BEFORE THE STATE ENGINEER OF OREGON

Washington County

ON THE QUESTION OF) DETERMINATION OF A) CRITICAL GROUND WATER) AREA IN THE COOPER) MOUNTAIN - BULL MOUNTAIN) AREA, WASHINGTON COUNTY) NORTHWESTERN, OREGON)	FINDINGS, CONCLUSIONS, AND ORDER

INTRODUCTION

1

Notices of hearing on the question of determination of a critical ground water area in the Cooper Mountain - Bull Mountain area of southeastern Washington County, Oregon were published on the dates of March 22, 1973 and March 29, 1973 in newspapers of general circulation in Washington County. Written notices of the hearing were also mailed to all claimants or appropriators of ground water in the Cooper Mountain - Bull Mountain critical ground water area and all licensed water well contractors and/or drilling machine operators whose addresses were within Washington County, Oregon. Notices were mailed to:

(1) Senators: Senator Victor Atiyeh of Washington County
Senator Tom Hartung of Washington County

(2) Representatives: Representative Dick McGruder of Washington County
Representative Pat Whiting of Washington County
Representative L. Hampton of Washington County
Representative Michael R. Ragsdale of Washington County
Representative Les Au Coin of Washington County

(3) Federal Agencies: (a) Stanley Kapustka, Chief Portland District U. S. Geological Survey, Portland, Oregon
(b) Al Leonard, District Geologist, U. S. Geological Survey, Portland, Oregon

(4) State Agencies: (a) Fred D. Gustafson, Director State Water Resources Board
(b) Kessler R. Cannon, Assistant to Governor for Natural Resources, Salem, Oregon

(c) H. C. Saalfield, Director, Department of Veterans Affairs

(d) Cornelius C. Bateson, Administrator, Health Division, Department of Human Resources, Portland, Oregon

(5) County Officials:

(a) Virginia Dagg, Commissioner, Washington County

(b) Eldon Hout, Commissioner, Washington County

(c) William J. Masters, Commissioner, Washington County

(d) Ron Roth, Commissioner, Washington County

(e) Burton C. Wilson Commissioner, Washington County

(f) Michael F. Sandberg, Director, Washington County Health Department

(6) Miscellaneous Agencies:

(a) Aloha-Huber Water District

(b) Cooper Mountain Water District

(c) City of Beaverton Water Department

(d) Portland Metropolitan Boundary Commission

(e) Beaverton School District

(f) Tigard Water District

(g) Tualatin Development Company

(h) Tigard School District

(i) First National Bank of Oregon

(j) United States National Bank

(k) Columbia Regional Council of Governments

(l) City of Tigard

(m) City of Beaverton

(n) City of Aloha

(o) City of King City

2

The notice of hearing invited all interested persons to be present to give oral or documentary evidence on the following subjects:

(a) Whether ground water levels in the area in question are declining or have declined excessively;

(b) Whether the wells of two or more ground water claimants or appropriators within the area in question interferes substantially with one another;

(c) Whether the available ground water supply in the area in question is being or is about to be overdrawn;

(d) Whether the purity of the ground water supply 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.

3

Hearings on the above entitled subjects were held by the State Engineer on Monday, May 7, 1973 at 3:00 p.m., and 7:30 p.m., in the Aloha High School Multipurpose Room at Aloha, Oregon in accordance with the Notice given. The State Engineer presented his findings and received pertinent evidence favorable to the determination of a critical ground water area as provided in ORS 537.730, 537.735, and 537.740.

The following persons appeared as witnesses at this hearing:

(a) Wm. S. Bartholomew, Hydrogeologist, Office of the State Engineer
(b) Lloyd Carroll, Mayor, King City, Oregon
(c) T. C. Wasson, well owner, operator
(d) J. R. Smurthwaite, well owner, operator
(e) Mrs. Early Dene, well owner, operator
(f) George Patton, resident of King City
(g) Mrs. Glenn Brisbine, well owner, operator
(h) Karl Schaefer, well owner, operator
(i) Henry Burns, well owner, operator
(j) Robert E. Santee, Manager, Tigard Water District
(k) Edward M. Jannsen, water well contractor and driller
(l) Charles Prentice, resident of Beaverton
(m) Jack Millay, well owner, operator
(n) Paul Seibel, well owner, operator
(o) Ann B. Campbell, well owner, operator
(p) Leslie T. Wright, well owner, operator
(q) Robert Stewart, Cooper Mountain Water District
(r) Kenneth L. Orchard, well owner, operator
(s) Larry McCoy, well owner, operator
(t) Oscar Hagg, well owner, operator
(u) Joe Jackson, well owner, operator
(v) Wanda Sims, well owner, operator
(w) Marshall Heron, well owner, operator
(x) George Ward, Consulting Engineer
(y) Edna Davis, well owner, operator
(z) Richard Walker, well owner, operator

4

It now appearing that all evidence and testimony have been taken in the above entitled matter, the State Engineer being fully advised in the premises, makes and orders to be entered in the records of his office the following Findings, Conclusions, and Order.

FINDINGS

1

Cooper Mountain and Bull Mountain are distinctive topographic highlands located in the central-southeast portion of the Tualatin Valley. The area as defined in these findings lies south of Aloha-Huber, southwest of Beaverton, west of Tigard, and immediately north of the Tualatin River. The boundary of the area encloses about the 41 square miles and is described as follows:

2

Starting at the southeast corner of the study area in Washington County, said corner being the southeast corner of the NE¼ of the SE¼, Section 14, Township 2 South, Range 1 West, Willamette Meridian; thence west approximately one-half mile to the southwest corner of the NW¼ of the SE¼ of Section 14, Township 2 South, Range 1 West, Willamette Meridian; thence northwesterly approximately 2,950 feet to the west quarter corner of Section 14, Township 2 South, Range 1 West, Willamette Meridian; thence southwesterly approximately 10,750 feet to the southwest corner of Section 16, Township 2 South, Range 1 West, Willamette Meridian; thence west approximately 1 mile to the southwest corner of Section 17, Township 2 South, Range 1 West, Willamette Meridian; thence northwesterly approximately 6,050 feet to the west quarter corner of Section 18, Township 2 South, Range 1 West, Willamette Meridian; thence northwesterly approximately 11,400 feet to the northwest corner of the SW¼ of the SW¼ of Section 11, Township 2 South, Range 2 West, Willamette Meridian; thence northwesterly approximately 5,300 feet to the west quarter corner of Section 10, Township 2 South, Range 2 West, Willamette Meridian; thence northwesterly approximately 9,500 feet to the northwest corner of Section 4, Township 2 South, Range 2 West, Willamette Meridian; thence northeasterly approximately 10,700 feet to a point on the east bank of the Tualatin River, said point being located on the section line between Sections 2 and 28 approximately 3,600 feet west of the southwest quarter corner of Section 21, Township 1 South, Range 2 West, Willamette Meridian; thence east approximately 950 feet to the south quarter corner of Section 21, Township 1 South, Range 2 West, Willamette Meridian; thence northeasterly approximately 14,250 feet to the northwest corner of the NE¼ of the SE¼ of Section 14, Township 1 South, Range 2 West, Willamette Meridian; thence east approximately 2¼ miles to the east quarter corner of Section 18, Township 1 South, Range 1 West, Willamette Meridian; thence southeasterly approximately 11,800 feet to the east quarter corner of Section 21, Township 1 South, Range 1 West, Willamette Meridian; thence south approximately 1½ miles to the southeast corner of Section 28, Township 1 South, Range 1 West, Willamette Meridian; thence southeasterly approximately 14,800 feet to the southeast corner of Section 2, Township 2 South, Range 1 West, Willamette Meridian; thence southerly approximately 9,240 feet to the point of beginning. The boundary lines of the proposed critical ground water area are shown on the topographic map on Plate No. 1 (attached).

3

GEOLOGIC SETTING

A. Physiography

Cooper Mountain and Bull Mountain form an upland area which is located a few miles southeast of the geographic center of the Tualatin Basin. The broad valley floor of the Tualatin Basin stands at elevations of approximately 110 to 250 feet above mean sea level. Rising above the valley floor at maximum elevations of 785 feet and 710 feet are the upland areas of Cooper Mountain and Bull Mountain respectively. The Tualatin River is a low gradient stream that drains the basin from west to east, joining the Willamette River southeast of the study area.

4

The Tualatin Valley has been formed by down-warping or folding of geologic formations in this area. The fold axis extends in a northwest-southeast direction forming the Tualatin Basin. Some areas of the basin were subjected to sharp anticlinal folding and arching, which were at times accompanied by faulting or breaking of the folded sediments and volcanic rocks occurring in the area. Both Cooper Mountain and Bull Mountain represent topographic highs that have been created by these structural folds.

5

B. Stratigraphy

The oldest geologic formations within the critical area are marine sedimentary deposits. However, these materials do not outcrop within the critical ground water area. These rocks are composed of tuffaceous sand, silt, and claystone that were deposited during Eocene and Oligocene time as near shore deposits in a shallow sea. Following the deposition of these bedded sandstone and claystone materials folding and erosion occurred as the sea retreated westward.

6

A period of extensive volcanic activity followed during Miocene time. The Columbia River Basalt formations were deposited as a thick sequence of accordantly layered basaltic lava flows. Subsequent weathering, and erosion of scoraceous lava surfaces created porous, permeable zones between individual lava flows. These individual interflow zones, where saturated, form the most productive water-bearing units within the proposed critical ground water area. Experience in the Columbia River Basalt formations and other areas of Oregon and Washington have demonstrated that the vertical permeability within the basaltic lavas is usually very poor. Therefore, much of the annual precipitation incident to this area runs off to local surface streams. The limited recharge to the deep basalt aquifers has failed to keep pace with the increased demands for ground water in this area. The total thickness of these deposits is estimated to be about 900 feet.

