carex f.	3.2	22.5

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
135	Grassland No.6	2	Bromus t.	18.2	
136	Grassland No.6	2	Koeleria c.	1.3	
137	Grassland No.6	2	Carex f.	1.8	
138	Grassland No.6	2	Agropyron s.	1.2	
139	Grassland No.6	2	Poa s.	3.4	
140	Grassland No.6	2	Artemisia t.	1.4	27.3
142	Grassland No.6	3	Stipa c.	6.7	
143	Grassland No.6	3	Agropyron s.	3.4	
144	Grassland No.6	3	Carex f.	8.6	
145	Grassland No.6	3	Poa s.	12.3	31.0
50	Grassland No.6	4	Stipa c.	6.0	
51	Grassland No.6	4	Carex f.	4.2	
52	Grassland No.6	4	Koeleria c.	36.0	
53	Grassland No.6	4	Bouteloua g.	2.3	48.5
159	Grassland No.7	1	Agropyron c.	2.0	
160	Grassland No.7	1	Sporobolus a.	29.9	41.9
161	Grassland No.7	2	Agropyron c.	40.3	40.3
70	Grassland No.7	3	Agropyron c.	35.3	
71	Grassland No.7	3	Sporobolus a.	3.6	38.9
72	Grassland No.7	4	Agropyron c.	17.8	
73	Grassland No.7	4	Forbs	10.6	28.4
74	Grassland No.8	1	Agropyron c.	16.5	
75	Grassland No.8	1	Sporobolus a.	3.7	
76	Grassland No.8	1	Forbs	3.3	
77	Grassland No.8	1	Artemisia f.	2.6	
78	Grassland No.8	1	Aristida l.	15.0	41.1
79	Grassland No.8	2	Agropyron c.	17.2	

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
80	Grassland No.8	2	Sporobolus a.	6.2	
81	Grassland No.8	2	Aristida l.	6.4	
82	Grassland No.8	2	Forbs	12.5	42.3
162	Grassland No.8	3	Sporobolus a.	14.9	
163	Grassland No.8	3	Forbs	1.2	
164	Grassland No.8	3	Artemisia f.	4.4	
165	Grassland No.8	3	Agropyron c.	18.1	
166	Grassland No.8	3	Aristida l.	1.5	
167	Grassland No.8	3	Forbs	3.8	43.9
168	Grassland No.8	4	Sporobolus a.	2.8	
169	Grassland No.8	4	Aristida l.	12.9	
170	Grassland No.8	4	Forbs	3.3	
171	Grassland No.8	4	Agropyron c.	7.4	26.4

PRODUCTIVITY CONTROL DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
54	Grassland Control	1	Agropyron c.	29.4	
55	" Control	1	Melilotus o.	9.9	39.3
141	" Control	2	Agropyron c.	38.5	
146	" Control	2	Melilotus o.	6.7	45.2
56	" Control	3	Agropyron c.	30.5	
57	" Control	3	Melilotus o.	7.1	37.6
147	" Control	4	Agropyron c.	49.4	49.4
58	" Control	5	Agropyron c.	37.4	
59	" Control	5	Melilotus o.	5.9	43.3
149	" Control	6	Agropyron c.	50.3	
148	" Control	6	Melilotus o.	10.4	60.7
150	" Control	7	Agropyron c.	45.9	
151	" Control	7	Melilotus o.	13.4	59.3
60	" Control	8	Agropyron c.	33.7	37.7
152	" Control	9	Melilotus o.	15.4	
153	" Control	9	Agropyron c.	32.0	
154	" Control	9	Artemisia t.	1.1	48.5
61	" Control	10	Agropyron c.	35.9	
62	" Control	10	Melilotus o.	11.2	47.5
155	" Control	11	Melilotus o.	10.3	
156	" Control	11	Agropyron c.	29.9	40.2
63	" Control	12	Agropyron c.	41.9	
64	" Control	12	[illegible]lotus o.	6.7	48.6
157	" Control	13	M[illegible] lotus o.	11.4	
158	" Control	13	Agropyron c.	22.9	34.3
65	" Control	14	Melilotus o.	30.1	
66	" Control	14	Melilotus o.	16.7	46.8

PRODUCTIVITY CONTROL DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
67	Grassland Control	15	Agropyron c.	15.7	
68	" Control	15	Melilotus o.	15.6	
69	" Control	15	Artemisia t.	13.1	44.4

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
81	Sagebrush No.1	1	Carex f.	6.4	
82	Sagebrush No.1	1	Stipa c.	12.5	
83	Sagebrush No.1	1	Bouteloua g.	6.3	
84	Sagebrush No.1	1	Koeleria c.	0.8	26.0
172	Sagebrush No.1	2	Carex f.	14.4	
173	Sagebrush No.1	2	Koeleria c.	13.9	
174	Sagebrush No.1	2	Bouteloua g.	1.0	29.3
175	Sagebrush No.1	3	Stipa c.	2.9	
176	Sagebrush No.1	3	Bouteloua g.	3.4	
177	Sagebrush No.1	3	Artemisia t.	9.5	
178	Sagebrush No.1	3	Poa s.	2.6	
179	Sagebrush No.1	3	Koeleria c.	1.3	19.7
85	Sagebrush No.1	4	Artemisia t.	23.0	
86	Sagebrush No.1	4	Bouteloua g.	17.3	
87	Sagebrush No.1	4	Stipa c.	11.8	
88	Sagebrush No.1	4	Poa s.	4.3	56.4
89	Sagebrush No.2	1	Koeleria c.	4.3	
90	Sagebrush No.2	1	Carex f.	4.5	
91	Sagebrush No.2	1	Artemisia t.	5.9	14.7
180	Sagebrush No.2	2	Poa s.	5.5	
181	Sagebrush No.2	2	Artemisia t.	47.3	
182	Sagebrush No.2	2	Koeleria c.	8.2	61.0
183	Sagebrush No.2	3	Bromus t.	13.4	
184	Sagebrush No.2	3	Koeleria c.	11.5	
185	Sagebrush No.2	3	Artemisia t.	7.9	
186	Sagebrush No.2	3	Poa s.	1.5	34.3
93	Sagebrush No.2	4	Artemisia t.	4.1	

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
94	Sagebrush No.2	4	Stipa c.	4.2	
95	Sagebrush No.2	4	Koeleria c.	4.7	
96	Sagebrush No.2	4	Artemisia t.	8.6	
97	Sagebrush No.2	4	Carex f.	10.8	
98	Sagebrush No.2	4	Bouteloua g.	2.7	35.1
99	Sagebrush No.3	1	Artemisia t.	17.2	
300	Sagebrush No.3	1	Koeleria c.	8.5	
301	Sagebrush No.3	1	Stipa c.	5.9	
302	Sagebrush No.3	1	Carex f.	6.7	
303	Sagebrush No.3	1	Artemisia t.	2.9	40.5
187	Sagebrush No.3	2	Artemisiat t.	11.6	
188	Sagebrush No.3	2	Bouteloua g.	6.6	
189	Sagebrush No.3	2	Koeleria c.	2.9	
190	Sagebrush No.3	2	Artemisia t.	2.3	
191	Sagebrush No.3	2	Bromus t.	8.2	29.8
192	Sagebrush No.3	3	Koeleria c.	6.1	
193	Sagebrush No.3	3	Artemisis f.	13.7	
194	Sagebrush No.3	3	Bromus t.	7.2	27.0
305	Sagebrush No.3	4	Artemisia t.	12.2	
306	Sagebrush No.3	4	Stipa c.	3.5	
307	Sagebrush No.3	4	Koeleria c.	3.6	
308	Sagebrush No.3	4	Carex f.	3.8	
309	Sagebrush No.3	4	Bouteloua g.	2.6	25.7
502	Sagebrush No.4	1	Bouteloua g.	10.9	
503	Sagebrush No.4	1	Koeleria c.	1.9	
504	Sagebrush No.4	1	Artemisia t.	4.2	
505	Sagebrush No.4	1	[illegible] c.	8.7	

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
517	Sagebrush No.4	1	Poa s.	1.2	26.9
508	Sagebrush No.4	2	Bouteloua g.	5.8	
510	Sagebrush No.4	2	Koeleria c.	1.6	
511	Sagebrush No.4	2	Artemisia t.	7.3	
512	Sagebrush No.4	2	Stipa c.	8.1	22.8
501	Sagebrush No.4	3	Stipa v.	3.1	
506	Sagebrush No.4	3	Koeleria c.	2.5	
507	Sagebrush No.4	3	Stipa c.	5.9	
515	Sagebrush No.4	3	Artemisia f.	1.9	
516	Sagebrush No.4	3	Bouteloua g.	12.6	
518	Sagebrush No.4	3	Phlox h.	8.7	34.7
500	Sagebrush No.4	4	Bouteloua g.	17.0	
509	Sagebrush No.4	4	Artemisia t.	11.7	
514	Sagebrush No.4	4	Artemisia f.	2.8	31.5
519	Sagebrush No.4	1	Bouteloua g.	15.6	
520	Sagebrush No.4	1	Koeleria c.	7.1	
521	Sagebrush No.4	1	Poa s.	3.5	
522	Sagebrush No.4	1	Artemisia t.	2.3	28.5
523 524	Sagebrush No.4	2	Artemisia t.	39.5	
525	Sagebrush No.4	2	Bouteloua g.	10.8	
526	Sagebrush No.4	2	Stipa c.	4.8	
527	Sagebrush No.5	2	Poa s.	4.7	59.8
528	Sagebrush No.5	3	Bouteloua g.	7.1	
529	Sagebrush No.5	3	Koeleria c.	3.7	
530	Sagebrush No.5	3	Artemisia t.	15.3	
531	Sagebrush No.5	3	Stipa c.	4.8	
532	Sagebrush No.5	3	Phox h.	2.0	32.9

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
534	Sagebrush No.5	4	Bouteloua g.	6.0	
535	Sagebrush No.5	4	Koeleria c.	4.7	
537	Sagebrush No.5	4	Artemisia t.	35.6	
553	Sagebrush No.5	4	Poa s.	7.3	53.6
554	Sagebrush No.6	1	Artemisia t.	12.7	
555	Sagebrush No.6	1	Bouteloua g.	2.7	
556	Sagebrush No.6	1	Artemisia f.	1.5	16.9
536	Sagebrush No.6	2	Bouteloua g.	5.2	
540	Sagebrush No.6	2	Stipa c.	3.0	
541	Sagebrush No.6	2	Koeleria c.	2.4	
542	Sagebrush No.6	2	Artemisia t.	13.9	24.5
558	Sagebrush No.6	3	Bouteloua g.	12.5	
559	Sagebrush No.6	3	Artemisia f.	3.2	
560	Sagebrush No.6	3	Poa s.	1.8	17.5
543	Sagebrush No.6	4	Bouteloua g.	7.2	
544	Sagebrush No.6	4	Stipa c.	8.4	
545	Sagebrush No.6	4	Artemisia t.	12.5	
546	Sagebrush No.6	4	Poa s.	6.1	34.2
581	Sagebrush No.7	1	Bouteloua g.	5.1	
582	Sagebrush No.7	1	Artemisia t.	13.0	
583	Sagebrush No.7	1	Poa s.	11.6	29.7
610	Sagebrush No.7	2	Bouteloua g.	7.8	
611	Sagebrush No.7	2	Bromus t.	2.7	
612	Sagebrush No.7	2	Artemisia t.	9.2	
613	Sagebrush No.7	2	Koeleria c.	3.6	
641	Sagebrush No.7	2	Stipa c.	11.6	
615	Sagebrush No.7	2	Artemisia f.	8.9	43.8

PRODUCTIVITY EXCLOSURE DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
584	Sagebrush No.	3	Bouteloua g.	4.1	
585	Sagebrush No.7	3	Artemisia t.	14.3	
586	Sagebrush No.7	3	Poa s.	2.7	21.1
616	Sagebrush No.7	4	Bouteloua g.	3.0	
617	Sagebrush No.7	4	Artemisia t.	13.1	
618	Sagebrush No.7	4	Stipa c.	3.1	
619	Sagebrush No.7	4	Artemisia f.	6.4	25.6
620	Sagebrush No.8	1	Poa p.	17.5	
621	Sagebrush No.8	1	Artemisia t.	11.3	
622	Sagebrush No.8	1	Koeleria c.	8.1	
623	Sagebrush No.8	1	Stipa c.	12.1	
624	Sagebrush No.8	1	Stipa v.	8.3	57.3
587	Sagebrush No.8	2	Artemisia t.	22.2	
588	Sagebrush No.8	2	Poa s.	4.6	
589	Sagebrush No.8	2	Taraxacum o.	1.8	28.6
598	Sagebrush No.8	3	Artemisia t.	22.0	
599	Sagebrush No.8	3	Artemisia f.	5.4	
600	Sagebrush No.8	3	Poa s.	2.7	30.1

PRODUCTIVITY CONTROL DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
561	Sagebrush Control	1	Artemisia t.	17.3	
562	" Control	1	Bouteloua g.	18.4	35.7
547	" Control	2	Bouteloua g.	13.5	
548	" Control	2	Koeleria c.	6.2	
549	" Control	2	Artemisia t.	10.6	
550	" Control	2	Stipa c.	13.8	
551	" Control	2	Poa s.	3.4	47.5
563	" Control	3	Bouteloua g.	11.2	
564	" Control	3	Poa s.	13.8	25.0
565	" Control	4	Bouteloua g.	8.7	
566	" Control	4	Poa s.	0.2	
601	" Control	4	Artemisia t.	27.7	
603	" Control	4	Stipa c.	3.4	40.0
552	" Control	5	Bouteloua g.	7.4	
553	" Control	5	Koeleria c.	7.3	
571	" Control	5	Artemisia t.	17.3	
572	" Control	5	Artemisia f.	16.7	
574	" Control	5	Phlox h.	0.6	
602	" Control	5	Poa s.	8.3	57.6
567	" Control	6	Artemisia t.	21.2	
568	" Control	6	Poa s.	7.6	
569	" Control	6	Bouteloua g.	5.9	
573	" Control	6	Artemisia f.	0.9	35.6
601	" Control	7	Koeleria c.	7.7	
603	" Control	7	Stipa c.	23.4	
604	" Control	7	Poa s.	4.4	35.5
575	" Control	8	Artemisia t.	13.4	

PRODUCTIVITY CONTROL DATA SHEET

Bag	Exclosure	Plot	ID	Dry Wt. (gms)	Total Dry Wt./Plot (gms)
576	Sagebrush Control	8	Poa s.	8.9	
577	" Control	8	Bouteloua g.	3.3	
578	" Control	8	Artemisia f.	7.6	33.2
605	" Control	9	Bouteloua g.	9.5	
606	" Control	9	Koeleria c.	7.5	
607	" Control	9	Artemisia t.	24.4	
608	" Control	9	Stipa c.	21.4	
609	" Control	9	Poa s.	1.5	64.3
579	" Control	10	Bouteloua g.	19.4	
580	" Control	10	Poa s.	12.6	32.0

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APPENDIX D-9

Wildlife Survey

APPENDIX D-9

WILDLIFE SURVEY

Introduction

A formal wildlife study was conducted by Ecology Audit in Sections 13 and 14, Township 34 North, Range 74 West, of the 6th p.m., beginning in April, 1979, and was completed in January, 1980. This study is the source of most of the wildlife data herein.

Teton's site and staff personnel have maintained casual observations on wildlife in the permit area since that time. These observations have resulted in the addition of new species to appropriate lists and tables along with gaining familiarity with the distribution and habits of those readily observable species on the permit area. These observations could provide an indication of changing habitat conditions should they occur during future operations. We are also continually on the lookout for potential appearance of endangered species on the permit area.

Permit Area Habitat

The permit aarea is generally a sagebrush and grassland habitat within the twelve inch average annual precipitation zone. Topography is gently to moderately sloping. The higher elevations at 5,380 feet msl in Section 13 decreasing to 5,150 feet msl in the southwest portion of Section 14 where the Little Sand Creek drainage is located. Sagebrush, Artemisia, dominates the vegetation in the eastern portion of the area. The north half of Section 14 is dominated by grasses, the north half of Section 14 is somewhat atypical as evidenced by the absence of sagebrush which may have been eradicated by man and also the presence of a great deal of crested wheatgrass, Agropyron cristatum.

The permit area does not provided a real unique habitat diversity or unusual features. The most important feature of the area to wildlife are the drainage tributaries to the Little Sand Creek and the stock ponds created within them. Although the drainages within the permit area are ephemeral flowing only in the spring or during heavy rain, the ponds within them collect and hold water for a longer period of the year. Ponds in the southwest corner of Section 14 hold water year around. Due to the ephemeral nature of Little Sand Creek there is no communications with water downstream. The lower pond, however, is freshened periodically by well water from the windmill just upstream.

RESULTS

Lists of species of birds and mammals which are indegenous to the area of the mine site are presented in Tables D-9.1 D-9.2. The list of Avian species seen on or in the vicinity of the permit area is presented in Table D-9.3 along with the months in which they were observed. The mammalian species observed on or in the vicinity of the permit area are given in Table D-9.4 along with the months within which they were observed.

AVIAN SURVEY

The relative densities of bird populations were assessed by a conducting transect counts in Sections 13 and 14. The locations of the transects are given on the wildlife site map Figure D-9.1. The method consisted of walking a transect of several hundred yards and stopping at fifty yard interval for five minutes. All birds sited within an estimated two hundred feet of the observer were recorded. Habitat affinities for each species were assessed by recording the vegetation type in which the birds were sited. For birds in flight the vegetation type which the bird was flying over at the time of the siting was recorded. The results of the transect counts are presented in Table D-9.5. The number of sitings per transect were converted to densities per one hundred acres. Number of species occuring in grassland vegetation was found to be higher than in the sagebrush type. This is primarly due to the existance of the water reservoirs of ephemeral streams. The most abundant birds inhabiting the permit area from May through August, 1979, were the Lark Buntings, followed by Meadowlarks, Brewer's Sparrows, Vesper Sparrows, and Jimmy Sparrows.

Game birds on the permit area are not numerous. Water fowl, mostly puddle ducks, visited the ponds in the southwest corner of the permit area during spring and fall migrations. One brood of five mallards was raised on this pond during the summer of 1980. Mourning doves are constantly observed throughout the spring and summer months and there is probably limited ground nesting activities by this species although no nests were located. The sage grouse encountered on the permit area are usually lone individuals. No sage grouse strutting grounds were observed on the area or in the vicinity during the spring bird observations.

LAGOMORPH SURVEY

A census of Lagomorph populations were conducted on August 1, July 24, September 28 and October 19, 1979, by night time spot lighting from a vehicle and day time sitings. The locations of the transects across the permit area are indicated on the wildlife site map (Figure D-9.1). The spot lighting was continued along the road to the east of the permit area. Desert cottontail, Sylvilagus auduboni, was the most abundant lagomorph species as shown in the survey results presented in Table D-9.5. The desert cottontail is commonly observed around the pipe yard and storage areas of the research and development facility. These areas seem to have provided a source of additional man made cover for this species.

SMALL MAMMAL LIVE TRAP SURVEY

Four small mammal trapping sites were selected in the field, two in each vegetation type. Trapping sites 1 and 2 were located in the grassland vegetation while sites 3 and 4 were in the sagebrush vegetation type. The locations of the trapping sites are indicated on the wildlife site map Figure D.9.1.

A grid was established at each trapping site which consisted of five traps in each of ten rows. The traps were spaced at ten to thirty foot intervals. These grids yielded a sample area of approximately 3,500 square feet. Sherman live traps were used. The results of the trapping are presented in Table D-9.7.

BIG GAME SURVEY

A total of fourteen big game census counts were conducted on the permit area from April 12, 1979, through January 23, 1980. The results of these counts are presented in Table D-9.8.

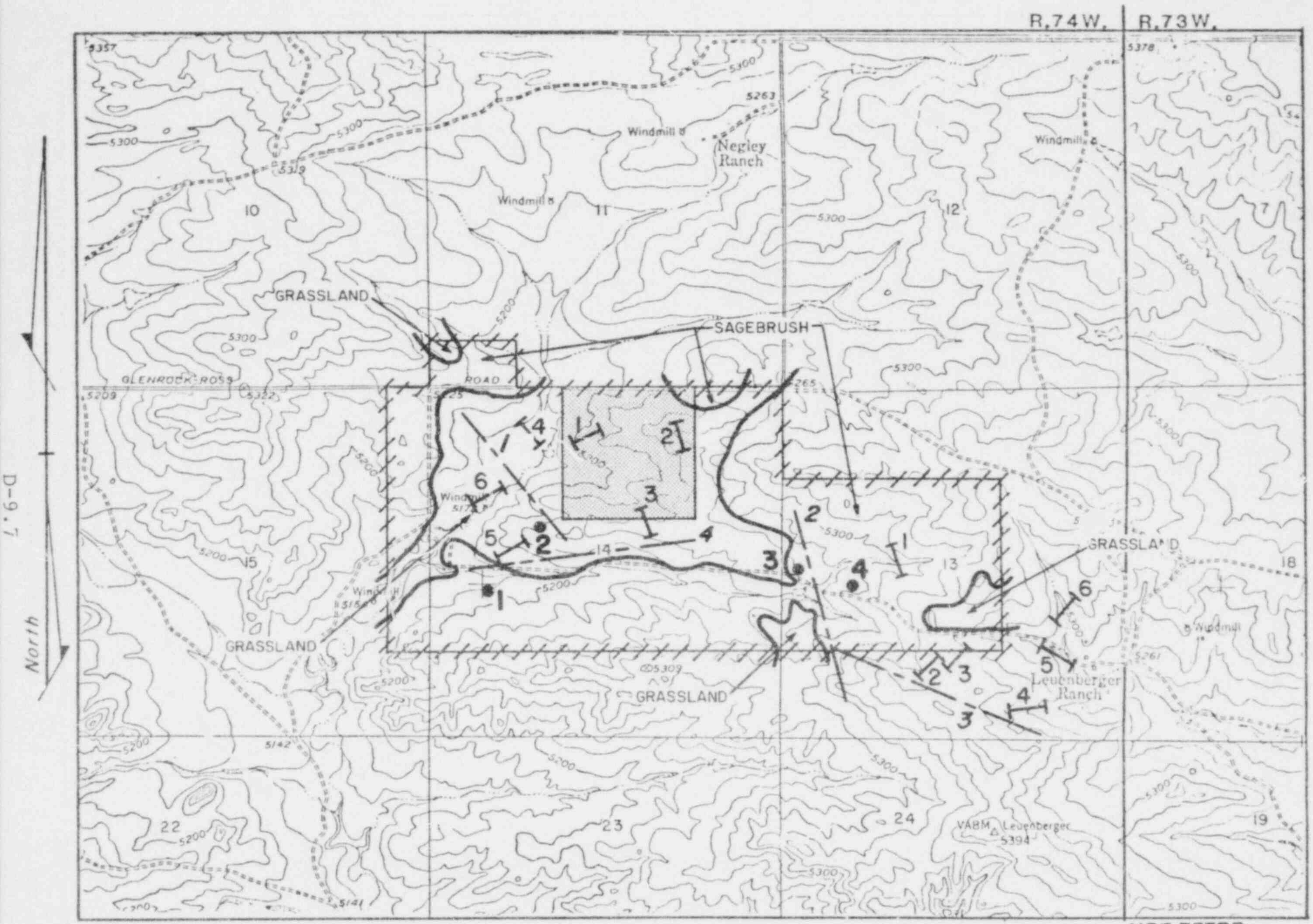
The counts were made by a walking observer traversing the permit area from east to west with a backup observed in a vehicle who proceeded around the edge of the permit area.

