BEFORE THE STATE ENGINEER OF OREGON

MALHEUR COUNTY

ON THE QUESTION OF DETERMINATION OF A CRITICAL GROUND WATER AREA IN COW VALLEY, MALHEUR COUNTY OREGON

FINDINGS, CONCLUSIONS AND ORDER

INTRODUCTION

- 1 -

Now at this time the above entitled matter coming for consideration by the State Engineer, and it appearing that all evidence and testimony have been taken in the above entitled proceedings, and the State Engineer having carefully considered all such evidence and testimony and the geologic and engineering data gathered in accordance with the law, and now being fully advised in the premises, makes and orders to be entered in the records of his office the following "Findings, Conclusions and Order."

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Written notices of a hearing on the question of determination of a critical ground water area in Cow Valley, Malheur County, Oregon were given on February 24, 1956, to all the licensed water well drillers of record. Notices were also given to all the claimants or appropriators of ground water in Cow Valley, and were also published in a newspaper of general circulation in Malheur County. These notices set forth the date of the hearing and invited interested persons to be present to present 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 interfere 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.

(e) Any other pertinent matter on the question of whether or not the area shall be determined to be a critical ground water area under provisions of ORS 537.730, 537.735 and 537.740.

A hearing on the above entitled matter was held at the Malheur County Court House, Vale, Oregon, during the period April 24 through April 27, 1956 and July 8, 1959. Appearances were made by Robert D. Lytle and Charles W. Swan, attorneys for Guss Davis, Anthony Yturri and Martin P. Gallagher, attorneys for Rankin Crow, and John D. Nichols and Louis S. Bonney, Assistant Attorneys General, Attorneys for the State Engineer. Testimony and documentary evidence were given by Jack E. Sceva, Ground Water Geologist of the Oregon State Engineer; R. C. Newcomb, District Geologist of the Ground Water Branch, U. S. Geological Survey; Max Holloway, well driller and ground water appropriator in Cow Valley; Walter E. Anderson, farm operator in Cow Valley; Eugene D. Smith, former farm operator in Cow Valley; Walter E. Gillespie, Malheur County Engineer; Rankin Crow, ground water appropriator in Cow Valley; and John W. Robinson, Consulting Ground Water Geologist.

FINDINGS

- 1 -

Cow Valley is located between the towns of Ironside and Brogan, lying along both sides of U. S. Highway 28 between mile post 241 and 250. Its drainage area includes about 50 square miles, tributary to Cow Creek above the abandoned earth dam in the NW¼, Section 3, Township 15 South, Range 41 East, W.M., being within Township 14 South, Ranges 40 and 41 East, Township 15 South, Ranges 39, 40 and 41 East and Township 16 South, Ranges 40 and 41 East, all being within Malheur County, Oregon. Cow Valley as used hereafter shall mean the broad east-trending valley floor of Cow Creek and the extensive coalescing alluvial fans that border the valley floor. It lies principally in Township 15 South, Ranges 40 and 41 East, however a small part of Cow Valley lies in the southern tier of Sections in Township 14 South, Ranges 40 and 41 East.

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Cow Creek heads in the mountainous area in the south central part of the drainage area. It flows west and north through a narrow valley and debouches onto Cow Valley in the west central part of the drainage area. From there, the course of Cow Creek is generally north and east through Cow Valley to where it leaves by way of a narrow gap in the NW¼ of Section 3, Township 15 South, Range 41 East. Only during periods of unusually heavy runoff does Cow Creek flow entirely through the valley. Generally it sinks into the ground within a few miles from where it flows out of the mountains onto the valley plain. Numerous streams flow off the surrounding mountains during periods of heavy runoff. Many of these streams also sink into the ground before they reach the channel of Cow Creek.

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The first irrigation well was drilled in Cow Valley in 1949. With the success of this well additional irrigation wells were soon constructed. During the 1958 irrigation season, 14 irrigation wells were in use. As there was some concern as to the magnitude of the available ground water supply as early as 1950, the U. S. Geological Survey began measuring water levels in two of the irrigation wells. As these water level records showed an annual decline, the Ground Water Branch of the U. S. Geological Survey was requested to make an investigation of the Ground Water resources of Cow Valley in 1954. An investigation was made by the Geological Survey working in financial cooperation with the Oregon State Engineer during the fall and winter of 1954 and the spring and summer of 1955. Their investigation resulted in the preparation of the report "The Ground Water Resources of Cow Valley near Ironside, Malheur County, Oregon" by S. G. Brown and R. C. Newcomb which was released in 1956.

