

INVESTIGATIONS

Geology & Ground Water Resources In Vicinity of the Columbia River And Interstate 5, Clark County Washington. No. 2

state of washington
department of ecology
daniel j. evans
governor
john a. biggs
director
olympia, washington
october, 1971

Aa investigation of the geology and ground-water resources along State Highway 205 from the Columbia River to Interstate 5. Testing was done to determine the quantity and quality of ground water available for the replacement of a well to be destroyed by highway construction. Prepared by Paul A. Eddy, Office of Technical Services, Department of Ecology, Olympia, Washington, February, 1971.

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Purpose and Scope of the Investigation

This study was initiated upon receipt of a letter dated September 17, 1970 sent by the Chief Right of Way Agent, Department of Highways, requesting information about present and future ground-water availability and possible adverse effects which could be incurred by construction of the SR 205 freeway.

The scope of this study was set to include several determinations which are:

1. Ascertain the availability of ground water to the present site.
2. Determine direction of ground-water flow.
3. Conduct a pump test in order to obtain specific information about the well behavior.
4. Determine possible damage to the well by nearby construction.

The study consisted of a general geologic reconnaissance of the area and a pump test of the well in question. Additional information was obtained from the files of the Department of Ecology.

Location and Topography of the Area

This well in question lies geographically near the southwestern edge of Clark County and is within Township 2 North, Range 2 East of the Willamette Meridian, Section 6. The altitude of the well is approximately 260 feet above sea level and lies on gently rolling flatland. The well in question lies approximately 75 feet north and 30 feet east of the dwelling. (Fig. 1)

Geology and Ground Water

The geology of this area consists of three primary rock units and they are as follows:

Older Consolidated Rocks - Included in this group are the Goble volcanic series, the Eagle Creek formation, the Keechelus andesitic series (Skamania andesite series of Felts, 1939), the Columbia River Basalt, and intrusive rocks of one or two areas such as the Silver Spring granodiorite stock (Felts 1939). With few exceptions these older consolidated rocks crop out only in the foothills and are in areas which are largely uninhabited, the rocks are not economically important as aquifers.

Troutdale Formation - This unit consists of: Semiconsolidated clay, silt, sand, and gravel and is the most widespread formation with its' upper unit considered to be one of the most productive aquifers in the county. Wells drilled into the sand and gravel strata of the upper Troutdale formation generally have a moderate to high permeability thus yielding moderate to large supplies of water except where the unit has been badly weathered.

Pleistocene Alluvial Deposits - This unit also goes by the synonym "Portland Delta Gravels" which are sand and gravel which has a comparatively fresh and unweathered appearance. In general the material is well sorted, but the degree of sorting is much better in the finer grained phases than in the coarse phase. In places the gravels are lightly cemented, but not enough so that the porosity is greatly reduced.

The stratigraphic unit in which this well is located is the Pleistocene Alluvial deposits of the Forth Plains area. It has been indicated that wells located between Salmon Creek and Burntbridge Creek obtain moderate yields from coarse sand and gravel which are chiefly the result of reworking the alluvial delta deposits and part of the upper member of the Troutdale Formation. The reworked gravels in the vicinity of this well reach to a depth in excess of 100 feet. This is because the Pleistocene Alluvial deposits filled a valley of the ancestral Columbia River which was cut into the Troutdale Formation. (Fig. 2)

Pump Test Data

The following table indicates the response of this well to pumping. The pump size was a three quarter horsepower pump which yielded 15 gallons per minute during the test. General well information is illustrated on Figure 3.

October 15, 1970

Pumping Date Hour	Water Level Below Top of Casing	Remarks and time interval
10:15 AM	103.45	0
	105.6	30 seconds
10:16	105.88	1 minute
10:20	106.88	5 "
10:26	106.6	11 "
10:29	106.73	14 "
10:31	106.78	16 "
10:33	106.81	18 "
10:36	106.81	21 "

10:40	106.81	25 Minutes
10:50	106.81	35 "
11:00	106.81	45 "
11:05	106.82	50 "
11:10	106.82	55 "
11:15	106.82	60 minutes

Pump Off

	103.3	30 Seconds
11:16	103.5	1 minute
	103.45	1 Min. 30 Sec.
11:17	103.45	2 minutes

Conclusions

Over the sixty minute pump test this well produced approximately 900 gallons of water. The well showed no indication of pumping dry, in fact the water level stabilized at 106.81-82 feet below the top of casing after only 16 minutes of pumping. The pump test had to be restarted twice, each time an additional outlet had to be opened in order for the pump to continue running.