The big game animals observed on the permit area were the pronghorn antelope, Antilocapra americana, and the mule deer, Odocoileus hemionus. The mule deer, although present in the vicinity is rarely seen on the permit area, the antelope on the other hand is a permanent resident. A small herd of twelve to seventeen individuals may be observed on the permit area constantly. Antelope appear very adaptable and the research and development activities during the spring and summer of 1980 did not appear to alter their habits.

These animals were freq ntly seen around the plant and well field facilities including areas of active construction. At least five fawns were seen on the permit area most of the summer of 1980. Particular attention was given to census counts during the winter months in order to determine the importance of the permit area for winter range. While the number of antelope observed on the permit area remained constant, a large herd of antelope, forty-three to fifty animals, was observed on two winter census counts in Sections 23 and 24, south of the permit area indicating a potential wintering area in the breaks to the south.

ENDANGERED SPECIES

There have been no observations of any rare or endangered avian or mammalian species on the permit area or in the vicinity. Two species in this catagory were given careful consideration during the planning of the wildlife study. They were the Peregrine Falcon, Falco peregrinus, and the Black-footed Ferret, Mustela nigripes. Careful identification of birds of prey sited during the wildlife study did not turn up the Peregrine Falcon. A formal Black-footed Ferret search was not undertaken due to the lack of prairie dog activities on the permit area or in the vicinity.



1/2 0 1/2 Mile

Figure D-9.1

WILDLIFE SITE MAP

KEY

T NEDCO R CENSE AREA

PERMIT AREA

BIRD TRANSECT

SMALL MAMMAL TRAP GRIDS

LAGOMORPH TRANSECT

UNC TETON EXPLORATION DRILLING, INC
A UNC RESOURCES Company
3030 Energy Lane
Casper, Wyoming 82601

TABLE D-9.1

AVIAN FAUNA POTENTIALLY OCCURRING
IN THE REGION OF THE LEUENBERGER INSITU MINE
CONVERSE COUNTY, WYOMING

SCIENTIFIC NAME	COMMON NAME	COMMENTS
ORDER PODICIPEDIFORMES: GREBES		
FAMILY PODICIPEDIDAE: GREBES		No suitable habitat on site.
Aechmophorus occidentalis	Western Grebe	Common summer resident.
Policeps nigricollis	Eared Grebe	Common summer resident of lakes and ponds.
Polil mbus podiceps	Pied-billed Grebe	Common summer resident of lakes and ponds.
ORDER CICONIFORMES: HERONS, ETC.		
FAMILY ARDEIDAE: HERONS		
Ardea herodias	Great Blue Heron	Common summer resident of lakes and ponds.
Nycticorax nycticorax	Black-crowned Night Heron	Common summer resident of lakes, ponds, and marshes.
Botaurus lentiginosus	American Bittern	Occasional summer resident of marshes.
ORDER ANSERIFORMES: SWANS, GEESE, DUCKS		
FAMILY ANATIDAE: SWANS, GEESE, DUCKS		
Branta canadensis	Canada Goose	Common summer resident of streams and lakes. No suitable habitat on site.
Anas platyrhynchos	Mallard	Common resident of ponds on site.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY ANATIDAE Continued		
Anas strepera	Gadwall	Common summer resident of ponds and lakes.
Anas acuta	Pintail	Common summer resident of ponds and lakes.
Anas crecca	Green-winged Teal	Common summer resident of ponds and lakes. Increased numbers during migration.
Anas discors	Blue-winged Teal	Common summer resident of ponds and lakes. Increased numbers during migration.
Anas cyanoptera	Cinnamon Teal	Uncommon summer resident, possible migrant.
Anas americana	American Wigeon	Common summer resident.
Anas clypeata	Shoveler	Common migrant.
Aythya americana	Redhead	Common migrant.
Anthya valisineria	Canvasback	Common migrant.
Aythya collaris	Ring-necked Duck	Common migrant.
Aythya marila	Greater Scaup	Common migrant.
Aythya affinis	Lesser Scaup	Common migrant.
Bucephala clangual	Common Goldeneye	Common winter resident. No suitable habitat on site.
Bucephala albeola	Bufflehead	Common summer resident on lakes.
Oxyura jamaicensis	Ruddy Buck	Occasional migrant.
Mergus merganser	Common Merganser	Common resident.
ORDER FALCONIFORMES: VAULTURES, HAWKS, FALCONS		
FAMILY CATHARTIDAE: AMERICAN VULTURES		
Cathrtes aura	Turkey Vulture	Summer resident.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY ACCIPITRIDAE: HAWKS, HARRIERS, EAGLES		
Accipiter cooperii	Cooper's Hawk	Occasional summer resident and migrant.
Accipiter striatus	Sharp-shinned Hawk	Occasional summer resident of woodlands. No suitable habitat on site.
Buteo jamaicensis	Red-tailed Hawk	Common resident. Feeds in open area commonly observed on site.
Buteo swainsoni	Swainson's Hawk	Common summer resident.
Buteo lagopus	Rough-legged Hawk	Winter resident.
Buteo regalis	Ferruginous Hawk	Common resident.
Aquila chrysaetos	Golden Eagle	Common resident.
Haliaeetus leucocephalus	Bald Eagle	Winter resident.
Circus cyaneus	Marsh Hawk	Common resident.
FAMILY FALCONIDAE: FALCONS		
Falco mexicanus	Prairie Falcon	Summer resident and migrant.
Falco peregrinus	Peregrine Falcon	Rare migrant or winter resident. Endangered species.
Falco sparverius	Sparrow Hawk	Summer resident or migrant.
Falco columbarius	Pigeon Hawk	Occasional summer resident.
ORDER GALLIFORMES: GROUSE, PHEASANTS, TURKEYS		
FAMILY TETRAONIDAE: GROUSE		
Centrocercus urophasianus	Sage Grouse	Common resident of sagebrush area.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
ORDER GRUIFORMES: CRANES, RAILS, COOTS		
FAMILY GRUIDAE: CRANES		
Grus canadensis	Sandhill Crane	Common migrant and occasional summer resident.
FAMILY RALLIDAE: RAILS, COOTS		
Rallus limicola	Virginia Rail	Migrant and occasional summer resident of marshes.
Porzana carolina	Sora	Migrant and occasional summer resident.
Fulica americana	American Coot	Common resident of lakes and marshes.
ORDER CHARADRIIFORMES: SHORE BIRDS, GULLS, TERMS		
FAMILY CHARADRIIDAE: PLOVERS		
Charadrius semipalmatus	Semipalmated Plover	Rare migrant.
Charadrius vociferus	Killdeer	Common summer resident.
FAMILY SCOLOPACIDAE: SANDPIPERS, WOODCOCK AND SNIPE		
Capella gallinago	Common Snipe	Common resident.
Numenfus americanus	Long-billed Curlew	Common migrant and summer resident.
Bartramia longicauda	Upland Plover	Common summer resident.
Actitis macularia	Spotted Sandpiper	Common summer resident near streams and lakes.
Tringa solitaria	Solitary Sandpiper	Common migrant.
Catoptrophorus semipalmatus	Willet	Common migrant.
Tringa melanoleuca	Greater Yellowlegs	Common migrant.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY SCOLOPACIDAE Continued		
Tringa flavipes	Lesser Yellowlegs	Common migrant.
Calidris melanotos	Pectoral Sandpiper	Occasional migrant.
Calidris bairdii	Baird's Sandpiper	Common migrant.
Calidris minutilla	Least Sandpiper	Common migrant.
Limmodromus scolopaceus	Long-billed Dowitcher	Common migrant.
Calicris pusillus	Semipalmated Sandpiper	.igrant.
Calidris mauri	Western Sandpiper	Common migrant.
Limosa fedoa	Marbled Godwit	Common migrant.
Calidris alba	Sanderling	Common migrant.
FAMILY RECURVIROSTRIDAE: AVOCETS AND STILTS		
Recurvirostra americana	American Avocet	Common resident of lakes and marshes.
FAMILY PHALAROPODIDAE: PHALAROPES		
Steganopus tricolor	Wilson's Phalarope	Summer resident of lakes, streams, and marshes.
FAMILY LARIDAE: GULLS AND TERNS		
Larus californicus	California Gull	Occasional migrant.
Sterna forsteri	Forster's Tern	Common migrant.
ORDER COLUMBIFORMES: PIGEONS AND DOVES		
FAMILY COLUM[illegible]DAE: PIGEONS AND DOVES		
Columba livia	Rock Dove	Common resident.
Zenaida macroura	Mourning Dove	Summer resident

SCIENTIFIC NAME	COMMON NAME	COMMENTS
ORDER STRIGIFORMES: OWLS AND BARN OWLS		
FAMILY STRIGIDAE: TYPICAL OWLS		
Otus asio	Screech Owl	Occasional resident. Prefers woodlot areas.
Bubo virginanus	Great Horned Owl	Common resident. Observed nesting on site.
Speotyto cunicularia	Burrowing Owl	Summer resident, usually associated with abandoned mammal burrows.
Asio Otus	Long-eared Owl	Common resident of wooded areas.
Asio flammeus	Short-eared Owl	Occasional resident, frequents open areas.
Aegolius acadicus	Saw-whet Owl	Occasional resident
ORDER CAPRIMULGIFORMES: GOATSUCKERS		
FAMILY CAPRIMULGIDAE: GOATSUCKERS		
Phalaenoptilus nuttallii	Poor-will	Occasional summer resident.
Chordeiles minor	Common Nighthawk	Common summer resident.
ORDER APODIFORMES: SWIFTS, HUMMINGBIRDS		
FAMILY APODIDAE: SWIFTS		
Aeronautes saxatalis	White-throated Swift	Common summer resident.
FAMILY TROCHILIDAE: HUMMINGBIRDS		
Selasphorus platycercus	Broad-tailed Hummingbird	Common suumer resident.
Selasphorus rufus	Rufous Hummingbird	Occasional migrant.
Stellula calliope	Calliope Hummingbird	Summer resident or migrant.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
ORDER CROACIIFORMES: KINGFISHERS, HORNBILLS		
FAMILY ALCEDINIDAE		
Megaceryle alcyon	Belted Kingfisher	Common resident along streams.
ORDER PICIFORMES WOODPECKERS, ETC.		
FAMILY PICIDAE		
Colaptes auratus	Common Flicker	Resident.
Melanerpes erythrocephalus	Red-headed Woodpecker	Common summer resident.
ORDER PASSERIFORMES: PERCHING BIRDS		
FAMILY TYRANNIDAE: FLYCATCHERS		
Tyrannus tyrannus	Eastern Kingbird	Common summer resident.
Tyrannus verticalis	Western Kingbird	Common summer resident.
Sayornis saya	Say's Phoebe	Common summer resident.
Empidonax traillii	Willow Flycatcher	Common summer resident.
Empidonax oberholseri	Dusky Flycatcher	Summer resident.
Empidonax difficilis	Western Flycatcher	Occasional summer resident in deciduous or coniferous forests. No suitable habitat on the site.
Contopus sordidulus	Western Wood Pewee	Common summer resident in forests. No suitable habitat on the site.
Nuttallornis borealis	Olive-sided Flycatcher	Occasional summer resident in forested areas. No suitable habitat on the site.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY ALAUDIDAE: LARKS		
Eremophila alpestris	Horned Lark	Common resident of open areas.
FAMILY HIRUNDINIDAE: SWALLOWS		
Tachycineta thalassina	Violet-green Swallow	Common summer resident.
Iridoprocne bicolor	Tree Swallow	Occasional summer resident. Preferring tree nests. No suitable habitat on site.
Riparia riparia	Bank Swallow	Common summer resident.
Stelgidopteryx ruficollis	Rough-winged Swallow	Common summer resident.
Hirundo rustica	Barn Swallow	Common summer resident near farm buildings.
Petrochelidon pyrrhonota	Cliff Swallow	Common summer resident. No suitable habitat on site.
Progne subis	Purple Martin	Occasional summer resident.
FAMILY CORVIDAE: JAYS, MAGPIES AND CROWS		
Pica pica	Black-billed Magpie	Common resident.
Corvus corax	Common Raven	Common resident.
Gymnorhinus cyanocephalus	Pinyon Jay	Occasional resident preferring Pinyon-juniper wood lands. No suitable habitat on site.
FAMILY PARIDAE: CHICKADEES		
Parus atricapillus	Black-capped Chickadee	Common resident of forested areas. No suitable habitat on site.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY SITTIDAE: NUTHATCHES		
Sitta carolinensis	White-breasted Nuthatch	Occasional resident, frequenting forested areas.
Sitta canadensis	Red-breasted Nuthatch	Common migrant and occasional resident in coniferous areas.
Sitta pygmaea	Pygmy Nuthatch	Occasional resident preferring yellow pine (Pinus Pondorosa) areas.
FAMILY TROGLODYTES: WRENS		
Troglodytes aedon	House Wren	Common summer resident.
Salpinctes obsoletus	Rock Wren	Common summer resident.
FAMILY MIMIDAE: MOCKINGBIRDS AND THRASHERS		
Mimus polyglottos	Mockingbird	May occasionally occur in region.
Dumatella carolinensis	Catbird	Common summer resident, preferring dense brush cover.
Toxostoma rufum	Brown Thrasher	Occasional summer resident.
Oreoscoptes montanus	Sage Thrasher	Common summer resident of sagebrush areas.
FAMILY TURIDAE: THRUSHES, SOLITAIRES AND BLUEBIRDS		
Turdus migratorius	American Robin	Common resident.
Catharus guttatus	Hermit Thrush	Common migrant and occasional summer resident. Prefers woodlands.
Catharus ustulatus	Swainson's Thrush	Common summer resident of evergreen areas. No suitable habitat on site.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY TURIDAE Continued		
Catharus fuscescens	Veery	Common summer resident preferring deciduous forest areas. No suitable habitat on site.
Sialia sialis	Eastern Bluebird	Occasional summer resident.
Sialia mexicana	Western Bluebird	May occasionally occur in region.
Silia currucoides	Mountain Bluebird	Common summer resident.
Myadestes townsendii	Townsend's Solitaire	Common migrant and occasional summer resident in coniferous forest areas. No suitable habitat on site.
FAMILY MOTACILLIDAE: PIPITS AND WAGTAILS		
Anthus spragueii	Sprague's Pipit	Occasional migrant occurring in dense cover.
FAMILY BOMBYCILLIDAE: WAXWINGS		
Bombycilla garrulus	Bohemian Waxwing	Winter resident.
Bombycilla cedrorum	Cedar Waxwing	Occasional summer resident.
FAMILY LANIIDAE: SHRIKES		
Lanius excubitor	Northern Shrike	Occasional winter resident.
Lanius ludovicianus	Loggerhead Shrike	Common summer resident.
FAMILY STURNIDAE: STARLINGS		
Sturnus vulgaris	Starling	Common resident.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY VIREONIDAE: VIREOS		
Vireo solitarius	Solitary Vireo	Occasional summer resident in mixed hardwood-coniferous forests.
Vireo olivaceus	Red-eyed Vireo	Occasional migrant preferring deciduous forest. No suitable habitat on site.
Vireo gilvus	Warbling Vireo	Common summer resident along streams and in wooded areas.
FAMILY PLOCEIDAE: WEAVER FINCHES		
Passer domesticus	House Sparrow	Common resident near human habitations.
FAMILY ICTERIDAE: BLACKBIRDS AND ORIOLES		
Dolichonyx oryzivorus	Bobolink	Common summer resident.
Sturnella neglecta	Western Meadowlark	Common summer resident.
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	Common summer resident of marshes. No suitable habitat on site.
Agelaius phoeniceus	Red-winged Blackbird	Common summer resident.
Icterus galbula	Northern Oriole	Common summer resident.
Euphagus cyanocephalus	Brewer's Blackbird	Common summer resident.
Quiscalus quiscula	Common Grackle	Occasional summer resident.
Molothrus ater	Brown-headed Cowbird	Common summer resident.
FAMILY THRAUPIDAE: TANAGERS		
Piranga ludoviciana	Western Tanager	Common summer resident of woodlands, no suitable habitat on site.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY FRINGILLIDAE: GROSBEAKS, FINCHES, SPARROWS AND BUNTINGS		
Pheucticus melanocephalus	Black-headed Grosbeak	Common summer resident. Occurs in wooded area. No suitable habitat on site.
Passerina amoena	Lazuli Bunting	Occasional summer resident. Found in scrub growth. No suitable habitat on site.
Hesperiphona vespertina	Evening Grosbeak	Common resident of coniferous forests. No suitable habitat on site.
Carpodacus purpureus	Purple Finch	Winter resident preferring wooded areas. No suitable habitat on site.
Carpodacus mexicanus	House Finch	Common resident.
Leucosticte tephrocotis	Gray-crowned Rosy Finch	Occasional winter resident.
FAMILY THRAUPIDAE: TANAGERS		
Leucosticte atrata	Black Rosy Finch	Occasional resident.
Acanthis flammea	Common Redpoll	Occasional winter resident.
Spinus pinus	Pine Siskin	Occasional winter resident. Occurring in coniferous areas. No suitable habitat on site.
Spinus tristis	American Goldfinch	Common summer resident.
Loxia curvirostra	Red Crossbill	Occasional resident. Preferring pine-wooded areas. No suitable habitat on site.
Chlorura chlorura	Green-tailed Towhee	Occasional summer resident.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY THRAUPIDAE Continued		
Pipilo erythrophthalmus	Rufous-sided Towhee	Common summer resident.
Calamospiza melanocorys	Lark Bunting	Common summer resident.
Passerculus sandwichensis	Savannah Sparrow	Common summer resident.
Ammodramus savannarum	Grasshopper Sparrow	Common summer resident.
Ammodramus bairdii	Baird's Sparrow	Occasional migrant.
Pooecetes gramineus	Vesper Sparrow	Common summer resident.
Chondestes grammacus	Lark Sparrow	Common summer resident.
Amphispiza belli	Sage Sparrow	Common summer resident.
Junco hyemalis	Dark-eyed Junco	Common winter resident in coniferous forest. No suitable habitat on site.
Junco caniceps	Gray-headed Junco	Occasional summer resident in coniferous forest. No suitable habitat on site.
Spizella arborea	Tree Sparrow	Common winter resident. Occuring in thickets, weedy fields and hedges.
Spizella passerina	Chipping Sparrow	Common summer resident.
Spizella pallida	Clay-colored Sparrow	Occasional migrant and possing summer resident.
Spizella breweri	Brewer's Sparrow	Common summer resident.
Zonotrichia leucophrys	White-crowned Sparrow	Occasional summer resident.
Passerella iliaca	Fox Sparrow	Common migrant and occasional summer resident.
Melospiza melodia	Song Sparrow	Common resident.

SCIENTIFIC NAME	COMMON NAME	COMMENTS
FAMILY THRAUPIDAE Continued		
Calcarius maccownii	McCown's Longspur	Common summer resident.
Calcarius lapponicus	Lapland Longspur	Common summer resident.
Calcarius ornatus	Chestnut-collared Longspur	Common summer resident.

