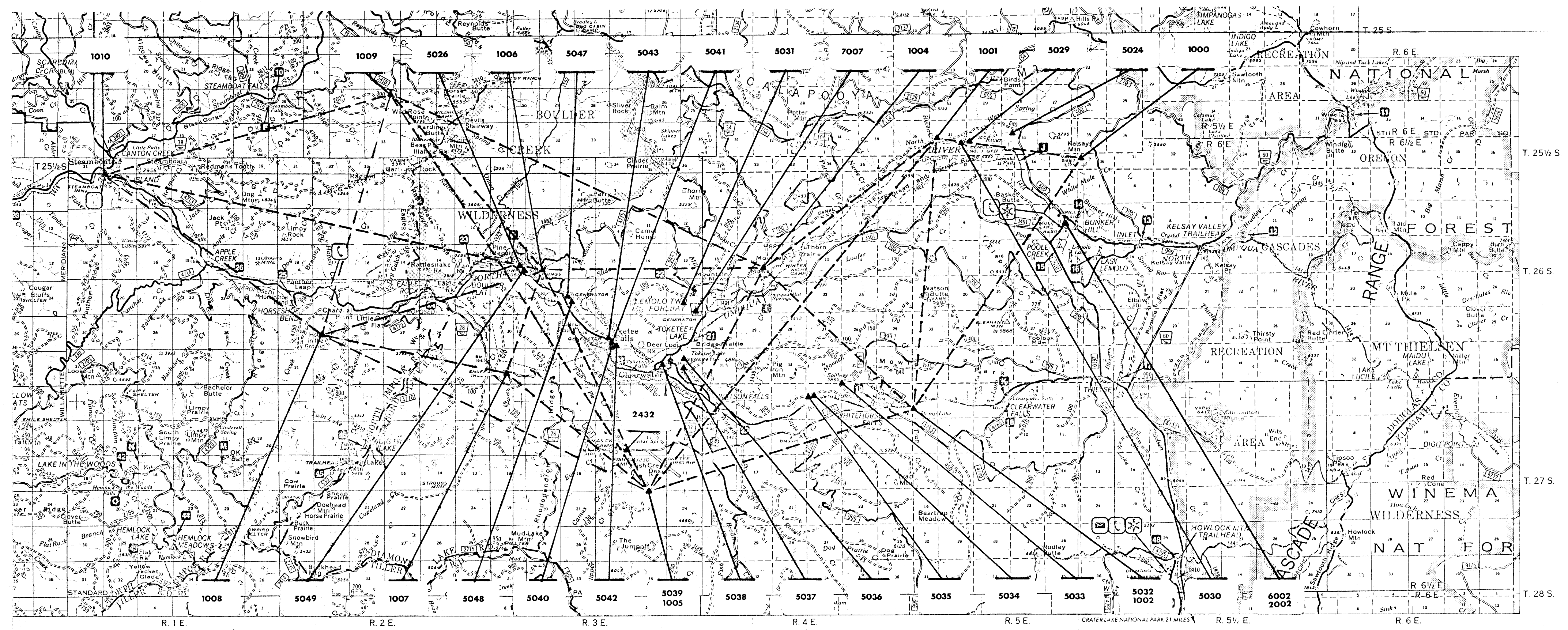


REGISTERED PROFESSIONAL LAND SURVEYOR
Richard B. Davis
JANUARY 5, 1999



FIXED CONTROL POINTS:
1000 FIXED IN X AND Y, HELD PUBLISHED COORDINATES
1002 FIXED IN Z, ELEVATION BASED ON USC68S BM '9 480'
1004 FIXED IN Z, ELEVATION BASED ON USFS GPS ELEVATION
1007 FIXED IN Z, ELEVATION BASED ON USC68S BM '9 477'
1009 FIXED IN Z, ELEVATION BASED ON USFS GPS ELEVATION
1010 FIXED IN X, Y AND Z, HELD PUBLISHED COORDINATES
2002 FIXED IN Z, ELEVATION BASED ON USFS GPS ELEVATION AT '268 SE 81'
2432 FIXED IN Z, ELEVATION BASED ON USC68S BM '9 477'

