GROUNDWATER REPORT NO. 30

STATE OF OREGON

WATER RESOURCES DEPARTMENT

WILLIAM H. YOUNG
Director

UPDATE OF GROUND WATER CONDITIONS AND DECLINING WATER LEVELS IN THE BUTTER CREEK AREA, MORROW AND UMATILLA COUNTIES, OREGON

By
MARC A. NORTON
and
WILLIAM S. BARTHOLOMEW

SALEM, OREGON
OCTOBER 1984

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PREFACE

Ground Water Report 24 - GROUND WATER CONDITIONS AND DECLINING WATER LEVELS IN THE BUTTER CREEK AREA, MORROW AND UMATILLA COUNTIES, OREGON was published in October 1975 in response to declining water levels in the basalt aquifer since 1958. The report presented geologic and hydrologic information to be used by the Oregon Water Resources Department in a proceeding for the determination of the Butter Creek Critical Ground Water Area. The hearing was held on February 18, 1976 in Hermiston, Oregon and an order was issued by the Department on April 2, 1976 declaring the area critical, closing the area to further appropriations and restricting withdrawals from the Butter Creek Critical Ground Water Area. The order was challenged in the Court of Appeals and was remanded on January 24, 1977 because of a procedural error.

A second hearing was held in Hermiston, Oregon on June 28, 1977. A new order was issued on May 23, 1978 again declaring the area critical, closing the area to further appropriations, and restricting withdrawals from the Butter Creek Critical Ground Water Area. The order was challenged in the Court of Appeals and was remanded a second time on June 11, 1979 because of another procedural error. Since that time no further legal action has been taken in regard to the proposed Butter Creek Critical Ground Water Area. Data collection in the area has continued up through the present.

This document is an update of Ground Water Report 24. The update is accomplished in the following manner: 1) The original DEFINITIONS OF SELECTED GROUND WATER AND GEOLOGIC TERMS section has been placed in Appendix I and has been replaced with a more complete list. 2) Water rights for wells developing water from the basalts were listed in Table 1 and water rights for wells developing from the alluvial deposits were listed in Table 2. The basalt water rights are now listed in Appendix II, the gravel water rights are listed in Appendix IV and water rights that have been cancelled are listed in Appendix III. 3) The original RECORDS OF WELLS - Basalt Aquifers has been revised and is in Appendix V. 4) Water level data from wells within the proposed Butter Creek Critical Ground Water Area have been included in the updated text and are in Appendix VI. 5) Pumpage data from wells within the proposed Butter Creek Critical Ground Water Area are in Appendix VII. 6) Any revisions or additions to the original text succeed the original paragraph, are indented, single-spaced, and are set aside by a row of asterisks (*) before and after the additions to the text.

The authors feel that this format would be the easiest method of updating and revising the report with the current hydrogeologic concepts and the data collected since 1975.

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DEFINITIONS OF SELECTED GROUND WATER AND GEOLOGIC TERMS

Alluvium: Detrital deposits of clay, silt, sand and gravel resulting from the erosion and/or deposition by modern rivers, thus including the sediments laid down in river beds, flood plains, lakes, and at the foot of mountain slopes, and estuaries

Anticline: A fold that is convex upward, in which strata dip away in opposite directions from a common ridge or axis and whose core contains stratigraphically older rocks.

Aquifer: A body of saturated rock, alluvium, or other naturally occurring material that contains sufficient permeability to store, transmit, and yield sufficient quantities of water to wells or springs so that the wells or springs can serve as a practical source of water.

Artesian Aquifer: Artesian is synonymous with confined. A geologic unit that contains water under sufficient hydrostatic pressure to cause the water level in a well to stand above the bottom of the overlying confining layer. When the water pressure is sufficient to raise the water level above land surface, a well penetrating the aquifer will flow.

Borehole: A circular hole made by boring or drilling.

Cascading Water: Ground water that enters a well bore above the regional water level and falls down the well.

Fanglomerate: A sedimentary rock of heterogeneous materials that were originally deposited in an alluvial fan and have since become cemented into consolidated rock.

Fault: A fracture or series of fractures in the earth's crust accompanied by a displacement of one side of the fracture with respect to the other and in a direction parallel to the fracture.

Hydraulic Conductivity: The quantity of ground water flowing in one unit of time through a face of unit area perpendicular to the direction of flow under a driving force of one unit of hydraulic head change per unit length. This is usually expressed as gallons per day per foot square, or feet per day.

Hydraulic Gradient: The change in static head per unit of distance in a given direction.

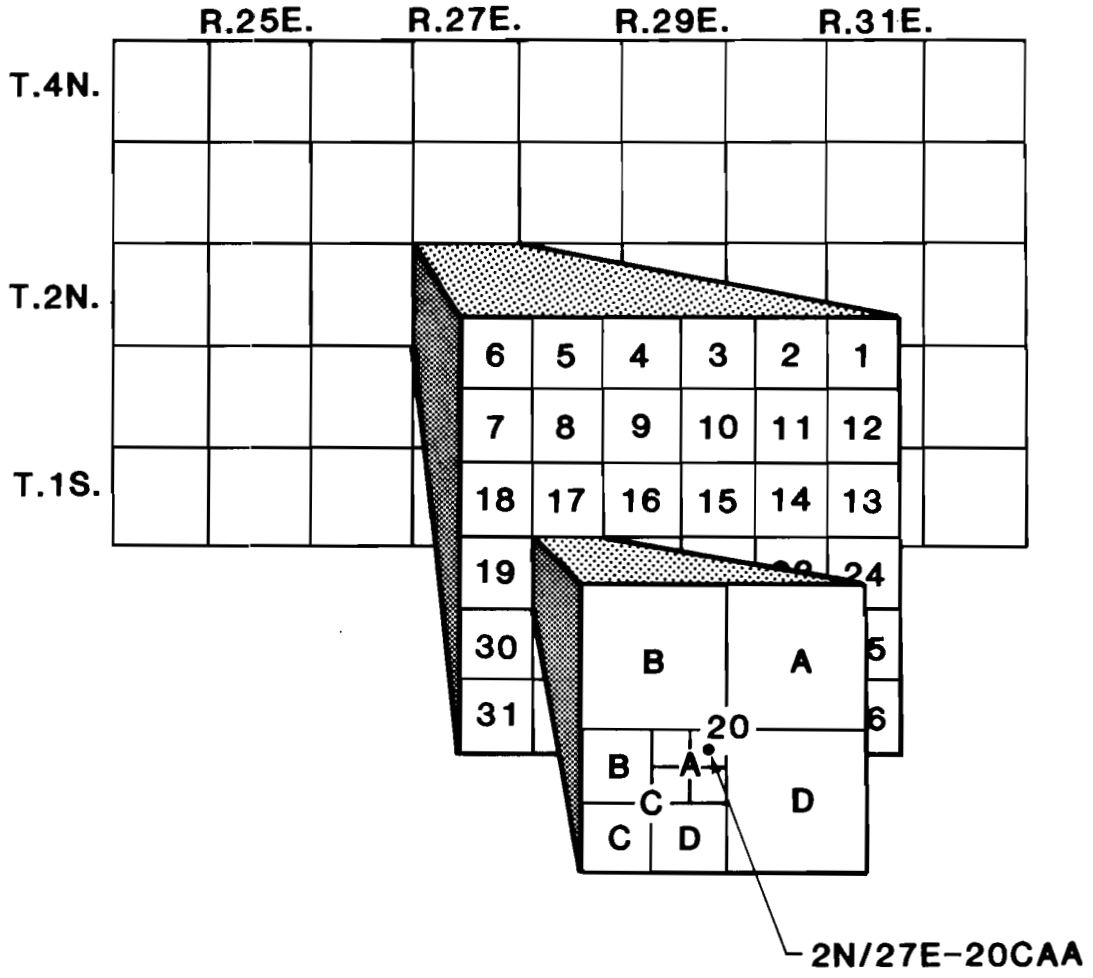
Interference: The lowering of the water level in a well or spring due to pumping of neighboring well(s).

Monocline: A local steepening or steplike bend in otherwise gently dipping strata.

Permeability:	The ability of a rock or soil to transmit fluid such as water under a hydraulic gradient.
Porosity:	The ratio of the total volume of voids in a rock or soil to its total volume, usually expressed as a decimal, fraction or as a percentage.
Potentiometric Head:	The level to which water in an aquifer will rise by hydrostatic pressure usually expressed as an elevation above sea level.
Storage Coefficient:	The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.
Syncline:	A fold that is concave upward in rocks in which strata dip inward from both sides toward the axis of the fold and whose core contains stratigraphically younger rocks.
Synoptic Measurements:	A group of water level measurements taken at approximately the same time over a broad area to give a simultaneous display of conditions.
Transmissivity:	The rate of flow of water at the prevailing temperature through a unit width of aquifer, extending the full saturated thickness, under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the saturated thickness of the aquifer. This is usually expressed as gallons per day per foot, or square feet per day.
Vesicular:	A textural term describing the many small cavities which are formed by the expansion of a bubble of gas or steam during the solidification of igneous rock.
Water Level:	The distance from land surface to the top of the water column in a well that penetrates either an artesian or water table aquifer. When the well is pumping, the water level is referred to as a pumping level. The water level is referred to as a static water level in a well that has recovered from pumping.
Water Table Aquifer:	Water table is synonymous with unconfined. A water-bearing geologic unit where the hydrostatic pressure at the upper surface of the water body is atmospheric.

Figure 1. Well Numbering System

The well and spring numbering system used in Oregon is based on the rectangular system used for subdivision of public land. Each well number indicates the geographic location of the well and describes the township, range and section. For example, the well number 2N/27E-20CAA indicated a well located within Township 2 North, Range 27 East and Section 20. The letters indicate the well location within the section as shown in Figure 1. The first letter (C) represents the quarter section (160 acres), the second letter (A) the quarter-quarter section (40 acres), the third letter (A) the 10-acre tract. If more than one well is located within a 10-acre tract, a series number is added following the third letter to distinguish each well.



GROUND WATER CONDITIONS AND DECLINING WATER LEVELS IN THE BUTTER CREEK AREA, MORROW AND UMATILLA COUNTIES, OREGON

I. INTRODUCTION

A. Location

The Butter Creek Area lies along the eastern and southern borders of the Ordnance critical ground water area in Morrow and Umatilla Counties, Oregon. The area encompasses approximately 274 square miles (175,360 acres). Base maps for the area have been compiled from 7 1/2 minute topographic maps prepared by the U.S. Geological Survey for the Umatilla, Hermiston, Ordnance, Service Butte, Service Buttes NW, Strawberry Canyon NE, Strawberry Canyon SE, Butter Creek Junction and Vey Ranch quadrangles. The northern portion of the Butter Creek area lies parallel to and west of the Hermiston city limits. The proposed critical area boundary is shown on Plate 1. The southern portion of the area is much wider and contains most of the deep basalt wells located north of the Willamette Baseline within Ranges 26, 27 and west half of Range 28 East.

* *

When the southern boundary of the proposed critical ground water area was adjusted in 1976, the portions of the following topographic maps were added on in the south: Swaggart Buttes, Gleason Butte, and Lena. The Irrigon, Clarke, Boardman, Well Spring, Strawberry Canyon SW and Lexington topographic maps cover the area north and west of the boundaries. The city limits of Hermiston currently extend inside the boundaries of the proposed Butter Creek Critical Ground Water Area. Plate 1 has been updated and shown on Plate 2.

* *

A regional geologic study of the entire Columbia Slope was undertaken in 1951 by the U.S. Geological Survey. See Hogensen - Geology and Ground Water of the Umatilla River Basin, Oregon - U.S. Geological Survey Water Supply Paper 1620, published 1964. R.C. Newcomb of the U.S. Geological Survey completed a tectonic structure map, I-587,

in 1970. In 1971, a second report was prepared by James H. Robison of the U.S. Geological Survey in cooperation with the Oregon State Engineer. See Hydrologic Atlas HA-387, Hydrology of Basalt Aquifers in the Hermiston - Ordnance Area, Umatilla and Morrow Counties, Oregon, published 1971.

* *

Swanson and Wright published an article on the bedrock geology of the Columbia Plateau in 1978. A reconnaissance geologic map of the Columbia River Basalt Group was published in 1981 by Swanson and others. An open file report by the Water Resources Department, Oberlander and Miller, was completed in 1981 on the hydrology of the Umatilla Structural Basin. Selected ground water data was published by the U.S.G.S in 1983. Personal communication with Ann Smith and Charlie Collins, U.S.G.S., supplied valuable data and information on the Umatilla Structural Basin.

* *

B. Purpose

Water levels in domestic and irrigation wells located within the Butter Creek ground water area have been declining since 1958. Some well owners have found it necessary to deepen wells and lower pump settings during the last few years. Continued overdraft of the basalt aquifers has made a significant reduction in the amount of stored ground water within the area. Pumping lifts in some of the deeper wells are now approaching 600 feet. The Ground Water Act of 1955 and particularly paragraphs 8 and 9 of ORS 537.525, recognizes and declares the State Legislative policy:

8. "Depletion of ground water supplies below economic levels, impairment of natural quality of ground water by pollution and wasteful practices in connection with ground water be prevented or controlled within practical limits."

9. "Whenever wasteful use of ground water, impairment of or interference with existing rights to appropriate surface water, declining ground water levels, interference among wells, overdrawing of the ground water supplies, or pollution of the ground water exists or impends, controlled use of the ground water concerned be authorized and imposed under voluntary joint action by the Director of the Water Resources Department and the ground water users concerned whenever possible, but by the Director of the Water Resources Department by the police power of the State when such joint action is not taken or is ineffective."

* *

The underlined portion of paragraph 9 of ORS 537.525 currently reads as follows:

> ... Water Resources Director and the ground water users concerned whenever possible, but by the Director under the police power of the state when voluntary joint action is not taken or is ineffective."

* *

ORS 537.730 of the Ground Water Act provides for the initiation of a proceeding for the determination of a critical ground water area. The Director of the Water Resources Department may initiate such a proceeding whenever he has reason to believe that: (a) ground water levels in the area in question are declining or have declined excessively; or (b) the wells of two or more ground water claimants or appropriators within the area in question interferes substantially with one another; or (c) the available ground water supply in the area in question is being or is about to be overdrawn; or (d) the purity of the ground water in the area in question has been or reasonably may be expected to become polluted to an extent contrary to the public welfare, health and safety.

* *

A new subsection has been added to ORS 537.730 in front of (c) so that (c) is now (d) and (d) is now (e). Subsection (c) now reads:

> (c) The wells of ground water claimants or appropriators within the area in question interfere or are likely to interfere with the production of geothermal resources from an area regulated under ORS chapter 522 or the production of geothermal resources from an area regulated under ORS chapter 522 interferes or is likely to interfere with an existing ground water appropriation;

* *

The State Engineer established a net of water level observation wells within the critical area during the years of 1958 through 1972. Periodic water level data has been collected in 37 wells within the study area since 1958.

* *

Since the writing of the original report, water levels have declined further. The water level for a well located at 2N/27E-20CAA when measured in February of 1982, 1983 and 1984 has been greater than 600 feet below land surface. The pumping lift for this well exceeds the 600-foot depth being approached in 1975. From 1975 through 1984, water levels in an average of 40 wells per year have been checked during the synoptic measurements (Table 1).

TABLE 1: Number of wells measured in the proposed Butter Creek Critical Ground Water Area by year since 1975.

Year	Number of Wells	Year	Number of Wells
1975	38	1980	36
1976	37	1981	22
1977	35	1982	32
1978	41	1983	39
1979	60	1984	64

* *

This report represents local geology and ground water information to be used by the Water Resources Department in a proceeding for the determination of the proposed Butter Creek critical ground water area.

* *

This update of the 1975 report will depict the current conceptual model of the hydrogeologic system in the Butter Creek area of the Umatilla Structural Basin. Hydrologic data including precipitation records, water level data, and pumpage records will be presented and discussed.

* *

C. Ground Water Development

The development of the ground water in the basalt aquifers in the Butter Creek ground water area began in the year 1925 with the construction of a well, 125 feet deep, in Section 34, Township 2 North, Range 27 East. During the late 1940's and the early 1950's, six additional wells were constructed along the small narrow valley areas adjacent to Butter Creek. The first deep well (well No. 11) was constructed in the area in 1952 to a depth of 554 feet. The well was deepened to 840 feet in 1961 and reportedly began flowing during April of that year. Following the construction of this well, the area along Butter Creek developed rapidly. By 1960, a total of 15 irrigation wells were completed. Ten more wells were added during the years between 1960 to 1966. During the next two years, 1967 and 1968, 25 wells were drilled thereby doubling the total number

TABLE 2:

CHRONOLOGIC LIST OF CURRENTLY USED IRRIGATION WELLS BY DATE OF CONSTRUCTION

(Numbers are the well numbers of the wells described in the back of this report)

(Underlined numbers are the wells in the north part of the ground water area in Townships 4 and 5 North, Range 28 East)

Year	Wells in Basalt
1925	1
1949	2
1950	
1951	3, 5, 7
1952	6
1953	9, 13, 13A
1954	
1955	
1956	15
1957	4, 11A
1958	12
1959	14
1960	16
1961	
1962	17, 18, 21, 49
1963	19
1964	20, 23, 25, 33
1965	
1966	29
1967	25*, 28, 30, 31, 34, 37, 38, 46
1968	3*, 32, 35, 35A, 36A, 41, 42, 44, 45, 47, 48, 51, 55, 56, 59, 71
1969	50, 53, 53A, 54, 57, 58, 78
1970	49*, 50*, 52, 63
1971	52A, 62, 62A, 64, 72
1972	62B, 68, 71*, 74, 77
1973	

* Wells that have been deepened.

of irrigation wells in the area. An average of 5 wells per year were added between 1968 and 1972 bringing the total number of wells to 72. These wells range in depth from 665 feet to 1500 feet.

* *

Well No. 11 is located in Township 2 North/Range 27 East-Section 11BDD. Since 1972, twelve more wells have been drilled.

* *

In the northern part of the Butter Creek ground water area, in the west half of Townships 4 and 5 North, Range 28 East, 12 wells currently develop ground water from the basalt aquifers. Wells penetrating into the basalt in this area range from 59 feet to 785 feet in depth.

The major ground water development has taken place in the southern part of the area, in Townships 1 and 2 North, Ranges 26 and 27 East, during the years between 1968 and 1972. In the overall Butter Creek ground water area, approximately 66 wells currently develop ground water from the aquifers within the basalts. In addition, five sumps are in use and develop water from the shallow gravels along the banks of Butter Creek.

* *

In 1980 there were only 52 irrigation wells developing water from the basalts. By 1984 there were 42 irrigation wells pumping ground water from the basalts.

* *

II. GEOLOGIC SETTING

* *

The following paragraph by Todd (1959, page 5) briefly describes the interconnection between precipitation, geology, and ground water:

> "Ground water constitutes one portion of the earth's water circulatory system known as the hydrologic cycle....Water-bearing formations of the earth's crust act as conduits for transmission and as reservoirs for storage of water. Water enters these formations from the ground surface or from bodies of surface water, after which it travels slowly for varying distances until it returns to the surface by action of natural flow, plants, or man. The storage capacity of ground water reservoirs combined with small flow rates provide large, extensively distibuted sources of water supply....Ground water emerging into surface stream channels aids in sustaining streamflow when surface runoff is low or non-existent. Similarly, water pumped from wells represents the sole water source in many regions during much of every year."

The following sections describe the climate and geologic setting as they pertain to the hydrologic system in the Butter Creek area.

* *

A. Climate

The climate for this portion of the "Columbia Slope" is described as mild and semi-arid. The meager precipitation of six to nine inches per year occurs during the winter and spring months. The average number of frost free days is reported to vary from 158 to 184 days. Hogensen reports that evaporation records at Hermiston for the years of 1947 through 1954 show a winter evaporation of 4 inches or less per year. The average annual pan evaporation at Hermiston is approximately 45 inches per year. This converts to a direct surface evaporation of about (45 x .7) = 31.5 inches per year.

* *

Evaporation data has been collected at Pendleton Branch Experiment Station since 1975. From 1975 through 1983, evaporation rates have averaged 55.15 inches from March through October. For various reasons, pan evaporation rates are higher than from a large lake or reservoir. To correct this, the pan evaporation data are multiplied by a pan coefficient which is 0.7. Therefore, the average rate at Pendleton after corrections is 38.6 inches.

Precipitation at Hermiston averages 8.70 inches per year. From 1978 through 1983, precipitation has been over 10 inches a year and in three of the years, over 11 inches of precipitation was measured (Figure 3). This above-average precipitation increases surface water supplies and makes available more water for recharge to the ground water system.

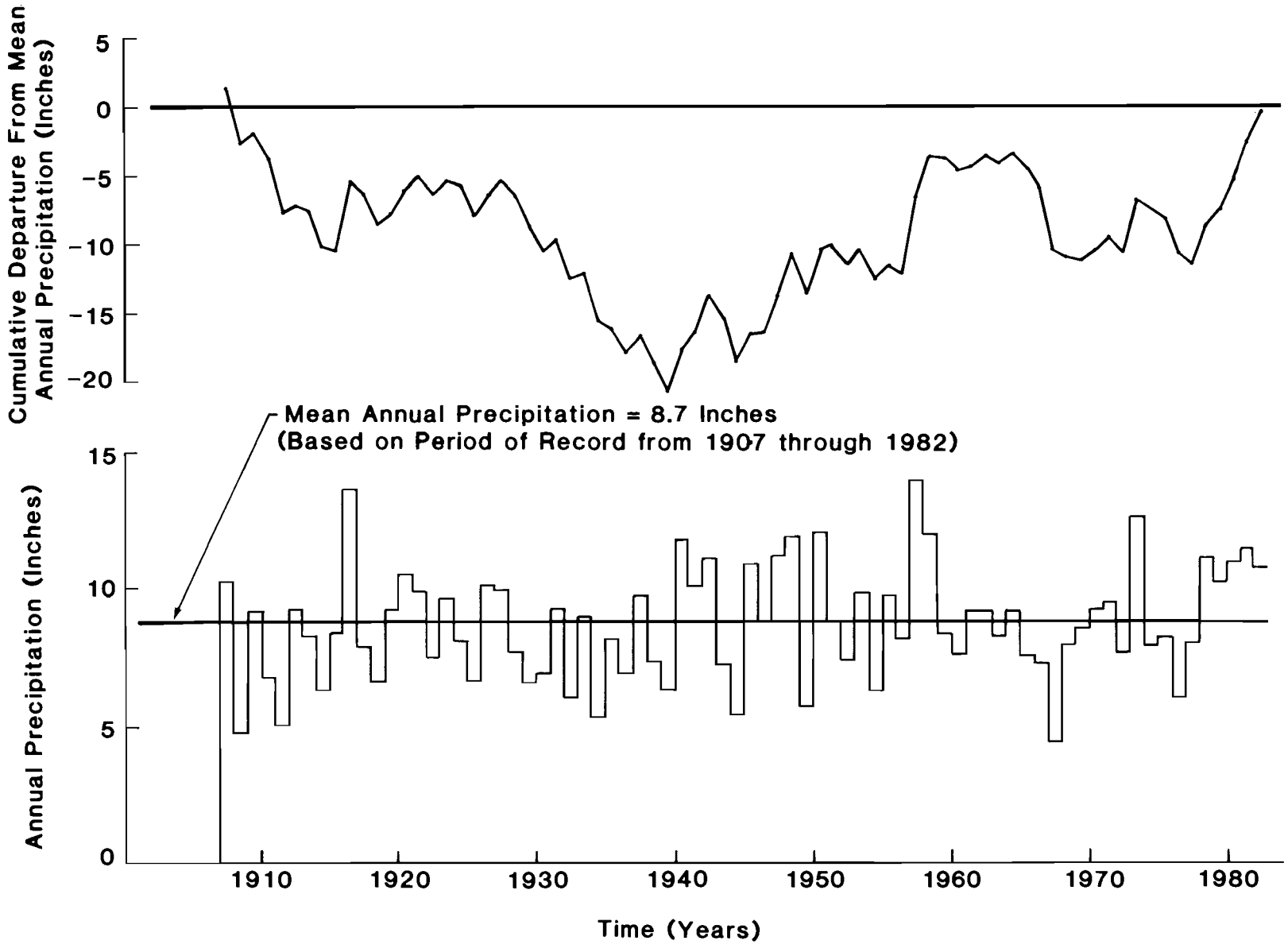
* *

B. Physiography

The Butter Creek critical ground water area extends from the Columbia River southward with rising gentle slopes marked by low terraces, rounded hills and small stream valleys that drain northward away from the base of the Blue Mountains. The Butter Creek critical area gently rises from an altitude of about 250 feet near the Columbia River at Irrigon to an elevation in excess of 1800 feet near the base line separating Townships 1 North and 1 South. The Willamette base line forms the southern boundary of the Butter Creek critical area.

Figure 2: Precipitation and Cumulative Departure from Average Precipitation in percent: 1917 - 1974 (Hermiston, Oregon). ***Previous Figure 1.***

Figure 3: Precipitation and Cumulative Departure from average precipitation in inches: 1907 - 1982 (Hermiston, Oregon).



The majority of irrigated land within the Butter Creek area stands at elevations between 680 and 1700 feet above sea level. Butter Creek provides the main drainage within the critical area. Two intermittent streams lying further to the west form parallel drainages which occupy Sand Hollow and Little Juniper Canyons.

* *

> At the first hearing on the determination of the Butter Creek Critical Ground Water Area on February 18, 1976, the southern boundary was moved south to the anticlinal axis that runs through Morris Butte, Gleason Butte, and Swaggert Buttes. Morris Butte, with an elevation of 2931 feet above sea level, is the highest point within the boundaries.

* *

C. Stratigraphy

The oldest and most dominant geologic formation within the Butter Creek critical area is exposed locally in the hills along the southern portion of the critical area at elevations generally above 1500 feet. Here the extensive series of Miocene basalt rock are exposed at land surface. The formation is known as the Columbia River Group and is the thickest and most extensive rock unit within the critical area. The basalt rocks are resistant to weathering and therefore control the topography of the area.

Three sedimentary units overlie the basalt surface. The older sedimentary material is described as fanglomerate which is composed of silt and basaltic conglomerate layed (SIC) down in Pliocene time following a moderate folding of the Columbia River basalt surface. Much of the fanglomerate material is composed of eroded basalt from higher elevations which have been water deposited with surface slope debris at lower elevations. Below an elevation of approximately 750 feet, the fanglomerate is itself overlain by Pleistocene glacial lake deposits (glaciofluviatile deposits). These materials are made up of poorly sorted sand, gravel and interbedded silt which were water deposited during flood stages of the Columbia River. The maximum thickness of the older alluvial deposits in the

Ordnance critical area is approximately 200 feet. In the northern portion of the Butter Creek area the gravel deposits are thinner, averaging about 140 feet near Buck Corners.

****

The uppermost alluvial deposit is composed of poorly sorted, medium- grained sand and gravel that covers the Butter Creek flood plain.

****

1. Columbia River Basalt

The Columbia River basalt formation is composed of a thick series of accordantly layered basaltic lavas. This formation underlies the entire critical area at depth. The thickness of the Columbia River basalt is in excess of 2500 feet and may exceed 5000 feet in some areas of the Columbia Plateau. Columbia River basalts are made up of individual lava flows which were poured out one upon the other over a broad area of Washington, Oregon and Idaho. Individual lava flows in the formation vary from 10 to 150 feet in thickness. Most of the lava flows were very fluid and moved rapidly over distances from 1 to 12 miles. The lavas poured out from numerous cracks and fissures within the Columbia basin. Individual out pourings (SIC) formed rivers and lakes of molten rock which cooled rapidly. The extensive out pourings (SIC) of this lava obscured earlier buried surfaces and formed a broad lava plain covering more than 50,000 miles of Oregon, Washington and Idaho.

During the quiet periods of volcanic activity, local streams became impounded upon the basalt surface. In such areas, local interbeds of clay, silt, sand and gravel were layed (SIC) down by the local streams. These sedimentary interbeds are quite common within the Columbia River Group. Robison (1971) has estimated that the sedimentary interbeds constitute 4 to 30 percent of the total thickness of the Columbia River basalt formation. A number of these sedimentary interbeds stand above the regional water table. However, where saturated below the regional water table, sand and gravel interbeds form good water yielding zones to wells. The deepest water well within the Butter Creek area penetrates the Columbia River basalt formation for a depth of 1500 feet. The well is identified as Grieb Well 3.

* *

The well is located in Township 1 North/Range 26 East-Section 5BBA.

* *

Individual lava flows within the Columbia River formation differ in physical characteristics. Varying rock textures are due in part to the chemical composition, the magma temperature, and local environmental conditions at the time of deposition. The water bearing properties of a particular lava flow are also determined in part by the rate of lava weathering and the general gas and liquid content of the individual lava flow. Basaltic lavas of the Columbia River formation often contained intrapped (SIC) gases. When a lava flow reached the land surface, gas bubbles often formed in the liquid magma and created porous, scoraceous(SIC) interflow zones between successive layers of lava. Subsequent weathering and erosion of the scoraceous(SIC) surface often created porous, permeable zones between the layered lava rocks. The top and bottom surfaces of some of the individual flows have formed very permeable contact zones. Where these zones have become saturated below the regional water table, they form high yielding aquifer units within the Columbia River formation. Most of the ground water movement is parallel to the bedding plains of the individual lava flows, therefore the lateral or horizontal permeability between flows is often very high.

Thick lava flows commonly develop a columnar jointing within individual flows. The columns are generally five-sided (pentagonal) pillars or columns which stand perpendicular to the top and the bottom of the individual lava flow. Rectangular and diced jointing also serve to divide some of the basaltic lava formations into angular blocks having dimensions of one to twenty-four inches on a side. When these jointing systems are open and well developed, they provide some permeable zones in which ground water can move vertically through the dense rock formation. It is common, however, that overlying silt cover and rock weathering have closed, to some degree, the fractures and joints which reduces the vertical permeability of the basalt.

The thickness of the Columbia River Group is estimated to be in excess of 2500 feet within the critical ground water area and it is the most widespread and productive aquifer within the Butter Creek critical area. Limited amounts of ground water are developed from the younger Butter Creek gravel deposits.

Older rock units that underlie the Columbia River basalt formation are not exposed in the area. However, they are believed to be equivalent of the Clarno formation which is exposed 15 to 20 miles south of the Butter Creek area. These materials are tightly compacted sediments and contain a variety of volcanic tuffaceous clay and ash deposits and an occasional lava flow. The formation offers very low yields to wells and is considered nonproductive for other than domestic and stock water supplies.

****

In 1980, the Oregon Water Resources Department and the United States Geological Survey (USGS) in Portland entered into a cooperative agreement for further investigation of the geology and hydrology of the Umatilla Structural Basin in northeast Oregon. The Butter Creek study area is located in the north-central portion of the basin. The agreement called for the development of a digital model of the ground water flow system(s) in the basalts. Before the model could be developed, a better understanding of the hydrogeology was needed. Ann Smith, USGS, examined several hundred drillers' logs and extended the surface mapping by Swanson and others, 1981, into the subsurface. Based on the data collected from the drillers' logs, water level measurements, and geologic structures in the basin, a conceptual model was developed. The following discussion on the stratigraphy and structure of the basin as it relates to the Butter Creek area is based on personal communication with Ann Smith and the basic data relevant to the Butter Creek area.

Basalts in the Butter Creek study area are of the YAKIMA BASALT SUBGROUP of the COLUMBIA RIVER BASALT GROUP. The subgroup is divided into three Formations: 1) the SADDLE MOUNTAINS BASALT; 2) the WANAPUM BASALT; and 3) the GRANDE RONDE BASALT. The interbeds mentioned below are members of the Ellensburg Formation (Swanson and others, 1981). The stratigraphic relationship and a description of each unit is shown in Figure 4.

The SADDLE MOUNTAINS BASALT is made up of three members: 1) Elephant Mountain; 2) Pomona; and 3) Umatilla. The basalt units are separated by the Rattlesnake Ridge and Selah Interbeds, respectively. The Elephant Mountain member is not present in the Butter Creek area as it pinches out north and west of the proposed critical area boundaries. The Pomona and Umatilla members are present only in the panhandle section of the Butter Creek area. Figure 5 shows the lateral extent of the basalt flows and the location of the geologic cross sections. The Pomona member has a maximum thickness in the Butter Creek area of 200 feet, while the Umatilla member is generally less than 100 feet thick except near the Columbia River where it reaches 150 feet thick. Figure 6 shows the southern limit of the Pomona and Umatilla Basalts. The Mabton Interbed lies below the Umatilla member and separates the SADDLE MOUNTAINS BASALT from the WANAPUM BASALT. Figure 7, a cross section through the panhandle, shows that the Umatilla Member pinches out near the western boundary of Butter Creek.

The Priest Rapids and Roza members of the WANAPUM BASALT are not present in the Butter Creek area. The Frenchman Springs member of the WANAPUM BASALT is a major source of ground water in the Butter Creek area. It exceeds 600 feet in thickness near the Columbia River (Figure 6) and extends approximately 22 miles south, pinching out on the flank of the Willow Creek Monocline. An increase in dip is displayed mainly in the Frenchman Springs member and the underlying Grande Ronde Basalt. In the Butter Creek area, one major interbed and two smaller, less extensive interbeds are found in the Frenchman Springs member. Figure 8 shows the Frenchman Springs thinning rapidly to the east.

The GRANDE RONDE BASALT is the oldest formation exposed in the Butter Creek area. Over 800 feet of Grande Ronde Basalt has been penetrated in the Butter Creek Area but the total thickness is estimated to be 1800 feet. In the northern portion of the area, the GRANDE RONDE BASALT is overlain by as much as 970 feet of younger basalts and sediments.

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FIGURE 4 Stratigraphy and descriptions of geologic units in the Proposed Butter Creek Critical Ground Water Area (Modified from Swanson and others, 1981). Sedimentary interbeds are members of the Ellensburg Formation.

DESCRIPTION OF UNIT	GEOLOGIC UNIT		TIME UNIT		
Alluvium, morainal and glacial outwash material, and gravel, sand, and silt deposited by Missoula floods. Locally includes loess of Palouse Formation.	Sedimentary Deposits		HOLOCENE AND PLEISTOCENE	QUATERNARY	CENOZOIC
Unconsolidated and weakly consolidated gravel, interbedded sand, and tuffaceous deposits. Composed mostly of clasts derived from Columbia River Basalt Group and older units. Includes deposits of the Shutler formation of Hodge (1932, 1942) and "Pliocene fanglomerate" of Hogenson (1964), both correlated with the Dalles Formation by Newcomb (1966).	Gravel and Conglomerate				
Slightly phyric basalt flows of Pomona chemical type (Wright and others, 1973). Contains small phenocrysts of plagioclase, clinopyroxene, and olivine. Reversed magnetic polarity (Rietman, 1966; Choiniere and Swanson, 1979). Potassium-argon age about 12 m.y. (McKee and others, 1977). Occurs extensively on Horse Heaven Plateau and in northern Oregon along Columbia River.	Pomona Member	SADDLE MOUNTAINS BASALT	MIOCENE	TERTIARY	
	Selah Interbed				
Fine-grained basalt flows or flows of Umatilla chemical type (Wright and others, 1980). Typified by very even grain size and near lack of phenocrysts. Normal magnetic polarity (Rietman, 1966). Occurs on Horse Heaven Plateau, along Columbia River east of Umatilla, Oregon, at scattered localities on northwest flank of Blue Mountains uplift east of Adams, Oregon, and extensively between crest of uplift and Joseph Creek. Major vent area occurs north at Puffer Butte (Price, 1974, 1977; Swanson and others, 1980), and feeder dikes occur along strike in mapped area in Joseph Creek (T6N, R45E) and in Little Sheep Creek (T1S, R47E; Kleck, 1975).	Umatilla Member				
	Mabton Interbed				
Basalt flows of Frenchman Springs chemical type (Wright and others, 1973). Many flows contain irregularly distributed plagioclase glomerocrysts as much as 50 mm across, but some flows, particularly the younger ones, are virtually aphyric. Generally fine- to medium-grained. Normal magnetic polarity (Rietman, 1966). Overlies thin saprolite developed on top of Grande Ronde Basalt in places in Blue Mountains, and commonly rests on thin tuffaceous or subarkosic sandstone and siltstone farther west. Basal flow is pillowed in many places. Feeder dikes occur in north-northwest zone 20-25 km wide extending from lat. 45 degrees 30 minutes North of La Grande to north edge of mapped area and far beyond (Swanson and others, 1979, 1980).	Frenchman Springs Member	WANAPUM BASALT			
	Vantage Interbed				
Basalt flows, aphyric to very sparsely plagioclasephyric, comprising thickest and most voluminous formation in Columbia River Basalt Group. Generally fine-grained and petrographically non-distinctive. A few flows in lower reversely magnetized part of section (R_1 of Swanson and others, 1979) contain numerous plagioclase phenocrysts. Chemical composition varies within a broad field now termed Grande Ronde chemical type (Yakima chemical type of Wright and others, 1973). In western part of mapped area, flows of high-Mg Grande Ronde chemical type generally overlie somewhat finer-grained, hackly flows of low-Mg type in upper normally magnetized (N_2) part of section. Flows range in thickness from less than 1 m to more than 50 m but are generally between 15 and 25 m. Many flows near margin of Columbia Plateau are invasive into interbedded subarkosic sediments, forming sill-like bodies as much as 120 m thick. Covers and laps out on rugged topography developed on older rocks around margins of Columbia Plateau, where flows are commonly pillowed. In some places flows undergo a facies change near the margin of the plateau, thickening and becoming hackly jointed within a few kilometers of the margin, with a pillowed zone at or very close to contact with the older rocks. Divided into magnetostratigraphic units on basis of dominant magnetic polarity.	High-Mg Flows [x] and Low-Mg Flows [x]	GRANDE RONDE BASALT			
		COLUMBIA RIVER BASALT GROUP			

x Not recognized as formal nomenclature.

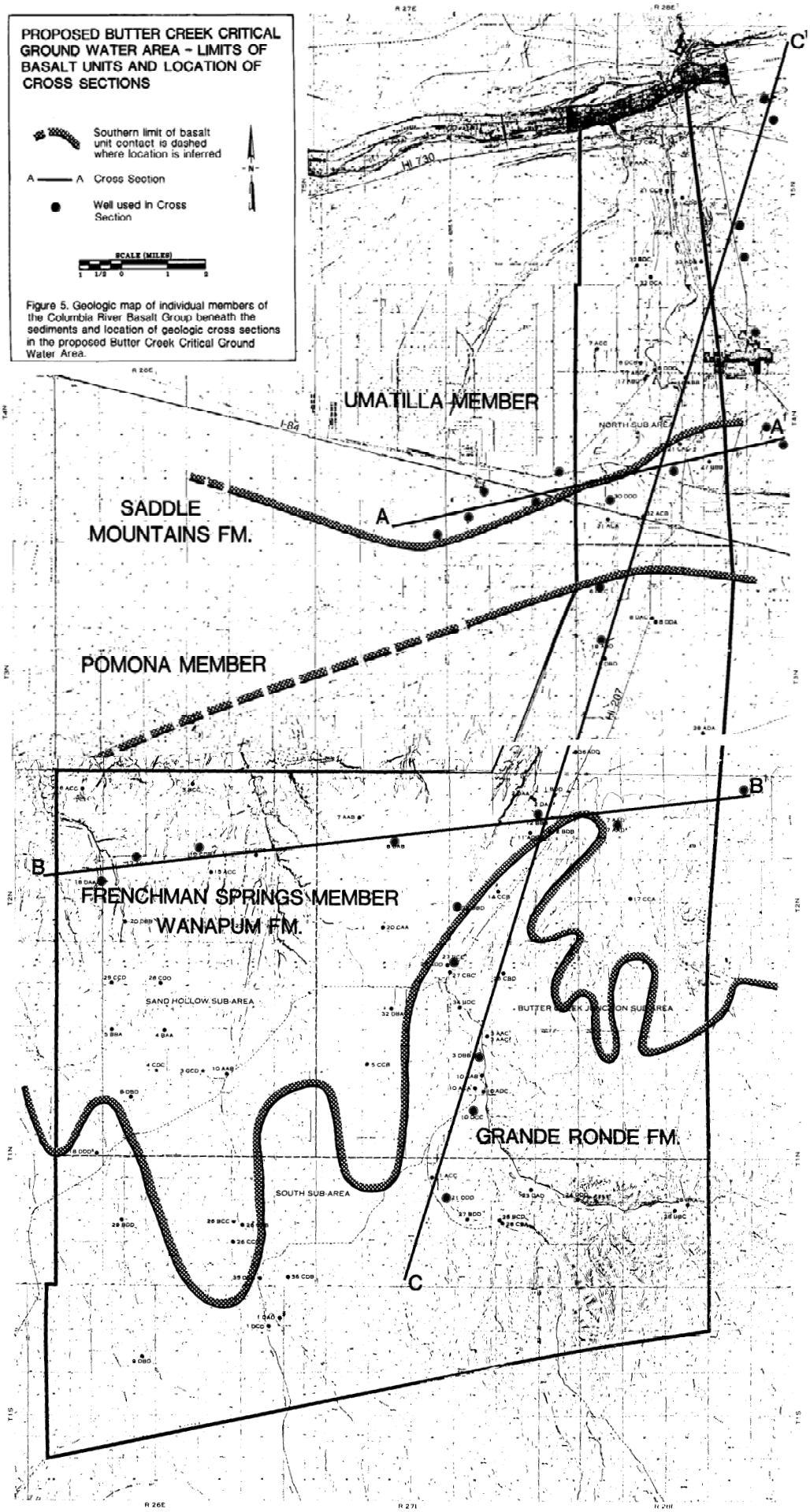

Figure 5: Geologic map of individual members of the Columbia River Basalt Group beneath the sediments and location of geologic cross sections in the proposed Butter Creek Critical Ground Water Area.