7

The Helvetia formation of Pliocene age rests directly on the weathered surface of the Columbia River Group. These beds vary in thickness from 15 to 145 feet. They are composed of weathered clay, silt, and sandy silt soils and they form an apron around the base of Cooper Mountain and Bull Mountain. These deposits are thin and usually stand above the regional water table. Therefore, they are not important as a source of ground water.

8

The Troutdale formation of Pliocene time rests directly on the eroded surface of the Helvetia formation and the exposed Columbia River Basalt formation. These deposits were laid down as fresh water lake sediments and are composed of silt, sand, and clay. Though this formation does not outcrop at land surface within the critical area boundaries, it has been encountered by numerous wells within the area. The formation wedges out against the upward folded basalt formations which form Cooper Mountain and Bull Mountain, and constitutes the major alluvial aquifer of the Tualatin Valley. The thickness of the Troutdale formation increases toward the north boundary of the study area where wells have penetrated a depth of 762 feet.

9

The Upland Silt of early Pleistocene age overlies the older Columbia River Basalt and Helvetia formation. These silt deposits are thin, 2 to 10 feet, and they are composed of buff colored, sandy silt and contain occasional rounded pebbles of weathered basalt. This unit is thin and unsaturated, therefore, it is not an important source of ground water.

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10

Alluvial sediments cover the Tualatin Valley floor up to elevations of about 200 feet above mean sea level. These most recent deposits are made up of fine silt, lacustrine sand, and organic peat materials that have accumulated within major flood plains on the floor of the Tualatin Basin. The deposits were laid down in a fresh water lake environment. Driller's logs indicate a maximum thickness of about 60 to 70 feet for these sediments. The average thickness is about 20 to 40 feet over most of the valley floor.

11

The geologic structure of the Tualatin Basin indicates that all of the rock formations of the area have been structurally deformed by folding and faulting as the valley area was slowly warped into a synclinal valley. Most of the geologic structure exhibits general dipping slopes, however, some abrupt changes in structure do occur. Well log data indicates a significant bedrock displacement associated with the east-west trending fold and/or fault which appears to disrupt the basalt aquifer near the northern base of Cooper Mountain.

12

The structural position of the basalt aquifers determine to a large degree whether or not the basalt aquifers are within economic reach of wells built on the valley floor. Shattered rock near fault zones may provide openings that allow saline ground water to move upward from the underlying marine sedimentary formations into the more permeable basalt aquifers.

13

OCCURRENCE OF GROUND WATER

Surface water and ground water are interrelated as part of the earth's hydrologic cycle. Ground water within the Tualatin Valley like the surface water supplies originates as precipitation. Climatological records at Hillsboro, Forest Grove, and City of Portland indicate that the Cooper Mountain-Bull Mountain area receives about 42 inches of precipitation each year. More than 80 per cent of the annual precipitation occurs during the months of October through March. It is common for the area to experience a dry summer season, having little or no rainfall during the periods of July through September. Much of the annual precipitation in the area is lost as direct runoff to streams. The numerous deeply incised and closely spaced stream gullies and canyons which occur on the flanks of both Cooper Mountain and Bull Mountain indicate a tight, poorly permeable surface that rejects much of the rainfall as runoff to local surface streams. Therefore, the Cooper Mountain and Bull Mountain aquifers receives only limited amounts of ground water recharge.

14

Precipitation upon reaching land surface runs off, evaporates, transpires, or seeps slowly into the ground. Some of the water seeping into the ground is absorbed by soils and used by plants. After the surface soils have been saturated some of the precipitation percolates downward through the soil material toward the water table. The water table marks the elevation below which all pore spaces are filled with water. Generally, the water table is not a flat surface as the name implies. More often, it is formed as a subdued replica of the surface topography. Nature tends to maintain a balance between the amount of ground water recharge and the amount of ground water discharge within a ground water system. Ground water moves in the direction of the hydraulic gradient. Therefore, the ground water moves away from recharge areas toward lower elevations to areas of ground water discharge.

15

The elevation of the regional water table fluctuates seasonally and its position is dependent upon the amount of annual recharge. The highest ground water levels in the critical area are recorded in wells following the rainy season. The lowest water levels are recorded during the late summer and early fall. The maximum observed water level fluctuation of 39 feet was recorded in Well No. 1S/2W-13dcd. A minimum water level fluctuation was observed to be about 3 feet and occurred in Well No. 2S/1W-4ba. The average water level fluctuation within the study area is about 8 feet.

16

A. Ground Water Discharge

Limited amounts of ground water move from the mountainous recharge areas on both Cooper Mountain and Bull Mountain through rock materials toward discharge areas within the Tualatin Valley. The water table elevation beneath Cooper Mountain and Bull Mountain stands approximately 150 feet above mean sea level. Therefore, most of the wells located on the mountain encounter the water table at depths of 200 to 600 feet below land surface. Local springs, base flow to the major streams of the area, and ground water withdrawals from the numerous irrigation, municipal, and domestic wells and evapotranspiration losses constitute the major ground water discharge within the critical area.

17

B. Aquifer Units

Two principal aquifer units have been identified within the critical area. The uppermost aquifers are the sedimentary formations composed of basin fill and alluvial detritus which have been formed as a result of erosion of older exposed geologic units surrounding the Tualatin Basin. Underlying the sedimentary materials is the second and deeper aquifer identified as the Columbia River Basalt Group. This series of layered basaltic rocks form the major aquifer system within the proposed critical ground water area at Cooper Mountain and Bull Mountain.

18

1. Sedimentary Aquifers

All of the sedimentary formations that overlie the Columbia River Basalt Group are considered as one aquifer system because of their common hydrologic and physical characteristics. Much of the sedimentary series are composed of sand, silt, and poorly sorted sandy gravel material. Bedded sand materials occur at varying depths of 40, 100, 200, and 300 feet beneath the valley floor. Most of these sands are relatively thin, being generally less than 10 feet in thickness. The ground water body contained in these deposits generally stands between 20 and 40 feet below land surface. Many of the early domestic wells within the area were constructed as shallow dug wells into these deposits. Drilled wells in the sedimentary material occasionally exceed 100 feet in depth. The shallow wells generally produce water of good chemical quality. However, they are subject to surface water contamination. As expected, the deeper drilled wells in the sedimentary materials encounter ground water having higher concentrations of total dissolved solids. The ground water contained in the sedimentary deposits is classed as hard to moderately hard.

19

The yield of wells constructed in the sedimentary aquifers range from 2½ gallons to approximately 40 gallons per minute. The deeper wells average 10 to 15 gallons per minute. The specific capacity of such wells is low, generally being less than 1 gallon per minute per foot of drawdown. The water-bearing characteristics of the sedimentary aquifers are poor due to the large amount of clay in the fine-grained sand deposits. These deposits are generally not capable of supporting large well yields required for irrigation. Therefore, the majority of existing wells drilled in the sedimentary aquifers provide single family domestic water supplies.

20

2. Basalt Aquifers

The major rock aquifer system within the critical area is made up of individual basaltic lavas of the Columbia River Basalt Group. Ground water within this aquifer system occurs both as unconfined, semi-confined, and confined ground water. Extensive rock weathering near the exposed surface of this rock unit has resulted in a variable depth, clay soil cover which forms the surface of Cooper Mountain and Bull Mountain. The vertical permeability of this formation is very low. Much of the annual rainfall on this upland area is rejected as surface runoff to local streams. Water levels in the basalt aquifers vary from a few feet below land surface near the valley floor to more than 500 feet below land surface near the crest of Cooper Mountain. The deepest water well of record within the study area is the 930 foot well constructed for Leslie T. Wright, see well No. 1S/2W-13dd, Table 1.

The quality of ground water produced in the Columbia River Basalt aquifer system is generally very good. Some exception is noted in areas of sharp folding or faulting of the basaltic units. The Robert Murphy well located in the NE¼ of the NW¼ of Section 27, Township 1 South, Range 1 West, W.M., produces ground water containing excessively large amounts of total dissolved solids. The well was constructed to a depth of 314 feet in the Columbia River Basalt formation. The chloride content of this water was 1,840 parts per million and the total dissolved solids were 3,640 parts per million. Water of such poor quality indicates that saline and brackish water contained in the underlying Oligocene sedimentary formations have been forced upward into the lower basalt aquifers. The Jane S. Hackman well was constructed by the Texas Oil Company to a depth of 9,263 feet. This oil exploration well penetrated completely through the Columbia River Basalt formation at a depth of 1,029 feet below land surface. The marine sedimentary deposits encountered below the basalts yielded poor quality ground water containing 43,700 parts per million chloride. Chloride concentrations in the amount of 1,840 parts per million in the Murphy well is believed to represent a mixing of the upper ground water zones of the basalt with the strong brines which occur in the deeper marine formations.

22

Yields from wells drilled into the basalt aquifers within the critical area vary from 10 gallons to 1,089 gallons per minute. Large quantities of water are developed from the scoraceous contact zones between individual lava flows. Although there are a number of very permeable contact zones within the basalt, the total amount of ground water in storage within this aquifer unit is relatively small when compared to alluvial aquifer systems. The total amount of ground water contained within the basalt formations is estimated to be 1 to 3 per cent of the total saturated volume of the rock formation. This estimate agrees with storage coefficients of basalt aquifers occurring within critical ground water areas established at The Dalles, Oregon and at Ordnance, Oregon.

23

Numerous single family domestic wells have been constructed in the basalt aquifers on Cooper Mountain and Bull Mountain. The basalt formations provide the only aquifer system within the area that is capable of supporting both the domestic wells and higher yielding wells suitable for development of municipal, industrial, or irrigation water supplies. Due to the declining water levels within the basalt aquifer, many of the domestic property owners have found it necessary to deepen their individual domestic wells 50 to 100 feet. Some domestic wells near the crest of Cooper Mountain now extend to total depths varying from 600 to 900 feet below land surface.