The specific capacity of this well is 4.4 gallons per minute per foot of drawdown based on the conducted pump test. (Fig. 4)

This well will produce the required water of 300 gallons per day (4 person family, 200 gallons per person) pumped on a continuous basis. The well will in fact produce in excess of 7000 gallons per an 8 hour period based on data from the pump test which was run.

The sample tested by the County Health Office indicated that the (M.F.) of bacteria of the coliform group had a count which was less than 1 per 100 milliliter of water. At this level of contamination by non-pathogenic coliform, the risk of contracting disease by drinking the water is virtually zero.

The general direction of ground-water flow is difficult to ascertain but it appears to be toward the northwest in the direction of the unnamed tributary of Salmon Creek.

It is impossible to determine by the conducted pump test the maximum capacity of this well, but it does indicate that a replacement well will have to at least 15 gallons per minute in order to replace the existing well. This quantity will serve the household needs and also dairy needs if required.

REFERENCES

Mundorff, M. J., 1964, Geology and Ground-water Conditions of Clark County, Washington, with a Description of a Major Alluvial Aquifer Along the Columbia River: Washington Department of Conservation Water Supply Bulletin No. 9, pgs. 31, 32, 33 and 49.

Washington State Department of Health, Bulletin ES No. 4, pg. 10.

APPENDIX I

FIGURES 1 - 5

PAGES 6 - 10



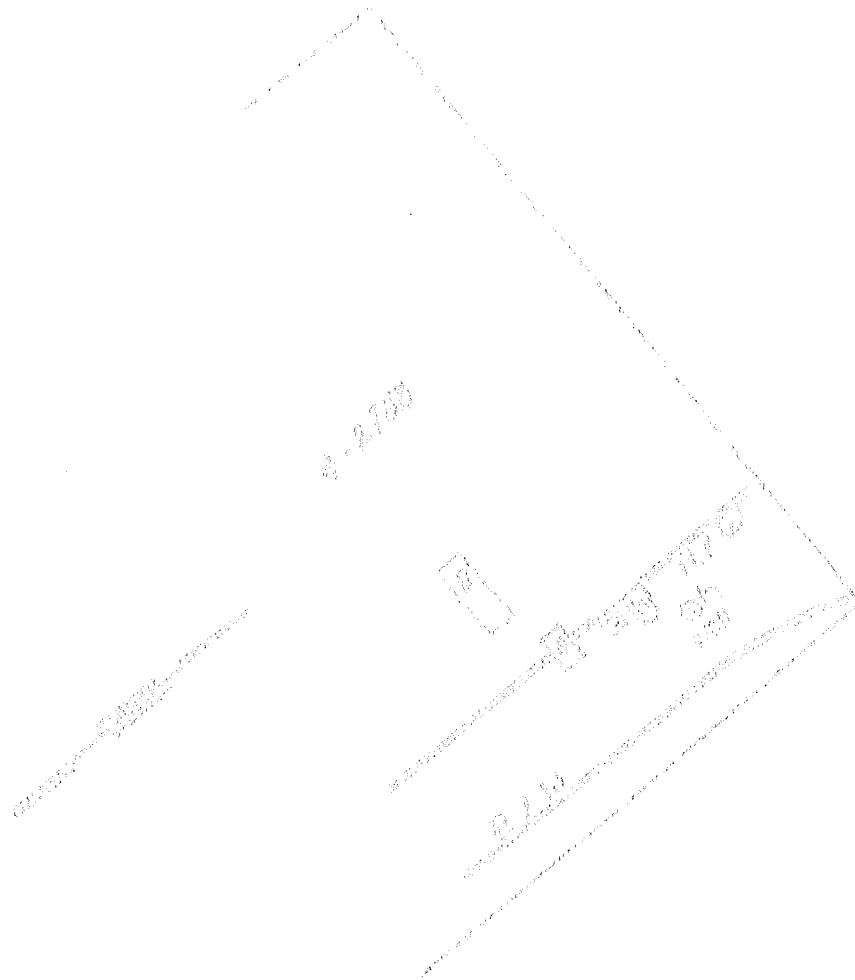
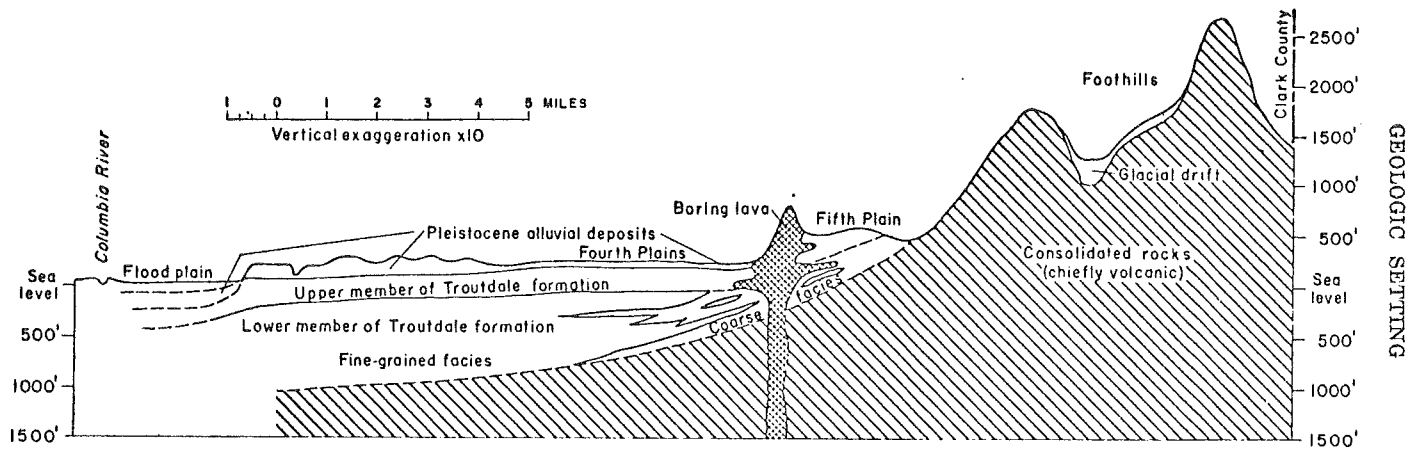