GEOLOGIC CROSS SECTION A-A'

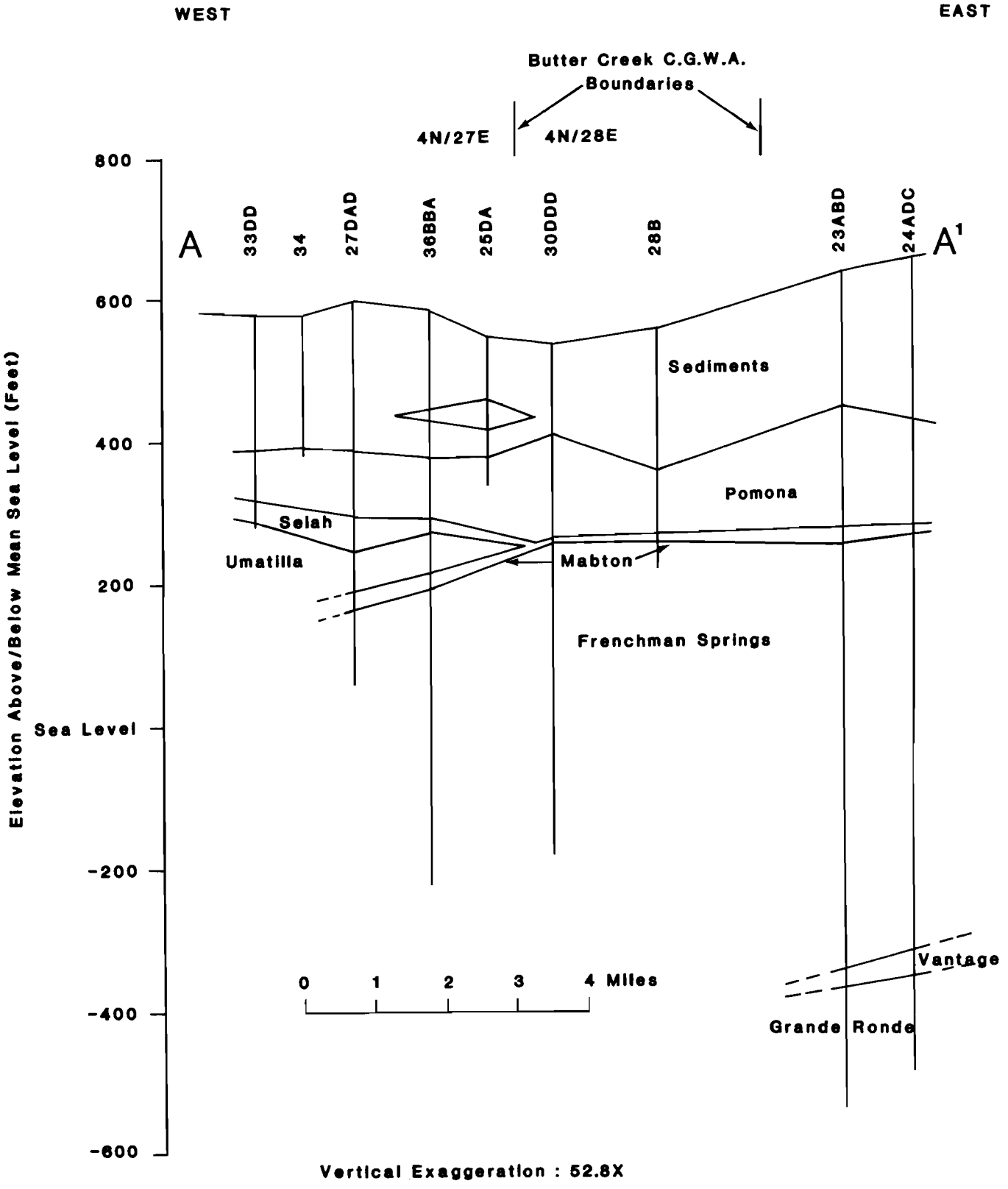

Figure 6: Geologic Cross section A - A'.

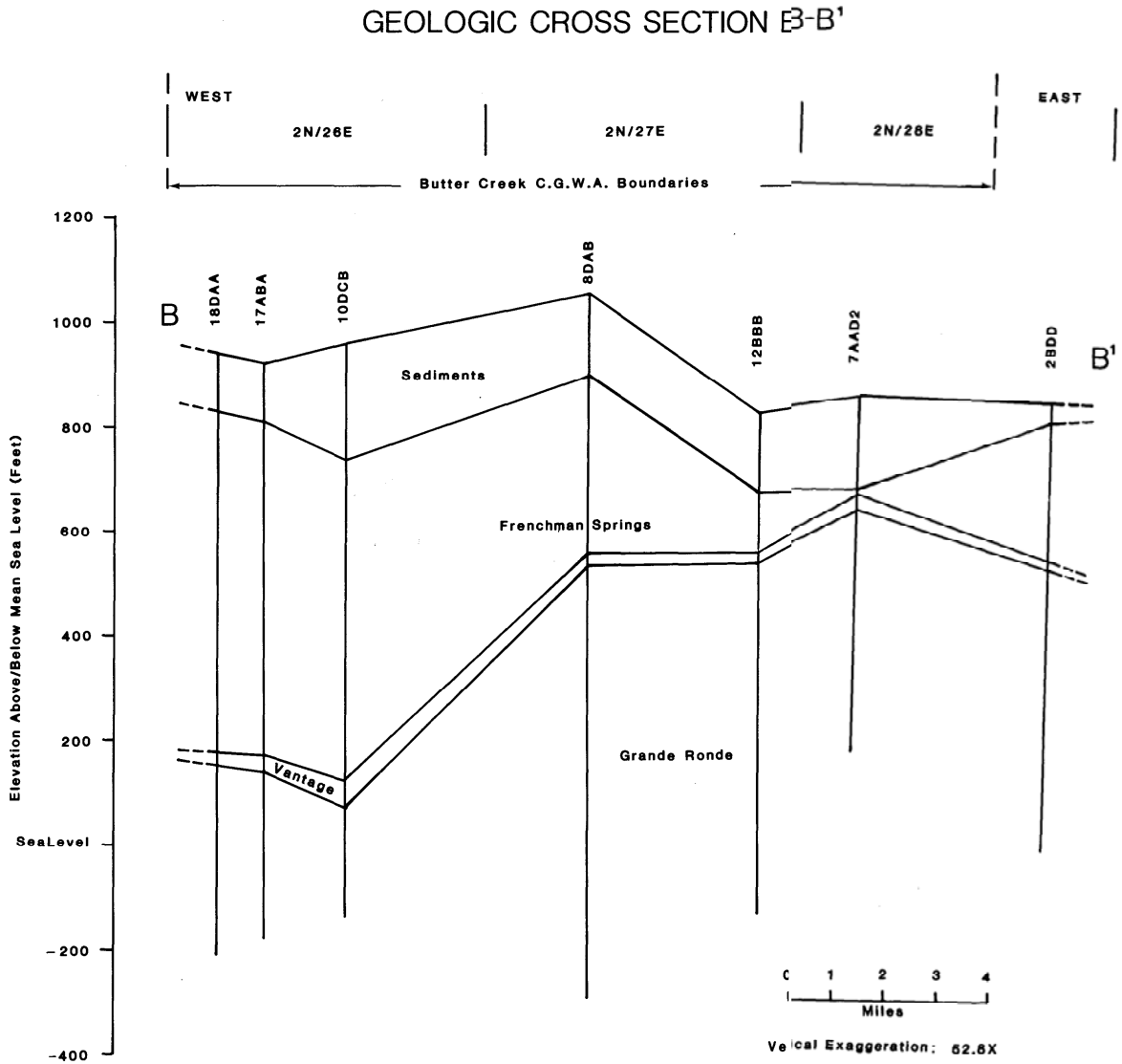

Figure 7: Geologic Cross section B - B'.

Geologic Cross Section C-C'

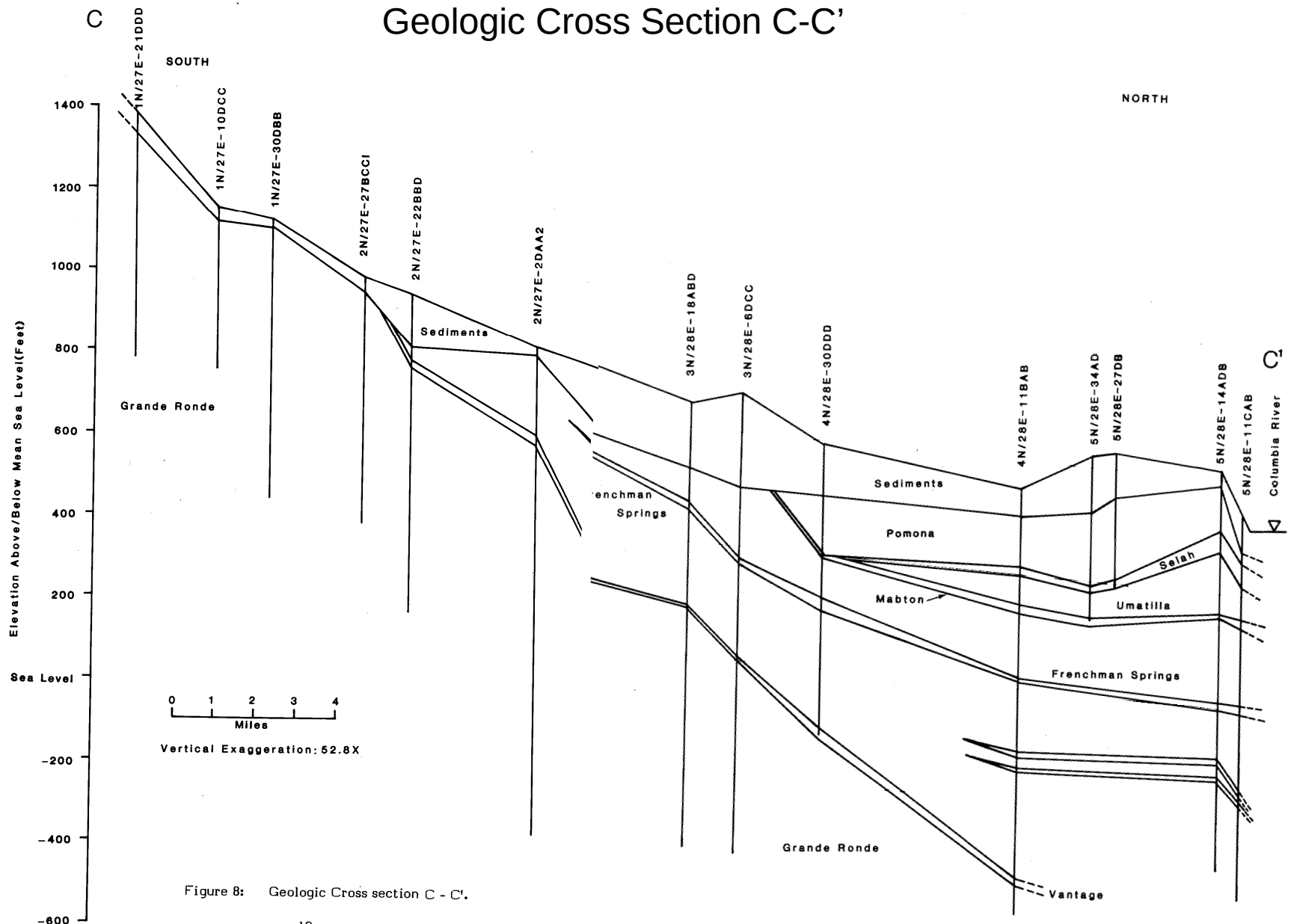

Figure 8: Geologic Cross section C - C'.

2. Fanglomerate

The fanglomerate as described by Hogensen (1964) and Robison (1971) is composed of a heterogeneous mixture of poorly sorted silt, sand and clay materials. The fanglomerate made up of rock chips, silt, sand and slope washed debris was derived from the weathered surface of the Columbia River basalt. In most places, these deposits are tightly cemented. Permeable layers of silt or sand are rare. The formation generally stands above the regional water table. Due to low permeability, the low annual precipitation and high topographic position, the fanglomerate is not an important source of ground water within the critical area. The formation may support a few dug wells offering generally less than 5 gallons per minute.

3. Older Alluvium

The older alluvium is composed of coarse sand and gravel sediments laid down by the Columbia River during flood stages in Pleistocene time. The sand and gravels were water deposited in a shallow lake and stream environment on the underlying basalt surface. Their thickness varies from 0 to a maximum of about 200 feet which occurs in the center of the Ordnance ground water area in Township 4 North, Range 27 East, W.M. The sand and gravel deposits are poorly sorted and become progressively thinner to the south. At an elevation of approximately 750 feet the gravels lens out against the underlying fanglomerate.

A very small area of approximately 10 to 11 square miles of the older alluvium occurs within the Butter Creek critical area. These gravels lie along the east side of Butter Creek for a distance of approximately 6 miles along the eastern boundary of the critical area. Two wells, in Section 28, Township 3 North, Range 28 East, owned by Ernest Betz, penetrate completely through the older alluvium at depths of 130 feet and 105 feet

respectively. The static water level in the alluvial gravels was reported to be approximately 55 feet below land surface. In contrast, the static water level in the basalt aquifers dropped to a depth of 275 feet upon completion of the Betz wells to depths of 636 feet and 830 feet. As presently constructed, these wells permit the cascading of water from the 55-foot water level zone to the 270-foot water level. The wells should be repaired to prevent the loss of water from the upper gravel zone.

* *

Well 3N/28E-28ADA penetrated 105 feet of sediments before encountering basalt with completion to a depth of 830 feet. In May, 1982, the well was deepened to 984 feet. The depth of seal was 25 feet.

Well 3N/28E-28CAB was completed in February 1967 to a total depth of 636 feet with 130 feet of sediment overlying the basalts. Sixteen-inch surface casing was installed to a depth of 130 feet with torch-cut perforations from 50 to 130 feet. The depth of seal was 20 feet.

As neither well meets construction standards set by the Oregon Water Resources Department, both cases have been reported to the Enforcement Section of the Department for further action. Land ownership also has changed. Four other wells in the proposed Butter Creek Critical Ground Water Area that don't meet construction standards have also been reported to the Enforcement Section of the Department

* *

4. Recent Alluvial Gravels

Poorly sorted, medium-grained sand and gravels have been deposited over the flood plain of the Butter Creek drainage. The flood plain is approximately 1 mile wide and extends for a distance of approximately 12 miles northward from Butter Creek junction (SIC). Generally the alluvium is very thin and contains a large amount of reworked wind-blown silt and loess deposits which reduce the permeability of this formation. Ground water yields from this deposit are sufficient only for domestic and stock water purposes. A few sumps have been constructed and are used for irrigation of small acreages located on the valley floor.

D. Geologic Structure

The basalt formations of the Umatilla lowlands have been broadly folded by an east-west trending syncline or trough which parallels the Columbia River drainage near Irrigon, Oregon. Newcomb (1967), described the Dalles-Umatilla syncline over a distance of more than 160 miles along the Columbia River. This broad gentle fold is crossed by several smaller structures having north-south trending axes. The main cross structure within the Butter Creek ground water area is the Service Butte anticline which forms the eastern boundary of the proposed critical area. Much of the basalt surface is concealed beneath the alluvial gravel cover, therefore, only the broad regional structures can be observed. The gentle northward slope of the basalt surface is approximately 100 feet to the mile in the upland areas. The dip flattens to about 30 feet per mile on lower lands adjacent to the Columbia River.

Tectonic structures such as folds and faults in the basalt rocks often form barriers to the movement of ground water in this rock unit. Stratigraphic changes also interrupt ground water movement and form barriers in the basalt aquifers. The basalt rocks are very competent formations and tend to rupture along the axis of major folds. Several poorly defined folds and/or faulted areas occur within the Butter Creek critical area. These structures are oriented in the northwest-southeast direction. One of these faulted areas has disrupted and offset the Butter Creek drainage in the vicinity of the Butter Creek Junction within Township 2 North, Range 27 East, W.M. The smaller fold has been mapped immediately west and adjacent to the lower Butter Creek drainage. This fold parallels the Service Butte fold and extends from Butter Creek Junction along the west side of Butter Creek to the Columbia River. There is some evidence that these folds

separate the Butter Creek basalt aquifers from the more westerly basalt units within the Ordnance critical ground water area. Hydrologic boundaries, however, are not precisely defined. Therefore, control area boundaries have been used to define the Butter Creek and Ordnance critical ground water areas.

* *

> The Service Anticline may extend south joining the anticline that forms the southern boundary of the Butter Creek area. The Rieth Anticline and the Agency Syncline both exhibit a similar pattern. The Agency Syncline is located east and south of the proposed boundaries.
>
> The Willow Creek Monocline, previously known as the Willow Creek Lineament, is expressed in the subsurface of the Butter Creek area in Township 2 North, Ranges 26, 27 and 28 East. The younger basalts of the SADDLE MOUNTAINS BASALT pinch out against the Monocline. The Frenchman Springs member of the WANAPUM BASALT thins rapidly in a southerly direction. The basalt flows in the GRANDE RONDE BASALT may have been stretched and folded or faulted or both in forming the Monocline.
>
> Geologic structures such as the Service Anticline, the Rieth Anticline, and the Willow Creek Monocline can increase or reduce the permeability of the basalt units.

* *

III. OCCURRENCE OF GROUND WATER

The Columbia River basalt formations contain the most productive aquifers in the Butter Creek area. Deep wells in these rock formations are often capable of yielding from 500 to 4000 gallons per minute. Large irrigation wells were drilled in the area during the late 1950's and were located along the Butter Creek valley floor. The first deep wells on the Columbia Slope were constructed in 1941 at the Umatilla Army Depot at Ordnance. Subsequent municipal and industrial wells have been drilled immediately east and west of the critical area near Hermiston and in neighboring cities of Umatilla, Irrigon and Boardman.

Drilling records of many of these wells are on file with the Water Resources Department at Salem, Oregon and the U.S. Geological Survey office at Portland, Oregon. Water level changes in observation wells of the area are shown on hydrographs of the respective wells in Appendix A of this report.

****

Hydrographs of many Butter Creek area wells have been included in this report and will be discussed at the conclusion of the Ground Water Level Decline section (Page 44).

****

Robinson (1971) identified three main ground water zones in the basalt aquifers. The uppermost basalt aquifers extend to depths of about 200 feet. An intermediate water bearing zone occurs between the depths of 200 feet and 400 feet. The deeper zone includes the aquifers below 400 feet in depth.

* *

The many productive zones in the Columbia River Basalts of the Butter Creek area have not been broken down as suggested by Robinson (1971). Depending on the depth and location of the well, one or more productive zones are encountered at varying depths. The hydrogeology is too complex to simply represent three aquifers separated at 200 and 400 feet below land surface.

* *

Fractured and scoriaceous interflow zones often separate individual basalt flows from one another. These contact zones are usually open, permeable areas and serve as aquifers in areas where they are saturated. Ground water moves freely through tabular interflow zones parallel to bedding planes. The dense central portion of each flow usually restricts the vertical permeability and creates confined and partially confined aquifers. The early wells drilled along Butter Creek encountered ground water under artesian pressure and some wells flowed at land surface. Continued construction of irrigation wells in the area during the last 10 years has resulted in diminishing artesian pressures by as much as 108 pounds per square inch or 250 feet of head.

* *

Water level declines have continued and currently exceed 380 feet of decline in part of the Butter Creek area.

* *

A. Aquifer Units

Two aquifer units make up the ground water storage reservoirs of the area. Basalt aquifers of the Columbia River Group form the dominant ground water body within the Butter Creek area. A second unit of small local deposits of sand and gravel occur along the flood plain of Butter Creek and the lower portion of the Umatilla River north of Hermiston.

1. Sedimentary gravel and sand deposits in the Butter Creek area are usually thin, generally less than 30 feet. Therefore, they do not constitute a large ground water reservoir area and cannot be relied on as a dependable ground water source. The water table in the gravel is in balance with local stream levels. In the upper reaches of Butter Creek the gravels are so thin that they cannot sustain the base flow of the stream during the dry summer season; therefore, the stream bed goes dry and the deposits have little significance as a year around ground water source.

2. The basalt formation in the Butter Creek area underlies the entire Columbia Slope to a depth of more than 2,500 feet. Ground water occurs in the saturated interflow zones (contact zones) that separate one lava flow from the other. These rudely tabular zones contain broken, rubbly, scoraceous (SIC) rock that have formed as gas charged (inflated), porous, contact zones at the upper and lower surface of each lava flow. Vesicles (gas holes) and interconnecting fractures provide thin permeable zones between some of the lava units. The thickness and areal extent of these water bearing zones are quite variable. Stratigraphic changes often disrupt, pinch out, overlap, or terminate at the boundaries of an individual flow and create discontinuous aquifer zones throughout the basalt formation.

A cross section through a typical basalt flow of the Columbia River Basalt Group is shown on Figure 9 (From Swanson and Wright, 1978). Ground water moves through the porous vesicular top, the vesicular base, pillow section and any coarse sediment deposited between flows.

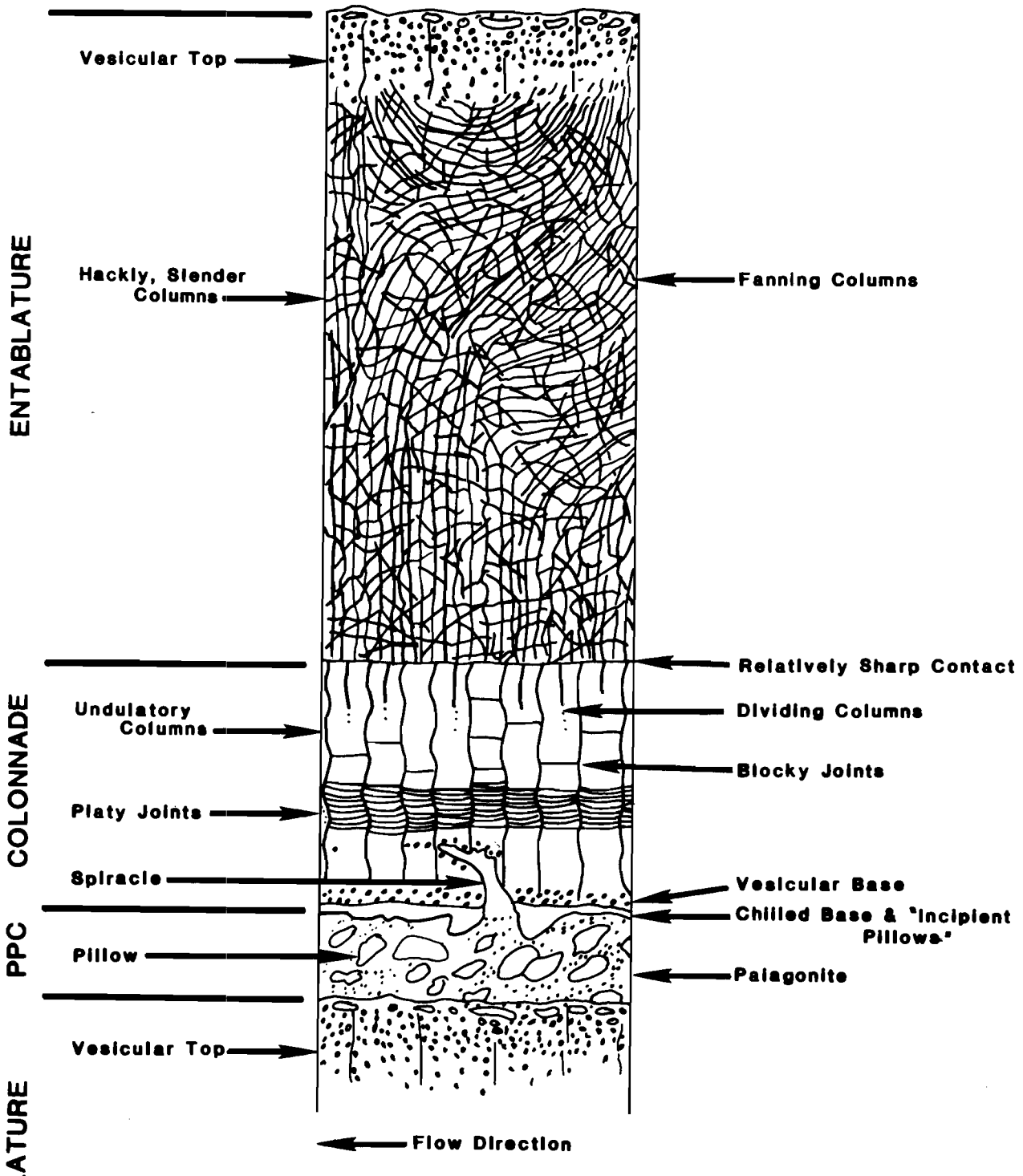

Figure 9: Typical cross section through Columbia River Basalt Group flow showing intraflow structures (Modified from Swanson and Wright, 1978).

Water laid silt, clay, sand and gravel form thin sedimentary interbeds between some basalt flows. Two of these interbeds have been identified in the wells located along the Butter Creek drainage. These beds were penetrated at depths of 170 to 220 feet and varied in thickness from 10 feet to more than 240 feet. These interbedded deposits have been identified as the Rattle Snake and Selah members of the Ellensburg formation near the top of the Columbia River group. The most extensive gravel interbeds were encountered west of Butter Creek in an irrigation well, 1461 feet deep, between the depths of 203 feet and 440 feet below land surface. The static water level of this well was reported to be 344 feet below land surface at the time of construction. One of the gravel units penetrated by the well is partially saturated and serves as an aquifer unit within the basalt formations.

* *

The Selah, Mabton, and Vantage Interbeds have been identified in the Butter Creek area. The Rattlesnake Ridge Interbed if present in the Butter Creek area would be difficult to distinguish from the sediments overlying the basalts as the Elephant Mountain member of the Saddle Mountains Basalt does not extend into the Butter Creek area.

* *

Tight, poorly permeable silt and clay interbeds at depths of 14 feet to 170 feet provide a confining layer for wells near Township 2 North, Range 27 East, Sections 1, 2, 11 and 12. Shallow artesian wells have been constructed in this area. Deeper confined zones also occur in the basalt formations. The tabular, separate water bearing zones are typical of all basalt aquifers of the Pacific Northwest.

* *

The wells in Sections 1, 2, 11, and 12 of Township 2 North, Range 27 East have water levels greater than 360 feet below land surface which is below the confining layer mentioned above. Therefore, any artesian pressure present at this time is from permeable zones penetrated at a deeper level.

* *

Structural deformation of the basalts have directly influenced the occurrence of ground water. The flowing of artesian wells and the excessive pumping levels common in wells in various areas of the Columbia Slope are a reflection of the structure, petrographic composition and stratigraphic conditions of the underlying basaltic rocks.

Ground water in the basalts moves down the hydraulic gradient in the tabular water bearing zones. In downwarped low areas (synclines) water accumulates and is stored. In upland areas on broad anticline folds, ground water moves down dip and away from these structures. Sharp folds and faulting of basalt rocks create barriers to ground water movement. The eastern boundary of the Butter Creek area is located along the north-south axis of the Service Butte anticlinal fold. This fold is very abrupt and is thought to be faulted over most of its length between Service Butte and the Columbia River. This structure may form an effective hydraulic barrier to the movement of ground water. No hydrologic barrier has been identified along the western boundary of the area adjacent to the Bombing Range Road. However, water levels west of the boundary suggests that such a boundary exists. The limited number of wells make a finite location of the structure difficult at this time.

* *

The effect of structural barriers to ground water flow may be minimal if the structure is parallel to the direction of flow. The direction of flow near structures may change during the irrigation season due to pumpage. This would intensify the effect of the structure on the ground water system during the withdrawal period.

Very few wells have been drilled within six miles of the proposed western Butter Creek boundary. Water level data indicates that a shallow perched aquifer in the basalts is present west of the boundary with a higher water level. Deeper wells west of the proposed boundary have water levels similar to those at a like altitude in the Butter Creek area.

* *

Due to the initial dip of 1 to 2 degrees toward the north and northwest, ground water in the basalt interflow zones moves northward away from the Blue Mountain uplands. Structural barriers disrupt this regional movement and create local artesian conditions such as originally found along Butter Creek.

* *

The direction of ground water flow is controlled by differences in potentiometric head. In the Butter Creek area, and for most of the Umatilla Structural Basin (Columbia Slope), heads are greater in the foothills to the south and lower in the flood plain to the north, resulting in a ground water flow direction generally coincident with the dip of the basalt units.

* *

Perched ground water is often encountered on impervious basalt layers that stand above the regional water table. It is common for drillers to report cascading ground water in many of the wells constructed in this area. Water level data is often very eradic (SIC) between wells of different depths, making comparison of water levels difficult.

* *

Recent developments in the study of the hydrogeology of the Columbia River Basalt Group allows for better correlation of water levels between wells. Figure 10 shows the regional potentiometric surface of the Butter Creek Area. The direction of flow is perpendicular to the contours which indicates ground water flow towards the north-northwest. In Township 3 North, the upper saturated layers have a head 200 feet higher than the regional system. Near the Columbia River, the difference between water levels in the two units is less, approximately 70 to 100 feet higher in the upper system.

* *

Newcomb (1959, Page 14) has reported that the Columbia River basalts over their regional extent have an average yield, to 10 or 12 inch diameter wells, of about 1 gallon per minute per foot of penetration below the regional water table. The maximum yields in the Butter Creek basalt wells are reported to be 3200 to 4000 gallons per minute. Moderate well yields range from about 800 to 1500 gpm in this area. The specific capacity of larger wells varies from 40 to 155 gpm per foot of drawdown. Highly transmissive zones between lava flows make up less than 10 percent of the formation thickness and varies considerable (SIC) from well to well. The well yield and related specific capacity of the average basalt well therefore, is very unpredictable.

* *

Most of the water level data collected since 1975 has been in the winter months when large-capacity wells are not pumping. Only one well in the Butter Creek area currently yields more than 2000 gallons per minute (gpm). Specific capacities have been calculated for a few of the wells in the Butter Creek area from the data collected during the spring of 1984. The values ranged from 25 to 55 gpm per foot of drawdown, considerably lower than the range of values listed above.

* *

Many drilling and production records of the older wells drilled into the basalt are not available today. Only a small number of wells out of 60 to 80 wells drilled in the Butter Creek Basalt formations are considered inadequate for irrigation use.

B. Ground Water Recharge

Very limited ground water recharge may occur in the basalt formation where lava flows have been exposed in upland areas. In some cases the tilted beds of lava approach land surface where they receive infiltration water directly from rainfall, saturated surface gravels or streams that cross porous contact zones.

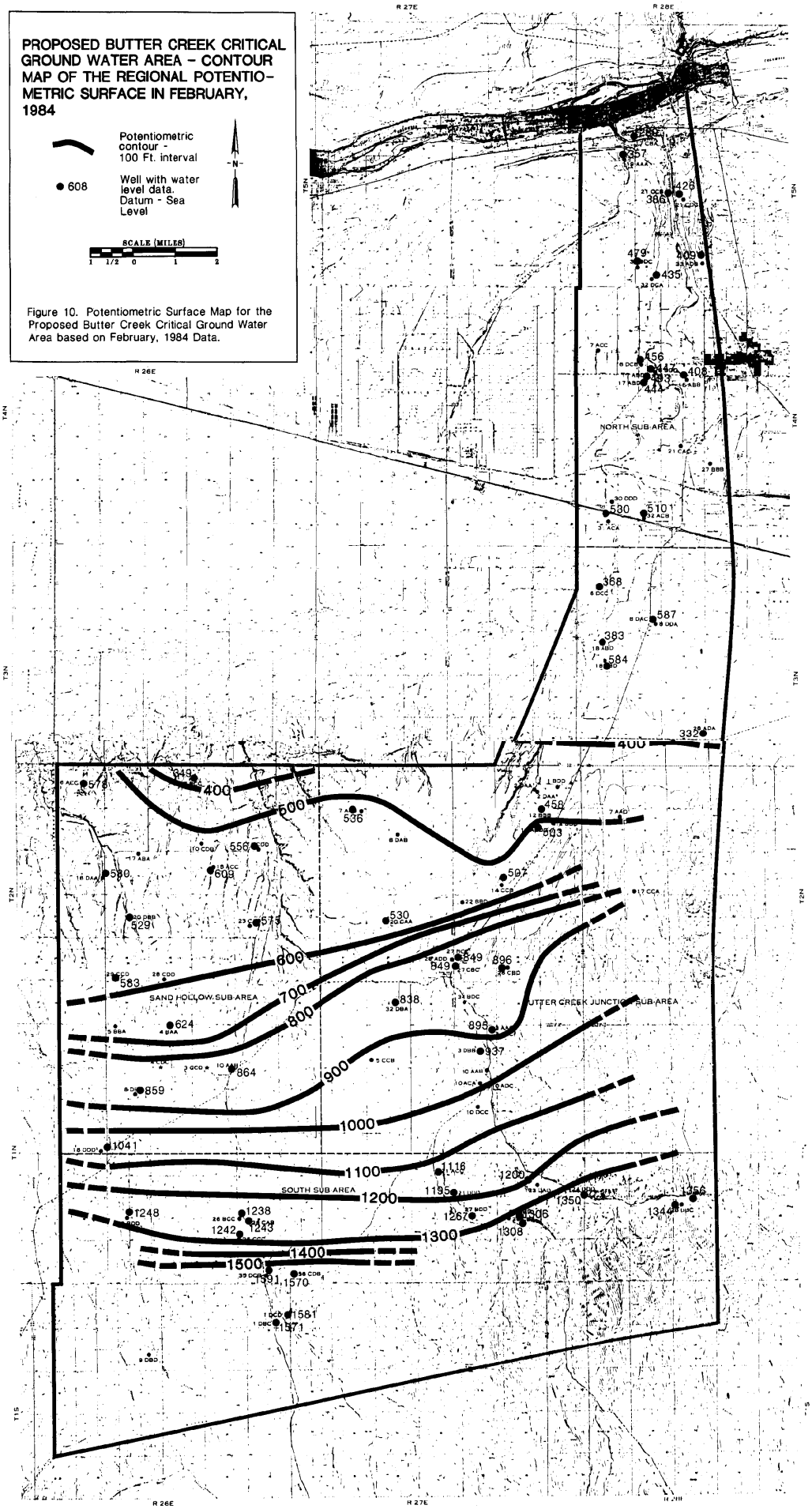

Figure 10. Potentiometric Surface Map for the Proposed Butter Creek Critical Ground Water Area based on February, 1984 Data.

Figure 10: Potentiometric Surface map for the Proposed Butter Creek Critical Ground Water Area based on February, 1984 data.

Within the Butter Creek critical area, the basalts have a very shallow dip of 1 to 2 degrees to the north. In the upland areas, the basalt slopes about 100 feet to the mile to the north. Many of the lava flows received limited recharge from the Butter Creek drainage above Pine City. Below Pine City, the dip flattens to about 30 feet per mile, less than 1 degree slope. Pressure gradients in the basalt aquifers created some flowing artesian wells during the early development of ground water in the Butter Creek area. Most of the aquifers in the Butter Creek critical area are confined or partially confined aquifers. Subsequent pumping of closely spaced, artesian wells has reduced artesian pressures and has caused a severe water level decline. For a more detailed discussion of aquifer characteristics in the Columbia River basalt, see U. S. Geological Survey Water Supply Paper 1620, page 41 - Aquifer Constants as described by Hogenson.

Water bearing characteristics of the basalt aquifers vary from place to place. Some of the zones pinch out, some overlap each other, and some become nonporous where they have been folded or faulted by structural changes. Massive, dense lava flows commonly do not allow adequate vertical permeability and they prevent water from moving to the regional water table. Vertical separation of ground water zones within the basalt is quite common. This separation of ground water zones is shown by the perched nature of the various layered seeps and springs that occur in exposed canyons and hillside outcrops and by cascading water zones in drilled wells.

* *

Several aquifer tests conducted by the Water Resources Department in the Umatilla Structural Basin have yielded the following range of aquifer characteristics: Transmissivity - 1136 to 67,760 ft^2/day (8,500 to 507,000 gpd/ft); and Storage Coefficient - 3.1×10^{-2} to 9.2×10^{-5} (dimensionless). One of the aquifer tests was within the boundaries of the Butter Creek area. The test consisted of pumping one well for three days and measuring the water level in the pumping well and in five observation wells. Recovery of the water levels after the pump was shut off were measured in all of the wells. The wells monitored in the test are listed in Table 3.

TABLE 3: List of wells monitored during the aquifer test in the Butter Creek area.

Well Location	Report No. 24 Number	Owner	Remarks
T1N/R26E-26CCC	48	Turner	Pumped Well
T1N/R26E-26CAB	19	Turner	Observation Well
T1N/R26E-35DCB	71	Cutsforth	Observation Well
T1N/R26E-36CDB	72	Cutsforth	Observation Well
T1S/R26E-1DAD	11X	Cutsforth	Observation Well
T1S/R26E-1DCD	79	Cutsforth	Observation Well

Transmissivity values from the test ranged from 6,150 to 16,700 square feet per day (46,000 to 125,000 gallons per day per foot). Storage coefficients were calculated at the observation well (T1N/R26E-26CAB) and ranged from 2.5 to 7.3×10^{-4}. The results of the test indicated at least one barrier to flow located between the wells in Section 26 and the other four observation wells. The test indicated a ground water barrier but not whether it was a result of faulting, folding, or stratigraphic change (Oberlander and Miller, 1981).

* *

Precipitation in amounts of less than 10 inches per year does not provide adequate recharge to the Butter Creek basalt aquifers. Abrupt changes in the static water levels during the drilling of basalt wells is a direct indication of the layered separation of perched ground water zones. In perched ground water areas, water cascades down the well bore to porous zones located at greater depths in uncased wells. Comparison of water levels in wells can only be made in wells of similar depth in order to obtain meaningful water level data. Water levels in wells located in recharge areas usually decline as the well is deepened to greater depths. Therefore, water levels in a shallow well and a deep well are usually not comparable.

* *

As the understanding of the basalt stratigraphy has advanced, so has the understanding of the ground water flow regime. Water is recharged into the basalt flows of the upper Grande Ronde in the Blue Mountains and moves down gradient. Some of the recharge is intercepted by streams reducing the amount of water recharging the deeper basalts. Wells drilled above the upper limb of the Willow Creek Monocline find increasing pressure with depth. North of the upper limb, wells have a constant water level with depth or a drop in water level with depth.

The Willow Creek Monocline is acting as a partial barrier to ground water flow from the south. The hydraulic gradient above the monocline averages 75 feet per mile. Across the structure, the gradient steepens to over 175 feet per mile, then flattens out to about 10 feet per mile in the northern portion of the area.

* *

Age dating of the ground water aquifers of the Ordnance basalt aquifers has shown that the shallower water bearing zones are younger than the deeper zones. Robison indicated ground water of modern age (1950) was found in shallow aquifers 30 to 70 feet deep. Water in deeper wells of 256 to 453 feet was found to be 6700 years old. Deeper water zones in a 950-foot deep well was found to contain ground water having a composite age of about 27,000 years.

* *

Several wells have been sampled for Carbon -14 age dating in the Umatilla Structural Basin. Age determinations by this method constitute apparent age of the ground water tested since possible carbon exchange, mixing of different aged waters and "fossil" carbon dissolution can add vagueness to the proper interpretations of these values. Three of the wells sampled are in the proposed Butter Creek Critical Ground Water Area. The first well is 70 feet deep and is located in the southern part of the area (15/26E-1DAD). Ground water from this well was analyzed as being of modern age which indicates that the well is near an area of recharge or is hydraulically connected to Milk Creek, a nearby stream. Well 2, located at 1N/26E-26CCC, is 960 feet deep and was age dated at 10,200 ± 160 years old. The second well is down gradient from the hydrogeologic structure discussed on the previous page. The third well flows and produces some natural gas. The depth of the well is 777 feet and is located at 1N/27E-24DDD. Age dating of the water from this well resulted in an apparent age of 23,800 ± 380 years old. The results of the age dating in the Umatilla Structural Basin support the description of the ground water flow regime discussed previously.

* *

Water levels in deep basalt wells have an almost flat gradient in the northen part of the critical areas. Some leakage from uncased wells provides a very limited recharge to deep water bearing zones. Water level decline rates have been observed in 24 wells. Substantial water level changes occurred in 1967-68, indicating either a change in storage area characteristics of the ground water reservoir, or an increase in ground water use (discharge), or a reduction in annual recharge to the aquifer. Robison, (HA-387, USGS

1971) concluded that "Ground water in the deeper basalt aquifers is receiving little recharge. The complex head relations demonstrate the vertical separation and lateral compartmentation of aquifer units, and the water level fluctuations indicate that the intermediate and deeper zones receive no recharge from local precipitation." Water level data collected to date indicates little or no annual recharge and suggests that classic ground water circulation patterns are not being observed within wells of the proposed critical area.

****

An estimate of 50,000 acre-feet per year of recharge for the entire Umatilla Structural Basin was derived during the calibration of the ground water model by the U.S.G.S. This is an estimate and has not been verified. Part of that volume enters shallow perched ground water reservoirs and is naturally discharged into streams in the upper portion of the flow system. The Columbia River is also a natural discharge point for the flow system. What portion of this recharge estimate reaches the Butter Creek area as ground water has not been determined at this time. Further calibration of the computer model will be needed to refine the estimates.

****

At present, artificial recharge to wells does not appear to be an economically feasible alternative. Pumping lifts, costs and distance of transport of water from the Columbia River for well recharge are not attractive to owners of the deep basalt wells in the Butter Creek area. However, the direct use of imported surface water offers the best and most effective remedy to this problem.

****

Approximately 2400 acres of farm land are now being irrigated by a combination of surface water (Columbia River) and ground water or by surface water alone that were previously irrigated solely with ground water. Considering current economic conditions such as increased power costs, the higher cost of construction and financing, it may not be feasible at this time to increase the amount of land under surface water irrigation in the major portion of the Butter Creek Area.

****

C. Ground Water Discharge

The pumping of large capacity irrigation wells within the Butter Creek critical area constitutes the major ground water use. Water levels in the basalts are relatively deep averaging about 315 feet below land surface. The deepest water levels observed are approximately 455 to 460 feet and the shallowest water levels are 250 to 270 feet below land surface. The regional water table of the area has a very flat gradient of generally less than 10 feet per mile indicating high permeability and/or very low recharge. Basalt aquifers with deep water levels are not hydrologically connected with the Columbia River. The river is perched on the basalt surface.

* *

Ground water levels in the basalts within the Butter Creek boundaries range from near land surface to more than 600 feet below land surface. The 250 to 270 feet given above as the shallowest water levels in 1975 were for the Sand Hollow and Butter Creek Junction Subareas only.

Recent work by the U.S.G.S. in Oregon and Washington shows the hydraulic gradient towards the Columbia River from the north and south suggesting that the river is a line sink in hydraulic connection with the ground water system and not perched above the ground water system.

* *

Since large yielding irrigation wells within the Butter Creek area have caused a sustained water level decline, it is necessary that pumpage of ground water be reduced or that an outside source for water be provided to balance the present ground water withdrawal.

* *

In early 1976, the Oregon Water Resources Department required that irrigation wells be installed with operating totalizing flow meters. Table 4 lists the pumpage in acre-feet per year for each of the four subareas within Butter Creek boundaries. Data collected in 1976, 1977, and 1978 are only a partial representation of the pumpage in Butter Creek as it took that time interval for the flow meters to be installed on all of the wells. The maximum number of flow meters that showed usage during both 1979 and 1980 was 52 wells. In 1983 there were 42 wells in use. When flow meters were not functioning properly or were missing, the volume of water pumped was derived through the use of power consumption records. Pumpage values were not established for 1976, 1977, or 1978 with the power consumption records. From 1979 through the present, the pumpage data is as complete as possible.

TABLE 4: Annual ground water pumpage in acre-feet from the proposed Butter Creek Critical Ground Water Area by Subarea with the number of wells pumping listed in parentheses.

Year	1976	1977	1978	1979	1980	1981	1982	1983
Subarea								
South	1500 (7)	3550 (9)	2700 (12)	2710 (14)	2170 (13)	2610 (13)	2510 (13)	2070 (13)
Sand Hollow	3100 (4)	5500 (8)	6230 (9)	7020 (12)	6690 (12)	7340 (11)	5300 (11)	5320 (10)
Butter Creek Junction	8650 (18)	10,880 (18)	10,510 (19)	10,710 (22)	11,030 (21)	10,810 (22)	10,690 (18)	7360 (16)
North	380 (2)	270 (3)	210 (4)	220 (4)	220 (6)	220 (5)	430 (4)	190 (4)
Total	13,600* (31)	20,220* (38)	19,650* (44)	20,660 (52)	20,120 (52)	20,990 (51)	18,930 (46)	14,950 (42)
ESTIMATED TOTAL **	24,000	27,000	23,000					

* Flow meters had not been installed on all wells.
** Estimated pumpage for years with missing flow meter data.