24

WATER LEVEL DECLINE

A. Introduction

Census figures indicate that there has been a steady increase in the population of Washington County, and particularly within the critical ground water area during the past 12 to 15 years. During this time, approximately 60,000 to 80,000 people have settled within the communities of Beaverton, Tigard, and Aloha-Huber and in rural subdivisions of the rapidly growing residential area of Cooper Mountain and Bull Mountain. Local municipalities have been largely dependent upon ground water supplies during their initial period of rapid growth. The continuing increase of population and urban development has resulted in an increased demand on the existing, limited ground water supply.

25

B. Water Table Decline

Water level declines within the basalt aquifers of this area were first noted during the years of 1949 through 1951. The initial decline of water levels were expected as normal adjustments of the water table to the newly developing municipal wells located near Beaverton, Oregon. With the passage of Oregon Ground Water Act of 1955, the State Engineer established observation wells throughout the area in 1958.

26

All wells constructed in the basalt aquifers have contributed in some degree to the decline of water levels in the area. The large yielding wells serving municipal, industrial, and irrigation water uses have had the greatest effect on the lowering of the water table and the decline has been in proportion to the respective pumping rates and total amount of ground water withdrawal. Three major pumping cones have been identified in the areas of heaviest pumping. The pumping cones have developed around the Beaverton, Aloha-Huber, and the Tigard well fields located within the northeast, the northwest, and the southeast portions of the critical area. Water level declines of 6 to 10 feet per year have been recorded in observation wells near the main pumping centers. During the 10 year period between 1960 and 1970, water levels have declined 60 to 70 feet near the Aloha-Huber wells, 80 to 90 feet near the Beaverton well, and 70 to 80 feet near the Tigard well field. The hydrologic factors affecting the overall water level decline are the rock porosity, permeability, storage characteristics of the composite aquifer system, the amount of annual recharge available to the area, and the total amount of ground water withdrawn by wells.

27

The annual pumpage from the basalt aquifers has been estimated to be approximately 6,000 acre feet per year. Ground water regulations and controls should be selected to best achieve a balance between the annual pumpage and the total annual recharge to the basalt aquifers. Future adjustments may be required as more detailed information becomes available on the effect of reduced annual pumpage from the critical area. Preliminary estimates have shown that approximately 2,900 acre feet or 48% of the total annual pumpage is derived from recharge each year. The remainder of 3,100 acre feet or 52% is the amount of ground water removed from storage. If ground water withdrawals are limited to the amount of the average annual recharge, then no further water level declines would occur within the critical area after the pumping cones are stabilized.

28

C. Municipal Water Use

The communities of Tigard, Aloha-Huber, and Beaverton have begun to replace their ground water supplies by substituting surface water from sources outside the critical area. During the years of 1971-1972 and 1973, local communities have imported increasing amounts of surface water. The Aloha-Huber Water District recently merged with the Wolf Creek Water District which obtains surface water from the Bull Run Water Shed through Portland. The City of Hillsboro can provide 600 gallons per minute to Aloha-Huber for emergency uses. The Aloha-Huber Wells No. 1 and No. 2 produce 225 gallons per minute and 1,000 gallons per minute respectively, and the Scheupback well has a capacity of 600 gallons per minute. However, the use of the Scheupback well is limited to 260 gallons per minute for emergency municipal use.

The Wolf Creek Water District, formerly the Aloha-Huber Water District, has made a reduction of 46% in the amount of ground water used during the 1972-1973 water year by substituting imported surface water. During the period of 1970 through 1972 a total of 48% reduction in the use of ground water has been achieved. The following tabulation lists the annual amount of water, in acre feet, developed by the former Aloha-Huber Water District wells since 1958.

29

Wolf Creek (Aloha-Huber) Water District
(water use in acre feet)

Year	Well No. 1	Well No. 2	Scheupback Well	Bull Run Imports
1958	21 ac. ft.			
1959	221 ac. ft.			
1960	257 ac. ft.			
1961	134 ac. ft.			
1962	570 ac. ft.			
1963	399 ac. ft.			
1964	431 ac. ft.			
1965	443 ac. ft.	54 ac. ft.		
1966	39 ac. ft.	628 ac. ft.		
1967	18 ac. ft.	809 ac. ft.	106 ac. ft.	
1968	12 ac. ft.	838 ac. ft.	50 ac. ft.	
1969	No Data	897 ac. ft.	69 ac. ft.	
1970	91 ac. ft.	1196 ac. ft.	37 ac. ft.	
1971	139 ac. ft.	1179 ac. ft.	0 ac. ft.	
1972	274 ac. ft.	962 ac. ft.	33 ac. ft.	
1973	98 ac. ft.	577 ac. ft.	10 ac. ft.	6274 ac. ft.
Totals	3147 ac. ft.	7140 ac. ft.	305 ac. ft.	6274 ac. ft.

Total Production from Wells: 10,592 acre feet

30

The City of Beaverton well (Sorrento well) is 800 feet deep and had an initial capacity of approximately 880 gallons per minute in 1955. Reduction in well capacity has occurred due to declining water levels in the past few years. Present use of the Beaverton well accounts for the appropriation of approximately 716 acre feet of ground water each year. This is approximately 25% of the annual water needs for the City of Beaverton. The average daily use of ground water for the city amounts to approximately 638,792 gallons per day. Peak uses during the summer months approach 13 to 14 million gallons per day. When adequate system pressures are available, the City of Beaverton can import approximately 15 million gallons per day. However, critical periods of low pressure during the summer months have restricted the import of surface water in the past. The City of Beaverton has been working with the Metsger Water District in bringing in a 16-inch line from the Portland Bull Run System. Beaverton has two main water reservoirs having capacities of 5 million gallons and 1½ million gallons respectively

31

The Beaverton City well has a 50 HP motor pumping from 270 feet at a rate of 600 gallons per minute. This well is not continuously operated but used intermittently to augment imported water and maintain pressure in the system. During 1973 approximately 2,212 acre feet of water was imported from Bull Run Water System.

City of Beaverton

Year	Well Production
Feb. - Dec. 1967	436 acre feet
1968	675 acre feet
1969	900 acre feet
1970	954 acre feet
1971	809 acre feet
1972	716 acre feet
1973	725 acre feet
Total	5,215 acre feet

32

The City of Tigard has four wells appropriating ground water for municipal use. On June 5, 1973, Tigard completed a 16-inch line to Lake Oswego which provides for the transmission of 4.1 million gallons per day from the Clackamas River System. Tigard has also completed a tie line between the 16-inch line and the 24-inch water main at Bradley Corners. This line which has been completed in October, 1973, will also bring in 3.3 million gallons per day from the Bull Run system. Therefore, the present surface water source to the City of Tigard is estimated to be approximately 6.1 million gallons per day. It should be noted that the imported water is spread throughout each water district and there is no way to tell what portion of the imported water is distributed within the Cooper Mountain-Bull Mountain critical area.

33

Tigard Water District

The following table lists the annual amount of ground water use in acre feet from the Tigard District wells.

Year	Well No. 1	Well No. 2	Well No. 3	Well No. 4
1967	28 ac. ft.	53 ac. ft.	59 ac. ft.	
1968	609 ac. ft.	187 ac. ft.	35 ac. ft.	44 ac. ft.
1969	700 ac. ft.	251 ac. ft.	350 ac. ft.	287 ac. ft.
1970	599 ac. ft.	278 ac. ft.	207 ac. ft.	532 ac. ft.
1971	445 ac. ft.	467 ac. ft.	223 ac. ft.	283 ac. ft.
1972	623 ac. ft.	319 ac. ft.	256 ac. ft.	303 ac. ft.
1973	653 ac. ft.	239 ac. ft.	169 ac. ft.	208 ac. ft.
Totals	3657 ac. ft.	1794 ac. ft.	1299 ac. ft.	1657 ac. ft.

Total production 1967 through 1973 of Wells 1, 2, 3, and 4 = 8,407 acre feet.

During 1973, 151 acre feet of water was imported from Capitol Highway Water District and 629 acre feet of water was imported from Lake Oswego.

34

Tigard, Beaverton, and Wolf Creek Water District are all planning material reductions in the amount of ground water to be appropriated for municipal uses. Reductions in ground water use by these appropriators in 1973 over that used in 1972 and 1970 are listed as follows:

	Period	Per Cent Reduction
Wolf Creek Water District	1972	46%
	1970	48%
Tigard Water District	1972	15%
	1970	21%
City of Beaverton	1970	24%
	1972	+1% (increase)

The reductions have improved the critical ground water situation presently developed within the area.

35

Cooper Mountain Water District is a small domestic water corporation located near the crest of Cooper Mountain in the SE¼ of Section 31, Township 1 South, Range 1 West, W.M. It is served by one well (Item No. 77, Table 2) with a capacity of 0.22 cubic feet per second for appropriation of water for quasi-municipal purposes within the district. They currently have 37 service connections in the district. They are located about 3/4 of a mile from the new proposed Wolf Creek Water District Reservoir system now under construction on Cooper Mountain.

36

GROUND WATER USE

A. Domestic and Stock Water Uses

Water district sales figures show that the average domestic household uses approximately 394 gallons per day per connection. The number of private well systems serving domestic water within the critical area was estimated to be 809 wells. Forty-seven new wells were drilled in 1971, increasing the total to 856 and in 1972 an additional 42 wells were constructed making a total of 898 wells at the end of 1972. If each of these wells produces 394 gallons per day for 365 days per year, each well would require 143,810 gallons per year, or about .44 acre feet. Therefore, the total estimated use for wells exempted from filing either certificates of registration or applications for permits to appropriate water was 356 acre feet in 1970, 377 acre feet in 1971, and 395 acre feet in 1972.

37

B. Irrigation Uses

There have been 46 claims of vested ground water rights initiated prior to August 3, 1955 filed. Subsequent to August 3, 1955, there have been 33 applications for permits to appropriate ground water within the area.