TABLE D-9.2

MAMMALIAN FAUNA POTENTIALLY OCCURRING
IN THE REGION OF THE LEUENBERGER INSITU MINE
CONVERSE COUNTY, WYOMING

SCIENTIFIC NAME	COMMON NAME
ORDER INSECTIVORA: INSECTIVORES	
FAMILY SORICIDAE: SHREWS	
Sorex cinereus cinereus	Masked Shrew
Sorex vagrans obscurus	Vagrant Shrew
Sorex merriami leucogenys	Merriam's Shrew
ORDER CHIROPTERA: BATS	
FAMILY BESPERTILIONIDAE: PLAINNOSE BATS	
Myotis lucifugus carissima	Little Brown Myotis
Myotis subulatus subulatus	Small-footed Myotis
Myotis volans interior	Long-legged Myotis
Lasiurus cinereus cinereus	Hoary Bat
Plecotus townsendii pallescens	Townsend's Big-eared Bat
Eptesicus fuscus pallidus	Big Brown Bat
ORDER LAGOMORPHA: PIKAS, RABBITS, AND HARES	
FAMILY LEPORIDAE: RABBITS AND HARES	
Sylvilagus auduboni baileyi	Desert Cottontail
Sylvilagus nuttalli grangeri	Nuttall's Cottontail
Lepus townsendi campanius	White-tailed Jackrabbit
Lepus californicus melanotis	Black-tailed Jackrabbit

SCIENTIFIC NAME	COMMON NAME
ORDER RODENTIA: RODENTS	
FAMILY SCIURIDAE: SQUIRRELS	
Entamias minimus pallidus	Least Chipmunk
Spermophilus tridecemlineatus pallidus	Thirteen-lined Ground Squirrel
Cynomys ludovicianus ludovicianus	Black-tailed Prairie Dog
FAMILY GEOMYIDAE: POCKET GOPHERS	
Thomomys talpoides attenuatus	Northern Pocket Gopher
FAMILY HETEROMYIDAE: POCKET MICE AND KANGAROO RATS	
Perognathus fasciatus olivaceogriseus	Olive-backed Pocket Mouse
Perognathus hispidus paradoxus	Hispid Pocket Mouse
Dipodomys ordii luteolus	Ord's Kangaroo Rat
FAMILY CRICETIDAE: NEW WORLD MICE, RATS, AND VOLES	
Reithrodontomys montanus albescens	Plains Harvest Mouse
Reithrodontomys megalotis dychei	Western Harvest Mouse
Peromyscus maniculatus nebrascensis	Deer Mouse
Onychomys leucogaster arcticeps	Northern Grasshopper Mouse
Microtus pennsylvanicus insperatus	Meadow Vole
Microtus longicaudus longicaudus	Long-tailed Vole
Microtus ochrogaster haydeni	Prairie Vole
Lagurus curtatus levidensis	Sagebrush Vole
Ondatra zibethicus cinnamominus	Muskrat
FAMILY MURIDAE: OLD WORLD RATS AND MICE	
Rattus norvegicus norvegicus	Norway Rat
Mus musculus domesticus	House Mouse

SCIENTIFIC NAME	COMMON NAME
ORDER CARNIVORA: CARNIVORES	
FAMILY CANIDAE: COYOTES, FOXES	
Canis latrans latrans	Coyote
Vulpes vulpes regalis	Red Fox
FAMILY PROCYONIDAE: RACCOONS	
Procyon lotor hirtus	Raccoon
FAMILY MUSTELIDAE: MUSTELIDS	
Mustela erminea muricus	Ermine
Mustela frenata nevadensis	Long-tailed Weasel
Taxidea taxus taxus	Badger
Mephitis mephitis hudsonica	Striped Skunk
Spilogale putorius interrupta	Spotted Skunk
FAMILY FELIDAE: CATS	
Lynx rufus pallescens	Bobcat
ORDER ARTIODACTYLA: EVEN-TOED HOOFED MAMMALS	
FAMILY CERVIDAE: DEER, ELK	
Odocoileus hemionus hemionus	Mule Deer
FAMILY ANTILOCAPRIDAE: PRONGHORN	
Antilocapra americana americana	Pronghorn

TABLE D-9.3

AVIAN SPECIES
Observed on or in the Vicinity of the Permit Area

Commn Name	Scientific Name	Month (s) Observed
Red-wing Blackbird	Agelaius phoeniceus	4,5
Green-winged Teal	Anas carolinensis	10
Blue-winged Teal	Anas discors	10
Mallard	Anas platyrhynchos	4,9,10
Canada Goose	Branta canadensis	4
Goldeneye	Bucephala clangula	4
Red-tailed Hawk	Buteo janiaicensis	5,6
Rough-legged Hawk	Buteo lagopus	4
Golden E le	Auqila chrysaetos	4
Sparrow Hawk	Falco sparverius	4,5
Sage Grouse	Centrocercus urophasianus	6, 7
Killdeer	Charadrius vociferus	4,5
Mourning Dove	Zenaidura macroura	4,5
Great Horned Owl	Bubo virginanus	4,5,6,7,8,9,10
Common Nighthawk	Chordeiles minor	4,5,6,7,8
Horned Lark	Eremophila alpestris	4,5,6
Cliff Swallow	Pertrochelidon pyrrhonota	5
Western Bluebird	Sialica mexicana	4,5,8,9

TABLE-9.3 Continued

Common Name	Scientific Name	Month (s) Observed
Loggerhead Shrike	*Lanius ludovicianus*	4,5
Western Meadowlark	*Sturnella neglecta*	4,5,6,7,8,9
Lark Bunting	*Calamospiza melanocorys*	4,5,6
Black-billed Magpie	*Pica pica*	5,6,9,10
Vesper Sparrow	*Pooecetes gramineus*	4,5,6,7,8,9,10
Sage Sparrow	*Amphispiza belli*	4,5,6,7,8,9,10
Chipping Sparrow	*Spizella passerina*	4,5
Brewer's Sparrow	*Spizella breweri*	4,5

Includes all species observed within a two mile radius of the permit area.

TABLE D-9.4

Mammalian Species
Observed on or in the Vicinity of the Permit Area

Common Name	Scientific Name	Month (s) Observed
Pronghorn	Antilocapra americana	4,5,6,7,8,9,10
Mule Deer	Odocoilcus hemionus	4,5,9,10
Coyote	Canis latrans	3,4,8,9
White-tailed Jack-rabbit	Lepus townsendi	5,6,8,9,10
Striped Skunk	Mephitis mephitis mephitis	5,6
Muskrat	Ondatrazibethicus cinnamominus	2,3
Desert Cottontail	Sylvilagus auduboni	5,6,8,9,10
Thirteen-lined Ground Squirrel	Spermophilus tridecemlineatus	5,8
Badger	Taxidea taxus taxus	3
Deer Mice	Peromyscus maniculatus	6,7,8
Raccoon	Procyon lotor	7

Includes all species observed within a two mile radius of the permit area.

TABLE D-9.5

Bird Transect Counts

Bird Species	Habitat	Transect 1	2	3	4	5	6	Percent in Grassland	Percent in Sagebrush	Sample Size	Density[a] n/100 acres
Lark Bunting	Grassland	12	2	3	14	4	11	51		91	104.4
	Sagebrush	8	6	6	4	13	8		49		
Horned Lark	Grassland	-	-	2	-	1	-	33		9	10.3
	Sagebrush	-	2	2	1	1	-		67		
Meadow Lark	Grassland	3	2	2	8	9	11	69		51	58.5
	Sagebrush	1	4	2	2	4	3		31		
Vesper Sparrow	Grassland	-	-	1	2	3	4	59		17	19.5
	Sagebrush	1	2	-	1	1	2		41		
Brewer's Sparrow	Grassland	1	-	-	3	4	3	58		19	21.8
	Sagebrush	2	1	2	1	1	1		42		
Kill Deer	Grassland	-	2	3	-	5	2	100		12	13.8
	Sagebrush	-	-	-	-	-	-		0		
Cliff Swallow	Grassland	-	-	-	-	1	-	100		1	<1
	Sagebrush	-	-	-	-	-	-		0		
Sage Sparrow	Grassland	-	-	-	4	1	2	50		14	16.1
	Sagebrush	-	-	-	1	2	4		50		

[a]Density calculated as the average density for each bird species recorded in the transects. Bird densities are expressed as the number of birds per 100 acres.

TABLE D-9.5

Bird Species	Habitat	Transect 1	2	3	4	5	6	Percent in Grassland	Percent in Sagebrush	Sample Size	Density[a] n/100 acres
Chipping Sparrow	Grassland	-	-	-	1	2	4	33		17	19.5
	Sagebrush	-	-	-	2	4	4		67		
Mallard Duck	Grassland	-	-	4	2	-	-	100		6	6.9
	Sagebrush	-	-	-	-	-	-		0		
Marsh Hawk	Grassland	-	-	-	-	2	-	100		2	<1
	Sagebrush	-	-	-	-	-	-		0		
Redtailed Hawk	Grassland	-	-	-	2	-	-	100		2	<1
	Sagebrush	-	-	-	-	-	-		0		
Magpie	Grassland	-	-	-	2	2	-	100		4	4.6
	Sagebrush	-	-	-	-	-	-		0		
Loggerhead Shriek	Grassland	-	-	-	-	2	-	100		2	<1
	Sagebrush	-	-	-	-	-	-		0		
Redwing Blackbird	Grassland	-	-	1	2	2	6	100		11	12.6
	Sagebrush	-	-	-	-	-	-		0		
Brewer's Sparrow	Grassland	-	-	1	1	2	-	100		4	4.6
	Sagebrush	-	-	-	-	-	-		0		
Great Horned Owl	Grassland	-	-	-	-	2	-	100		2	<1
	Sagebrush	-	-	-	-	-	-		0		

$\bar{x}_1 = 79.6$

$\bar{x}_2 = 20.4$

[a]Density calculated as the average density for each bird species recorded in the transects. Bird densities are expressed as the number of birds per 100 acres.

TABLE D-9.6

Lagomorph Surveys

Transect	Date	White-tailed Jackrabbit	Desert Cottontail	Distance Traveled
1) Section 14	7/24/79	2	3	1.0 miles
2) Central Section 13 to Southern boundaries	8/1/79	2	8	2.0 miles
3) Section 13 southern boundary	9/28/79	6	3	.25 miles
4) Section 14 southern boundary	10/19/79	3	3	.25 miles

TABLE D-9.7

Small Mammal Trapping Record

	Sampling Sites 1	2	3	4	
	Date/Trap Nights				
	6/4/79	6/5/79	7/24/79	8/1/79	Total
	50	50	50	50	200
Deer Mice		1	1		2
Thirteen-lined Ground Squirrel	1	—	1	1	3
	1	1	2	1	5

TABLE D-9.8

PRONGHORN ANTELOPE CENSUS
WITHIN THE PERMIT AREA

	DATE	RATIO MALE:FEMALE:JUVENILE	TOTAL NUMBER OBSERVED
1.	April 12, 1979	2: 8: 4	14
2.	May 4, 1979	2: 7: ?	27
3.	May 22, 1979	2: 8: 2	12
4.	June 4, 1979	0:10: 7	17
5.	June 5, 1979	3: 5: 0	8
6.	July 24, 1979	15?	15
7.	July 26, 1979	17?	17
8.	August 1, 1980	1: 3: 2	6
9.	September 27, 1979	12?	12
10.	September 28, 1979	0:15:0?	15
11.	October 24, 1979	0:17:0?	17
12.	December 14, 1979	3: 6: 3	12
13.	January 3, 1980	3: 8: 2	13
14.	January 22, 1980	2: 7: 8	17

? = Sex undistinguishable

APPENDIX D-10

Radiological Assessment

APPENDIX D-10.1

BASELINE RADIOLOGICAL SURVEY

Total gamma ray radioactivity was measured in the vicinity of the Test Site and well field area to establish local baseline values prior to initial R&D operation. Measurements were made with an Exploranium (Division of Geometrics) Portable Gamma Ray Scintillometer Model GR-101A. The background for this area is 50 C.P.S. Geometrics reports (McDermott, 1977) that a reading of twice background can be considered of anomalous value, no anomalous areas were found. The highest reading recorded at the Site was 75 C.P.S. which is 1.5 times background. Measurements were taken on the surface overlying both the "N" sand and "M" sand mineralization trends and in areas where the process plant, solar evaporation ponds and well fields were to be located.

Background Gamma Ray Survey

A second gamma radiation survey was performed for Teton on July 28, 1980, by Aero Vironment Inc. of Pasadena, California, using portable scintillation monitors and a pressurized ionization chamber (PIC).

The PIC, a Reuter-Stokes RSS-111, has been shown to have an essentially flat gamma ray response over the range of 60 Kev to 8 Mev. This instrument is ideally suited for this type of radiological monitoring.

A copy of the Calibration Certificate for the PIC is presented in Figure D-10.1. During the survey, the portable monitors were carried back and forth across transects and calibrated against the PIC on every other transect.

The output of the analog rate meters were continuously monitored and the readings were recorded based on a 500-foot-square grid pattern. The readings of the rate meters were converted to μR/hr.

All data obtained was in the normal background range of 13 to 19 μR/hr. The mean gamma reading for Section 14 was 15.1 μR/hr, while with a standard deviation of 1.0 μR/hr, while the mean and standard deviation for Section 13 were 16.4 μR/hr. and 1.3 μR/hr, respectively.

Figure D-10.2 shows the area surveyed in Section 14, T-34N, R-74W. Figure D-10.3 shows the area surveyed in the middle portion of Section 13, T-34N, R-74W, these two figures give the location of specific radiation measurements and show the respective grids.

It is worth noting that the second gamma survey was consistant with the initial survey and no anomalous areas were found in any of the areas disturbed by the research and development activities including the present ponds, area around the plant facility, well fields and outside storage areas.

Baseline Soils Radiation

Soil samples were collected at eight randonly selected locations indicated on Figure D-10.2. These locations were selected by numbering on all of the grid squares in both Section 13 and 14 and pulling numbers from a computer random generation program. Sampling was done with a hand auger at three subsequent depths: 0-5 cm, 5-50 cm, and 50-100 cm. Soils brought up by the auger for all eight sample locations were placed in tubs according to the depth interval and composited for analysis. At one sample location (grid square number 27), the bedrock material could not be penetrated with the hand auger and the deepest layer was not sampled. The results of the composite analysis are presented in Table D-10.1.

Baseline Soils Sediment Radiation

Grab samples were taken from the buttom of the three stock ponds within the permit area. These samples were composited from at least three different locations in the bottom of the ponds. The results of the analysis are presented in Table D-10.2, locations of the ponds are shown on Figure D-10.4. Pond location number 3 was dry at the time the sample was taken.

reuter-stokes instruments, inc.

18530 South Miles Parkway, Cleveland, Ohio 44128 • Telephone (216) 475-3434, Telex 98-5253

CALIBRATION CERTIFICATION

We certify that the Area Monitor, Model Number RSS-111, listed below has been calibrated for output using calibrated radiation sources traceable to National Bureau of Standards.

SERIAL NUMBER 2-3587

DATE OF CALIBRATION 8/30/79

REUTER-STOKES
INSTRUMENTS, INC.

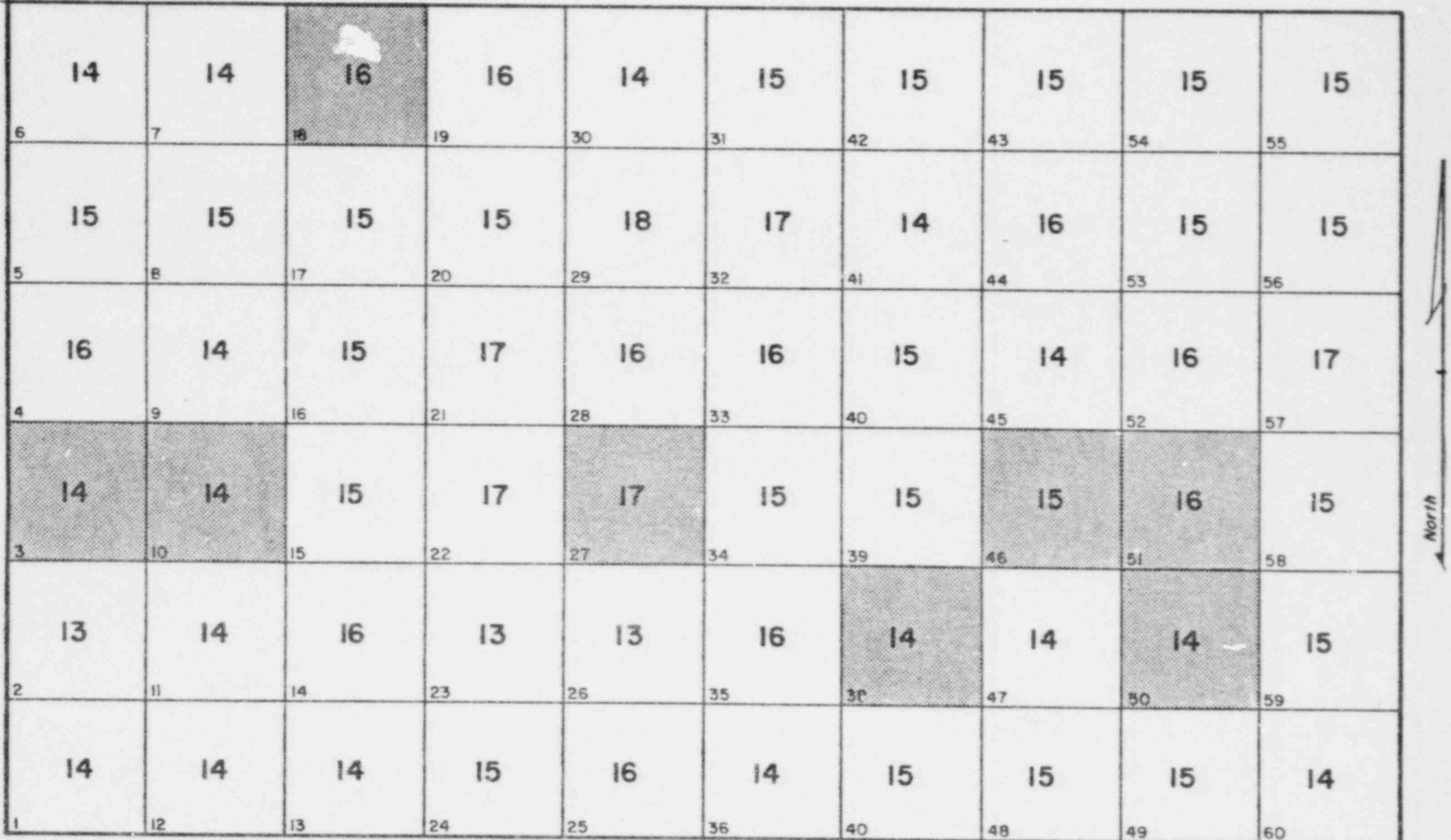
[signature]

DATE 8/31/79

Figure D-10.1

NW Corner, Section 14, T.54N., R.74W.

0 INITIAL GRID POINT



D-10.5

250 0 500 1000 Feet

UNC TETON EXPLORATION DRILLING, INC.

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KEY

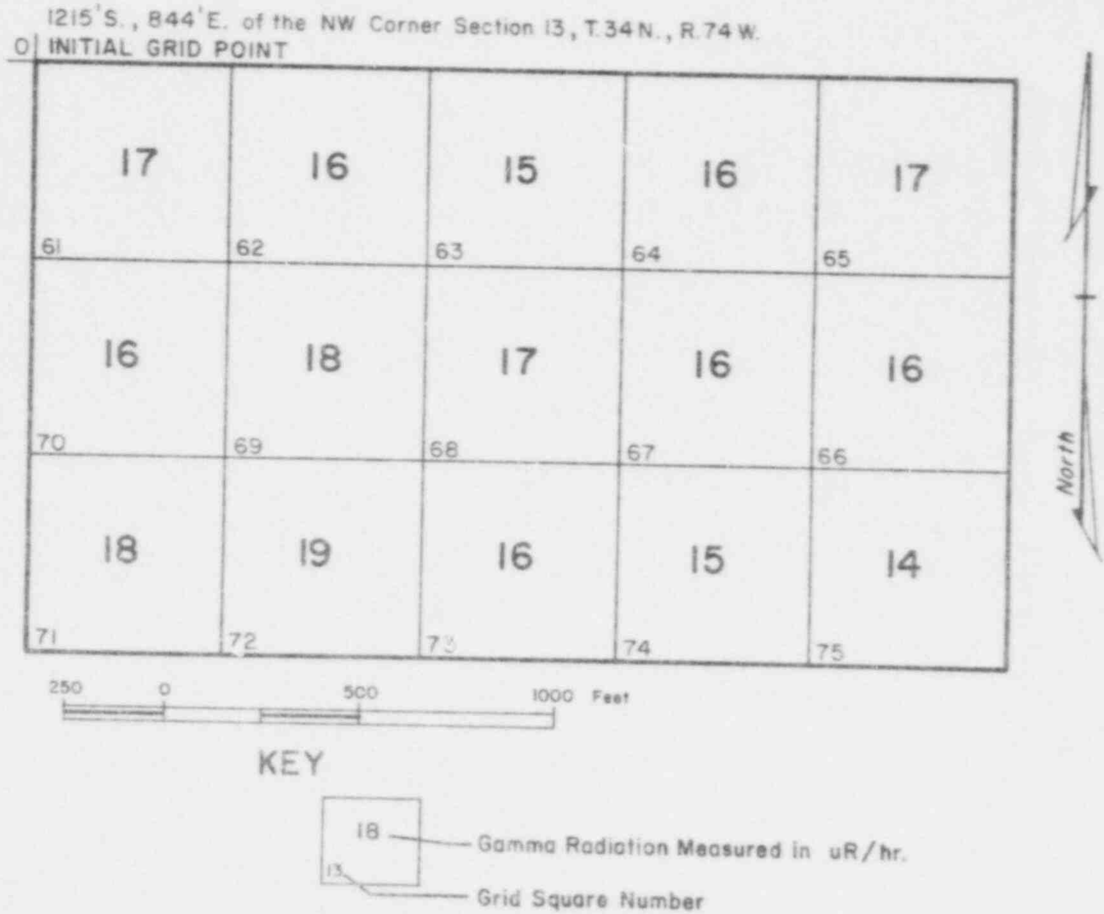
Indicates Soil Sample Location

Gamma Radiation Measured in uR/hr.

Grid Square Number

Figure D-10.2

GAMMA SURVEY GRID PROCESSING PLANT, WELL FIELD AND POND AR[...]



UNC TETON EXPLORATION DRILLING, INC.

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A UNC RESOURCES Company

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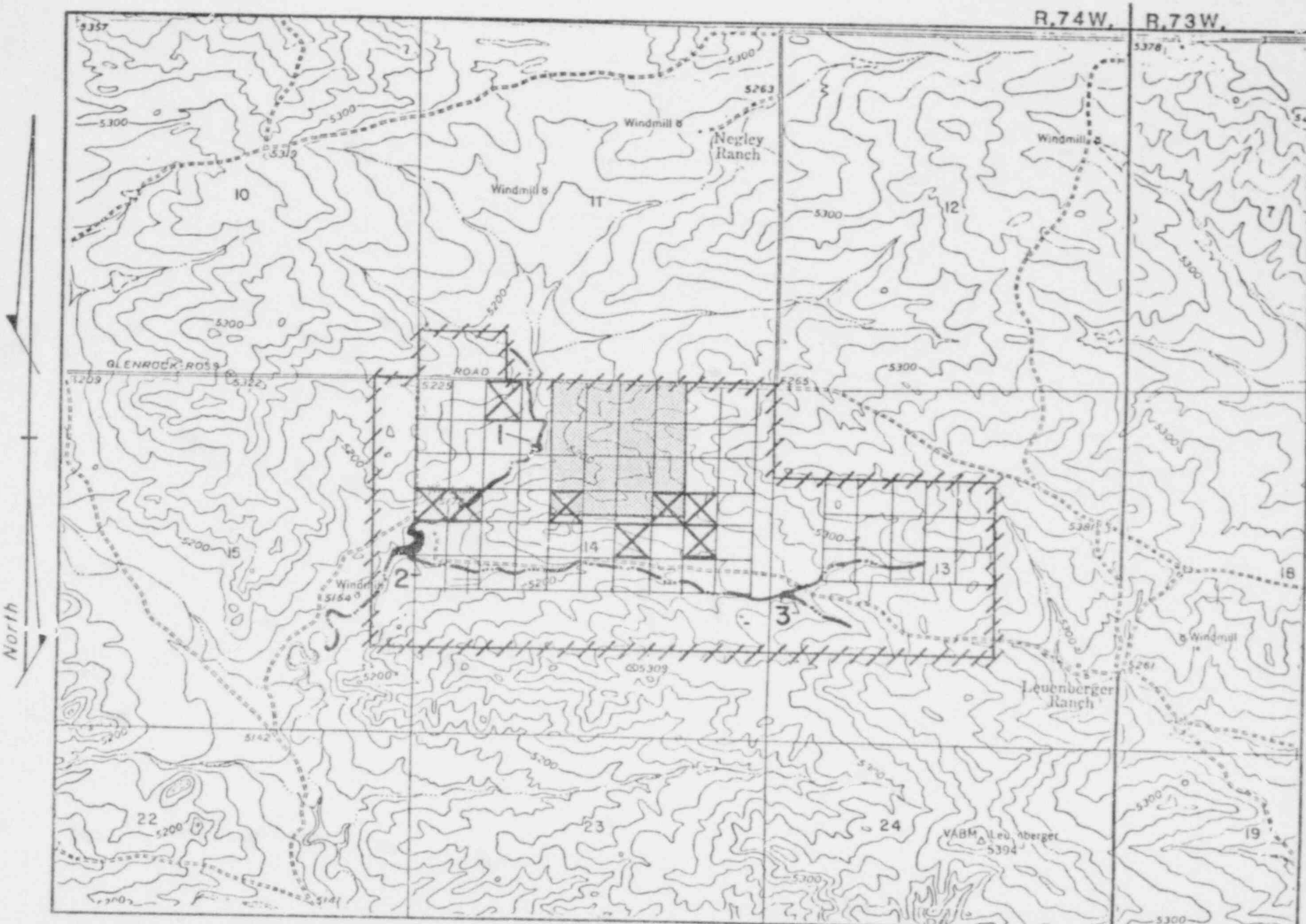
Figure D-10.3

GAMMA SURVEY GRID POND AREA
MIDDLE PORTION SECTION 13, T.34N., R76W.