Cow Valley lies in an arid region whose climate is characterized by warm dry summers, and more humid cool winters. The amount of precipitation generally shows an increase with greater altitudes. No weather stations have been located in Cow Valley. A weather station was operated at Ironside, approximately 7 miles northwest of Cow Valley, during the period July 1909 through December 1915. The average annual precipitation at that station for that period was 13.49 inches. A weather station has also been operated at Vale, Oregon, approximately 37 miles southeast from Cow Valley, since 1891. The mean annual precipitation reported by the Weather Bureau for this station is 8.90 inches. As Cow Valley and its drainage area lie above the altitude

to these two weather stations, it is probable that the average annual precipitation incident to Cow Valley and its drainage area would be somewhat greater than that recorded at these weather stations.

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Cow Valley is an upland basin that was formed by the folding and faulting of the underlying rock formations. The older rocks, which form the hills and mountains surrounding Cow Valley, are composed largely of partly metamorphosed sedimentary and igneous rocks. Cow Valley Butte, which lies immediately north of the valley is in part composed of a granitic type of rock. These older rocks are at many places overlain by a stratum of lava and beds of associated sedimentary materials composed chiefly of tuffs and agglomerates. These rocks, which have a visible thickness of about 300 feet, originally formed a cap rock over the older rocks. They were faulted along with the older rocks when the ancestral Cow Valley was formed, and now occur on the slopes and crest of some of the hills and mountains as well as beneath the valley floor.

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The post faulting erosion of the hills and mountains surrounding Cow Valley resulted in the deposition of several hundred feet of alluvial materials in parts of the valley. These alluvial deposits, which also form the broad coalescing alluvial fans that border the valley floor, are composed chiefly of rock rubble, gravel, sand and silt.

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Ground water occurs in the alluvial deposits and the lava rocks and associated sediments. The most productive water bearing zones are generally encountered in the volcanic rocks and associated sediments, however the coarse gravel strata in the alluvial deposits

do serve as an important source of ground water. Only one well has penetrated to any great depth into the older rocks that underlie the volcanic rocks. This 1,000 foot well encountered very little water-bearing material in these older rocks and is believed to have developed only a small additional supply of ground water with 785 feet of penetration into these older rocks. All these water-bearing zones in the alluvial deposits and the volcanic rocks and associated sediments are believed to be hydraulically connected and form one ground water reservoir which will be known herein as the Cow Valley Ground Water Reservoir. Brown and Newcomb, in their report on the ground water resources of Cow Valley reached the following conclusions concerning this reservoir.

> "The water levels, the mutual drawdown of water level, the chemical and physical similarity of the water, the drillers logs all indicate that the water-bearing materials penetrated by the wells are hydraulically interconnected. In effect, these features indicate that the aquifers in Cow Valley are an over-all hydraulic unit and that any difference in well performance are due to conditions that may extend only a short distance from any one well or are due to differences in the manner of constructing, finishing and using the wells."

The water table in the western part of Cow Valley, the area where ground water is being withdrawn for irrigation, is essentially a flat surface having only a slight gradient down valley. Pumping has created a broad flat cone of depression that recovers to a near level surface within a short period of time after pumping ceases. For example, water level measurements made in October 1955, approximately one month after pumping ceased, show that the overall range in elevation of the water table was approximately 4 feet. In January 1956, the range was in the order of 2 feet. This relatively flat water table indicates that if and when a reduction of ground water withdrawals becomes necessary, the location of the point or

area of reduction will not be of great importance; that is a reduction at any point, would in time, be effective throughout the entire ground water reservoir. The water table in May 1957 was at an altitude of 3872 feet.

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Water level measurements are available at two observation irrigation wells for the period 1949 to 1958. These water level measurements which are depicted on the attached hydrographs, (Exhibits 1 and 2 attached hereto) show the changes that have taken place in the position of the water table during that period. Additional water level measurements are available in other irrigation wells for the period 1955 to 1958, these additional water level measurements show that the changes recorded at the two observation wells are indicative of the changes that have taken place throughout the ground water reservoir. These hydrographs show that the spring high position of the water table does not generally recover to the position recorded the previous spring. This indicates that some ground water is being withdrawn from storage.