Thirty-two permits have been issued for these applications and 20 water right certificates have been issued. In addition, there has been one special order changing the character of use of water from irrigation to municipal use. Estimates for ground water use for water rights are based on the amount of land set forth in the water right document. The total number of acres claimed under both well registration and permitted water rights is 1,028 acres. The duty of water allowed for a water right within western Oregon is at a rate of not to exceed one-eightieth cubic foot per second (5.61 gallons per minute per acre), and a total diversion for the year of 2.5 acre feet per acre. If all water rights were exercised to their maximum water use each year, it would require approximately 2,570 acre feet of water annually. A more realistic figure relating to the actual amount of water used annually is 1.75 acre feet per acre. This is the delivery rate that has been estimated for the Scoggins Dam project in the Tualatin River Basin developed by the U. S. Bureau of Reclamation. If 1.75 acre feet per acre is considered to be the average rate of use, then a more reasonable estimate of 1,800 acre feet would be required for the present irrigation within the critical area.

38

The State Engineer has not accepted any new applications for permits within the proposed critical area since May 29, 1970. For the past three years prospective applicants have been advised of pending studies and during this time the State Engineer would not approve any additional permits. If this closure is finalized there will be no additional ground water authorized or appropriated for irrigation or other uses requiring a State Engineer permit. Owners of all outstanding permits have reported completion of their projects so no additional development will occur. The extent of development under claims of right cannot be determined in this proceeding but it appears that due diligence since 1955 would have resulted in complete development by this time.

39

C. Records of Municipal Water Use

Records of the city water supply systems for the Aloha-Huber, City of Tigard, and the City of Beaverton service areas have been maintained and reported to the office of the State Engineer annually. The total amount of ground water developed by the municipal water wells for the period of January 1967 through December 1973 is listed as follows:

Production Year	Aloha-Huber in ac. feet	Tigard in ac. feet	Beaverton in ac. feet	Total Annual Use in ac. feet
1967	933	140	436	1509
1968	900	875	675	2450
1969	966	1588	900	3454
1970	1324	1616	954	3894
1971	1318	1418	809	3545
1972	1269	1501	716	3486
1973	685	1269	725	2679

40

D. Records of Industrial Uses

Certificates of registration have been issued for diversions of up to 657 acre feet per year of ground water for industrial purposes. Estimates for the above described uses is based on an 8 hour day, 5 days a week and 260 days per year. The total amount of industrial water use has not changed appreciably over the past several years. No new water rights have been filed for industrial uses within the critical area since 1963.

41

E. Summation of Ground Water Uses

At the present time, we have no way of calculating the exact amount of ground water withdrawn from aquifers within the area, however, estimates of the water use can be made. The maximum amount of water being withdrawn from the area was estimated for the years 1970 through 1973 as being about 6,000 acre feet per year.

F. Effects of Continued Water Level Decline

The total amount of ground water being withdrawn from the proposed critical area is in excess of the average annual recharge. If water levels continue to decline at the present rate, wells of the area will have to be deepened if their yields are to be maintained. With continued lowering of the water level, it will become uneconomical to develop deeper ground water supplies. It is possible that some of the existing basalt wells will become contaminated by the intrusion of saline ground water from the underlying marine formations. Brackish water intrusion into the basalt aquifers has already occurred in a few local areas near Bull Mountain. A significant increase in the total amount of chloride and total dissolved solids has been noted in the Portland Golf Course well located immediately north and east of the critical ground water area. This well is located within Section 26 of Township 1 South, Range 1 West. The water quality deterioration occurs during the late summer irrigation season. In the winter season the water quality of this well improves after the well is shut down and fresh water moves in to fill the pumping cone.

43

Under the provisions of ORS 537.605, 46 claims of the right to use ground water from the proposed Cooper Mountain-Bull Mountain critical ground water area have been filed and Certificates of Registration issued. Said claims are tabulated in order of their claimed date of priority and are shown on Table 1.

44

Under the provisions of ORS 537.615 through 537.630, 34 permits to appropriate ground water from the Cooper Mountain-Bull Mountain critical ground water area have been issued by the State Engineer. Said water rights as evidenced by certificates or permits are tabulated in order of the date of priority and are shown on Table 2.

The tables show the maximum amounts claimed in a Registration Statement or allowed in rights acquired through a permit from the State Engineer. The rights are further limited to the amount which is being beneficially used and in most cases it is substantially less than the maximum allowable.

CONCLUSIONS

1

Water levels in basalt wells have declined at an average rate of 6 to 8 feet per year. Unless there is an increase in the amount of recharge to these aquifers, or a reduction in the amount of ground water withdrawn, there will be a continued water level decline. New low positions will be established each year until it becomes impossible to withdraw more ground water from the basalt aquifers within the critical area than is being recharged each year. Without curtailment of ground water withdrawals, water levels will continue to decline and will result in ultimate failure of some wells.

2

The continued decline of water levels within the basalt aquifers may induce movement of saline ground water from the deeper underlying marine formations into the lowermost fresh water-bearing basalt aquifers. Saline ground waters intruded into the lower basalt formations may contaminate some fresh water supplies and cause a deterioration of chemical quality in some fresh water aquifers.

3

Accurate information and pumpage data on the total ground water withdrawals from Cooper Mountain-Bull Mountain critical ground water reservoir are necessary to finalize quantitative estimates of the storage capacity of this ground water body. Totalizing water meters should be installed on all wells used for non-exempted ground water appropriations. The owner of the non-exempted ground water diversions should maintain a record of pumpage each year and file these itemized pumpage reports with the Office of the State Engineer annually.

4

In order to insure the preservation of the public welfare, safety, and health it is necessary that the rights to appropriate ground water and priority therefrom be acknowledged and protected and that reasonably stable ground water levels be determined and maintained.

5

The Certificate of Registration is not a final determination of the water right acquired. It operates as evidence of the claim until a final determination of the rights acquired in an appropriate adjudication proceedings.

ORS 537.610 provides in part:

> "(2) Upon issuance to him of the certificate of registration the registrant is prima facie entitled to a right to appropriate the ground water and apply it to beneficial use to the extent and in the manner disclosed in the recorded registration statement and the certificate of registration."

> "(3) No certificate of registration issued under this section shall be construed as a final determination of any matter stated therein. The right of the registrant to appropriate ground water under a certificate of registration is subject to determination under ORS 537.760 to 537.695, and is not final or conclusive until so determined and a ground water right certificate issued. A right to appropriate ground water under a certificate of registration has a tentative priority from the date when the construction of the well was begun."

6

It is quite obvious from the records that water has not been used in the maximum amount claimed in the certificate of registration and many may never acquire vested rights to the full amount claimed. For example, the City of Beaverton has claimed 950 gallons per minute or 1,532 acre feet per year. Their well capacity is approximately 800 gallons per minute and they have diverted an average of 820 acre feet per year over the last 5 years.

7

Similarly, from the sporadic records available, it appears that the claims for irrigation and industrial purposes are in the order of twice as much water as they ordinarily divert. Under these circumstances it is not possible to determine in advance the number of rights that can be served each year. In order to balance the pumping withdrawals with recharge, it is necessary to limit the amount withdrawn to 2,900 acre feet per year. It is estimated that in an average year this would cover all rights up to Item No. 58 as listed on Table 2.

8

In order to effectuate such administration, it will be necessary for each water user hereunder to advise the watermaster on or before February 1 of each year of the amount of water he intends to use during the year. By March 10th, the watermaster will determine and advise those who will be entitled to use water that year, based on the theoretical maximum diversion of 2,900 acre feet per year. At the end of the year, the pumping records will be evaluated and future years allotments will be authorized on the basis of an actual diversion and use of not to exceed 2,900 acre feet per year. The watermaster will authorize and regulate to that amount based on the water users stated intent made on or before February 1st of each year.

9

It appears that the entire basalt aquifer underlying the described boundaries is a common water body forming one ground water reservoir. All water pumped from this reservoir will affect the available supply developed by other users. The rate of expansion of the cone of depression is relatively slow and several years may pass before water levels in wells near the Beaverton, Tigard, and Aloha-Huber wells will stabilize. Pumping the city wells at current rates will require differential water levels or head losses near the wells in the order of 150 feet. To utilize the maximum amount of water available in the ground water reservoir while minimizing the detrimental effect on prior rights, all wells may use water in accordance with their rights until the water has declined 10 feet from the original static position.

10

In addition, much of the area has developed country estate homesites and there is a desire to continue some development. The only long term source of domestic water for such development is by importation through one of the established municipal water systems. Extension of lines to serve all potential users may not be practical at this time. As an interim measure, single family domestic wells may be constructed for tracts not less than 10 acres in area for household purposes only. If in an area where the static water level has not declined more than 20 feet the domestic use may include the irrigation of not to exceed ½ acre lawn and garden with a total diversion of not to exceed 1 acre foot (325,850 gallons) per year. This is equivalent to an average diversion of 893 gallons per day and is about twice the average residential use.

11

Excessive decline in the form of pumping depressions in the reservoir have occurred due to sustained pumpage from the wells of Beaverton, Tigard, and Aloha-Huber Water Districts. Under the above system some of the pumpage in the area of major draft including municipal use, will be curtailed. However, continued pumping by the major wells at the maximum rate authorized would cause continued decline of the water levels surrounding the wells and eventual well failure or decrease in well capacity. In fact, some reduction in capacity has already taken place. In order to stabilize the water levels and prevent further drop, it will be necessary to further curtail specific wells. In addition, it will be necessary to not only limit all future expansion of use to imported water but to replace existing uses with imported water.