1/2 0 1/2 Mile

Figure D-10.4

SOIL AND SEDIMENT SAMPLE LOCATION

KEY

- TETON-NEDCO R&D LICENSE AREA
- PERMIT AREA
- STREAM CHANNEL
- 2 SEDIMENT SAMPLE SITE
- ☒ SOIL SAMPLE LOCATION

UNC TETON EXPLORATION DRILLING
A UNC RESOURCES Company
3030 Energy Lane
Casper, Wyoming 82601

POOR ORIGINAL

TABLE D-10.1

COMPOSITE SOIL SAMPLES

Location	Surface Soil	Surface Soil	Surface Soil
Depth	0-5 cm	5-50 cm	50-100 cm
Determination (pCi/g)			
Uranium (as U_3O_8) (%)	0.0002	0.0003	0.0002
Radium-226 ± Counting Error*	0.6 ± 1.5	0.4 ± 1.3	0.3 ± 1.3
Thorium-230 ± Counting Error*	2.5 ± 0.6	3.4 ± 0.7	1.6 ± 0.5
Lead-210 ± Counting Error*	1.2 ± 0.5	1.3 ± 0.5	0.8 ± 0.5

* Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.

TABLE D-10.2

POND SEDIMENT SAMPLES

Location Depth	North Pond #2 Composite	Pond #2 Composite	Pond #3 Composite
Determination (pCi/g)			
Uranium (as U_3O_8) (%)	0.0004	0.0009	0.0001
Radium-226 ± Counting Error*	1.4 ± 1.7	0.5 ± 1.2	1.7 ± 1.5
Thorium-230 ± Counting Error*	2.2 ± 0.5	3.2 ± 0.6	3.4 ± 0.7
Lead-210 ± Counting Error*	2.4 ± 0.6	2.1 ± 0.5	5.3 ± 0.7

* Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.

BASELINE RADIATION IN AIR

A high volume air sampler was placed downwind from the proposed process plant in the SE 1/2, Section 11, T-34N, R-74W (Figure 5-3). The sampler is equipped with a timer which triggers the sampler once every six days and an air particulate sample is collected over a twenty-four hour period.

The baseline sampling period for the Leuenberger Site extended from January 1 to March 31, 1980, and consisted of ten separate twenty-four hour sampling times throughout the three month interval. Each of these samples were collected, weighed and then composited. The composite sample was analyzed for Ra-226, Th-230, Pb-210 and natural Uranium. The concentrations are expressed in mass of radionuclide per unit volume of air sampled. The results of the analyses of the sample composite are reported in Table D-10.3, and represent the premining radionuclide baseline concentrations in air downwind from the proposed process plant (see Figures 2-3 and 5-3).

REFERENCE

McDermett, M. M., 1977, Geometrics Technical Report #12: Geometrics, 395 Java Drive, Sunnybrook, CA.

TABLE D-10.3

Baseline Radionuclide Analysis for Airborne Particulates

Ra-226 pCi/l	Th-230 pCi/l	Pb-210 pCi/l	U natural pCi/l
$2.59 +0.82 \times 10^{-7}$	$1.61 \pm 0.23 \times 10^{-6}$	$3.22 \pm 0.25 \times 10^{-5}$	1.45×10^{-6}

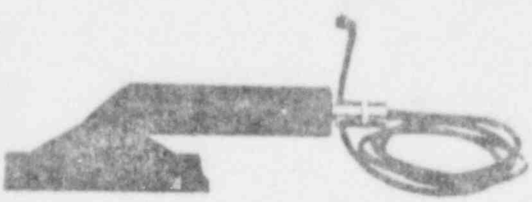
Filters Analyzed	Volume of Air Sampled
T^{15}	1229.7 m^3
T^{17}	1177.3 m^3
T^{18}	1193.1 m^3
T^{19}	1197.5 m^3
T^{20}	1135.7 m^3
T^{21}	1103.3 m^3
T^{22}	1222.5 m^3
T^{23}	1218.9 m^3
T^{25}	1200.2 m^3
T^{27}	1182.3 m^3
TOTAL	11,860.5 m^3

Manufactures Sepcifications for
Radiation Detection Equipment

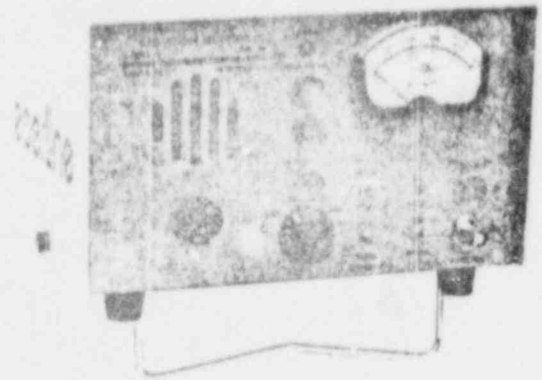
Alpha and Beta

Contamination Measurements

POOR ORIGINAL



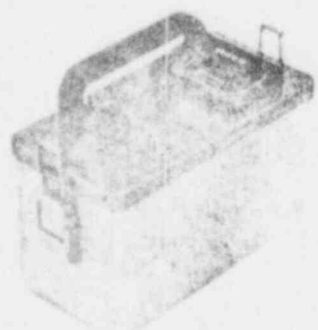
AC-3-8



RM-19

HP-210M

RASCAL



PS-2

The AC-3-8 Alpha Probe and the HP-210M Beta Probe may be used with any of the instrument shown above to measure alpha and beta contaminaion. The RM-19 may be used as a fixed station monitor, such as at the exit from yellowcake handling areas. The RASCAL is recommended for portable, battery operation. It may be used with either of the probes listed above to survey areas for total alpha or beta contamination and to assay wipe samples for removable contamination. The PS-2 also may be used for portable applications.

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RM-19 SPECIFICATIONS

Meter: Scale length 2.37 inches (6 cm) marked 0-500 counts per minute (cpm) with 25 increments. BATTery OK segment. High voltage scale length, 2.37 inches, marked 0-2500 V in 100 V increments.

Range: Switch controlled X1, X10, X100 or X1k, yielding 500, 5k, 50k or 500k cpm full scale.

Response Time: Fast, approximately 2 seconds; slow, approximately 20 seconds, measured to 90% of final reading.

Linearity: Within ±5% of full scale, typically within ±2% of full scale.

Calibration: Four card-mounted controls for independent adjustment of each range.

Alarm: Front panel adjustable from 0 to greater than full scale, displayed on meter when the PUSH-TO-SET alarm switch is actuated. Red light on front panel and approximately 1k Hz tone on speaker independent of volume control.

Speaker: 2 inch size. One click for each event counted. Volume can be adjusted from maximum loudness to zero.

High Voltage: Adjustable from less than 500 V to +2500 V ±10% by rear panel HV ADJUST. Less than 40 V change between battery limits.

Input Sensitivity: Adjustable by internal control from approximately 2×10^{-14} C to 3×10^{-13} C (approximately 1-15 mV equivalent on voltage sensitive input).

Detector: MHV series coaxial connector.

Power: 105-125 V, 50-60 Hz at approximately 0.1 A. Gel Cel® battery is float charged when plugged into AC line. Lifetime without recharge approximately 50 hours. Charging time approximately 50 hours. Lifetime approximately 8 hours with alarms on. Calibration shifts less than ±10% with battery between limits on meter.

Temperature: Operational from -20°F to +140°F (-29°C to 60°C) with less than ±10% of full scale change in calibration, or ±10% of full scale change in alarm point. The typical change over this range for the high voltage is less than ±5%.

Finish: Baked enamel paint, brown panels, tan cover, black nomenclature.

Size: 6.0 inches high x 9 inches deep x 9-3/8 inches wide (15.2 x 22.9 x 23.8 cm).

Weight: 6 pounds 2 ounces (2.8 kg).

RASCAL SPECIFICATIONS

The RASCAL is described in more detail on page 29 of this brochure.

PS-2 SPECIFICATIONS

The PS-2 is described in more detail on page 17 of this brochure.

DETECTOR SPECIFICATIONS

The AC-3-8 and HP-210M probes are described in the section "Test Instruments and Probe Assemblies" at the back of this brochure.

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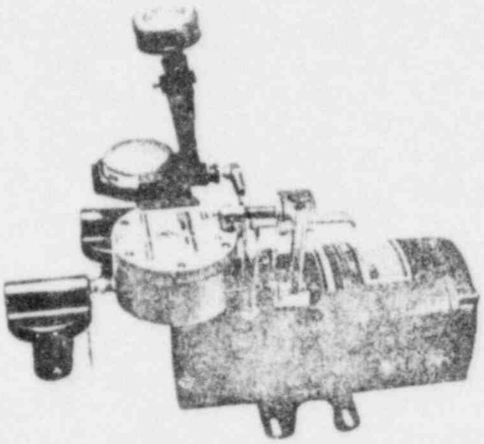
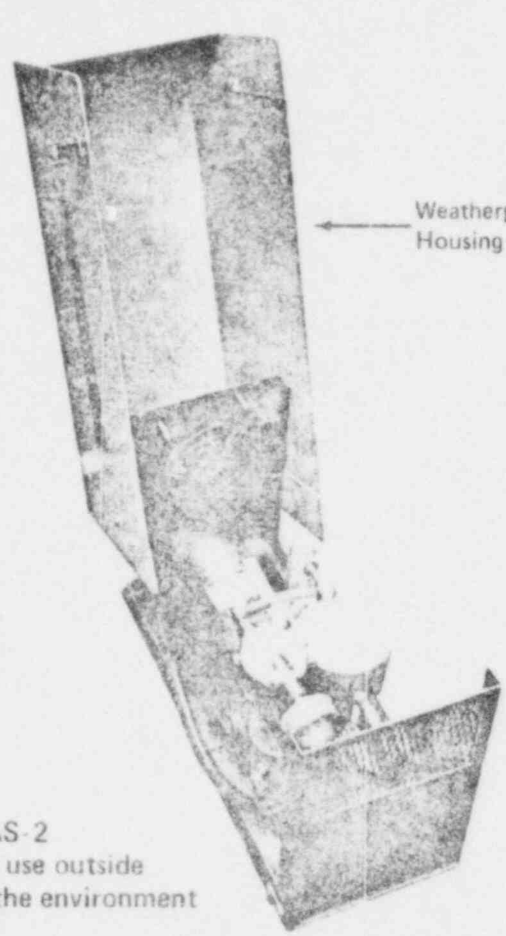
POOR ORIGINAL

Regulated Air Samplers



RAS-1
for indoor use



RAS-2
for use outside
in the environment

Air sampling for radioactive particulate material is extremely important in dry ore or product handling areas. Exhaust stacks from these areas also require periodic monitoring for airborne radioactive particles. Filter samples collected with RAS-1 or RAS-2 may be analyzed for gross alpha (α) using a SAC-4 α counter. They are then composited for subsequent fluorometric determination of uranium and radiochemical determination of ^{230}Th, ^{226}Ra and ^{210}Pb. The most limiting radionuclide in ore dust is ^{230}Th. The most limiting radionuclide in yellowcake (U_3O_8) areas is usually natural uranium or ^{230}Th.

The RAS-2 is used to monitor at the plant perimeter for airborne radioactive particles. In this case, a weatherproof housing (Eberline WPH-1) is provided. For this type of environmental monitoring, the pump is allowed to run continuously with the filter changed weekly.

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REGULATED AIR SAMPLERS (continued)

The RAS-1 or RAS-2 consists of an oil-less vacuum pump with a regulator for use where a nearly constant air flow is desirable. The regulator holds a constant pressure drop across an in-line orifice by varying a bypass valve into the pump, allowing the pump to work at a minimum head drop at all times so it runs cooler, and extending its lifetime. The sample holder uses standard 47 mm filters. Each unit is supplied with 1 box of 100 glass fiber filters 47 mm in diameter.

The relatively small size and light weight of the RAS-1 make it easily portable. The oil-less pump requires no lubrication at all. Vanes are carbon-graphite, self-sealing and self-adjusting to maintain "like-new" efficiency during long life. The RAS-2 is designed for permanent installation in an outdoor location.

It should be noted that when pressure varies, the flow through an orifice with a constant pressure drop varies approximately as the square root of the ratio of the absolute pressure. Thus, if paper loading causes a pressure drop to one-half of the original, the flow referred to atmosphere will decrease to 0.7 of the original. The orifice is adjustable, allowing flow rate adjustment from near zero up to the pump maximum capacity. Best regulation is maintained below 2 cubic feet per minute (cfm).

SPECIFICATIONS

Pump Type: Oil-less, carbon vane.

Maximum Capacity: 4 cfm at 0 pressure drop.

Ultimate Vacuum: 26 inches Hg at sea level.

Typical Operating Capacity: Between 1/2 and 2 cfm.

Sample Size: 47 mm.

Flowmeter: 0-100 liters per minute (0 to 3-1/2 cfm).

Filter: Outlet and bypass filter/muffler furnished.

Power: 115 V, 60 Hz at 5 A.

Thermal Protector: Furnished in motor.

Size: 17-1/2 inches long x 7 inches wide x 10 inches high (44.5 x 17.8 x 25.4 cm).

Weight: 30 pounds (13.6 kg).

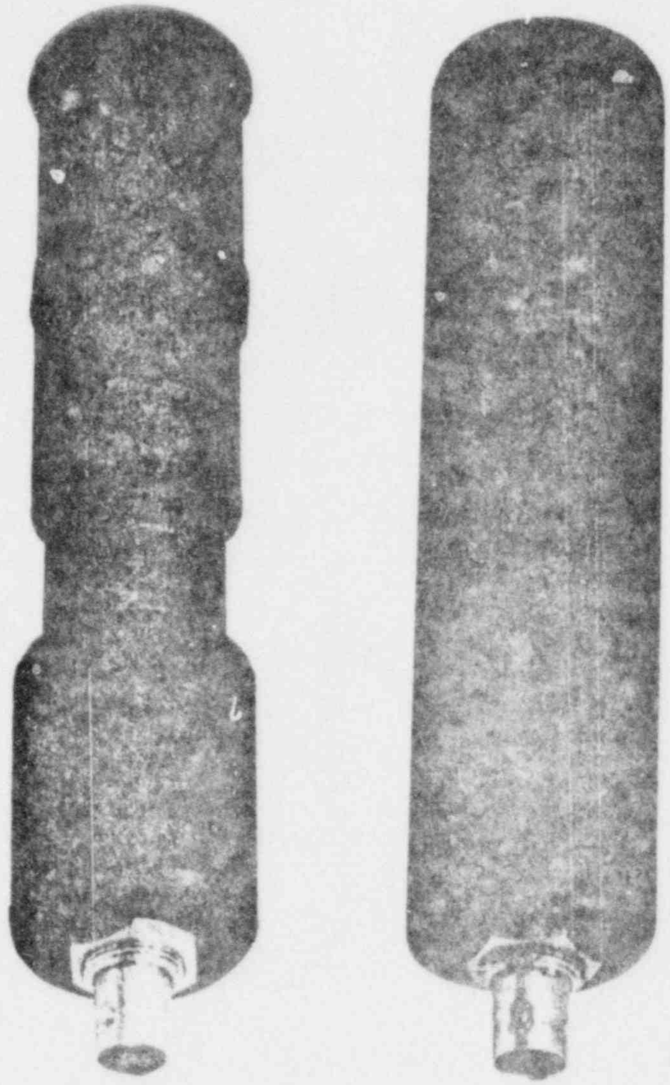
ACCESSORIES

Glass Fiber Filter Papers, 47mm, box 100

1000-hour Elapsed Time Meter, hermetically sealed

POOR ORIGINAL

Energy Compensated Hand Probes



Models HP-270 and HP-270G geiger probes are energy compensated over a wide range of photon energies so that the characteristic over-response at lower energies is virtually eliminated.

These two probes are ideal for conditions that require a small G-M hand probe. Both probes are housed in high impact ABS plastic to provide an extremely rugged package. The two probes differ in that the HP-270 has a beta window and the HP-270G does not.

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ENERGY COMPENSATED HAND PROBES (continued)

SPECIFICATIONS

Housing: High impact black ABS plastic.

Connector: BNC series coaxial.

Environmental: Splashproof.

Size: HP-270 – 1-3/8 inch dia. x 6 inches long (3.5 x 15.2 cm); HP-270G – 1-3/8 inch dia. x 5-3/4 inches long (3.5 x 14.6 cm).

Weight: 5 ounces (0.14 kg).

Energy Response: ±20% from 40 KeV to 1.25 MeV (see graph).

Temperature Range: -55°C to +75°C.

Gamma Sensitivity (^{137}Cs): Approximately 1200 counts per minute per mR/hr.

Operating Voltage: 900 ±50 V.

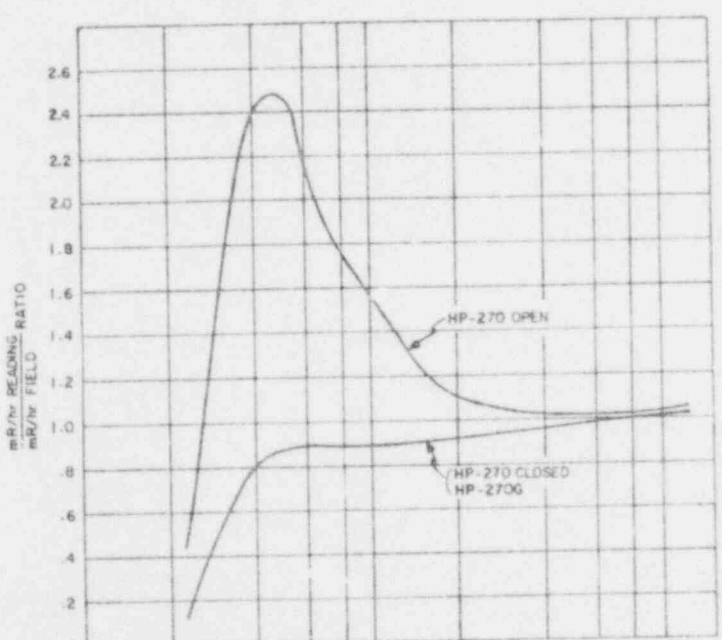
Plateau Length: 100 V minimum.

Plateau Slope: 0.1% per volt maximum.

Dead Time: Approximately 100 μseconds.

Life: Unaffected by operation.

Wall: 30 mg/cm² stainless steel.



Energy Response of Models HP-270 and HP-270G

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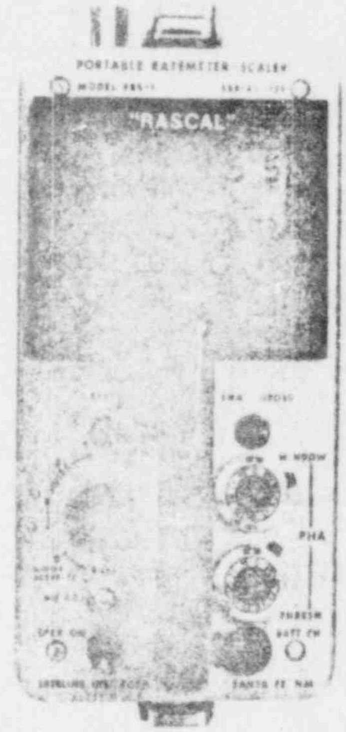
RASCAL
Portable Ratemeter-Scaler



EBERLINE RECOMMENDS:

Instrument	*Measurement*
PRS-2/SAC-R5	**Radon Gas**
PRS-2/SPA-1	**Radon Daughter (WL)**
PRS-2/HP-270	**Gamma Radiation**
PRS-2/HP-210M	**Beta Contamination**
PRS-2/AC-3	**Alpha Contamination**

Most of the radiation measurements needed in uranium production can be done with one instrument, the RASCAL, and various detector probes. The instrument is designed to be used with most Eberline scintillation, G-M or proportional probes. The RASCAL is a compact, portable, digital-display instrument with selectable ratemeter or scaler functions. Its application within the uranium industry is limited only by one's imagination. The instrument is rugged and splashproof with its own internal battery power supply. Included are a variable high voltage power supply, pulse amplifier, six-decade liquid crystal display, crystal-controlled time base, calibration function, built-in speaker and a self-contained rechargeable battery pack. The PRS-1 and PRS-1P also function as a single channel pulse height analyzer. All circuits are solid-state with extensive use of CMOS integrated circuits for low power consumption and to enhance reliability. The precision of any ratemeter measurement is preselectable, with digital display of rate multiplied by predetermined calibration constant. For example, the PRS-2 may be used with the SPA-1 detector as a Working Level (WL) meter, with WL displayed directly as a decimal fraction. The instrument also provides digital readout of the internal high voltage applied to the detector.

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RASCAL (continued)

SPECIFICATIONS

High Voltage: Regulated, adjustable by a front-panel control. PRS-1 and PRS-2 from 500 V to 1500 V. PRS-1P and PRS-2P from 800 V to 2400 V. A voltmeter position on the range switch provides a digital indication of the voltage. The supply is a plug-in module for ease of maintenance.