NOTE: AT POINTS 1004, 1009, 1010 AND 2002 THE PUBLISHED ELEVATIONS ARE NAVD 83 AND WERE CONVERTED TO NAVD 88 FOR INCORPORATION INTO THIS SURVEY. BECAUSE OF THIS CONVERSION PROCESS AND THE SPARSE VERTICAL CONTROL AVAILABLE, THE NEW ELEVATIONS DETERMINED DURING THIS SURVEY HAVE A STATED ACCURACY OF +0.5 FEET IN ABSOLUTE ELEVATION. THE ELEVATIONS SHOWN HEREON RELATIVE TO EACH OTHER HAVE 1.0 SIGMA VALUES OF 0.3 FEET OR LESS. THESE VERTICAL ACCURACIES SATISFIED THE INTENDED PURPOSE OF THIS SURVEY--GIS MAPPING CONTROL.

DASHED LINES - OBSERVED GPS VECTORS ON PRIMARY NETWORK

EXPLANATION OF SCOPE OF PROJECT:
PACIFICORP IS IN THE PROCESS OF PREPARING A GEOGRAPHIC INFORMATION SYSTEM (GIS) COVERING ALL OF THEIR HYDRO-ELECTRIC GENERATING AND WATER IMPOUNDING FACILITIES ON THE NORTH UMPQUA RIVER IN DOUGLAS COUNTY, OREGON.

THIS CONTROL SURVEY SHOWS THE RESULTS OF A PRIMARY CONTROL NETWORK SURVEY BASED ON GLOBAL POSITIONING SYSTEM (GPS) TECHNIQUES WHICH ENCOMPASSES PACIFICORP'S ENTIRE PROJECT AREA WITH ACCURATE SURVEY CONTROL THAT IS DIRECTLY TIED TO NGS STATIONS 'STEAM' AND 'KELSA MOUNTAIN'.

A SECONDARY CONTROL NETWORK TO PROVIDE PHOTOGRAMMETRIC MAPPING CONTROL FOR EXISTING PACIFICORP AERIAL PHOTOGRAPHY ON EXISTING FLIGHT LINES WAS ALSO SURVEYED AS A PART OF THIS PROJECT. AS MOST OF THESE POINTS WERE PREVIOUSLY MONUMENTED BY OTHERS AND WERE PRIMARILY TEMPORARY IN NATURE (IE: SPIKES, REBAR WITHOUT CAPS AND REBAR WITH UNMARKED ALUMINUM CAPS) THEY ARE NOT SHOWN AS A PART OF THIS SURVEY.

ADDITIONALLY, BRASS DISKS WITH HORIZONTAL AND VERTICAL CONTROL POSITIONS WERE ESTABLISHED FROM THE PRIMARY AND SECONDARY NETWORKS ON EACH DAM, FOREBAY AND POWER HOUSE STRUCTURE. THE LOCATIONS AND ACCOMPANYING POINT DATA FOR THESE POINTS ARE SHOWN HEREON. THE PRIMARY PURPOSE OF THIS MAP IS TO MAKE OF PUBLIC RECORD THESE NEW POINTS LOCATED AT LEMOLO DAM NUMBER 1; UPPER MOUNTAIN MEADOWS; SHOWN AS POINT 1004 OF THE PRIMARY CONTROL NETWORK; 'WILD ROSE' SHOWN AS POINT 1009 OF THE PRIMARY CONTROL NETWORK.

ALL COORDINATES DESCRIBED HEREON ARE BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83 (81)). ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

LEVEL OF ACCURACY ACHIEVED:
THE ACCURACY OF THE PRIMARY CONTROL NETWORK WAS REQUIRED TO MEET NGS SECOND ORDER, CLASS 1 STANDARDS. IN SUMMARY, THIS STANDARD CALLS FOR NOT MORE THAN 1 PART ERROR IN 50,000 PARTS. THE LEVEL OF ACCURACY THAT WAS ACHIEVED WAS LESS THAN 1 PART ERROR IN OVER 100,000 PARTS FOR THE PRIMARY NETWORK AND BETTER THAN 1 PART IN 5000 FOR THE SECONDARY CONTROL.