12

The three major municipal systems were contacted in 1971 and again in the spring of 1973 and urged to make voluntary reductions as soon as possible. Reductions in ground water use were offset by increased importation of outside surface supplies. Reductions in use of ground water during 1973 was as follows:

Beaverton: +1% over 1972 and -24% over 1970
Tigard: -15% over 1972 and -21% over 1970
Aloha-Huber: -46% over 1972 and -48% over 1970
Total Reduction: -23% over 1972 and -31% over 1970

13

King City has requested and urged at the hearing that irrigation of their golf course, (Tualatin Development Co., Permit No. G-3463) be given preferential consideration since it was a major part of the retirement community. There is no question but what it does have special value to King City community, however, in view of the need to reduce water for household residential use there does not appear to be sufficient justification to give such preference. Water is available by import from the Clackamas or Bull Run Systems through Tigard and can be used for irrigation of the essential portions of the course even though it is more costly treated water. In fact, it appears that it will be necessary for Tualatin Development Co. to shut down their well, Item No. 74, except for emergency use on a standby basis.

14

Reduction of capacity from the City of Beaverton well has occurred as a result of declining water levels and the extensive cone of depression has developed. The voluntary reduction in annual production has altered the decline but it is too soon to tell whether or not this reduction will be adequate to stabilize the water level decline. Additional reductions by the effect of this order in shutting down late priorities in the vicinity of this cone of depression may provide sufficient reduction to stabilize the drop in water levels.

15

Reductions in well capacity have also occurred around the Tigard well field due to the drop in water levels. To stabilize the cone of depression i.e. the area of influence of the pumping wells, it appears that in addition to shutting down Well No. 4 in accordance with relative priority dates, that Well No. 3 should also be cut from production and placed on a standby basis and emergency peak use not to exceed 20 acre feet per year. It also appears that the loss of capacity in Well No. 2 should be made up by shifting the production to Well No. 1. This will tend to stabilize the deeper pump cone developed around No. 2 and perhaps permit some recovery. The reduction of use for Well No. 3 will also aid in the recovery. This is not to be construed as a final determination of the claimed vested right. If the claim to a vested water right is valid, then the withdrawal can be better made at the location of Well No. 1. Tigard's Well No. 4 has shown less decline in water level than Well No. 3, but due to its late priority should be cut off from further production except for emergencies and restricted peak use not exceeding 10 acre feet per year. Item No. 70 (Permit No. G-3270) is an enlargement of use from Tigard Well No. 1 and due to late priority should be cut off.

16

Continued monitoring of water levels will be necessary and if the restrictions are not adequate it will be necessary to reduce pumpage further. All of the municipal wells that are restricted in pumpage should remain in the systems for emergencies and restricted peak use. In order to insure their being in operating condition it is necessary that they be tested periodically by running short periods of time. Quantities used for these purposes should be measured and included as a part of the total permissible withdrawal. In order to evaluate the effect over the next three years, average annual pumpage from the three municipal systems of Beaverton, Tigard, and Wolf Creek Water Districts (former Aloha-Huber) should not exceed the following amounts:

Beaverton - 725 acre feet
Tigard - 1060 acre feet
Wolf Creek - 685 acre feet

The restrictions imposed by this conclusion are very severe ones when imposed without regard to priority as they necessarily must be. The imposition is essential because the quantities taken from the wells involved exceed the ability of the aquifer to sustain itself. The wells would ultimately fail of their own course if restrictions were not imposed and at the same time water would remain unused in the bulk of the critical ground water area. In some parts of the area there would not even be a measurable decline in water level over the next 10 to 20 years. In order to maximize the use of the available resource on a continuous yield basis it is necessary to permit the appropriation of water from other wells of late priority in other parts of the area. This would not affect applications to change point of diversion or place of use or character of use to areas with lower withdrawals.

17

Of the 80 existing claims on rights listed in Tables 1 and 2, irrigation accounts for 66, municipal for 10, and industrial for 4 with over 60 per cent of the irrigation for tracts of 10 acres or less. In Finding No. 37 the reasonable maximum annual use was estimated to be 1800 acre feet per year. However, it doesn't appear that the use has actually been that much. The estimate of total annual use of 6000 acre feet per year in Finding No. 41 assumed irrigation to account for 1456 acre feet or about one-half the maximum allowable under the rights. Such overall level of use is in keeping with that applied to the other classes of use. Since the bulk of the irrigation wells have relatively small amounts of water appropriated from each the decline is spread over a greater part of the area.

18

The existing and potential uses for individual homesites is quite small for each user. The existing uses, however, constitute approximately 13 per cent of the total amount of water available for use. If not restricted, this figure could easily increase to 20 per cent of the total available in the next 10 years. Basically the bulk of the municipal uses involved are for the same purposes of the individual domestic; namely, household and lawn and garden irrigation. The existing municipal uses exceed the total available in the reservoir; therefore, they must be reduced. It would not be proper to eliminate current users who have been using water for the past several years for residential purposes in order to permit unrestricted individual residential development in the future. If further urbanization or subdivision development is to be permitted, it should be with imported water. Development should be limited to those areas which can be served by expansion of existing public supply systems. The Washington County Planning Commission should take cognizance of these limitations on ground water supply in their land use planning in approving subdivisions, and issuance of building permits for individual developments within the critical ground water area.

19

ORS 537.735 (3) provides:

> "(c) A provision according preference without reference to relative priorities, to withdrawals of ground water in the critical area for domestic and livestock purposes first, and thereafter other beneficial purposes, including agricultural, industrial, municipal other than domestic, and recreational purposes, in such order as the State Engineer deems advisable under the circumstances."

This statute clearly requires a preference for domestic and livestock uses over all other purposes. The actual limits of what is included in domestic use is not defined; however, when construed with the entire chapter, it appears clear that the legislature intended the narrow limits of household purposes. A part of the same Act now codified as ORS 537.745 clearly makes a distinction between domestic purposes for single or group and the irrigation of not to exceed one-half acre of noncommercial lawn and garden. The green area of lawn, shrubs, and gardens have become almost a necessary amenity in today's world. The suitability of a homesite which cannot have them is severely reduced. Nevertheless, the statutory preference is therefore limited to the culinary purposes of drinking, cooking, washing, sanitary facilities, and such similar uses as are essential to the household.

20

The most critical problem of domestic water supply involves the Cooper Mountain Water District Well No. 1. Their well is listed as Item No. 77 in Table 2 and has a date of priority of February 23, 1968. Because of the late priority for this well, it will be necessary to shut the well off in order to limit water use to 2,900 acre feet per year. The district is not adjacent to another city or water district which has import capabilities and it would require about 1 mile of pipeline plus booster pumps to import water. This would take some time to construct if this choice is made. A second alternative and perhaps more economical would be to negotiate with the holder of a right with an early date of priority and make a transfer of such right to their well and use. The district has several alternative courses to obtain a firm supply but it may take some time to determine the best course of action. A delay of 6 months in shutting down their appropriation under their current right would involve approximately 5.1 acre feet of water. This relatively small amount would appear justified in view of the existing human needs involved.

The alluvial and sedimentary aquifers overlying the basalt on the lower slopes near the peripheral edge of the critical ground water area constitutes a separate ground water reservoir. Due to the very low permeability of the aquifer the development and use of water from the reservoir is very limited. The use to date does not indicate any overdraft, well interference, or other problems requiring restriction on future use or corrective controls to be applied at this time. The need for such actions can be evaluated as a part of the annual review of the effectiveness of the controls adopted for the deeper basalt aquifer.

ORDER

1

NOW, THEREFORE, IT IS ORDERED that the Cooper Mountain-Bull Mountain basalt aquifer is declared a critical ground water area and is to be known as "The Cooper Mountain-Bull Mountain Critical Ground Water Area." The boundary of the critical ground water area, which is shown on Plate No. 1 is declared as follows:

> Starting at the southeast corner of the study area in Washington County, said corner being the southeast corner of the NE¼ of the SE¼, Section 14, Township 2 South, Range 1 West, Willamette Meridian; thence west approximately one-half mile to the southwest corner of the NW¼ of the SE¼ of Section 14, Township 2 South, Range 1 West, Willamette Meridian; thence northwesterly approximately 2,950 feet to the west quarter corner of Section 14, Township 2 South, Range 1 West, Willamette Meridian; thence southwesterly approximately 10,750 feet to the southwest corner of Section 16, Township 2 South, Range 1 West, Willamette Meridian; thence west approximately 1 mile to the southwest corner of Section 17, Township 2 South, Range 1 West, Willamette Meridian; thence northwesterly approximately 6,050 feet to the west quarter corner of Section 18, Township 2 South, Range 1 West, Willamette Meridian; thence northwesterly approximately 11,400 feet to the northwest corner of the SW¼ of the SW¼ of Section 11, Township 2 South, Range 2 West, Willamette Meridian; thence northwesterly approximately 5,300 feet to the west quarter corner of Section 10, Township 2 South, Range 2 West, Willamette Meridian; thence northwesterly approximately 9,500 feet to the northwest corner of Section 4, Township 2 South, Range 2

West, Willamette Meridian; thence northeasterly approximately 10,700 feet to a point on the east bank of the Tualatin River, said point being located on the section line between Sections 21 and 28 approximately 3,600 feet west of the southwest quarter corner of Section 21, Township 1 South, Range 2 West, Willamette Meridian; thence northeasterly approximately 14,250 feet to the northwest corner of the NE¼ of the SE¼ of Section 14, Township 1 South, Range 2 West, Willamette Meridian; thence east approximately 2¼ miles to the east quarter corner of Section 18, Township 1 South, Range 1 West, Willamette Meridian; thence southeasterly approximately 11,800 feet to the east quarter corner of Section 21, Township 1 South, Range 1 West, Willamette Meridian; thence south approximately 1½ miles to the southeast corner of Section 28, Township 1 South, Range 1 West, Willamette Meridian; thence southeasterly approximately 14,800 feet to the southeast corner of Section 2, Township 2 South, Range 1 West, Willamette Meridian; thence southerly approximately 9,240 feet to the point of beginning.

It shall include all water contained in the ground water reservoir composed of the basalt aquifers within the critical area and regulation shall be imposed on all uses therefrom.