Count Rate Meter: True digital computing circuitry provides six decades of count rate information. A front-panel switch selects a preset number of counts: 10, 100, 1k or 10k for computation. The least number of counts selected provides the fastest answer and the greatest number of counts selected provides the most accurate answer. The compute time is fixed at 3 seconds.

Scaler: Six decades of digital information with fixed timed positions of 0.5, 1, 2 and 5 minutes plus manual and stop. Display may indicate each increment of count or may be updated at the end of the count period as selected by an internal switch. A front-panel control provides variable reset rate of approximately 1 to 10 seconds, or may be switched off.

Calibration Function: The calibration function provides a way to convert count rate information in cpm to desired units of measurement such as mR/hr, or to correct for probe efficiency. A rate multiplier board with selectable multiplication from 9.99 to 0.01 is provided as a standard item with the instrument. A rate divider board with selectable division from 0.1 to 99.9 is available as an option. All controls for the calibration function are internal.

Display: A liquid crystal display is used for low power consumption and continuous display of data. The display has six digits, nine legends and three decimal points. Five legends (cpm, cps, mR/hr, R/hr and mrem/hr) plus the three decimal points are selected for display by internal switches. The remaining legends (COUNT, COMPUTE and BATTery OK) are controlled by the circuit logic of the instrument. A light, controlled by a panel-mounted push button switch, is provided for instrument use in low ambient light. When used as an "instant" working level meter by the Rolle method, the WL value is displayed as a decimal fraction, but the legend is left blank.

Threshold: Adjustable by a front-panel control from 0 to 1.0 V.

Window (PRS-1 and PRS-1P): Adjustable by a ten-turn front-panel control from 1 to 1.0 V, always constant above threshold. ALPHA-GROSS switch provides gross counting by disabling the window.

Speaker: The speaker and the speaker control switch are mounted on the front panel.

Reset: Resets both count rate meter and scaler functions.

Detector Connector: Eberline type CJ-1, waterproof connector mates with CP-1.

Power: Rechargeable Gel-Cell battery provides approximately 75 hours of continuous operation between charging. (An optional battery pack is available for five Ni-Cd, rechargeable D-cell batteries or five D-cell non-rechargeable batteries, for approximately 200 hours of continuous operation.) Battery charger included. Recharges batteries in 14 hours via miniature phone jack connector.

Size: 7-3/4 inches high x 9-1/2 inches long x 4 inches wide (19.7 x 24.1 x 10.2 cm).

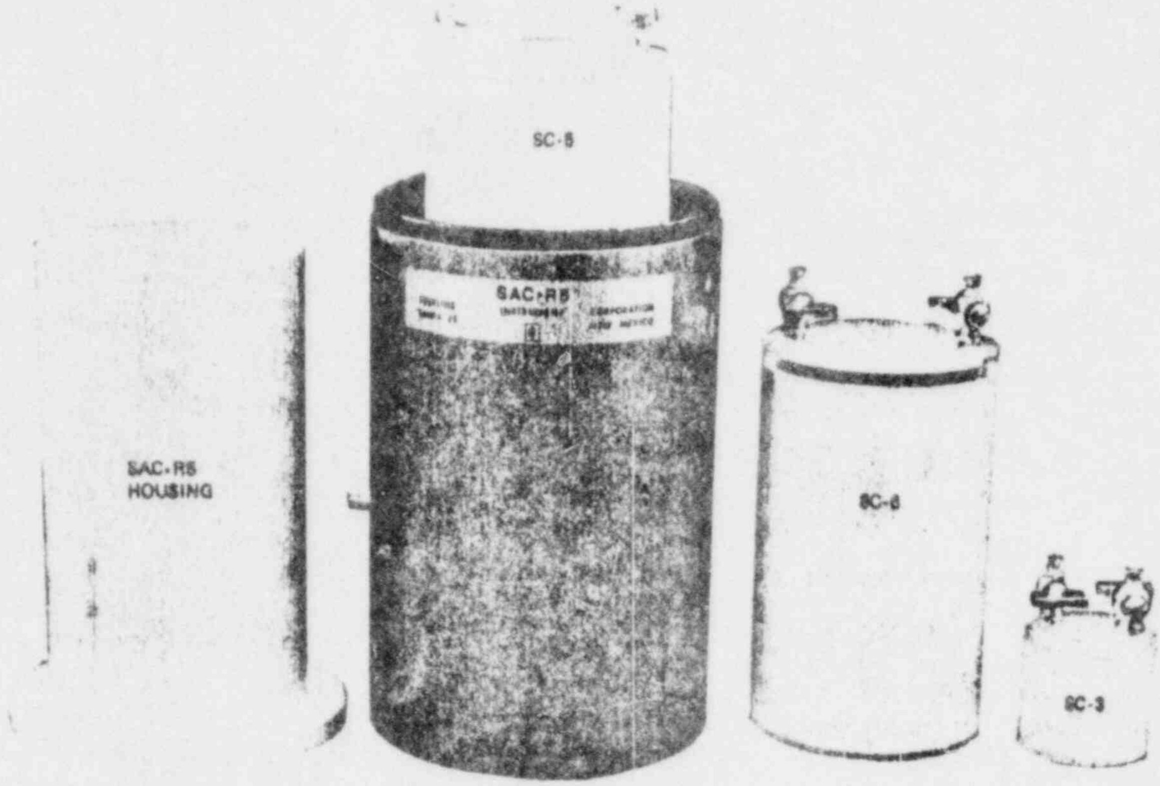
Weight: Approximately 5 pounds (2.3 kg).

Temperature: Operational from 0°F to 140°F (-18°C to 60°C).

Accessory: Carrying strap.

POOR ORIGINAL

Radon Gas Detector



The Model SAC-R5 is a 5 inch diameter scintillation detector in a lighttight enclosure for the detection of Radon-222. It may be used with a variety of counting instruments (Models MS-3, MS-2 or PRS-2) to count scintillation cells (SC-3, SC-5, SC-6 or standard Lucas cells). It also may be used with a separate sheet of ZnS scintillation material, to count alpha emissions from filter papers and swipe samples.

The scintillation cells (SC-3, SC-5 and SC-6) are used to collect gaseous samples that may contain ^{222}Rn. The cells are made of transparent plastic and the inner walls are lined with silver-activated zinc sulfide scintillation material. Two valves are provided on top so that gas can flow through the cell when collecting the sample or purging the cell. The cells are vacuum tight so that they can be evacuated and subsequently filled by opening one of the valves.

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D-10.20

RADON GAS DETECTOR (continued)

SPECIFICATIONS

SAC-R5

Maximum Sample Size: Approximately 4-7/8 inches dia. x 8-3/4 inches high (12.4 x 22.2 cm).

Photomultiplier Tube: Nominal 5-inch, 10-stage, end window tube.

Background Count: One count per minute maximum when set properly on alpha plateau curve.

Electrical Connection: Single coaxial. MHV type connector.

Operating Voltage: Positive 2500 V maximum. Actual voltage required dependent on many factors including phototube gain, counter input sensitivity, type of cell being counted, etc. SAC-R5 input resistance is approximately 120 MΩ.

Size: Overall – 6.5 inches dia. x 17.7 inches high (16.5 x 45 cm).

Weight: 8.5 pounds (3.9 kg).

OPTIONAL ACCESSORIES

ZnS(Ag) Scintillation Sheet: 3 inches x 3 inches, Eberline 10798-A12 (25 per package).

Certified Thorium-230 Alpha Standard, DNS-4.

SCINTILLATION CELLS

		SC-3	SC-5	SC-6
Volume, liters		0.1	0.5	1.4
Response Factors*				
CPM per pCi		5.9	4.6	4.3
CPM per pCi/l		0.59	2.3	6.0
Size Overall	Height	3.4" (8.5 cm)	4.4" (11 cm)	8.7" (22 cm)
	Diameter	2.5" (6.4 cm)	4.5" (11.5 cm)	4.5" (11.5 cm)
Weight		0.3 lbs. (140 gm)	0.85 lbs. (385 gm)	1.5 lbs. (680 gm)

Pressure Limits: From vacuum to approximately ambient. Do not pressurize.

Hose Fittings: For 5/16 I.D. hose.

*Nominal response factors after radon daughters reach equilibrium with ^{222}Rn.

Calibration of Radon Gas Counting Systems

The Scintillation Alpha Counter for Radon, Eberline Model SAC-R5, may be used with various scalers (Models MS-2, MS-3 or PRS-2) and with various scintillation cells (Models SC-3, SC-5 or SC-6). Prior to use, each system should be calibrated with radon gas. This involves running a high voltage plateau with aged air or nitrogen in the cell (background) and then with ^{222}Rn gas in the cell. Then the operating high voltage must be selected as described in the SAC-R5 manual. Once the operating high voltage has been set, the response of each scintillation cell should be determined using ^{222}Rn gas flushed from a NBS standard of ^{226}Ra.

Very few companies or agencies who buy radon gas measuring equipment have the capability to do the above calibration. Therefore, the Eberline laboratory can perform this system calibration for the customer.

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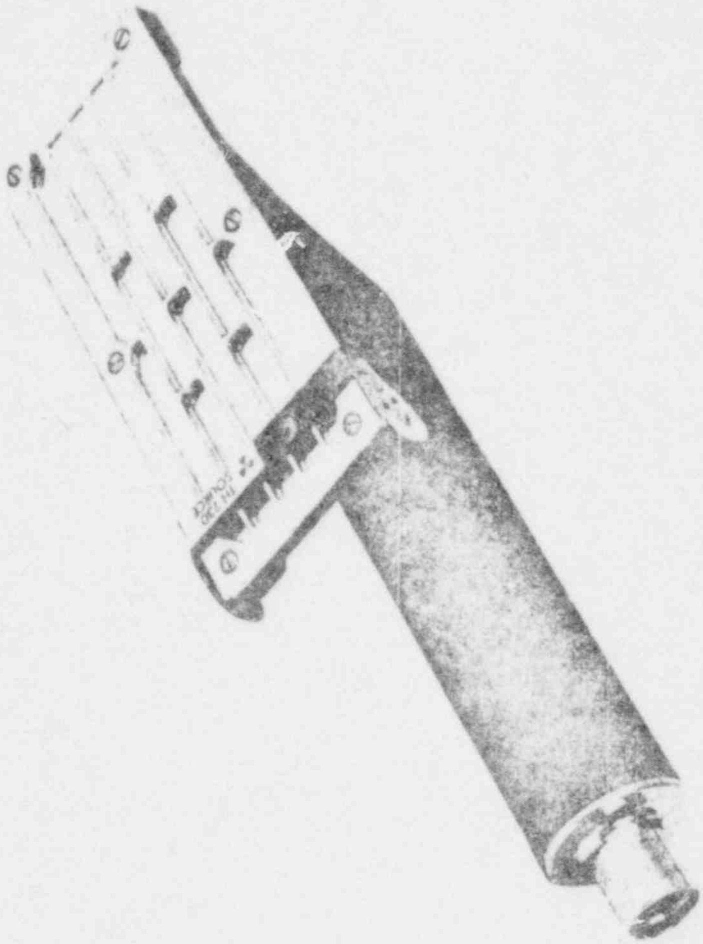
Alpha Scintillation Probes



The Model AC-3 is an alpha (α) scintillation probe designed for survey work or for personnel monitoring. The AC-3 will work with many Eberline instruments and is particularly suited for rapid personnel monitoring.

The AC-3 probes are essentially identical, differing only in the window assembly. The -7 designates a maximum open area for α surveys. The -8 designates a rugged window which has a fine mesh protection over the mylar for personnel monitoring.

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ALPHA SCINTILLATION PROBES (continued)

SPECIFICATIONS

Active Area: 9.1 in^2 (59 cm^2) within 5-3/4 inch x 2 inch (14.6 x 5.1 cm) sampling area.

Window Thickness: 0.5 mg/cm^2 aluminized mylar.

Efficiency: From a 1 inch dia. source or from 59 cm^2 of a large distributed area ^{239}Pu source (2π).

- -7 window: 28% minimum, 31% typical.
- -8 window: 18% minimum, 20% typical.

Sensitivity: From a large area ^{239}Pu source.

- -7 window: Typically 2×10^7 counts per minute per $\mu Ci/cm^2$ (9 cpm per disintegrations per minute/cm^2).
- -8 window: Typically 1.3×10^7 counts per minute per $\mu Ci/cm^2$ (5.9 cpm per disintegrations per minute/cm^2).

Uniformity: No single reading from a 1 inch dia. ^{239}Pu source deviates more than ±12% from the average reading.

Plateau: With 1 inch dia. ^{239}Pu source, typically 200 V long.

Scintillator: ZnS(Ag) powder embedded in tape.

Operating Voltage: Optimum voltage depends on phototube characteristics, cable length, input impedance and sensitivity of counter.

Maximum Voltage: +1600 V.

Operating Current: 110 MΩ dynode string yields nominal 10 μA drain at 1100 V.

Temperature Range: -40°F to +140°F (-40°C to 60°C).

Connector: Special Eberline waterproof connector (CJ-1). Mating connector is Eberline Model CP-1.

Size: Approximately 11-1/2 inches long x 2-3/4 inches wide x 3-1/4 inches high (29.2 x 7 x 8.3 cm).

Weight: 1 pound 6 ounces (0.62 kg)

Specify when ordering:

- -7 for α survey (Open Window)
- -8 for personnel monitor (Rugged Window)

Optional

CS-15 ^{230}Th Check Source (no license required)

APPENDIX D-10.3

Qualifications Summary of
Radiation Protection Staff

Supervisory Position	Proposed Individual
Mine Manager	Paul Hildenbrand
Senior Safety and Radiation Officer	John Lusher
Environmental and Safety Coordinator/Radiation Protection Officer	Steve Rieger

RESUME

POSITION: Mine Manager

NAME: Paul R. Hildenbrand

Training and Education	Date
Portland State University, Portland, OR B.S. Geology	1969
Portland State University, Portland, OR Twenty-two post bacculaureate hours in Geology	
Radiation Monitoring--Eberline Instrument Corporation, Santa Fe, NM	July 24-28, 1979
Radiation Monitoring--Research Project Management, American Management Association, Chicago, ILL	Oct. 24-26, 1979

Work Related Experience

Senior Geologist and Project Manager, UNC Teton Exploration Drilling, Inc., Casper, WY	1979 - Present
Senior Production Geologist, Nuclear Dynamics Inc., Moorcroft, WY	1978 - 1979
Senior Mine Geologist, Wyoming Minerals Corporation, Three Reves, TX	1977 - 1978
Coal Geologist, Sunshine Mining Company, Kellog, ID	1974 - 1977
Mine Geologist, Anglo American Corporation of South Africa, Johnannesburg, S.A.	1970 - 1971
Mine Geologist, Sunshine Mining Company, Kellog, ID	1969 - 1970

RESUME

POSITION: Senior Safety & Radiation Officer

NAME: John Lusher

Training and Education	Date
Sheridan Junior College A.A.S. in Engineering	5-77 (Graduation Date)
Navy Service Schools	
Basic Nuclear Power School	1-8-62 to 6-22-62
Nuclear Power Training Unit	7-9-62 to 12-20-62
Engineering Laboratory Technicians School	1-28-63 to 4-26-63
Refresher Courses in Laboratory Technician and Primary Plant Components	1 month in 1965
Nuclear Power Plant Operators Training Program, Rensselaer Polytechnic Institute, Troy, NY	13 Weeks Summer and Fall 1967
Health Physics Courses -- General Electric Co., Valledos Nuclear Center, Pleasanto, CA	13 Weeks in 1968
Boiling Water Reactor Technology, General Electric Atomic Power Equipment Department, San Jose, CA	4-4-68 to 5-5-68
M.E.S.A. Instructor Courses: First Aid Methods Emergency Mine Training Use of Self-Rescuer	 5-17-75 and 4-14-77 4-14-77 4-14-77
National Safety Council, Key Man Development Program	5-18-77
Westinghouse Course 401 on Safety Management	
State of Wyoming Certified Emergency Medical Technician	12-77

Other Work Related Courses:

Tire Simulator Training
Basic Search and Rescue
Self Contained Breathing Apparatus
Basic Nozzle
Fundamental of Occupational Safety
Security Management
Transportation of Hazards Materials Seminar

Work Related Experience	Date
Senior Safety and Radiation Officer, UNC Teton Exploration Drilling, Inc., Casper, WY	1980 - Present
Safety and Radiological Engineer, Wyoming Minerals Corporation, Irigaray Mine, Buffalo, WY	1977 - 1980
Superintendent, 3 years, heavy earthmoving company. John L. Lusher Construction, Buffalo, WY	1973 - 1977
Millstone Point Company, Waterfo:d, Connecticut, Radiation Protection Consultant, 5 years at the Lawrence and Memorial Hospital, New London, CT	1967 - 1973
Leading Engineer Laboratory Technician, James K. Pol, SSBN645, 2 years. Operator Instructor, Knolls Atomic Power Laboratory, W. Milton, New York, 3 years, Mechanical Operator James K. Polk, 2 years.	1959 - 1967

RESUME

POSITION: Environmental & Safety Coordinator/
Radiation Protection Officer

NAME: Steve Rieger

Training and Education	Date
Casper College, Casper, WY	1970 - 1972
University of Wyoming, Laramie, WY B.S. Biology/Botany	1972 - 1975

Work Related Experience	
Environmental & Safety Coordinator/ Radiation Safety Officer for uranium solution mining Research and Development Project, UNC Teton Exploration Drilling, Inc., Casper, WY	Apr. 1980 - Present
Senior Environmental Technician, UNC Teton Exploration Drilling, Inc., Casper, WY	Apr. 1980 - Sept. 1980
Environmental Technician II, UNC Teton Exploration Drilling, Inc., Casper, WY	Nov. 1979 - Apr. 1980
Reclamation Assistant, UNC Teton Exploration Drilling, Inc., Casper, WY	Nov. 1978 - Nov. 1979
Salesman Driver, Stoval Beverage Company, Casper, WY	Feb. 1977 - Oct. 1978
Field Technician, Wyoming Game and Fish, Cheyenne, WY	May 1976 - Nov. 1976
Core Analyst, Core Laboratory, Casper, WY	Feb. 1976 - May 1976
Wildlife Technician, U.S. Fish and Wildlife Services, Cheyenne, WY	May 1975 - Sept. 1976

APPENDIX D-10.4

Air Pathway Radiological
Exposure Model

Site specific radon emission data were collected during the R & D phase to develop a Radon-222 source term for the commercial operation. To develop this data, Radon-222 gas samples were collected from the process plant emission stack at various times during the R & D operation. Samples were always collected directly downwind from the stack. Using this procedure, the highest Radon-222 concentrations were measured at a given distance from the source of the emissions. The wind speed was recorded during the sampling periods. Table D-10.4 lists the field data recorded for the Radon-222 emission assessment.

Process Plant Emissions

As discussed in Chapter 3, the in situ uranium mining process is essentially comprised of a closed loop system with fluid flow from the well field area, to the processing plant and back to the well field area for reinjection into the ore body. During production, the system is almost in equilibrium except for about a .5% bleed stream (see Chapter 3).

TABLE D-10.4

RADON-222 EMISSION FIELD DATA

Date	Approximate Wind Speed (mph)	RADON-222 CONCENTRATION IN pCi/l 1' Downwind	10' Downwind	30' Downwind	90' Downwind
6/2/80	25	1677.33±1.279	74.76±.280	22.89±.163	3±.064
9/20/80	5	227±.49	24±.16	3±.062	
10/3/80	15	589.5±.37	.45±.05	1.67±.06	1.13±.06
Mean	15	831.28	33.07	9.19	2.07
Stand. Deviation	10	754.79	37.98	4.89	1.32

Sources of radiological activity to the environment during the production and ground water restoration mode will be principally derived from the evolution and potential accumulation of Radon-222 gas. Due to the depth of the N & M ore bodies (250-350'), Radon-222 gas will be more soluble within the production zone than on the surface in the process plant. As such, it is expected that Radon gas can potentially be released under atmospheric pressure from the various process tanks and columns within the process plant.

For in-plant worker safety, process plant tanks and apparatus where Radon-222 can potentially be released to the atmosphere are fitted with a venting system to direct these gases to the process plant emission stack. A second venting system is used for the working area within the process plant (Chapter 4.1). Notwithstanding an in-plant radiation monitoring program will be conducted to ensure that the venting systems are working correctly, and that in-plant Radon-222 gas concentrations are well below safe working levels. This procedure was successfully used during the R & D 100 gpm phase of the Leuenberger Operations.

Model Calibration

During the 100 gpm R & D process, Radon-222 emissions from the process plant within one foot of the tank ventilation stack was 832 pCi/l on the average with a standard deviation of ±755 pCi/l. The amount of gas evolving from the plant is a function of the residence time of a unit volume of water circulated through the process plant and the total surface area to which this volume is exposed to the atmosphere within the plant.

For the commercial scale operation, the circulation rate will be 20 times greater than the rate used during the R & D phase and may reach 2,000 gpm when mining and restoration are operating concurrently. The volume capacity within the plant will not increase proportionately to the circulation rate. Therefore, the residence time per unit volume will be lower during the commercial operation than during the R & D phase. That is the residence time for a parcel of water during the commercial operation will not be 20 times greater than the residence time during the R & D phase. Similarly, the surface area of the various holding tanks during the commercial operation will not be 20 times greater than the surface area used during the R & D phase.

Recognizing these limits, a factor of 20 times the observed emission levels becomes a conservative value, and if used will define the upper limit to the amount of Radon-222 gas emitted during the commercial operation.

Air Transport

Figure D-10.5 shows the average concentrations of Radon-222 gas measured downwind from the ventilation stack. Multiplying these values by a factor of 20 produces the upper limit concentration of Radon-222 concentrations expected downwind from the commercial process plant emission stacks (Figure D-10.5).

Table 7-1 (Chapter 7) lists the concentrations of Radon-222 and the equivalent annual exposure dose at various distances from the process plant ventilation stacks. An approximate average annual wind speed of 15 mph was used (Chapter 2.5). To calculate these values, an additional constraint was used requiring that the concentrations observed downwind were the same in every direction from the ventilation stacks. This assumption is conservative in that the highest concentrations would be measured downwind. The model assumes that the same concentrations would be measured in any direction at the same distance.