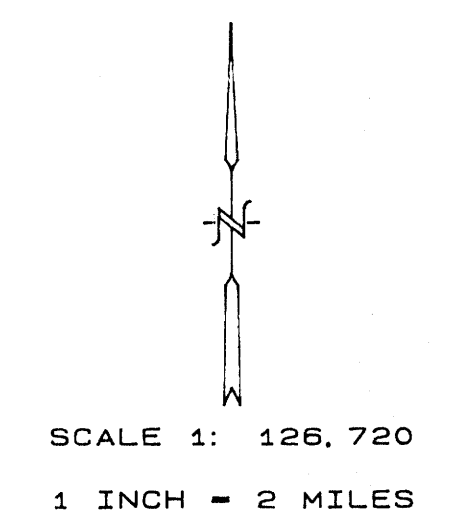
DESCRIPTION OF METHODS EMPLOYED:
ALL MEASUREMENTS FOR DETERMINING THE POSITION OF THE PRIMARY AND SECONDARY SURVEY MONUMENTS DESCRIBED HEREON WERE MADE WITH TRIMBLE NAVIGATION COMPANY MODEL GOODT GLOBAL POSITIONING SYSTEM SURVEY RECEIVERS. TRIMNET ADJUSTMENT SOFTWARE WAS USED TO PROVIDE A RIGID LEAST-SQUARES ADJUSTMENT OF ALL OBSERVED DATA.

ADDITIONAL VERTICAL MEASUREMENTS WERE EXTENDED TO SEVERAL OF THE PRIMARY AND SECONDARY CONTROL NETWORK STATIONS FROM THE NGS FIRST ORDER LEVELING LINE RUN WHICH CLOSELY APPROXIMATES THE OLYMPIA HIGHWAY ALONG THE SOUTHERLY PORTION OF THE PROJECT AREA. IN ADDITION 3 USFS GPS MONUMENTS FROM A PROJECT COMPLETED BY THE U. S. FOREST SERVICE IN 1985 AND 1988 WERE HELD FOR VERTICAL POSITION ONLY. THESE MONUMENTS ARE AS FOLLOWS: '268 SE 81' LOCATED AT LEMOLO DAM NUMBER 1; 'UPPER MOUNTAIN MEADOWS' SHOWN AS POINT 1004 OF THE PRIMARY CONTROL NETWORK; 'WILD ROSE' SHOWN AS POINT 1009 OF THE PRIMARY CONTROL NETWORK.

WITH THE EXCEPTION OF THE BRASS DISK AT LEMOLO POWER HOUSE NUMBER 2 WHICH IS A DIRECT GPS OBSERVATION, ALL OF THE BRASS DISKS WERE TIED BY CONVENTIONAL GROUND SURVEY METHODS FROM THE ADJUSTED PRIMARY AND/OR SECONDARY CONTROL NETWORKS.