2

IT IS FURTHER ORDERED that the alluvium aquifer overlying the Cooper Mountain-Bull Mountain basalt aquifer is declared a part of said critical ground water area and all ground water contained in the sedimentary aquifers shall be subject to further appropriation as provided in ORS Chapter 539 and set forth in Paragraph No. 5 herein.

3

IT IS FURTHER ORDERED that the watermaster shall regulate the control works on all wells in the above described critical ground water area so that the rate and total quantity of ground water withdrawn does not exceed that which can be put to beneficial use in accordance with provisions of this order and allowed under their ground water right, certificate of registration, or permit or certificate. At all times the systems shall be operated to prevent the waste of water. The procedure for regulating and posting such changes shall be as set forth in ORS 540.040.

4

IT IS FURTHER ORDERED that unlawful diversions of ground water within the Cooper Mountain-Bull Mountain Critical Ground Water Area shall cease. To this end, the watermaster shall investigate all known or reported violations of ORS 537.535 and shall regulate the control works of all wells found to be operating in violation of ORS 537.535 so as to prevent such violations.

5

IT IS FURTHER ORDERED that all applications for permits to appropriate ground water from within the areal boundaries of the Cooper Mountain-Bull Mountain Critical Ground Water Area that are filed after the effective date of this order shall be approved only on the condition that no ground water shall be appropriated from the basaltic lavas and related interbeds of the Columbia River Basalt formation. Any new appropriators will be required to develop ground water from the overlying valley fill sedimentary formations of the Troutdale formation and recent Quaternary alluvium. Wells developing ground water from the sedimentary deposits shall not penetrate into the underlying basaltic rock formations.

6

IT IS FURTHER ORDERED that the appropriation of ground water from the Cooper Mountain-Bull Mountain basalt aquifer is hereby restricted to existing wells which are being used for the purposes exempt from filing as set forth in ORS 537.545:

> " * * * for stockwatering purposes, for watering any lawn or noncommercial garden not exceeding one-half acre in area, for single or group domestic purposes in an amount not exceeding 15,000 gallons a day or for any single industrial or commercial purpose in an amount not exceeding 5,000 gallons a day. * * * * "

and the wells set forth in Tables 1 and 2, Page Nos. 38 - 41. Except as otherwise specifically set forth herein, the distribution of water from these wells is to be based on the relative date of priority of the water rights of the appropriators and further limited to a maximum of 2,900 acre feet per year from the Cooper Mountain-Bull Mountain basalt aquifer. All persons desiring to use water under rights or claims set forth in Tables 1 and 2 shall notify the watermaster of their intent prior to February 1st of each year. The notification shall identify the water right involved and list the time, quantity, use, and place of use intended. On or before March 10th of each year the watermaster will review the notices and based on the relative dates of priority, the restrictions set forth in paragraphs 9, 11, 12, and 13 of this order, an average annual appropriation of 2,900 acre feet per year, and the amount the static water level has declined from its original level up to a maximum of 10 feet and he will notify those parties authorized to use water for that year. Such review shall consider the amount of water used during the previous years in order to effectuate the average annual appropriation of 2,900 acre feet. However, this provision shall not require wells to be shut down which are hereafter restricted to use for existing domestic (household) purposes only.

7

IT IS FURTHER ORDERED that additional wells for withdrawal of ground water from the basalt aquifer of the Cooper Mountain-Bull Mountain Critical Ground Water Area shall be restricted to single family domestic and stock water purposes on tracts not less than 10 acres in area. Ground water appropriated for stock shall be piped to watering tanks or troughs, equipped with control works and operated to prevent the overflow and waste of ground water. If located within the area shown on Plate 2, Page No. 43 as having had less than 20 feet of decline in static water levels, domestic use may include irrigation of up to one-quarter acre of noncommercial lawn and garden. In the event that the water level in the well declines 20 feet or more from the original static water level, then the uses shall be restricted to domestic (household purposes) and stock water use only. Ground water appropriated for domestic purposes shall be limited to that which can be beneficially used and not exceeding 1 acre foot (325,850 gallons) per year.

8

IT IS FURTHER ORDERED that the owners or operators of all wells in the above described critical ground water area other than for exempt purposes as described in Paragraph 6, shall equip their wells with totalizing water meters and control valves prior to any ground water withdrawal after 90 days from the date of this order. The type and installation of said meters and control valves shall be subject to approval of the State Engineer. Each well owner or operator shall maintain an accurate monthly record of the amount of ground water withdrawn from each well. A copy of these water use records shall be forwarded to the Office of the State Engineer within 30 days of the close of each calendar year.

9

IT IS FURTHER ORDERED that water may be used from wells listed as Item Nos. 61, 65, 66, 69, 71, 76, and 80, on Table 2, Page No. 40 and 41 in accordance with their rights of record until the static water levels have declined 10 feet from the original position as determined by the watermaster and included in his annual notification.

10

IT IS FURTHER ORDERED that the Cooper Mountain Water District No. 1 may continue their appropriation without regard to priority at their existing level of use for 6 months from the date of this order or until November 17, 1974; that they may not add any additional users or connections during this period unless and until another source of water or water right is obtained to provide water for the additions.

IT IS FURTHER ORDERED that appropriation of water by the City of Beaverton from their well, Item No. 10, be restricted to not to exceed 725 acre feet per year during 1974, 1975, and 1976.

12

IT IS FURTHER ORDERED that appropriation of water by the City of Tigard from their wells, Item Nos. 13, 21, 51, and 67 be restricted to not to exceed 1,060 acre feet per year during 1974, 1975, and 1976.

13

IT IS FURTHER ORDERED that appropriation of water by the Wolf Creek Water District (former Aloha-Huber) from their wells under Item Nos. 49, 54, and 55 be restricted to not to exceed 685 acre feet per year during 1974, 1975, and 1976.

14

IT IS FURTHER ORDERED that the State Engineer shall make an annual review of the ground water conditions in the Cooper Mountain-Bull Mountain Critical Ground Water Area for the purpose of determining the effectiveness of the control provisions and the need for additional control provisions, or changes in ground water withdrawals

Dated this 17th day of May, 1974.

Chris L. Wheeler

CHRIS L. WHEELER
State Engineer

TABLE 1

ABSTRACT OF CLAIMS OF VESTED RIGHTS TO GROUND WATER FROM THE COOPER-BULL MOUNTAIN GROUND WATER AREA BY PRIORITY DATE

Item No.	Record Holder	Priority Date	Appl. No.	Cert. of Registration No.	Claimed Diversion	Acreage	Max. Allow.*	Use	Well Location	Total Depth in feet	Producing Aquifer
1.	The U. S. National Bank of Portland, Trustee	1918	GR-3990	GR-3599	20-25 gpm	3.00	7.50	Irr.	26aac 1S 2W	400	Basalt
2.	Virgil Bish	1922	GR-3872	GR-3522	33 gpm	4.10	10.25	Irr.	3dbc 2S 2W	700	Basalt
3.	Wm. A. Schurman	1924	GR-3632	GR-3326	4.5 gpm	2.00	2.98	Irr.	19cac 1S 1W	325	Basalt
4.	Ray Kincheloe	1932	GR-3681	GR-3375	80 gpm	14.00	35.00	Irr.	23bdd 1S 2W	300	Basalt
5.	J. Richard Smurthwaite	Prior to 1938	GR-2540	GR-2400	18 gpm	2.00	5.00	Irr.	23dbd 1S 2W	215	Basalt
6.	Leslie T. Wright	8/9/38	GR-2846	GR-4038	50 gpm	6.75	16.88	Irr.	13dcd 1S 2W	930	Basalt
7.	John B. Peyton	1940	GR-2834	GR-2670	12 gpm	0.51	1.28	Irr.	30abd 1S 1W	320	Basalt
8.	Anton G. Hauptman	5/42	GR-3533	GR-4052	10 gpm	0.75	1.88	Irr.	18db 1S 1W	113	Sediments
9.	Edna E. Barron	2/44	GR-2376	GR-2258	80 gpm	5.00	12.50	Irr.	19dad 1S 1W	301	Basalt
10.	Robert O. Malsey (City of Beaverton #2)	1945	GR-343	GR-328	950 gpm		1532.12	Mun.	21cdd 1S 1W	800	Basalt
11.	Lewis C. Martin	7/12/46	GR-3194	GR-4096	10 gpm	0.50	1.25	Irr.	19dac 1S 1W	253	Basalt
12.	Arthur A. and Mildred Tauscher	2/17/47	GR-4030	GR-3631	12 gpm	2.00	5.00	Irr.	25abd 1S 2W	566	Basalt
13.	Tigard Water District #1	4/47	GR-616	GR-588	200 gpm		322.55	Mun.	11bcb 2S 1W	610	Basalt
14.	J. S. Higgins	5/20/47	GR-3364	GR-4062	8 gpm	2.00	5.00	Irr.	19ddc 1S 1W	242	Basalt
15.	J. V. Chandler	3/1/48	GR-2199	GR-2104	35 gpm	4.00	10.00	Irr.	10acb 2S 1W	183	Basalt
					35 gpm		13.41	Ind.			
16.	Armand John DeRosset Jr. Estate	1948	GR-894	GR-869	8 gpm	10.00	5.30	Irr.	28dda 1S 1W	360+	Sediments
17.	M. W. Webber	1948	GR-3123	GR-2930	10 gpm	5.00	6.63	Irr.	1ccd 2S 2W	117	Basalt
18.	Jack L. Barron	4/49	GR-2465	GR-2335	14 gpm	1.00	2.50	Irr.	20cbc 1S 1W	276	Basalt
19.	Glen Brisbine	8/49	GR-3812	GR-3474	5 gpm	2.00	3.31	Irr.	30abb 1S 1W	371	Basalt
20.	Reuben and Joyce Sandness	1949	GR-2636	GR-3997	16 gpm	1.00	2.50	Irr.	4bdb 2S 1W	178	Basalt
21.	Tigard Water District #2	1949	GR-615	GR-587	500 gpm		806.38	Mun.	10bba 2S 1W	453	Basalt
22.	Lester Arnold Montgomery	3/1/50	GR-4053	GR-3653	6 gpm	0.75	1.88	Irr.	31cca 1S 1W	433	Basalt