Limitations

The model used for air transport is conservative in that the concentrations of Radon-222 measured on site downwind from the ventilation stacks are considered to be the same everywhere

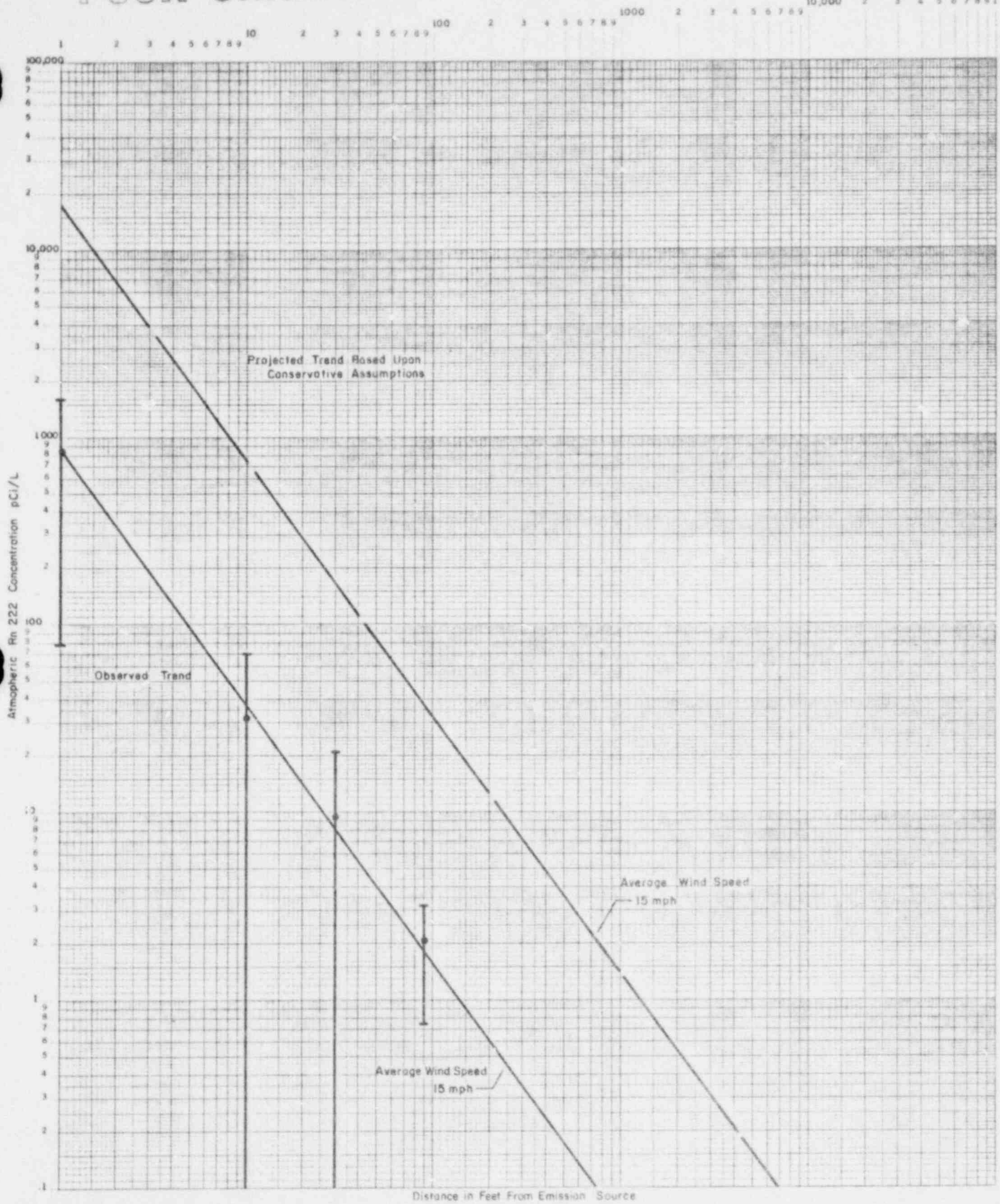

Figure D-10.5
OBSERVED AND PROJECTED Rn 222
CONCENTRATION FROM PROCESS PLANT
VENTILATION SYSTEM

around the plant. In addition, the factor of 20 used to estimate the initial stack emission is higher than the true value that will be measured during the operation. Measurements taken at the stacks during the commercial operation will be made to determine the true lower value.

APPENDIX E

SITE LOCATION AND LOCAL POPULATION DATA

APPENDIX E-1

Permit Area Location Data

The permit area is outlined on the original US Geological Survey Leuenberger Ranch Wyoming Quadrangle Map, Figure E-1. This map shows surface waters, drainages and windmills in and adjacent to the permit area. Groundwater wells are listed in Appendix D-6 and mineral drill holes are listed in Appendix D-5.

The major public right away through the area is the paved Glenrock-Ross road which is used for access to the permit area. Other know rights-of-way and easements are listed in Appendix A and B, along with their locations, names and addresses of the owners.

Lands to be affected by mining are all within the permit area as shown and discribed in detail in the mine plan portion of this application. The only known lands in the permit area and adjacent to it which have been previously disturbed by mining activities are those within the Teton-Nedco Research and Development area, also shown on Figure E-1.

The locations of residences and occupies dwellings adjacent to the permit area are shown on Figure E-2. A major portion of these dwellings are located just north of the permit area in the Negley development. Detail land ownership information on this area is provided in Appendix B and Table E-1 lists all of the dwellings and owners shown on Figure E-2.

TABLE E-1

OCCUPIED DWELLINGS

ADJACENT TO THE PERMIT AREA

MAP NUMBER	OWNER	TYPE OF DWELLING
1	Jacob S. Negley	House
2	Hawley L. and Dollie Pixler	House
3	Earl G. Doege	Mobile Home
4	Robert D. and Lorna N. Haun	House
5	Earl G. Doege	House
6	Harry G. Reeves	Mobile Home - Tenant Dwelling
7	Merle H. Dunham	Mobile Home
8	Elmer G. Doege	Mobile Home
9	Patrick Riddell	House
10	Ron L. Rogers	Mobile Home
11	Merle H. Dunham	Mobile Home - Tenant Dwelling
12	Merle H. Dunham	Mobile Home - Tenant Dwelling
13	Earlene LaPlant	Mobile Home
14	Smith Sheep Company	Ranch House - Tenant Dwelling

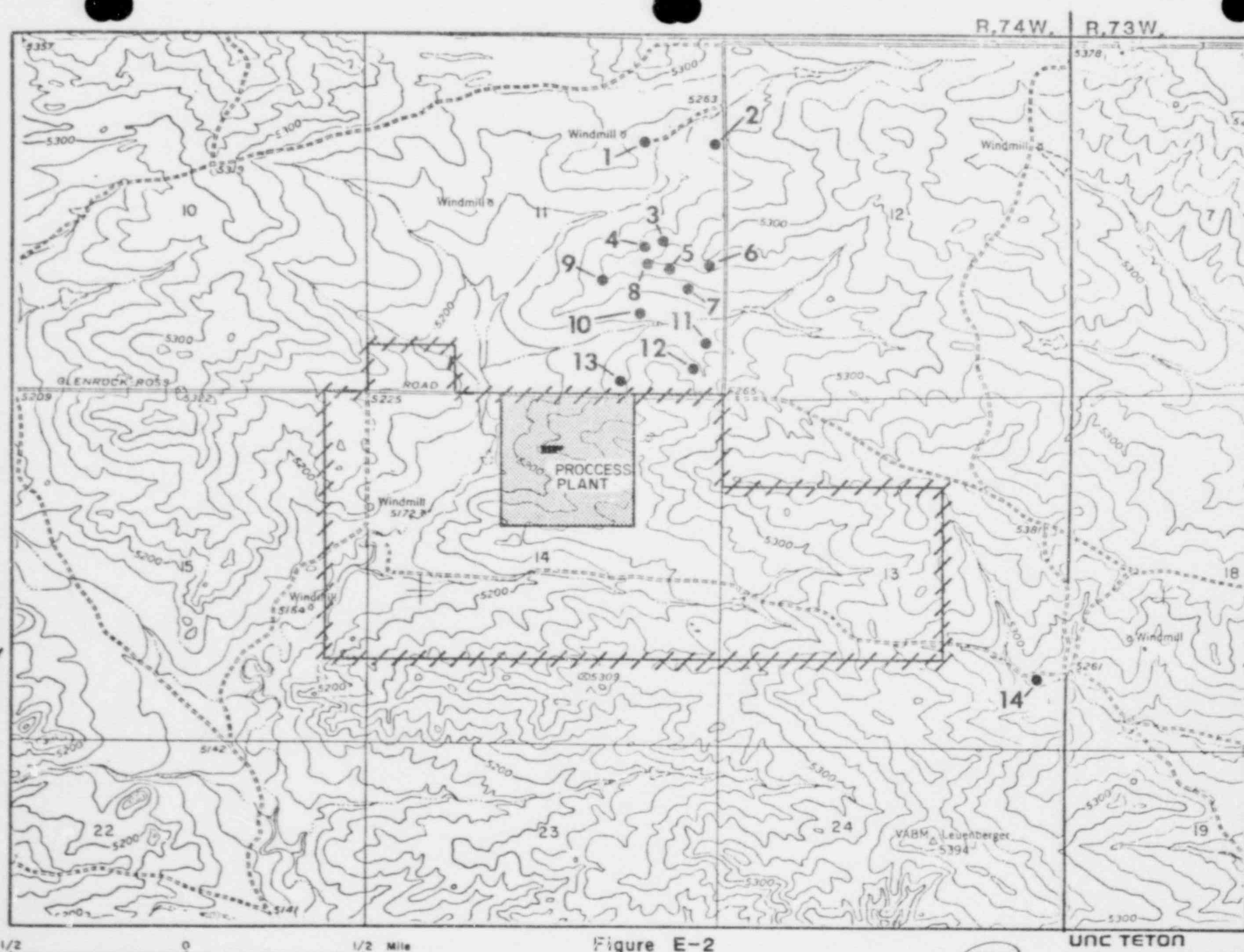

Figure E-2

RESIDENCE AND DWELLING LOCATION MAP

UNC TETON
EXPLORATION DRILLING, INC
A UNC RESOURCES Company

3030 Energy Lane
Casper, Wyoming 82601

E-1.4

POOR ORIGINAL

DOCUMENT/ PAGE PULLED

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APPENDIX E-2

Population Projections for Converse County

and the Towns of Douglas and Glenrock, Wyoming

POPULATIONS PROJECTIONS

FOR

CONVERSE COUNTY AND THE TOWNS OF DOUGLAS AND GLENROCK

Latest Revision on February 25, 1980

Intensive energy resource development creates new permanent jobs which in turn stimulate increased population growth. This correlative statement explains, in the simplest terms, the state of events in Converse County during the past few years. The prograssive exploration for and development of coal, uranium, petroleum, and related natural resources have produced dynamic population increases as illustrated in the following table.

TABLE I.

Percentage of Population Change

	1970*	1980**	Percent of Change 1970 to 1980
Glenrock area	1,515	3,100	104.6%
Douglas area	2,677	8,800	228.7%
Converse County	5,938	13,700	130.7%

* source was U.S. Census
** source was estimate by CAPO, February, 1980

The Converse Area Industrial Association has supplied annual figures, projecting the number of permanent employees and construction forces personnel required by the eight member companies for planned or operational projects. The projected figures for the next seven years are supplied in Table II.

TABLE II.

Permanent Employees and Construction Force Projections Made
By the Converse Area Industrial Association, February, 1980.

Year	Douglas Area	Glenrock Area	Construction**
1980	49	55	253
1981	33	34	496
1982	55	68	306
1983	0	0	1,213
1984	33*	0	2,063
1985	195*	20	1,965
1986	167*	39	1,565

* Contains employee projections based on tentatively scheduled projects.
** Construction estimates based largely on projects that are uncertain as of this report date.

The figures in Table II represent annual additions of permanent employees and do not include family or service personnel. Construction projections represent the total temporary construction force expected to be in Converse County during the year indicated. A portion of these construction people will undoubtedly reside outside the County, but work in the County. For purposes of this projection, 30% of the total construction force has been assumed to reside outside of Converse County.

By utilizing multipliers generated by Wyoming DEPAD in its study, Coal and Uranium Development of the Powder River Basin--An Impact Analysis, pages 51-59, these permanent employee additions and temporary construction forces can be extrapolated to give annual population levels expected from the activities of the Converse Area Industrial Association membership.

Tables III, IV and V illustrate the extrapolation of the basic employee addition and construction forces into expected population levels for the Glenrock area, the Douglas area, and Converse County respectively. The notes at the bottom of the tables explain the procedures and multipliers utilized to derive the figures. In the case of the construction work forces, the greatest proportion of the force, 55%, has been allocated to the Douglas area based on expected project locations and historical trends.

The figures in column G reflect the expected level of permanent population growth. These do not include any construction related population. The annual construction related population level is added to the annual cumulative population level to give the annual aggregate population level, reflected in column H.

E.2.3

TABLE III

GLENROCK - POPULATION PROJECTIONS

ear	A. Annual Permanent Employee Additions	B. Induced Service Sector Employee Additions	C. Additional Permanent Population	D. Construction Employees	E. Induced Service Sector Employees	F. Annual Additional Construction Related Population	G. Permanent Population Level	H. Aggregate Population Level
980	55	83	345	38	10	96	3,445	3,541
981	34	51	213	74	19	186	3,658	3,844
982	68	102	425	46	12	116	4,083	4,199
983	0	0	0	182	46	456	4,083	4,539
984	0	0	0	309	77	772	4,083	4,855
985	20	30	125	295	74	738	4,208	4,946
985	39	59	245	235	59	588	4,453	5,041

A. Given by the C.A.I.A. See Table II.

B. Induced Service Sector Employees: For every permanent base job, there is created additional jobs in the service sector, i.e., teachers, clerks, retail store owners, doctors, etc. The multiplier for this is 1.5, therefore, Induced Service Sector Employees = permanent employees X permanent service multiplier.

C. Additional permanent population: = permanent employees + induced service employees X permanent population multiplier (2.5)

D. Given by the C.A.I.A. See Table II. It is assumed that many of the construction employees will seek housing in the local community. The C.A.I.A. has not committed itself to a plan for construction housing at the plant site. 15% of total assi to Glenrock. 30% will reside outside of the County.

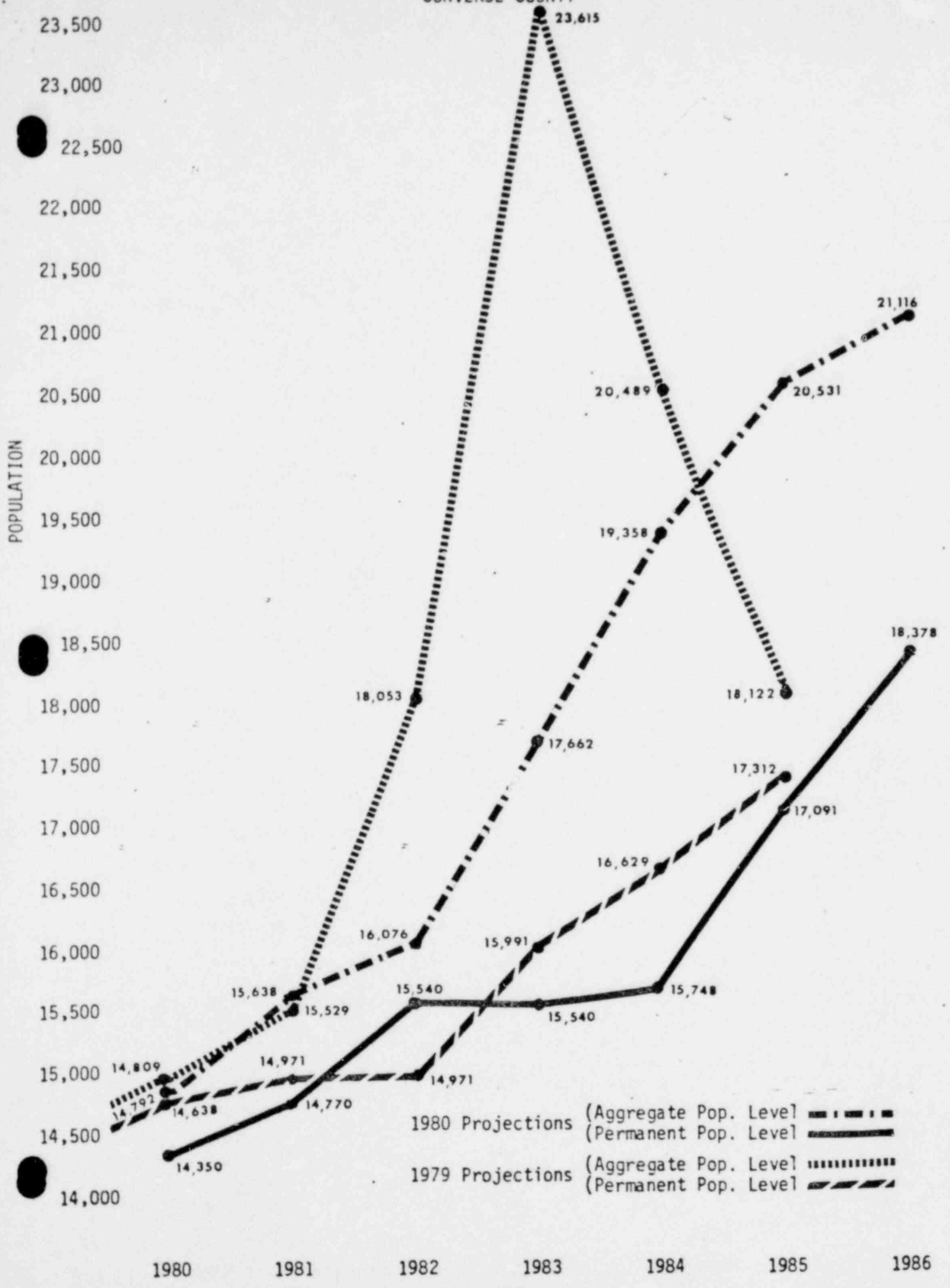
E. Induced Service Sector Employment: The multiplier for construction induced service employees is considerably less than fo the permanent sector. Therefore induced service sector employment = construction employees X construction service multiplier (.25).

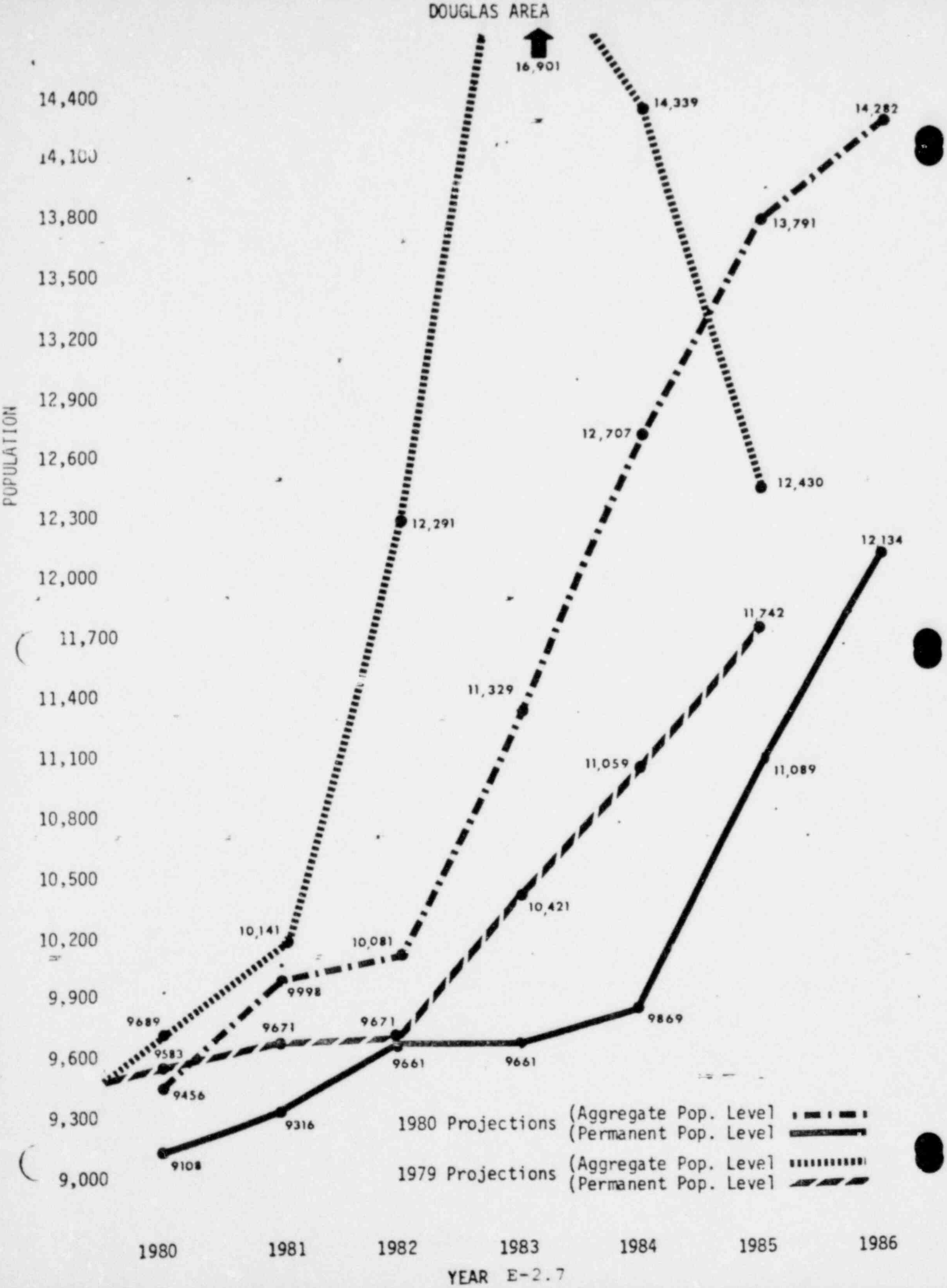
F. Additional Construction Related Population: This population should be more transitory than the permanent sector. Additio ally, many people working on construction will not bring their families to the area. Construction employees + constructio induced service employees X construction related population (2.0) = annual additional construction related population.