Figure 3.



Generalized east-west section across Clark County.

Figure 2

WELL SCHEDULE

Date October 19 70

Record by Paul A. Eddy

Source of data Field

1. Location: State Washington County Clark

Map Orchards Well No. 2/2E-6 NE 1/4 SE 1/4

2. Owner Larry Hess Address 6811 N. E. 88th

Tenant _____ Address _____

Driller _____ Address _____

3. Topography Rolling flatland

4. Elevation 260 ft. ~~below~~ ^{above} Sea level

5. Type: Dug, (drilled), driven, bored, jetted _____ 19 _____

6. Depth: Rept. _____ ft. Meas. _____ ft.

7. Casing: Diam. 8 in., to _____ in., Type _____

Depth _____ ft., Finish _____

8. Chief Aquifer _____ From _____ ft. to _____ ft.

Others _____

9. Water level 103.45 ft. ~~rept.~~ ^{meas.} October 19 70 ~~below~~ ^{above} at LSD

_____ which is _____ ft. ~~below~~ ^{above} surface

10. Pump: Type Gould Capacity _____ G.M.

Power: Kind _____ Horsepower 3/4

11. Yield: Flow _____ G.M., Pump 15 G.M., (Meas.), Rept., Est. _____

Drawdown 2.37 ft. after 1 hours pumping _____ 15 G.M.