In 1979, 20,660 acre-feet of ground water was withdrawn from the basalt aquifers by irrigation wells with water rights in the proposed Butter Creek Critical Ground Water Area. In 1980 and 1981, the volume pumped was 20,120 and 20,990 acre-feet, respectively. The volume of pumpage in 1982 was 18,930 acre-feet, down 2060 acre-feet from 1981. For 1983, there was a 21-percent decline in pumpage from 1982, down to 14,950 acre-feet.

In 1977, when 38 wells pumped 20,220 acre-feet, it is very likely that approximately 7,000 acre-feet of ground water was pumped without being monitored. It is likely that at least 13 wells were pumping that did not have operating flow meters. At an average discharge per well of 530.0 acre-feet (20,220 acre-feet/38 wells) multiplied by the estimated number of wells without flow meters equals an additional 7,000 acre-feet. This would indicate that since 1977, there has been a decline in the annual withdrawal rate of over 12,000 acre-feet. During this same time frame, the rate of water level declines has also slackened.

Pumpage data for each well has been included in Appendix VII.

* *

IV. GROUND WATER LEVEL DECLINE

A balance exists in nature between annual recharge and annual discharge to a ground water flow system. Only minor variations occur in the amount of ground water in storage within an unused aquifer.

The water table is not a stationary water surface, rather it is a continuously adjusting surface that fluctuates in response to changes in recharge, discharge, pumping effects and barometric pressure changes. Water level measurements were made in selected observation wells within the Butter Ceeek area in 1960. As new wells were constructed, they were added to the observation net. Today, we are measuring water levels in about 37 of the 79 wells operating in the proposed critical area. The most reliable data is collected during the winter season during a quiet period of non-use. Relatively few wells of the area have adequate measuring ports or usable air lines that facilitate accurate water level measurements. Hydrographs indicating the season changes in water levels for 24 observed wells are included in this report. (See records of wells page 30.)

* *

The updated version of the well records is on page 111. Since 1975, an average of 40 wells have been measured on an annual basis. In February 1984, 64 water levels were measured along with power and flow meter readings. Over 100 irrigation wells have been drilled in the Butter Creek area. Many of these wells have been converted to domestic and/or are not currently being used for irrigation. Twenty to twenty-five wells have been placed on a monthly observation well network. This network was started in the spring of 1984 to provide information on seasonal water level fluctuations, pumping water levels, discharge rates and power consumption information. Continuous water level recorders have been installed in three wells located at 1) 2N/26E-3BCC; 2) 2N/26E-29CCD; and 3) 4N/28E-27BBB.

* *

Two artesian wells, No. 13 and No. 14, have hydrographs that show no water pressure decline during the period of 1960 through 1966. However, in 1967, water levels made an abrupt 12 foot decline. The wells have continued to decline to about 23 feet below land surface in 1975. Similar changes in development of the Butter Creek basalt aquifers began in the early 1950's. Flowing wells ceased to flow and water levels began to decline in 1960. The decline averaged 5 to 7 feet per year in some remote wells. Wells located near large irrigation projects declined about 10 to 12 feet per year up to about 1968. A marked increase in water level decline of about 20 feet per year has occurred since 1968 in closely spaced well fields. Irrigation wells located along the western boundary of the Butter Creek area in Township 2 North, Range 26 East, Morrow County have water level declines of 14 to 22 feet per year over the past three years.

* *

The two artesian wells referred to above were numbers 13 and 13A rather than 13 and 14 and are located in 1N/28E-28BAA and 28BBC, respectively. When the water levels were measured in February, 1984, both had static levels approximately 30 feet below land surface. Water level trends and depths to water are extremely variable, depending on location, depth of well, usage of well, and proximity to other wells. The range of water level fluctuations varies from 0.41 feet per year rise to 17.42 feet per year decline. These values were calculated based on the total water level change over the maximum period of record for each well. Only three of the wells have shown a long-term rise in water level and they are located at 1S/26E-1DCD, 1N/26E-35DCB and 4N/28E-8DCB. The first well, 1S/26E-1DCD, was completed at a depth of 250 feet in 1976. Discharge in 1983 was down 100 acre-feet from the year before. Located in 1N/26E-35DCB, the second well is a 508-foot-deep irrigation well that has been used steadily since 1975 with pumpage dropping off the last two years. The third well is fairly shallow and is located in the panhandle portion of the area which has not seen large ground water development. Hydrographs of 49 wells in the Butter Creek area are discussed in detail later in this section.

* *

Approximately 72 irrigation wells are located within the Butter Creek area. Fourteen water right applications for 14 wells were made between 1950 and 1959 in the subject area. Twenty-five filings for 27 wells were made between 1960 and 1968. Since 1968, 37 applications for ground water rights have been received and 29 wells have been completed within the area. Sixty-two permits have been issued in the Butter Creek area; the last permit was issued for a June 24, 1970 priority. Sixteen applications have been held subsequent to the 1970 date pending the completion of the critical ground water area determination. Applicants were advised on numerous occasions that wells should not be constructed within the Butter Creek or Ordnance ground water areas. Twenty wells listed within the 79 water right applications have not been constructed to date. Under present overdraft conditions, it is expected that these wells will not be authorized under the existing applications or permits.

* *

The number of basalt irrigation wells with drillers' logs on file with the Department in the Butter Creek area is 102. At least 470 domestic wells and 20 municipal and industrial wells have also been completed in the basalts within the proposed Butter Creek Critical Ground Water Area boundaries. There are 60 water rights in the certificate stage, 10 permits that have not gone to certificate, two applications that are pending, and action has been suspended on four more. The most recent priority date for a permit issued within the proposed critical area is June 24, 1975. Since June 1975, ten water rights have been canceled or rejected.

* *

The rate of decline is partially related to the rate of individual well yields. The highest rate of water level decline, 29.5 feet per year, has occurred in Well No. 53, which has the highest rate of pumpage in the area (4000 gpm). This rapid water level decline has been

observed in the area southwest of Butter Creek Junction for the past 3 years. Well No. 11, in Section 1 of Township 2 North, Range 27 East, was flowing in 1960; it has experienced an average water level decline of 26 feet per year and the water level now stands near 232 feet below land surface. The pumping lift in this well is approaching 600 feet. Water level declines must be controlled by reducing the annual amount of ground water being pumped.

****

Well No. 53 mentioned above should be Well No. 53A located at 2N/27E-32DBA. Due to airline problems which were not discovered until 1977, the 29.5 feet per year decline rate was in error. The actual decline rate was 16.0 feet per year from January 1972 until December 1977.

Plots of the water level data for 49 wells in the Butter Creek area will follow with a short paragraph about each well and hydrograph.

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* *

1N/26E-8DBD - The well was completed to its total depth of 1053 feet in February 1971 with a water level of 196 feet below land surface. The water level declined 93.85 feet from February 1971 through December 1977 or 13.41 feet decline per year. From December 1977 through February 1983, the water level dropped 43.31 feet or a decline rate of 7.22 feet per year. The water level rose 0.35 foot between February 1983 and March 1984 which may have been in response to a 32 percent reduction in pumping during that period.

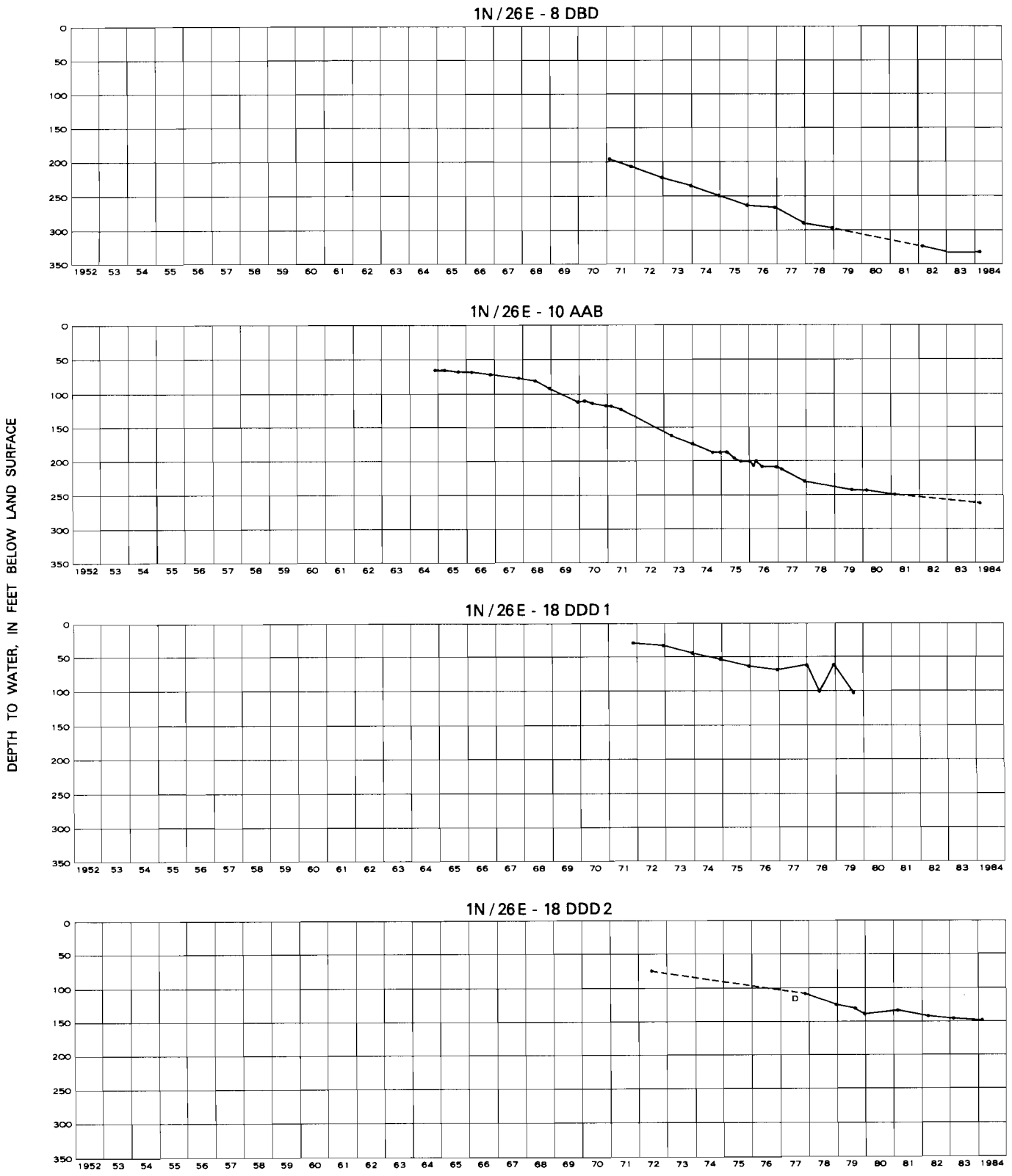
1N/26E-10AAB- The well had a water level of 65 feet below land surface when completed in December 1964 to a depth of 376 feet. In February 1976, the well was reamed and straightened to original depth. From December 1964 through November 1967, the water level declined 12.4 feet or 4.08 feet per year. The rate of decline increased to 15.28 feet per year from November 1967 through December 1977. The rate of decline from December 1977 through February 1984 was 4.62 feet per year.

1N/26E-18DDD1- Reported to be 300 feet deep, the well was drilled prior to 1954. Water level data shows a decline rate of 3.83 feet per year from November 1971 through December 1978. The water right was transferred to a replacement well in October 1977 as the old well was unable to produce an adequate supply of water.

1N/26E-18DDD2- Drilled in June 1972, this well is 340 feet deep with a reported water level of 75 feet below land surface. The well was deepened in November 1977 to a depth of 383 feet with a reported water level of 108 feet. Since the deepening in 1977, the water level has dropped 41.03 feet or a decline of 5.13 feet per year.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA



Deepened ..... D

Data Not Available - - - - -

1N/26E-26BCC- This well was drilled in February 1963 for irrigation and domestic purposes. The well was completed to a depth of 230 feet with a water level reported at 112 feet below land surface. From 1963 through 1967, the water level remained fairly constant. Then from 1967 through 1978, the water level dropped 89.89 feet or 8.17 feet per year. In 1977, the water rights were transferred to another well in the same section. From 1978 through 1984, the water level dropped 18.17 feet of 2.60 feet per year.

1N/26E-26CAB- This well was drilled in December 1976 to a depth of 675 feet with a reported water level of 127 feet below land surface. In January 1984, an attempt was made to seal off cascading water from an upper zone. Most of the cascading water was plugged off. The water level has declined an average of 4.3 feet per year since December 1976.

1N/26E-26CCC- Originally drilled to a depth of 479 feet the well had a reported water level of 175 feet below land surface in August 1968. In January 1976, new surface casing was installed and the well was reamed from 8 1/2 inches to 14 inches from 274 feet to 479 feet. In December 1976, the well was deepened to 960 feet with a water level of 232 feet below land surface. From August 1968 through November 1971 the water level declined 10.0 feet per year. From 1971 through the present the water level has declined an average of 4.14 feet per year.

1N/26E-29BDD- Drilled to a reported depth of 360 feet in the late forties or early fifties, the well is used now for domestic, stock, and a small amount of irrigation. From November 1971 through August 1979 the water level declined an average of 6.45 feet per year. Since August 1979, the water level has declined slightly more than one foot per year.

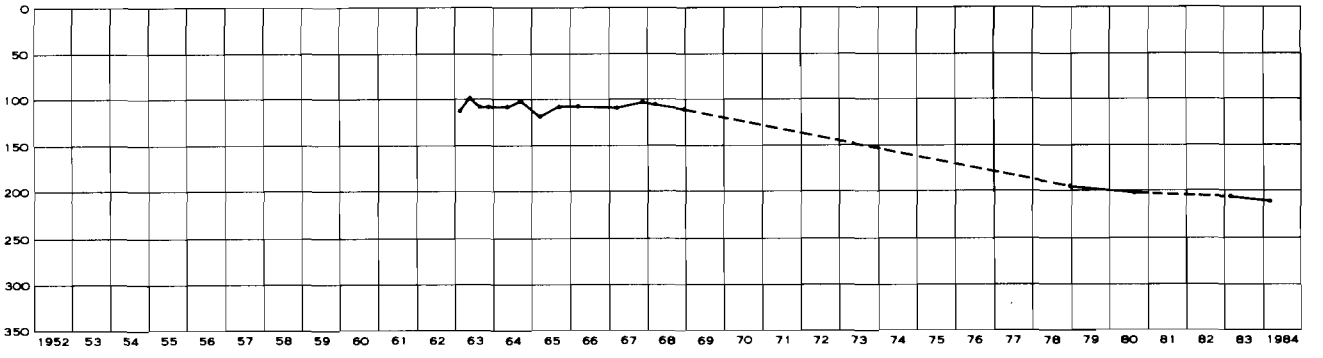
HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

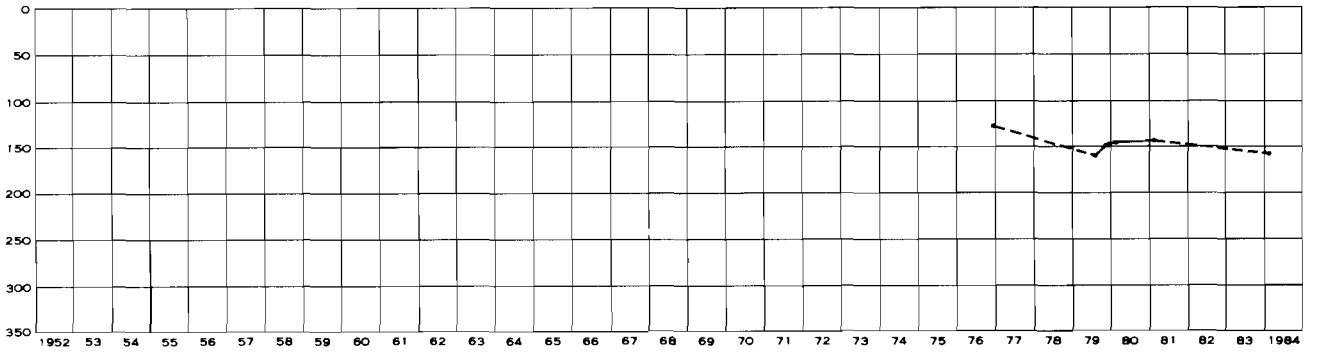
(Continued)

DEPTH TO WATER, IN FEET BELOW LAND SURFACE

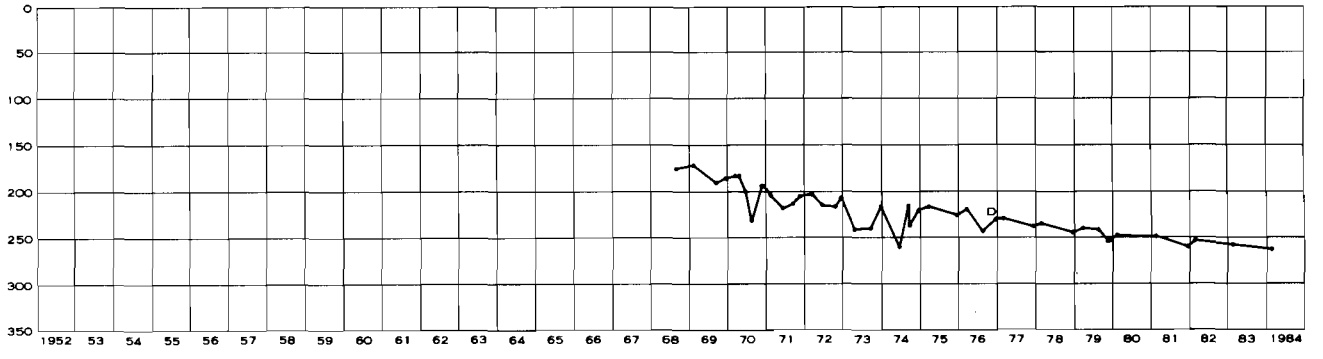
1N / 26E - 26 BCC



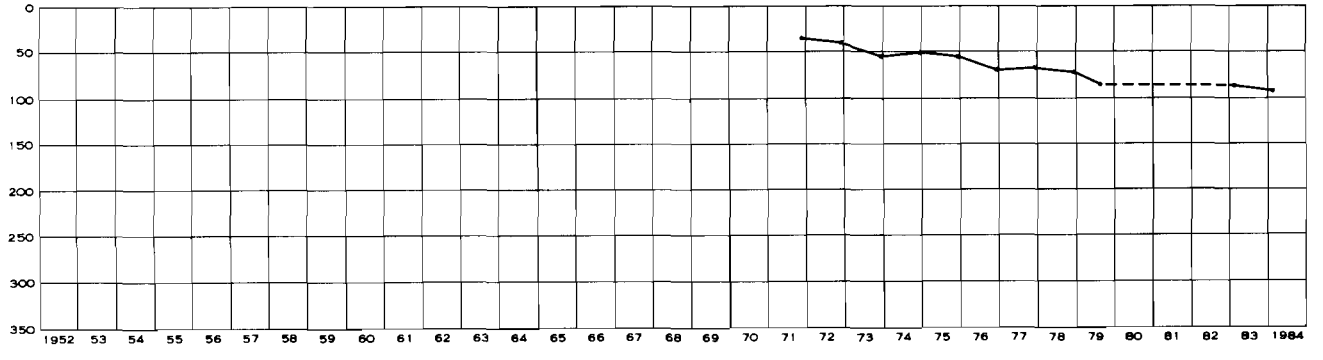
1N / 26E - 26 CAB



1N / 26E - 26 CCC



1N / 26E - 29 BDD



Deepened ..... D

Data Not Available - - - - -

1N/26E-35DCB- Drilled to 246 feet in June 1968, the water level was reported at 16 feet below land surface. In January 1972, the well was deepened to 508 feet. By November 1971 the water level had dropped over 75 feet. After deepening in January 1972, the water level rose to 17 feet below land surface. Over the next two years the water level rose 17.63 feet. Since December 1974, the water level has declined 8.68 feet, an average decline of 0.87 feet per year.

1N/26E-36CDB- The well was drilled to 665 feet in September 1971 with a water level of 82 feet below land surface. From December 1971 through December 1978 the water level declined an average of 4.88 feet a year. Since December 1978, the water level has remained fairly constant. From February 1983 to February 1984, the water level rose 6.43 feet. This rise is probably in response to a 28 percent reduction in pumping during that period.

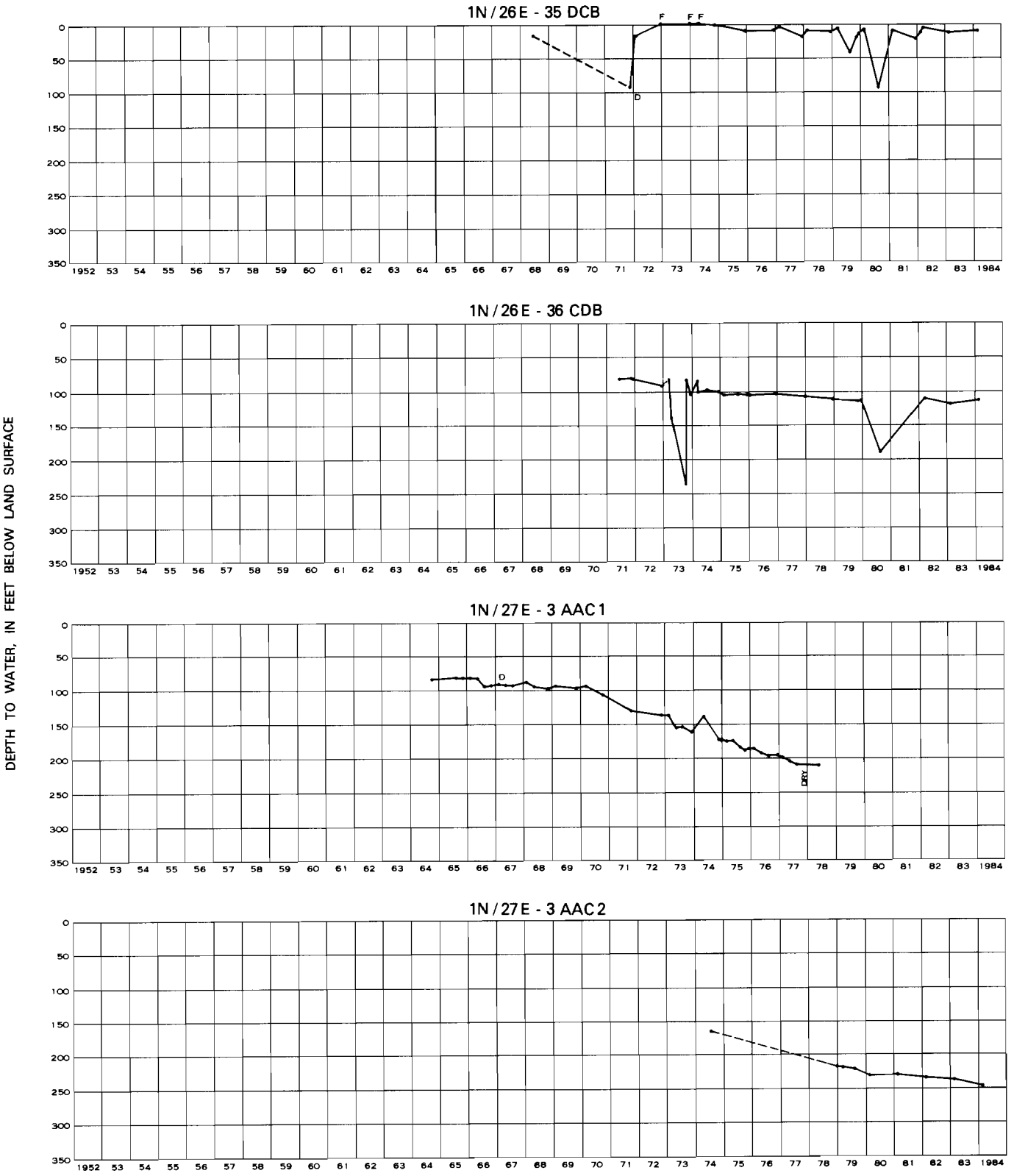
1N/27E-3AAC1- In October 1964, the well was drilled to a depth of 107 feet with a water level of 83 feet below land surface. The well was deepened in March 1967 to a depth of 220 feet with a water level at 88 feet below land surface. From October 1964 to March 1970, the water level dropped 1.56 feet per year. Then from March 1970 to February 1977 the water level dropped 14.98 feet per year. The well was dry in December of 1977 and 1978.

1N/27E-3AAC2- Drilled 100 feet north of Well 3AAC1 in July 1974, the well was completed to a depth of 285 feet with a water level of 165 feet below land surface. The water level has declined an average of 7.3 feet per year.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



Flowing ..... F
Deepened ..... D
Data Not Available - - - - -

1N/27E-3DBB- Originally drilled in January 1964 to a depth of 129 feet, this well had an artesian flow of 75 gallons per minute. In February 1966, the well was deepened to 259 feet with a water level of less than 4 feet below land surface. In December 1973 the well was reamed from 154 to 255 feet from 8 inch to 10 inch diameter. At the time of reaming the water level was reported to be 60 feet below land surface. In March 1977 the well was again deepened, this time to 684 feet with a water level of 132 feet below land surface. Since deepening in 1977, the water level has declined an average of 7.3 feet per year.

1N/27E-5CCB- Drilled to a depth of 892 feet in April 1969, the well had a water level of 208 feet below land surface on March 5, 1969. The water level decline averaged 15.2 feet from March 1969 through December 1978. From December 1978 through February 1982, the water level has declined an average of 3.0 feet per year.

1N/27E-10AAB- This well was completed in 1952 to a depth of 120 feet. In February 1967, the well was deepened to 243 feet with a reported water level of 21 feet below land surface. From January 1961 to May 1970 the water level dropped 30.0 feet. By February 1977 the water level had declined an additional 102.5 feet or an average of 14.6 feet of decline per year. An obstruction at 90 feet below land surface prevents current measurement.

1N/27E-10ACA- Drilled to a depth of 120 feet with a water level of 23 feet below land surface, this well was completed in July 1962. The water level declined 4.4 feet per year from July 1962 to March 1970. Lack of access prevents current measurement.

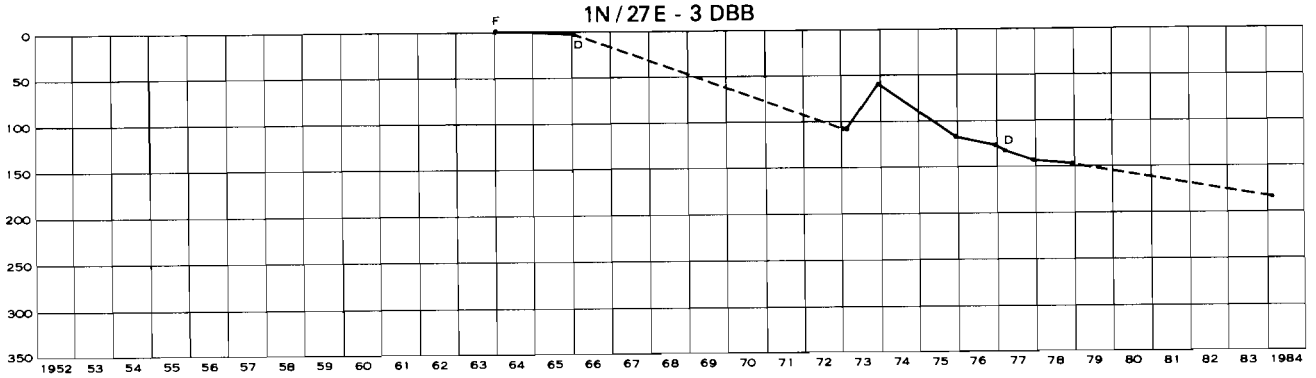
HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)

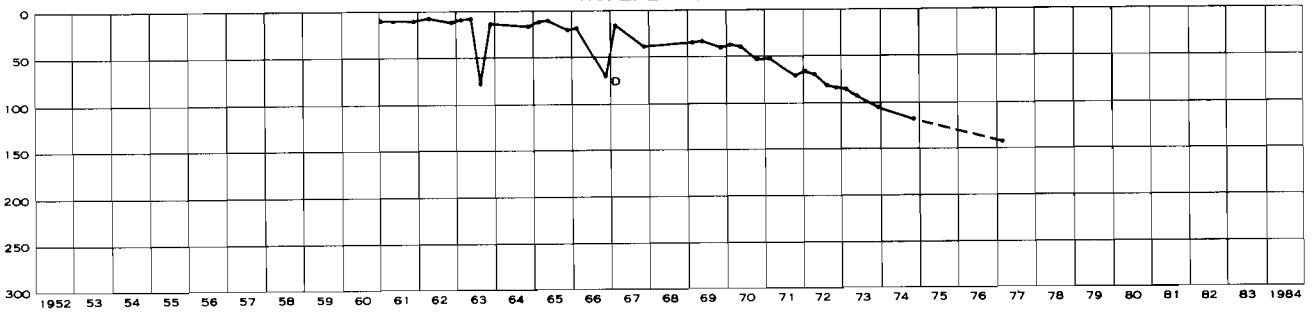
DEPTH TO WATER, IN FEET BELOW LAND SURFACE

1N / 27E - 3 DBB

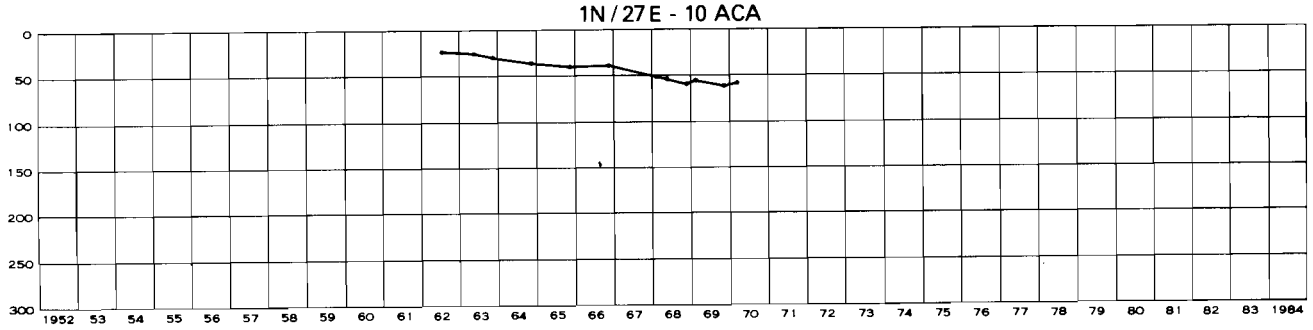


1N / 27E - 5 CCB

1N / 27E - 10 AAB



1N / 27E - 10 ACA



Flowing ..... F
Deepened ..... D
Data Not Available - - - - -

1N/27E-10ADC- Reportedly drilled to 110 feet in 1952, this domestic well may have been deepened to 127 feet in 1973. From January 1961 to March 1970, the water level declined 33.21 feet or 3.3 feet per year. The water level declined 12 feet per year from March 1970 to May 1973. From May 1973 to March 1979, the water level remained fairly constant, declining only 2.12 feet over the six year period. This well is probably tapping a local shallow source of recharge.

1N/27E-21ACC- This well was completed to a depth of 450 feet in November 1968 with a water level of 125 feet below land surface. In March 1976, the well was reamed from six to fourteen inch diameter from 223 feet to 450 feet. At that time, the water level was reported to be 180 feet below land surface. The well was deepened in February 1977 to a depth of 760 feet with a water level of 89 feet below land surface. From November 1968 to December 1974 the water level declined an average of 6.3 feet per year. The water level declined 10.9 feet over the next nine years, an average of 1.21 feet per year.

1N/27E-21DDD- Drilled in May 1968 to a depth of 420 feet, this well had a reported water level of 22 feet below land surface. In April 1977 the well was deepened to 600 feet with a water level of 167 feet below land surface. From May 1968 to December 1976 the water level declined an average of 3.9 feet per year. The water level dropped 110 feet between December 1976 and April 1977 or when the well was deepened. Since the deepening, the water level has declined an average of 2.9 feet per year. The water level rise of 15.1 feet from February 1983 to February 1984 may have been in response to a 90 percent reduction in pumping during that time. The February 1983 measurement was with an airline while the March 1982 and February 1984 measurements were made with an electric tape. Data collected in 1984 indicates that the airline probably has a leak.

1N/27E-26BCD- Originally drilled to a depth of 133 feet in March 1967, this well has been deepened twice. The water level was 7 feet below land surface upon completion in 1967. The first deepening in July 1968 was to a depth of 250 feet with a water level of 50 feet below land surface. The second deepening was to a total depth of 575 feet in April 1977 with a water level of 145 feet below land surface. From March 1967 to December 1974, the water level declined an average of 20.3 feet per year. The water level rose an average of 14 feet over the next year, then remained fairly constant until December 1978. From December 1978 to February 1984 the water level declined an average of 3.8 feet per year.

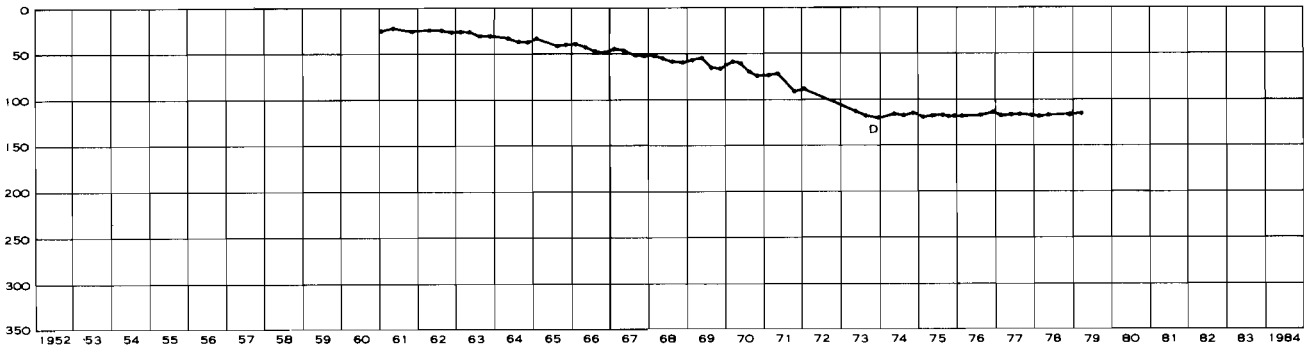
HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

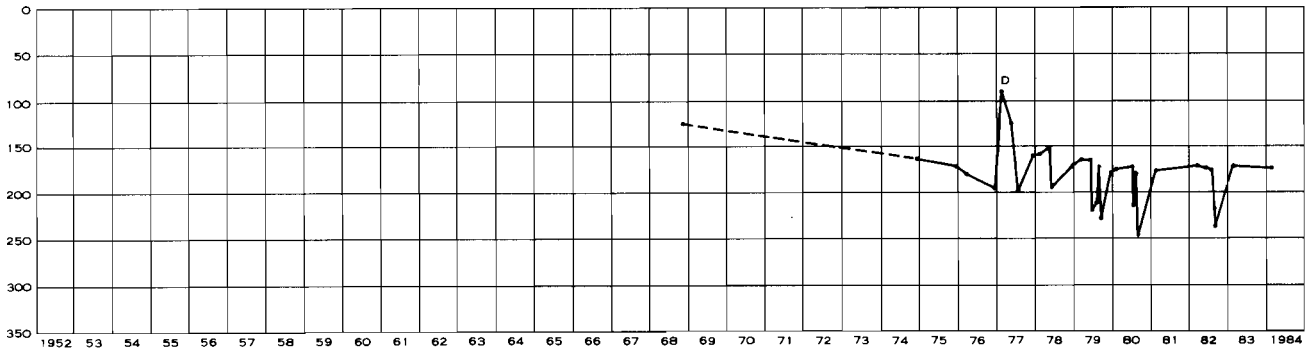
(Continued)

DEPTH TO WATER, IN FEET BELOW LAND SURFACE

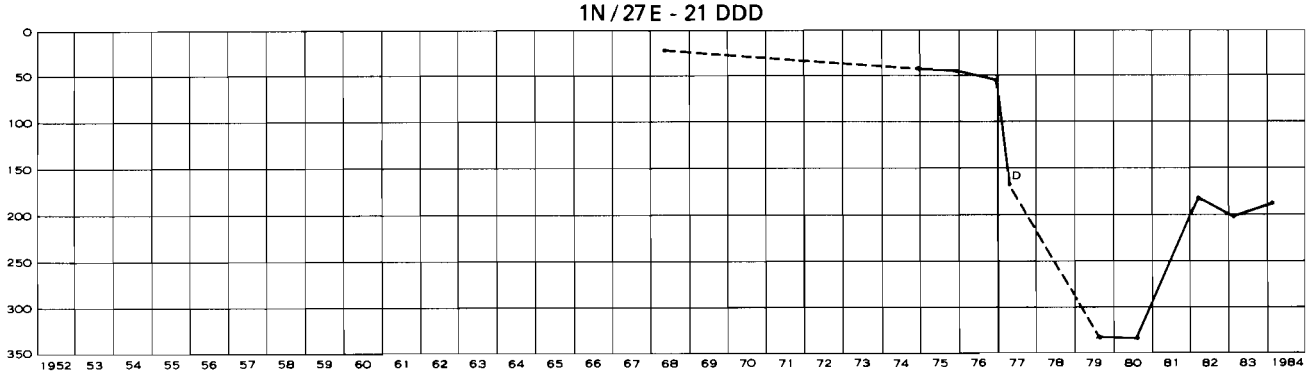
1N / 27 E - 10 ADC



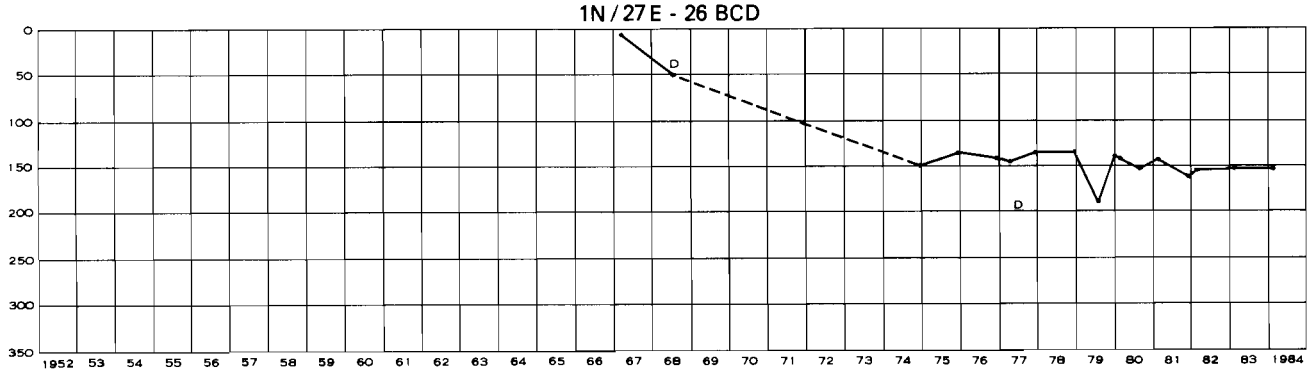
1N / 27 E - 21 ACC



1N / 27 E - 21 DDD



1N / 27 E - 26 BCD



Deepened ..... D

Data Not Available - - - - -

1N/27E-26CBA This well was drilled in April 1968 to a depth of 200 feet with a reported water level of 40 feet below land surface. From April 1968 to December 1974, the water level declined an average of 15.3 feet per year. From December 1974 to December 1975 the water level rose approximately 33.6 feet and remained constant for the next four years. From December 1978 to August 1979, the water level dropped 41 feet, but has remained fairly constant since.

1N/27E-27BDD- Drilled as a domestic well in November 1962, the well was completed to 65 feet with a reported water level of 7 feet below land surface. In November 1970 the well was deepened for use as an irrigation well to 116 feet with a reported water level of 67 feet below land surface. The well was deepened again in November 1981 to a depth of 240 feet with a reported water level of 95 feet below land surface. From November 1962 to November 1970 the water level declined an average of 7.5 feet per year. The water level rose 12 feet over the next six years. From February 1977 to February 1984, the water level declined an average of 8.3 per year.

1N/28E-28BAA- Completed in July 1953, this well was drilled to a depth of 500 feet with a water level reported to be at land surface. The water level remained fairly stable through February 1967. Since February 1967, the water level has declined less than 25 feet or an average decline of 1.4 feet per year.

1N/28E-28BBC- When completed to a depth of 356 feet in March 1953, this well had an artesian pressure of ten pounds per square inch and had a flow rate of 1200 gallons per minute. From March 1953 to March 1958 the water level declined an average of 5.2 feet per year. From March 1958 through May 1967, the water level rose 2.6 feet. The last time the well was reported flowing was May 1964. The water level decline from May 1967 to February 1984 averaged 1.75 feet per year.