G. Permanent Population Level: = current population (3,100) + cumulative total of additional permanent population.

H. Aggregate Population Level: = annual figure in column F added to annual figure in column G.

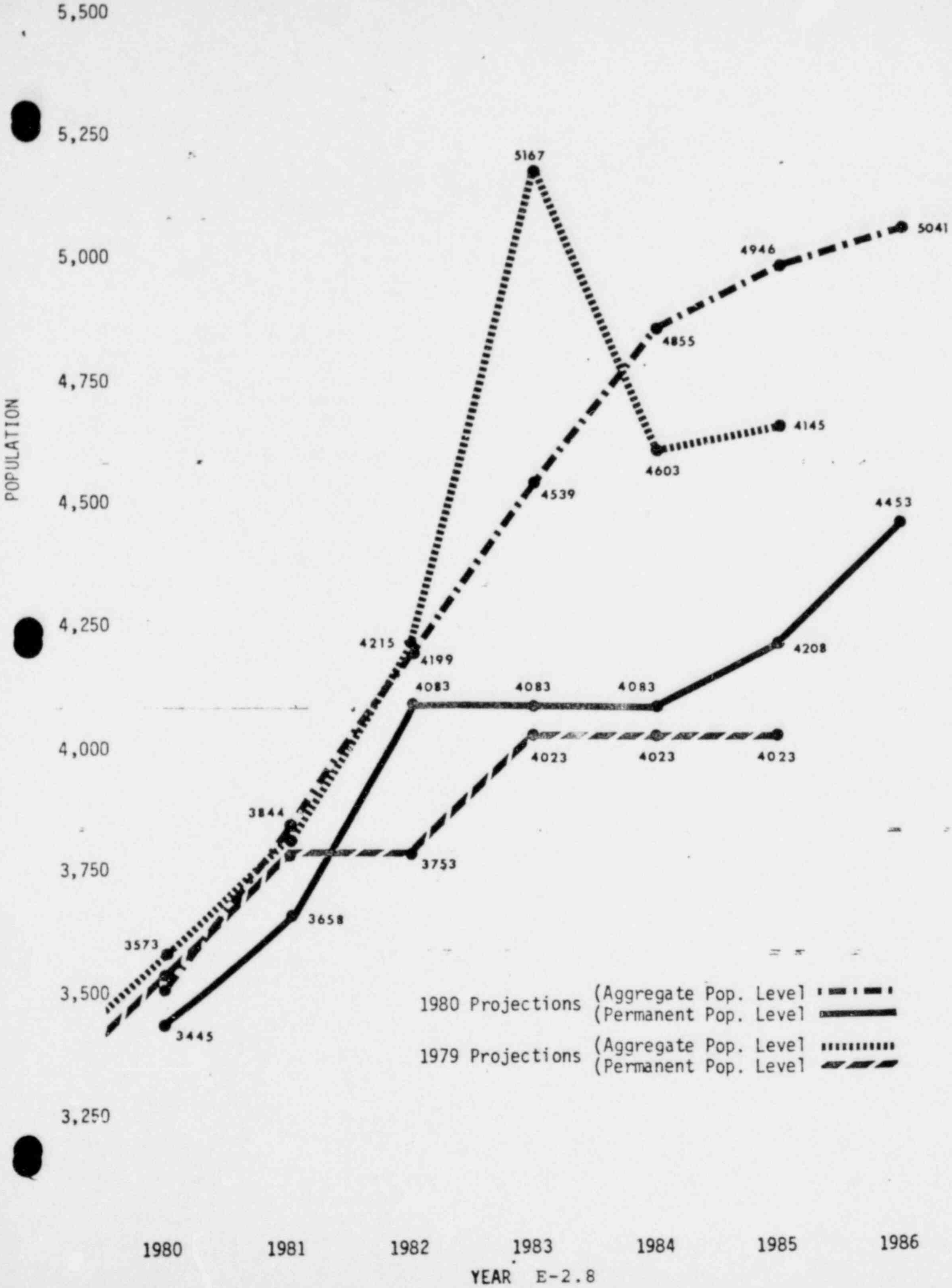
CONVERSE COUNTY





DOUGLAS AREA
16,901
14,339
14,282
13,791
12,707
12,430
12,291
12,134
11,742
11,329
11,059
11,089
10,421
10,141
10,081
9998
9689
9671
9671
9583
9456
9661
9661
9869
9316
9108
14,400
14,100
13,800
13,500
13,200
12,900
12,600
12,300
12,000
11,700
11,400
11,100
10,800
10,500
10,200
9,900
9,600
9,300
9,000
POPULATION
1980 Projections (Aggregate Pop. Level
(Permanent Pop. Level
1979 Projections (Aggregate Pop. Level
(Permanent Pop. Level
1980
1981
1982
1983
1984
1985
1986
YEAR

GLENROCK AREA



E-2.8

DOUGLAS WYOMING
1977 COMMUNITY PROFILE

INDUSTRIAL DEVELOPMENT DIVISION — DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT

Population

	City	County
1970	2,679	5,938
1975	3,839	8,048
1976 (est.)	6,500	10,500

Climate

Mean daily maximum temperature in:
January 57° July 96°
Mean monthly temperature in:
January 27° July 72.5°

Mean annual precipitation: 10.70 in.
Mean annual snowfall: 50 in.

Average annual wind velocity: 10 mph
Average annual relative humidity: 50%
Elevation: 4,815 feet

Average growing season: 121 days

Civic and Municipal Data

GOVERNMENT

Mayor-Council System
In city limits: 2,500 acres
Undeveloped: 20% of acreage
Available for industrial development: approximately 60 acres in and around Douglas.
Recreational parks - 5 in town.

POLICE FORCE

Police force staff - 10. Protection provided to areas outside the city limits by the County Sheriff's office.

ZONING

Territory covered - municipality act administered by Planning Commission. Industry regulated by performance standards.

STREETS

75% paved of which 80% have sidewalks and gutters.

CHURCH

Protestant - 12 Catholic - 1 LDS - 1

FIRE DEPARTMENT

25-man volunteer fire department. Areas east and outside the city limits are served by the Douglas Fire Department. Douglas fire insurnace rating - 8.

HOUSING

No. of Housing Units	County
Single Family	2,621
Multi-Family	412
Mobile Homes	551
Total	3,584
No. Housing Units in Town	1,660

The estimated cost of a new 3-bedroom home (1,100 sq. ft.), unfinished basement, 1-car garage, located in an area of comparable homes is approximately: $47,000
Average monthly rental (3 bdrm.): $300

RETAIL AND WHOLESALE TRADE — COUNTY

No. of retail establishments: 80
No. of wholesale establishments: 10
Net collection of retail/wholesale sales tax: $80,296

EDUCATION - SCHOOLS

	No. of Schools	No. of Pupils
High School	1	432
Jr. High	1	269
Elementary	1	888
Other	Rural	66

Ratio of pupils/teachers: 17.6
Total expended/pupil: $2,216.53
Casper Junior College in Casper (50 miles), enrollment - 3,894

LIBRARIES
One in town with a total of 60,680 volumes.

MEDICAL
Doctors - 4 Dentists - 1
Douglas Memorial Hospital - 32 bed, occupancy rate - 44%.
Michael Manor - 59 bed nursing home, occupancy rate - 88%.

NEWS MEDIA
Newspaper: Douglas Budget, weekly, circulation - 3,200.
Radio: KWIV - 5:30am - 10:30pm
Television: 9 channels available, local stations available in Casper, Scottsbluff and Hay Springs, Nb.

HOTELS AND MOTELS
Hotels: 2 No. of rooms: 40
Motels: 10 No. of rooms: 220

CONVENTION FACILITIES
One with a capacity of 400. One with a capacity of 250.

Tax Structure

Assessed Valuation
City $6,122,135
County $191,502,247

Tax Levy (in mills)

	1976	1975	1974
City	23.03	26.56	26.42
County	10.92	10.98	11.25
School	44.15	40.85	44.06
Total	78.11	78.39	81.74

Bonded Indebtedness
School - $8,599,000
City - 748,000

Total amount of revenue collected by the city in 1976 - $853,649.

Total amount of revenue collected by the county in 1976 - $11,060,966.

Net collection of sales tax in county - $1,-398,229

Ratio of assessed valuation to true value - 37%

Wyoming has no state, corporate or individual income tax.

Financial Institutions

BANKS - Two
Deposits: $46,705,000
Capital: €50,000
Surplus: 2,075,000
Total Assets: 51,194,495

SAVINGS & LOAN ASSOCIATIONS
Guaranty Federal Savings and Loan

Financing for industrial facilities is available through local banks and Wyoming industrial development corporations.

Major Firms

Name	Product	Emp.
Davis Oil Co.	oil & gas	60
Exxon Co.	uranium	325
Kerr-McGee	uranium	56
Inexco Oil Co.	oil & gas	65
Phillips Petro.	petroleum	30
Eagle Engin. Co.	sand & gravel	9-24
Stacy Drilling	oil & gas field exploration	20
Stinson Sawmill	lumber	10
Russel Lumber	lumber & posts	17
Rock Mt. Energy	uranium	60

Transportation

HIGHWAYS
Federal I 25, US 20, US 26
State Wyo 59, Wyo 94, Wyo 93

MOTOR FREIGHT
Consolidated Freightways
Pacific Intermountain Express Co.
Salt Creek Freightways

RAILROADS
Days goods are in transit to:

Chicago	3	Minneapolis	3
Cleveland	4	New York	5
Dallas	6	Salt Lake City	3
Denver	3	San Francisco	5
Seattle	5	Los Angeles	6
Omaha	2	Kansas City	3

Burlington Northern and Chicago and North Western Transportation Co. provides freight service several times daily.

AIR
Airport: Converse County Airport
Runway length: 5,066 feet, asphalt
Commercial service in Casper (59 miles) via Frontier or Western Airlines.

Utilities

MUNICIPAL WATER SOURCE

Source capacity: 3.1 million gal/day
Peak demand: 2.5 million gal/day
Storage capacity: 3.8 million gallons
Transmission capacity: 1.5 million gal/day
Treatment: Chlorination
Total hardness of water - 256 ppm
Rates: First 5,000 gal. - $5.50/mo.

SANITATION

Method of disposal: Landfill
Charge: $4.50/mo. Commercial charge varies.
Sewer: Lagoon Treatment Facility
Rate: Commercial & Residential $4.00/mo.

NATURAL GAS

Supplied by: Kansas-Nebraska Natural Gas Company

*Rates - General Gas Service

cu.ft./mo.	per Mcf
First 1,000	$2.34
Next 4,000	1.39
Next 45,000	1.17
Next 50,000	1.08
All Additional	1.08

Fuel Oils - #2 available at 40.2¢/gal.
LP Gas - 10,000 gal./yr. - 36.9¢/gal.
50,000 gal./yr. - 36.9¢/gal.

ELECTRIC POWER

Supplied by: Pacific Power & Light

*Rates - Large General 100kw - 500kw
Demand Charge
$180.00 for the first 100 kw of Demand or less, 1.25 per kw for all additional kw of demand.
Energy Charge
1.61 per kwh for the first 50 kwh per kw but for not less than the first 5,000 kwh.
1.42 per kwh for the next 20,000 kwh
1.06 per kwh for the next 50,000 kwh
.92 per kwh for the next 100,000 kwh
.85 per kwh for the next 200,000 kwh
.81 per kwh for all additional kwh

*Other rate schedules are available.

Labor Market Analysis

LABOR SUPPLY - COUNTY

Labor Force 4,516
Male 3,152 Female 1,364
Unemployed 105
Male 71 Female 34
Unemployment rate 2.3%

DISTRIBUTION OF LABOR FORCE - COUNTY

	No. of Units	No. of Employees
Agriculture Forestry & Services	69	298
Mining	37	866
Construction	67	434
Manufacturing	5	47
Trans., Commun. & Utilities	21	426
Wholesale Trade	19	86
Retail Trade	77	545
Finance, Ins. & Real Estate	18	116

WAGE RATES (WEEKLY)

	Co. Avg. Wage	State Wage
Agriculture & Forestry	$ 122.72	$ 134.45
Mining	296.51	301.60
Construction	235.06	243.66
Manufacturing	226.83	231.82
Trans., Commun. & Utilities	310.48	244.73
Wholesale Trade	121.10	215.50
Retail Trade	112.46	109.63
Finance, Ins. & Real Estate	164.99	175.28
Services		135.00

TOTAL PAYROLL

April - June 1976

	County
Agriculture & Forestry	$ 474,767
Mining	3,198,136
Construction	1,158,155
Manufacturing	130,730
Trans., Commun. & Utilities	1,671,027
Wholesale Trade	124,899
Retail Trade	771,445
Finance, Ins. & Real Estate	242,371

Source: Employment Security Commission

Recreation

CULTURAL ATTRACTIONS

Wyoming State Fair, Wyoming Pioneer's Memorial Museum, Fort Fetterman Museum, Fourth of July Celebration, Oregon Trail

SPORTS

Golfing, swimming, bowling, skiing, skating, boating, tennis, hunting, fishing, baseball, water skiing.

PUBLIC RECREATION AREAS

Wyoming State Fair Grounds	109 holes
Washington Park	5 acres
Riverside Park	8 acres
Douglas golf course	30 acres
Jackalope Plunge	8 acres
Baseball park	9 acres
Ayres Natural Bridge	20.72 acres

County Resources

Converse County

MINERALS - oil, uranium, coal, gas and stone

Value of net production $123,456,373

FOREST LAND No. of acres: 74,912

MAJOR AGRICULTURAL PRODUCTS - sheep, cattle, alfalfa, wheat, lumber

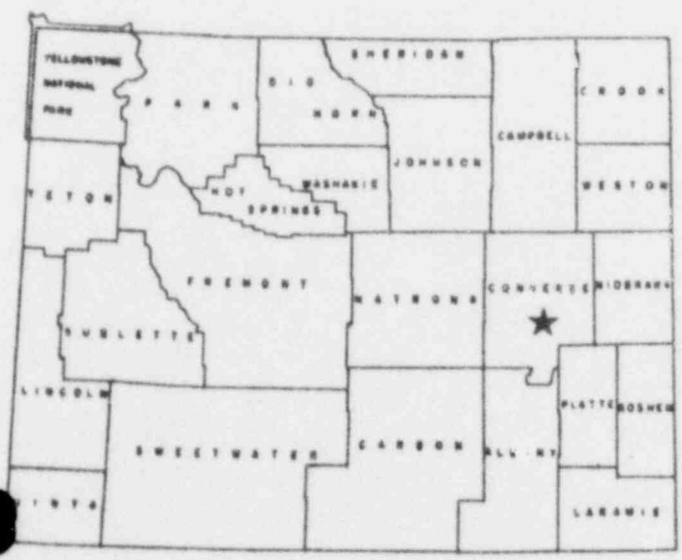
TOTAL NUMBER OF ACRES IN COUNTY: 2,653,284 4,146 sq. miles

FOR FURTHER INFORMATION CONTACT

Douglas Area Chamber of Commerce
Box 275, Douglas, WY 82633

Industrial Development, DEPAD
Barrett Bldg., Cheyenne, WY 82002
(307) 777-7284

DOUGLAS



Distance in miles from: to:	Douglas
Chicago	993
Billings	339
Denver	232
Omaha	575
Seattle	1,035
Casper	53
New York	1,800
Kansas City	752
Los Angeles	1,134
St. Louis	1,000
Salt Lake City	465
Cheyenne	127

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GLENROCK WYOMING
1977 COMMUNITY PROFILE

INDUSTRIAL DEVELOPMENT DIVISION — DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT

Population

	City	County
1970	1,515	5,938
1975	2,071	8,048
1976 (est.)	2,500	10,500

Climate

Mean daily maximum temperature in:
January 28.5° July 88.2°
Mean monthly temperature in:
January 21.1° July 72.9°

Mean annual precipitation: 11.92 in.
Mean annual snowfall: 71.9 in.

Average annual wind velocity: 13.6 mph
Average annual relative humidity: 50%
Elevation: 5,009 feet

Average growing season: 1219 days

Civic and Municipal Data

GOVERNMENT
Mayor-Council System
In city limits: 450 acres
Undeveloped: 20% of acreage
Available for industrial development - approximately 200 acres in and around the city.
Recreational parks - 25 acres.

POLICE FORCE
Police force staff - 5. Protection provided to areas outside the city limits by the County Sheriff's office.

ZONING
Territory covered - municipality act administered by Planning Commission. Industry regulated by performance standards.

STREETS
20% paved

CHURCH
Protestant - 8 Catholic - 1 LDS - 1

FIRE DEPARTMENT
25-man volunteer fire department. Outlying areas within 30-mile radius are served. Glenrock fire insurance rating - 8.

HOUSING

No. of Housing Units	County
Single Family	2,621
Multi-Family	412
Mobile Homes	551
Total	3,58[illegible]

The estimated cost of a new 3-bedroom home (1,100 sq. ft.), unfinished basement, 1-car garage, located in an area of comparable homes is approximately: $40,000-42,000
Average monthly rental (3 bdrm.): $300

RETAIL AND WHOLESALE TRADE — COUNTY
No. of retail establishments: 80
No. of wholesale establishments: 10
Net collection of retail/wholesale sales tax: $80,296

EDUCATION - SCHOOLS

	No. of Schools	No. of Pupils
High School	1	237
Jr. High	1	124
Elementary	1	410
Other	—	—

Ratio of pupils/teachers: 18.8
Total expended/pupil: $1,921
Casper Junior College in Casper (20 miles), enrollment - 3,894.

LIBRARIES
One with a total of 12,000 volumes.

MEDICAL
Doctor - 1 Dentist - 1
Diagnostic and Treatment Center
Memorial Hospital of Natrona County in Casper (25 miles) 319-bed, occupancy rate - 57%.
Three nursing homes, and allergy clinic, Casper Medical Clinic and Central Wyoming Counseling and Mental Health Clinic in Casper

NEWS MEDIA
Newspaper: Glenrock Independent, weekly, circulation - 750
Radio: Numerous stations, local stations in Casper and Douglas.
Television: 10 channels available. Local stations in Casper.

HOTELS AND MOTELS
Hotels: 1 No. of rooms: 37
Motels: 2 No. of rooms: 20

CONVENTION FACILITIES
Four convention facilities with a capacity of largest three: 150, 150 and 75.

Tax Structure

Assessed Valuation
City $2,170,766
County $191,501,247

Tax Levy (in mills)

	1976	1975	1974
City	9.33	15.41	15.31
County	13.34	13.05	10.93
School	47.28	44.96	52.33
Total	69.96	73.43	80.56

Total amount of taxes levied in Converse County for all purposes in 1976 - $11,043,-512.

Net collection of sales tax in county - $1,-398,229

Wyoming has no state, corporate or individual income tax.

Financial Institutions

BANKS - One
Deposits: $6,206,000
First National Bank

SAVINGS & LOAN ASSOCIATIONS
Savings and Loan located in Casper (25 miles)

Financing for industrial facilities is available through local banks and Wyoming industrial development corporations.

Major Firms

Name	Product	Emp.
Continental Oil	oil & gas	5
Dave Johnston	coal	50-99
John Jourgensen Paint Company	traffic marking paint	5
Kerr-McGee	uranium	215
Exxon Company	uranium	250
Pronghorn Drilling	metal mining svc.	5
Pacific Power & Light	electric power	200
Singwell	oilfield svc.	17
Thatcher & Sons	oilfield svc.	80
V-1 Oil Co.	natural gas	9-24

Transportation

HIGHWAYS
Federal I 25, US 20, US 26, US 87
State Wyo 95

MOTOR FREIGHT
Consolidated Freightways
Pacific Intermountain Express Co.
Salt Creek Freightways

RAILROADS
Days goods are in transit to:

Chicago	4	Minneapolis	3
Cleveland	4	New York	5
Dallas	6	Salt Lake City	3
Denver	3	San Francisco	5
Seattle	5	Los Angeles	6
Omaha	2	Kansas City	3

Freight service provided by Burlington Northern and Chicago Northwestern Transportation Co. Service available several times daily.

AIR
Nearest airport: Casper Municipal (30 miles)
Commercial service available via Frontier and Western Airlines.

Utilities

MUNICIPAL WATER SOURCE

Wells - 4
Source capacity: 1.5 million gal/day
Peak demand: 1.4 million gal/day
Storage capacity: 720,000 gallons
Transmission capacity: 600 gal/min.
Treatment: chlorination
Total hardness of tap water - 55 ppm
Rates - First 1,000 gal/mp. - $1.00
Next 5,000 $5.00
Over 5,000 .60/1,000

SANITATION

Method of disposal: Landfill
Charge: $3.00/mo. commercial charge varies.
Sewer: Lagoon Treatment Facility
Rate: Residential - $2.50/mo.
Commercial - First 5,000 gal. - $2.50 min.
Over 5,000 gal. - .30/1,000 gal.

NATURAL GAS

Supplied by: Kansas-Nebraska Natural Gas Company, Inc.

*Rates - General cu.ft./no.	per mcf
First 1,000	$2.053
Next 4,000	1.053
Next 45,000	.713
Next 50,000	.673
All Add'l	.583

ELECTRIC POWER

Supplied by: Pacific Power & Light
*Rates: Large General 100kw - 500kw
Demand Charge
$180.00 for the first 100 kw of Demand or less, 1.25 per kw for all additional kw of demand.
Energy Charge
1.61 per kwh for the first 50 kwh per kw, but for not less than the first 5,000 kwh.
1.42 per kwh for the next 20,000 kwh
1.06 per kwh for the next 50,000 kwh
.92 per kwh for the next 100,000 kwh
.85 per kwh for the next 200,000 kwh
.81 per kwh for all additional kwh

*Other rate schedules are available.

Labor Market Analysis

LABOR SUPPLY - COUNTY

Labor Force 4,516
Male 3,152 Female 1,364
Unemployed 105
Male 71 Female 34
Unemployment rate 2.3%

DISTRIBUTION OF LABOR FORCE - COUNTY

	No. of Units	No. of Employees
Agriculture Forestry & Services	69	298
Mining	37	866
Construction	67	434
Manufacturing	5	47
Trans., Commun. & Utilities	21	426
Wholesale Trade	19	86
Retail Trade	77	545
Finance, Ins. & Real Estate	18	116

WAGE RATES (WEEKLY)

	Co. Avg. Wage	State Wage
Agriculture	$	$
& Forestry	122.72	134.45
Mining	296.51	301.60
Construction	235.06	243.66
Manufacturing	226.83	231.82
Trans., Commun. & Utilities	310.48	244.73
Wholesale Trade	121.10	215.50
Retail Trade	112.46	109.63
Finance, Ins. & Real Estate	164.99	175.28
Services		135.00

TOTAL PAYROLL

April - June 1976

	County
Agriculture	$
Forestry	474,767
Mining	3,198,136
Construction	1,158,155
Manufacturing	130,730
Trans., Commun. & Utilities	1,671,027
Wholesale Trade	124,899
Retail Trade	771,445
Finance, Ins. & Real Estate	242,371

Source: Employment Security Commission

CULTURAL ATTRACTIONS

Glenrock Little Theater, Wyoming Pioneer's Memorial Museum (Douglas), Deer Creek Station (Oregon Trail Military Post)

SPORTS

Fishing, hunting, swimming, skiing, tennis, bowling, snowmobiling, baseball, and skating.

