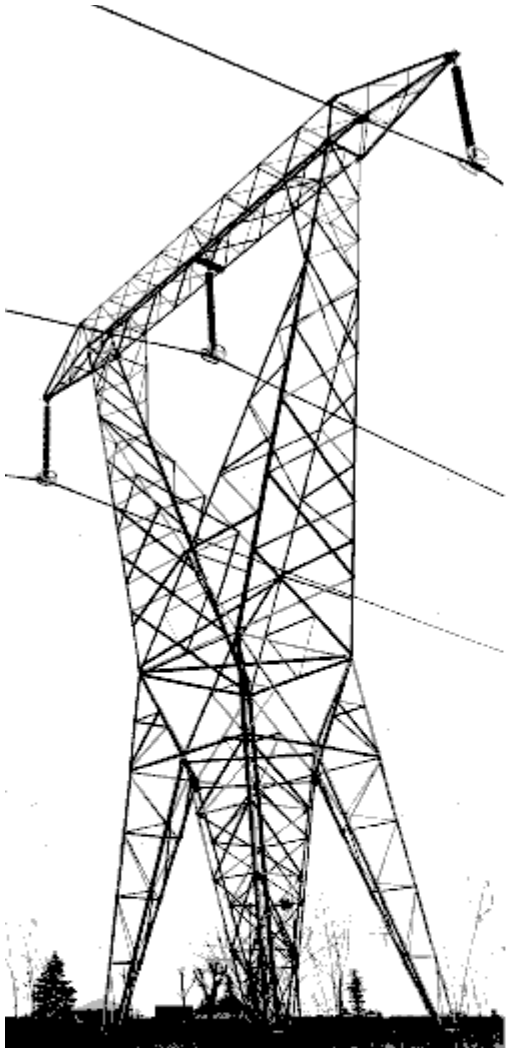
BONNEVILLE POWER ADMINISTRATION

TRANSMISSION LINE IMPEDANCES (115 KV and Below)



TOP -- Network Planning
System Electrical Databook

Bookmasters: Roger D. Howlett & Timothy K. Lungren

Note: @ - Changes since last revision

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Aberdeen - Tap (Olympia - Cosmopolis 1)**												
	Aberdeen - Twr 15/2	0.28	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		M-135
	Twr 15/2 - Twr 14/1	1.29	SDC	J22	1272 kcmil ACSR Bittern	23.49	0.083	0.761	0.369	2.500	5.582		M-136
	Twr 14/1 - Twr 12/2	1.65	SDC	SPEC	1272 kcmil ACSR Bittern	31.90	0.083	0.798	0.369	2.425	5.313		
	Twr 12/2 - Twr 1/3	11.30	SDC	J22	1272 kcmil ACSR Bittern	23.49	0.083	0.761	0.369	2.500	5.582		
	Twr 1/3 - Tap	0.06	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		14.58											
		14.58											
115	**Adair - Tap (Salem - Albany 2)**												
		0.10	WSP	H15	266.8 kcmil ACSR Partridge	11.34	0.377	0.759	0.663	2.763	5.571		
		0.91	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		1.01											
		1.01											
115	**Addy - Colville 1**												
	Addy - Str 1/2	0.10	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-201
	Str 1/2 - Str 1/3	0.07	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		M-202
	Str 1/3 - Str 2/2	0.60	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 2/2 - Str 12/7	10.86	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 12/7 - Str 13/2	0.19	TSP		1.3 In AAC/TW Hood	15.75	0.069	0.721	0.355	2.605	5.942		
	Str 13/2 - Str 16/3	3.14	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 16/3 - Colville	0.26	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		
		15.22											
		15.22											
115	**Ahsahka - Tap (Dworshak PH - Orofino(AVA) 1)**												
	Ahsahka - Twr 1/4	0.77	WSP		397.5 kcmil ACSR Ibis	12.11	0.253	0.743	0.539	2.723	5.697	CWTR	
	Twr 1/4 - Tap	0.01	SSC	H18	795 kcmil ACSR Drake	20.16	0.128	0.763	0.414	2.558	5.544		
		0.78											
		0.78											
115	**Albany - Burnt Woods 1**												
	Albany - Str 2/7	1.78	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-128
	Str 2/7 - Burnt Woods	24.00	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		M-140
		25.78											
		25.78											
115	**Albany - Eugene 1**												
	Albany - Str 1/1	0.09	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/1 - Str 1/3	0.07	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 1/3 - Harrisburg Tap	22.47	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		22.63											
	Harrisburg Tap - Str 25/7	1.77	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 25/7 - Str 26/10	0.77	WSP	H17	397.5 kcmil ACSR Ibis	12.72	0.253	0.749	0.539	2.712	5.650		
	Str 26/10 - Str 27/5	1.13	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 27/5 - Str 27/6	0.22	SDC	H2	397.5 kcmil ACSR Ibis	15.43	0.253	0.773	0.539	2.665	5.473		
	Str 27/6 - Str 29/12	1.87	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 29/12 - Str 30/21	1.16	WSP	H17	397.5 kcmil ACSR Ibis	12.72	0.253	0.749	0.539	2.712	5.650		
	Str 30/21 - Alderwood Tap	1.35	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		8.27											
	Alderwood Tap - Junction City (BLC) Tap	2.07	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.07											
	Junction City (BLC) Tap - Parker (BLC) Tap	2.94	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.94											
	Parker (BLC) Tap - Eugene	3.90	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		3.90											
		39.81											
115	**Albany - Lebanon 1**												
	Albany - Str 1/1	0.03	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		M-139
	Str 1/1 - Str 1/12	0.50	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
	Str 1/12 - Str 2/7	0.81	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
	Str 2/7 - Str 2/10	0.27	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 2/10 - Str 3/1	0.63	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
	Str 3/1 - Lochner Tap (3/3)	0.18	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		2.42											
	Lochner Tap - Froman Tap	3.32	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.32											
	Froman Tap (6/7) - Str 17/2	10.61	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 17/2 - Lebanon	0.66	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		11.27											
		17.01											
115	**Albany 230/115 kV Tie**												
		0.13	SSC	SPEC	1590 kcmil AAC Coreopsis	16.03	0.069	0.708	0.355	2.586	6.042		
		0.13											
		0.13											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Aberdeen - Tap (Olympia - Cosmopolis 1)														
0.071	0.221		0.151	0.737		0.75	0.00054	0.00167		0.00114	0.00557		0.00010	
0.107	0.981		0.476	3.225		3.60	0.00081	0.00742		0.00360	0.02438		0.00048	
0.137	1.316		0.609	4.002		4.38	0.00103	0.00995		0.00460	0.03026		0.00058	
0.936	8.596		4.167	28.246		31.54	0.00707	0.06500		0.03151	0.21358		0.00417	
0.034	0.053		0.051	0.167		0.16	0.00026	0.00040		0.00039	0.00126		0.00002	
1.284	11.168	11.241	5.454	36.376	36.783	40.43	0.00971	0.08444	0.08500	0.04124	0.27506	0.27813	0.00535	
1.284	**11.168**	**11.241**	**5.454**	**36.376**	**36.783**	**40.43**	**0.00971**	**0.08444**	**0.08500**	**0.04124**	**0.27506**	**0.27813**	**0.00535**	
115 Adair - Tap (Salem - Albany 2)														
0.038	0.076		0.066	0.276		0.28	0.00028	0.00057		0.00050	0.00209		0.00004	
0.343	0.723		0.603	2.451		2.42	0.00259	0.00547		0.00456	0.01853		0.00032	
0.380	0.799	0.885	0.669	2.728	2.809	2.70	0.00288	0.00604	0.00669	0.00506	0.02062	0.02124	0.00036	
0.380	**0.799**	**0.885**	**0.669**	**2.728**	**2.809**	**2.70**	**0.00288**	**0.00604**	**0.00669**	**0.00506**	**0.02062**	**0.02124**	**0.00036**	
115 Addy - Colville 1														
0.008	0.071		0.037	0.261		0.30	0.00006	0.00054		0.00028	0.00198		0.00004	2-3/8 IN EHS STL
0.005	0.050		0.025	0.183		0.21	0.00004	0.00038		0.00019	0.00138		0.00003	2-3/8 IN EHS STL
0.041	0.472		0.213	1.484		1.63	0.00031	0.00357		0.00161	0.01122		0.00022	2-3/8 IN EHS STL
0.749	8.545		3.855	26.860		29.44	0.00567	0.06461		0.02915	0.20310		0.00389	
0.013	0.137		0.067	0.495		0.56	0.00010	0.00104		0.00051	0.00374		0.00007	
0.217	2.471		1.115	7.766		8.51	0.00164	0.01868		0.00843	0.05872		0.00113	
0.018	0.186		0.092	0.680		0.78	0.00014	0.00141		0.00070	0.00514		0.00010	2-3/8 IN EHS STL
1.052	11.932	11.978	5.405	37.729	38.114	41.44	0.00795	0.09022	0.09057	0.04087	0.28529	0.28820	0.00548	
1.052	**11.932**	**11.978**	**5.405**	**37.729**	**38.114**	**41.44**	**0.00795**	**0.09022**	**0.09057**	**0.04087**	**0.28529**	**0.28820**	**0.00548**	
115 Ahsahka - Tap (Dworshak PH - Orofino(AVA) 1)														
0.195	0.572		0.415	2.097		2.19	0.00148	0.00433		0.00314	0.01586		0.00029	
0.001	0.008		0.004	0.026		0.03	0.00001	0.00006		0.00003	0.00019		0.00000	
0.196	0.580	0.612	0.419	2.123	2.164	2.22	0.00149	0.00439	0.00463	0.00317	0.01605	0.01636	0.00029	
0.196	**0.580**	**0.612**	**0.419**	**2.123**	**2.164**	**2.22**	**0.00149**	**0.00439**	**0.00463**	**0.00317**	**0.01605**	**0.01636**	**0.00029**	
115 Albany - Burnt Woods 1														
0.451	1.371		0.960	4.752		4.89	0.00341	0.01037		0.00726	0.03593		0.00065	
13.512	21.182		20.376	66.765		62.54	0.10217	0.16016		0.15407	0.50484		0.00827	
13.963	22.553	26.525	21.336	71.517	74.631	67.43	0.10558	0.17053	0.20057	0.16133	0.54077	0.56432	0.00892	
13.963	**22.553**	**26.525**	**21.336**	**71.517**	**74.631**	**67.43**	**0.10558**	**0.17053**	**0.20057**	**0.16133**	**0.54077**	**0.56432**	**0.00892**	
115 Albany - Eugene 1														
0.023	0.069		0.049	0.240		0.25	0.00017	0.00052		0.00037	0.00182		0.00003	
0.018	0.057		0.038	0.190		0.18	0.00014	0.00043		0.00029	0.00144		0.00002	
5.694	17.308		12.120	59.985		61.69	0.04305	0.13087		0.09165	0.45357		0.00816	
5.735	17.434	18.353	12.207	60.415	61.636	62.12	0.04336	0.13183	0.13878	0.09230	0.45683	0.46606	0.00822	