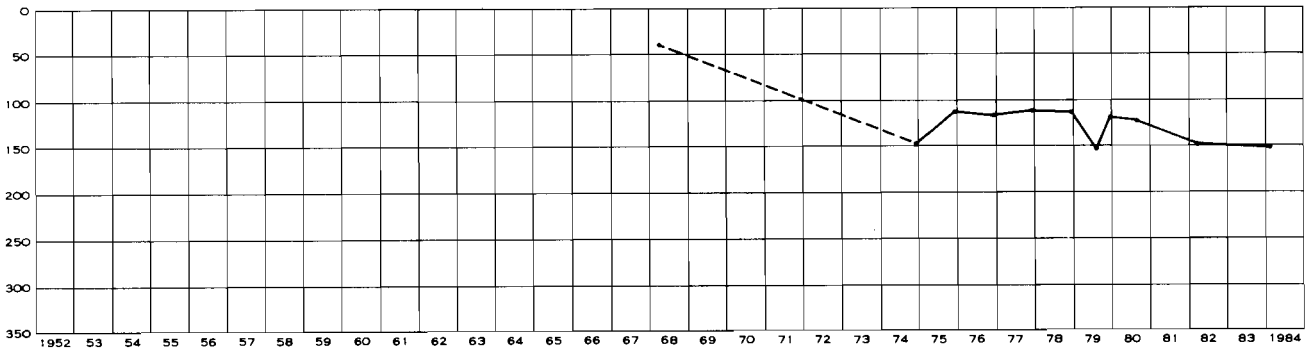
HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

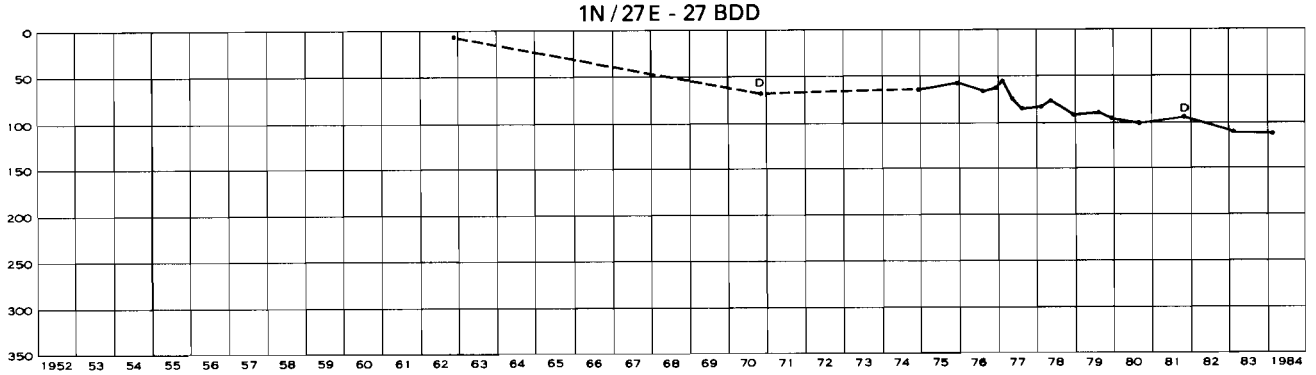
(Continued)

DEPTH TO WATER, IN FEET ABOVE (+) OR BELOW LAND SURFACE

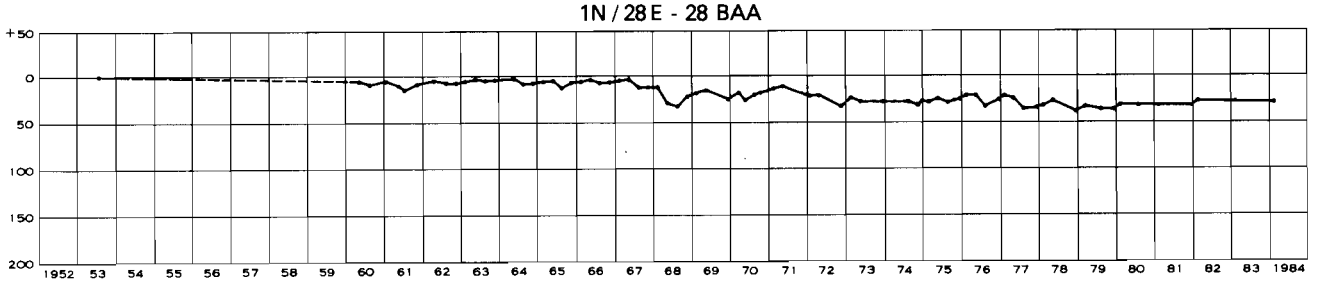
1N / 27 E - 26 CBA



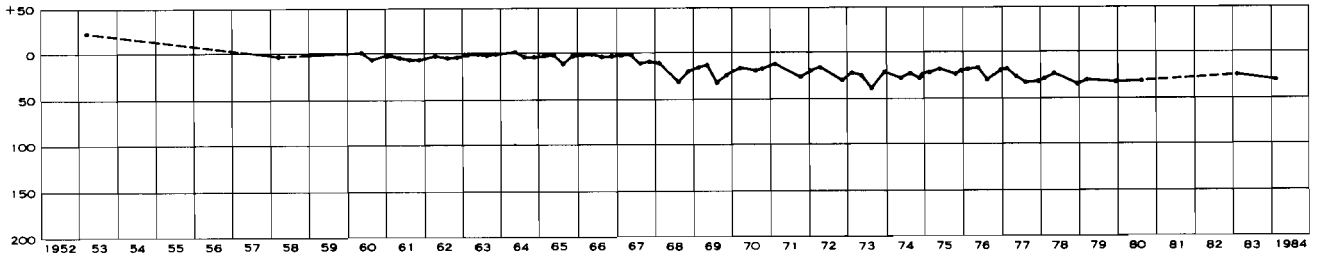
1N / 27 E - 27 BDD



1N / 28 E - 28 BAA



1N / 28 E - 28 BBC



Deepened ..... o

Data Not Available - - - - -

2N/26E-3BBC- Drilled in August 1972, this well is 1265 feet deep with a reported water level at the time of completion of 428 feet below land surface. Cascading water occurs from an upper saturated zone down to the measured water level. From March 1976 to December 1981, the water level declined at a rate of 10.4 feet per year. Since December 1981 the water level has risen an average of 0.45 feet per year. The cascading water from the upper basalts may be responsible for the water level rise by recharging the lower basalts. A continuous water level recorder was installed on January 27, 1984.

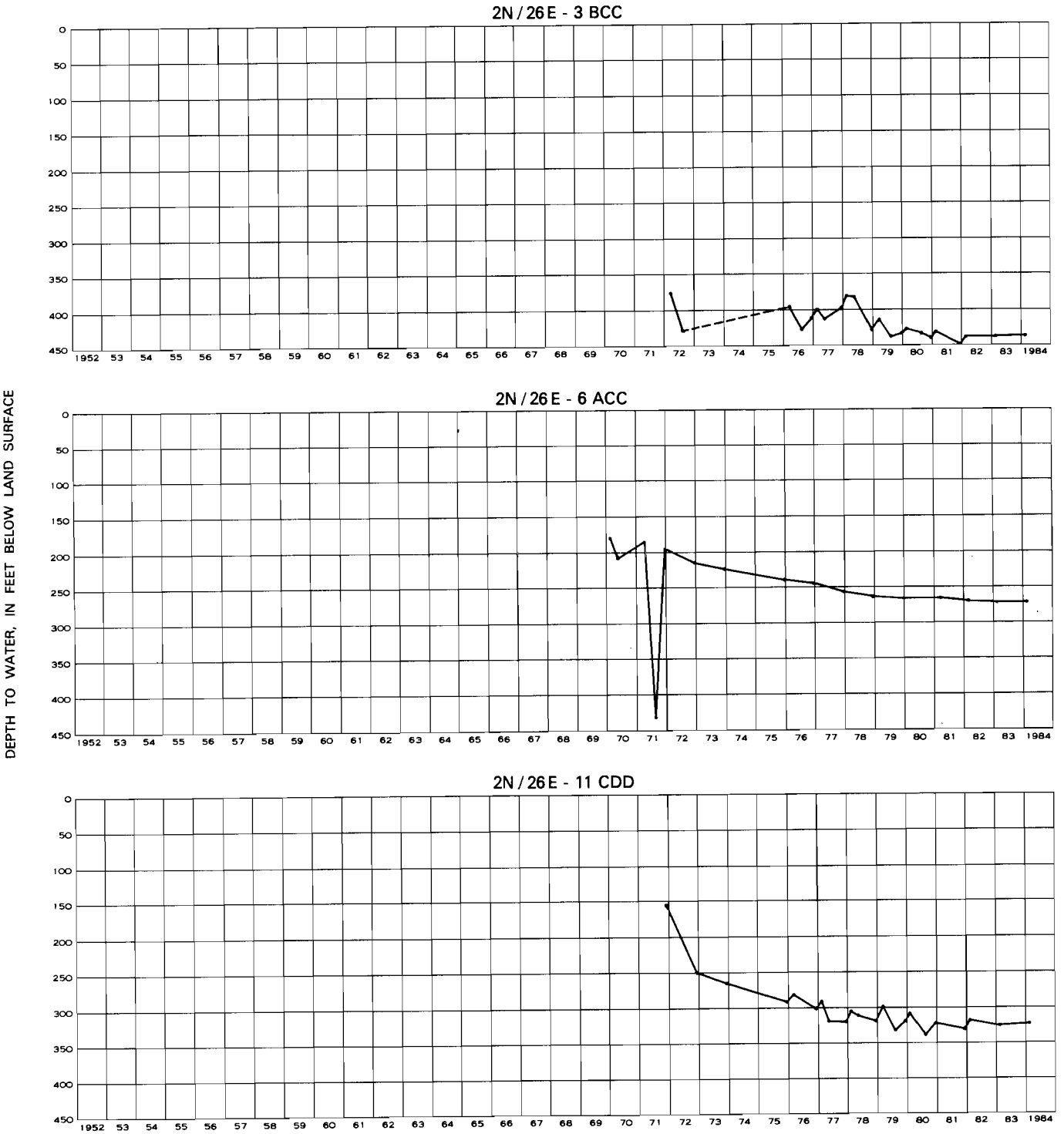
2N/26E-6ACC- This well was completed in May 1970 at a depth of 1097 feet and a reported water level of 208 feet below land surface. Water level declined from April 1971 to December 1978 at an average rate of 11.2 feet per year. Since December 1978 the rate of water level decline has decreased to 1.3 feet per year. Withdrawals from this well have dropped from over 400 acre-feet in 1981 to 24 acre-feet in 1983 and no withdrawal in 1984. The water level rise from February 1983 to February 1984 +(0.43) may be in response to the decrease in withdrawals.

2N/26E-11CDD- Reported to be 1200 feet deep, this well was drilled during 1971 and is currently being used for domestic purposes. From December 1971 to December 1972 the water level declined 95.17 feet. The water level decline averaged 11.6 feet per year from December 1972 to December 1978. Since December 1978 the water level has declined an average of 0.7 feet per year.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



Data Not Available - - - - -

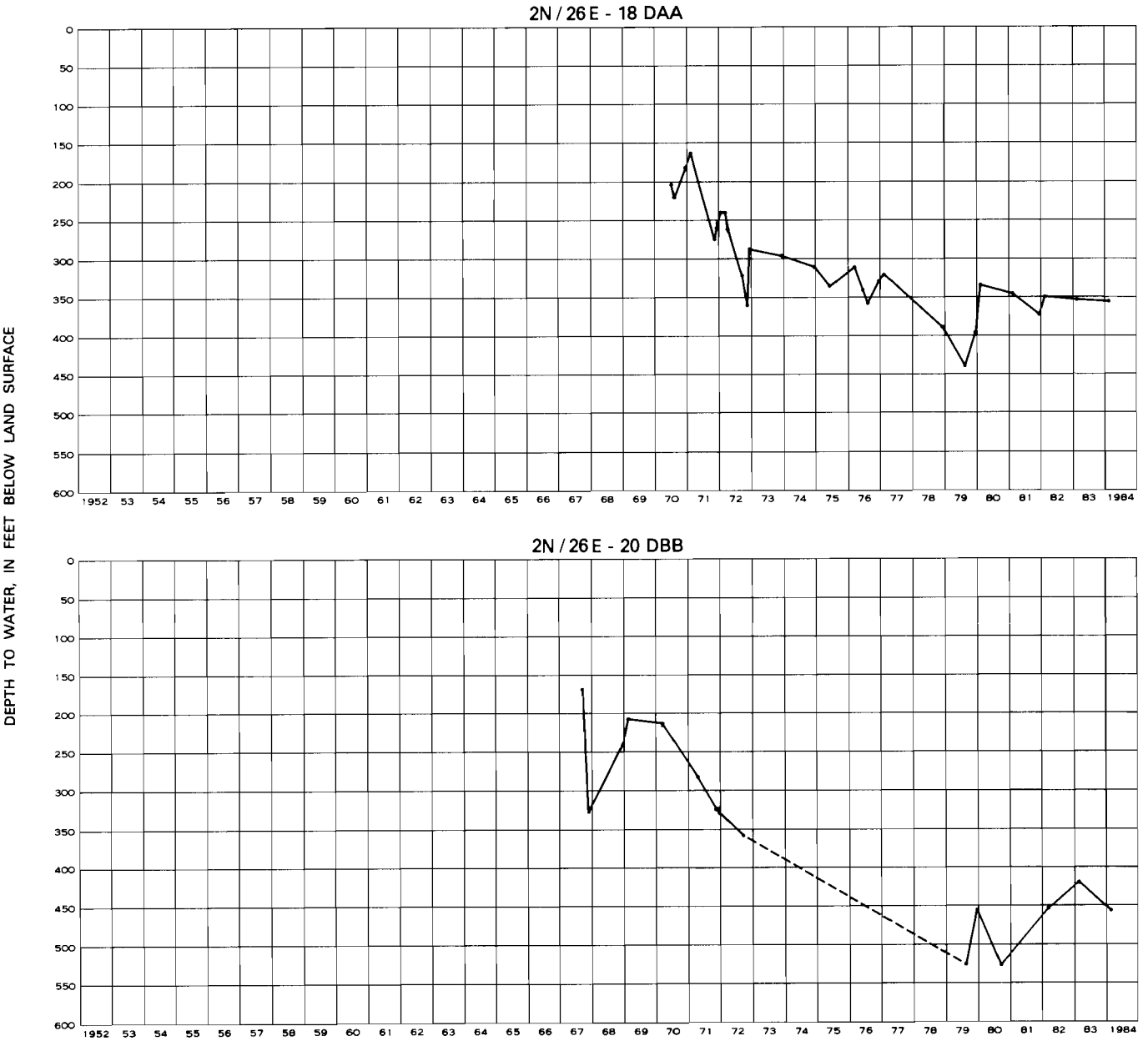
2N/26E-18DAA- Completed in July 1970, the well is 1145 feet deep with a reported water level of 205 feet below land surface. From February 1971 to December 1972 the water level declined 124.53 feet. From December 1972 to February 1981, water level declines averaged 7.3 feet per year. Since February 1981 water levels have averaged 3.0 feet of decline per year.

2N/26E-20DBB- This well was completed in July 1967 to a depth of 1000 feet with a reported water level of 166 feet below land surface. The water level has averaged over 17 feet of decline per year since July 1967. From July 1967 to September 1972 the water level decline averaged 38.4 feet per year. Since September 1972 the decline has averaged 8.6 feet per year.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



Data Not Available - - - - -

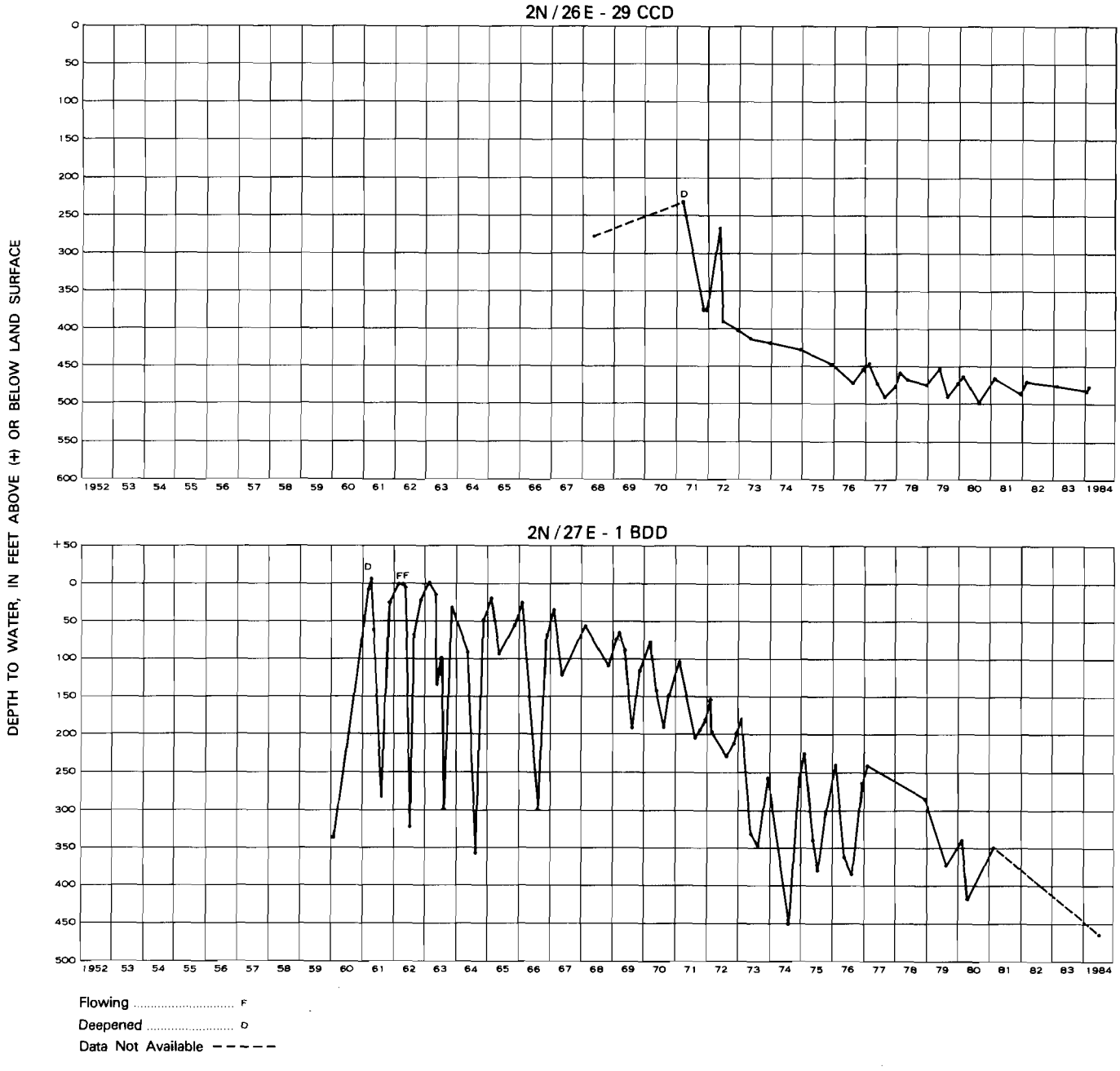
2N/26E-29CCD- Drilled to a depth of 914 feet in May 1968, this well had a reported water level of 277 feet below land surface. In March 1971 the well was deepened to a depth of 1004 feet with a reported water level of 233 feet below land surface. From March 1971 to December 1972 the water level dropped 168.71 feet. Over the next three years, the water level declined an average of 15.2 feet per year. Since December 1975, the water level has declined an average of 3.6 feet per year. A continuous water level recorder was installed on May 8, 1984.

2N/27E-1BDD- When drilled in 1952, the well was 554 feet deep. In March 1961 the well was deepened to 840 feet. A reported water level in 1952 showed the water level at 327 feet below land surface. The water level was at 334 feet below land surface on February 1, 1960. After deepening in March 1961 the water level was reported at 7 feet below land surface and 6.93 feet above land surface on April 9, 1961. The water level recovered to above land surface in the spring of 1962 and 1963 after being pumped during the irrigation season. From February 5, 1963, when the water level was recorded at 0.57 feet above land surface, to March 1970 the water level declined an average of 11.1 feet per year. The water level decline averaged 24.7 feet per year from March 1970 to February 1981.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



2N/27E-2DAA1- When completed in May 1957 to a depth of 799 feet, this well had an artesian flow of 580 gallons per minute. The well was deepened to 886 feet in February 1962. From April 1962 to April 1964 the water level declined an average of 14.3 feet per year. The decline of the water level averaged 20.4 feet per year from April 1964 to February 1975. The average rate of decline increased to 21.3 feet per year from February 1975 to February 1982.

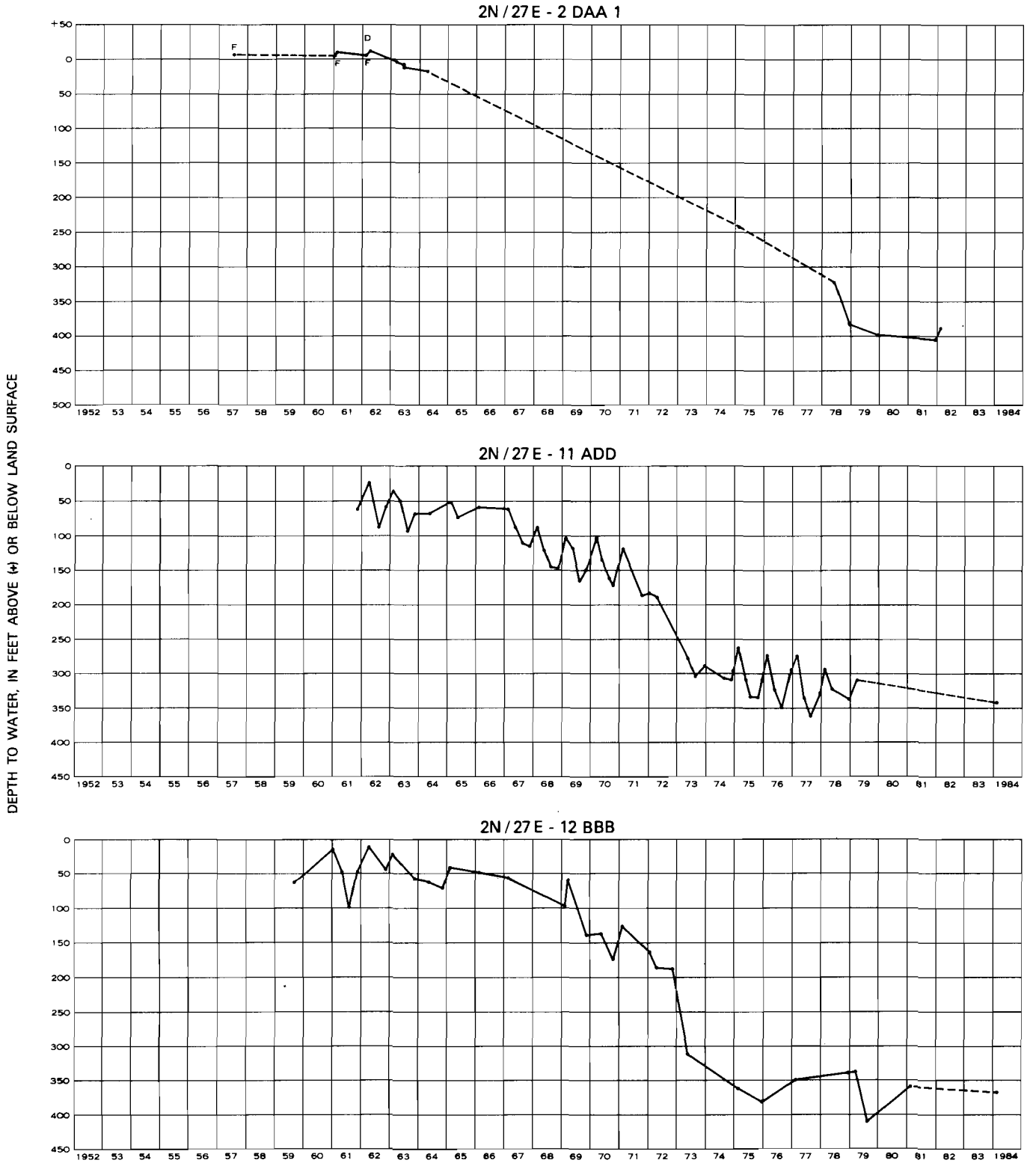
2N/27E-11ADD- This well was reported to have been drilled in 1952 to a depth of 525 feet and is currently unused. From April 1962 to February 1971 the water level declined an average of 10.5 feet per year. Over the next four years the water dropped 143.42 feet or an average of 35.9 feet per year. Since February 1975, the average annual water level decline has been 8.8 feet.

2N/27E-12BBB- This well was drilled in September 1959 to a depth of 959 feet. It was noted on the driller's log that there was a 50-foot decline in the water level when a well located in T2N/R27E-Section 1 or 2 was pumping. From January 1961 to March 1969 the water level decline averaged 5.6 feet per year. The rate of decline increased to 32.3 feet per year from March 1969 to November 1972. From November 1972 to May 1973, the water level dropped 123.92 feet. Since May 1973, the rate of decline has been 5.0 feet per year.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



2N/27E-14CCB- Originally drilled as an irrigation well to 280 feet in 1951, the well was deepened in September 1968. After deepening, the well was 785 feet with a reported water level of 200 feet below land surface. From January 1952 to March 1970 the water level declined an average of 7.3 feet per year. The water level decline averaged 29.8 feet per year from March 1970 to November 1975. Since November 1975, the water level has declined an average of 4.7 feet per year. The well is now used for a domestic supply.

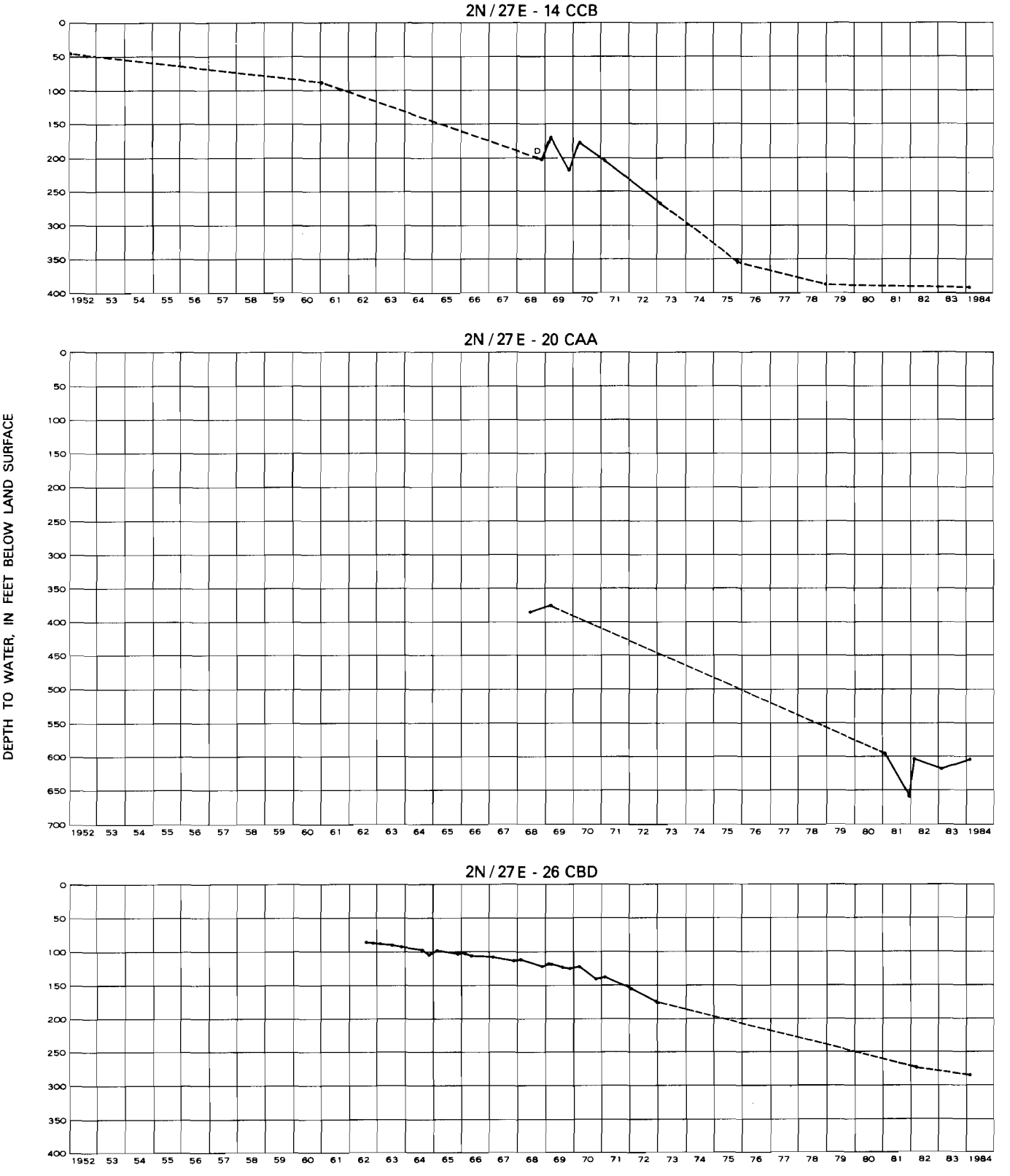
2N/27E-20CAA- Completed in August 1968, this well was 1103 feet deep with a reported water level of 385 feet below surface. From March 1969 to February 1981, the water level declined 220.4 feet, an average decline of 18.4 feet per year. Since 1981, the rate of decline has averaged 2.70 feet per year. The water level was 14 feet higher in February 1984 than it was in February 1983 due to a 48 percent reduction in withdrawals during that time period.

2N/27E-26CBD- This well was completed to a depth of 932 feet in August 1962 with a reported water level of 86 feet below land surface. The water level declined an average of 4.9 feet per year from August 1962 to March 1970. The rate of decline increased to 17.0 feet per year from March 1970 to December 1972. Since December 1972, the water level in the well has declined an average of 10.0 feet per year. The water level values in 1979 and 1980 were measured in the summer and show the effects of pumpage.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



Deepened ..... D

Data Not Available - - - - -

2N/27E-27BCC1- When completed in January 1957 this well was 598 feet deep with a reported water level of 50 feet below land surface. From January 1957 to February 1963 the water level rose 6.5 feet. Over the next six years, the water level declined an average of 14.4 feet per year. After the March 1969 measurement, the water level was not checked again until March 1982. Over that 13-year period, the water level declined 7.8 feet and has been fairly stable since March 1982. The well has been used for domestic purposes since early 1983. The water level rise of 2.7 feet from February 1983 to February 1984 may be in response to the reduction in withdrawals.

2N/27E-27CBC- Drilled in September 1967, this well was 240 feet deep with a reported water level of 85 feet below land surface. From September 1967 to January 1972, the water level declined 0.93 feet. The average water level decline from January 1972 to December 1977 was 9.3 feet per year. Since December 1977 the water level has declined an average of 1.0 foot per year.

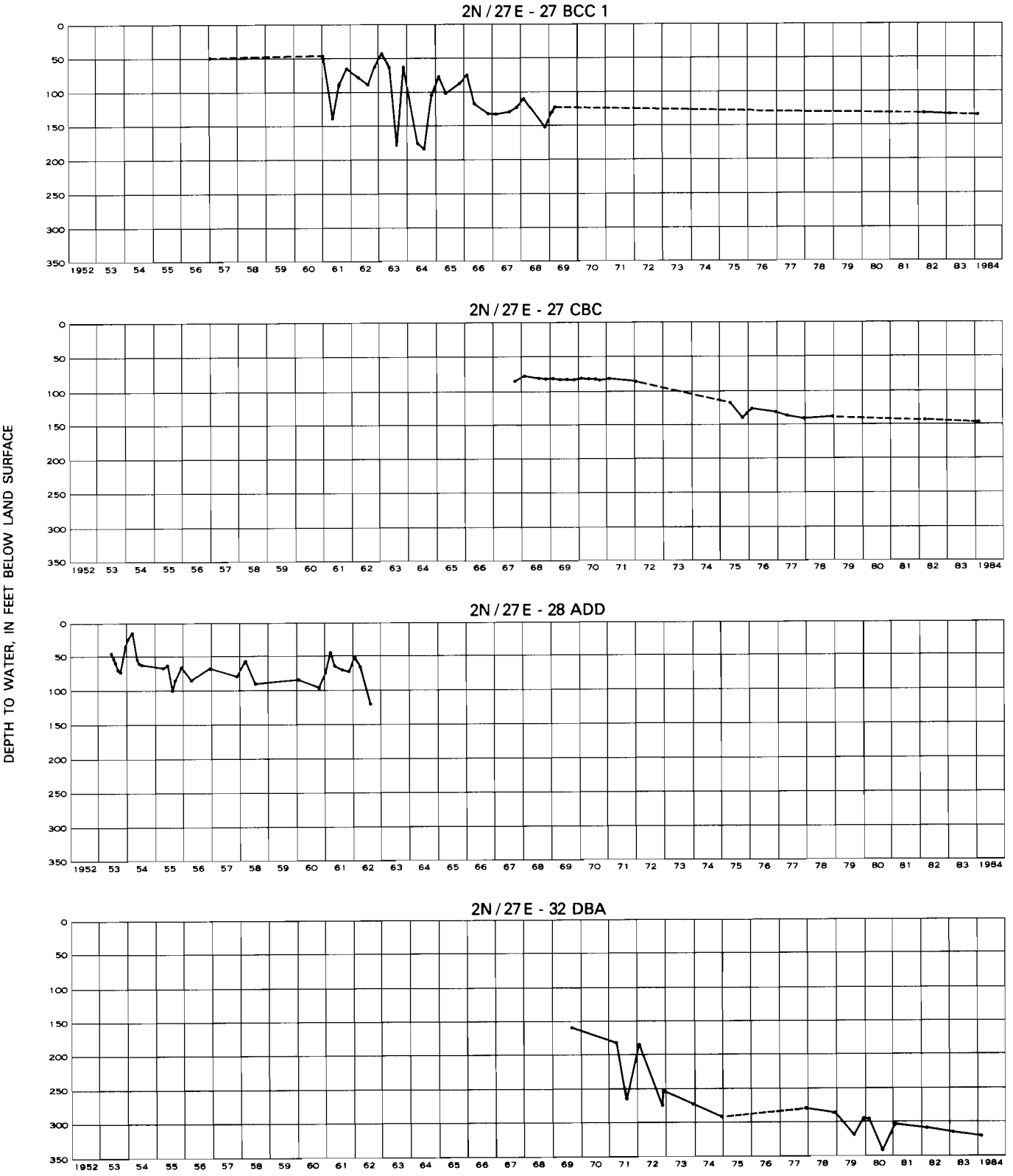
2N/27E-28ADD- This well was drilled to a depth of 263 feet either in or prior to 1952. The water level declined an average of 6.5 feet per year from August 1953 to August 1962. The well is constructed such that there is no access.

2N/27E-32DBA- The depth of this well when completed in September 1969 was 936 feet with a reported water level of 158 feet below land surface. From September 1969 to December 1978, the water level averaged an annual decline of 14.3 feet. Since December 1978 the water level has declined an average of 6.9 feet per year.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



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2N/28E-7AAD1- The original well was drilled to 400 feet prior to 1966. In January 1966 the well was deepened to 702 feet with a reported water level of 90 feet below land surface. From January 1966 to March 1969, the water level declined an average of 9.0 feet per year. The water level declined an average of 30.3 feet per year from March 1969 to December 1974. From December 1974 to February 1980 the water level declined at an average of 9.1 feet per year. For two years the water level was stable before declining 11.6 feet from February 1982 to February 1983.

3N/27E-25DDC- This well was completed in July 1960 to a depth of 591 feet with a reported water level of 240 feet below land surface. The water level has declined an averaged of 3.4 feet per year from July 1960 to December 1978.

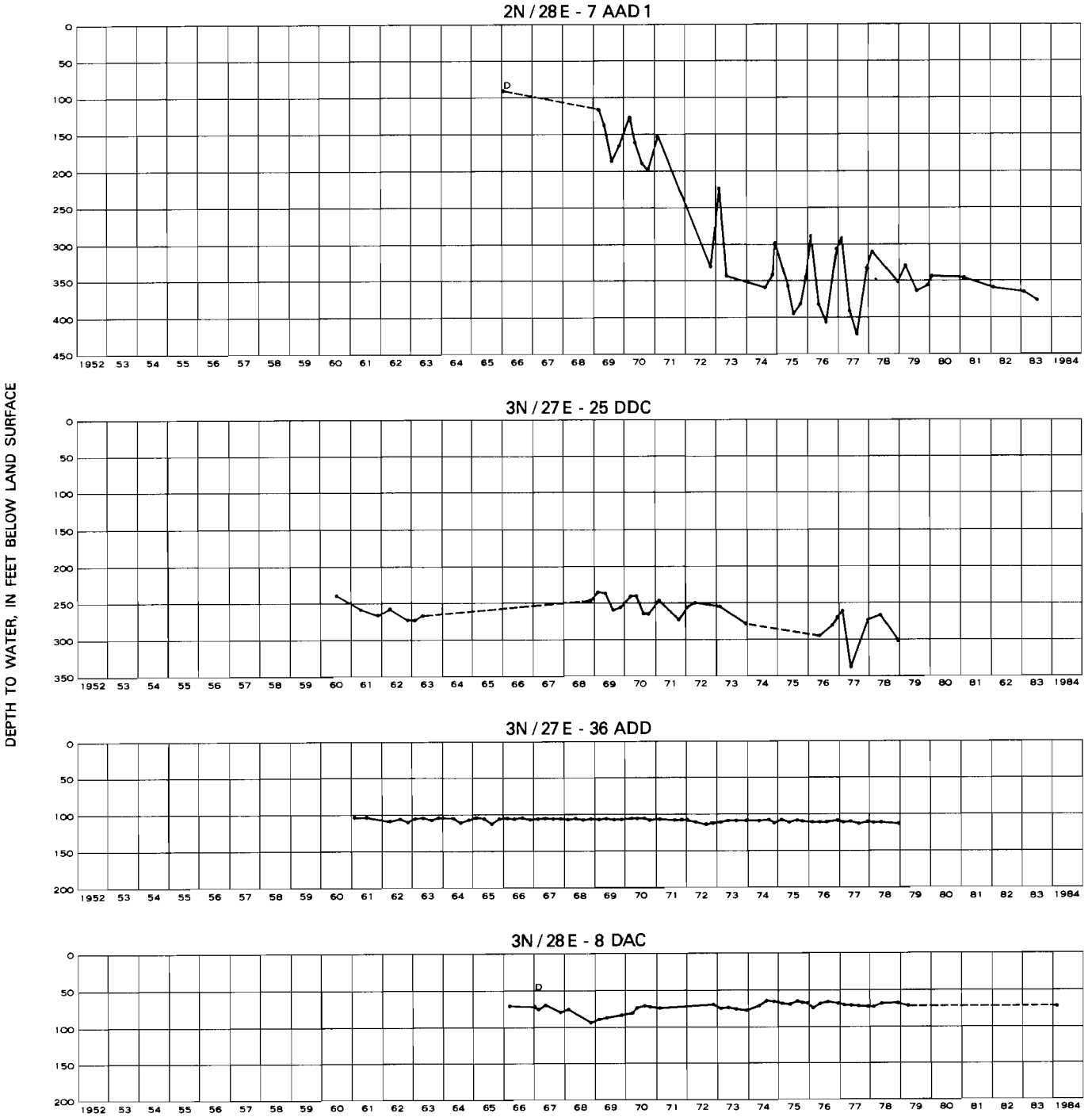
3N/27E-36ADD- This domestic well is 145 feet deep and penetrates only alluvium. The well was drilled in January 1961 with a reported water level of 110 feet below land surface. From January 1961 to December 1978, the water level has declined slightly more than eight feet.

3N/28E-8DAC- Drilled in March 1966 to a depth of 250 feet, the well had a reported water level of 70 feet below land surface. The well was deepened in January 1967 to a depth of 437 feet with a reported water level of 72 feet below land surface. This well was drilled for irrigation but is used as a domestic supply only as the yield was too low for irrigation. The water level has risen 2.78 feet since February 1967.

HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



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3N/28E-18DBD- Completed in January 1956, this well was 875 feet deep with a reported water level of 60 feet below land surface. Water is cascading down the well from saturated sediments that are above the regional water level. The water level declined an average of 7.1 feet per year from January 1956 to May 1964. The water level was not measured from May 1964 to August 1979. Over this time frame the water level rose 34.7 feet. Since August 1979, the water level has risen 10.3 feet. The well has reportedly caved in and the pump pulled due to a broken shaft. At this time, the well is open and has not been used for three years. The water level rise is in response to the recharge (cascading water) from the upper sediments (allowed by substandard well construction) and lack of use over the last three years.

3N/28E-28ADA- This well was completed in April 1968 at a depth 830 feet with a reported water level of 275 feet below land surface. The well was deepened to a depth of 984 feet in May 1982 with a reported water level of 360 feet below land surface. The water level has declined an average of 5.7 feet per year from April 1968 to February 1983. From February 1983 to February 1984 the water level rose 3.10 feet. Cascading water from upper zones is entering the lower basalts and the water level rise may be in response to the recharge.

3N/28E-28CAB- When completed in February 1967 the well was 636 feet deep with a reported water level of 280 feet below land surface. From November 1967 to December 1971, the water level averaged an annual decline of 8.5 feet. From December 1971 to February 1976, the water level remained constant. Poor access prevents water level measurement at this time.

4N/28E-18CAB- This is a gravel well drilled in January 1964 to a depth of 93 feet with a water level of 44 feet. From January 1964 to December 1978, the water level declined an average of 0.9 foot per year.

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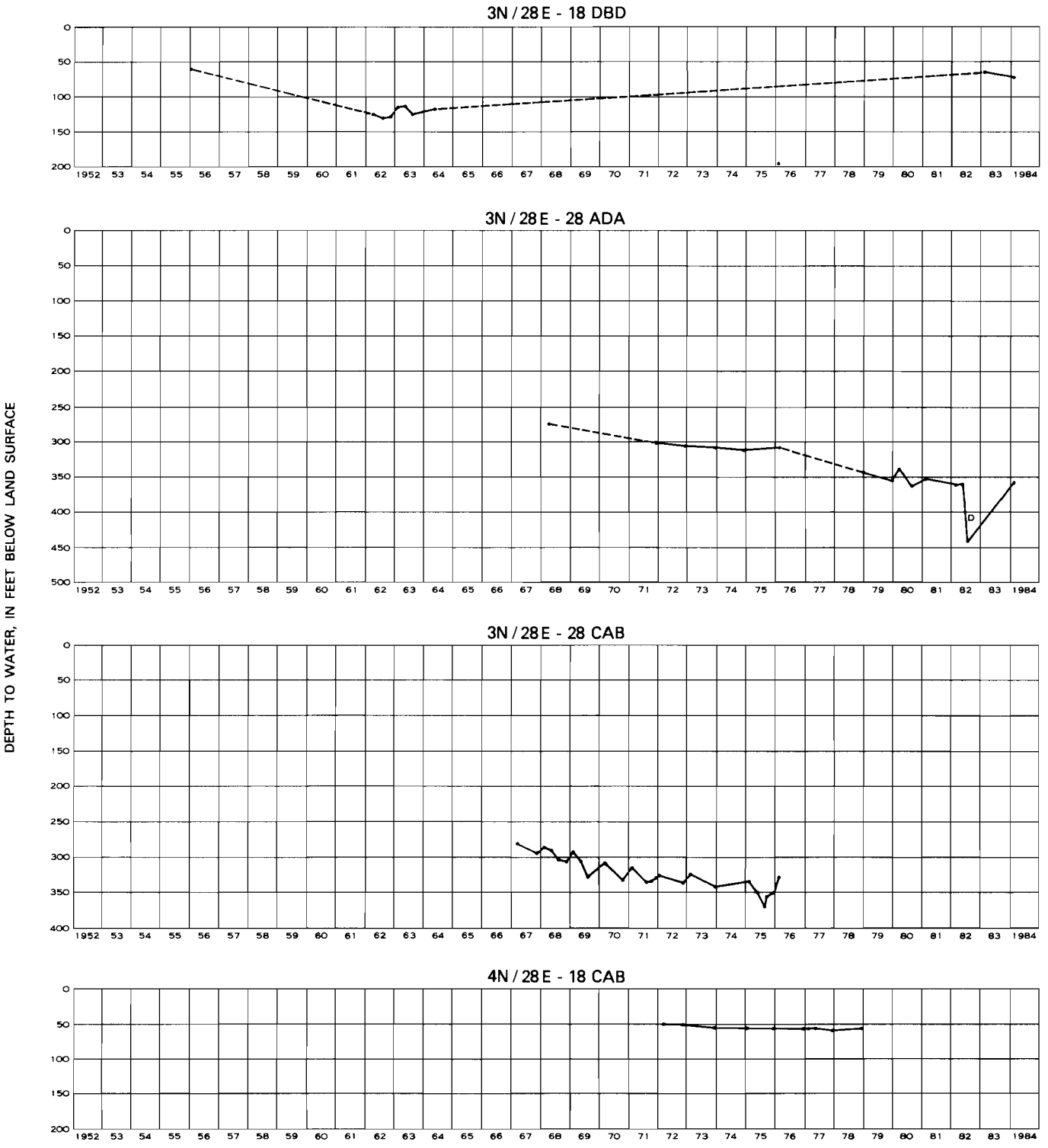
HYDROGRAPHS OF SELECTED WELLS

BUTTER CREEK AREA

(Continued)



Deepened ..... D

Data Not Available - - - - -

V. USE OF GROUND WATER

Ground water uses within the Butter Creek area generally fall into three catagories: (1) domestic and stock water, (2) irrigation uses, and (3) municipal. Other uses such as industrial, manufacturing and food processing have not, as yet, been established in the area.