12. User: (Dom.), Stock, PS., RR., Ind., Irr., Obs. _____

13. Quality _____ Temp. 11 °C

Taste, odor, color Good, none, none Sample (Yes) No _____

< 1/100 ml Coliform

14. Remarks: (Log, Analyses, etc.) _____

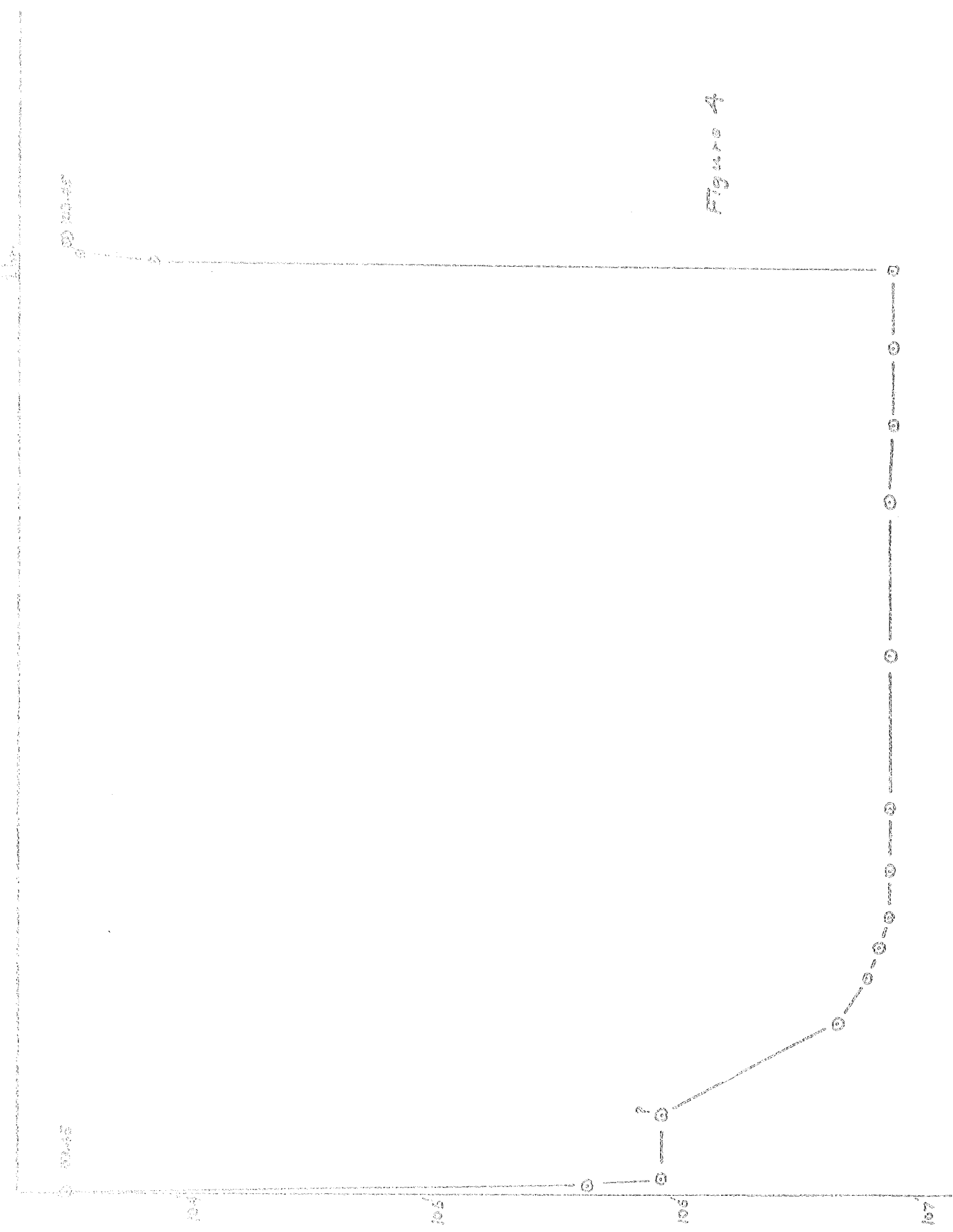


Figure 4

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
GROUND WATER ANALYSIS

Location Orchards State Washington County Clark
 Latitude _____ Longitude _____ Sec. No. _____
 Date Collected October 15, 1970 Point of coll. _____
 Source drilled Local well No. 2/2-633
 Owner Hess Water use _____
 Depth (ft) _____ Cased to (ft) _____ Diam. (in) 8 Date drilled _____
 W.L. 123.45' Above LSP Yield _____ WBF _____
 Treatment none Appear. when col. _____
 Collected by Paul Eddy Remarks _____