0.449	1.363		0.955	4.725		4.86	0.00339	0.01031		0.00722	0.03573		0.00064	
0.195	0.577		0.415	2.088		2.18	0.00148	0.00436		0.00314	0.01579		0.00029	
0.286	0.870		0.610	3.017		3.10	0.00217	0.00658		0.00461	0.02281		0.00041	
0.056	0.170		0.119	0.586		0.60	0.00042	0.00129		0.00090	0.00443		0.00008	
0.474	1.440		1.009	4.992		5.13	0.00358	0.01089		0.00763	0.03775		0.00068	
0.294	0.869		0.626	3.145		3.28	0.00222	0.00657		0.00473	0.02378		0.00043	
0.342	1.040		0.728	3.604		3.71	0.00259	0.00786		0.00551	0.02725		0.00049	
2.096	6.330	6.668	4.461	22.157	22.602	22.86	0.01585	0.04786	0.05042	0.03373	0.16754	0.17090	0.00302	
0.525	1.594		1.117	5.526		5.68	0.00397	0.01206		0.00844	0.04178		0.00075	
0.525	1.594	1.678	1.117	5.526	5.638	5.68	0.00397	0.01206	0.01269	0.00844	0.04178	0.04263	0.00075	
0.745	2.265		1.586	7.848		8.07	0.00563	0.01712		0.01199	0.05935		0.00107	
0.745	2.265	2.384	1.586	7.848	8.007	8.07	0.00563	0.01712	0.01803	0.01199	0.05935	0.06055	0.00107	
0.988	3.004		2.104	10.411		10.71	0.00747	0.02271		0.01591	0.07872		0.00142	
0.988	3.004	3.162	2.104	10.411	10.622	10.71	0.00747	0.02271	0.02391	0.01591	0.07872	0.08032	0.00142	
10.088	**30.627**	**32.246**	**21.474**	**106.358**	**108.504**	**109.44**	**0.07628**	**0.23159**	**0.24383**	**0.16237**	**0.80422**	**0.82045**	**0.01447**	
115 Albany - Lebanon 1														
0.011	0.023		0.020	0.083		0.08	0.00009	0.00017		0.00015	0.00063		0.00001	2-3/8IN HS STL
0.188	0.382		0.331	1.378		1.39	0.00142	0.00288		0.00251	0.01042		0.00018	1-3/8IN HS STL
0.305	0.618		0.537	2.233		2.25	0.00231	0.00467		0.00406	0.01688		0.00030	
0.102	0.214		0.179	0.727		0.72	0.00077	0.00162		0.00135	0.00550		0.00009	
0.237	0.480		0.418	1.739		1.75	0.00179	0.00363		0.00316	0.01315		0.00023	
0.068	0.143		0.119	0.485		0.48	0.00051	0.00108		0.00090	0.00367		0.00006	
0.912	1.860	2.071	1.604	6.644	6.835	6.66	0.00689	0.01406	0.01566	0.01213	0.05024	0.05168	0.00088	
1.251	2.637		2.200	8.943		8.83	0.00946	0.01994		0.01664	0.06762		0.00117	
1.251	2.637	2.919	2.200	8.943	9.210	8.83	0.00946	0.01994	0.02207	0.01664	0.06762	0.06964	0.00117	
3.997	8.428		7.031	28.580		28.21	0.03022	0.06373		0.05317	0.21611		0.00373	
0.249	0.524		0.437	1.778		1.76	0.00188	0.00396		0.00331	0.01344		0.00023	1-3/8IN HS STL
4.245	8.953	9.908	7.469	30.358	31.263	29.97	0.03210	0.06769	0.07492	0.05647	0.22955	0.23639	0.00396	
6.408	**13.450**	**14.898**	**11.273**	**45.945**	**47.308**	**45.46**	**0.04845**	**0.10170**	**0.11265**	**0.08524**	**0.34741**	**0.35771**	**0.00601**	
115 Albany 230/115 kV Tie														
0.009	0.092		0.046	0.336		0.39	0.00007	0.00070		0.00035	0.00254		0.00005	
0.009	0.092	0.093	0.046	0.336	0.339	0.39	0.00007	0.00070	0.00070	0.00035	0.00254	0.00257	0.00005	
0.009	**0.092**	**0.093**	**0.046**	**0.336**	**0.339**	**0.39**	**0.00007**	**0.00070**	**0.00070**	**0.00035**	**0.00254**	**0.00257**	**0.00005**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Albeni Falls - Bonners Ferry 2**												
	* Line Sections Operated in Parallel with (Sand Creek - Bonners Ferry 1)/ Only Single Circuit Parameters Shown												
	Str 24/9 - Str 24/10	0.12	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		M-205
	Str 24/10 - Str 26/1	1.40	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 26/1 - Str 26/2	0.13	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
		1.65											
*	Str 31/3 (31/4) - Str 32/4	1.53	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
*	Str 32/4 - Str 32/5 Jump/LO	0.04	WHF	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
*	Str 32/5 - Str 32/6(Selle)	0.05	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
		1.62											
*	Str 32/6 - Twr 32/7 Jumper	0.06	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
*	Twr 32/7 - Twr 38/2 Jumper	5.69	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 38/2 - Samuels (NLI)	0.03	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
		5.78											
*	Samuels (NLI) - Twr 38/3 Jump/LO	0.07	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 38/3 - Twr 39/2	0.86	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 39/2 - Twr 41/1	1.97	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
*	Twr 41/1 - Twr 44/6	3.57	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
*	Twr 44/6 - Twr 45/2	0.56	TDC	J26	1272 kcmil AAC Narcissus NL	23.25	0.084	0.767	0.370	2.510	5.560		
*	Twr 45/2 - Twr 46/5	1.61	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
*	Twr 46/5 - Twr 48/2	1.54	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 48/2 - Twr 55/4	7.54	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
*	Twr 55/4 - Twr 57/3 Jumper	1.49	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
		19.21											
		28.26											
115	**Albeni Falls - Pine Street (Pend Oreille)**												
	Newport - Pine Street line belongs to AVISTA 0.16 miles												
@	Albeni Falls - Twr 1/1	0.11	SDC	SPEC	795 kcmil ACSR Drake	30.24	0.128	0.812	0.414	2.459	5.198		
@	Twr 1/1 - Twr 1/2	0.12	SDC	H6	397.5 kcmil ACSR Ibis	17.90	0.253	0.791	0.539	2.629	5.344		
@	Twr 1/2 - Str 1/4	0.17	WHF	H18	397.5 kcmil ACSR Ibis	20.16	0.253	0.805	0.539	2.600	5.245		
@	Str 1/4 - Str 2/7	1.33	WHF	H22	397.5 kcmil ACSR Ibis	14.49	0.253	0.765	0.539	2.680	5.529		
@	Str 2/7 - Str 2/8	0.26	WHF	H11	397.5 kcmil ACSR Lark	17.64	0.251	0.783	0.537	2.626	5.381		
@	Str 2/8 - Str 2/9	0.07	WHF	H22	397.5 kcmil ACSR Ibis	14.49	0.253	0.765	0.539	2.680	5.529		
@	Str 2/9 - Newport	0.12	WHF	H22	397.5 kcmil ACSR Ibis	14.49	0.253	0.765	0.539	2.680	5.529		
		2.18											
@	Newport - Pine Street (Pend)	0.16	WHF		795 kcmil ACSR Drake	12.64	0.128	0.706	0.414	2.671	6.006	PPUD	
		0.16											
		2.34											
115	**Albeni Falls - Sand Creek 1**												
	Albeni Falls - Str 1/1	0.08	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		M-205
	Str 1/1 - Str 1/3	0.21	SDC	J1	795 kcmil ACSR Drake	25.83	0.128	0.793	0.414	2.497	5.327		
	Str 1/3 - Str 3/7	1.85	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		
	Str 3/7 - Str 5/3	1.46	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		
	Str 5/3 - Priest River AVA Tap	0.84	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
		4.44											
	Priest River AVA - Str 6/22	0.90	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
		0.90											
	Priest River Crossing	0.13	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		
		0.13											
	Str 7/1 - Str 7/8	0.88	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		
	Str 7/8 - Priest River Tap	0.02	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		0.90											
	Priest River Tap - Str 7/9	0.01	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 7/9 - Laclede Tap	6.27	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		6.28											
	Laclede Tap - Str 23/3	9.14	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 23/3 - Sandpoint	0.63	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		9.77											
	Sandpoint - Str 24/8	0.47	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 24/8 - Str 24/9	0.10	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 24/9 - Str 26/1	1.52	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 26/1 - Str 26/2	0.13	WSP	J31	1272 kcmil AAC Narcissus NL	21.54	0.084	0.758	0.370	2.528	5.631		
	Str 26/2 - Str 26/3	0.10	WSP	J31	1272 kcmil AAC Narcissus NL	21.54	0.084	0.758	0.370	2.528	5.631		
	Str 26/3 - Str 29/5	3.20	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 29/5 - Str 29/7	0.15	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 29/7 - Str 30/4	0.77	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 30/4 - Str 31/2	0.70	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 31/2 - Sand Creek	0.09	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
		7.23											
		29.65											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Albeni Falls - Bonners Ferry 2														