A. Domestic and stock water

Domestic and stock watering uses, though very important, do not appropriate a significant amount of ground water from the basalt aquifers. Household water and stock water is almost always supplied by small diameter wells capable of pumping 5 to 25 gallons per minute. Some of the wells develop shallow water-bearing gravel deposits adjacent to local stream channels and do not exceed 100 feet in depth. Other wells must be drilled deep into the basalt formations to depths of 200 feet or more. One domestic well at the D.O. Nelsen Ranch house near the western boundary of the proposed critical area has been drilled to 503 feet.

****

The use of ground water for domestic, one-half acre of lawn and garden, and stock-watering purposes is exempt under Oregon law (ORS 537.545) from having to file for a water right. It is estimated that each domestic well uses 1.0 acre-foot of water annually for in-house uses and irrigation of lawn and garden. There are 467 domestic well logs on file with the Water Resources Department for the Butter Creek area. In addition to the logs on file, irrigation wells have been converted and many wells were drilled with no log being filed. Therefore, approximately 600 acre-feet per year is withdrawn from the basalts for domestic purposes.

****

B. Irrigation Water Rights

Irrigation water uses are by far the largest and most important water uses affecting the total changes in ground water storage within the proposed critical ground water area. At present, there is one claim to a vested water right filed as a well registration under ORS 537.605. This registration has a claimed date of priority listed at 1925. All subsequent water rights within the area were filed as applications for permits to appropriate ground water. The first application was made on April 13, 1950. Since that date, 62 permits have been issued. The last application for ground water use within the Butter Creek area to be accepted was dated February 2, 1972. A total of 36 certificates of water rights have been issued. Thirty-four certificates are for basalt aquifer wells and two certificates are for shallow gravel sumps along Butter Creek. Water rights within the proposed critical area are listed on Table 1 of this report.

* *

A total of 86 water right applications to appropriate ground water have been processed to date in the Butter Creek area. The last application to appropriate ground water was accepted June 24, 1975. Of those 86 applications, 60 have been issued certificates, 10 permits are waiting final proof survey, 2 applications are pending and action has been suspended on four more. Ten applications or permits have been canceled. There are an additional 46 applications for shallow gravel wells with 35 of the applications having reached certification.

* *

The duty of water allowed for water rights within the Butter Creek-Ordnance area is 1/80th cfs, and is not to exceed 3.0 acre-feet per acre per irrigation season. If all of the existing water rights of the area were exercised to their maximum allowable water use each season, it would require about 56,300 acre-feet of water annually.

****

As of October 1984, there are 22,962.80 acres with permits or rights for primary irrigation with ground water and 9,782.98 acres with supplemental permits or rights to irrigate with ground water. If the maximum allowable water use per year were exercised, it would require over 98,000 acre-feet of water annually.

****

Water right applications have not been accepted for ground water use from the deep basalt aquifers of the Butter Creek area since February 2, 1972. Three applications for shallow basalt wells were accepted for the northernmost portion of the Butter Creek area located near the Columbia River.

****

When the proposed Butter Creek Critical Ground Water Area's southern boundary was moved from the Willamette Base Line south to the axis of the Service Anticline, three additional water rights were brought inside the boundary. The youngest priority water right is dated August 28, 1980.

****

C. Effects of Continued Ground Water Use

The withdrawal of ground water from deep wells in the Butter Creek area reduces the quantity of water available to neighboring water users. Some irrigation wells in this area are not equipped with totalizing water meters. Therefore, the total amount of water used each year can only be estimated at this time. Ground water storage estimates have been made based on aquifer areas and changes in water levels. Storage estimates assist in evaluating the potential use of water from the Butter Creek basalts. Accurate metered data on annual water use will be needed to improve estimates of ground water storage.

* *

Based on irrigation pumpage from 1979 through 1983 and water level data from December 1978 and February 1984, an estimate of the storage coefficient was calculated. Irrigation withdrawals from the basalts within the proposed Butter Creek Critical Ground Water Area over the five-year period was approximately 95,000 acre-feet, or 4.15×10^9 cubic feet. Ground water level declines during that same time frame indicate that approximately 7.73×10^{10} cubic feet of basalt was dewatered. To calculate the storage coefficient, divide the volume of water withdrawn by the volume of basalt dewatered. It was assumed that no recharge to the basalts occured during the five-year period. The value calculated for the storage coefficient was 5.27×10^{-2} and is higher than all previously calculated and estimated values. This may indicate that the ground water flow system is changing from a confined to an unconfined condition or that there is recharge to the system.

As an example, assume that one-half of the water withdrawn was from recharge; therefore, only 2.07×10^9 cubic feet of water was removed from storage. Dividing by the volume of dewatered basalts, the storage coefficient would then be 2.68×10^{-2}. This value is similar to those calculated previously by Water Resources personnel.

* *

Water level decline and meager annual precipitation (recharge) combined with the total amount of ground water use in the area indicate that a ground water mining situation has developed in the Butter Creek area. It is necessary to restrict all ground water withdrawals to the duty of water allowed under the water rights of record within the critical area. It is also important to establish a reasonable length for the annual irrigation season.

* *

There have been several major changes in the irrigation practices used in the Butter Creek Area. The change that probably has had the most effect was the reduction in the length of the irrigation season. Pumping used to be year-round except during harvest and for a short period in December. Irrigation does not currently begin until late April or May and ends generally in October. When grain is being irrigated, the pumps are generally shut down by late June or early July and then start up again in late August or September. Some of the water users are applying less water when they are irrigating. Most of the systems have been converted to low pressure rather than high pressure. This saves mainly on power consumption, but there is also some savings on water. These changes have lowered the rate of ground water withdrawals.

* *

At the present rate of water use, water levels in wells will continue the annual decline. Some wells will have to be deepened in order to maintain production yields. Pumping lifts are now approaching 500 feet in some of the deeper wells. Increased pumping costs will reduce the economic advantages to the well owners of the area. Any economic growth and development based on the mining of ground water resources within the area will suffer severe reversals when ground water withdrawals become no longer feasible. The use of ground water must be managed to assure optimum development and beneficial use within the capacity of the existing water resources. Therefore, ground water pumpage within the proposed critical area must be substantially reduced and controlled.

* *

Since the first well was drilled in the Butter Creek Area for irrigation, 30 wells have been deepened: three of those wells were deepened twice and one of the wells was deepened three times. In addition to the deepenings, 5 wells were reamed so that the pump could be set lower and 7 wells were replaced. Pumping lifts have exceeded 688 feet below land surface at one well and are below 500 feet at several others. Surface water has been brought in to replace or supplement ground water on some of the land.

* *

VI. CONCLUSIONS

* *

Based on continued investigations by the Department and subject to revisions as a result of any subsequent legal processes, the following conclusions have been drawn.

* *

A. The average annual recharge is not sufficient to maintain stabilized ground water levels at present rates of withdrawal. A ground water mining situation now exists within the Butter Creek area. Water levels in wells constructed into the basalt aquifers of the Butter Creek critical area will continue to decline. Unless there is an increase in the amount of annual recharge or a reduction in ground water withdrawals, new low water level positions will be established each year until such time that it will become impossible to obtain the present amount of ground water being withdrawn. The ultimate failure of some wells will occur.

B. Accurate pumpage information describing the total amount of ground water withdrawn annually from the Butter Creek critical ground water reservoir is required. Water meter data is necessary to make quantitative estimates of the ground water storage capacity within the critical area aquifers. Therefore, totalizing water meters must be installed on all wells used for non-exempted ground water appropriation. Each water well owner should maintain a record of pumpage to be reported to the Water Resources Department annually.

* *

Flow meters have been installed on all non-exempted points of ground water appropriation. The flow meters must be maintained and in proper working order for reliable data collection.

* *

C. The estimated thickness of at least 2000 feet and the tabular bedding of the Columbia River Basalt Group suggest that there may be additional aquifer zones lying at depths below and separated from the presently developed aquifers within the study area. Extensive casing and cement grouting procedures will be required for deeper well exploration projects. Perhaps 2000 feet of grouted casing will be necessary to separate lower water bearing zones from the presently developed aquifer system.

* *

Depending on the location of the well in the Butter Creek area, over 1500 feet of casing may be needed to separate the presently used water-bearing zones and potential producing zones not yet tapped.

* *

D. To insure the preservation of the public welfare, safety and health, it is necessary that the rights to appropriate ground water and their respective priorities be acknowledged and protected and that reasonably stable ground water levels be determined and maintained.

* *

E. Early development of the basalt ground water system in the area took place along the valley bottom land adjacent to Butter Creek in the late 1940's and 1950's. Fifteen irrigation wells were constructed from 1960 to 1966 with an additional 25 wells drilled in 1967 and 1968. Over the next five years, 25 more wells were constructed. Since 1972, 12 wells have been drilled.

F. Since 1978, precipitation measured near Hermiston, Oregon, has been 2 to 3 inches above the average annual precipitation established from 1907 through 1982.

G. The stratigraphy of the Columbia River Basalts in the proposed Butter Creek Critical Ground Water Area has been broken down in the following manner:

Group	Formation	Member
Columbia River Basalt	Saddle Mountains Basalt	Pomona
		Umatilla
	Wanapum Basalt	Frenchman Springs
	Grande Ronde Basalt	

The total thickness of the Columbia River Basalt is estimated to be over 2,700 feet. Folding and faulting has disrupted the original basalt layering, forming zones that can restrict or increase the ability of ground water to move laterally and vertically through them.

H. Two wells are referred to in the original text as not meeting well construction standards as set by the Oregon Water Resources Department. Since then, six additional wells have been discovered to be improperly constructed. These have also been turned over to the Enforcement Section of the Department.

I. There are at least two aquifers in the proposed Butter Creek Critical Ground Water Area: 1) the shallow aquifer consists of the alluvial material overlying the basalt, particularly in the panhandle area and some of the creek valleys; 2) the more extensive of the aquifers is the basalts. Within the basalt aquifer, there are many saturated zones connected to varying degrees by fractures and by wells. Ground water flow is from the south towards the north and the Columbia River.

J. Aquifer tests conducted in the proposed Butter Creek Critical Ground Water Area and in the rest of the Umatilla Structural Basin have yielded a wide range of aquifer characteristics.

K. Carbon-14 age dating of ground water supports the conceptual model of the flow system with recharge occurring mainly in the Blue Mountains and natural discharge to the Columbia River.

L. Annual withdrawals for irrigation have decreased from over 20,000 acre-feet in the late 1970's to about 15,000 acre-feet in 1983.

M. Within the proposed Butter Creek Critical Ground Water Area boundaries, 102 irrigation wells have been drilled. According to Department records, only 42 of those wells were pumped in 1983. Due to declining water levels or reduced yields, 30 wells have been deepened. Three of these wells were deepened twice and one well has been deepened three times.

N. Of the 86 water right applications to appropriate ground water in the proposed Butter Creek Critical Ground Water Area, 60 have been issued certificates, 10 are in the permit phase and 6 applications are pending. Ten applications, permits, or certificates have been canceled or rejected. Current water rights allow for 22,962.80 acres of primary ground water irrigation and 9,782.98 acres of supplemental irrigation.

O. Static water levels, measured in February 1984, have exceeded 600 feet below land surface at a well located at T2N/R27E-20CAA. The pumping water level in this well was measured at 688.8 feet below land surface on May 7, 1984.

P. Of the 53 wells with long-term water level data, 51 of the wells have average annual water level declines varying from 0.22 feet to 17.24 feet. Thirty wells have average annual water level declines greater than five (5) feet.

Q. Two wells with long-term water level data have shown water level rises. One of the wells is in the South Subarea, separated from the rest of the area by the hydrogeologic structure identified in the previously discussed aquifer test (pages 33, 34). The second well is located in the panhandle in an area that has not seen large irrigation development.

R. Water levels within the boundaries of the proposed Butter Creek Critical Ground Water Area have declined excessively. The following is a list of the number of wells by the total amount of water level decline.

Number of Wells	Water Level Decline (feet)
3	Greater than 300
5	200 to 300
19	100 to 200
11	50 to 100
13	0 to 50

For the period of water level record on each well, 72 percent of the 53 wells have shown greater than 50 feet of water level decline. Only 4 percent of the wells in the area have not shown decline.

S. In 1982, almost 19,000 acre-feet of ground water were pumped. Of the 20 wells measured in February of 1982 and 1983, 17 wells had lower water levels after the 1982 irrigation season. In 1983, approximately 15,000 acre-feet of ground water were withdrawn, down 4,000 acre-feet from the year before. Twenty-six were measured in both February 1983 and 1984. Slightly more than half of these wells showed declines over the irrigation season. Twelve of the wells showed a rise in water level during that twelve-month period. Even with a 21 percent reduction in withdrawals, more than half of the wells still showed declines.

T. Many of the hydrographs have exhibited a decreasing rate of water level decline. This may be an indication that the ground water system in the Butter Creek Area is starting to reach an equilibrium. However, the declines which continue are an indication that, for the 1983 irrigation season, at least in some areas the capacity of resource is exceeded. Attainment of stability may require reduction in pumpage.

* *

VII. RECOMMENDATIONS

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Based on continued investigations by the Department and subject to revisions as a result of any subsequent legal processes, the following recommendations have been drawn.

****

A. The Butter Creek area defined in this report as being within Morrow and Umatilla Counties, Oregon should be declared a critical groundwater area.

B. The layered series of basalt rock aquifers of the Columbia River Group located within the critical area boundaries should be closed to further ground water development except for individual domestic and stock watering purposes.

C. All production wells in use other than wells defined in ORS 527.545, should be equipped with totalizing water meters. Well owners should maintain an accurate accounting of the total amount of water pumped from each well. Individual pumping records should be forwarded to the Water Resources Department at the close of each years (SIC) irrigation season.

D. All wells operating in violation of ORS 537.535 (without water right permits) should be regulated and controlled by the Watermaster.

E. Ground water appropriations from wells in the critical area aquifers should be regulated and controlled as provided by ORS 527.735 and 537.745. The Watermaster should regulate the control works of all wells within the critical area so that the rate and total quantity of ground water withdrawn does not exceed that allowed under their ground water rights, certificates or permits. The procedure for distribution and ground water regulation should be set forth in ORS 540.040.

F. If agriculture growth and land irrigation practices are to continue in the area, it will be necessary to import irrigation water from outside sources such as the Columbia and Umatilla Rivers so that ground water withdrawals can be reduced.

G. All proposed wells not yet constructed under the terms of existing water right applications and permits should not be constructed or used to appropriate ground water.

H. All applications to appropriate ground water from the Butter Creek deep basalt aquifers that are pending at this time as shown on Table 1 should be canceled. Permits should not be issued for these applications as listed:

List Number	Name	Application Number
61	V. James Stockard	G-5023
63	Nelson and Tucker	G-5194
65	Wm. J. Doherty	G-5404
66	Wm. J. Doherty	G-5407
68	Taylor Bros. Farms	G-5467
68A	Taylor Bros. Farms	
68B	Taylor Bros. Farms	
68C	Taylor Bros. Farms	
69	Orval Matheny	G-5468
70	Porter Peringer	G-5594
71	Fritz Cutsforth	G-5609
72	Fritz Cutsforth	G-5679
73	Merle and Villa R. Abney	G-5715

* *

Table 1 given above is currently Tables 5, 6 and 7 which are in Appendices II, III and IV, respectively. Current status of the applications are as follows:

List Number	Name	Application Number	Current Status
61	V. James Stockard	G-5023	Rejected 11/1/77
63	Nelson and Tucker (now Boardman Farms)	G-5194	Still Pending
65	Wm. J. Doherty	G-5404	Action Suspended until 3/1/85
66	Wm. J. Doherty	G-5407	Action Suspended until 3/1/85
68	Taylor Bros. Farms	G-5467	Permit G-8817
68A	Taylor Bros. Farms		
68B	Taylor Bros. Farms		
68C	Taylor Bros. Farms		
69	Orval Matheny	G-5468	Withdrawn 3/14/76
70	Porter Peringer (now Frank Mader)	G-5594	Rejected 11/1/77
71	Fritz Cutsforth	G-5609	Certificate 49558
72	Fritz Cutsforth	G-5679	Certificate 49557
73	Merle and Villa R. Abney	G-5715	Still Pending

Two applications are still pending and action has been suspended until March 1, 1985 on two more. One application was withdrawn and two were rejected. Application G-5467 was issued on April 25, 1980 for 7.0 cfs from one well for irrigation of 1435.9 acres. Applications G-5609 and G-5679 were issued certificates on July 29, 1976 for 3.12 cfs/406.0 acres and 3.34 cfs/302.4 acres, respectively.

* *

I. Permits should be issued for the four shallow basalt wells located near the Columbia River under the following listed applications:

List Number	Name	Application Number
67	Marion R. Chaves	G-5432
74	Lon Wadekamper	G-5805
77	John L. King	G-6101
78	Phillip D. Hay	G-6576

* *

The following is an update of the above listed applications:

List Number	Name	Application Number	Current Status
67	Marion R. Chaves	G-5432	Rejected 11/1/77
74	Lon Wadekamper	G-5805	Certificate 46819
77	John L. King	G-6101	Permit G-8229
78	Phillip D. Hay	G-6576	Permit G-8230

* *

J. The Butter Creek area should be closed to further construction of wells extending into the shallow or deep basalt aquifers, except for wells to be used for stock watering purposes or for watering any lawn or noncommercial garden not exceeding 1/2 acre in area for single domestic purposes only. Each domestic well should be limited to tracts of land not less than 10 acres in area.

K. Wells developing water from the basalt aquifers in the Butter Creek ground water area within Township 1 North and Township 2 North, Ranges 26 and 27 East and the west half of Range 28 East, of Township 1 North, Township 2 North, and Township 3 North should be limited collectively to a total annual diversion of not more than 27,000 acre-feet of water. This total allowable diversion of water should be distributed on the basis of water right priority for wells in the area.

* *

The area described above includes the Sand Hollow and Butter Creek Junction Subareas and that portion of the South Subarea that lies north of the Willamette Baseline. At the time of publication in 1975, the Willamette Baseline was the southern boundary of the proposed Critical Area. Previous orders restricted withdrawals to 27,000 acre-feet annually from the Sand Hollow and Butter Creek Junction Subareas. The South Subarea's pumpage was not restricted in either order.

Water levels are continuing to go down, although not as rapidly as in the late 1960's and early 1970's. Over half of the wells measured in February of 1983 and 1984 were lower in 1984. During that same period, pumpage in the proposed Butter Creek Critical Ground Water Area had dropped from approximately 19,000 acre-feet to less than 15,000 acre-feet. Therefore, to prevent or curtail further declines, pumpage from the proposed Butter Creek Critical Ground Water Area should be limited to not more than 15,000 acre-feet annually. If declines continue, then further cutbacks would be required.

* *

L. Those wells developing ground water from basalt aquifers within the west half of Range 28 East of Townships 4 North and 5 North, do not materially affect ground water withdrawals from wells located to the south within Township 1 North and Township 2 North, Ranges 26 and 27 East and the west half of Range 28 East of Townships 1 North, 2 North, and 3 North and therefore, should be excluded from distribution based on relative priority dates.

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APPENDIX I

PREVIOUS DEFINITIONS

APPENDIX I

DEFINITIONS OF SELECTED GROUND WATER AND GEOLOGIC TERMS

1. Alluvium - detrital deposits of sand, silt, gravel, or clay laid down in river beds, flood plains, lakes and fans at the foot of mountain slopes.

2. Anticline - an up-turned fold in which strata dip away in opposite directions from a common ridge or axis.

3. Aquifer - a formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells or springs.

4. Artesian or confined water - ground water that is under sufficient pressure to rise above the level at which it is encountered by a well but which does not necessarily rise to or above land surface.

5. Borehole drawdown - the amount the water level in a well is lowered by pumping.

6. Fanglomerate - a cemented heterogeneous mixture of detrital materials originally deposited in an alluvial fan.

7. Hydraulic Conductivity - the volume of water at the existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

8. Hydraulic Gradient - the change in static head per unit of distance in a given direction.

9. Permeability - the capacity of a rock or soil for transmitting fluid. The degree of permeability depends upon the size and shape of the pores, the size and shape of their interconnection and the extent of their interconnection.

10. Porosity - the ratio of the aggregate volume of interstices in a rock or soil to its total volume, usually expressed as a decimal fraction or as a percentage.

11. Porous - containing voids, pores, interstices, or other openings that may or may not interconnect.

12. Potentiometric Head - the level to which water will rise in tightly cased wells.

13. Static Water Level - the level at which water will stand in tightly cased wells when not pumping.

14. Syncline - a fold in rocks in which strata dip inward from both sides toward the axis of the fold.

15. Storage Coefficient - the volume of water an aquifer released from or takes into storage per unit surface area of the aquifer per unit change in head.

16. Transmissivity - the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient. Usually expressed as gallons per day per foot, or square feet per day.

17. Unconfined ground water - water in an aquifer that has a water table and is free to rise and fall in response to changes in storage.

18. Water Table - that surface of an unconfined water body at which the pressure is atmospheric and which represents the upper surface of the zone of saturation.

19. Zone, saturated - that part of the water-bearing material in which all voids are ideally filled with water under pressure greater than atmospheric.

20. Zone, unsaturated - the zone between the land surface and the water table that is dry or that contains water liquid under less than atmospheric pressure and water vapor, air, or other gasses generally at atmospheric pressure.

APPENDIX II

WATER RIGHTS - BASALTS

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area

Location Site Number	Priority New No.	Priority Old No.	Date	Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
2N/27E-34BDC	1	1	1925	Delbert L. Graham*	GR-4142		GR-4066	0.11	10.0	Formerly B.P. Doherty
4N/28E-16ABB	2	2	4/13/50	Sack Mikami*	U-357	U-331	24264	0.02	1.6	Formerly Allen C. and Florine Langenwalter, Well Replaced 4/1977, T-4218
2N/27E-14CCB	3	3	3/4/52	Oscar D. McCarty	U-468	U-425	24271	4.44	111.7 (P) 288.3 (S)	
2N/27E-27BCC1	4	4	4/18/52	John E. Correa*	U-489	U-441	31201	0.38	30.0 (S)	Formerly John F. Kilkenny
2N/27E-28ADD	5	5	5/7/52	Frank Mader*	U-496	U-450	31096	1.96	48.7 (P) 132.4 (S)	Formerly Tucker Echo Ranch
1N/27E-10AAB	6	6	11/14/52	Earl W. Wattenburger	U-540	U-495	26072	0.24	19.0 (S)	
1N/26E-29BDD	7	7	12/17/52	Robert J. Kilkenny	U-546	U-515	29143	0.08	6.3	
2N/27E-14CCB	8	8	4/9/53	Oscar D. McCarty	U-587	U-536	24273	1.97	157.4	Same well as New Priority 3
1N/26E-18DDD2	9	9	6/24/54	Irvin E. Rauch	G-40	G-1440	30193	0.06	4.52	T-3830 - POA from 1N/26E-18DDD1
2N/27E-1BDD	10**	11	1/21/57	Frank O'Kane*	G-547	G-434	28601	4.0	198.5 (P)	Formerly Clausie Ammon
2N/27E-2DAA2		11a							220.4 (S)	Formerly Clausie Ammon replacement well

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number Acreage	Priority New No. Remarks	Old No.		Landowner or Date	Application Record Holder	Permit	Certificate Number	Permitted Diversion Number	Number	(cfs)	
1S/26E-1DCD	11	11x	4/29/57	Fritz Cutsforth	G-633	G-541	49209	0.47	18.6 (P) 19.0 (S)	(Transfer 4094)	
1N/27E-24DDD	12	12	10/14/57	A.J. Vey	G-784	G-681	34196	1.6	128.0 (S)		
1N/28E-28BAA 1N/28E-28BBC	13**	13 13A	2/11/58	A.J. Vey	G-858	G-823	26092	1.02	17.0 (S) 64.5 (S)	Well 3 Both Well 2 and 3	
2N/27E-12BBB	14	14	1/21/59	Hale & Hanson*	G-1350	G-1227	30742	2.5	54.5 (P) 274. (S)	Formerly Aaby & Hanson	
3N/28E-18DBD	15	15	9/2/60	Horn Enterprises	G-1836	G-1685	32696	0.94	30.0 (P) 45.0 (S)	Formerly Harry J. Andrews	
3N/27E-25DDC	16	16	9/21/60	R.G. Saylor*	G-1845	G-1688	32592	0.96	2.0 (P) 199.3 (S)	Formerly George B. Wallace	
1N/27E-10ACA	17	17	2/5/62	Earl W. Wattenburger	G-2226	G-2047	34283	0.78	17.6 (P) 64.8 (S)		
2N/27E-26CBD	18	18	10/8/62	Sarvis Springs Farm	G-2461	G-2276	36022	2.68	347.4 (P)		
1N/26E-26CAB	19	19	4/24/63	Kenneth Turner	G-2605	G-2409	51157	0.56	10.9	T-3506 & T-5016	POU & POA

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Priority New No.	Priority Old No.	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
1N/27E-3DBB	20	20	11/8/63	Edward B. Wattenburger	G-2730	G-2528	34284	1.11	13.2 (P) 77.8 (S)	Well deepened to 684 feet
5N/28E-19AAA	21	21	12/24/63	City of Umatilla	G-2755	G-2560	34523	2.0		Municipal
4N/28E-10CCA	22		8/19/66	Hermiston Medical Cen	3929	3412		0.015	1.0 (P)	
1S/26E-1DCD	23		9/24/64	O.W. Cutsforth, Jr.	G-2969	G-2760	49210	0.60	43.4 (P) 4.4 (S)	Transfer: T-4094
1N/27E-23DAD	24	23	12/17/64	Sidney & Randy Britt*	G-3002	G-2797	34384	1.24	21.2 (P) 78.1 (S)	Formerly Raymond M. Porter & Sons
2N/27E-27BCC7	25	24	1/22/65	John E. Correa*	G-3019	G-2809	38846	0.60	137.8 (S)	Formerly Edwin & Clyde W. Johnson (Additional W.R.)
1S/26E-9DBD	26	24x	3/30/65	Gene Cutsforth	G-3065	G-3012	38712	0.45	51.0 (P)	
1N/27E-3DBB	27	27	4/1/66	Edward B. Wattenburger	G-3442	G-3101	38714	0.62	6.6 (P) 42.7 (S)	(Additional W.R.)
1N/27E-10DCC	28	28	5/27/66	Leo Ashbeck	G-3516	G-3164	42527	1.27	0.8 (P) 186.2 (S)	Deepened to 400 feet
4N/28E-30DDD	29	30	9/29/66	Ernest P & Karla Lewis*	G-3688	G-3492	44896	1.59	127.0 (S)	Formerly Proudfoot Ranch
4N/28E-32ACB	30	31	12/8/66	Rose Mueller	G-3749	G-3541	38388	0.86	68.5 (S)	

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Priority New No.	Priority Old No.	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
2N/27E-22BBD	31	32	1/13/67	Michael McCarty*	G-3772	G-3558	38847	2.64	362.2 (S)	Formerly E & C.W. Johnson
1N/26E-10AAB	32	33	3/13/67	William J. Doherty	G-3841	G-3474	38473	0.45	36.3 (P)	
3N/28E-28CAB	33	34	3/21/67	L & L Farms*	G-3859	G-3635	36675	1.57	125.6 (P)	Formerly Ernest A. Betz
3N/28E-18ABD	34**	35	5/24/67	Horn Enterprises*	G-3939	G-3530	41252	3.9	314.8 (P) 384.5 (S)	Formerly Stone Machinery Co Well 1
3N/28E-6DCC		35A						3.5		Formerly Stone Machinery Co Well 2
1N/26E-4BAA 1N/26E-5BAA	35**	36 36A	7/19/67	Grieb Ranch	G-3999	G-3792	43515	7.0	2831.9 (P)	POA from 2N/26E-28CDD
2N/26E-20DBB	36	37	8/7/67	Boardman Farms, Inc	G-4025	G-3777	43928	4.13	2240.4	Formerly Delwin O. Nelson Well 1, T-4159 allow Well 3 as 2nd POA
2N/27E-27CBC	37	38	9/11/67	Thomas A. Ashbeck	G-4073	G-3816	38855	0.16	12.6 (S)	

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Priority New No.	Priority Old No.	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
4N/28E-30DDD	38	40	11/13/67	Ernest P.&Karla Lewis*	G-4135	G-3895	44897	2.09	49.0 (P) 117.8 (S)	Formerly Proudfoot Ranch (Additional W.R.)
3N/28E-28ADA	39	41	12/18/67	L&L Farms*	G-4165	G-4048	36676	1.57	125.6 (P)	Formerly Ernest A. Betz
4N/28E-31ACA	40	43	2/15/68	William C. Cox	G-4234	G-3996	38859	0.32	15.2 (P) 23.6 (S)	
1N/26E-4BAA 1N/26E-5BBA	41**	36 36A	3/7/68	Grieb Ranch	G-3999	G-3792	43515	0.81		
5N/28E-21CDC	42	42	3/27/68	Clyde J. Nobles	G-4297	G-4059	42439	0.09	7.5 (S)	
1N/27E-21DDD	43	44	4/23/68	Dwight Bailey*	G-4340	G-4097	42428	1.24	17.5 (P) 81.7 (S)	Formerly Charles Daly
1N/27E-26BCD	44	46	7/10/68	William J. Healy	G-4486	G-4225	42670	1.43	12.1 (P) 102.5 (S)	
1N/27E-21ACC	45	47	7/24/68	Jasper E. Myers	G-4506	G-4248	42431	1.72	8.4 (P) 129.2 (S)	Deepened to 760 feet

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Priority New No.	Priority Old No.	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
1N/26E-26CCC 1N/26E-26CAB	46**	48	7/25/68	Kenneth Turner	G-4516	G-4255	51158	1.70	212.7 (P) 10.9 (S)	
1N/26E-26CCC 1N/26E-26CAB		48	7/25/68	Kenneth Turner	G-4516	G-4255		2.74	336.2 (P)	
1N/27E-27BDD	47	49	7/29/68	William J. Healy	G-4518	G-4226	42671	0.14	11.1 (S)	Domestic
2N/26E-6ACC	48	50	8/15/68	Jerald E. Rea	G-4557	G-4281	42433	2.0	668.0 (P)	
2N/28E-7AAD2	49	51	9/3/68	Robert Hale*	G-4581	G-4049	44654	4.5	812.2 (P)	Formerly Larry Hanson
2N/27E-8DAB 2N/27E-7AAB	50**	52 52A	9/18/68	Frank Mader*	G-4601	G-4325	46085	1.89 5.22	1687.5 (P)	Formerly Porter Peringer, Inc.
1N/27E-5CCB 2N/27E-32DBA	51**	53 53A	10/7/68	Curt & Neal Perkins*	G-4629	G-4354	42330	9.17 6.72	2078.0 (P)	Formerly Campbell Ranch, Inc
2N/27E-20CAA	52	55	12/16/68	Brok Tucker	G-4726	G-4477	50316	4.5	3000 (P)	Wagon Trail Farms
4N/28E-8DCB	53	56	1/21/69	Herman T. Schultz	G-4770	G-4493	38739	0.15	12.1 (S)	
2N/26E-17ABA	54	57	2/10/69	Boardman Farms*	G-4782	G-4504	43929	4.13	2240.4 (S)	Formerly Nelson and Tucker T-4160 Changed POA

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Priority New No.	Priority Old No.	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
4N/28E-8DDC	55	58	2/28/69	Herman Bush*	G-4800	G-4525	38289	0.02	1.6 (P)	Formerly Harold L. Rosenbaum
1N/27E-26CBA	56	59	9/16/69	Currin Brothers	G-4994	G-4712	42672	0.57	12.3 (P) 40.5 (S)	
2N/26E-23CAD 2N/26E-10CDB 2N/26E- 3BCC	57**	62 62A 62B	2/3/70	Lawrence D., Rosella, & Corrine Lindsay	G-5096	G-4918	52085	2.23 4.45 2.23	2596.1 (P)	Issued in name of Connecticut General Life Insurance Co
2N/26E-18DAA	58	63	5/20/70	Boardman Farms*	G-5194	Still Pending		6.69	3612.43 (S)	Formerly Nelson and Tucker
1N/26E-8DBD	59	64	6/24/70	William J. Doherty	G-5235	G-5092		6.64	640.0 (P)	Final Proof Survey has not been completed
1N/26E-4CDC	60	65	1/25/71	William J. Doherty	G-5404			40.0	1015.0 (P)	Action suspended until 3/1/85
1N/26E-3CCD	61	66	1/25/71	William J. Doherty	G-5407			40.0	753.0 (P)	Action suspended until 3/1/85
2N/26E-15ACC	62	68	3/25/71	Taylor Bros Farm	G-5467	G-8817		7.0	1435.9 (P)	Certificate has not been issued yet

TABLE 4 Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number		Priority Number	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
1N/26E-35DCB	63	71	8/30/71	Fritz Cutsforth	G-5609	G-6786	49558	3.12	406.0 (P)	
1N/26E-36CDB	64	72	12/2/71	Fritz Cutsforth	G-5679	G-6787	49557	3.34	302.4 (P)	
2N/28E-17CCA	65	73	2/2/72	Robert Hale	G-5715					Formerly Merle and Villa Abney Action Suspended
5N/28E-21CCB	66	74	5/22/72	Lon G. Wadekamper	G-5805	G-7358	46819	0.11	9.8	Previous well location - 4N/28E-7ACC, T-5228
4N/28E-17ABD2	67	77	5/1/73	King Ranches	G-6101	G-8229		0.05	4.35 (S)	Within Westland Irr District
5N/28E-33ADB	68	78	6/24/74	Stuart F. Bonney*	G-6576	G-8230		1.75	130.0 (P&S)	Formerly Phillip D. Hay
5N/28E-21CDD	69		12/23/74	Stuart Bonney	G-6767***	G-6848		1.8	148.0 (S)	
5N/28E-21CDD	70		1/20/75	Rogers Const. Inc	G-6792***	G-6792		0.25 0.66	32.0 (P)	 Industrial
1S/26E-1DCD	71	79	6/24/75	Fritz Cutsforth	G-7014	G-6514	50523	0.27	21.8 (P)	
5N/28E-33	72		7/21/80	Gary D. Wiley	G-9854			0.04	2.0	Action Suspended
5N/28E-16BAA	73		8/28/80	Interfaith Christian Center	G-9917			0.43 0.2	34 (P)	 Use in College facilities

* New Owner since Report No. 24
** Two or more wells under same permit
*** This water right has been included in Tables 4 and 6 due to uncertainty as to which aquifer yields water to the well.
(P) Primary irrigation acres
(S) Supplemental irrigation acres
9731B

APPENDIX III

WATER RIGHTS - CANCELED

TABLE 5 Canceled Ground Water Rights as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area

Location Site Number	Priority Number	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
1N/27E-3AA	25	6/28/65	George Luciani	G-3149	G-2966	38584			Canceled by owner on 1/1/82 See Transfer 3505
3N/28E-8AD	26	1/26/66	Henry F. Walker	G-3355	G-3255				Canceled on 6/23/75 for failure to perfect the water right (2 wells)
4N/28E-21CA	29	7/5/66	Robert M. Kenney	G-3565	G-3113	38597			Water Right canceled due to nonuse 10/28/82
1N/26E-29CCD	45	5/23/68	Grieb Farms	G-4403	G-4150				Canceled by applicant on 7/14/76
1N/26E-28CDD	54	11/29/68	Grieb Farms	G-4704	G-4473				Canceled by applicant on 7/14/76
2N/27E-8DAB 2N/27E-7AAB	60 60A	9/30/69	Porter-Peringer, Inc.	G-5007	G-4739				Canceled on 7/25/77 for failure to perfect the water right (4 wells)
2N/27E-12BD	61	10/27/69	V. James Stockard	G-5023					Application rejected on 11/1/77 - Recording fee refunded on 5/9/80
5N/28E-32BD	67	2/22/71	Marion R. Chaves	G-5432					Application rejected on 11/1/77 - Recording fee refunded 5/29/80
2N/26E-35CB	69	3/26/71	Orval Matheny	G-5468					Application was withdrawn on 3/14/76
2N/27E-16CA	70	8/9/71	Porter-Peringer, Inc.	G-5594					Application was rejected on 11/1/77 - Recording fee refunded on 5/29/80

* New Owner since Report No. 24
** Two or more wells under same permit
*** This water right has been included in Tables 4 and 6 due to uncertainty as to which aquifer yields water to the well.
(P) Primary irrigation acres
(S) Supplemental irrigation acres

APPENDIX IV

WATER RIGHTS - GRAVELS

TABLE 6 Water Rights for sumps as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area

Location Site Number	Old Priority Number	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
3N/28E-19ACB	10	11/21/56	Fred & Tresa Davis	G-515	G-438	35811	1.50	120.0 (P&S)	Sump 1
19BDB	10A								Sump 2
3N/28E-19BAD	22	2/24/64	Fred & Tresa Davis	G-2786	G-2597	35783	0.84	120 (S)	Sump 3
3N/27E-24DDA	39	9/15/67	John F. & Nellie Madison	G-4080	G-3834		2.45	208.0 (P) 138.9 (S)	T-5432
2N/27E-2DAA3	75	8/7/72	Ammon Brothers	G-5865	G-5598	47018	1.44	32.4 (P)	Sump
								82.6 (S)	
2N/27E-11CCD	76	1/10/73	Jerry E. Myers	G-5974	G-5663		2.23	93.0 (P) 381.0 (S)	Sump
4N/28E-28ABC		8/11/60	William Turner	G-4824	G-1675	34391	1.05	84.7 (P)	
4N/28E-18CBB		1/21/64	Thomas Huddleston	G-2768	G-2592	34586	2.34	105.1 (P) 82.1 (S)	
4N/28E-27CCC		7/27/64	Simplot Industries	G-2929	G-2718	51480	0.01	0.2 (P)	
4N/28E-33CDA		1/18/67	Mrs. Rose Mueller	G-3782	G-3567	38389	0.58	46.6 (S)	
4N/28E-8ACC		7/13/67	David C. Ralston	G-3991	G-3745	38390	0.06	4.7 (S)	
4N/28E-19DBB		9/13/67	Edgar Bloom	G-4077	G-3868	41941	0.145	11.6 (S)	Sump

TABLE 6 Water Rights for sumps as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Old Priority Number	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
4N/28E-18DCA		10/9/67	Woodrow Walker	G-4103	G-3851	39464	2.88	230.0	
4N/28E-18CAB		1/23/68	Glen O. Coons	G-4201	G-3966	51166	0.30	24.0	
4N/28E-19BCD		2/23/68	Malcolm Skinner	G-4246	G-4006	38481	2.46	196.5 (P)	
4N/28E-20BDD		3/28/68	Tom Quick	G-4306	G-4067	42339	0.21	16.4 (P)	
4N/28E-33CAD		5/23/68	Howard & Verna Stone	G-4404	G-4151	38860	0.15	12.0 (S)	
4N/28E-28ACC		9/27/68	Sandra Sharp	G-4613	G-4337	42860	1.15	91.7 (P)	
4N/28E-29ACC		9/2/70	Ronald & Jane Baker	G-5304	G-5044	48905	1.68		
4N/28E-29ADA		8/16/71	Ronald & Jane Baker	G-5304	G-5044	48905	1.00	214.4 (P)	
4N/28E-31ABB		1/12/71	Walter Dean Buchanan	G-5397	G-6879	49732	0.23	18.1 (P)	
4N/28E-28ACC		8/16/71	Leonard H. Williams	G-5599	G-5045	39547	0.83	66.6 (P)	
4N/28E-19CAA		1/21/72	Lamb-Weston, Inc.	G-5681	G-4947	43993	2.66		Food Processing
4N/28E-19CA		2/3/72	Lamb-Weston, Inc.	G-5720	G-4948	43934	3.02		Food Processing
4N/28E-19BCD		2/25/72	Malcom Skinner	G-5734	G-5034	42273	0.125	10.0 (P)	

TABLE 6 Water Rights for sumps as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Old Priority Number	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
4N/28E-20BCC		3/1/72	Lee & Lane Pollock	G-5738	G-4972	46930	1.0	80.0 (P)	Sump
4N/28E-29ACB		8/25/72	Ronald & Jane Baker	G-5879	G-6727	48904	2.0	214.4 (S)	
4N/28E-28CD		11/14/72	J.R. Simplot Co.	G-5940	G-5040		0.84	66.8 (P)	
4N/28E-20CAA		11/29/72	Benjamin Newman	G-5947	G-6785		1.11	40.0 (P)	
4N/28E-30BAD		4/12/73	Lamb-Weston, Inc	G-6069	G-7184		2.67		Food Processing
4N/28E-33DB		8/3/73	Randall McMichael	G-6258	G-7821		0.06	8.0 (P)	
4N/28E-33DBC		9/27/73	Double "M" Ranch, Inc	G-6310	G-6790	51167	0.06	8.0 (P)	
4N/28E-33DB		1/21/74	Double "M" Ranch, Inc	G-6409	G-6730	49883	0.25	25.0 (P)	
4N/28E-32CCC		2/6/74	Ronald Edwin Eves	G-6424	G-6791		0.08	6.0 (P)	2-Sand Points
5N/28E-21CDD		12/23/74	Stuart Bonney	G-6767***	G-6848		1.8	148.0 (S)	
5N/28E-21CDD		1/20/75	Rogers Construction Inc	G-6792***	G-6792		0.25 0.66	32.0 (P)	Industrial
4N/28E-27CCB		12/2/75	J.R. Simplot, Co	G-7168	G-7077	51607	2.45	37.9 (P) 88.5 (S)	Food Processing 3 wells

TABLE 6 Water Rights for sumps as of October, 1984 for The Proposed Butter Creek Critical Ground Water Area (Continued)

Location Site Number	Old Priority Number	Date	Landowner or Record Holder	Application Number	Permit Number	Certificate Number	Permitted Diversion (cfs)	Acreage	Remarks
5N/27E-15DD		11/15/76	J and M Water Works	G-7643	G-7145		6.7	1243.3 (S)	
5N/28E-16CDD		2/22/77	Stuart Bonney	G-7799	G-7231		0.56	41.0 (S)	
3N/28E-30ABD		5/26/77	Madison Ranches Inc	G-8167	G-7207		1.25	302.2 (S)	Sump
3N/28E-30ABD		6/14/77	Madison Ranches Inc	G-8213	G-7615		2.52	302.2 (S)	Sump
3N/28E-31BAB		7/13/77	Lowell Saylor	G-8269	G-7612		1.11	252.4 (P&S)	
2N/27E-11DA		1/14/83	Myers Farm Co., Inc	G-10869	G-10054		4.9	532.0 (P)	
5N/28E-17AA		4/6/83	Clyde & Nadine Vieth	G-10920	G-10034		0.07	5.7 (S)	
3N/27E-24DD		1/30/84	John Madison	G-11226	G-10325		0.46	37.0 (P)	
4N/28E-10CC		7/2/84	Hermiston Good Samaritan Center	G-11285			0.023	1.82 (P)	
4N/28E-26,27,28		7/17/84	J.R. Simplot	G-11291			5.14	410.2 (P&S)	6 wells

* New Owner since Report No. 24
** Two or more wells under same permit
*** This water right has been included in Tables 4 and 6 due to uncertainty as to which aquifer yields water to the well.
(P) Primary irrigation acres
(S) Supplemental irrigation acres
9731B

APPENDIX V

RECORDS OF WELLS

Basalt Aquifers

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1S/26E-1DAD

Owner: Fritz Cutsforth

County: Morrow Report No. 24 Well Number: 11X

Well Depth: 70 ft. Casing Size: 18 in. Casing Depth: 15 ft.