Use of Water: Irr., Irrigation; Ind., Industrial; Mun., Municipal

Well Location: by Section, Township and Range

*: in acre feet of water and based on 150 day irrigation season

TABLE 1 (Continued)

Item No.	Record Holder	Priority Date	Appl. No.	Cert. of Registration No.	Claimed Diversion	Acreage	Max. Allow.*	Use	Well Location	Total Depth in feet	Producing Aquifer
23.	Orville L. and Hubert F. Bierly	4/50	GR-2954	GR-2772	440 gpm	75.80	189.50	Irr.	1dab 2S 2W	588	Basalt
24.	C. V. Morrison	8/50	GR-3371	GR-3919	10 gpm	3.00	6.63	Irr.	30adb 1S 1W	305	Basalt
25.	Lyle R. & Jane Miller	5/4/51	GR-4028	GR-3627	12 gpm	25.00	7.96	Irr.	24dcb 1S 2W	241	Basalt
26.	William Bodman Sanders & Claire M. Sanders	8/27/51	GR-667	GR-1545	28 gpm	8.50	18.56	Irr.	10dba 2S 1W	330	Basalt
27.	Robert M. Stewart	10/51	GR-3837	GR-3497	42 gpm	4.00	10.00	Irr.	21dba 1S 1W	140	Basalt
28.	O. D. Walker and H. W. Shaper	10/5/51	GR-1460	GR-1409	35 gpm	3.00	7.50	Irr.	23aba 1S 2W	179	Sediments
29.	Union High School #2 Washington County	4/52	GR-2832	GR-2669	40 gpm	20.00	26.52	Irr.	14abb 2S 1W	680	Basalt
30.	Albert Rupprecht	5/52	GR-1551	GR-1495	50 gpm	20.80	33.15	Irr.	22adb 1S 2W	142	Sediments
31.	Edward Roshak	10/52	GR-366	GR-352	70 gpm	50.00	46.41	Irr.	6ddc 2S 1W	232	Basalt
32.	John and Joe Santoro	10/14/52	GR-333	GR-318	220 gpm	103.00	145.86	Irr.	23cda 1S 2W	227	Basalt
33.	E. L. Hannabass	11/1/52	GR-2806	GR-2648	15 gpm	3.00	7.50	Irr.	24aac 1S 2W	255	Basalt
34.	G. Palmer Brykit	11/6/52	GR-3005	GR-2814	12 gpm	3.00	7.50	Irr.	19dda 1S 1W	380	Basalt
35.	Howard Wm. and Marilyn K. Boyte	12/52	GR-132	GR-123	10 gpm	2.20	5.50	Irr.	11cba 2S 1W	162	Basalt
36.	George L. Penrose	2/1/53	GR-1555	GR-1499	64 gpm	10.00	25.00	Irr.	11abb 2S 1W	200	Basalt
37.	Walter H. and Hazel Pearl Engler	Approx. 2/15/53	GR-131	GR-122	35 gpm	3.50	8.75	Irr.	11cbb 2S 1W	262	Basalt
38.	Leonard S. Davis	3/53	GR-597	GR-567	60 gpm	12.00	30.00	Irr.	3dcc 2S 1W	218	Basalt
39.	Torazo Hasuike and James Hasuike	8/8/53	GR-1880	GR-1819	200 gpm	45.00	112.50	Irr.	17aba 2S 1W	293	Basalt
40.	Henry L. Burns	9/53	GR-600	GR-569	15 gpm	3.00	7.50	Irr.	19cdc 1S 1W	292	Basalt
41.	E. J. and R. E. Lindquist	10/15/53	GR-1538	GR-1481	135 gpm	7.00	17.50	Irr.	6ccc 2S 1W	544	Basalt
42.	Robert Sunamoto	1953	GR-575	GR-548	250 gpm	57.00	142.50	Irr.	4abc 2S 1W	385	Basalt
43.	School District #94 of Washington County	8/2/54	GR-4050	GR-3651	50 gpm	9.00	22.50	Irr.	19ddb 1S 1W	459	Basalt
44.	Arvin A. Burnett	9/15/54	GR-2789	GR-2636	12 gpm	0.57	1.43	Irr.	19dbc 1S 1W	283	Basalt
45.	Julius Wedeking	4/55	GR-379	GR-365	80 gpm	15.00	37.50	Irr.	12bac 2S 2W	315	Basalt
46.	Fred and George Vedder	7/1/55	GR-2393	GR-2274	9 gpm	1.80	4.50	Irr.	24ddd 1S 2W	108	Basalt

408

TABLE 2

ABSTRACT OF GROUND WATER RIGHT APPLICATIONS, PERMITS, AND CERTIFICATES FOR THE COOPER-BULL MOUNTAIN GROUND WATER AREA BY PRIORITY DATE

Item No.	Record Holder	Priority Date	Appl. No.	Permit No.	Cert. No.	Permitted Diversion	Acreage	Max. Allow.*	Use	Well Location	Total Depth in feet	Producing Aquifer
47.	Edward, Henry and Theodore Roshak	2/7/57	G-563	G-488	30332	0.48 cfs	38.40	96.00	Irr.	6ddc 2S 1W	232	Basalt
48.	Karl Schaefer	3/29/57	G-591	G-499	28970	0.35 cfs	28.00	70.00	Irr.	26bdc 1S 2W	403	Basalt
49.	Aloha-Huber Water District #1	5/2/57	G-637	G-588	36440	1.1 cfs		815.07	Mun.	24dac 1S 2W	720	Basalt
50.	J. M. Harder	6/24/57	G-690	G-612	29661	0.03 cfs	3.40	8.50	Irr.	10dda 2S 1W	353	Basalt
51.	Tigard Water District #3	9/16/57	G-760	G-655	28971	0.78 cfs		565.75	Mun.	4acc 2S 1W	494	Basalt
52.	Karl Schaefer	3/26/58	G-904	G-798	28972	0.35 cfs	28.00	70.00	Irr.	26bdc 1S 2W	403	Basalt
53.	Warren Northwest Inc.	7/31/58	G-1135	G-965	28491	0.11 cfs		57.20	Ind.	26dcd 1S 2W	299	Basalt
54.	Aloha-Huber Water District	1/21/59	Transfer #2490 Sp. Or. Vol. 22, p. 197			0.58 cfs		116.00	Mun.	17cdb 1S 1W	414	Basalt
55.	Schuepbach Brothers	1/21/59	Transfer #2490 Sp. Or. Vol. 22, p. 197			0.73 cfs	58.00	145.00	Irr.	17cdb 1S 1W	414	Basalt
56.	Frank Brooks	11/9/59	G-1617	G-1529	29666	0.04 cfs	5.10	11.90	Irr.	4dcd 2S 2W	55	Sediments
57.	Mrs. Myron P. Dressler	7/12/60	G-1734	G-1612	32496	0.02 cfs	1.90	4.75	Irr.	11cba 2S 1W	375 NL	Basalt
58.	Baker Rock Crushing Co.	11/9/61	G-2157	G-1985	33211	0.45 cfs		231.40	Ind.	26acc 1S 2W	472	Basalt
59.	Aloha-Huber Water District #2	2/23/62	G-2242	G-2064	36441	2.2 cfs		1630.15	Mun.	23ddc 1S 2W	874	Basalt
60.	William B. and Claire M. Sanders	4/30/62	G-2309	G-2170	32020	0.03 cfs	2.60	6.50	Irr.	10dba 2S 1W	330	Basalt
61.	J. H. Aten	5/17/62	G-2325	G-2150	33116	0.23 cfs	25.00	62.50	Irr.	12bcc 2S 2W	18 NL	Sediments
62.	Alfred B. Okerman	1/17/63	G-2530	G-2345	34729	0.03 cfs	2.30	5.75	Irr.	35bba 1S 2W	403	Basalt
63.	Robert Sunamoto	2/28/63	G-2556	G-2367	35683	0.18 cfs	14.30	35.75	Irr.	4abc 2S 1W	385	Basalt
64.	Lyle H. Cobb	6/25/63	G-2641	G-2485	34941	0.32 cfs	25.40	63.50	Irr.	29aad 1S 1W	900	Basalt
						0.41 cfs		211.38	Ind.			
65.	Louis F. Hesse	7/17/63	G-2663	G-2469	34497	0.30 cfs	48.10	89.24	Irr.	2dcb 2S 2W	424	Basalt
66.	M. K. Terril	9/23/65	G-3240	G-3116		0.01 cfs	4.00	2.97	Irr.	16dbb 2S 1W	285	Basalt
67.	Tigard Water District #4	11/19/65	G-3301	G-2999		2.20 cfs		1630.15	Mun.	10cbb 2S 1W	925	Basalt