0.010	0.089		0.044	0.307		0.35	0.00008	0.00067		0.00034	0.00232		0.00005	
0.118	1.032		0.518	3.597		4.06	0.00089	0.00780		0.00392	0.02720		0.00054	
0.011	0.096		0.048	0.333		0.37	0.00008	0.00073		0.00036	0.00252		0.00005	
0.139	1.218	1.225	0.611	4.237	4.281	4.78	0.00105	0.00921	0.00927	0.00462	0.03204	0.03237	0.00063	
0.129	1.128		0.566	3.931		4.43	0.00097	0.00853		0.00428	0.02972		0.00059	
0.003	0.030		0.015	0.102		0.12	0.00003	0.00022		0.00011	0.00077		0.00002	
0.004	0.037		0.019	0.128		0.14	0.00003	0.00028		0.00014	0.00097		0.00002	
0.136	1.195	1.202	0.600	4.161	4.204	4.69	0.00103	0.00903	0.00909	0.00453	0.03147	0.03179	0.00062	
0.005	0.045		0.022	0.154		0.17	0.00004	0.00034		0.00017	0.00116		0.00002	
0.471	4.321		2.098	14.237		15.91	0.00356	0.03268		0.01587	0.10765		0.00210	
0.002	0.023		0.011	0.075		0.08	0.00002	0.00017		0.00008	0.00057		0.00001	
0.479	4.389	4.415	2.132	14.466	14.622	16.17	0.00362	0.03318	0.03338	0.01612	0.10938	0.11056	0.00214	
0.006	0.053		0.026	0.175		0.20	0.00004	0.00040		0.00020	0.00132		0.00003	
0.071	0.653		0.317	2.152		2.40	0.00054	0.00494		0.00240	0.01627		0.00032	
0.163	1.505		0.727	4.912		5.48	0.00123	0.01138		0.00549	0.03714		0.00072	
0.300	2.632		1.321	9.172		10.34	0.00227	0.01990		0.00999	0.06935		0.00137	
0.047	0.430		0.207	1.405		1.56	0.00036	0.00325		0.00157	0.01063		0.00021	
0.133	1.230		0.594	4.015		4.48	0.00101	0.00930		0.00449	0.03036		0.00059	
0.128	1.170		0.568	3.853		4.31	0.00096	0.00884		0.00429	0.02914		0.00057	
0.624	5.758		2.781	18.802		20.96	0.00472	0.04354		0.02103	0.14217		0.00277	
0.123	1.132		0.550	3.728		4.17	0.00093	0.00856		0.00416	0.02819		0.00055	1-3/8 IN HS STL
1.596	14.561	14.649	7.090	48.215	48.733	53.88	0.01207	0.11010	0.11076	0.05361	0.36457	0.36849	0.00713	
2.350	**21.362**	**21.491**	**10.432**	**71.079**	**71.840**	**79.52**	**0.01777**	**0.16153**	**0.16250**	**0.07888**	**0.53746**	**0.54322**	**0.01052**	
115 Albeni Falls - Pine Street (Pend Oreille)														
0.014	0.089		0.045	0.271		0.29	0.00011	0.00068		0.00034	0.00205		0.00004	1-7 No 8 ALWLD
0.030	0.095		0.065	0.315		0.32	0.00023	0.00072		0.00049	0.00239		0.00004	1-3/8 IN HS STL
0.043	0.137		0.092	0.442		0.45	0.00033	0.00103		0.00069	0.00334		0.00006	1-3/8 IN HS STL
0.337	1.018		0.717	3.564		3.68	0.00255	0.00769		0.00542	0.02695		0.00049	2-3/8 IN HS STL
0.065	0.204		0.140	0.683		0.70	0.00049	0.00154		0.00106	0.00516		0.00009	2-7/16 IN EHS ST
0.018	0.054		0.038	0.188		0.19	0.00013	0.00040		0.00029	0.00142		0.00003	2-7/16 IN EHS ST
0.030	0.092		0.065	0.322		0.33	0.00023	0.00069		0.00049	0.00243		0.00004	2-3/8 IN HS STL
0.538	1.688	1.771	1.161	5.784	5.900	5.95	0.00407	0.01276	0.01339	0.00878	0.04374	0.04461	0.00079	
0.020	0.113		0.066	0.427		0.48	0.00015	0.00085		0.00050	0.00323		0.00006	
0.020	0.113	0.115	0.066	0.427	0.432	0.48	0.00015	0.00085	0.00087	0.00050	0.00323	0.00327	0.00006	
0.558	**1.801**	**1.885**	**1.228**	**6.212**	**6.332**	**6.43**	**0.00422**	**0.01362**	**0.01426**	**0.00928**	**0.04697**	**0.04788**	**0.00085**	
115 Albeni Falls - Sand Creek 1														
0.010	0.058		0.033	0.211		0.23	0.00008	0.00044		0.00025	0.00160		0.00003	2-3/8 IN HS STL
0.027	0.167		0.087	0.524		0.56	0.00020	0.00126		0.00066	0.00397		0.00007	1-3/8 IN HS STL
0.236	1.337		0.765	4.880		5.42	0.00178	0.01011		0.00578	0.03690		0.00072	2-3/8 IN HS STL
0.186	1.056		0.604	3.851		4.28	0.00141	0.00798		0.00456	0.02912		0.00057	
0.107	0.585		0.347	2.260		2.56	0.00081	0.00443		0.00263	0.01709		0.00034	1-3/8 IN HS STL
0.566	3.203	3.252	1.836	11.726	11.869	13.06	0.00428	0.02422	0.02459	0.01388	0.08867	0.08975	0.00173	
0.115	0.627		0.372	2.421		2.74	0.00087	0.00474		0.00281	0.01831		0.00036	1-3/8 IN HS STL
0.115	0.627	0.638	0.372	2.421	2.450	2.74	0.00087	0.00474	0.00482	0.00281	0.01831	0.01852	0.00036	
0.017	0.094		0.054	0.343		0.38	0.00013	0.00071		0.00041	0.00259		0.00005	
0.017	0.094	0.095	0.054	0.343	0.347	0.38	0.00013	0.00071	0.00072	0.00041	0.00259	0.00262	0.00005	
0.112	0.636		0.364	2.321		2.58	0.00085	0.00481		0.00275	0.01755		0.00034	
0.008	0.016		0.013	0.054		0.05	0.00006	0.00012		0.00010	0.00041		0.00001	
0.120	0.652	0.663	0.377	2.375	2.405	2.63	0.00091	0.00493	0.00501	0.00285	0.01796	0.01819	0.00035	
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
2.362	4.948		4.155	16.954		16.79	0.01786	0.03742		0.03142	0.12820		0.00222	
2.366	4.956	5.492	4.162	16.981	17.484	16.81	0.01789	0.03748	0.04153	0.03147	0.12840	0.13220	0.00222	
3.443	7.213		6.057	24.715		24.47	0.02603	0.05454		0.04580	0.18688		0.00324	
0.237	0.497		0.418	1.704		1.69	0.00179	0.00376		0.00316	0.01288		0.00022	2-3/8 IN HS STL
3.680	7.711	8.544	6.475	26.418	27.200	26.16	0.02783	0.05830	0.06460	0.04896	0.19976	0.20567	0.00346	
0.177	0.373		0.311	1.266		1.25	0.00134	0.00282		0.00236	0.00957		0.00017	2-3/8 IN HS STL
0.038	0.079		0.066	0.269		0.27	0.00028	0.00060		0.00050	0.00204		0.00004	
0.128	1.121		0.563	3.905		4.40	0.00097	0.00847		0.00425	0.02953		0.00058	
0.011	0.099		0.048	0.329		0.37	0.00008	0.00074		0.00036	0.00249		0.00005	
0.008	0.076		0.037	0.253		0.28	0.00006	0.00057		0.00028	0.00191		0.00004	
0.269	2.359		1.184	8.222		9.27	0.00203	0.01784		0.00896	0.06217		0.00123	
0.013	0.111		0.056	0.384		0.43	0.00010	0.00084		0.00042	0.00290		0.00006	
0.065	0.568		0.285	1.978		2.23	0.00049	0.00429		0.00215	0.01496		0.00030	
0.059	0.516		0.259	1.798		2.03	0.00045	0.00390		0.00196	0.01360		0.00027	
0.008	0.066		0.033	0.231		0.26	0.00006	0.00050		0.00025	0.00175		0.00003	
0.775	5.368	5.424	2.843	18.636	18.851	20.79	0.00586	0.04059	0.04101	0.02149	0.14091	0.14254	0.00275	
7.638	**22.611**	**23.866**	**16.118**	**78.900**	**80.530**	**82.57**	**0.05775**	**0.17097**	**0.18046**	**0.12187**	**0.59660**	**0.60892**	**0.01092**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Alcoa - Felida 1**												
	Alcoa - Twr 40/1	1.84	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		M-121
	Twr 40/1 - Stockford Tie(PUD)	2.06	WSP		795 kcmil AAC Arbutus (37)	10.81	0.131	0.703	0.417	2.725	6.093	ClarkP	M-122
		3.90											
	Stockford Tie - Felida(PUD)	1.56	WSP		336.4 kcmil ACSR Oriole	13.02	0.297	0.757	0.583	2.710	5.577	ClarkP	
		1.56											
		5.46											
115	**Alder Street - Tap (Chemawa - Salem Alumina (SEC) 1)**												
		1.00	WSP	H16	4/0 AAAC/5005E 7 Str	11.79	0.546	0.803	0.832	2.793	5.354	SALEM	
		1.00											
		1.00											
115	**Alderwood - Tap (Albany - Eugene 1)**												
	Alderwood - Str 10/3	0.06	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 10/3 - Str 9/15	0.37	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 9/15 - Str 9/3	0.66	WSP	H30	397.5 kcmil ACSR Ibis	12.64	0.253	0.749	0.539	2.713	5.656		
	Str 9/3 - Str 6/18	2.21	TDC	H29	397.5 kcmil ACSR Ibis	9.51	0.253	0.714	0.539	2.782	5.939		
	Str 6/18 - Str 6/16	0.11	WSP	H30	397.5 kcmil ACSR Ibis	12.64	0.253	0.749	0.539	2.713	5.656		
	Str 6/16 - Str 6/11	0.27	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 6/11 - Str 6/7	0.18	WSP	H31	397.5 kcmil ACSR Ibis	12.35	0.253	0.746	0.539	2.719	5.678		
	Str 6/7 - Str 5/17	0.38	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 5/17 - Str 5/8	0.52	WSP	H30	397.5 kcmil ACSR Ibis	12.64	0.253	0.749	0.539	2.713	5.656		
	Str 5/8 - Str 5/6	0.11	WSP	H31	397.5 kcmil ACSR Ibis	12.35	0.253	0.746	0.539	2.719	5.678		
	Str 5/6 - Str 4/14	0.43	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 4/14 - Str 4/11	0.20	WSP	H31	397.5 kcmil ACSR Ibis	12.35	0.253	0.746	0.539	2.719	5.678		
	Str 4/11 - Str 3/12	0.97	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 3/12 - Str 3/9	0.20	WSP	H31	397.5 kcmil ACSR Ibis	12.35	0.253	0.746	0.539	2.719	5.678		
	Str 3/9 - Str 3/3	0.38	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 3/3 - Str 2/19	0.27	WSP	H31	397.5 kcmil ACSR Ibis	12.35	0.253	0.746	0.539	2.719	5.678		