Use: Unused Elevation of Land Surface: 1600 feet

Well Log: Yes Date Drilled: 6/57

12" casing from 0 to 70 feet - torch cut from 27 to 66 feet

Water Rights Application: _____ Permit: _____ Certificate: _____

Date: _____ Appropriation: Well 1 - T-4094 changed POA to a well located in Section 1DCD

Pump H.P.: 20 Type: Turbine Depth of Bowls: _____ ft.

Remarks: _____

Site Number (Location): 1S/26E-1DCD

Owner: Fritz Cutsforth

County: Morrow Report No. 24 Well Number: _____

Well Depth: 250 ft. Casing Size: 12 in. Casing Depth: 28 ft.

Use: Irrigation Elevation of Land Surface: 1600 ft.

Well Log: Yes Date Drilled: 12/12/1976

Water Rights Application: G-633 Permit: G-541 Certificate: 49209

Date: 4/29/57 Appropriation: 0.47 cfs for irrigation of 18.6 acres and supplemental irrigation of 19.0 acres - T-4094 changed POA

Pump H.P.: 40 Type: Turbine Depth of Bowls: _____ ft.

Remarks: _____

ADDITIONAL WATER RIGHT INFORMATION

Site Number (Location): 1S/26E-1DCD

Owner: Fritz Cutsforth /O. W. Cutsforth, Jr.

County: Morrow Report No. 24 Well Number:

Water Rights Application: G-2969 Permit: G-2760 Certificate: 49210

Date: 9/24/64 Appropriation: 0.60 cfs for irrigation of 43.4 acres and supplemental irrigation of 4.4 acres, T-4094 changed POA

Remarks:

Site Number (Location): 1S/26E-1DCD

Owner: Fritz Cutsforth

County: Morrow Report No. 24 Well Number: 79X

Water Rights Application: G-7014 Permit: G-6514 Certificate: 50523

Date: 6/24/75 Appropriation: 0.27 cfs for irrigation of 21.8 acres

Remarks: Water rights from Well 11X were transferred to this well (T-4094)

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1S/26E-9DBD

Owner: Gene Cutsforth/Curt Cutsforth

County: Morrow Report No. 24 Well Number: 24X

Well Depth: 112 Ft. Casing Size: 10 In. Casing Depth: 17 Ft.

Use: Domestic Elevation of Land Surface: 1895 Ft.

Well Log: Yes + Test Date Drilled: 11/27/64

Water Rights Application: G-3065 Permit: G-3012 Certificate: 38712

Date: 3/30/65 Appropriation: 0.45 cfs for irrigation of 51.0 acres

Pump H.P.: Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/26E-4BAA

Owner: Grieb Ranch

County: Morrow Report No. 24 Well Number: 45

Well Depth: 1167 Ft. Casing Size: 16 In. Casing Depth: 130 Ft.

Use: Irrigation Elevation of Land Surface: 1130 Ft.

Well Log: Yes + Reaming/Test Date Drilled: 11/5/68

Reamed to 14 3/4 inch from 480 feet to 805 feet on 5/11/79

Water Rights Application: G-4403 Permit: G-4150 Certificate:

Date: 5/23/68 Appropriation: 7.0 cfs for supplemental irrigation of 960 acres CANCELED on 1/24/77

Pump H.P.: 250 Type: Turbine Depth of Bowls: Ft.

Remarks: Water right from Wells 36/36A (Report No. 24 Numbers) were transferred to this well.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/26E-5BBA

Owner: Grieb Ranch

County: Morrow Report No. 24 Well Number: 54

Well Depth: 1500 Ft. Casing Size: 16 In. Casing Depth: 100 Ft.

Use: Irrigation Elevation of Land Surface: 1105 Ft.

Well Log: Yes + Test Date Drilled: 5/25/69

Water Rights Application: G-4704 Permit: G-4473 Certificate:

Date: 11/29/68 Appropriation: 7.0 cfs for supplemental irrigation of 640 acres CANCELED 1/24/77

Pump H.P.: 400 Type: Turbine Depth of Bowls: Ft.

Remarks: Water right from Wells 36/36A (Report No. 24 Numbers) were transferred to this well.

Site Number (Location): 1N/26E-8DBD

Owner: William J. Doherty

County: Morrow Report No. 24 Well Number: 64

Well Depth: 1053 Ft. Casing Size: 16 In. Casing Depth: 158 Ft.

Use: Irrigation Elevation of Land Surface: 1192 Ft.

Well Log: Yes + Test Date Drilled: 2/15/71

Water Rights Application: G-5235 Permit: G-5092 Certificate:

Date: 6/24/70 Appropriation: 6.64 cfs for irrigation of 640 acres Final Proof Survey has not been completed.

Pump H.P.: 300 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/26E-10AAB

Owner: William J. Doherty

County: Morrow Report No. 24 Well Number: 33

Well Depth: 376 Ft. Casing Size: 10 In. Casing Depth: 18.5 Ft.

Use: Irrigation/Domestic Elevation of Land Surface: 1126 Ft.

Well Log: Yes + Test + Reaming Date Drilled: 12/2/64

Reaming of well from 8 inches to 10 inches on 2/27/76

Water Rights Application: G-3841 Permit: G-3474 Certificate: 38473

Date: 3/13/67 Appropriation: 0.45 cfs for irrigation of 36.3 acres

Pump H.P.: 40 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/26E-18DDD2

Owner: Irvin E. Rauch

County: Morrow Report No. 24 Well Number: 9

Well Depth: 383 Ft. Casing Size: 6 In. Casing Depth: 20 Ft.

Use: Irrigation Elevation of Land Surface: 1190 Ft.

Well Log: Yes + Deepening Date Drilled: 6/13/72

Deepened from 340 to 383 feet in 11/11/77

Water Rights Application: G-40 Permit: G-1440 Certificate: 30193

Date: 6/24/54 Appropriation: .06 cfs for irrigation of 4.52 acres

Transfer POA (T-3830) Protested Application - Interference

Pump H.P.: 3 Type: Submersible Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/26E-26BCC

Owner: Kenneth Turner

County: Morrow Report No. 24 Well Number: Was 19

Well Depth: 230 Ft. Casing Size: 8 In. Casing Depth: 24 Ft.

Use: Domestic Elevation of Land Surface: 1450 Ft.

Well Log: Yes Date Drilled: 2/14/63

Water Rights Application: G-2605 Permit: G-2409 Certificate: 35394

Date: 4/24/63 Appropriation: Transfer 3506 - Change in place of use and point of appropriation (Well 26CAB)

Pump H.P.: 25 Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/26E-26CAB

Owner: Kenneth Turner

County: Morrow Report No. 24 Well Number: 19

Well Depth: 675 Ft. Casing Size: 12 In. Casing Depth: 28 Ft.

Use: Irrigation Elevation of Land Surface: 1400 Ft.

Well Log: Yes + Test Date Drilled: 12/20/76

Pressure cemented to seal off cascading water on 1/25/84

Water Rights Application: G-2605 Permit: G-2409 Certificate: 51157

Date: 4/24/63 Appropriation: Transfer 3506 (3/31/77) 0.56 cfs for the irrigation of 10.9 acres/ Transfer 5016 changed place of use

Pump H.P.: 100 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/26E-26CCC

Owner: Kenneth Turner

County: Morrow Report No. 24 Well Number: 48

Well Depth: 960 Ft. Casing Size: 14 In. Casing Depth: 20 Ft.

Use: Irrigation Elevation of Land Surface: 1505 Ft.

Well Log: Both + New Casing & Reaming Date Drilled: 8/15/68

Deepened from 479 feet to 960 feet in 12/28/76 - Reamed in 2/17/76

Water Rights Application: G-4516 Permit: G-4255 Certificate: 51158

Date: 7/25/68 Appropriation: Transfer 3506 - Certificate 48755 (adds second point of appropriation) - 4.44 cfs for irrigation of 548.9 acres and supplemental irrigation of 10.9 acres; Special Order (Volume 36, page 169) cancel 25.8 acres of supplemental irrigation in Section 26

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/26E-29BDD

Owner: Robert J. Kilkenny

County: Morrow Report No. 24 Well Number: 7

Well Depth: 360 Ft. Casing Size: 8 In. Casing Depth: Ft.

Use: Stock Elevation of Land Surface: 1340 Ft.

Well Log: NONE Date Drilled:

Water Rights Application: U-546 Permit: U-515 Certificate: 29143

Date: 12/17/52 Appropriation: 0.08 cfs (36 gpm) for the irrigation of 6.3 acres

Pump H.P.: 2.5 Type: Submersible Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/26E-35DCB

Owner: Fritz Cutsforth

County: Morrow Report No. 24 Well Number: 71

Well Depth: 508 Ft. Casing Size: 14 In. Casing Depth: 70 Ft.

Use: Irrigation Elevation of Land Surface: 1600 Ft.

Well Log: Yes & Deepening + Test Date Drilled: 6/26/68

Deepened from 246 feet to 508 feet in 1972

Water Rights Application: G-5609 Permit: G-6786 Certificate: 49558

Date: 8/30/71 Appropriation: 3.12 cfs for irrigation of 406.0 acres

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/26E-36CDB

Owner: Fritz Cutsforth

County: Morrow Report No. 24 Well Number: 72

Well Depth: 665 Ft. Casing Size: 18 In. Casing Depth: 68 Ft.

Use: Irrigation Elevation of Land Surface: 1682 Ft.

Well Log: Yes + Test Date Drilled: 9/25/71

Water Rights Application: G-5679 Permit: G-6787 Certificate: 49557

Date: 12/2/71 Appropriation: 3.34 cfs for irrigation of 302.4 acres

Pump H.P.: 300 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-3AAC1

Owner: George Luciani

County: Morrow Report No. 24 Well Number: 25

Well Depth: 220 Ft. Casing Size: 10 In. Casing Depth: 38 Ft.

Use: Domestic/Irrigation Elevation of Land Surface: 1140 Ft.

Well Log: Yes + Deepening Date Drilled: 1964

Deepened in 1964 from 107 feet to 220 feet - Replaced in 1974

Water Rights Application: G-3149 Permit: G-2966 Certificate: 38584

Date: 6/28/65 Appropriation: 0.29 cfs for irrigation of 22.8 acres.

Reduced to 0.05 cfs for irrigation of 4 acres T-3505 changed POA 2/18/77 -

All CANCELED on 1/82

Pump H.P.: 7.5 Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/27E-3AAC2

Owner: George Luciani

County: Morrow Report No. 24 Well Number:

Well Depth: 285 Ft. Casing Size: 8 In. Casing Depth: 20 Ft.

Use: Domestic/Stock Elevation of Land Surface: 1140 Ft.

Well Log: Yes - Air Test Date Drilled: 7/12/74

Water Rights Application: Permit: Certificate: 38584

Date: Appropriation: T-3505 change point of appropriation -

All CANCELED 1/11/82

Pump H.P.: 7.5 Type: Submersible Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-3DBB

Owner: Edward B. Wattenburger

County: Morrow Report No. 24 Well Number: 20

Well Depth: 684 Ft. Casing Size: 10 In. Casing Depth: 18 Ft.

Use: Irrigation Elevation of Land Surface: 1120 Ft.

Well Log: Yes + 2 deepenings & reaming Date Drilled: 1/23/64

Deepened twice: from 129 feet in 1966 to 259 feet, again in 1977 from 259 feet to 684 feet

Water Rights Application: G-2730 Permit: G-2528 Certificate: 34284

Date: 11/8/63 Appropriation: 1.11 cfs to irrigate 13.2 acres and supplemental irrigation of 77.8 acres

Pump H.P.: 40 Type: Turbine Depth of Bowls: Ft.

Remarks:

ADDITIONAL WATER RIGHT INFORMATION

Site Number (Location): 1N/27E-3DBB

Owner: Edward B. Wattenburger

County: Morrow Report No. 24 Well Number: 27

Use: Irrigation Well Log: Same Well 1N/27E-3DBB

Water Rights Application: G-3442 Permit: G-3101 Certificate: 38714

Date: 4/1/66 Appropriation: 0.62 cfs for irrigation of 6.6 acres and supplemental irrigation of 42.7 acres

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-5CCB

Owner: Curt and Neal Perkins Formerly Campbell Ranch, Inc.

County: Morrow Report No. 24 Well Number: 53

Well Depth: 892 Ft. Casing Size: 16 In. Casing Depth: 88 Ft.

Use: Irrigation Elevation of Land Surface: 1270 Ft.

Well Log: Yes + Test Date Drilled: 4/17/69

Water Rights Application: G-4629 Permit: G-4354 Certificate: 42330

Date: 10/7/68 Appropriation: 15.89 cfs for irrigation of 2078.0 acres - Well 1 yields 9.17 cfs; Well 2 (2N/27E-32DBA) yields 6.72 cfs

Pump H.P.: 500 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/27E-10AAB

Owner: Earl W. Wattenburger

County: Morrow Report No. 24 Well Number: 6

Well Depth: 243 Ft. Casing Size: 8 In. Casing Depth: Ft.

Use: Domestic/Irrigation Elevation of Land Surface: 1115 Ft.

Well Log: Date Drilled: 1952

Deepened in 1967 from 120 feet to 243 feet

Water Rights Application: U-540 Permit: U-495 Certificate: 26072

Date: 11/14/52 Appropriation: 0.24 cfs for supplemental irrigation of 19.0 acres

Pump H.P.: 25 Type: Submersible Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-10ACA

Owner: Earl W. Wattenburger

County: Morrow Report No. 24 Well Number: 17

Well Depth: 120 Ft. Casing Size: 8 In. Casing Depth: Ft.

Use: Irrigation Elevation of Land Surface: 1130 Ft.

Well Log: Yes + Test Date Drilled: 7/5/62

Water Rights Application: G-2226 Permit: G-2047 Certificate: 34283

Date: 2/5/62 Appropriation: 0.78 cfs for irrigation of 17.6 acres and supplemental irrigation of 64.8 acres

Pump H.P.: 60 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/27E-10DCC

Owner: Leo Ashbeck

County: Morrow Report No. 24 Well Number: 28

Well Depth: 400 Ft. Casing Size: 12 In. Casing Depth: 33 Ft.

Use: Irrigation Elevation of Land Surface: 1150 Ft.

Well Log: Both logs - Test before deepened Date Drilled: 12/13/67

Deepened from 227 feet to 400 feet in 1975

Water Rights Application: G-3516 Permit: G-3164 Certificate: 42527

Date: 5/27/66 Appropriation: 1.27 cfs for irrigation of 0.8 acres and supplemental irrigation of 186.2 acres

Pump H.P.: 50 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-21ACC

Owner: Jasper E. Myers

County: Morrow Report No. 24 Well Number: 47

Well Depth: 760 Ft. Casing Size: 14 In. Casing Depth: 30 Ft.

Use: Irrigation Elevation of Land Surface: 1290 Ft.

Well Log: Yes + Reaming + Deepening Date Drilled: 11/12/68

Reamed from 223 to 450 feet from 6-inch diameter to 14-inch in 1976; deepened from 450 to 760 feet in 1977

Water Rights Application: G-4506 Permit: G-4248 Certificate: 42431

Date: 7/24/68 Appropriation: 1.72 cfs for irrigation of 8.4 acres and supplemental irrigation of 129.2 acres

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks: Stock well drilled to 437 feet in 1968 in Section 22DB. See log.

Site Number (Location): 1N/27E-21DDD

Owner: Dwight Bailey Formerly Charles Daly

County: Morrow Report No. 24 Well Number: 44

Well Depth: 600 Ft. Casing Size: 10 In. Casing Depth: 29 Ft.

Use: Irrigation Elevation of Land Surface: 1380

Well Log: Yes + Deepening + Test Date Drilled: 5/24/68

Deepened from 420 to 600 feet in 1977

Water Rights Application: G-4340 Permit: G-4097 Certificate: 42428

Date: 4/23/68 Appropriation: 1.24 cfs for irrgiation of 17.5 acres and supplemental irrigation of 81.7 acres

Pump H.P.: 60 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-23DAD

Owner: Sidney and Randy Britt Formerly Raymond M. Porter

County: Morrow Report No. 24 Well Number: 23

Well Depth: 215 Ft. Casing Size: 10 In. Casing Depth: 66 Ft.

Use: Irrigation Elevation of Land Surface: 1270 Ft.

Well Log: Yes + Test Date Drilled: 10/28/64

Water Rights Application: G-3002 Permit: G-2797 Certificate: 34384

Date: 12/17/64 Appropriation: 1.24 cfs for irrigation of 21.2 acres and supplemental irrigation of 78.1 acres

Pump H.P.: 50 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/27E-24DDD

Owner: A.J. Vey

County: Morrow Report No. 24 Well Number: 12

Well Depth: 777 Ft. Casing Size: 12 In. Casing Depth: 54.7 Ft.

Use: Irrigation/Stock Elevation of Land Surface: 1350 Ft.

Well Log: Yes Date Drilled: 5/23/58

Well produces gas - 8-inch casing from 306 to 500 feet

Water Rights Application: G-784 Permit: G-681 Certificate: 34196

Date: 10/14/57 Appropriation: 1.6 cfs for supplemental irrigation of 128.0 acres

Pump H.P.: 50 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-26BCD

Owner: Willaim J. Healy

County: Morrow Report No. 24 Well Number: 46

Well Depth: 575 Ft. Casing Size: 12 In. Casing Depth: 25 Ft.

Use: Irrigation Elevation of Land Surface: 1460 Ft.

Well Log: Yes + 2 Deepenings + 2 Tests Date Drilled: 3/17/67

Deepened from 133 to 250 feet in 1968, again from 250 to 575 feet in 1977

Water Rights Application: G-4486 Permit: G-4225 Certificate: 42670

Date: 7/10/68 Appropriation: 1.43 cfs for irrigation of 12.1 acres and supplemental irrigation of 102.5 acres

Pump H.P.: 60 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/27E-26CBA

Owner: Currin Brothers

County: Morrow Report No. 24 Well Number: 59

Well Depth: 200 Ft. Casing Size: 6 In. Casing Depth: 70 Ft.

Use: Irrigation Elevation of Land Surface: 1460 Ft.

Well Log: Yes Date Drilled: 4/15/68

Perforated from 50 to 70 feet in porous basalt

Water Rights Application: G-4994 Permit: G-4712 Certificate: 42672

Date: 9/16/69 Appropriation: 0.57 cfs for irrigation of 12.3 acres and supplemental irrigation of 40.5 acres

Pump H.P.: 30 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/27E-27BDD

Owner: William J. Healy

County: Morrow Report No. 24 Well Number: 49

Well Depth: 240 Ft. Casing Size: 8 In. Casing Depth: 20 Ft.

Use: Domestic Elevation of Land Surface: 1380 Ft.

Well Log: Yes + 2 Deepenings + 2 Tests Date Drilled: 11/9/62

Deepened twice: 1) from 65 to 116 feet in 70; 2) from 115 to 240 feet in 81

Water Rights Application: G-4518 Permit: G-4226 Certificate: 42671

Date: 7/29/68 Appropriation: 0.14 cfs for supplemental irrigation of 11.1 acres

Pump H.P.: 1 Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 1N/28E-28BAA

Owner: A.J. Vey

County: Morrow Report No. 24 Well Number: 13

Well Depth: 500 Ft. Casing Size: 12 In. Casing Depth: 29.5 Ft.

Use: Irrigation Elevation of Land Surface: 1385 Ft.

Well Log: Yes + Test Date Drilled: 7/13/53

Well 3

Water Rights Application: G-858 Permit: G-823 Certificate: 26092

Date: 2/11/58 Appropriation: 1.02 cfs for irrigation of 81.5 acres from 2 wells; 64.5 acres from Wells 2 and 3; 17 acres from Well 3

Pump H.P.: 75 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 1N/28E-28BBC

Owner: A.J. Vey

County: Morrow Report No. 24 Well Number: 13A

Well Depth: 365 Ft. Casing Size: 12 In. Casing Depth: 16 Ft.

Use: Irrigation Elevation of Land Surface: 1375 Ft.

Well Log: Yes Date Drilled: 3/5/53

Well 2 - Chemical Analysis - Well flowed originally

Water Rights Application: G-858 Permit: G-823 Certificate: 26092

Date: 2/11/58 Appropriation: 1.02 cfs for irrigation of 81.5 acres from 2 wells; 64.5 acres from Wells 2 and 3; 17 acres from Well 3

Pump H.P.: 50 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/26E-3BCC

Owner: Connecticut General/Lawrence D., Rosella, and Corrine Lindsay

County: Morrow Report No. 24 Well Number: 62B

Well Depth: 1265 Ft. Casing Size: 16 In. Casing Depth: 211 Ft.

Use: Unused Elevation of Land Surface: 786 Ft.

Well Log: Yes + Test Date Drilled: 8/14/72

Water Rights Application: G-5096 Permit: G-4918 Certificate: 52085

Date: 2/3/70 Appropriation: 2.23 cfs from this well

Remarks: Water level recorder installed on 1/27/84.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/26E-6ACC

Owner: Jerald E. Rea

County: Morrow Report No. 24 Well Number: 50

Well Depth: 1097 Ft. Casing Size: 16 In. Casing Depth: 240 Ft.

Use: Irrigation Elevation of Land Surface: 850 Ft.

Well Log: Complete Well Log Date Drilled: Completed 5/18/70

Originally drilled to 714 feet (no date) deepened to 830 feet in 1970 and again to 1097 feet in 1970

Water Rights Application: G-4557 Permit: G-4281 Certificate: 42433

Date: 8/15/68 Appropriation: 2.0 cfs for irrigation of 668.0 acres

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/26E-10CDB

Owner: Connecticut General/Lawrence D., Rosella, and Corrine Lindsay

County: Morrow Report No. 24 Well Number: 62A

Well Depth: 1104 Ft. Casing Size: 16 In. Casing Depth: 226.3 Ft.

Use: Irrigation/Stock Elevation of Land Surface: 960 Ft.

Well Log: Yes + Test Date Drilled: 2/14/71

Water Rights Application: G-5096 Permit: G-4918 Certificate: 52085

Date: 2/3/70 Appropriation: 4.45 cfs from this well

Pump H.P.: 400 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/26E-11CDD

Owner: Lawrence D., Rosella and Corrine Lindsay

County: Morrow Report No. 24 Well Number: 62C

Well Depth: 1200 Ft. Casing Size: 16 In. Casing Depth: _____ Ft.

Use: Domestic Elevation of Land Surface: 879 Ft.

Well Log: NONE Date Drilled: 1971

Water Rights Application: NONE Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: 5 Type: Submersible Depth of Bowls: _____ Ft.

Remarks: _____

Site Number (Location): 2N/26E-15ACC

Owner: Taylor Brothers Farm

County: Morrow Report No. 24 Well Number: 68

Well Depth: 1145 Ft. Casing Size: 16 In. Casing Depth: 236 Ft.

Use: Irrigation Elevation of Land Surface: 940 Ft.

Well Log: Yes + Test Date Drilled: 6/1/72

Water Rights Application: G-5467 Permit: G-8817 Certificate: not issued

Date: 3/25/71 Appropriation: 7.0 cfs for irrigation of 1435.9 acres

Final Proof Survey on 2/8/83

Pump H.P.: 500 Type: Turbine Depth of Bowls: _____ Ft.

Remarks: Well 2

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/26E-17ABA

Owner: Boardman Farms, Inc. Formerly Nelson-Tucker

County: Morrow Report No. 24 Well Number: 57

Well Depth: 1103 Ft. Casing Size: 16 In. Casing Depth: 242.3 Ft.

Use: Irrigation Elevation of Land Surface: 920 Ft.

Well Log: Yes + Test Date Drilled: 9/15/69

Water Rights Application: G-4782 Permit: G-4504 Certificate: 43929

Date: 2/10/69 Appropriation: 4.13 cfs for supplemental irrigation of 2240.4 acres; T-4160 changed point of appropriation

Pump H.P.: 400 Type: Turbine Depth of Bowls: Ft.

Remarks: Well 2

Site Number (Location): 2N/26E-18DAA

Owner: Boardman Farms, Inc. Formerly Nelson-Tucker

County: Morrow Report No. 24 Well Number: 63

Well Depth: 1145 Ft. Casing Size: 16 In. Casing Depth: 232 Ft.

Use: Irrigation Elevation of Land Surface: 935 Ft.

Well Log: Yes + Test Date Drilled: 7/28/70

Water Rights Application: G-5194 Permit: Pending Certificate:

Date: 5/20/70 Appropriation: 6.69 cfs for supplemental irrigation of 3612.43 acres; Permit still pending

Pump H.P.: 500 Type: Turbine Depth of Bowls: Ft.

Remarks: Well 3

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/26E-20DBB

Owner: Boardman Farms, Inc. Formerly Delwin O. Nelson

County: Morrow Report No. 24 Well Number: 37

Well Depth: 1000 Ft. Casing Size: 16 In. Casing Depth: 123 Ft.

Use: Irrigation Elevation of Land Surface: 985 Ft.

Well Log: Yes + Test Date Drilled: 7/14/67

Water Rights Application: G-4025 Permit: G-3777 Certificate: 43928

Date: 8/7/67 Appropriation: 4.13 cfs for irrigation of 2240.4 acres; T-4159 allows Well 3 as second point of appropriation

Pump H.P.: 350 Type: Turbine Depth of Bowls: Ft.

Remarks: Well 1

Site Number (Location): 2N/26E-23CAD

Owner: Connecticut General/Lawrence D., Rosella, and Corrine Lindsay

County: Morrow Report No. 24 Well Number: 62

Well Depth: 1145 Ft. Casing Size: 16 In. Casing Depth: 188.1 Ft.

Use: Irrigation Elevation of Land Surface: 980 Ft.

Well Log: Yes + Test Date Drilled: 2/20/71

12-inch casing from 509 to 610 feet and 10-inch casing from 880 to 1130 feet

Water Rights Application: G-5096 Permit: G-4918 Certificate: 52085

Date: 2/3/70 Appropriation: 8.9 cfs for irrigation of 2596.1 acres (2.23 cfs @ Well 62) (4.45 cfs @ Well 62A) (2.23 cfs @ Well 62B)

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/26E-28CDD

Owner: Grieb Ranch

County: Morrow Report No. 24 Well Number: 36

Well Depth: 549 Ft. Casing Size: 16 In. Casing Depth: 150 Ft.

Use: Unused Elevation of Land Surface: 1080 Ft.

Well Log: Yes + Air Test Date Drilled: 12/23/68

Water Rights Application: G-3999 Permit: G-3792 Certificate: 43515

Date: 7/19/67 for 7.0 cfs and 3/7/68 for 0.81 cfs Appropriation: 7.81 cfs for irrigation of 2831.9 acres; changed POA to 1N/26E-4BAA and 5BAA

Remarks:

Site Number (Location): 2N/26-29CCD

Owner: Grieb Ranch

County: Morrow Report No. 24 Well Number: 36A

Well Depth: 1004 Ft. Casing Size: 16 In. Casing Depth: 152 Ft.

Use: Unused Elevation of Land Surface: 1060 Ft.

Well Log: Yes + Deepening + 2 Tests Date Drilled: 5/68

Deepened from 914 feet to 1004 on 3/19/71

Water Rights Application: G-3999 Permit: G-3792 Certificate: 43515

Date: 7/19/67 for 7.0 cfs and 3/7/68 for 0.81 cfs Appropriation: changed POA to 1N/26E-4BAA and 5BAA

Remarks: Water level recorder installed 5/8/84.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-1BDD

Owner: Frank O'Kane Formerly Clausie Ammon

County: Umatilla Report No. 24 Well Number: 11

Well Depth: 886 Ft. Casing Size: 15 In. Casing Depth: 140 Ft.

Use: Unused Elevation of Land Surface: 800 Ft.

Well Log: Original Log Date Drilled: 1952

Deepened from 554 to 840 feet in 3/1961

Water Rights Application: G-547 Permit: G-434 Certificate: 28601

Date: 01/21/57 Appropriation: 4.0 cfs from 2 wells for irrigation of 198.5 acres and supplemental irrigation of 220.4 acres

Pump H.P.: NONE Type: Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/27E-2DAA1

Owner: Frank O'Kane Formerly Clausie Ammon

County: Umatilla Report No. 24 Well Number: 11A

Well Depth: 886 Ft. Casing Size: 12 In. Casing Depth: 77 Ft.

Use: Unused Elevation of Land Surface: 810 Ft.

Well Log: Yes + deepening + Test Date Drilled: 5/15/57

Deepened from 799 to 886 in 1965 REPLACED in 3/78

Water Rights Application: Permit: Certificate:

Date: Appropriation:

Pump H.P.: NONE Type: Depth of Bowls:

Remarks: xxx

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-2DAA2

Owner: Frank O'Kane

County: Umatilla Report No. 24 Well Number: 11A Replacement

Well Depth: 1205 Ft. Casing Size: 14 Ft. Casing Depth: 202 Ft.

Use: Irrigation Elevation of Land Surface: 810 Ft.

Well Log: Yes Date Drilled: 3/27/78

Water Rights Application: G-547 Permit: G-434 Certificate: 28601

Date: 01/21/57 Appropriation: 4.0 cfs from 2 wells for irrigation of 198.5 acres and supplemental irrigation of 220.4 acres

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks: Replacement well - motor pulled in 1982.

Site Number (Location): 2N/27E-2DAA3

Owner: Frank O'Kane Formerly Ammon Brothers

County: Umatilla Report No. 24 Well Number: 75

Well Depth: Sump Ft. Casing Size: In. Casing Depth: Ft.

Use: Elevation of Land Surface: Ft.

Well Log: NONE Date Drilled:

Water Rights Application: G-5865 Permit: G-5598 Certificate: 47018

Date: 08/07/72 Appropriation: 1.44 cfs for irrigation of 32.4 acres and supplemental irrigation of 82.6 acres

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks: Ground water is appropriated from the sediments overlying the Columbia River Basalts.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-7AAB

Owner: Frank Mader Formerly Porter-Peringer, Inc.

County: Morrow Report No. 24 Well Number: 52A/60A

Well Depth: 1461 Ft. Casing Size: 16 In. Casing Depth: 464 Ft.

Use: Irrigation Elevation of Land Surface: 1030 Ft.

Well Log: Yes + Test Date Drilled: 01/18/71;

12" casing from 466 to 1220 feet; perforated from 967 to 987, 1070 to 1085, 1175 to 1195

Water Rights Application: G-4601 Permit: G-4325 Certificate: 46085

Date: 09/18/68 Appropriation: 7.11 cfs for irrigation of 1687.5 acres; Well 7 yields 5.22 cfs; 60A CANCELED 7/25/77

Pump H.P.: 700 Ft. Type: Turbine Depth of Bowls: 700 Ft.

Remarks:

Site Number (Location): 2N/27E-8DAB

Owner: Frank Mader Formerly Porter-Peringer, Inc.

County: Morrow Report No. 24 Well Number: 52/60

Well Depth: 1251 Ft. Casing Size: 16 & 14 In. Casing Depth: 170 Ft.

Use: Irrigation Elevation of Land Surface: 1055 Ft.

Well Log: Yes & 3 Deepenings & 1 Test Date Drilled: 01/20/70;

Deepened 3 times 14" casing from 140 to 370 feet 1) from 800 to 1000; 2) 1085 to 1190; 3) 1187 to 1251 all in 1970

Water Rights Application: G-4601 Permit: G-4325 Certificate: 46085

Date: 09/18/68 Appropriation: 7.11 cfs for irrigation of 1687.5 acres - Well 8 yields 1.89 cfs; 60 CANCELED 07/25/77

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-11ADD

Owner: Hale Brothers

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 525 Ft. Casing Size: _____ In. Casing Depth: _____ Ft.

Use: Unused Elevation of Land Surface: 845 Ft.

Well Log: NONE Date Drilled: 1952

Water Rights Application: NONE Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: NONE Type: _____ Depth of Bowls: _____ Ft.

Remarks: _____

Site Number (Location): 2N/27E-11CCD

Owner: Jerry E. Meyers

County: Umatilla Report No. 24 Well Number: 76

Well Depth: Sump Ft. Casing Size: _____ In. Casing Depth: _____ Ft.

Use: _____ Elevation of Land Surface: 870 Ft.

Well Log: NONE Date Drilled: _____

30 feet x 100 feet x 20 feet deep

Water Rights Application: G-5974 Permit: G-5663 Certificate: _____

Date: 01/10/73 Appropriation: 2.23 cfs for irrigation of 88.0 acres and supplemental irrigation of 386.0 acres

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ Ft.

Remarks: Ground water is appropriated from the sediments overlying the Columbia River Basalts.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-12BBB

Owner: Hale Brothers Formerly Aaby and Hanson

County: Umatilla Report No. 24 Well Number: 14

Well Depth: 959 Ft. Casing Size: 12 In. Casing Depth: 178 Ft.

Use: Irrigation Elevation of Land Surface: 825 Ft.

Well Log: Yes - Test Date Drilled: 9/17/59

10 inch casing from 642 to 748 feet

Water Rights Application: G-1350 Permit: G-1227 Certificate: 30742

Date: 01/21/59 Appropriation: 2.5 acres for irrigation of 54.5 acres and supplemental irrigation of 274.0 acres

Pump H.P.: 150 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/27E-12BDB

Owner: Butter Creek Equipment

County: Umatilla Report No. 24 Well Number:

Well Depth: Ft. Casing Size: In. Casing Depth: Ft.

Use: Unused Elevation of Land Surface: 855 Ft.

Well Log: NONE Date Drilled:

Water Rights Application: NONE Permit: Certificate:

Date: Appropriation:

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-14CCB

Owner: Oscar D. McCarty

County: Umatilla Report No. 24 Well Number: 3

Well Depth: 785 Ft. Casing Size: 12 Ft. Casing Depth: _____ Ft.

Use: Domestic Elevation of Land Surface: 900 Ft.

Well Log: Yes - Both Date Drilled: 1951;

Deepened from 280 to 785 feet in 9/26/68

Water Rights Application: U-468 Permit: U-425 Certificate: 24271

Date: 3/4/52 Appropriation: 4.44 cfs for irrigation of 111.7 acres and supplemental irrigation of 288.3 acres

Pump H.P.: 10 Type: Submersible Depth of Bowls: _____ Ft.

Remarks:

ADDITIONAL WATER RIGHT INFORMATION

Site Number (Location): 2N/27E-14CCB

Owner: Oscar D. McCarty

County: Umatilla Report No. 24 Well Number: 8

Use: Domestic

Water Rights Application: U-587 Permit: U-536 Certificate: 24273

Date: 4/9/53 Appropriation: 1.97 cfs (884 gpm) for irrigation of 157.4 acres

Pump H.P.: 10 Type: Submersible Depth of Bowls: _____ ft.

Remarks:

ADDITIONAL WATER RIGHT INFORMATION

Site Number (Location): 2N/27E-20CAA

Owner: Brok Tucker

County: Morrow Report No. 24 Well Number: 55

Well Depth: 1148 Ft. Casing Size: 16 In. Casing Depth: 227 Ft.

Use: Irrigation Elevation of Land Surface: 1135 Ft.

Well Log: Yes + Test Date Drilled: 8/30/68

Deepened from 1103 to 1148 feet in 1981

Water Rights Application: G-4726 Permit: G-4477 Certificate: 50316

Date: 12/16/68 Appropriation: 4.5 cfs for irrigation of 3000 acres

Pump H.P.: 400 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/27E-22BBD

Owner: Michael McCarty Formerly Edwin and Clyde W. Johnson

County: Umatilla Report No. 24 Well Number: 32

Well Depth: 778 Ft. Casing Size: 12 In. Casing Depth: 142 Ft.

Use: Domestic Elevation of Land Surface: 935 Ft.

Well Log: Yes Date Drilled: 2/23/68

Water Rights Application: G-3772 Permit: G-3558 Certificate: 38847

Date: 1/13/67 Appropriation: 2.64 cfs for supplemental irrigation of 362.2 acres

Pump H.P.: 15 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-26CBD

Owner: Robert Hawkins-Sarvis Springs Farm

County: Umatilla Report No. 24 Well Number: 18

Well Depth: 932 Ft. Casing Size: 12 In. Casing Depth: 77 Ft.

Use: Irrigation Elevation of Land Surface: 1180 Ft.

Well Log: Yes + Test Date Drilled: 8/29/62

Water Rights Application: G-2461 Permit: G-2276 Certificate: 36022

Date: 10/8/62 Appropriation: 2.68 cfs for irrigation of 347.4 acres

Pump H.P.: 125 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/27E-27BCC1

Owner: John E. Correa Formerly Michael F. Kilkenney

County: Umatilla Report No. 24 Well Number: 4

Well Depth: 598 Ft. Casing Size: 16 In. Casing Depth: 29 Ft.

Use: Domestic Elevation of Land Surface: 980 Ft.

Well Log: Yes + Test Date Drilled: 1/7/57

Water Rights Application: U-489 Permit: U-441 Certificate: 31201

Date: 04/18/52 Appropriation: 0.5 cfs for irrigation of 5.5 acres and supplemental irrigation of 34.5 acres

Pump H.P.: Type: Submersible Depth of Bowls: Ft.

Remarks:

ADDITIONAL WATER RIGHT INFORMATION

Site Number (Location): 2N/27E-27BCC1

Owner: John E. Correa Formerly Edwin and Clyde W. Johnson

County: Umatilla Report No. 24 Well Number: 24

Use: Domestic Elevation of Land Surface: _____ feet

Same well as Certificate 31201 (2N/27E-27BCC1)

Water Rights Application: G-3019 Permit: G-2809 Certificate: 38846

Date: 1/22/65 Appropriation: 0.60 cfs for supplemental irrigation of 137.8 acres

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-27CBC

Owner: Thomas A. Ashbeck

County: Umatilla Report No. 24 Well Number: 38

Well Depth: 240 Ft. Casing Size: 8 In. Casing Depth: 34 Ft.

Use: Irrigation Elevation of Land Surface: 996 Ft.

Well Log: Yes + Test Date Drilled: 9/21/67

Water Rights Application: G-4073 Permit: G-3816 Certificate: 38855

Date: 9/11/67 Appropriation: 0.16 cfs for supplemental irrigation of 12.6 acres

Pump H.P.: 15 Type: Turbine Depth of Bowls: _____ Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-28ADD

Owner: Frank Mader Formerly Tucker Echo Ranch

County: Morrow Report No. 24 Well Number: 5

Well Depth: 263 Ft. Casing Size: 12 In. Casing Depth: 32.5 Ft.

Use: Irrigation Elevation of Land Surface: 990 Ft.

Well Log: Yes Date Drilled:

Water Rights Application: U-496 Permit: U-450 Certificate: 31096

Date: 05/07/52 Appropriation: 1.96 cfs for irrigation of 48.7 acres and supplemental irrigation of 132.4 acres

Pump H.P.: 60 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/27E-32DBA

Owner: Curt Perkins Formerly Campbell Ranch, Inc.

County: Morrow Report No. 24 Well Number: 53A

Well Depth: 936 Ft. Casing Size: 16 In. Casing Depth: 241 Ft.

Use: Irrigation Elevation of Land Surface: 1210 Ft.

Well Log: Yes + Test Date Drilled: 9/13/69

Water Rights Application: G-4629 Permit: G-4354 Certificate: 42330

Date: 10/7/68 Appropriation: 15.89 cfs for irrigation of 2078.0 acres; Well 2 yields 6.72 cfs; Well 1 (1N/27E-5CCB) yields 9.17 cfs

Pump H.P.: 400 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/27E-34BDC

Owner: Delbert L. Graham Formerly B.P. Doherty

County: Umatilla Report No. 24 Well Number: 1

Well Depth: 125 (RPT) Ft. Casing Size: 6 In. Casing Depth: 25 Ft.

Use: _____ Elevation of Land Surface: 1040 Ft.

Well Log: No log Date Drilled: 1925

Reported yield 200 gpm

Water Rights Application: GR-4142 Permit: _____ Certificate: GR-4066

Date: 1925 Appropriation: 0.11 cfs (49 gpm) for irrigation of 10.0 acres

Pump H.P.: _____ Type: Submersible Depth of Bowls: 85 Ft.

Remarks: _____

Site Number (Location): 2N/28E-7AAD1

Owner: Robert Hale Formerly Larry Hanson

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 702 Ft. Casing Size: _____ In. Casing Depth: _____ Ft.

Use: Unused Elevation of Land Surface: 855 Ft.

Well Log: Log of deepening only + Test Date Drilled: Unknown

Deepened from 400 to 702 feet in 1966

Water Rights Application: _____ Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ Ft.

Remarks: _____

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 2N/28E-7AAD2

Owner: Robert Hale Formerly Larry Hanson

County: Umatilla Report No. 24 Well Number: 51

Well Depth: 690 Ft. Casing Size: 16 In. Casing Depth: 120 Ft.

Use: Irrigation Elevation of Land Surface: 855 Ft.

Well Log: Yes & Deepening & Test Date Drilled: 5/6/66

Deepened from 155 feet to 690 feet in 1968

Water Rights Application: G-4581 Permit: G-4049 Certificate: 44654

Date: 9/3/68 Appropriation: 4.5 cfs for irrigation of 812.2 acres

Pump H.P.: 400 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 2N/28E-17CCA

Owner: Robert Hale Formerly Merle and Villa Abney

County: Umatilla Report No. 24 Well Number: 73

Well Depth: (RPT) 300 Ft. Casing Size: 16 In. Casing Depth: 105 Ft.

Use: Unused Elevation of Land Surface: 1020 Ft.

Well Log: None Date Drilled:

Well was under construction in 1974-1975

Water Rights Application: G-5715 Permit: Certificate:

Date: 2/2/72 Appropriation: Action Suspended

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks: Well has not been completed.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 3N/27E-24DDA

Owner: John and Nellie Madison

County: Umatilla Report No. 24 Well Number: 39

Well Depth: Sump Ft. Casing Size: ____ In. Casing Depth: ____ Ft.

Use: Irrigation Elevation of Land Surface: 710 Ft.

Well Log: NONE Date Drilled: ____

25 feet x 40 feet x 28 feet deep

Water Rights Application: G-4080 Permit: G-3834 Certificate: 46097

Date: 09/15/67 Appropriation: 2.45 cfs for irrigation of 208.0 acres and supplemental irrigation of 138.9 acres

Pump H.P.: ____ Type: ____ Depth of Bowls: ____ Ft.

Remarks: Ground water is appropriated from the sediments overlying the Columbia River Basalts

Site Number (Location): 3N/27E-25DDC

Owner: R.G. Saylor Formerly George B. Wallace

County: Umatilla Report No. 24 Well Number: 16

Well Depth: 591 Ft. Casing Size: 12 In. Casing Depth: 184 Ft.

Use: Irrigation Elevation of Land Surface: 750 Ft.

Well Log: Yes Date Drilled: 7/17/60

Water Rights Application: G-1845 Permit: G-1688 Certificate: 32592

Date: 9/21/60 Appropriation: 0.96 cfs for irrigation of 2.0 acres and supplemental irrigation of 199.3 acres

Pump H.P.: 100 Type: Turbine Depth of Bowls: ____ Ft.

Remarks: ____

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 3N/27E-36ADD

Owner: R.G. Saylor

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 145 Ft. Casing Size: 6 In. Casing Depth: 122 Ft.

Use: Domestic only Elevation of Land Surface: 775 Ft.