Use of Water: Irr., Irrigation; Ind., Industrial; Mun., Municipal

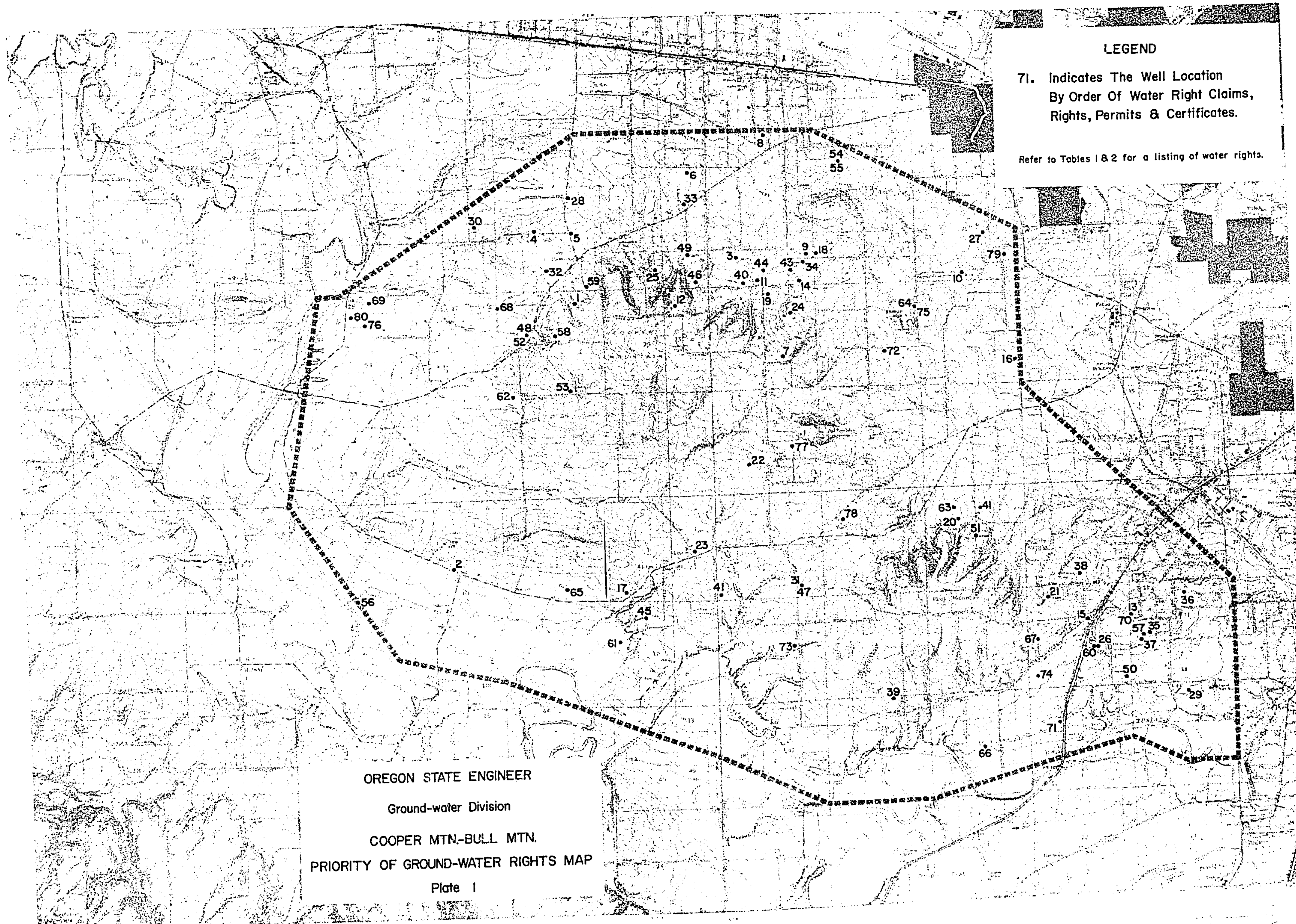
Well Location: by Section, Township and Range

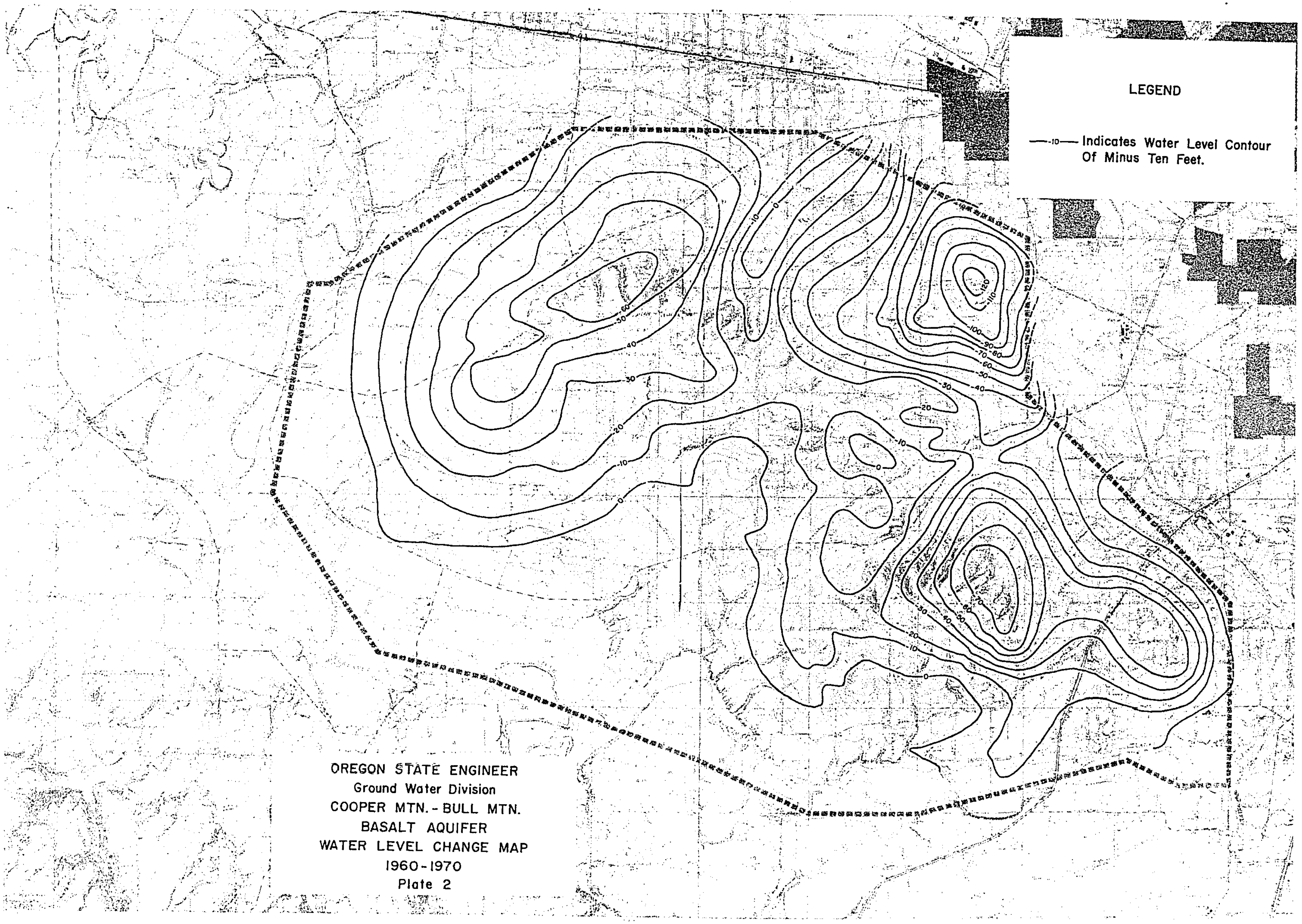
*: in acre feet of water and based on 150 day irrigation season

NL: No Log

TABLE 2 (Continued)

Item No.	Record Holder	Priority Date	Appl. No.	Permit No.	Cert. No.	Permitted Diversion	Acreage	Max. Allow.*	Use	Well Location	Total Depth in feet	Producing Aquifer
68.	Robert John Elskamp	12/8/65	G-3315	G-3087		0.06 cfs	5.00	12.50	Irr.	26bbc 1S 2W	540	Basalt
69.	D. L. Watts	2/8/66	G-3373	G-3177		0.62 cfs	49.56	123.90	Irr.	28aab 1S 2W	150	Basalt
70.	Tigard Water District #1	4/25/66	G-3466	G-3270		1.67 cfs		1237.43	Mun.	11bcb 2S 1W	610	Basalt
71.	T. C. Wasson	5/26/66	G-3510	G-3304		0.06 cfs	4.50	11.25	Irr.	15bdb 2S 1W	695	Basalt
72.	Cyrene Elizabeth Hardie	9/12/66	G-3665	G-3441	34943	0.12 cfs	9.50	23.75	Irr.	29dbd 1S 1W	303	Basalt
73.	Fred Mathias	12/9/66	G-3752	G-3542	36444	0.13 cfs	16.00	39.00	Irr.	7acd 2S 1W	206	Basalt
74.	Tualatin Development Co.	1/17/67	G-3777	G-3463		0.54 cfs	43.38	108.45	Irr.	10ccb 2S 1W	805	Basalt
75.	Lyle Cobb	1/31/67	G-3794	G-3576	36445	0.21 cfs	17.00	42.50	Irr.	29aad 1S 1W	900	Basalt
76.	Clifford E. Hawkinson	10/4/67	G-4100	G-3848		0.08 cfs	6.00	15.00	Irr.	28adb 1S 2W	175	Basalt
77.	Cooper Mountain Water District #1	2/23/68	G-4248	G-4008		0.22 cfs		163.01	Mun.	31dab 1S 1W	892	Basalt
78.	Harry Werner	5/29/68	G-4422	G-4167		0.20 cfs	27.40	60.00	Irr.	5bca 2S 1W	229	Basalt
79.	John Klotz & Anna Klotz	9/3/68	G-4379	G-4131		0.06 cfs	4.50	11.25	Irr.	21dda 1S 1W	395	Basalt
80.	Charles or Katherine Starr	5/29/70	G-5203	G-5024		0.11 cfs	13.00	32.50	Irr.	28abd 1S 2W	120	Basalt


LEGEND
71. Indicates The Well Location By Order Of Water Right Claims, Rights, Permits & Certificates.
Refer to Tables 1 & 2 for a listing of water rights.
OREGON STATE ENGINEER
Ground-water Division
COOPER MTN.-BULL MTN.
PRIORITY OF GROUND-WATER RIGHTS MAP
Plate 1


LEGEND
—-10— Indicates Water Level Contour Of Minus Ten Feet.
OREGON STATE ENGINEER
Ground Water Division
COOPER MTN. - BULL MTN.
BASALT AQUIFER
WATER LEVEL CHANGE MAP
1960-1970
Plate 2