	Str 2/19 - Str 2/11	0.49	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 2/11 - Cheshire	0.03	WHF		397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
		7.84											
	Cheshire - Str 2/8	0.03	WHF		397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 2/8 - Tap	1.40	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
		1.43											
		9.27											
115	**Allston - Astoria 1**												
	Allston - Str 1/1	0.04	WHF	H18	1272 kcmil ACSR Pheasant	20.16	0.082	0.736	0.368	2.531	5.754		M-129
	Str 1/1 - Str 1/2	0.03	WHF	H18	1272 kcmil ACSR Pheasant	20.16	0.082	0.736	0.368	2.531	5.754		M-160
	Str 1/2 - Str 1/4	0.23	WHF	H18	1272 kcmil ACSR Pheasant	20.16	0.082	0.736	0.368	2.531	5.754		M-170
	Str 1/4 - Str 2/2	0.97	SDC	J11	1272 kcmil ACSR Pheasant	32.76	0.082	0.795	0.368	2.413	5.313		
	Str 2/2 - Str 2/3	0.03	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
	Str 2/3 - Str 4/6	1.71	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 4/6 - Str 5/1	0.24	WSP	H27	253 kcmil Cu GC LS 19238	12.46	0.254	0.769	0.540	2.739	5.498		
	Str 5/1 - Delena (PUD)	0.05	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
		3.30											
	Delena (PUD) - Str 5/4	0.05	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 5/4 - Str 5/5	0.03	WSP	H27	253 kcmil Cu GC LS 19238	12.46	0.254	0.769	0.540	2.739	5.498		
	Str 5/5 - Clatskanie	6.58	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		6.66											
	Clatskanie - Mist (Coop)	4.80	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		4.80											
	Mist (Coop) - Str 20/1	3.34	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 20/1 - Westport	0.50	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		3.84											
	Westport - Str 21/2	0.74	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 21/2 - Grays River Tap	3.32	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		4.06											
	Grays River Tap - Str 33/4	8.73	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 33/4 - Knappa	0.01	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		8.74											
	Knappa - Str 33/5	0.01	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 33/5 - Str 39/4	6.26	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 39/4 - Str 39/5	0.16	SSC	H18	253 kcmil Cu GC LS 19238	20.16	0.254	0.827	0.540	2.622	5.098		
	Str 39/5 - Str 39/6	0.15	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 39/6 - Fern Hill (PP&L)	0.02	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		6.60											
	Fern Hill (PP&L) - Str 40/1	0.02	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 40/1 - Str 43/3	3.46	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 43/3 - Str 43/7	0.37	WSP	H17	253 kcmil Cu GC LS 19238	12.72	0.254	0.772	0.540	2.734	5.479		
	Str 43/7 - Astoria	0.13	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		3.98											
		41.98											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Alcoa - Felida 1														
0.240	1.426		0.766	4.907		5.07	0.00181	0.01078		0.00579	0.03710		0.00067	
0.270	1.449		0.859	5.613		6.28	0.00204	0.01096		0.00650	0.04244		0.00083	
0.510	2.875	2.919	1.625	10.520	10.645	11.34	0.00385	0.02174	0.02208	0.01229	0.07955	0.08049	0.00150	
0.463	1.180		0.909	4.228		4.35	0.00350	0.00892		0.00687	0.03197		0.00058	
0.463	1.180	1.268	0.909	4.228	4.325	4.35	0.00350	0.00892	0.00958	0.00687	0.03197	0.03270	0.00058	
0.972	**4.055**	**4.170**	**2.534**	**14.748**	**14.964**	**15.69**	**0.00735**	**0.03066**	**0.03153**	**0.01916**	**0.11152**	**0.11315**	**0.00208**	
115 Alder Street - Tap (Chemawa - Salem Alumina (SEC) 1)														
0.546	0.803		0.832	2.793		2.68	0.00413	0.00607		0.00629	0.02112		0.00035	
0.546	0.803	0.971	0.832	2.793	2.914	2.68	0.00413	0.00607	0.00734	0.00629	0.02112	0.02203	0.00035	
0.546	**0.803**	**0.971**	**0.832**	**2.793**	**2.914**	**2.68**	**0.00413**	**0.00607**	**0.00734**	**0.00629**	**0.02112**	**0.02203**	**0.00035**	
115 Alderwood - Tap (Albany - Eugene 1)														
0.015	0.044		0.032	0.164		0.17	0.00011	0.00033		0.00024	0.00124		0.00002	1-3/8 IN EHS STL
0.094	0.273		0.200	1.012		1.06	0.00071	0.00206		0.00151	0.00765		0.00014	1-3/8 IN EHS STL
0.167	0.494		0.356	1.791		1.87	0.00126	0.00374		0.00269	0.01354		0.00025	
0.560	1.578		1.192	6.148		6.56	0.00423	0.01193		0.00901	0.04649		0.00087	
0.028	0.082		0.059	0.298		0.31	0.00021	0.00062		0.00045	0.00226		0.00004	
0.068	0.199		0.146	0.739		0.78	0.00052	0.00151		0.00110	0.00558		0.00010	
0.046	0.134		0.097	0.489		0.51	0.00034	0.00101		0.00073	0.00370		0.00007	
0.096	0.280		0.205	1.040		1.09	0.00073	0.00212		0.00155	0.00786		0.00014	
0.132	0.389		0.280	1.411		1.47	0.00100	0.00294		0.00212	0.01067		0.00019	
0.028	0.082		0.059	0.299		0.31	0.00021	0.00062		0.00045	0.00226		0.00004	
0.109	0.317		0.232	1.176		1.24	0.00082	0.00240		0.00175	0.00889		0.00016	
0.051	0.149		0.108	0.544		0.57	0.00038	0.00113		0.00082	0.00411		0.00008	
0.246	0.715		0.523	2.653		2.79	0.00186	0.00541		0.00396	0.02006		0.00037	
0.051	0.149		0.108	0.544		0.57	0.00038	0.00113		0.00082	0.00411		0.00008	
0.096	0.280		0.205	1.040		1.09	0.00073	0.00212		0.00155	0.00786		0.00014	
0.068	0.201		0.146	0.734		0.77	0.00052	0.00152		0.00110	0.00555		0.00010	
0.124	0.361		0.264	1.340		1.41	0.00094	0.00273		0.00200	0.01014		0.00019	
0.008	0.022		0.016	0.082		0.09	0.00006	0.00017		0.00012	0.00062		0.00001	
1.987	5.751	6.085	4.229	21.505	21.917	22.65	0.01502	0.04349	0.04601	0.03198	0.16261	0.16572	0.00299	
0.008	0.022		0.016	0.082		0.09	0.00006	0.00017		0.00012	0.00062		0.00001	
0.355	1.032		0.755	3.830		4.02	0.00268	0.00780		0.00571	0.02896		0.00053	
0.362	1.054	1.115	0.771	3.912	3.987	4.11	0.00274	0.00797	0.00843	0.00583	0.02958	0.03015	0.00054	
2.349	**6.805**	**7.199**	**5.000**	**25.417**	**25.904**	**26.75**	**0.01776**	**0.05146**	**0.05444**	**0.03781**	**0.19219**	**0.19587**	**0.00354**	
115 Allston - Astoria 1														
0.003	0.029		0.015	0.101		0.12	0.00002	0.00022		0.00011	0.00077		0.00002	2-7 No 8 ALWLD
0.002	0.022		0.011	0.076		0.09	0.00002	0.00017		0.00008	0.00057		0.00001	
0.019	0.169		0.085	0.582		0.66	0.00014	0.00128		0.00064	0.00440		0.00009	2-7 No 8 ALWLD
0.079	0.772		0.357	2.341		2.58	0.00060	0.00583		0.00270	0.01770		0.00034	
0.002	0.021		0.011	0.078		0.09	0.00002	0.00016		0.00008	0.00059		0.00001	
0.435	1.355		0.924	4.603		4.56	0.00329	0.01025		0.00698	0.03480		0.00060	
0.061	0.185		0.130	0.657		0.66	0.00046	0.00140		0.00098	0.00497		0.00009	
0.013	0.037		0.027	0.136		0.14	0.00010	0.00028		0.00020	0.00103		0.00002	
0.615	2.591	2.662	1.558	8.574	8.715	8.89	0.00465	0.01959	0.02013	0.01178	0.06483	0.06590	0.00118	
0.013	0.037		0.027	0.136		0.14	0.00010	0.00028		0.00020	0.00103		0.00002	
0.008	0.023		0.016	0.082		0.08	0.00006	0.00017		0.00012	0.00062		0.00001	
1.672	5.215		3.554	17.712		17.53	0.01264	0.03943		0.02687	0.13393		0.00232	
1.692	5.275	5.540	3.597	17.930	18.287	17.76	0.01280	0.03989	0.04189	0.02720	0.13558	0.13828	0.00235	
1.220	3.804		2.592	12.921		12.79	0.00922	0.02876		0.01960	0.09770		0.00169	
1.220	3.804	3.995	2.592	12.921	13.178	12.79	0.00922	0.02876	0.03021	0.01960	0.09770	0.09965	0.00169	
0.849	2.647		1.804	8.991		8.90	0.00642	0.02001		0.01364	0.06798		0.00118	
0.127	0.396		0.270	1.346		1.33	0.00096	0.00300		0.00204	0.01018		0.00018	2-3/8 IN HS STL
0.976	3.043	3.196	2.074	10.336	10.542	10.23	0.00738	0.02301	0.02416	0.01568	0.07816	0.07972	0.00135	
0.188	0.586		0.400	1.992		1.97	0.00142	0.00443		0.00302	0.01506		0.00026	2-3/8 IN HS STL
0.844	2.631		1.793	8.937		8.85	0.00638	0.01989		0.01356	0.06757		0.00117	
1.032	3.217	3.379	2.193	10.929	11.146	10.82	0.00780	0.02433	0.02555	0.01658	0.08264	0.08428	0.00143	
2.218	6.918		4.715	23.499		23.26	0.01677	0.05231		0.03565	0.17769		0.00308	
0.003	0.008		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
2.221	6.926	7.273	4.720	23.526	23.995	23.29	0.01679	0.05237	0.05500	0.03569	0.17789	0.18144	0.00308	
0.003	0.008		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