Well Log: _____ Date Drilled: 1/13/61

Water Rights Application: _____ Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: _____ Type: Submersible Depth of Bowls: _____ Ft.

Remarks: _____

ADDITIONAL WELL INFORMATION

Site Number (Location): 3N/28E-6DCC

Owner: Horn Enterprises Formerly Stone Machinery Company

County: Umatilla Report No. 24 Well Number: 35A

Well Depth: 1136 Ft. Casing Size: 20 In. Casing Depth: 79.6 Ft.

Use: Irrigation Elevation of Land Surface: 670 Ft.

Well Log: Yes + Test Date Drilled: 4/1/68

16 inch casing from 0 to 237.7 feet

Water Rights Application: G-3933 Permit: G-3530 Certificate: 41252

Date: 5/24/67 Appropriation: Well 2 - 3.50 cfs Well - 1 is located at 3N/28E-18ABD

Pump H.P.: 250 Type: Turbine Depth of Bowls: _____ Ft.

Remarks: _____

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 3N/28E-8ADB

Owner: Henry F. Walker

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 100 Ft. Casing Size: 8 In. Casing Depth: _____ Ft.

Use: Unused Elevation of Land Surface: 651 Ft.

Well Log: _____ Date Drilled: 1966

Water Rights Application: _____ Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ Ft.

Remarks: _____

Site Number (Location): 3N/28E-8DAC

Owner: Henry Walker

County: Umatilla Report No. 24 Well Number: 26A

Well Depth: 437 Ft. Casing Size: 12 In. Casing Depth: 167 Ft.

Use: Domestic Elevation of Land Surface: 660 Ft.

Well Log: Yes + Deepening Date Drilled: 3/7/66

10 inch casing from 165 to 205 feet; deepened from 250 to 437 in 1967

Water Rights Application: G-3355 Permit: G-3255 Certificate: _____

Date: 01/26/66 Appropriation: Applied for 3.23 cfs from two wells for 258 acres CANCELED 6/23/75

Pump H.P.: _____ Type: Submersible Depth of Bowls: _____ Ft.

Remarks: _____

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 3N/28E-18ABD

Owner: Horn Enterprises Formerly Stone Machinery Company

County: Umatilla Report No. 24 Well Number: 35

Well Depth: 1095 Ft. Casing Size: 16 In. Casing Depth: 214 Ft.

Use: Irrigation Elevation of Land Surface: 642 Ft.

Well Log: Yes + Test Date Drilled: 12/20/68

Water Rights Application: G-3939 Permit: G-3530 Certificate: 41252

Date: 05/24/67 Appropriation: 7.40 cfs for irrigation of 314.8 acres and supplemental irrigation of 384.5 acres; Well 1 - 3.9 cfs

Pump H.P.: 350 Type: Turbine Depth of Bowls: Ft.

Remarks: Second well located in Section 6DCC

Site Number (Location): 3N/28E-18DBD

Owner: Horn Enterprises Formerly Harry J. Andrews

County: Umatilla Report No. 24 Well Number: 15

Well Depth: 875 Ft. Casing Size: 12 In. Casing Depth: 57 Ft.

Use: Irrigation Elevation of Land Surface: 655 Ft.

Well Log: Yes + Test Date Drilled: 1/1/56

Water Rights Application: G-1836 Permit: G-1685 Certificate: 32696

Date: 9/2/60 Appropriation: 0.94 cfs for irrigation of 30 acres and supplemental irrigation of 45 acres

Pump H.P.: NONE Type: Depth of Bowls: Ft.

Remarks: Pump pulled due to a broken shaft

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 3N/28E-19ACB & BDB

Owner: Fred and Tresa Davis

County: Umatilla Report No. 24 Well Number: 10 & 10A

Well Depth: From Sumps (2) Casing Size: _____In. Casing Depth: _____Ft.

Use: Irrigation Elevation of Land Surface: 675 Ft.

Well Log: None Date Drilled: Not Reported

1 - 100 feet x 20 feet x 7 feet deep 2 - 90 feet x 20 feet x 7 feet deep

Water Rights Application: G-515 Permit: G-438 Certificate: 35811

Date: 11/21/56 Appropriation: 1.50 cfs from Sumps 1 and 2 for irrigation and supplemental irrigation of 120.0 acres

Pump H.P.: _____ Type: _____ Depth of Bowls: _____Ft.

Remarks: Ground water is appropriated from the sediments overlying the Columbia River Basalts.

ADDITIONAL WATER RIGHT INFORMATION

Site Number (Location): 3N/28E-19BAD

Owner: Fred and Tresa Davis

County: Umatilla Report No. 24 Well Number: 22

Well Depth: Sump 3 Casing Size: _____ inches Casing Depth: _____ feet

Use: Irrigation Elevation of Land Surface: 670 feet

Well Log: None Date Drilled: _____

3 - 150 feet x 30 feet x 35 feet deep

Water Rights Application: G-2786 Permit: G-2597 Certificate: 35783

Date: 02/24/64 Appropriation: 0.84 cfs for supplemental irrigation of 120 acres

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ feet

Remarks: Ground water is appropriated from the sediments overlying the Columbia River Basalts.

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 3N/28E-28ADA

Owner: L & L Farms Formerly Ernest A. Betz

County: Umatilla Report No. 24 Well Number: 41

Well Depth: 984 Ft. Casing Size: 16 In. Casing Depth: 105 Ft.

Use: Irrigation Elevation of Land Surface: 690 Ft.

Well Log: Yes + Test + Deepening Date Drilled: 4/3/68

Deepened from 830 to 984 feet in 05/04/82

Water Rights Application: G-4165 Permit: G-4048 Certificate: 36676

Date: 12/18/67 Appropriation: 1.57 cfs for irrigation of 125.6 acres

Pump H.P.: 350 Type: Turbine Depth of Bowls: Ft.

Remarks:

Site Number (Location): 3N/28E-28CAB

Owner: L & L Farms Formerly Ernest A. Betz

County: Umatilla Report No. 24 Well Number: 34

Well Depth: 636 Ft. Casing Size: 16 In. Casing Depth: 130 Ft.

Use: Irrigation Elevation of Land Surface: 711 Ft.

Well Log: Yes + Test Date Drilled: 2/2/67

Water Rights Application: G-3859 Permit: G-3635 Certificate: 36675

Date: 03/21/67 Appropriation: 1.57 cfs for irrigation of 125.6 acres

Pump H.P.: 200 Type: Turbine Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-7ACC

Owner: Lon G. Wadekamper

County: Umatilla Report No. 24 Well Number: 74

Well Depth: 286 Ft. Casing Size: 8 In. Casing Depth: 80 Ft.

Use: Unused Elevation of Land Surface: 535 Ft.

Well Log: Yes + Test Date Drilled: 6/15/72

Perforations from 70 to 80 feet in basalt

Water Rights Application: G-5805 Permit: G-7358 Certificate: 46819

Date: 05/22/72 Appropriation: 0.11 cfs for irrigation of 9.8 acres

T-5228 change in POU and change in POA to 5N/28E-20DD

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks:

Site Number (Location): 4N/28E-8DCB

Owner: Herman T. Schultz

County: Umatilla Report No. 24 Well Number: 56

Well Depth: 265 Ft. Casing Size: 10 In. Casing Depth: 84.6 Ft.

Use: Irrigation Elevation of Land Surface: 505 Ft.

Well Log: Yes Date Drilled: 7/29/68

Water Rights Application: G-4770 Permit: G-4493 Certificate: 38739

Date: 1/21/69 Appropriation: 0.15 cfs for supplemental irriation

of 12.1 acres

Pump H.P.: 10 Type: Submersible Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-8DDC

Owner: Herman Bush Formerly Harold L. Rosenbaum

County: Umatilla Report No. 24 Well Number: 58

Well Depth: 215 Ft. Casing Size: 8 In. Casing Depth: Ft.

Use: Domestic/Irrigation Elevation of Land Surface: 490 Ft.

Well Log: Deepening and Bailer Test Date Drilled:

Deepened from 108 to 215 in 1968

Water Rights Application: G-4800 Permit: G-4525 Certificate: 38289

Date: 02/28/69 Appropriation: 0.02 cfs for irrigation of 1.6 acres

Pump H.P.: 3 Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 4N/28E-10CCA

Owner: Hermiston Medical Center

County: Umatilla Report No. 24 Well Number:

Well Depth: 207 ft. Casing Size: 8 in. Casing Depth: 60 ft.

Use: Unused Elevation of Land Surface:

Well Log: Yes and Test Date Drilled: 11/7/65

Water Rights Application: G-3929 Permit: G-3412 Certificate:

Date: 8/19/66 Appropriation: 0.015 cfs for irrigation of 1.0 acre

Pump H.P.: Type: Depth of Bowls: ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-16ABB

Owner: Sach Mikami Formerly Langenwaller

County: Umatilla Report No. 24 Well Number: 2

Well Depth: 300 Ft. Casing Size: 6 In. Casing Depth: 71 Ft.

Use: Domestic Elevation of Land Surface: 500 Ft.

Well Log: Yes Date Drilled: 4/4/77

Water Rights Application: U-357 Permit: U-331 Certificate: 24264

Date: 4/13/50 Appropriation: 0.02 cfs for 1.6 acres; T-4218

change in point of appropriation - new well located 150 feet SE of original

Pump H.P.: Type: Submersible Depth of Bowls: Ft.

Remarks: Replacement well

Site Number (Location): 4N/28E-16BAA

Owner: Interfaith Christian Center

County: Umatilla Report No. 24 Well Number:

Well Depth: 500 ft. Casing Size: 8 in. Casing Depth: 43 ft.

Use: Domestic/Irrigaton Elevation of Land Surface:

Well Log: Yes + Test Date Drilled: 1/27/78

Water Rights Application: G-9917 Permit: Certificate:

Date: 8/28/80 Appropriation: 0.43 cfs for irrigation of 34.0

acres and 0.2 for industrial use

Pump H.P.: Type: Depth of Bowls: ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-17ABD2

Owner: King Ranches

County: Umatilla Report No. 24 Well Number: 77

Well Depth: 203 Ft. Casing Size: 8 In. Casing Depth: 95 Ft.

Use: Domestic/Irrigation Elevation of Land Surface: 500 Ft.

Well Log: Yes Date Drilled: 12/30/72

Water Rights Application: G-6101 Permit: G-8229 Certificate:

Date: 5/1/73 Appropriation: .05 cfs for supplemental irrigation within Westland Irrigation District - modified use

Pump H.P.: Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 4N/28E-21CAC

Owner: Union Pacific Railroad Formerly Robert M. Kenney

County: Umatilla Report No. 24 Well Number: 29

Well Depth: 347 Ft. Casing Size: 12 In. Casing Depth: 158 Ft.

Use: Abandoned Elevation of Land Surface: 555 Ft.

Well Log: Partial Log Date Drilled: 1966

Well has been partially filled with cement - questionable depth

Water Rights Application: G-3565 Permit: G-3113 Certificate: 38597

Date: 7/5/66 Appropriation: 1.33 cfs for irrigation of 106.6 acres CANCELLED on 10/28/82

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-27BBBA

Owner: C.B. Livestock

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 630 Ft. Casing Size: 12 In. Casing Depth: _____ Ft.

Use: Unused Elevation of Land Surface: 640 Ft.

Well Log: Yes Date Drilled: 3/7/77

Water Rights Application: _____ Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ Ft.

Remarks: _____

Site Number (Location): 4N/28E-30DDD

Owner: Ernest P. and Karla Lewis Formerly Proudfoot Ranch

County: Umatilla Report No. 24 Well Number: 30

Well Depth: 721 Ft. Casing Size: 16 In. Casing Depth: 100 Ft.

Use: Irrigation Elevation of Land Surface: 562 Ft.

Well Log: Yes + Test Date Drilled: 6/28/67

Perforated from 32 to 57 feet

Water Rights Application: G-3688 Permit: G-3492 Certificate: 44896

Date: 9/29/66 Appropriation: 1.59 cfs for supplemental irrigation of 127.0 acres

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ Ft.

Remarks: _____

ADDITIONAL WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-30DDD

Owner: Ernest P. and Karla Lewis Formerly Proudfoot Ranch

County: Umatilla Report No. 24 Well Number: 40

Use: Irrigation

Same well as Water Right Certificate 44896

Water Rights Application: G-4135 Permit: G-3895 Certificate: 44897

Date: 11/13/67 Appropriation: 2.09 cfs for irrigation of 49.0 acres and supplemental irrigation of 117.8 acres

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-31ACA

Owner: William C. Cox

County: Umatilla Report No. 24 Well Number: 43

Well Depth: 400 Ft. Casing Size: 10 In. Casing Depth: 120 Ft.

Use: Irrigation Elevation of Land Surface: 575 Ft.

Well Log: Yes Date Drilled: 2/19/68

Torch set perforations (160#) from 80 to 120 feet

Water Rights Application: G-4234 Permit: G-3996 Certificate: 38859

Date: 2/15/68 Appropriation: 0.32 cfs for irrigation of 15.2 acres and supplemental irrigation of 23.6 acres

Pump H.P.: 5.0 Type: Submersible Depth of Bowls: 360 Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 4N/28E-32ACB

Owner: Rose Mueller

County: Umatilla Report No. 24 Well Number: 31

Well Depth: 200 Ft. Casing Size: 16 In. Casing Depth: 140 Ft.

Use: Irrigation Elevation of Land Surface: 550 Ft.

Well Log: Yes + Test Date Drilled: 4/28/67

Water Rights Application: G-3749 Permit: G-3541 Certificate: 38388

Date: 12/8/66 Appropriation: 0.86 cfs for supplemental irrigation of 68.5 acres

Pump H.P.: _____ Type: Turbine Depth of Bowls: _____ Ft.

Remarks: Pump motor removed.

Site Number (Location): 5N/28E-17CBA

Owner: City of Umatilla - Umatilla River Well

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 536 Ft. Casing Size: _____ In. Casing Depth: _____ Ft.

Use: Irrigation Elevation of Land Surface: 300 Ft.

Well Log: NONE Date Drilled: 1940

Water Rights Application: _____ Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: 25 Type: Turbine Depth of Bowls: _____ Ft.

Remarks: _____

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 5N/28E-19AAA

Owner: City of Umatilla - McFarland Well

County: Umatilla Report No. 24 Well Number: 21

Well Depth: (RPT) 785 Ft. Casing Size: (RPT)16 In. Casing Depth: 400 Ft.

Use: Municipal Elevation of Land Surface: 485 Ft.

Well Log: None Date Drilled: 1947

Water Rights Application: G-2755 Permit: G-2560 Certificate: 34523

Date: 12/24/63 Appropriation: 2.0 cfs for municipal supply

Pump H.P.: 100 Type: Turbine Depth of Bowls: Ft.

Remarks: Three deep wells have been drilled east of Umatilla outside of the proposed Butter Creek Boundaries.

Site Number (Location): 5N/28E-21CCB

Owner: Lon G. Wadekamper

County: Umatilla Report No. 24 Well Number: New 74

Well Depth: 250 Ft. Casing Size: 6 In. Casing Depth: 29 Ft.

Use: Domestic/Irrigation Elevation of Land Surface: 390 Ft.

Well Log: Yes Date Drilled: 1/28/83

Water Rights Application: G-5805 Permit: G-7358 Certificate: 46819

Date: 5/22/72 Appropriation: 0.11 cfs for irrigation 9.8 acres

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 5N/28E-21CDC

Owner: Clyde J. Nobles

County: Umatilla Report No. 24 Well Number: 42

Well Depth: (RPT) 59 Ft. Casing Size: (RPT) 6 In. Casing Depth: (RPT)39 Ft.

Use: Irrigation Elevation of Land Surface: 430 Ft.

Well Log: None Date Drilled:

Water Rights Application: G-4297 Permit: G-4059 Certificate: 42439

Date: 3/27/68 Appropriation: 0.09 cfs for supplemental irrigation of 7.5 acres

Pump H.P.: Type: Submersible Depth of Bowls: Ft.

Remarks:

Site Number (Location): 5N/28E-21CDD

Owner: Stuart Bonney

County: Umatilla Report No. 24 Well Number:

Well Depth: 100 ft. Casing Size: 10 in. Casing Depth: 74 ft.

Use: Irrigation Elevation of Land Surface:

Well Log: Yes Date Drilled: 1974

Water Rights Application: G-6767 Permit: G-6848 Certificate:

Date: 12/23/74 Appropriation: 1.8 cfs for supplemental irrigation of 148.0 acres

Pump H.P.: Type: Depth of Bowls: ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 5N/28E-21COD

Owner: Roger Construction, Inc.

County: Umatilla Report No. 24 Well Number:

Well Depth: 100 ft. Casing Size: 10 in. Casing Depth: 74 ft.

Use: Irrig./Indust. Elevation of Land Surface:

Well Log: Yes Date Drilled: 1974

Water Rights Application: G-6792 Permit: G6792 Certificate:

Date: 1/20/75 Appropriation: 0.25 cfs for irrigation of 32.0 acres and 0.66 cfs for industrial use

Pump H.P.: Type: Depth of Bowls: ft.

Remarks:

Site Number (Location): 5N/28E-32CAB

Owner: Marion Chaves

County: Umatilla Report No. 24 Well Number: 67

Well Depth: 578 Ft. Casing Size: 12 In. Casing Depth: 129 Ft.

Use: Unused Elevation of Land Surface: 605 Ft.

Well Log: Yes + Deepening + Air Test Date Drilled: 1/10/77

Deepened from 340 feet to 578 feet in 1978

Water Rights Application: G-5432 Permit: Certificate:

Date: Appropriation: Application REJECTED 11/1/77

Pump H.P.: Type: Depth of Bowls: Ft.

Remarks:

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 5N/28E-32DCA

Owner: Marion Chaves

County: Umatilla Report No. 24 Well Number: _____

Well Depth: 330 Ft. Casing Size: 8 In. Casing Depth: 93 Ft.

Use: Unused Elevation of Land Surface: 495 Ft.

Well Log: Yes Date Drilled: 1/25/78

Water Rights Application: None Permit: _____ Certificate: _____

Date: _____ Appropriation: _____

Pump H.P.: _____ Type: _____ Depth of Bowls: _____ Ft.

Remarks: _____

Site Number (Location): 5N/28E-33ADB

Owner: Stuart F. Bonney Formerly Phillip D. Hay

County: Umatilla Report No. 24 Well Number: 78

Well Depth: 315 Ft. Casing Size: 10 In. Casing Depth: 20 Ft.

Use: Unused Elevation of Land Surface: 520 Ft.

Well Log: Yes Date Drilled: 3/11/69

Water Rights Application: G-6576 Permit: G-8230 Certificate: _____

Date: 6/24/74 Appropriation: 1.75 cfs for irrigation and supplemental irrigation of 130.0 acres and stock use

Pump H.P.: 75 Type: Submersible Depth of Bowls: _____ Ft.

Remarks: _____

WATER RIGHT AND WELL INFORMATION

Site Number (Location): 5N/28E-33

Owner: Gary D. Wiley

County: Umatilla Report No. 24 Well Number:

Well Depth: ft. Casing Size: in. Casing Depth: ft.

Use: Elevation of Land Surface:

Well Log: Date Drilled:

Water Rights Application: G-9854 Permit: Certificate:

Date: 7/21/80 Appropriation: 0.04 cfs for irrigation of 2.0 acres - Action Suspended

Pump H.P.: Type: Depth of Bowls: ft.

Remarks:

APPENDIX VI

WATER LEVEL DATA

WELL NUMBER	DATE	WATER LEVEL
1S/26E-1DAD*	JUN 15, 1957	+27.7
	MAR 19, 1974	12.60
	DEC 09, 1975	18.64
	DEC 06, 1976	19.12
	DEC 06, 1977	23.85
	DEC 06, 1978	24.67
	AUG 09, 1979	25.70
	DEC 19	20.70
	AUG 28, 1980	29.10
	FEB 10, 1984	19.40
	APR 17	17.74
	MAY 09	18.93
	JUN 21	29.72
	AUG 06	24.65
	AUG 23	21.90
1S/26E-1DCD	DEC 12, 1976	26.
	DEC 06, 1978	30.85
	DEC 19, 1979	30.41
	FEB 13, 1980	62.5
	AUG 28	29.5
	FEB 11, 1981	27.2
	MAR 27, 1982	32.4
	FEB 06, 1983	27.2
	FEB 10, 1984	29.32
	JUN 21	35.29
	AUG 23	31.42
1S/26E-9DBD	NOV 27, 1964	40.0
	SEP 10, 1979	54.3
	JUL 24, 1980	52.5
	JUN 25, 1984	43.36
	AUG 06	43.38
	AUG 23	43.07
1N/26E-4BAA	OCT 25, 1968	300.
	AUG 08, 1979	604.3
	AUG 27, 1980	603.8
	FEB 10, 1981	494.1
	MAR 25, 1982	488.3
	FEB 14, 1984	505.6
	AUG 23	518.3
1N/26E-5BBA	MAY 20, 1969	203.
	DEC 02, 1971	259.
	JUN 28, 1972	275.

* Water levels in feet above (+) or below land surface datum.

1N/26E-8DBD	FEB 15, 1971	196.
	NOV 30	206.8
	DEC 05, 1972	222.6
	DEC 13, 1973	234.7
	DEC 17, 1974	249.82
	DEC 09, 1975	263.16
	DEC 06, 1976	266.23
	DEC 07, 1977	289.85
	DEC 05, 1978	296.68
	FEB 26, 1982	323.87
	FEB 08, 1983	333.16
	MAR 22, 1984	332.81
	AUG 06	335.19
1N/26E-10AAB	DEC 04, 1964	65.0
	MAR 31, 1965	65.24
	SEP 27	68.35
	MAR 01, 1966	68.69
	NOV 28	71.66
	NOV 20, 1967	77.24
	JUN 05, 1968	80.92
	DEC 17	92.88
	DEC 11, 1969	112.63
	MAR 11, 1970	111.47
	JUN 04	115.
	DEC 04	119.28
	FEB 23, 1971	119.35
	JUN 10	123.05
	APR 03, 1973	162.86
	DEC 13	174.
	SEP 10, 1974	187.
	DEC 17	186.77
	MAR 13, 1975	186.20
	JUN 03	196.07
	SEP 15	201.16
	DEC 09	199.88
	FEB 27, 1976	207.
	MAR 08	199.15
	JUN 08	208.19
	DEC 06,	208.03
	FEB 15, 1977	212.81
	DEC 06	230.03
	AUG 10, 1979	243.25
	FEB 13, 1980	243.21
	FEB 11, 1981	250.7
	FEB 10, 1984	262.4
1N/26E-18DDD1	NOV 30, 1971	29.68
	DEC 05, 1972	33.68
	DEC 06, 1973	44.84
	DEC 17, 1974	53.02
	DEC 09, 1975	63.01
	DEC 06, 1976	69.63
	DEC 07, 1977	60.7
	JUN 27, 1978	101.84
	DEC 05	60.28

1N/26E-18DDD2	JUN 13, 1972	75.
	NOV 11, 1977	108.
	DEC 05, 1978	125.
	AUG 14, 1979	130.60
	DEC 19	137.8
	FEB 11, 1981	133.9
	MAR 27, 1982	141.4
	FEB 08, 1983	145.52
	FEB 10, 1984	149.03
	JUN 25	150.62
	AUG 06	153.37
	AUG 23	151.47
1N/26E-26BCC	FEB 14, 1963	112.
	MAY 07	102.11
	AUG 06	108.5
	NOV 05	108.
	MAY 05, 1964	108.
	SEP 30	101.1
	MAR 31, 1965	118.
	SEP 27	107.4
	MAR 01, 1966	106.73
	MAR 14, 1967	108.89
	NOV 20	104.16
	MAR 12, 1968	106.
	DEC 17	110.5
	DEC 06, 1978	194.05
	AUG 28, 1980	201.1
	FEB 06, 1983	206.50
	FEB 10, 1984	212.22
	JUN 21	217.34
1N/26E-26CAB	DEC 20, 1976	127.
	AUG 10, 1979	159.56
	NOV 12	148.8
	DEC 11	147.45
	FEB 13, 1980	145.5
	AUG 28	156.4
	FEB 11, 1981	144.6
	FEB 01, 1984	159.15
	FEB 10	157.27
	APR 17	156.59
1N/26E-26CCC	AUG 15, 1968	175.
	FEB 19, 1969	171.5
	SEP 09	190.
	DEC 11	185.
	MAR 11, 1970	183.
	APR 11	183.
	JUN 04	200.
	AUG 27	231.
	NOV 11	195.
	DEC 04	193.5
	FEB 23, 1971	204.
	JUN 10	218.

1N/26E-26CCC (cont.)	SEP 09	213.
	NOV 30	205.
	MAR 07, 1972	203.
	JUN 28	215.
	OCT 03	216.
	DEC 05	207.
	APR 03, 1973	241.
	SEP 10	239.
	DEC 06	216.
	JUN 10, 1974	260.
	SEP 01	214.
	SEP 11	237.
	DEC 17	220.
	MAR 13, 1975	216.
	DEC 09	226.
	MAR 08, 1976	219.
	AUG 17	244.
	DEC 06	229.01
	DEC 28	232.
	FEB 15, 1977	229.
	DEC 06	238.
	FEB 14, 1978	235.
	DEC 06	244.
	MAR 13, 1979	240.
	AUG 10	241.85
	NOV 12	253.15
	DEC 11	251.85
	DEC 14	251.35
	DEC 19	251.12
	FEB 13, 1980	248.28
	FEB 11, 1981	249.75
	DEC 07	260.05
	FEB 23, 1982	252.55
	FEB 06, 1983	258.11
	FEB 10, 1984	262.97
	MAY 09	296.0
	JUN 21	298.24
1N/26E-29BDD	NOV 30, 1971	35.38
	DEC 05, 1972	40.15
	DEC 06, 1973	55.08
	DEC 17, 1974	51.01
	DEC 09, 1975	56.42
	DEC 06, 1976	70.75
	DEC 06, 1977	68.65
	DEC 06, 1978	73.2
	AUG 14, 1979	86.8
	FEB 08, 1983	87.95
	FEB 10, 1984	92.24
	AUG 06	104.93
	AUG 23	103.01

1N/26E-35DCB*	JUN 13, 1968	16.
	NOV 30, 1971	91.58
	JAN 18, 1972	17.
	DEC 05	F
	DEC 06, 1973	F
	MAR 19, 1974	F
	DEC 17,	0.37
	DEC 09, 1975	9.95
	DEC 06, 1976	8.53
	FEB 15, 1977	2.99
	DEC 06	17.52
	FEB 14, 1978	8.48
	DEC 06	10.40
	MAR 13, 1979	5.96
	AUG 09	41.08
	NOV 12	18.75
	NOV 17	16.19
	DEC 11	11.85
	DEC 14	11.5
	FEB 13, 1980	7.43
	AUG 28	93.10
	FEB 11, 1981	8.3
	DEC 07	20.90
	FEB 23, 1982	10.52
	MAR 27	4.65
	FEB 06, 1983	11.15
	FEB 10, 1984	9.05
	MAY 09	51.15
	JUN 21	35.68
	AUG 06	27.85
	AUG 23	20.61
1N/26E-36CDB	JUN 07, 1971	82.
	NOV 30	80.25
	DEC 01	82.
	DEC 05, 1972	91.14
	MAR 01, 1973	83.
	APR 12	138.
	OCT 06	234.
	OCT 07	83.
	DEC 06	104.11
	MAR 06, 1974	84.
	MAR 19	100.34
	JUL 16	97.
	DEC 16	101.
	DEC 17	100.74
	FEB 21, 1975	105.
	AUG 01	104.
	DEC 09	104.58
	JAN 14, 1976	105.
	DEC 06	102.62
	DEC 06, 1977	109.8

* F indicates well flowing.

1N/26E-36CDB (cont.)	DEC 06, 1978	111.26
	NOV 12, 1979	114.35
	NOV 17	113.55
	DEC 14	112.8
	AUG 28, 1980	188.9
	MAR 27, 1982	109.9
	FEB 06, 1983	117.88
	FEB 10, 1984	111.45
	JUN 21	116.9
	AUG 06	114.6
	AUG 23	113.15
1N/27E-3AAC1	OCT 15, 1964	83.
	AUG 10, 1965	81.12
	NOV 16	80.94
	FEB 15, 1966	80.76
	MAY 03	81.50
	AUG 09	93.79
	NOV 01	92.36
	FEB 07, 1967	90.55
	MAY 02	92.10
	AUG 08	93.02
	FEB 06, 1968	87.83
	MAY 07	94.25
	NOV 19	97.32
	FEB 18, 1969	93.05
	NOV 18	96.52
	MAR 11, 1970	93.91
	OCT 27	106.40
	OCT 02, 1971	129.83
	NOV 14, 1972	135.82
	FEB 20, 1973	136.12
	MAY 22	155.
	AUG 28	154.49
	DEC 06	161.32
	MAY 07, 1974	138.22
	NOV 05	172.69
	DEC 19	173.51
	FEB 11, 1975	174.74
	MAY 06	174.68
	AUG 05	182.95
	OCT 28	187.39
	DEC 02	185.75
	FEB 10, 1976	185.88
	MAY 10	191.17
	AUG 17	196.54
	DEC 04	195.49
	FEB 15, 1977	198.79
	MAY 10	204.93
	AUG 09	209.72
	DEC 08	DRY
	MAY 09, 1978	210.20
	DEC 07	DRY

1N/27E-3AAC2	JUL 11, 1974	165.0
	DEC 07, 1978	218.75
	MAR 13, 1979	218.75
	AUG 15	221.8
	FEB 16, 1980	231.5
	FEB 12, 1981	229.2
	FEB 23, 1982	233.8
	FEB 24, 1983	241.9
	FEB 11, 1984	245.4
1N/27E-3DBB	JAN 12, 1964	F
	JAN 31, 1966	3.75
	JAN 26, 1973	107.5
	FEB 20	107.72
	DEC 14	60.
	DEC 12, 1975	115.6
	DEC 04, 1976	125.48
	MAR 25, 1977	132.
	DEC 07	143.58
	DEC 06, 1978	147.1
	FEB 12, 1984	183.02
1N/27E-5CCB	MAR 05, 1969	208.
	APR 17	208.
	MAY 15	238.
	APR 01, 1971	230.
	AUG 25	250.
	JAN 26, 1972	250.
	NOV 06	268.
	DEC 06, 1978	360.
	AUG 08, 1979	343.93
	DEC 19	351.6
	FEB 12, 1980	353.4
	AUG 27	451.8
	FEB 26, 1982	369.1
1N/27E-10AAB	JAN 25, 1961	9.0
	MAY 24	9.0
	NOV 07	10.5
	APR 10, 1962	6.5
	NOV 14	11.
	FEB 05, 1963	8.5
	MAY 07	7.
	AUG 06	78.
	NOV 05	13.
	NOV 17, 1964	15.5
	FEB 16, 1965	10.5
	MAY 04	10.
	NOV 16	20.
	FEB 15, 1966	18.
	NOV 01	71.
	FEB 07, 1967	17.18
	FEB 15	15.
	FEB 25	21.
	NOV 19, 1968	38.3
	FEB 18, 1969	34.54
	MAY 06	33.33

1N/27E-10AAB (cont.)	NOV 18	39.53
	MAR 11, 1970	36.28
	MAY 05	38.77
	OCT 27	52.65
	FEB 23, 1971	52.14
	OCT 02	70.34
	JAN 25, 1972	66.61
	APR 25	69.17
	AUG 29	81.33
	NOV 14	84.33
	FEB 20, 1973	85.33
	MAY 22	93.04
	DEC 06	105.4
	NOV 05, 1974	118.04
	FEB 15, 1977	141.32
1N/27E-10ACA	JUL 05, 1962	23.
	MAY 07, 1963	25.72
	NOV 05	30.26
	NOV 17, 1964	36.97
	NOV 16, 1965	40.31
	FEB 15, 1966	39.28
	FEB 06, 1968	51.3
	MAY 07	54.4
	NOV 19	59.25
	FEB 18, 1969	55.6
	NOV 18	60.65
	MAR 11, 1970	57.99
1N/27E-10ADC	JAN 25, 1961	25.86
	MAY 24	23.62
	NOV 07	26.10
	APR 10, 1962	25.37
	AUG 07	25.50
	NOV 14	27.22
	FEB 05, 1963	26.77
	MAY 07	26.94
	AUG 06	31.29
	NOV 05	31.26
	MAY 05, 1964	34.01
	AUG 10	37.5
	NOV 17	37.94
	FEB 16, 1965	34.76
	May 04	34.36
	AUG 10	41.59
	NOV 16	41.32
	FEB 15, 1966	40.29
	MAY 03	43.67
	AUG 09	47.90
	NOV 01	49.49
	FEB 07, 1967	45.49
	MAY 02	47.39
	AUG 08	51.38
	NOV 07	53.09
	FEB 06, 1968	52.31

1N/27E-10ADC (cont.)	MAY 07	55.49
	AUG 06	59.67
	NOV 19	60.27
	FEB 18, 1969	57.26
	MAY 06	55.40
	AUG 12	60.30
	NOV 18	61.61
	MAR 11, 1970	59.07
	MAY 05	60.82
	AUG 04	70.31
	OCT 27	74.60
	FEB 23, 1971	74.39
	MAY 11	73.25
	OCT 02	91.01
	JAN 25, 1972	89.08
	MAY 22, 1973	113.44
	AUG 28	117.77
	DEC 06	120.39
	MAY 07, 1974	115.97
	AUG 06	117.54
	NOV 05	115.18
	FEB 11, 1975	118.78
	MAY 06	117.03
	AUG 04	116.88
	OCT 28	118.05
	DEC 02	117.91
	FEB 10, 1976	118.31
	MAY 11	117.63
	AUG 17	116.99
	DEC 04	114.54
	FEB 15, 1977	116.85
	MAY 10	116.46
	AUG 09	115.77
	DEC 07	117.59
	FEB 14, 1978	117.63
	MAY 09	116.57
	DEC 06	116.27
	MAR 13, 1979	115.56
1N/27E-10DCC	DEC 08, 1967	90.
	DEC 19, 1974	170.62
	JUN 03, 1975	172.46
	OCT 13	180.
	DEC 02	182.28
	MAR 25, 1982	236.2
1N/27E-21ACC	NOV 12, 1968	125.
	DEC 19, 1974	163.
	DEC 02, 1975	172.
	MAR 17, 1976	180.
	DEC 04	195.
	FEB 09, 1977	89.
	FEB 18	90.
	MAY 10	125.
	AUG 09	198.

1N/27E-21ACC (cont.)

DEC 07	160.
FEB 14, 1978	158.
MAY 09	151.
JUN 13	195.
DEC 06	171.
MAR 13, 1979	159.2
JUN 08	165.
JUN 09	200.
JUN 11	205.
JUN 14	212.
JUN 17	227
JUN 20	224
JUN 22	220.
JUN 27	173.
JUL 17	169.
JUL 21	207.
JUL 22	210.
JUL 24	215.
JUL 28	218.
JUL 30	217.
AUG 01	215.
AUG 03	222.
AUG 06	211.
AUG 17	173.06
AUG 26	224.
AUG 28	225.
AUG 31	226.
SEP 03	227.
SEP 05	233.
SEP 07	228.
SEP 22	181.
DEC 18	176.5
FEB 13, 1980	174.90
JUL 11	173.
JUL 12	212.
JUL 17	227.
JUL 19	231.
JUL 23	230.
JUL 25	224.
JUL 26	214.
AUG 15	179.
AUG 16	209.
AUG 19	224.
AUG 22	226.
AUG 24	232.
AUG 26	240.
AUG 28	240.
AUG 29	242.
AUG 30	245.
FEB 12, 1981	175.4
MAR 26, 1982	171.3
JUN 17	175.
AUG 09	177.
AUG 10	217.

1N/27E-21ACC (cont.)	AUG 13	235.
	AUG 16	233.
	AUG 26	229.
	AUG 28	238.
	FEB 24, 1983	174.2
	FEB 11, 1984	173.92
	JUN 21	167.3
	AUG 08	173.1
	AUG 28	174.2
1N/27E-21DDD	MAY 24, 1968	22.
	DEC 18, 1974	42.
	DEC 02, 1975	44.
	DEC 04, 1976	57.
	APR 07, 1977	167.
	AUG 17, 1979	332.49
	AUG 27, 1980	334.1
	MAR 26, 1982	182.4
	FEB 24, 1983	202.4
	FEB 11, 1984	187.10
1N/27E-23DAD	OCT 28, 1964	28.
	APR 1979	50.
	FEB 12, 1984	70.35
	JUN 21	66.73
1N/27E-24DDD*	MAY 23, 1958	+90.
	JAN 24, 1961	+25.41
	MAY 24	+30.03
	AUG 23	+30.03
	NOV 07	+27.72
	AUG 17, 1979	F
	FEB 13, 1980	F
	FEB 12, 1981	F
	MAR 27, 1982	F
	FEB 12, 1984	F
	JUN 21	F
	AUG 08	F
	AUG 28	F
1N/27E-26BCD	MAR 17, 1967	7.
	JUL 16, 1968	50.
	DEC 18, 1974	149.
	DEC 02, 1975	135.
	DEC 04, 1976	141.
	APR 06, 1977	145.
	DEC 07	135.
	DEC 06, 1978	135.
	AUG 17, 1979	190.0
	DEC 18	140.
	FEB 13, 1980	142.7
	AUG 27	154.0
	FEB 12, 1981	143.15
	DEC 07	162.8
	FEB 23, 1982	154.70

* Water levels in feet above (+) or below land surface datum.

1N/27E-26BCD (cont.)	FEB 24, 1983	152.4
	FEB 11, 1984	154.1
	JUN 21	199.7
	AUG 08	212.6
	AUG 28	214.8
1N/27E-26CBA	APR 15, 1968	40.
	DEC 18, 1974	147.07
	DEC 01, 1975	113.5
	DEC 04, 1976	118.
	DEC 07, 1977	112.
	DEC 06, 1978	113.
	AUG 17, 1979	154.1
	DEC 18	118.0
	AUG 27, 1980	122.2
	MAR 26, 1982	148.4
	FEB 11, 1984	152.37
	JUN 21	125.65
	AUG 28	202.3
1N/27E-27BDD	NOV 09, 1962	7.
	NOV 14, 1970	67.
	DEC 18, 1974	64.
	DEC 02, 1975	57.
	AUG 17, 1976	66.
	DEC 04	62.
	FEB 15, 1977	55.
	MAY 10	74.
	AUG 09	85.
	FEB 14, 1978	83.
	MAY 09	76.
	DEC 06	92
	AUG 17, 1979	89.03
	DEC 18	96.
	AUG 27, 1980	101.
	NOV 03, 1981	95.0
	FEB 24, 1983	110.12
	FEB 11, 1984	112.94
	JUN 21	109.25
	AUG 28	114.38
1N/28E-28BAA	JUL 13, 1953	0.
	MAY 13, 1960	5.5
	AUG 31	9.5
	JAN 24, 1961	5.5
	MAY 24	10.5
	AUG 23	16.5
	NOV 07	9.5
	APR 10, 1962	5.5
	AUG 07	8.5
	NOV 14	8.5
	FEB 05, 1963	5.5
	MAY 07	4.5
	AUG 06	5.5
	NOV 05	5.

1N/28E-28BAA (cont.)

MAY 05, 1964	3.5
AUG 10	9.5
NOV 17	9.
FEB 16, 1965	7.
MAY 04	6.
AUG 10	13.
NOV 16	7.
FEB 05, 1966	6.5
MAY 03	4.5
AUG 09	6.95
NOV 01	6.35
FEB 07, 1967	4.97
MAY 02	4.01
AUG 08	12.86
NOV 07	13.30
FEB 06, 1968	13.53
MAY 07	30.14
AUG 06	34.15
NOV 19	22.72
FEB 18, 1969	18.19
MAY 06	15.58
NOV 18	26.52
MAR 11, 1970	18.69
MAY 05	25.84
AUG 04	21.12
OCT 27	19.18
FEB 23, 1971	15.51
MAY 11	11.46
JAN 25, 1972	22.65
APR 25	20.85
NOV 14	34.01
FEB 20, 1973	24.38
MAY 22	28.48
DEC 06	28.09
AUG 06, 1974	27.91
NOV 05	31.73
DEC 18	26.13
FEB 11, 1975	23.47
MAY 06	20.57
AUG 04	24.27
OCT 28	27.19
DEC 02	25.28
FEB 10, 1976	21.94
MAY 11	21.47
AUG 17	32.05
DEC 04	25.87
FEB 15, 1977	21.38
MAY 10	29.37
AUG 09	35.62
DEC 07	34.43
FEB 14, 1978	30.78
MAY 09	26.85
DEC 06	38.24
MAR 13, 1979	33.60
AUG 24	36.67

1N/28E-28BAA (cont.)	DEC 18	35.95
	FEB 13, 1980	32.6
	AUG 27	31.19
	FEB 12, 1981	26.45
	DEC 07	32.91
	FEB 22, 1982	28.98
	FEB 24, 1983	27.90
	FEB 12, 1984	28.97
	JUN 21	29.55
	AUG 08	36.23
	AUG 28	40.87
1N/28E-28BBC*	MAR 05, 1953	+23.1
	MAR 07, 1958	3.07
	MAY 13, 1960	+0.61
	AUG 31	5.42
	JAN 24, 1961	1.02
	MAY 24	4.87
	AUG 23	6.99
	NOV 07	6.68
	APR 10, 1962	1.63
	AUG 07	4.90
	NOV 14	4.51
	FEB 05, 1963	2.04
	MAY 07	0.68
	AUG 06	2.
	NOV 05	1.45
	MAY 05, 1964	0.63
	AUG 10	4.32
	NOV 17	4.69
	FEB 16, 1965	2.30
	MAY 04	1.29
	AUG 10	10.40
	NOV 16	2.43
	FEB 15, 1966	1.65
	MAY 03	0.61
	AUG 09	3.36
	NOV 01	2.81
	FEB 07, 1967	1.43
	MAY 02	0.47
	AUG 08	10.39
	NOV 07	9.92
	FEB 06, 1968	10.16
	AUG 06	30.55
	NOV 19	19.31
	FEB 18, 1969	15.10
	MAY 06	12.23
	AUG 12	30.92
	NOV 18	23.65
	MAR 11, 1970	15.81

* Water levels in feet above (+) or below land surface datum.