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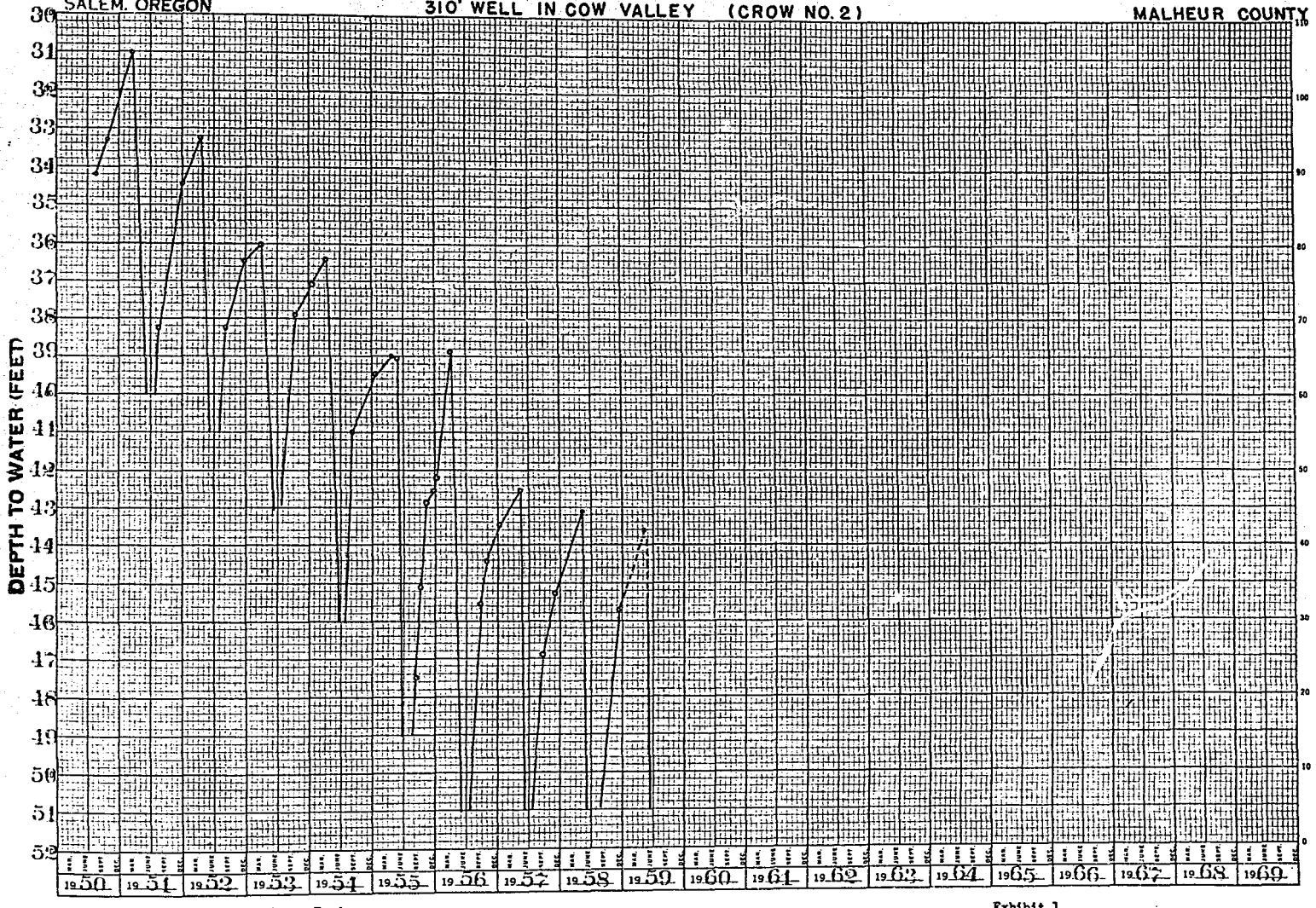
The Cow Valley ground water problem might be compared to an imaginary surface water reservoir from which more water is being withdrawn each year than is replenished. The amount of water withdrawn in excess of the amount of replenishment is withdrawn from storage in the reservoir that had accumulated in bygone years. The water surface in this imaginary reservoir would correspond to the water table in Cow Valley. This surface would lower each year until all the stored water had been withdrawn. At that time it would be impossible to withdraw more water than the amount that flows in each year. Any increase in the withdrawals prior to that time would accelerate the lowering of the water surface. If withdrawals (including