1.591	4.961		3.381	16.851		16.68	0.01203	0.03751		0.02557	0.12741		0.00221	
0.041	0.132		0.086	0.420		0.41	0.00031	0.00100		0.00065	0.00317		0.00005	
0.038	0.119		0.081	0.404		0.40	0.00029	0.00090		0.00061	0.00305		0.00005	
0.005	0.016		0.011	0.054		0.05	0.00004	0.00012		0.00008	0.00041		0.00001	
1.677	5.236	5.498	3.565	17.754	18.109	17.57	0.01268	0.03959	0.04157	0.02695	0.13425	0.13693	0.00232	
0.005	0.016		0.011	0.054		0.05	0.00004	0.00012		0.00008	0.00041		0.00001	
0.879	2.742		1.869	9.314		9.22	0.00665	0.02073		0.01413	0.07042		0.00122	
0.094	0.285		0.200	1.011		1.01	0.00071	0.00216		0.00151	0.00765		0.00013	1-3/8 IN HS STL
0.033	0.103		0.070	0.350		0.35	0.00025	0.00078		0.00053	0.00265		0.00005	2-3/8 IN HS STL
1.011	3.146	3.305	2.150	10.729	10.942	10.63	0.00765	0.02379	0.02499	0.01625	0.08113	0.08274	0.00141	
10.443	**33.238**	**34.840**	**22.449**	**112.699**	**114.913**	**111.98**	**0.07897**	**0.25133**	**0.26344**	**0.16975**	**0.85217**	**0.86891**	**0.01481**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Alvey - Drain Tap**												
	Alvey - Str 7/1	0.57	HSL		795 kcmil AAC Arbutus (37)	14.49	0.131	0.739	0.417	2.654	5.786	PP&L	M-137
	Str 7/1 - Str 12/2	1.23	THP		795 kcmil AAC Arbutus (37)	10.04	0.131	0.694	0.417	2.743	6.175	PP&L	
	Str 12/2 - Str 7/3	0.58	THP		795 kcmil AAC Arbutus (37)	9.14	0.131	0.683	0.417	2.766	6.283	PP&L	
	Str 7/3 - Goshen	0.01	VDE		397.5 kcmil ACSR Ibis	12.60	0.253	0.748	0.539	2.714	5.659	PP&L	
		2.39											
	Goshen - Str 8/3	0.01	VDE		397.5 kcmil ACSR Ibis	10.08	0.253	0.721	0.539	2.768	5.879	PP&L	
	Str 8/3 - Creswell(EPUD)	3.35	S		2/0 Cu 7 Str	11.03	0.477	0.823	0.763	2.837	5.217	PP&L	
		3.36											
	Creswell(EPUD) - Str 12/8	1.87	THP		2/0 Cu 7 Str	10.04	0.477	0.812	0.763	2.860	5.294	PP&L	
	Str 12/8 - Str 8/13	4.93	S		2/0 Cu 7 Str	11.03	0.477	0.823	0.763	2.837	5.217	PP&L	
	Str 8/13 - Str 10/14	1.03	THP		2/0 Cu 7 Str	10.04	0.477	0.812	0.763	2.860	5.294	PP&L	
	Str 10/14 - Village Green	2.30	S		2/0 Cu 7 Str	11.03	0.477	0.823	0.763	2.837	5.217	PP&L	
		10.13											
	Village Green - Str 10/17	0.73	THP		2/0 Cu 7 Str	10.04	0.477	0.812	0.763	2.860	5.294	PP&L	
	Str 10/17 - Dorena Tap	1.16	S		2/0 Cu 7 Str	11.03	0.477	0.823	0.763	2.837	5.217	PP&L	
		1.89											
	Dorena Tap - Drain Tap	1.84	S		2/0 Cu 7 Str	11.03	0.477	0.823	0.763	2.837	5.217	PP&L	
		1.84											
		19.61											
115	**Alvey - Springfield (SUB)**												
	Alvey - Str 1/7	0.57	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-137
	Str 1/7 - Str 1/9	0.36	WHF	H11	397.5 kcmil ACSR Lark	17.64	0.251	0.783	0.537	2.626	5.381		
	Str 1/9 - Str 2/23	1.02	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 2/23 - Str 3/1	0.25	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 3/1 - Str 3/14	0.61	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 3/14 - Str 4/1	0.37	WHF	H11	397.5 kcmil ACSR Lark	17.64	0.251	0.783	0.537	2.626	5.381		
	Str 4/1 - Str 5/4	1.10	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 5/4 - Str 5/5	0.22	SDC	H2	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
	Str 5/5 - Springfield (SUB)	0.10	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
		4.60											
		4.60											
115	**Alvey Capacitor Tie 1**												
		0.13	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.13											
		0.13											
115	**Alvey Transformer Bay Tap**												
	Section 1	0.03	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
	Section 2	0.01	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.04											
		0.04											
115	**Anaconda - Silver Bow 1**												
	Anaconda - Str 1/2	0.05	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 1/2 - Str 1/6	0.24	WHF	J7	397.5 kcmil ACSR Ibis	25.20	0.253	0.832	0.539	2.546	5.069		
	Str 1/6 - Str 13/4	12.24	WHF	J7	795 kcmil ACSR Drake	25.20	0.128	0.790	0.414	2.503	5.348		
	Str 13/4 - Silver Bow	0.16	WHF	J7	397.5 kcmil ACSR Ibis	25.20	0.253	0.832	0.539	2.546	5.069		
		12.69											
		12.69											
115	**Anderson Ranch - Mountain Home**												
	Anderson Ranch - Dixie	0.01	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.01											
	Dixie - Mountain Home	17.88	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		17.88											
		17.89											
115	**Angus (BPUD) - Tap (Franklin - Badger Canyon 2)**												
		1.60	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544	BPUD	
		1.60											
		1.60											
115	**Athol (KEC) - Tap (Albeni Falls (BPA) - Rathdrum (AVA) No 1)**												
		5.83	WSP	H21	4/0 ACSR Penguin (6/1)	11.68	0.563	0.851	0.849	2.845	5.428		
		5.83											
		5.83											
115	**Badger Canyon - Reata (BPUB) 1**												
	Badger Canyon - Str 1/6	0.48	WSP	H24	397.5 kcmil ACSR Ibis	12.44	0.253	0.747	0.539	2.717	5.671		
	Str 1/6 - Str 3/11	2.25	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 3/11 - Str 4/2	0.37	WSP	H24	397.5 kcmil ACSR Ibis	12.44	0.253	0.747	0.539	2.717	5.671		
	Str 4/2 - Reata (BPUB)	0.15	WSP	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		3.25											
		3.25											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Alvey - Drain Tap														
0.075	0.421		0.238	1.513		1.65	0.00056	0.00318		0.00180	0.01144		0.00022	1-3/8 IN HS STL
0.161	0.854		0.513	3.374		3.80	0.00122	0.00646		0.00388	0.02551		0.00050	
0.076	0.396		0.242	1.604		1.82	0.00057	0.00300		0.00183	0.01213		0.00024	
0.003	0.007		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00021		0.00000	
0.314	1.679	1.708	0.998	6.517	6.593	7.30	0.00238	0.01270	0.01292	0.00755	0.04928	0.04986	0.00097	
0.003	0.007		0.005	0.028		0.03	0.00002	0.00005		0.00004	0.00021		0.00000	
1.597	2.757		2.555	9.504		8.74	0.01207	0.02085		0.01932	0.07187		0.00116	
1.599	2.764	3.193	2.560	9.532	9.870	8.77	0.01209	0.02090	0.02415	0.01936	0.07207	0.07463	0.00116	
0.891	1.518		1.426	5.348		4.95	0.00674	0.01148		0.01078	0.04044		0.00065	
2.350	4.057		3.760	13.987		12.86	0.01777	0.03068		0.02843	0.10576		0.00170	
0.491	0.836		0.785	2.946		2.73	0.00371	0.00632		0.00594	0.02227		0.00036	
1.096	1.893		1.754	6.525		6.00	0.00829	0.01431		0.01326	0.04934		0.00079	
4.828	8.303	9.605	7.725	28.806	29.824	26.53	0.03651	0.06279	0.07263	0.05841	0.21781	0.22551	0.00351	
0.348	0.592		0.557	2.088		1.93	0.00263	0.00448		0.00421	0.01579		0.00026	
0.553	0.955		0.885	3.291		3.03	0.00418	0.00722		0.00669	0.02488		0.00040	
0.901	1.547	1.790	1.441	5.379	5.568	4.96	0.00681	0.01170	0.01354	0.01090	0.04067	0.04211	0.00066	
0.877	1.514		1.403	5.220		4.80	0.00663	0.01145		0.01061	0.03947		0.00063	
0.877	1.514	1.750	1.403	5.220	5.406	4.80	0.00663	0.01145	0.01323	0.01061	0.03947	0.04087	0.00063	
8.519	**15.808**	**17.957**	**14.128**	**55.454**	**57.225**	**52.36**	**0.06442**	**0.11953**	**0.13578**	**0.10682**	**0.41931**	**0.43270**	**0.00692**	
115 Alvey - Springfield (SUB)														
0.144	0.439		0.307	1.522		1.56	0.00109	0.00332		0.00232	0.01151		0.00021	
0.090	0.282		0.193	0.946		0.97	0.00068	0.00213		0.00146	0.00715		0.00013	
0.258	0.754		0.550	2.787		2.92	0.00195	0.00570		0.00416	0.02107		0.00039	
0.063	0.197		0.135	0.658		0.67	0.00048	0.00149		0.00102	0.00498		0.00009	
0.155	0.451		0.329	1.667		1.75	0.00117	0.00341		0.00249	0.01260		0.00023	
0.093	0.290		0.199	0.972		1.00	0.00070	0.00219		0.00150	0.00735		0.00013	
0.279	0.847		0.593	2.937		3.02	0.00211	0.00641		0.00449	0.02220		0.00040	
0.040	0.165		0.103	0.582		0.62	0.00030	0.00125		0.00078	0.00440		0.00008	
0.025	0.079		0.054	0.263		0.27	0.00019	0.00060		0.00041	0.00199		0.00004	
1.148	3.504	3.687	2.464	12.332	12.576	12.78	0.00868	0.02650	0.02788	0.01863	0.09325	0.09509	0.00169	
1.148	**3.504**	**3.687**	**2.464**	**12.332**	**12.576**	**12.78**	**0.00868**	**0.02650**	**0.02788**	**0.01863**	**0.09325**	**0.09509**	**0.00169**	
115 Alvey Capacitor Tie 1														
0.033	0.100		0.070	0.347		0.36	0.00025	0.00076		0.00053	0.00262		0.00005	