1N/28E-28BBC (cont.)	AUG 04	18.
	OCT 27	16.08
	FEB 23, 1971	11.98
	OCT 02	26.
	JAN 25, 1972	18.82
	APR 25	16.
	NOV 14	29.48
	FEB 20, 1973	21.63
	MAY 22	24.20
	AUG 28	38.27
	DEC 06	20.65
	MAY 07, 1974	26.74
	AUG 06	22.19
	NOV 05	26.88
	DEC 18	22.69
	FEB 11, 1975	21.17
	MAY 06	17.36
	OCT 28	22.44
	DEC 02	19.81
	FEB 10, 1976	18.29
	MAY 11	16.08
	AUG 17	28.60
	DEC 04	20.1
	FEB 15, 1977	18.22
	MAY 10	26.46
	AUG 09	32.76
	DEC 07	31.15
	FEB 14, 1978	27.33
	MAY 09	23.67
	DEC 06	34.56
	MAR 13, 1979	30.40
	DEC 18	31.61
	AUG 27, 1980	30.9
	FEB 24, 1983	24.67
	FEB 12, 1984	30.23
	JUN 21	25.9
	AUG 08	40.79
	AUG 28	36.69
2N/26E-3BCC	MAR 01, 1972	376.
	AUG 14	428.
	MAR 03, 1976	396.01
	AUG 17	427.30
	DEC 06	412.04
	FEB 15, 1977	399.42
	MAY 10	413.
	DEC 06	398.44
	FEB 14, 1978	380.93
	MAY 09	381.15
	DEC 05	428.23
	MAR 13, 1979	413.33
	AUG 14	437.29
	DEC 20	434.19
	FEB 12, 1980	427.3
	AUG 26	434.1

2N/26E-3BCC (cont.)	DEC 13	440.16
	FEB 11, 1981	432.05
	DEC 08	448.04
	FEB 23, 1982	437.18
	FEB 05, 1983	437.73
	JAN 27, 1984	439.82
	FEB 08	436.69
	MAR 07	434.63
	MAR 22	433.36
	APR 03	431.79
	APR 16	428.62
	MAY 08	429.61
	JUN 19	443.17
	JUL 23	446.70
	AUG 22	450.22
2N/26E-6ACC	FEB 04, 1970	181.
	MAY 19	208.
	APR 02, 1971	185.
	AUG 26	431.9
	DEC 02	195.25
	DEC 06, 1972	216.63
	DEC 07, 1973	224.2
	DEC 09, 1975	240.94
	DEC 06, 1976	243.89
	DEC 06, 1977	255.75
	DEC 07, 1978	263.7
	DEC 20	266.13
	FEB 11, 1981	265.27
	FEB 23, 1982	270.15
	FEB 05, 1983	272.18
	FEB 08, 1984	271.75
	JUN 28	273.43
	AUG 07	274.69
	AUG 28	275.00
2N/26E-10CDB	FEB 14, 1971	154.
	OCT 08	309.
	MAR 15, 1976	335.67
2N/26E-11CDD	DEC 02, 1971	154.13
	DEC 06, 1972	249.30
	DEC 07, 1973	265.42
	DEC 09, 1975	291.78
	MAR 15, 1976	281.60
	DEC 06	300.17
	FEB 15, 1977	291.20
	MAY 10	318.63
	DEC 06	320.03
	FEB 14, 1978	304.68
	MAY 09	311.51
	DEC 05	318.84
	MAR 13, 1979	298.67
	AUG 14	333.15
	DEC 20	318.06

2N/26E-11CDD (cont.)	FEB 12, 1980	308.83
	AUG 26	339.2
	DEC 13	322.13
	DEC 08, 1981	330.80
	FEB 23, 1982	316.75
	FEB 05, 1983	326.31
	FEB 08, 1984	322.43
2N/26E-15ACC	DEC 02, 1971	272.42
	MAY 11, 1972	247.0
	JUN 11, 1980	370.54
	FEB 09, 1984	331.4
2N/26E-17ABA	SEP 15, 1969	171.
	APR 02, 1971	161.
	NOV 23	280.
	SEP 10, 1973	352.
	AUG 10, 1979	296.78
	FEB 05, 1980	335.
	FEB 08, 1983	350.91
2N/26E-18DAA	JUL 22, 1970	205.
	AUG 27	220.60
	DEC 04	183.57
	FEB 23, 1971	162.81
	NOV 23	275.
	DEC 02	266.15
	DEC 06	260.31
	DEC 27	253.
	JAN 25, 1972	239.91
	MAR 01	239.43
	APR 24	262.42
	OCT 03	321.29
	NOV 06	360.
	DEC 06	287.34
	DEC 13, 1973	295.89
	DEC 17, 1974	310.
	JUN 03, 1975	335.50
	MAR 09, 1976	311.74
	JUN 08	340.10
	AUG 17	357.12
	DEC 06	329.14
	FEB 15, 1977	320.19
	DEC 05, 1978	389.
	AUG 09, 1979	439.44
	DEC 20	395.
	FEB 04, 1980	334.5
	FEB 12	343.88
	FEB 11, 1981	346.07
	DEC 08	373.50
	FEB 23, 1982	349.06
	FEB 08, 1983	353.94
	FEB 08, 1984	355.18
	MAY 08	361.73
	JUN 18	378.18

2N/26E-20DBB	JUL 18, 1967	166.
	SEP 06	168.6
	NOV 20	328.
	MAY 26, 1968	167.
	JUN 07	166.
	JUL 05	165.
	AUG 23	165.
	SEP 13	166.
	DEC 17	239.45
	FEB 19, 1969	206.71
	MAR 10, 1970	212.49
	APR 02, 1971	281.3
	NOV 23	325.
	DEC 02	324.
	DEC 28	328.
	SEP 1972	358.
	AUG 10, 1979	525.7
	DEC 20	455.3
	AUG 25, 1980	526.4
	MAR 26, 1982	453.5
	FEB 08, 1983	419.50
	FEB 08, 1984	456.40
	APR 16	489.9
	MAY 08	459.9
	JUN 18	514.2
2N/26E-23CAD	FEB 16, 1971	217.
	FEB 20	223.
	AUG 25	324.5
	SEP 22	301.
	DEC 02	320.
	DEC 22	299.
	FEB 08, 1984	405.29
2N/26E-28CDD	DEC 23, 1968	270.
	AUG 26, 1971	385.2
	DEC 06	394.96
	JAN 26, 1972	383.17
	APR 24	384.5
	DEC 05	429.49
	MAY 30, 1973	431.3
	DEC 13	455.94
	FEB 05, 1983	DRY
2N/26E-29CCD	MAY 10, 1968	277.
	MAR 20, 1971	233.
	NOV 30	375.
	DEC 02	375.
	MAY 29, 1972	267.
	MAY 30	330.
	JUN 28	390.97
	DEC 05	401.71
	MAY 30, 1973	414.40
	DEC 13	419.08
	DEC 17, 1974	428.33

2N/26E-29CCD (cont.)	DEC 09, 1975	447.35
	AUG 17, 1976	472.86
	DEC 06	454.93
	FEB 15, 1977	446.02
	MAY 10	472.05
	AUG 09	491.66
	DEC 06	476.00
	FEB 14, 1978	458.27
	MAY 09	468.82
	DEC 05	474.13
	MAR 13, 1979	453.78
	AUG 14	490.86
	DEC 19	473.48
	FEB 12, 1980	464.22
	AUG 27	496.0
	FEB 10, 1981	465.6
	DEC 08	486.5
	FEB 23, 1982	471.85
	FEB 05, 1983	477.35
	JAN 05, 1984	482.25
	FEB 08	476.58
	APR 16	475.30
	MAY 08	478.30
	AUG 22	496.82
2N/27E-1BDD*	1952	327.
	FEB 01, 1960	334.
	MAR 16, 1961	7.
	APR 09	+6.93
	MAY 25	63.92
	AUG 23	282.
	NOV 07	24.31
	FEB 06, 1962	F**
	APR 10	F
	APR 25	3.25
	JUL 03	322.
	AUG 07	69.59
	NOV 14	21.36
	FEB 05, 1963	+0.57
	MAY 07	14.67
	JUN 21	132.
	JUN 27	110.
	JUN 29	100.
	JUL 10	112.
	JUL 21	115.
	AUG 06	299.00
	NOV 05	32.89
	MAY 05, 1964	90.08
	NOV 17	48.06
	FEB 16, 1965	18.50

* Water levels in feet above (+) or below land surface datum.
** F indicates well flowing

2N/27E-1BDD (cont.)	MAY 04	94.73
	NOV 16	55.32
	FEB 15, 1966	26.44
	NOV 01	68.90
	FEB 07, 1967	34.70
	MAY 02	121.64
	FEB 06, 1968	55.43
	NOV 19	109.68
	FEB 18, 1969	73.68
	MAR 11	66.13
	MAY 06	88.45
	AUG 12	191.55
	NOV 18	114.90
	MAR 11, 1970	77.13
	MAY 05	140.92
	AUG 04	190.60
	OCT 27	148.17
	FEB 23, 1971	103.17
	AUG 09	205.20
	OCT 02	193.15
	DEC 10	180.47
	JAN 25, 1972	154.50
	FEB 05	196.88
	AUG 28	229.10
	NOV 14	210.25
	DEC 05	196.88
	FEB 20, 1973	177.98
	MAY 29	327.80
	MAY 30	330.40
	AUG 28	347.99
	DEC 12	257.85
	DEC 19, 1974	258.07
	FEB 11, 1975	225.75
	MAY 06	336.73
	JUL 10	381.60
	OCT 28	304.72
	DEC 02	275.19
	FEB 10, 1976	238.20
	MAY 11	362.32
	AUG 17	385.47
	DEC 02	265.42
	FEB 15, 1977	241.53
	AUG 15, 1979	373.54
	FEB 13, 1980	339.10
	APR 13	417.7
	FEB 10, 1981	348.45
	JUL 02, 1984	465.09
2N/27E-2DAA1	MAY 12, 1957	F
	JAN 12, 1961	F
	JAN 26	+4.6
	FEB 01	+9.24
	FEB 20, 1962	F
	APR 07	+11.55
	MAR 15, 1963	4.
	JUN 15	9.3
	JUN 20	12.

2N/27E-2DAA1 (cont.)	APR 01, 1964	17.
	FEB 11, 1975	240.8
	JUN 22, 1978	322.6
	DEC 07	382.41
	DEC 18, 1979	399.39
	DEC 04, 1981	405.80
	FEB 24, 1982	389.92
2N/27E-2DAA2	AUG 15, 1979	430.8
	DEC 18	405.
	FEB 24, 1982	403.4
	FEB 07, 1983	419.0
	FEB 13, 1984	402.2
2N/27E-7AAB	JAN 07, 1971	352.
	JAN 27	338.
	APR 02	338.5
	APR 16	430.
	AUG 25	450.
	FEB 25, 1982	505.66
	FEB 09, 1983	505.00
	JUL 26	513.
	FEB 11, 1984	494.4
	APR 17	589.1
	MAY 08	599.5
	JUN 22	636.5
	JUL 26	677.0
	AUG 08	657.3
	AUG 27	638.8
2N/27E-8DAB	OCT 28, 1969	370.
	JAN 09, 1970	370.
	APR 17	340.
	JUN 11	371.
	FEB 06, 1977	495.8
2N/27E-11ADD	NOV 07, 1961	61.85
	APR 10, 1962	24.75
	AUG 07	89.20
	NOV 14	57.93
	FEB 05, 1963	35.45
	MAY 07	50.49
	AUG 06	94.34
	NOV 05	67.76
	MAY 05, 1964	67.54
	FEB 16, 1965	50.68
	MAY 04	74.12
	FEB 15, 1966	58.00
	FEB 07, 1967	61.75
	MAY 02	88.40
	AUG 08	110.96
	NOV 07	115.43
	FEB 06, 1968	88.62
	MAY 07	121.89
	AUG 06	145.55

2N/27E-11ADD (cont.)	NOV 19	147.80
	FEB 18, 1969	103.95
	MAY 06	119.37
	AUG 12	165.16
	NOV 18	148.08
	MAR 11, 1970	104.07
	MAY 05	135.60
	AUG 04	158.84
	OCT 27	172.16
	FEB 23, 1971	118.90
	OCT 02	186.91
	JAN 25, 1972	183.80
	APR 25	188.02
	MAY 29, 1973	276.50
	AUG 28	302.77
	DEC 12	288.08
	AUG 06, 1974	306.57
	NOV 05	309.94
	DEC 19	298.94
	FEB 11, 1975	262.32
	MAY 06	308.40
	JUL 10	333.80
	OCT 28	334.19
	DEC 02	303.87
	FEB 10, 1976	272.44
	MAY 11	323.45
	AUG 17	347.93
	DEC 04	293.86
	FEB 15, 1977	274.94
	MAY 10	331.52
	AUG 9	360.80
	DEC 08	328.80
	FEB 15, 1978	293.39
	MAY 09	322.07
	DEC 07	335.13
	MAR 13, 1979	309.72
	FEB 13, 1984	341.27
	APR 17	345.34
	MAY 08	338.06
	JUN 22	366.00
2N/27E-12BBB	SEP 17, 1959	63.
	JAN 25, 1961	14.35
	MAY 25	49.70
	AUG 23	100.10
	NOV 07	48.
	APR 10, 1962	11.24
	NOV 14	44.38
	FEB 05, 1963	22.25
	NOV 05	55.88
	MAY 05, 1964	61.50
	NOV 17	71.13
	FEB 16, 1965	40.84
	FEB 15, 1966	48.21
	FEB 07, 1967	56.83

2N/27E-12BBB (cont.)	FEB 18, 1969	96.79
	MAR 12	58.85
	NOV 18	138.2
	MAY 05, 1970	135.31
	OCT 27	174.84
	FEB 23, 1971	126.24
	JAN 25, 1972	162.77
	APR 25	186.15
	NOV 14	188.08
	MAY 29, 1973	312.
	MAY 30	335.
	FEB 11, 1975	363.
	DEC 02, 1975	382.
	FEB 10	370.
	FEB 15, 1977	350.
	DEC 07, 1978	340.
	MAR 13, 1979	337.
	AUG 15	408.0
	FEB 10, 1981	360.
	FEB 13, 1984	366.9
2N/27E-12BDB	AUG 15, 1979	43.05
2N/27E-14CCB	JAN 17, 1952	45.
	JAN 25, 1961	88.6
	SEP 26, 1968	200.
	NOV 03	203.
	NOV 18	207.
	FEB 18, 1969	176.5
	MAR 12	169.0
	NOV 18	218.5
	MAR 11, 1970	176.5
	FEB 23, 1971	204.
	FEB 20, 1973	267.5
	NOV 05, 1975	355.
	DEC 07, 1978	388.
	FEB 12, 1984	392.21
	JUN 29	400.54
	AUG 08	410.74
	AUG 27	413.88
2N/27E-20CAA	JUN 30, 1968	385.
	MAR 13, 1969	376.
	FEB 10, 1981	596.4
	DEC 08	659.4
	FEB 25, 1982	604.
	FEB 08, 1983	618.5
	FEB 08, 1984	604.5
	APR 16	643.2
	MAY 07	688.8
	AUG 08	654.8
	AUG 27	661.7
2N/27E-22BBD	FEB 23, 1968	171.
	AUG 27, 1980	430.
	MAR 24, 1982	366.1

2N/27E-26CBD	AUG 29, 1962	86.
	NOV 14	87.45
	FEB 05, 1963	88.1
	JUL 10	89.95
	NOV 05	91.91
	AUG 10, 1964	97.51
	NOV 17	104.07
	FEB 16, 1965	98.25
	NOV 16	103.31
	FEB 15, 1966	101.95
	MAY 03	105.79
	FEB 07, 1967	108.37
	NOV 07	113.7
	FEB 06, 1968	111.93
	NOV 19	121.92
	FEB 19, 1969	118.98
	MAR 13	118.36
	AUG 12	122.77
	NOV 18	124.62
	MAR 11, 1970	122.82
	OCT 27	139.52
	FEB 23, 1971	137.03
	JAN 25, 1972	155.1
	DEC 05	173.87
	MAR 24, 1982	273.2
	FEB 12, 1984	284.05
2N/27E-27BCC1	JAN 07, 1957	50.
	JAN 25, 1961	46.5
	MAY 24	140.5
	AUG 23	86.5
	NOV 07	65.5
	APR 10, 1962	78.5
	AUG 07	89.5
	NOV 14	63.5
	FEB 05, 1963	43.5
	MAY 07	63.5
	AUG 06	178.5
	NOV 05	63.5
	MAY 05, 1964	175.
	AUG 10	183.5
	NOV 17	103.5
	FEB 16, 1965	77.31
	MAY 04	102.37
	NOV 16	86.44
	FEB 15, 1966	74.32
	MAY 03	117.27
	NOV 01	132.67
	FEB 07, 1967	132.56
	AUG 08	129.61
	NOV 07	122.77
	FEB 06, 1968	110.12
	NOV 19	151.92
	FEB 18, 1969	129.6
	MAR 11	122.85

2N/27E-27BCC1	MAR 18	125.
	MAR 24, 1982	132.8
	FEB 24, 1983	134.20
	FEB 12, 1984	131.50
	APR 17	127.14
	MAY 08	125.00
	JUN 26	137.37
	AUG 07	134.66
	AUG 27	142.01
2N/27E-27CBC	SEP 21, 1967	85.
	FEB 06, 1968	77.03
	AUG 06	81.42
	NOV 19	81.72
	FEB 18, 1969	80.76
	MAY 06	81.63
	AUG 12	81.59
	NOV 18	81.95
	MAR 11, 1970	80.57
	MAY 05	80.88
	AUG 04	81.12
	OCT 27	83.06
	FEB 23, 1971	81.
	JAN 25, 1972	85.93
	MAY 06, 1975	118.24
	OCT 28	139.09
	DEC 02	133.04
	FEB 10, 1976	126.14
	DEC 04	131.15
	MAY 10, 1977	137.10
	DEC 08	141.45
	DEC 07, 1978	139.27
	MAR 25, 1982	144.3
	FEB 12, 1984	147.33
2N/27E-28ADD	JUN 17, 1953	44.
	JUL 21	53.
	AUG 25	57.
	SEP 23	70.
	OCT 22	73.
	DEC 17	35.
	JAN 21, 1954	25.
	MAR 01	17.
	MAR 29	14.
	MAY 11	38.
	JUN 02	60.
	JUL 07	62.
	APR 27, 1955	67.
	JUN 14	63.
	SEP 19	85.
	DEC 09	66.
	APR 14, 1956	85.
	DEC 01	67.
	NOV 16, 1957	78.
	MAR 07, 1958	57.

2N/27E-28ADD (cont.)	JUL 31	90.
	JAN 11, 1960	83.
	OCT 10	97.
	JAN 09, 1961	73.
	JAN 25	59.
	MAR 28	44.
	MAY 25	65.
	AUG 23	71.
	NOV 07	73.
	JAN 03, 1962	50.
	APR 10	66.
	AUG 10	122.05
2N/27E-32DBA	SEP 13, 1969	158.
	APR 01, 1971	182.
	AUG 25	264.
	JAN 26, 1972	184.33
	NOV 06	276.
	DEC 05	254.
	DEC 06, 1973	272.
	DEC 18, 1974	292.
	DEC 06, 1977	280.2
	DEC 06, 1978	287.
	AUG 08, 1979	319.
	DEC 06	288.68
	DEC 19	295.06
	FEB 13, 1980	295.91
	AUG 27	343.8
	FEB 12, 1981	302.9
	FEB 26, 1982	309.77
	FEB 05, 1983	315.63
	FEB 10, 1984	321.70
	JUN 26	378.73
	JUL 24	386.96
2N/28E-7AAD1	JAN 03, 1966	90.
	MAR 11, 1969	116.85
	MAY 06	137.02
	AUG 12	185.77
	NOV 18	163.93
	MAR 11, 1970	125.68
	MAY 05	160.68
	AUG 04	190.60
	OCT 27	197.91
	FEB 23, 1971	153.76
	NOV 06, 1972	329.5
	FEB 20, 1973	222.39
	MAY 28	344.0
	MAY 30	344.50
	AUG 06, 1974	359.12
	NOV 05	341.58
	DEC 19	298.88
	MAY 06, 1975	357.36
	JUL 10	395.20
	OCT 28	382.51

2N/28E-7AAD1 (cont.)	DEC 02	344.17
	FEB 10, 1976	287.17
	MAY 11	383.13
	AUG 17	407.11
	DEC 04	306.31
	FEB 15, 1977	290.87
	MAY 10	389.77
	AUG 9	424.29
	DEC 08	333.02
	FEB 15, 1978	309.30
	DEC 07	350.85
	MAR 13, 1979	328.36
	AUG 15	364.00
	DEC 18	357.15
	FEB 13, 1980	344.25
	FEB 10, 1981	345.2
	FEB 25, 1982	354.5
	FEB 07, 1983	366.10
	JUL 22	377.25
2N/28E-7AAD2	MAY 06, 1966	90.0
	JUL 23, 1968	155.00
2N/28E-17CCA	AUG 15, 1979	110.71
	AUG 21, 1980	108.1
3N/27E-25DDC	JUL 17, 1960	240.
	MAY 25, 1961	259.
	NOV 07	267.
	APR 10, 1962	259.
	NOV 14	272.
	FEB 05, 1963	271.
	MAY 07	266.
	NOV 19, 1968	247.
	FEB 18, 1969	235.
	MAY 06	237.
	AUG 12	260.
	NOV 18	255.5
	MAR 11, 1970	240.
	MAY 05	240.5
	AUG 04	264.
	OCT 27	264.5
	FEB 23, 1971	246.5
	OCT 02	272.5
	JAN 25, 1972	255.
	APR 25	250.
	FEB 20, 1973	255.
	DEC 06	278.
	MAY 06, 1975	295.
	OCT 28	281.
	DEC 02	269.
	FEB 10, 1976	260.
	MAY 11	338.5
	DEC 04	274.0
	MAY 09, 1978	267.0
	DEC 07	301.0

3N/27E-36ADD

JAN 26, 1961	104.08
MAY 25	104.24
APR 10, 1962	108.52
AUG 07	105.23
NOV 14	109.99
FEB 05, 1963	104.69
MAY 07	104.47
AUG 06	106.82
NOV 05	104.74
MAY 05, 1964	105.02
AUG 10	110.54
NOV 17	107.18
FEB 16, 1965	104.75
MAY 04	105.20
AUG 10	111.99
NOV 16	105.45
FEB 15, 1966	105.38
MAY 03	105.90
AUG 09	105.16
NOV 01	105.61
FEB 07, 1967	105.50
MAY 02	104.94
AUG 08	105.19
NOV 07	105.44
FEB 06, 1968	105.94
MAY 07	105.44
AUG 06	106.65
NOV 19	105.67
FEB 18, 1969	106.53
MAY 06	105.13
AUG 12	105.85
NOV 18	105.70
MAR 11, 1970	105.04
MAY 05	105.22
AUG 04	105.53
OCT 27	107.47
FEB 23, 1971	106.27
AUG 09	108.76
OCT 02	108.50
JAN 25, 1972	108.02
APR 25	110.72
AUG 29	114.52
NOV 14	112.44
FEB 20, 1973	111.10
MAY 22	108.47
AUG 28	108.38
DEC 06	108.65
MAY 07, 1974	108.89
AUG 06	107.71
NOV 05	111.28
FEB 11, 1975	108.61
MAY 06	110.75
AUG 05	108.91
OCT 28	109.62
FEB 10, 1976	110.19

3N/27E-36ADD	MAY 11	110.47
	AUG 17	110.44
	DEC 04	109.30
	FEB 16, 1977	110.51
	MAY 11	110.09
	AUG 10	112.84
	DEC 08	110.82
	FEB 15, 1978	110.41
	MAY 09	110.88
	DEC 07	112.21
3N/28E-6DCC	APR 01, 1968	178.
	DEC 05, 1972	265.47
	DEC 05, 1973	283.4
	DEC 03, 1975	282.5
	FEB 23, 1983	232.00
	JUL 26	350.95
	FEB 14, 1984	301.67
	JUN 20	291.57
	AUG 27	367.85
3N/28E-8DAC	MAR 07, 1966	70.0
	JAN 04, 1967	72.0
	FEB 06	75.48
	MAY 02	69.59
	NOV 07	79.03
	FEB 06, 1968	75.39
	NOV 19	93.11
	FEB 18, 1969	88.57
	MAY 06	87.80
	NOV 18	83.18
	MAR 11, 1970	80.14
	MAY 05	73.25
	AUG 04	70.64
	OCT 27	71.64
	FEB 23, 1971	74.07
	NOV 14, 1972	69.00
	FEB 20, 1973	74.75
	MAY 22	73.66
	AUG 28	75.25
	DEC 06	76.51
	MAY 07, 1974	70.50
	AUG 06	64.83
	NOV 05, 1974	65.23
	FEB 11, 1975	68.88
	MAY 06	68.67
	AUG 05	64.98
	OCT 28	66.03
	DEC 03	66.95
	FEB 10, 1976	69.37
	MAY 11	67.06
	AUG 17	65.54
	DEC 04	67.37
	FEB 16, 1977	70.52
	MAY 11	70.44

3N/28E-8DAC (cont.)	AUG 10	71.50
	DEC 07	73.59
	FEB 15, 1978	72.64
	MAY 10	69.89
	NOV 30	68.40
	MAR 14, 1979	71.63
	FEB 13, 1984	72.10
	APR 17	78.74
	MAY 08	68.02
	JUN 20	67.35
	AUG 09	76.07
	AUG 27	70.79
3N/28E-18ABD	DEC 20, 1968	232.
	AUG 14, 1979	341.1
	FEB 13, 1980	281.8
	FEB 24, 1982	316.9
	FEB 23, 1983	217.10
	JUL 26	340.
	FEB 13, 1984	259.05
	APR 17	277.6
	MAY 07	281.1
	JUN 20	289.1
	AUG 09	307.6
	AUG 22	312.1
3N/28E-18DBD	JAN 01, 1956	60.0
	APR 11, 1962	125.
	AUG 07	130.
	NOV 14	128.5
	FEB 05, 1963	114.
	MAY 07	113.5
	AUG 06	125.
	MAY 05, 1964	116.5
	FEB 23, 1983	65.00
	FEB 13, 1984	71.50
	JUN 20	65.33
	AUG 09	70.41
	AUG 27	72.17
3N/28E-28ADA	APR 03, 1968	275.
	DEC 10, 1971	301.86
	DEC 05, 1972	305.56
	DEC 12, 1973	307.69
	DEC 19, 1974	311.9
	FEB 10, 1976	308.41
	DEC 13, 1978	343.66
	DEC 15, 1979	355.2
	MAR 11, 1980	338.5
	AUG 21	363.6
	FEB 10, 1981	352.25
	MAY 04, 1982	360.
	FEB 07, 1983	361.
	JUL 21	441.
	FEB 13, 1984	357.9
	APR 17	351.0
	May 08	402.4

3N/28E-28CAB	MAR 02, 1967	280.
	NOV 07	295.
	FEB 06, 1968	286.
	MAY 07	290.5
	AUG 06	304.5
	NOV 19	305.5
	FEB 18, 1969	293.5
	MAY 06	305.5
	AUG 12	328.
	NOV 18	484.5
	MAR 11, 1970	307.5
	OCT 27	333.
	FEB 23, 1971	315.5
	AUG 09	336.
	AUG 23	343.
	OCT 02	335.
	DEC 10	329.
	JAN 25, 1972	326.
	NOV 14	336.
	FEB 20, 1973	324.
	DEC 06	342.
	FEB 11, 1975	335.
	MAY 06	350.
	AUG 05	371.
	SEP 16	356.
	DEC 02	350.
	FEB 10, 1976	328.66
4N/28E-7ACC	SEP 15, 1972	19.
	AUG 13, 1979	72.57
	FEB 23, 1983	63.80
4N/28E-8DCB	JUL 29, 1968	60.
	JUL 05, 1973	80.7
	AUG 13, 1979	129.55
	FEB 11, 1980	56.35
	FEB 23, 1983	51.95
	FEB 14, 1984	59.24
	APR 17	78.99
	MAY 10	88.20
	JUN 19	114.42
	AUG 13	142.97
	AUG 29	143.20
4N/28E-8DDC	AUG 26, 1968	38.
	FEB 23, 1983	44.20
	FEB 14, 1984	42.91
4N/28E-16ABB	FEB 14, 1984	91.53
	AUG 13	80.48
	AUG 29	80.87
4N/28E-16BAB	JAN 27, 1978	125.
	AUG 13, 1979	160.82

4N/28E-17ABD1	DEC 30, 1972	44.
	AUG 14, 1980	130.7
	AUG 29, 1984	140.79
4N/28E-17ABD2	DEC 16, 1977	52.
	FEB 23, 1983	52.55
	FEB 09, 1984	55.0
4N/28E-18CAB	MAR 07, 1972	50.43
	NOV 16	51.22
	DEC 05, 1973	55.72
	JAN 08, 1975	55.71
	DEC 03	55.87
	DEC 05	55.72
	DEC 02, 1976	57.12
	FEB 14, 1977	56.98
	MAY 09	55.89
	DEC 01	58.77
	DEC 15, 1978	55.90
4N/28E-27BBB	JUN 19, 1984	227.20
	JUL 23	242.89
	AUG 22	247.43
	AUG 31	243.23
	SEP 07	241.48
4N/28E-30DDD	JUN 28, 1967	132.
4N/28E-31ACA	FEB 19, 1968	40.
	AUG 13, 1979	48.88
	FEB 23, 1983	42.20
	FEB 13, 1984	44.62
	JUN 22	113.90
	AUG 09	47.56
	AUG 27	143.69
4N/28E-32ACB	APR 28, 1967	39.
	FEB 08, 1984	39.05
	JUN 28	43.82
	AUG 13	48.02
	AUG 27	47.59
5N/28E-17CBA	FEB 28, 1979	16.05
	JUL 24	79.6
	FEB 11, 1980	23.6
	FEB 25, 1982	14.9
	FEB 09, 1983	15.
	FEB 15, 1984	11.4
	JUN 27	14.9
	AUG 29	11.4

5N/28E-19AAA	NOV 19, 1947	115.
	MAY 01, 1954	130.
	MAY 14, 1971	174.
	JUN 14	180.
	JUL 14	192.
	AUG 14	242.
	SEP 14	260.
	OCT 14	179.
	NOV 14	160.
	DEC 14	156.
	JUL 14, 1977	195.
	AUG 14	194.
	SEP 14	177.
	OCT 14	152.
	NOV 14	145.
	DEC 14	140.
	JAN 14, 1978	139.
	FEB 14, 1978	135.5
	FEB 28, 1979	210.
	JUL 24	285.21
	FEB 09, 1983	134.00
	FEB 15, 1984	128.10
	JUN 27	127.0
	AUG 29	128.1
5N/28E-21CCB	FEB 15, 1984	4.1
	JUN 27	14.34
	AUG 13	69.95
5N/28E-21CDC	AUG 08, 1979	20.66
	FEB 14, 1984	3.45
	JUN 27	22.25
	AUG 13	3.83
	AUG 29	4.92
5N/28E-32BDC	JAN 10, 1977	135.
	JAN 18, 1978	105.
	AUG 09, 1979	168.55
	FEB 12, 1980	165.
	FEB 25, 1982	158.9
	FEB 09, 1984	125.85
	APR 17	127.80
	MAY 07	129.14
	JUN 19	129.04
	AUG 13	129.19
	AUG 29	129.08
5N/28E-32DCA	FEB 09, 1984	58.15
	APR 17	59.64
	MAY 07	58.18
	JUN 19	46.39
	AUG 13	45.68
	AUG 29	45.36
5N/28E-33ADB	MAR 11, 1969	100.
	AUG 09, 1979	119.31

APPENDIX VII

PUMPAGE DATA

TABLE 8 Ground Water Pumpage in Acre-feet for The Proposed Butter Creek Critical Ground Water Area

Priority Number	Subarea*	Well Location	Owner	1976	1977	1978	1979	1980	1981	1982	1983
1	B	2N/27E-34BDC	Graham								
2	N	4N/28E-16ABB	Mikami	Domestic only							
3	B	2N/27E-14CCB	McCarty								
4	B	2N/27E-27BCC	Correa				20.	20.	20.		Domestic
5	B	2N/27E-28ADD	Mader			59.	80.	80.	69.	100.	71.
6	B	1N/27E-10AAB	Wattenburger				107.	107.	122.	0.	0.
7	S	1N/26E-29BDD	Kilkenny								
8	B	2N/27E-14CCB	McCarty								Domestic
9	H	1N/26E-18DDD2	Rauch		0.4	5.	6.	6.	10.	8.	5.
10	B	2N/27E-1BAD	O'Kane								Unused
10	B	2N/27E-2DAA1	O'Kane			453.	763.	385.	134.	97.	0.
10	B	2N/27E-2DAA2	O'Kane								
11	S	1S/26E-1DCD	Cutsforth		421.	226.	173.	154.	154.	153.	52.
12	S	1N/27E-24DDD	Vey				89.	89.	89.	56.	0.
13	S	1S/28E-28BAA	Vey	22.	95.	253.	52.	42.	47.	27.	46.
13	S	1S/28E-28BBC	Vey	29.	230.	53.	146.	63.	195.	170.	272.
14	B	2N/27E-12BBB	Hale	558.	0.	0.	1064.	916.	273.	335.	253.
15	B	3N/28E-18DBD	Horn	265.	97.	429.	9.	9.	12.	0.	0.
16	B	3N/27E-25DDC	Saylor	400.	413.	325.	235.	203.	264.	202.	134.
17	B	1N/27E-10ACA	Wattenburger	47.	14.	14.	108.	0.	127.	0.	0.
18	B	2N/27E-26CBD	Hawkins	756.	627.	640.	337.	510.	483.	413.	369.
19	S	1N/26E-26CAB	Turner		215.	154.	158.	112.	158.	158.	158.
20	B	1N/27E-3DBB	Wattenburger	65.	315.			195.	195.	91.	197. 127.
21	N	5N/28E-19AAA	Umatilla	377.	263.	182.	200.	200.	128.	66.	51.
22	N	4N/28E-10CCA	Hermiston Medical Center								
23	S	1S/26E-1DCD	Cutsforth								
24	S	1N/27E-23DAD	Britt			176.	216.	216.	185.	118.	123.

TABLE 8 Ground Water Pumpage in Acre-feet for The Proposed Butter Creek Critical Ground Water Area (Continued)

Priority Number	Subarea*	Well Location	Owner	1976	1977	1978	1979	1980	1981	1982	1983
25	B	2N/27E-27BCC	Correa								
26	S	1S/26E-9DBD	Cutsforth								Domestic
27	B	1N/27E-3DBB	Wattenburger								
28	B	1N/27E-10DCC	Ashbeck	80.	192.	192.	109.	109.	39.	74.	69.
29	N	4N/28E-30DDD	Lewis						81.	362.	128.
30	N	4N/28E-32ACB	Mueller								
31	B	2N/27E-22BBD	McCarty								Domestic
32	H	1N/26E-10AAB	Doherty			0.	112.	112.	67.	0.	0.
33	B	3N/28E-28CAB	L&L Farms	800.	575.	575.	569.	569.	492.	619.	442.
34	B	3N/28E-6DCC	Horn	605.	656.	366.	533.	533.	930.	777.	555.
34	B	3N/28E-18ABD	Horn	763.	1221.	555.	898.	1237.	1177.	621.	384.
35	H	1N/26E-4BAA	Grieb		566.	598.	532.	442.	510.	281.	270.
35	H	1N/26E-5BBA	Grieb			1660.	672.	1065.	1369.	1128.	906.
36	H	2N/26E-20DBB	Boardman		631.	1318.	1245.	1429.	1381.	1141.	1125.
37	B	2N/27E-27CBC	Ashbeck	13.	65.	64.	42.	42.	32.	49.	45.
38	N	4N/28E-30DDD	Lewis								
39	B	3N/28E-28ADA	L&L Farms	80.	42.	65.	86.	61.	11.	579.	847.
40	N	4N/28E-31ACA	Cox			8.	4.	4.	5.	0.	0.
41	H	1N/26E-4BAA	Grieb								
41	H	1N/26E-5BBA	Grieb								
42	N	5N/28E-21CDC	Nobles			18.	18.	18.	Posted	Posted	Posted
43	S	1N/27E-21DDD	Bailey			44.	143.	70.	42.	80.	7.
43	S	1N/27E-26BCB	Healy			146.	125.	80.	122.	198.	3.
45	S	1N/27E-21ACC	Myers	499.	680.	275.	275.	177.	169.	201.	200.
46	S	1N/26E-26CAB	Turner								
46	S	1N/26E-26CCC	Turner	476.	568.	447.	453.	370.	528.	496.	643.
47	S	1N/27E-27BDD	Healy								Domestic

TABLE 8 Ground Water Pumpage in Acre-feet for The Proposed Butter Creek Critical Ground Water Area (Continued)

Priority Number	Subarea*	Well Location	Owner	1976	1977	1978	1979	1980	1981	1982	1983
48	H	2N/26E-6ACC	Rea	52.	461.	351.	446.	347.	418.	107.	24.
49	B	2N/28E-7AAD1-1	Hale								Unused
49	B	2N/28E-7AAD1-2	Hale	1190.	1294.	1167.	1103.	1055.	865.	807.	76.
50	B	2N/27E-7AAB	Mader	324.	1715.	1748	901.	1260.	1260.	1572.	1133.
50	B	2N/27E-8DAB	Mader	463.	418.	350.	269.	269.	228.	225.	0.
51	B	1N/27E-5CCB	Perkins	523.	1243.	1200.	1344.	1551.	1261.	1210.	590.
51	B	2N/27E-32DBA	Perkins	790.	1294.	1302.	1021.	1000.	1575.	1418.	1563.
52	B	2N/27E-20CAA	Tucker	827.	631.	977.	854.	854.	1280.	1353.	697.
53	N	4N/28E-8DCB	Schultz					0.	0.	0.	0.
54	H	2N/26E-17ABA	Boardman	509.	509.	106.	1116.	1091.	1105.	275.	1109.
55	N	4N/28E-8DDC	Bush	Domestic only							
56	S	1N/27E-26CBA	Currin				57.	57.	51.	0.	0.
57	H	2N/26E-3BCC	Lindsay	0.	0.	0.	0.	0.	0.	0.	Unused
57	H	2N/26E-10CDB	Lindsay		113.	44.	440.	440.	440.	440.	805.
57	H	2N/26E-23CAD	Lindsay	946.	1933.	249.	219.	428.	476.	465.	0.
58	H	2N/26E-18DAA	Boardman		1293.	1899.	971.	73.	0.	0.	370.
59	H	1N/26E-8DBD	Doherty				300.	300.	514.	588.	398.
60	H	1N/26E-3CCD	Doherty	Application pending - well not drilled							
60	H	1N/26E-4CDC	Doherty	Application pending - well not drilled							
62	H	2N/26E-15ACC	Taylor				960.	960.	1054.	865.	311.
63	S	1N/26E-35DCB	Cutsforth	175.	728.	515.	486.	452.	557.	379.	224.
64	S	1N/26E-36CDB	Cutsforth	301.	615.	417.	335.	293.	318.	479.	343.
65	B	2N/28E-17CCA	Hale	Application pending - well started, but not completed							Unused
66	N	5N/28E-21CCB	Wadekamper								15.
67	N	4N/28E-17ABD2	King								
68	N	5N/28E-33ADB	Bonney								
69	N	5N/28E-21CDD	Bonney	Uncertain as to basalt or gravel well							

TABLE 8 Ground Water Pumpage in Acre-feet for The Proposed Butter Creek Critical Ground Water Area (Continued)

Priority Number	Subarea*	Well Location	Owner	1976	1977	1978	1979	1980	1981	1982	1983
70	N	5N/28E-21CDD	Rogers Const.	Uncertain as to basalt or gravel well							
71	S	1S/26E-1DCD	Cutsforth								
72	N	5N/28E-33	Wiley	Application pending							
73	N	5N/28E-16BAA	Interfaith Christian Center			Application pending					
	S	1S/26E-1DAD	Cutsforth								Unused
	S	1N/26E-26BCC	Turner				Domestic Use Only				
	B	1N/27E-3AAC2	Luciani	No meter	7.	3.	2.	2.	0.	Domestic	Domestic
	H	2N/26E-11CDD	Lindsay								Domestic
	H	2N/26E-28CDD	Grieb								Unused
	H	2N/26E-29CCD	Grieb	1591.							Unused
	B	2N/27E-11ADD	Hale								Unused
	B	2N/27E-12BDB	B.C. Equip.								
	B	3N/28E-8DAC	Walker								Domestic
	N	4N/28E-7ACC	Wadekamper		10.	0.	0.	2.	2.	1.5	Trans.
	N	4N/28E-21CAC	U.P.R.R.	Canceled water Right							
	N	5N/28E-17CBA	Umatilla	99.	65.	24.	65.	65.	65.	42.	5.
	N	5N/28E-32DBC	Chaves	Canceled water right							
	N	5N/28E-32DCA	Chaves								
		TOTALS		13,625.	20,215.4	19,652.	20,663.	20,124.	20,985.	18,932.5	14,948.

* Subareas: N - North
B - Butter Creek Junction
H - Sand Hollow
S - South

PLATE 2 - 1984

BOUNDARY AND WELL LOCATIONS, PROPOSED BUTTER CREEK CRITICAL GROUND WATER AREA

PROPOSED CRITICAL GROUND WATER AREA BOUNDARY

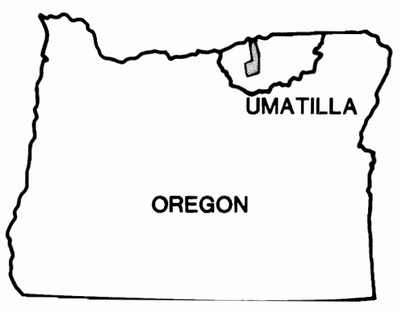
SUB-AREA BOUNDARY

• 3 BCC WELL - NUMBERS AND LETTERS REFER TO LOCATION - SEE TEXT FOR EXPLANATION

* 4 CDC WELL NOT DRILLED - APPLICATION PENDING

N

SCALE (MILES)
1 1/2 0 1 2



LOCATION OF PROPOSED BUTTER CREEK CRITICAL GROUND WATER AREA BOUNDARIES WITHIN OREGON AND UMATILLA STRUCTURAL BASIN.

R27E R28E R26E

T5N T4N T3N T2N T1N T1S

NORTH SUB-AREA

SAND HOLLOW SUB-AREA

BUTTER CREEK JUNCTION SUB-AREA

SOUTH SUB-AREA

17 CBA 19 AAA 21 CCB 21 CDC 32 BDC 33 ADB 32 DCA 7 ACC 8 DCB 8 DDC 17 ABD 17 ABD 18 ABB 21 CAC 27 BBB 30 DDD 32 ACB 31 ACA 6 DCC 8 DAC 8 DDA 18 ABD 18 DBD 28 ADA 28 CAB 25 DDC 36 ADD 6 ACC 3 BCC 2 DAA 2 DAA 1 BDD 7 AAB 12 BBB 12 BDB 11 ADD 7 AAD 7 ADD 10 CDC 11 CDD 8 DAB 17 ABA 15 ACC 16 DAA 14 CCB 22 BBD 17 CCA 20 DBB 23 CAD 20 CAA 27 BCC 28 ADD 27 CBC 26 CBD 29 CCD 28 CDD 34 BDC 32 DBA 5 BBA 4 BAA 3 AAC 3 AAC 4 CDC 3 CCD 10 AAB 5 CCB 3 DBB 10 AAB 8 DBD 10 ACA 10 ADC 10 DCC 18 DDD 21 ACC 21 DDD 23 DAD 24 DDD 28 BAA 27 BDD 26 BCD 26 CBA 33 BBC 29 BDD 26 BCC 26 CAB 26 CCC 35 DCB 36 CDB 1 DAD 1 DCD 9 DBD

R25E R26E

R26E R27E

R27E R28E

T5N
T4N

T4N
T3N

T3N
T2N

T2N
T1N

T1N
T1S

LEGEND

●IDENTIFIES WELL LOCATION BY ORDER OF WATER RIGHTS, CLAIMS, PERMITS, AND CETIFICATE OR APPLICATION

★WELLS UNDER PERMIT OR APPLICATION BUT NOT DRILLED

REFER TO TABLE I FOR LISTING OF WATER RIGHTS

WATER RESOURCES DEPARTMENT
STATE OF OREGON

BUTTER CREEK CRITICAL AREA 1977

GROUND-WATER RIGHTS MAP PLATE 1