PUBLIC RECREATION AREAS

Silver Spruce Dude Ranch	5,000 acres
Tennis courts	1 acre
Baseball parks	2 acres
City park	250 acres
Hogadon Ski Area	29 miles
Ayres National Bridge	
Oregon Trail	
Deer Creek Stage Stop	

Converse County

MINERALS - oil, uranium, coal, gas, stone

Value of net production $123,456,378

FOREST LAND No. of acres: 74,916

MAJOR AGRICULTURAL PRODUCTS - sheep, cattle, hay, corn, wheat, oats, barley, sugar beets

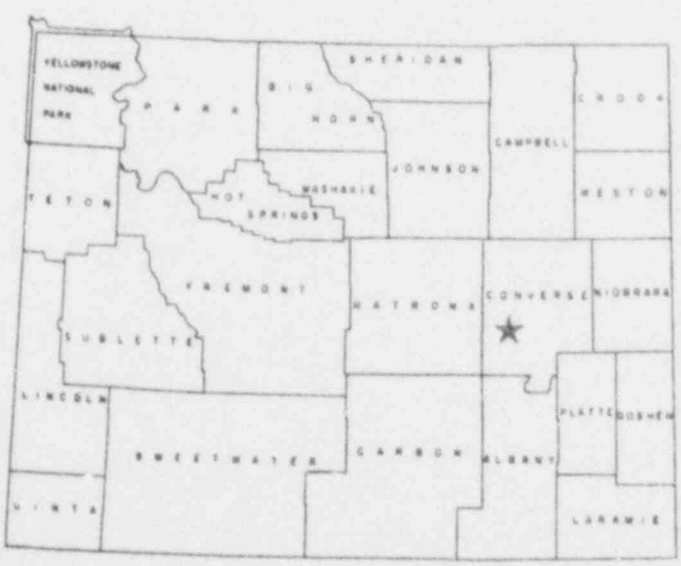
TOTAL NUMBER OF ACRES IN COUNTY: 2,653,284 4,146 sq. miles

FOR FURTHER INFORMATION CONTACT

Glenrock Area Chamber of Commerce
Box 411, Glenrock, WY 82637
(307) 436-9643

Industrial Development, DEPAD
Barrett Bldg., Cheyenne, WY 82002
(307) 777-7284

GLENROCK



Distance in miles from: Glenrock to:

Chicago	1,000
Billings	312
Denver	260
Omaha	600
Seattle	1,104
Casper	18
New York	1,821
Kansas City	762
Los Angeles	1,124
St Louis	1,013
Salt Lake City	450
Cheyenne	162

Printed by the Industrial Development Division, Department of Economic Planning and Develolpment, Barrett Bldg., Cheyenne, WY (307) 777-7284

APPENDIX E-3

Population Statistics for the City

of Casper, Wyoming

CASPER
wyoming

QUALITY
LIVING

Service center for mineral industry
(oil, natural gas, uranium, coal and bentonite)
Industrial and geographical center of Wyoming
Home of Casper Troopers   Home of Casper College
Located on the North Platte River in Central Wyoming
Elevation: City — 5,123 feet; Casper Mountain — 8,130 feet
Land area: Casper approximately 16.1 square miles
Natrona County 5,803 square miles
County Seat of Natrona County
Government: Council-City Manager

PUBLISHED BY THE
CASPER AREA CHAMBER OF COMMERCE
P.O. BOX 399
CASPER, WYOMING 82602
(307) 234-5311

CASPER

(1979 year-end data)

POPULATION

	City	County
1970	39,361	51,264
1979 (est.)	58,172	79,037
1990 (projected)	90,118	125,163

FINANCIAL INSTITUTIONS

Banks — 9

Savings & Loan Associations — 5

POLICE FORCE — FIRE DEPARTMENT

Police force staff — 117

Fire department staff — 95
Casper fire insurance rating — 4

Sheriff's staff — 63

LIBRARIES

Two with a total of 156,831 volumes
Natrona County Library (Downtown)
Goodstein Foundation Library (Casper College)

EDUCATION

	No. of Schools	No. of Pupils
High School	2	3,106
Jr. High	3	2,810
Elementary	25	7,643
Total expended/Pupil (Co.):		$1,789.12
Casper Day Care Center		100
Parochial Schools		598
Wyo. School for Deaf		30
Wyo. State Children's Home		60
Casper College		3,811
23 specialized career programs		
48 university parallel programs		
University of Wyo. — Casper Branch		250
5 Bachelor degree programs		
Master of Business Administration		

HISTORY

Casper is located on the North Platte River crossing of the Oregon, Mormon and California trails. It was known as Mormon's Ferry. The name was changed after Lt. Caspar Collins was killed defending the fort against hostile Indians in 1865.

Wyoming's significant role in the settlement of the West and the oil booms of the early 1900's recorded a colorful history for Casper and Central Wyoming.

CLIMATE

Mean daily maximum temperature in:
January 27.6° — July 86.2°
Mean monthly temperature in:
January 17.1° — July 69.6°

Total annual precipitation: 17.7 in.
Total annual snowfall: 112.7 in.
Average annual velocity: 12.1 mph
Average annual relative humidity: 63%

Average growing season: 130 days

CHURCHES

65 churches and one synagogue, representing 27 denominations.

MEDICAL

Physicians — 91 Dentists — 45
Chiropractors — 6
Psychological Center: 3 Psychiatrists
Memorial Hospital of Natrona County — 282 beds
Occupancy Rate 59%
3 Nursing Home facilities — 247 beds
Allergy Clinic, Central Wyoming Counseling Center, Casper Clinic & Casper Radiology Group

MEDIA

Newspaper: Casper Star Tribune, daily, statewide circulation — 33,282
Casper Journal twice weekly, local circulation — 15,000
Radio: Four local stations, KATI, KAWY-FM, KTWO and KVOC.
Television: Local station KTWO, United cable, AP news channel, 2 library stations, HBO station, in August — KCWY-TV.

RECREATION

Water and snow skiing, skating, snowmobiling, boating, baseball, hunting, swimming, tennis, horseshoe pitching, bowling, skating and camping.

Alcova Lake — 2,513 acres	26 miles SW
Hogadon Ski Area — 200 acres	11 miles S
Casper Mountain	960 acres
37 city parks	1,520 acres
Medicine Bow Nat'l Forest	14 miles S
swimming pools	4
golf courses	3
Hell's Half Acre	43 miles W

MUNICIPAL WATER SOURCE

Wells and water treatment plant
Source capacity: 35 million gal/day
Peak demand: 26 million gal/day
Storage capacity: 18 million gallons
Treatment: Chlorination and/or filtered
Hardness of tap water — 230 ppm.
Rates (Industrial — Commercial — Residential)
(Within corporate limits)
1st 6,000 gal/quarter — $7.35
Over 6,000 gal — 65¢ `000 gal.

SANITATION

Method of disposal: Sanitary landfill
Charge: $1.00/carlcad; $1.50/pickup load; $4.50/ton
Residential garbage rate: $10.25/quarter
Sewage Treatment: Primary, Secondary & Chlorination
Capacity: 6.5 million gal./day
Present load: 5.0 million gal./day
Rates: Residential — (based on winter water use) minimum charge $3.75 for first 6,000 gal./quarter + 30¢/1,000 over 6,000 gal.
Commercial — same as residential, but based on act' al water use.

NATURAL GAS

Supplied by: Northern Utilities Division of Kansas-Nebraska Natural Gas Company

Available supply 15.7 years 1,050 BTU/cu ft.

*Commercial Yearly Rate	per Mcf
2-5 million	$2.63
5-8 million	2.62
8-12 million	2.61
12-20 million	2.60
20-30 million	2.59
30-40 million	2.58
40-50 million	2.57

*Residential Rate	per Mcf
0-10 thousand	$2.99
10-50 thousand	2.78
50-200 thousand	2.73
200-300 thousand	2.69
300 thousand - over	2.63

ELECTRIC POWER

Supplied by: Pacific Power & Light
*Residential Rates
Based on number of kilowatts multiplied by .02556 plus minimum charge of $1.65/mo. multiplied by 4% sales tax.
3 General Service Classifications
0-100 kw (usage)
100-1000 kw
1000 and over kw

*Other rate schedules are available upon request.

LABOR MARKET ANALYSIS

SUPPLY (County)
Labor Force 38,161
Unemployed 831
Unemployment rate 2.2%

DISTRIBUTION OF LABOR FORCE

INCOME

Wyo. Per Capita Personal Income 1979 — $9,657
(Source: "Survey of Current Business")
Natrona Co. Median Household Effective Buying Income 1978 — $19,990
(Source: "Survey of Buying Power")

MAJOR EMPLOYERS

Name	Product	Emp.
Marathon Oil Co.	oil	181
Amoco Oil Refinery	oil	268
Little America Refinery	oil	150
Western Oil Tool Mfg.	steel fabrication	257
Teton Exploration	mining svcs.	250
Amoco Production	oil	52
Natrona County Memorial Hospital		750
Natrona County School District		1,674
True Drilling and affiliates	oil	650
First National Bank	financial	291
Wyoming Machinery	machinery	440
Wyoming National Bank	financial	200
Lower & Company	construction	200
Salt Creek Freightways	motor freight	670

HOUSING

No. of housing units in Casper: 19,236
Home ownership: 60%
No. of housing units in combined metro area: 25,066
The estimated cost of a new 3-bedroom home (1,100 sq. ft.), unfinished basement, 1-car garage, located in an area of comparable homes is approximately: $70,000 - $95,000
Average monthly rental (3 bdrm.): $380

CULTURAL ATTRACTIONS

Pioneer Museum; Ft. Caspar; Werner Wildlife Museum; Central Wyo. Fair and Rodeo; Community Concert; Civic Symphony; Nicolaysen Art Museum; West Winds Art Gallery; Goss Rock Museum

RETAIL AND WHOLESALE TRADE — COUNTY

No. of retail establishments: 467
Amount of retail sales (1978): $317,051,000
No. of wholesale establishments: 351

TAX STRUCTURE

Bonded Indebtedness
- School — $17,650,000.00
- City — $3,921,300

Total amount of revenue collected by the city in 1979 — $20,435,000

Ratio of assessed valuation to true 1979 value is approximately 8-10%.

Ratio of assessed value for manufacturing plants and new buildings — 25%.

TAXES

Wyoming
- No Personal Income Tax
- No Corporate Income Tax
- No Gross Receipts Tax
- No Excise Tax
- 3% Retail Sales Tax
- Favorable Inheritance Tax
- Favorable Unemployment Tax
- Low Property Taxes

Natrona County
- Additional 1% Sales Tax

Casper:
- No City Sales Tax
- No Occupation Tax
- No Poll Tax
- Low Property Taxes

LOCATION

Distance in miles from:

Billings, MT	289
Cheyenne, WY	180
Chicago, IL	1,036
Kansas City, MO	782
Los Angeles, CA	1,104
Omaha, NB	616
Salt Lake City, UT	357
Seattle, WA	1,094

MAJOR SHOPPING AREAS

Downtown Casper
200 Stores

Hilltop Shopping Center
217 South Montana
27 Stores

Sunrise Shopping Center
4000 South Poplar
23 Stores and Offices

Westridge Village
CY & Poplar
12 Stores

CY Avenue (Westridge Drive west to Paradise Valley)
69 Stores and Businesses

Mountain Plaza
Outer Dr. & Wyo. 220
7 Stores

Plaza East
E. Second & Walsh Dr. Drive
13 Stores

Eastridge Shopping Center
E. Second & Curtis
(Proposed)

Garden Creek Mall
Outer Drive & Poplar Street
(Proposed)

Beverly Plaza
12th & Beverly
14 Stores

ACCOMMODATIONS

Hotels: 2 — No. of rooms: 168
Motels: 36 — No. of rooms: 1,784

CONVENTION FACILITIES

Five with meeting room capacities of 1,500; 920; 500; 3,000 and 1,450.

STREETS

Less than 1% unpaved.

MINERALS — NATRONA COUNTY

Oil, natural gas, bentonite, uranium

MAJOR AGRICULTURAL PRODUCTS

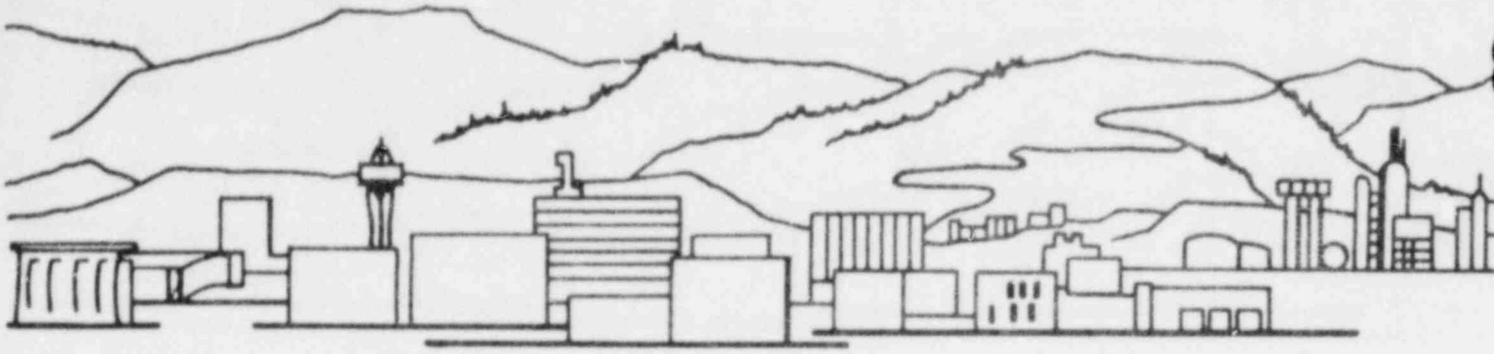
Beef, sheep, alfalfa, oats & barley

HIGHWAYS

Federal I-25, US 20, US 87, US 26, State Wyo 220

AIR SERVICE

Airport: Natrona County International
Runways: 4 with asphalt surface
Lengths: 10,600 ft.; 8,681 ft.; 8,661 ft & 8,687 ft.
Served by: Western Airlines, Frontier Airlines, Continental Airlines, Big Sky Airlines
General Aviation Services available.



CASPER, WYOMING

Area Development Statistics

(1979 year-end data)

Casper is primarily a service center for the mineral industry (oil, coal, uranium, natural gas and bentonite) in Wyoming. We are experiencing considerable growth due to the energy activity and this growth trend is expected to continue for some time. Casper also serves as a center for finance, retail, medical facilities and conventions.

POPULATION

YEAR	CASPER	NATRONA COUNTY
1890	544	
1900	883	
1[illegible]	2,639	
1[illegible]	11,447	14,635
19[illegible]0	16,619	24,272
1940	17,964	23,858
1950	23,673	31,437
1960	38,930	49,623
1970	39,361	51,264

Source: Official U.S. Census

POPULATION PROJECTIONS

YEAR	CASPER	METROPOLITAN AREA	NATRONA COUNTY
1979	58,172	74,000	79,037
1980	61,429	78,000	83,779
1985	77,737		107,967
1990	90,118		125,163

Source: Estimates City-County Planner, January, 1980

COMMERCIAL AIR TRANSPORTATION

YEAR	PASSENGERS		FREIGHT	
	ON	OFF	ON	OFF
1[illegible]	36,481	37,745	595,905	650,041
19[illegible]	57,827	64,641	602,693	1,350,826
1975	91,971	93,147	980,124	3,080,212
1977	118,205	118,231	1,112,734	2,855,956
1978	130,908	131,129	1,042,456	2,975,052
1979	145,367	141,892	978,067	2,886,926

Source: Casper Air Terminal

NATRONA COUNTY BUILDING PERMITS

YEAR	NUMBER PERMITS ISSUED	TOTAL COST
1978	503	$32,564,310.00
1979	577	$38,266,817.00

Source: City/County Planner

CASPER BUILDING PERMITS

YEAR	NUMBER PERMITS ISSUED	TOTAL COST
1965	254	$ 5,830,449.00
19[illegible]	428	$ 5,756,235.00
19[illegible]	835	$25,164,252.70
197[illegible]	1,372	$41,100,580.68
1978	1,329	$61,212,378.73
1979	1,605	$73,289,263.12

Source: City Engineer's Office

MILL LEVIES

YEAR	CITY	SCHOOL	COUNTY	STATE	TOTAL
1965	9.85	42.23	13.02	1.00	66.10
1970	9.84	43.82	15.49	6.00	75.15
1975	8.00	36.70	14.75	14.67	74.12
1977	8.00	35.00	12.50	18.00	73.50
1978	8.00	35.00	12.85	18.00	73.85
1979	8.00	33.50	13.00	18.00	72.50

Source: County Assessor's Office

SCHOOL ENROLLMENT

ELEMENTARY AND HIGH SCHOOLS		CASPER COLLEGE	
YEAR	TOTAL	YEAR	TOTAL
1970	13,931	1970	2,899
1975	13,191	1975	4,001
1977	13,878	1977	3,945
1978	14,520	1978	4,024
1979	14,187	1979	3,811

Source: Casper Public School, Casper College and Parochial Schools.

BANKS

YEAR	ASSETS	DEPOSITS
1965	$135,787,030.21	$120,980,256.85
1970	$186,405,399.90	$165,070,039.74
1975	$415,327,498.65	$360,251,658.67
1977	$505,247,063.00	$442,290,045.00
1978	$568,835,210.57	$501,764,008.99
1979	$676,680,000.00	$588,724,000.00

Source: Statements of Condition — December 31st

ASSESSED VALUATION

YEAR	CITY OF CASPER	NATRONA COUNTY
1965	$60,120,361	$138,609,955
1970	$56,590,013	$145,266,549
1975	$60,563,103	$213,447,584
1977	$81,550,777	$220,416,872
1978	$89,869,032	$227,024,752
1979	$98,285,450	$246,256,286

Source: County Assessor's Office

RETAIL SALES — NATRONA COUNTY

YEAR	TOTAL
1965	$101,416,000
1970	$112,624,000
1975	$214,571,000
1977	$261,488,000
1978	$317,051,000

Source: Sales Management Survey of Buying Power

UTILITIES

YEAR	TELEPHONES	WATER METERS	GAS METERS	ELECTRIC
1965	27,947	NA	14,703	14,597
1970	33,332	11,666	15,313	15,839
1975	45,437	12,574	18,116	19,333
1977	54,732	13,468	20,797	22,243*
1978	60,265	14,166	21,962	23,912*
1979	65,039	14,830	23,009	25,574*

*New method of computing data

SALES AND USE TAX COLLECTIONS

YEAR	NATRONA COUNTY
1965	$ 3,223,655.17
1970	$ 6,166,844.09
1975	$18,999,487.00*
1977	$25,911,956.07*
1978	$25,533,771.00*
1979	$25,596,748.00*

Source: Wyoming Department of Revenue, Monthly Report (*1¢ additional sales tax included)

POSTAL RECEIPTS

YEAR	TOTAL
1965	$ 887,362.84
1970	$1,167,905.70
1975	$1,875,330.86
1977	$2,562,768.81
1978	$3,158,243.89
1979	$3,401,112.23

ESTIMATES OF EMPLOYMENT IN NON-AGRICULTURAL ESTABLISHMENTS IN NATRONA COUNTY
(Employment in Thousands)

	1965	1970	1975	1977	1978	1979
TOTAL EMPLOYMENT NON-AGRICULTURAL	17.4	19.8	25.1	30.3	36.4	39.0
MINING	3.1	3.3	4.6	5.7	7.3	7.8
CONTRACT CONSTRUCTION	1.1	1.2	1.8	2.9	3.7	4.0
MANUFACTURING	1.4	1.7	1.6	1.7	1.7	1.8
TRANSPORTATION COMMUNICATION & UTILITIES	1.6	1.7	1.8	2.1	2.5	2.8
WHOLESALE TRADE	1.2	1.4	2.0	2.8	3.4	4.1
RETAIL TRADE	[illegible]	3.2	4.5	5.0	6.5	6.7
FINANCE, INSURANCE & REAL ESTATE	0.8	0.8	0.9	1.3	1.4	1.5
SERVICE & MISC.	2.3	2.8	3.9	4.4	5.2	5.2
GOVERNMENT	3.0	3.7	4.0	4.4	4.6	5.1

Source: Employment Security Commission

EFFECTIVE BUYING INCOME

YEAR	PER CAPITA-WYOMING	MEDIAN HOUSEHOLD NATRONA COUNTY
[illegible]	2,008	7,812
[illegible]	2,217	8,723
1970	2,981	10,260
1975	4,805	14,745
1976	5,242	14,892
1977	5,940	17,221
1978	6,724	19,990

Source: Sales Management "Survey of Buying Power"

NATRONA COUNTY VEHICLE REGISTRATIONS
(Total Licenses Issued)

YEAR	TOTAL
1965	39,262
1970	44,795
1975	60,507
1976	61,645
1977	72,437
1978	80,029
1979	93,639

Source: Natrona County License Department

WYOMING PER CAPITA PERSONAL INCOME

YEAR	TOTAL
1970	$3,672
1975	$5,942
1976	$6,723
1977	$7,562
1978	$8,637
1979	$9,657

Source: U.S. Department of Commerce Survey of Current Business

HOUSEHOLDS
(through December 1979)

CASPER

14,175 Single Family
843 Mobile Homes
7,218 Multi-Family
19,236 Total Households

MILLS

350 Single Family
30 Multi-Family
437 Mobile Homes
817 Total Households

EVANSVILLE

403 Single Family
42 Multi-Family
283 Mobile Homes
728 Total Households

SPECIAL STUDY AREA
(Surrounding unincorporated areas)

1,959 Single Family
65 Multi-Family
2,261 Mobile Homes
4,285 Total Households

TOTAL HOUSEHOLDS SURVEYED

16,887 Single Family
4,355 Multi-Family
3,824 Mobile Homes
25,066 Total Households

Source: City of Casper Housing and Community Development Office
6/80

PREPARED BY:
Casper Area Chamber of Commerce
500 North Center
P.O. Box 399
Casper, WY 82602
(307) 234-5311