0.033	0.100	0.105	0.070	0.347	0.354	0.36	0.00025	0.00076	0.00080	0.00053	0.00262	0.00268	0.00005	
0.033	**0.100**	**0.105**	**0.070**	**0.347**	**0.354**	**0.36**	**0.00025**	**0.00076**	**0.00080**	**0.00053**	**0.00262**	**0.00268**	**0.00005**	
115 Alvey Transformer Bay Tap														
0.005	0.022		0.014	0.079		0.08	0.00004	0.00017		0.00011	0.00060		0.00001	
0.003	0.008		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
0.008	0.030	0.031	0.019	0.106	0.108	0.11	0.00006	0.00023	0.00024	0.00015	0.00080	0.00082	0.00001	
0.008	**0.030**	**0.031**	**0.019**	**0.106**	**0.108**	**0.11**	**0.00006**	**0.00023**	**0.00024**	**0.00015**	**0.00080**	**0.00082**	**0.00001**	
115 Anaconda - Silver Bow 1														
0.013	0.037		0.027	0.137		0.14	0.00010	0.00028		0.00020	0.00104		0.00002	
0.061	0.200		0.129	0.611		0.61	0.00046	0.00151		0.00098	0.00462		0.00008	
1.561	9.671		5.061	30.642		32.73	0.01180	0.07313		0.03827	0.23170		0.00433	
0.041	0.133		0.086	0.407		0.41	0.00031	0.00101		0.00065	0.00308		0.00005	
1.675	10.041	10.179	5.304	31.798	32.237	33.89	0.01266	0.07592	0.07697	0.04011	0.24043	0.24376	0.00448	
1.675	**10.041**	**10.179**	**5.304**	**31.798**	**32.237**	**33.89**	**0.01266**	**0.07592**	**0.07697**	**0.04011**	**0.24043**	**0.24376**	**0.00448**	
115 Anderson Ranch - Mountain Home														
0.003	0.008		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
0.003	0.008	0.008	0.005	0.027	0.027	0.03	0.00002	0.00006	0.00006	0.00004	0.00020	0.00021	0.00000	
4.531	13.772		9.644	47.732		49.09	0.03426	0.10414		0.07293	0.36092		0.00649	
4.531	13.772	14.498	9.644	47.732	48.696	49.09	0.03426	0.10414	0.10963	0.07293	0.36092	0.36821	0.00649	
4.533	**13.780**	**14.506**	**9.650**	**47.758**	**48.724**	**49.11**	**0.03428**	**0.10420**	**0.10969**	**0.07297**	**0.36112**	**0.36842**	**0.00650**	
115 Angus (BPUD) - Tap (Franklin - Badger Canyon 2)														
0.603	1.221		1.060	4.410		4.44	0.00456	0.00923		0.00802	0.03335		0.00059	
0.603	1.221	1.362	1.060	4.410	4.536	4.44	0.00456	0.00923	0.01030	0.00802	0.03335	0.03430	0.00059	
0.603	**1.221**	**1.362**	**1.060**	**4.410**	**4.536**	**4.44**	**0.00456**	**0.00923**	**0.01030**	**0.00802**	**0.03335**	**0.03430**	**0.00059**	
115 Athol (KEC) - Tap (Albeni Falls (BPA) - Rathdrum (AVA) No 1)														
3.282	4.963		4.950	16.584		15.82	0.02482	0.03753		0.03743	0.12540		0.00209	
3.282	4.963	5.950	4.950	16.584	17.306	15.82	0.02482	0.03753	0.04499	0.03743	0.12540	0.13086	0.00209	
3.282	**4.963**	**5.950**	**4.950**	**16.584**	**17.306**	**15.82**	**0.02482**	**0.03753**	**0.04499**	**0.03743**	**0.12540**	**0.13086**	**0.00209**	
115 Badger Canyon - Reata (BPUB) 1														
0.122	0.358		0.259	1.304		1.36	0.00092	0.00271		0.00196	0.00986		0.00018	
0.570	1.680		1.214	6.112		6.38	0.00431	0.01271		0.00918	0.04622		0.00084	
0.094	0.276		0.200	1.005		1.05	0.00071	0.00209		0.00151	0.00760		0.00014	
0.038	0.116		0.081	0.400		0.41	0.00029	0.00087		0.00061	0.00303		0.00005	
0.824	2.430	2.566	1.753	8.822	8.994	9.20	0.00623	0.01838	0.01940	0.01326	0.06671	0.06801	0.00122	
0.824	**2.430**	**2.566**	**1.753**	**8.822**	**8.994**	**9.20**	**0.00623**	**0.01838**	**0.01940**	**0.01326**	**0.06671**	**0.06801**	**0.00122**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Badger Canyon - Richland 1**												
	Badger Canyon - Str 1/8	0.84	TDC	H26	795 kcmil ACSR Drake	12.97	0.128	0.710	0.414	2.665	5.978		M-193
	Str 1/8 - Vista (PUD) Tap	0.13	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		0.97											
	Vista Tap - Tapteal (PUD)	2.09	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		2.09											
	Tapteal (PUD) - Str 6/9	2.23	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 6/9 - Richland	0.22	SSC	J16	795 kcmil ACSR Drake	32.76	0.128	0.822	0.414	2.440	5.134		
		2.45											
		5.51											
115	**Bald Mountain - Tap (Underwood - Tap Line)**												
	Bald Mountain - Ch 1	0.29	WHF		266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	KLICK	
	Str (1/4)(1/3) - Tap	0.09	SSC		266.8 kcmil ACSR Partridge	34.02	0.377	0.893	0.663	2.497	4.715	KLICK	
		0.38											
		0.38											
115	**Bandon - Rogue 1**												
	Bandon - Str 1/7	0.58	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-164
	Str 1/7 - Str 4/4	2.79	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 4/4 - Two Mile	0.02	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.39											
	Two Mile - Str 4/5	0.06	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 4/5 - Langlois Tap	10.64	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		10.70											
	Langlois Tap - Str 24/3	9.51	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 24/3 - Port Orford	0.48	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		9.99											
	Port Orford - Str 25/4	0.53	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 25/4 - Geisel Monument Tap	20.98	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		21.51											
	Geisel Monument Tap - Str 46/8	0.22	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 46/8 - Rogue	0.19	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022		
		0.41											
		46.00											
115	**Bandon Sub Transformer Tie**												
		0.06	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.06											
		0.06											
115	**Bayshore - Tap (Shelton - Kitsap 2)**												
		0.81	WSP	H24	397.5 kcmil ACSR Ibis	12.44	0.253	0.747	0.539	2.717	5.671		
		0.81											
		0.81											
115	**Belfair (MN3) - Tap (Shelton - Kitsap 2)**												
		0.03	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.03											
		0.03											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Badger Canyon - Richland 1														
0.107	0.596		0.347	2.238		2.51	0.00081	0.00451		0.00263	0.01692		0.00033	1-7 NO 8 ALWLD
0.017	0.095		0.054	0.342		0.38	0.00013	0.00072		0.00041	0.00258		0.00005	
0.124	0.691	0.702	0.401	2.580	2.611	2.89	0.00094	0.00522	0.00531	0.00303	0.01951	0.01974	0.00038	
0.266	1.522		0.864	5.491		6.08	0.00201	0.01151		0.00653	0.04152		0.00080	
0.266	1.522	1.545	0.864	5.491	5.559	6.08	0.00201	0.01151	0.01168	0.00653	0.04152	0.04203	0.00080	
0.284	1.624		0.922	5.859		6.49	0.00215	0.01228		0.00697	0.04430		0.00086	
0.028	0.181		0.091	0.537		0.56	0.00021	0.00137		0.00069	0.00406		0.00007	
0.312	1.805	1.831	1.013	6.396	6.476	7.05	0.00236	0.01364	0.01385	0.00766	0.04836	0.04897	0.00093	
0.703	**4.017**	**4.078**	**2.278**	**14.467**	**14.645**	**16.02**	**0.00531**	**0.03037**	**0.03084**	**0.01723**	**0.10939**	**0.11074**	**0.00212**	
115 Bald Mountain - Tap (Underwood - Tap Line)														
0.109	0.230		0.192	0.781		0.77	0.00083	0.00174		0.00145	0.00591		0.00010	
0.034	0.080		0.060	0.225		0.21	0.00026	0.00061		0.00045	0.00170		0.00003	
0.143	0.311	0.342	0.252	1.006	1.037	0.98	0.00108	0.00235	0.00259	0.00190	0.00761	0.00784	0.00013	
0.143	**0.311**	**0.342**	**0.252**	**1.006**	**1.037**	**0.98**	**0.00108**	**0.00235**	**0.00259**	**0.00190**	**0.00761**	**0.00784**	**0.00013**	
115 Bandon - Rogue 1														
0.218	0.461		0.384	1.562		1.54	0.00165	0.00348		0.00291	0.01181		0.00020	
1.051	2.216		1.849	7.515		7.42	0.00795	0.01676		0.01398	0.05683		0.00098	
0.008	0.016		0.013	0.054		0.05	0.00006	0.00012		0.00010	0.00041		0.00001	
1.277	2.693	2.980	2.247	9.132	9.404	9.01	0.00966	0.02036	0.02254	0.01699	0.06905	0.07111	0.00119	
0.023	0.048		0.040	0.162		0.16	0.00017	0.00036		0.00030	0.00122		0.00002	
4.008	8.452		7.051	28.661		28.29	0.03031	0.06391		0.05332	0.21672		0.00374	
4.031	8.500	9.407	7.091	28.822	29.682	28.45	0.03048	0.06427	0.07113	0.05362	0.21794	0.22444	0.00376	
3.582	7.555		6.302	25.617		25.29	0.02709	0.05712		0.04765	0.19370		0.00334	
0.181	0.381		0.318	1.293		1.28	0.00137	0.00288		0.00241	0.00978		0.00017	
3.763	7.936	8.783	6.620	26.910	27.712	26.57	0.02846	0.06001	0.06641	0.05006	0.20348	0.20954	0.00351	