FINAL POINT SUMMARY OF CONTROL POINTS
NORTH UMPQUA HYDROELECTRIC PROJECT FOR PACIFIC POWER AND LIGHT

LATITUDE	LONGITUDE	HEIGHT (M)	(Y) NORTHING	(X) EASTING	(Z) ELEV (LNFT)	CONVERGENCE	SCALE FACTOR	ELEV. FACTOR	COMB. FACTOR	POINT NUMBER	POINT DESCRIPTION
43° 20' 55.90224" N	122° 11' 05.85054" W	1826.781	617575.174	4473128.776	5993.377	-1° 09' 09.935"	0.999899544	0.999713318	0.999812891	1000	FOUND 3" BRASS DISK USGS 'KELSA MOUNTAIN 1953'
43° 21' 28.93489" N	122° 18' 40.30818" W	1185.057	521429.455	4448484.420	3987.982	-1° 12' 58.753"	0.999900060	0.999814026	0.999741404	1001	FOUND 8" SPIKE
43° 14' 47.18475" N	122° 16' 55.19248" W	1183.026	590789.375	4448529.765	3981.319	-1° 13' 08.937"	0.999895528	0.999814345	0.999708892	1002	FOUND 5/8" REBAR WITH 1 1/2" ALUMINUM CAP, UNMARKED
43° 18' 14.72888" N	122° 21' 48.59427" W	954.813	602972.544	4425288.863	3132.589	-1° 16' 29.867"	0.999897396	0.999850159	0.999747571	1004	FOUND 2 1/2" BRASS CAPPED IRON PIPE USFS 'UPPER MTH MEADOWS'
43° 18' 21.73643" N	122° 29' 25.52648" W	785.793	603754.620	4391530.485	2512.445	-1° 21' 42.276"	0.999897477	0.999848073	0.999748073	1005	FOUND 5/8" REBAR WITH 1 1/2" ALUMINUM CAP 'PPL 0+00'
43° 15' 41.91241" N	122° 30' 33.28254" W	813.206	597898.537	4381335.709	2667.999	-1° 22' 28.617"	0.999895922	0.999823281	0.999773111	1006	FOUND PK NAIL
43° 18' 45.88980" N	122° 38' 44.38401" W	889.313	524845.884	4358950.193	3250.508	-1° 26' 42.505"	0.999894270	0.999858668	0.999755355	1008	SET 5/8" X 30" REBAR WITH YELLOW CAP 'R.B. DAVIS CO. LS 827'
43° 22' 40.81024" N	122° 34' 24.01179" W	1038.480	630510.484	4370117.894	3407.119	-1° 25' 06.483"	0.999901270	0.999837027	0.999739313	1009	FOUND 3 1/4" ALUMINUM CAPPED ALUMINUM PIPE USFS 'WILD ROSE'
43° 20' 36.72821" N	122° 44' 17.74938" W	363.700	619081.542	4329980.715	1193.241	-1° 31' 52.697"	0.999895257	0.999842924	0.999742186	1010	FOUND STANDARD H.P.S.N. SURVEY DISK NGS 'STEAM 1991'
43° 19' 08.17858" N	122° 11' 48.62088" W	1289.871	606836.514	4468750.533	4231.860	-1° 09' 39.196"	0.999898561	0.999856581	0.999797577	2002	FOUND PK NAIL
43° 13' 44.94895" N	122° 26' 27.19232" W	953.209	575431.096	4404062.516	3127.328	-1° 19' 40.269"	0.999895164	0.999850410	0.999742590	2432	FOUND 8" SPIKE
43° 13' 38.21304" N	122° 13' 19.25931" W	921.800	621856.903	4483306.899	4083.800	-1° 10' 41.681"	0.999900117	0.999840585	0.999704993	5024	SET BRASS DISK AT LEMOLO 1 FOREBAY
43° 13' 21.07758" N	122° 06' 40.61886" W	989.861	646486.992	4471570.978	3715.978	-1° 04' 16.368"	0.999897476	0.999847988	0.999741404	5026	SET BRASS DISK AT SODA SPRINGS POWER HOUSE
43° 21' 20.53777" N	122° 14' 55.02350" W	1204.15	620415.800	4456252.493	3342.290	-1° 11' 46.723"	0.999899926	0.999840428	0.999740070	5028	SET BRASS DISK AT LEMOLO 1 POWER HOUSE
43° 17' 23.29175" N	122° 24' 21.06266" W	1193.026	597315.705	4413900.099	3187.890	-1° 18' 13.977"	0.999896839	0.999847913	0.999744398	5031	SET BRASS DISK AT LEMOLO 2 FOREBAY
43° 14' 46.97170" N	122° 16' 55.36888" W	590.786	602972.544	4448518.261	3981.319	-1° 13' 09.957"	0.999895528	0.999814345	0.999708892	5032	SET BRASS DISK AT CLEAR WATER 1 DAM