STATE ENGINEER
SALEM, OREGON

310' WELL IN COW VALLEY (CROW NO. 2)

15/40-2N (1)
MALHEUR COUNTY



Prepared by State Engineer

Exhibit 1

evaporation) were reduced to the amount of the average annual replenishment, the water surface in this imaginary reservoir would be maintained at a relatively stable position. During years of below average replenishment the water surface would decline, but it would recover during periods of above average replenishment.

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Water level measurements on a basin wide well net are available for the years 1955 through the spring of 1958. From the amount of water level lowering and the estimated ground water withdrawals it is possible to calculate the storage capacity of the Cow Valley Ground Water Reservoir. The average for this 3 year period is 0.45 feet of water table lowering per 1,000 acre feet of water pumped. On this basis and for this period the storage capacity of the Cow Valley Ground Water Reservoir is about 2,200 acre feet per foot of lowering, or for every 2,200 acre feet of ground water withdrawn from the Cow Valley Ground Water Reservoir in excess of the amount of annual replenishment there would be one foot of water level decline.

- 12 -

The replenishment of water to a ground water reservoir is known as recharge. The Cow Valley Ground Water Reservoir is recharged by infiltration of part of the precipitation that is incident to the area and by infiltration of part of the runoff which is derived chiefly from the spring snowmelt in the hills and mountains bordering the Valley. The altitude of the water table in Cow Valley (approximately 3872 feet in May 1957) stands at a higher altitude then in the adjacent stream valleys, and the evident lack of permeability of the older rocks which underlie Cow Valley Ground Water Reservoir preclude the possibility of any substantial interbasin transfers underground to the Cow Valley Ground Water Reservoir. No evidence is known that indicates any water

source to the Cow Valley Ground Water Reservoir other than the precipitation that is incident to the drainage basin.

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From the storage capacity of the Cow Valley Ground Water Reservoir and the amounts of water table rise that is attributed to recharge, it is possible to calculate the amount of annual recharge. The following table gives the calculated recharge for the years 1956-1958.

YEAR	RECHARGE IN ACRE-FEET
1956	4,100
1957	3,400
1958	5,900

Average recharge 4,500 acre feet.

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The filling of the surface water storage reservoirs of Rankin Crow during the unusually heavy runoff that occurred during the spring of 1956 resulted in a rise in the water table in the nearby irrigation wells. This rise indicates that recharge to the Cow Valley Ground Water Reservoir could probably be increased if sufficient surface storage capacity was available to impede the runoff that flows through and out of the Valley.

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At the present time an unknown but relatively small amount of water is being evaporated or transpired back into the atmosphere in the eastern end of the valley. Some ground water also discharges through springs and seeps and leaves the valley by way of Cow Creek. A large part of this ground water, which is not now being put to beneficial use, could be utilized if the water table were lowered sufficiently to reduce these losses. It is estimated to a lowering of the water table to the 3840 altitude (approximately 32 feet) would

accomplish this saving. Such a lowering however would require the withdrawal of some 70,000 acre feet of ground water from storage. Such a lowering would reduce the pumping capacity of all the irrigation wells and would increase the pumping lift of water withdrawn by an additional 32 feet. The 70,000 acre feet of ground water which could serve as a reserve supply to tide appropriators over during long periods of below average precipitation, would not be available.