0.200	0.421		0.351	1.428		1.41	0.00151	0.00318		0.00266	0.01080		0.00019	
7.903	16.666		13.903	56.513		55.79	0.05976	0.12602		0.10513	0.42732		0.00738	
8.103	17.087	18.911	14.255	57.941	59.669	57.20	0.06127	0.12920	0.14299	0.10779	0.43812	0.45118	0.00756	
0.083	0.175		0.146	0.593		0.59	0.00063	0.00132		0.00110	0.00448		0.00008	
0.016	0.134		0.070	0.495		0.57	0.00012	0.00102		0.00053	0.00374		0.00008	
0.099	0.309	0.324	0.216	1.088	1.109	1.16	0.00075	0.00234	0.00245	0.00163	0.00823	0.00839	0.00015	
17.272	**36.525**	**40.403**	**30.428**	**123.893**	**127.574**	**122.39**	**0.13060**	**0.27618**	**0.30550**	**0.23008**	**0.93681**	**0.96465**	**0.01619**	
115 Bandon Sub Transformer Tie														
0.023	0.048		0.040	0.162		0.16	0.00017	0.00036		0.00030	0.00122		0.00002	
0.023	0.048	0.053	0.040	0.162	0.166	0.16	0.00017	0.00036	0.00040	0.00030	0.00122	0.00126	0.00002	
0.023	**0.048**	**0.053**	**0.040**	**0.162**	**0.166**	**0.16**	**0.00017**	**0.00036**	**0.00040**	**0.00030**	**0.00122**	**0.00126**	**0.00002**	
115 Bayshore - Tap (Shelton - Kitsap 2)														
0.205	0.605		0.437	2.201		2.30	0.00155	0.00457		0.00330	0.01664		0.00030	
0.205	0.605	0.639	0.437	2.201	2.244	2.30	0.00155	0.00457	0.00483	0.00330	0.01664	0.01697	0.00030	
0.205	**0.605**	**0.639**	**0.437**	**2.201**	**2.244**	**2.30**	**0.00155**	**0.00457**	**0.00483**	**0.00330**	**0.01664**	**0.01697**	**0.00030**	
115 Belfair (MN3) - Tap (Shelton - Kitsap 2)														
0.011	0.024		0.020	0.081		0.08	0.00009	0.00018		0.00015	0.00061		0.00001	
0.011	0.024	0.026	0.020	0.081	0.083	0.08	0.00009	0.00018	0.00020	0.00015	0.00061	0.00063	0.00001	
0.011	**0.024**	**0.026**	**0.020**	**0.081**	**0.083**	**0.08**	**0.00009**	**0.00018**	**0.00020**	**0.00015**	**0.00061**	**0.00063**	**0.00001**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Bell - Addy 1**												
	Bell - Str 1/1	0.02	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-185
	Str 1/1 - Str 1/3	0.11	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-186
	Str 1/3 - Str 1/8	0.39	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-201
	Str 1/8 - Str 2/9	0.65	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-202
	Str 2/9 - Str 4/1	1.37	WDC	J28	1272 kcmil AAC Narcissus	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 4/1 - Str 4/15	0.97	WDC	J29	1272 kcmil AAC Narcissus	19.01	0.084	0.743	0.370	2.559	5.751		
	Str 4/15 - Str 9/2	4.20	WDC	J28	1272 kcmil AAC Narcissus	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 9/2 - Str 9/4	0.13	WHF	H32	1272 kcmil AAC Narcissus	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 9/4 - Colbert (AVA) Tap	0.08	WSP	H15	1272 kcmil AAC Narcissus	11.34	0.084	0.680	0.370	2.684	6.307		
		7.92											
	Colbert (AVA) Tap - Halfmoon (IP&L)	0.04	WHF	H22	1272 kcmil AAC Narcissus	14.49	0.084	0.710	0.370	2.624	6.031		
		0.04											
	Halfmoon (IP&L) - Str 9/7	0.01	WSP	H22	1272 kcmil AAC Narcissus	14.49	0.084	0.710	0.370	2.624	6.031		
	Str 9/7 - Str 9/9	0.12	WHF	H11	1.3 In AAC/TW Hood	17.64	0.069	0.735	0.355	2.578	5.826		
	Str 9/9 - Tum Tum (IP&L)	1.62	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
		1.75											
	Tum Tum - Milan (AVA) Tap	5.72	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
		5.72											
	Milan (AVA) Tap - Str 18/6	1.76	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 18/6 - Deer Park	0.21	TDC	J20	1.3 In AAC/TW Hood	23.25	0.069	0.768	0.355	2.511	5.560		
		1.97											
	Deer Park - Str 19/1	0.21	TDC	J20	1.3 In AAC/TW Hood	23.25	0.069	0.768	0.355	2.511	5.560		
	Str 19/1 - Str 23/9	4.88	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 23/9 - Clayton (IP&L)	0.10	WSP	J31	1.3 In AAC/TW Hood	21.54	0.069	0.759	0.355	2.529	5.631		
		5.19											
	Clayton (IP&L) - Str 24/3	0.12	WHF		1.3 In AAC/TW Hood	18.90	0.069	0.743	0.355	2.561	5.757		
	Str 24/3 - Loon Lake (AVA) Tap	6.15	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
		6.27											
	Loon Lake (AVA) Tap - Str 51/6	21.30	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 51/6 - Str 52/6	0.84	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 52/6 - Addy	0.21	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		
		22.35											
		51.21											
115	**Bell - Trentwood 1**												
@	Bell - 12/10 Switch	11.19	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-185
		11.19											M-186
@	12/10 - Tap (IP&L)	0.04	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		0.04											
@	Tap - Trentwood	0.04	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		0.04											
		11.27											
115	**Bell - Trentwood 2**												
	Bell - Bigelow	6.65	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-185
		6.65											
	Bigelow - Trentwood	4.65	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-186
		4.65											
		11.30											
115	**Bellingham - Whatcom County PUD**												
		2.11	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	WHAT	M-117
		2.11											M-118
		2.11											
115	**Benton - Franklin 1**												
	Benton - Str 1/2	0.31	WHF	H11	253 kcmil Cu GC LS 19238	17.64	0.254	0.811	0.540	2.654	5.203		M-127
	Str 1/2 - Str 1/3	0.41	SSC	H18	397.5 kcmil ACSR Ibis	20.16	0.253	0.805	0.539	2.600	5.245		M-145
	Str 1/3 - Str 2/1	0.34	WHF	H11	253 kcmil Cu GC LS 19238	17.64	0.254	0.811	0.540	2.654	5.203		
	Str 2/1 - Baxter	4.01	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		5.07											
	Baxter - Str 13/2	6.86	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 13/2 - Str 20/4	7.14	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 20/4 - Str 21/4	1.25	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 21/4 - Franklin	0.71	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		15.96											
		21.03											
115	**Benton - Franklin 2**												
	Benton - Str 2A	0.32	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		M-127
	Str 2A - Str 2B	0.41	SSC	H18	397.5 kcmil ACSR Ibis	20.16	0.253	0.805	0.539	2.600	5.245		M-145
	Str 2B - Str 2/1	0.33	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 2/1 - Glade/Taylor Flat Tap	10.87	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		11.93											
	Glade/Taylor Flat Tap - Str 21/4	8.37	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 21/4 - Franklin	0.73	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		9.10											
		21.03											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Bell - Addy 1														
0.002	0.014		0.007	0.052		0.06	0.00001	0.00011		0.00006	0.00040		0.00001	2-3/8 IN EHS STL
0.009	0.079		0.041	0.288		0.33	0.00007	0.00059		0.00031	0.00217		0.00004	
0.033	0.279		0.144	1.019		1.17	0.00025	0.00211		0.00109	0.00771		0.00015	2-3/8 IN EHS STL
0.055	0.465		0.241	1.699		1.95	0.00041	0.00351		0.00182	0.01285		0.00026	
0.115	1.010		0.507	3.520		3.97	0.00087	0.00764		0.00383	0.02662		0.00052	
0.082	0.720		0.359	2.482		2.79	0.00062	0.00545		0.00271	0.01877		0.00037	
0.353	3.096		1.554	10.791		12.17	0.00267	0.02341		0.01175	0.08159		0.00161	
0.011	0.096		0.048	0.333		0.37	0.00008	0.00073		0.00036	0.00252		0.00005	
0.007	0.054		0.030	0.215		0.25	0.00005	0.00041		0.00022	0.00162		0.00003	
0.666	5.814	5.852	2.931	20.398	20.608	23.06	0.00504	0.04396	0.04425	0.02216	0.15424	0.15583	0.00305	
0.003	0.028		0.015	0.105		0.12	0.00003	0.00021		0.00011	0.00079		0.00002	
0.003	0.028	0.029	0.015	0.105	0.106	0.12	0.00003	0.00021	0.00022	0.00011	0.00079	0.00080	0.00002	
0.001	0.007		0.004	0.026		0.03	0.00001	0.00005		0.00003	0.00020		0.00000	
0.008	0.088		0.043	0.309		0.35	0.00006	0.00067		0.00032	0.00234		0.00005	
0.112	1.275		0.575	4.007		4.39	0.00085	0.00964		0.00435	0.03030		0.00058	
0.121	1.370	1.375	0.621	4.342	4.387	4.77	0.00091	0.01036	0.01040	0.00470	0.03283	0.03317	0.00063	
0.395	4.500		2.031	14.147		15.51	0.00298	0.03403		0.01535	0.10697		0.00205	