43° 15' 35.89893" N	122° 18' 15.89109" W	584.627	603754.620	4391530.485	2512.445	-1° 14' 45.195"	0.999895777	0.999814989	0.999710785	5033	SET BRASS DISK AT CLEAR WATER 1 FOREBAY
43° 15' 05.18861" N	122° 20' 14.27091" W	592.826	604318.026	4382334.330	2667.999	-1° 15' 25.135"	0.999895950	0.999845436	0.999741101	5034	SET BRASS DISK AT CLEAR WATER 2 DAM
43° 18' 04.00910" N	122° 20' 16.26101" W	592.813	603754.620	4391530.485	2512.445	-1° 16' 29.867"	0.999897396	0.999850159	0.999747571	5035	SET BRASS DISK AT CLEAR WATER 2 POWER HOUSE
43° 18' 01.10712" N	122° 24' 35.16850" W	580.211	604126.711	4382334.330	2667.999	-1° 18' 23.698"	0.999895607	0.999837027	0.999739313	5036	SET BRASS DISK AT CLEAR WATER 2 FOREBAY
43° 15' 52.87924" N	122° 24' 34.04508" W	588.156	604126.711	4382334.330	2667.999	-1° 18' 23.698"	0.999895607	0.999837027	0.999739313	5038	SET BRASS DISK AT TOKETEETEE DAM
43° 15' 20.11913" N	122° 25' 18.34808" W	588.156	604126.711	4382334.330	2667.999	-1° 18' 23.698"	0.999895607	0.999837027	0.999739313	5039	SET BRASS DISK AT FISH CREEK FOREBAY
43° 12' 39.31915" N	122° 25' 35.87964" W	587.701	603754.620	4391530.485	2512.445	-1° 19' 05.232"	0.999894980	0.999748063	0.999748063	5043	SET BRASS DISK AT SLIDE CREEK FOREBAY
43° 18' 15.64154" N	122° 27' 18.88938" W	590.786	602972.544	4448518.261	3981.319	-1° 13' 09.957"	0.999895528	0.999814345	0.999708892	5044	SET BRASS DISK AT SLIDE CREEK FOREBAY
43° 18' 30.51385" N	122° 26' 58.26398" W	591.867	602972.544	4448518.261	3981.319	-1° 12' 04.267"	0.999895257	0.999842924	0.999742186	5045	SET BRASS DISK AT SLIDE CREEK FOREBAY
43° 18' 20.98222" N	122° 26' 50.87444" W	591.282	602972.544	4448518.261	3981.319	-1° 12' 04.267"	0.999895257	0.999842924	0.999742186	5046	SET BRASS DISK AT SLIDE CREEK FOREBAY
43° 17' 36.34018" N	122° 28' 22.80398" W	592.826	604318.026	4382334.330	2667.999	-1° 20' 09.364"	0.999896995	0.999812380	0.999708892	5047	SET BRASS DISK AT SLIDE CREEK FOREBAY
43° 17' 35.12861" N	122° 28' 20.48120" W	592.826	604318.026	4382334.330	2667.999	-1° 20' 09.364"	0.999896995	0.999812380	0.999708892	5048	SET BRASS DISK AT SLIDE CREEK FOREBAY
43° 18' 08.72139" N	122° 29' 41.80989" W	602.956	605056.726	4390318.892	2813.840	-1° 21' 53.224"	0.999897396	0.999814345	0.999708892	6002	SET BRASS DISK AT SODA SPRINGS DAM
43° 19' 22.13353" N	122° 11' 39.01065" W	1289.871	606836.514	4468750.533	4231.860	-1° 09' 39.196"	0.999898561	0.999856581	0.999797577	6002	SET BRASS DISK AT LEMOLO 1 DAM
43° 18' 50.07888" N	122° 24' 06.55101" W	783.342	593332.418	4414748.770	2471.595	-1° 18' 05.418"	0.999895528	0.999814345	0.999708892	7007	SET BRASS DISK AT LEMOLO 2 POWER HOUSE
43° 18' 21.67713" N	122° 30' 06.61943" W	523.605	603821.027	4388492.999	1717.865	-1° 22' 10.390"	0.999897476	0.999917829	0.999815314		



RECORD OF CONTROL SURVEY
For
PACIFICORP GENERATING FACILITIES
NORTH UMPQUA RIVER AREA
In
DOUGLAS COUNTY, OREGON

SURVEY FROM OCTOBER 1991 TO SEPTEMBER 1992

AERIAL MAPPING
SURVEYING AND GPS
AERIAL PHOTOGRAPHY
AERIAL VOLUME STUDIES
GIS / LIS / MPC MAPPING

Richard B. Davis Co., Inc.
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BOOK 1218 PAGE 802
JAN. 26, 1993