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Eight Ground Water Right Certificates have been issued for the appropriation of ground water for irrigation in the Cow Valley area. Two additional ground Water Right Certificates will be issued upon completion of final proof surveys. The priority and limitation of these rights at the duty of 3 acre feet per acre are as follows:

Permit No.	Water Right Certificate	Date of Priority	Acreage Irrigated	Duty at 3 ac. ft. per ac.	Cumulative total at 3 acre-feet per acre
U-320	23627	5/13/49	189.0	567.0	567.0
U-349	23628	6/29/50	40.5	121.5	688.5
U-350	23629	6/29/50	163.7	491.1	1179.6
U-369	23630	9/20/50	132.0	396.0	1575.6
U-359	23631	9/20/50	194.1	582.3	2157.9
U-391	23632	5/10/51	479.6	1438.8	3596.7
U-392	23633	5/10/51	130.4	391.2	3987.9
U-406	23634	8/21/51	40.9 1/	122.7	4110.6
U-414		11/5/51	224.0 2/	672.0	4782.6
U-490	23635	10/17/52	48.0	144.0	4926.6
U-629		3/30/54	165.0 2/	495.0	5421.6

1/ Also 130.4 acres of supplemental irrigation of land covered by Ground Water Right Certificate No. 23633

2/ Acreage from application for permit.

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Estimates of annual ground water withdrawals under each of the ground water right certificates and permits, and withdrawals from wells operating without a State Engineer Permit are given in the

following table. Diversions under most of the appropriations exceeded the limitations set forth in the Water Right Certificates during the 1955, 1956 and 1957 irrigation seasons. The total withdrawals from all irrigation wells in Cow Valley is estimated to have been 7,261 acre feet during the 1957 irrigation season.

Permit No.	Water Right Certificate No.	Limit of right of 3 acre feet per acre duty (acre feet)	Annual Pumpage in Acre Feet						
			1951	1952	1953	1954	1955	1956	1957
U-320	23627	567.0	304	350	234	423	342	758	832
U-349	23628	121.5	150	131	61	235	124	169	132
U-350	23629	491.1	325	413	311	486	502	487	532
U-369	23630	396.0	478	327	228	402	469	494	529
U-359	23631)								
U-392	23633)	1096.2 1/	611	1028	1081	1627	1567	1597	1916
U-406	23634)								
U-391	23632	1438.8		1322	894	1890	1718	1520	1879
U-414	none	672	157	276	188	481	674	336	374
U-490	23635	144			68	252	260	203	208
U-629	none	495				629	539	385	130
None 2/	none	None					745	859	729
	Total	5421.6	2025	3847	3065	6425	6940	6808	7261

1/ Combined limit of rights and pumpage for two irrigation wells. Well covered by Water Right Certificate No. 23634 has right for supplemental irrigation of 130.4 acres covered by Certificate No. 23633.

2/ Pumpage from two irrigation wells operating without a permit.

Five ground water applications have been filed with the State Engineer for the construction of 6 wells for the irrigation of 1,335 acres and to increase the withdrawals from some of the existing wells for the irrigation of 150 acres and the supplemental irrigation of 267 acres. Four of the six new irrigation wells have already been constructed, and two of these have been used for irrigation since 1955 without a State Engineer permit.

CONCLUSIONS

- 1 -

The ground water level in Cow Valley is declining and the available ground water supply is being overdrawn. Without corrective control provisions on the development and withdrawal of ground water in

this area, the water table will continue to decline until the ground water appropriators who have complied with State Laws and obtained permits will be unable to withdraw the ground water to which they are entitled under such permits.

- 2 -

A reduction of ground water withdrawals to the limitations set forth in the ground water right certificates and permits would still result in the ground water withdrawals from the Cow Valley Ground Water Reservoir being in excess of the estimated average annual recharge. The amount of ground water that can be withdrawn under existing certificates and permits will be between 4,255 and 5,422 acre feet per year, being dependent upon the acreage being irrigated under Permits U-414 and U-629. Such a reduction, however, would reduce the rate of water level decline. The continued collection of pumpage and water level data would in time give more exact information as to the amount of the average annual recharge. This more exact information could be used as a basis for further reductions or enlargement of the ground water withdrawals from the Cow Valley Ground Water Reservoir.

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In order to insure the preservation of the public welfare, safety and health, and to prevent continuation of excessively declining ground water levels and further protect existing rights to appropriate ground water, it is necessary that Cow Valley be declared a Critical Ground Water Area.