Specific conductance (micromhos at 25° C) 157 pH 7.0 Temp. (°F) _____

	mg/l ppm	meq ppm		mg/l ppm	meq ppm
Silica (SiO ₂)	38		Bicarbonate (HCO ₃)	83	1.65
			Carbonate (CO ₃)	0	0.00
Calcium (Ca)	14	0.70	Sulfate (SO ₄)	6.8	0.14
Magnesium (Mg)	6.2	0.51	Chloride (Cl)	3.8	0.11
Sodium (Na)	5.2	0.23	Fluoride (F)	0.1	0.01
Potassium (K)	2.5	0.06	Nitrate (NO ₃)	11	0.18
Strontium (Sr)	<0.05		O-Phosphate (PO ₄)		
Lithium (Li)	<0.02				
Total		1.50	Total		1.47

	mg/l ppm		mg/l ppm		mg/l ppm
Aluminum (Al)	0.04	Nickel (Ni)	<0.05	Dissolved solids: Residue on evap. at 180°C Calculated	131
Iron (Fe)	0.47	Zinc (Zn)	0.25		119
Manganese (Mn)	<0.02			Hardness as CaCO ₃ Noncarbonate	61
Total Chromium (Cr)	<0.03			Color	0
Copper (Cu)	<0.05			Boron (B)	
Lead (Pb)	<0.1				

Lab. No. 6124 Field No. _____ Project Washington 11800

APPENDIX II

REQUEST LETTER

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STATE OF WASHINGTON
DANIEL J. EVANS, GOVERNOR



WASHINGTON
STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

G. H. ANDREWS, DIRECTOR
HIGHWAYS-LICENSES BUILDING
OLYMPIA
September 2, 1970

COMMISSIONERS
GEORGE D. ZAHN, CHAIRMAN
METHOW
ROBERT L. MIKALSON
CENTRALIA
HAROLD WALSH
EVERETT
BAKER FERGUSON
WALLA WALLA
JOHN N. RUPP
SEATTLE
LORENZ GOETZ, SECRETARY
OLYMPIA

DISTRICT OFFICES
NO. 1 SEATTLE 98108
6431 SO. CORSON AVE.
NO. 2 WENATCHEE 98801
P. O. BOX 98
NO. 3 OLYMPIA 98501
P. O. BOX 327
NO. 4 VANCOUVER 98663
4200 MAIN STREET
NO. 5 YAKIMA 98901
P. O. BOX 52
NO. 6 SPOKANE 99205
N. 2714 MAYFAIR ST.
NO. 7 BELLEVUE 98004
10506 N.E. 4TH ST.

H. M. Ahlquist, Director
Department of Ecology
Water Resources Division
Olympia, Washington 98501

Re: SR 205, Columbia River to
Jct. SR 5 Parcel 4-2788

Dear Sir:

Attached hereto are maps illustrating approximate location of premises owned by Larry Hess et ux., a portion of which has been conveyed to the State of Washington in connection with the above identified project. The map marked "A" serves to illustrate the general area, while that marked "B" serves to illustrate the more specific location.

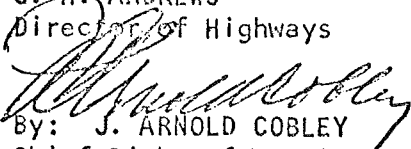
In the negotiated settlement of the above parcel the State has entered into a Well Agreement with Hess, under which, the State is to bear the expense of construction of a new well on his remaining property (not larger than 6 inch drilled, cased) to such depth as will supply it with an amount of water equal to the supply taken from the existing water supply, etc.

To assure compliance, on the State's part, of this agreement, we would like to ask your Department's assistance in making a test of the existing well as to volume and potability.

For purposes of arranging for, and in accomplishing this test, our Mr. Syd Wellman in Vancouver (Scan Telephone 80732-1251) stands ready to assist you in any way necessary. Thank you for your help in this matter.

Very truly yours,

G. H. ANDREWS
Director of Highways


By: J. ARNOLD COBLEY
Chief Right of Way Agent

GHA:cc
JAC:PAW

Attachment