ORDER

NOW, THEREFORE, IT HEREBY IS ORDERED that Cow Valley be declared a critical ground water area and is to be known as the "Cow Valley Critical Ground Water Area". The boundary of this critical ground water area is shown on the attached map, exhibit 3, and is described as follows:

Beginning at the southwest corner of Section 34, Township 14 South, Range 40 East, W.M., thence in a southwesterly direction to the northwest corner Section 17, Township 15 South, Range 40 East, W.M., thence south along the west line of said Section 17, and Section 20, Township 15 South, Range 40 East, W.M. to the southwest corner of said Section 20, thence east along the south line of Sections 20, 21, 22, 23 and 24, Township 15 South, Range 40 East, W.M. and Sections 19 and 20, Township 15 South, Range 41 East, W.M. to the southeast corner of Section 20, Township 15 South, Range 41 East, W.M., thence north along the east line of said Section 20 to the southwest corner Section 16, Township 15 South, Range 41 East, W.M., thence in a northeasterly direction to the northeast corner of said Section 16, thence east along the south line of Sections 10 and 11, Township 15 South, Range 41 East, W.M. to the south ¼ corner of said Section 11, thence north to the northeast corner, SE¼ SW¼ Section 2, Township 15 South, Range 41 East, W.M., thence west to the southeast corner of the NW¼ SW¼ of said Section 2, thence in a northwesterly direction to the northeast corner of the SW¼ NE¼ Section 3, Township 15 South, Range 41 East, W.M., thence west to the northwest corner, SW¼ NW¼ of said Section 3, thence in a southwesterly direction to the southwest corner, SE¼ NE¼ Section 4, Township 15 South, Range 41 East, W.M., thence west to the southwest corner SE¼ NE¼ Section 5, Township 15 South, Range 41 East, W.M., thence in a northwesterly direction to the southwest corner, NW¼ NE¼ of said Section 5, thence north to the north ¼ corner of said Section 5, thence in a northwesterly direction to the east ¼ corner Section 31, Township 14 South, Range 41 East, W.M., thence in a westerly direction to the west ¼ corner Section 34, Township 14 South, Range 40 East, W.M., thence south to point of beginning, all lying within Malheur County, Oregon.

The Cow Valley Critical Ground Water Area includes all the underlying water bearing stratum that are known collectively as the Cow Valley Ground Water Reservoir and includes all the water bearing zones in the underlying alluvial deposits and the volcanic rocks and associated sediments that underlie this area.

It is FURTHER ORDERED that the Cow Valley Critical Ground Water Area is closed to further appropriation of ground water. Applications for permits to appropriate ground water in this area will not be accepted.

It is FURTHER ORDERED that applications numbered G-36, G-37, G-41, G-43 and G-323 for the construction of irrigation wells and the appropriation of ground water in the Cow Valley Critical Ground Water Area are rejected.

It is FURTHER ORDERED that the Water Master regulate the control works on all wells in the above described Critical Ground Water Area other than those wells whose use of ground water is specifically exempted in ORS 537.545, so that the rate and total quantity of ground water withdrawn does not exceed that allowed under their ground water right Certificates or Permits. The procedure for regulating and posting such changes shall be as set forth in ORS 540.040.

It is FURTHER ORDERED that all unlawful diversions of ground water within the Cow Valley Critical Ground Water Area shall cease. To this end, the Water Master 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 violation. Written notices shall be posted at all wells so regulated stating that further unlawful diversion from that well shall result in the arrest and prosecution of the violator.

It is FURTHER ORDERED that the owners or operators of all wells in the above described Critical Ground Water Area other than those whose use of ground water is specifically exempted in ORS 537.545 shall, prior to any ground water withdrawal after January 1, 1960, equip their wells with totalizing water meters and shall maintain a record of the withdrawal of ground water from each well. A copy of these records shall be furnished to the State Engineer on or before November first of each year.

It is FURTHER ORDERED that the owners or operators of all wells in the above described Critical Ground Water Area other than

those whose use is specifically exempted in ORS 537.545 shall, prior to any ground water withdrawal after January 1, 1960, equip their wells with control valves so that the discharge can be regulated to the rate of withdrawal allowed under their water right Certificates or ground water Permits.

It is FURTHER ORDERED that an annual evaluation of the ground water supply in the Cow Valley Critical Ground Water Area be made by the State Engineer for the purpose of evaluating the effectiveness of the control provisions set forth in this order. If it is found that the control provisions set forth in this order are ineffective, and that additional reductions in the annual withdrawal of ground water from the Cow Valley Ground Water Reservoir are necessary to maintain a reasonably stable ground water level, such reductions shall be ordered in accordance with the relative dates of priority of the water rights of the appropriators.

Dated at Salem, Oregon this 12th day of November 1959.

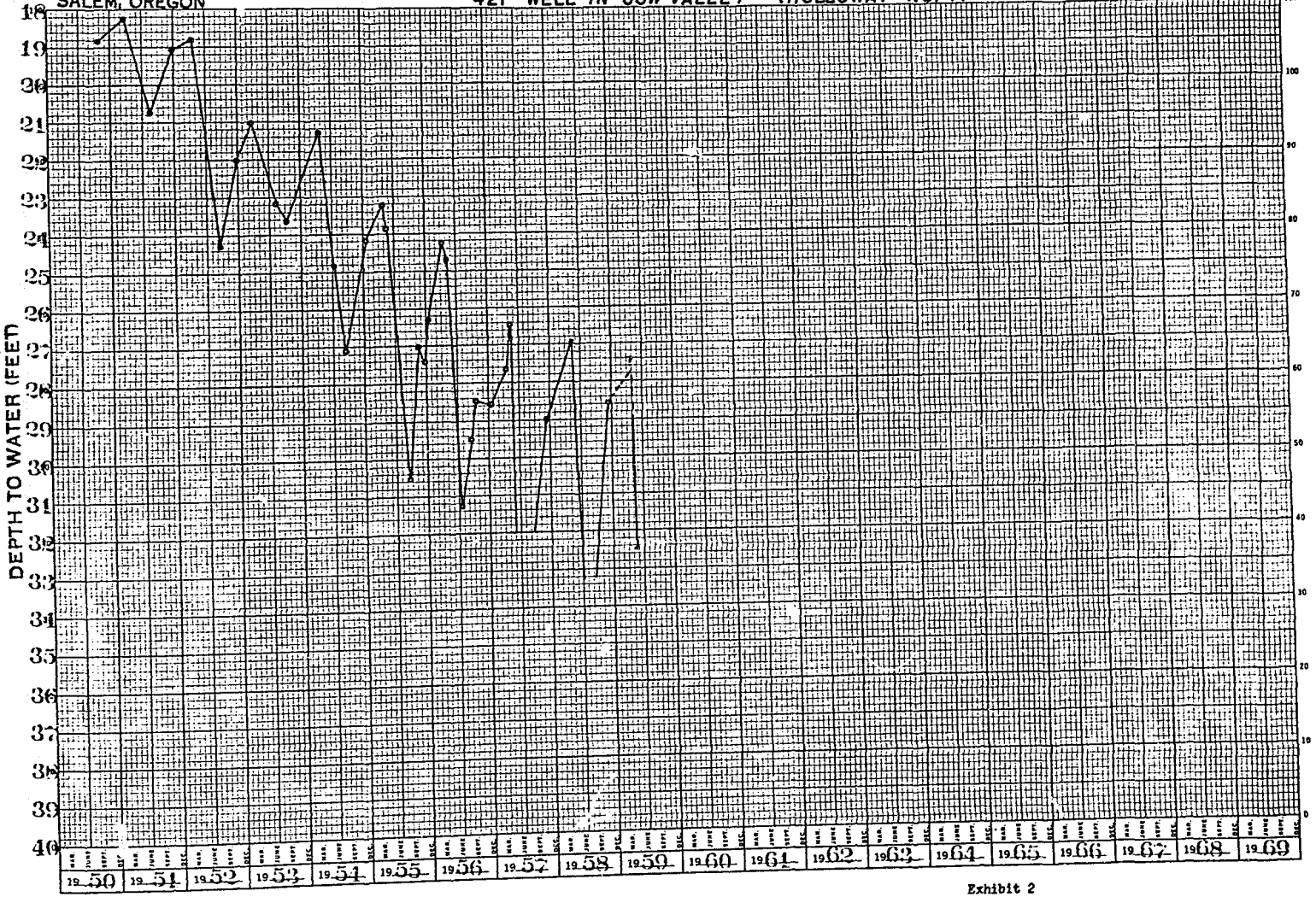
Lewis A. Stanley

LEWIS A. STANLEY
State Engineer

STATE ENGINEER
SALEM, OREGON

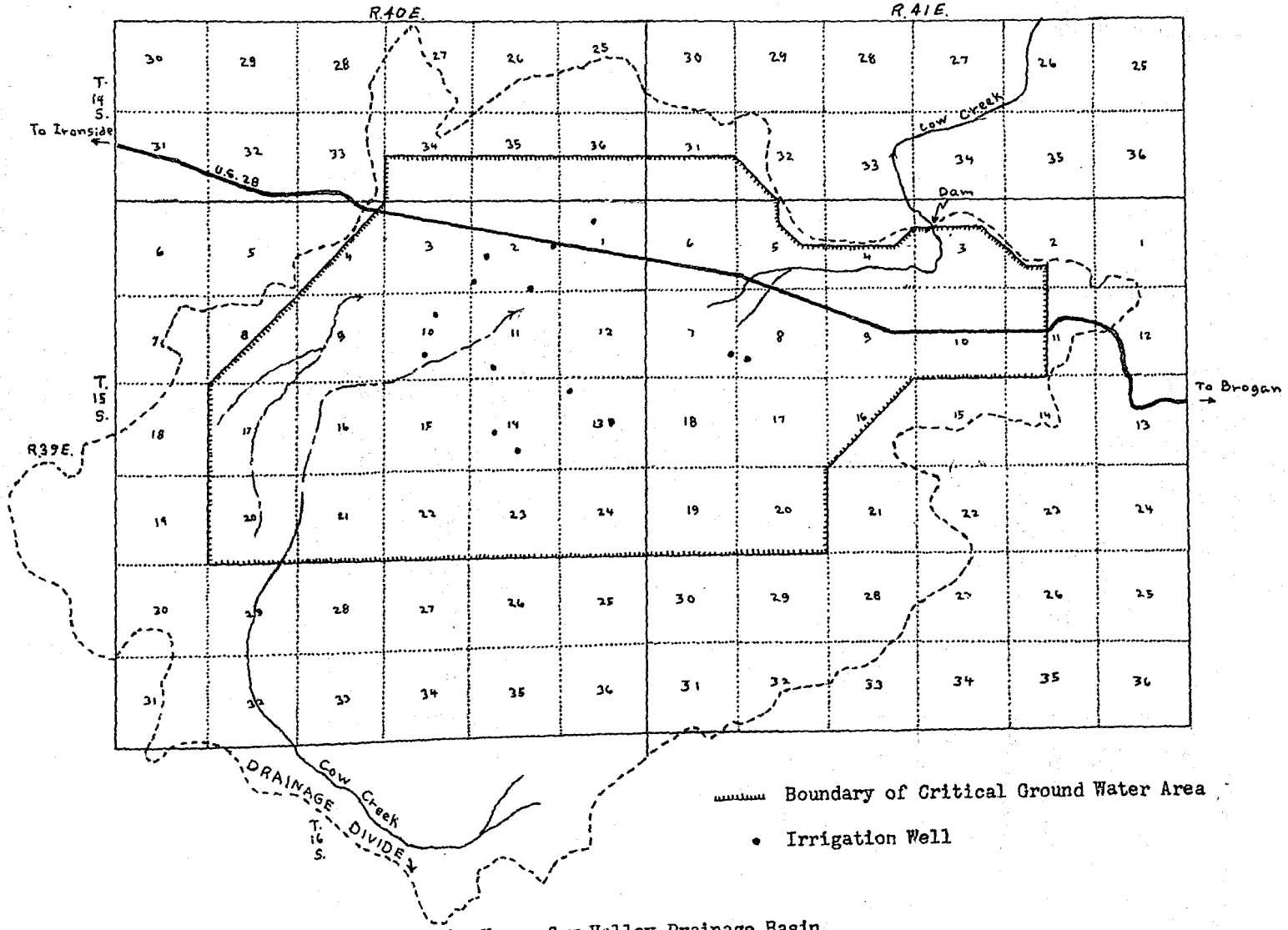
421' WELL IN COW VALLEY (HOLLOWAY NO. 1)

15/40-2J (1)
MALHEUR COUNTY



Prepared by State Engineer

Exhibit 2



Map of the Upper Cow Valley Drainage Basin

Showing location of the Cow Valley

Critical Ground Water Area

Malheur County, Oregon

Exhibit 3

Prepared by
State Engineer