0.395	4.500	4.518	2.031	14.147	14.292	15.51	0.00298	0.03403	0.03416	0.01535	0.10697	0.10807	0.00205	
0.121	1.385		0.625	4.353		4.77	0.00092	0.01047		0.00472	0.03291		0.00063	
0.014	0.161		0.075	0.527		0.58	0.00011	0.00122		0.00056	0.00399		0.00008	
0.136	1.546	1.552	0.699	4.880	4.930	5.36	0.00103	0.01169	0.01174	0.00529	0.03690	0.03728	0.00071	
0.014	0.161		0.075	0.527		0.58	0.00011	0.00122		0.00056	0.00399		0.00008	
0.337	3.840		1.732	12.070		13.23	0.00255	0.02903		0.01310	0.09126		0.00175	
0.007	0.076		0.036	0.253		0.28	0.00005	0.00057		0.00027	0.00191		0.00004	
0.358	4.077	4.092	1.842	12.850	12.981	14.10	0.00271	0.03083	0.03094	0.01393	0.09716	0.09816	0.00186	
0.008	0.089		0.043	0.307		0.35	0.00006	0.00067		0.00032	0.00232		0.00005	
0.424	4.839		2.183	15.211		16.67	0.00321	0.03659		0.01651	0.11501		0.00221	
0.433	4.928	4.947	2.226	15.518	15.677	17.02	0.00327	0.03726	0.03741	0.01683	0.11734	0.11854	0.00225	
1.470	16.759		7.562	52.681		57.75	0.01111	0.12672		0.05718	0.39834		0.00764	
0.058	0.661		0.298	2.078		2.28	0.00044	0.00500		0.00225	0.01571		0.00030	2-3/8 IN EHS STL
0.018	0.150		0.078	0.549		0.63	0.00013	0.00114		0.00059	0.00415		0.00008	2-3/8 IN EHS STL
1.545	17.570	17.638	7.937	55.307	55.874	60.65	0.01168	0.13285	0.13337	0.06002	0.41820	0.42249	0.00802	
3.657	**39.833**	**40.000**	**18.303**	**127.548**	**128.855**	**140.58**	**0.02765**	**0.30119**	**0.30246**	**0.13840**	**0.96445**	**0.97433**	**0.01859**	
115 Bell - Trentwood 1														
1.427	8.148		4.627	29.401		32.56	0.01079	0.06161		0.03499	0.22231		0.00431	
1.427	8.148	8.272	4.627	29.401	29.763	32.56	0.01079	0.06161	0.06255	0.03499	0.22231	0.22505	0.00431	
0.005	0.029		0.017	0.105		0.12	0.00004	0.00022		0.00013	0.00079		0.00002	
0.005	0.029	0.030	0.017	0.105	0.106	0.12	0.00004	0.00022	0.00022	0.00013	0.00079	0.00080	0.00002	
0.005	0.029		0.017	0.105		0.12	0.00004	0.00022		0.00013	0.00079		0.00002	
0.005	0.029	0.030	0.017	0.105	0.106	0.12	0.00004	0.00022	0.00022	0.00013	0.00079	0.00080	0.00002	
1.437	**8.206**	**8.331**	**4.660**	**29.611**	**29.976**	**32.79**	**0.01087**	**0.06205**	**0.06299**	**0.03524**	**0.22390**	**0.22666**	**0.00434**	
115 Bell - Trentwood 2														
0.848	4.842		2.750	17.472		19.35	0.00641	0.03661		0.02079	0.13212		0.00256	
0.848	4.842	4.916	2.750	17.472	17.687	19.35	0.00641	0.03661	0.03717	0.02079	0.13212	0.13374	0.00256	
0.593	3.386		1.923	12.218		13.53	0.00448	0.02560		0.01454	0.09238		0.00179	
0.593	3.386	3.437	1.923	12.218	12.368	13.53	0.00448	0.02560	0.02599	0.01454	0.09238	0.09352	0.00179	
1.441	**8.228**	**8.353**	**4.673**	**29.690**	**30.055**	**32.88**	**0.01089**	**0.06221**	**0.06316**	**0.03533**	**0.22450**	**0.22726**	**0.00435**	
115 Bellingham - Whatcom County PUD														
0.795	1.676		1.398	5.684		5.61	0.00601	0.01267		0.01057	0.04298		0.00074	
0.795	1.676	1.855	1.398	5.684	5.853	5.61	0.00601	0.01267	0.01403	0.01057	0.04298	0.04426	0.00074	
0.795	**1.676**	**1.855**	**1.398**	**5.684**	**5.853**	**5.61**	**0.00601**	**0.01267**	**0.01403**	**0.01057**	**0.04298**	**0.04426**	**0.00074**	
115 Benton - Franklin 1														
0.079	0.251		0.167	0.823		0.81	0.00060	0.00190		0.00127	0.00622		0.00011	2-3/8 IN HS STL
0.104	0.330		0.221	1.066		1.08	0.00079	0.00250		0.00167	0.00806		0.00014	2-3/8 IN HS STL
0.086	0.276		0.184	0.902		0.88	0.00065	0.00209		0.00139	0.00682		0.00012	
1.019	3.178		2.166	10.794		10.69	0.00770	0.02403		0.01638	0.08162		0.00141	
1.288	4.035	4.236	2.738	13.585	13.858	13.45	0.00974	0.03051	0.03203	0.02070	0.10272	0.10479	0.00178	
1.743	5.436		3.705	18.466		18.28	0.01318	0.04111		0.02802	0.13963		0.00242	
1.814	5.658		3.856	19.219		19.03	0.01372	0.04279		0.02916	0.14533		0.00252	
0.317	0.963		0.674	3.337		3.43	0.00240	0.00728		0.00510	0.02523		0.00045	
0.180	0.547		0.383	1.895		1.95	0.00136	0.00414		0.00290	0.01433		0.00026	2-3/8 IN HS STL
4.054	12.605	13.240	8.619	42.917	43.774	42.69	0.03065	0.09531	0.10012	0.06517	0.32452	0.33100	0.00565	
5.342	**16.640**	**17.476**	**11.357**	**56.503**	**57.633**	**56.14**	**0.04039**	**0.12582**	**0.13215**	**0.08587**	**0.42724**	**0.43579**	**0.00742**	
115 Benton - Franklin 2														
0.081	0.252		0.173	0.842		0.86	0.00061	0.00191		0.00131	0.00637		0.00011	2-3/8 IN HS STL
0.104	0.330		0.221	1.066		1.08	0.00079	0.00250		0.00167	0.00806		0.00014	2-3/8 IN HS STL
0.084	0.260		0.178	0.869		0.88	0.00063	0.00197		0.00135	0.00657		0.00012	
2.754	8.373		5.863	29.018		29.84	0.02083	0.06331		0.04433	0.21942		0.00395	
3.023	9.216	9.699	6.435	31.795	32.440	32.66	0.02286	0.06968	0.07334	0.04866	0.24041	0.24529	0.00432	
2.121	6.447		4.515	22.344		22.98	0.01604	0.04875		0.03414	0.16895		0.00304	
0.185	0.562		0.394	1.949		2.00	0.00140	0.00425		0.00298	0.01474		0.00027	2-3/8 IN HS STL
2.306	7.009	7.379	4.909	24.293	24.784	24.98	0.01744	0.05300	0.05580	0.03712	0.18369	0.18740	0.00330	
5.329	**16.225**	**17.078**	**11.344**	**56.088**	**57.223**	**57.64**	**0.04029**	**0.12268**	**0.12913**	**0.08577**	**0.42410**	**0.43269**	**0.00762**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Benton - HEW 451B 1**												
	Benton - Hanford 2 Tap	1.78	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.78											
	Hanford 2 Tap - Str 5/4	2.67	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 5/4 - HEW 451B	0.30	WSP	H24	397.5 kcmil ACSR Ibis	12.44	0.253	0.747	0.539	2.717	5.671		
		2.97											
		4.75											
115	**Benton - Othello Sw Sta(AVA)**												
	Benton - Str 11/7	10.94	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-180
		10.94											
	Str 11/7 - Chg.1	2.05	WHF		2/0 Cu 7 Str	14.49	0.477	0.856	0.763	2.771	5.005	AVA	
	Chg.1 - Chg.2	0.52	WHF		312.8 kcmil AAAC/6201 Buttle	18.90	0.376	0.830	0.662	2.648	5.138	AVA	
	Chg.2 - Chg.3	14.78	WHF		1/0 Cu 7 Str	13.86	0.601	0.865	0.887	2.796	4.953	AVA	
	Chg.3 - South Othello Tap	5.94	WHF		7 Str No 8 Cu	13.23	0.549	0.854	0.835	2.801	5.021	AVA	
		23.29											
	South Othello Tap - Othello Sw Sta	2.77	WHF		7 Str No 8 Cu	13.23	0.549	0.854	0.835	2.801	5.021	AVA	
		2.77											
		37.00											
115	**Benton - Scooteney 1**												
	Benton - Str 1/2	0.28	WHF	H11	795 kcmil ACSR Drake	17.64	0.128	0.747	0.414	2.590	5.669		M-127
	Str 1/2 - Str 1/3	0.41	SSC	H18	397.5 kcmil ACSR Lark	20.16	0.251	0.799	0.537	2.594	5.269		
	Str 1/3 - Str 2/1	0.33	WHF	H11	795 kcmil ACSR Drake	17.64	0.128	0.747	0.414	2.590	5.669		
	Str 2/1 - Ringold	6.82	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		7.84											
	Ringold - Mesa	6.38	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		6.38											
	Mesa - Connell Tap	4.53	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		4.53											
	Connell Tap - Scooteney	1.57	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		1.57											
		20.32											
115	**Benton - White Bluffs**												
	Benton - Str 1/3	0.11	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-129
	Str 1/3 - Str 1/7	0.38	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
	Str 1/7 - Str 6/5	4.91	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
	Str 6/5 - DOE B3/S4	0.48	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
		5.88											
	DOE B3/S4 - Str 1/5	0.32	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 1/5 - Str 1/7	0.15	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 1/7 - Str 1/10	0.29	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
	Str 1/10 - Str 2/2	0.66	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
	Str 2/2 - Str 5/3	3.10	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
	Str 5/3 - Str 5/15	0.44	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
	Str 5/15 - White Bluffs	0.09	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
		5.05											
		10.93											
115	**Bertelsen - Willow Creek (EWEB) 1**												
	Bertelsen - Str 1/1	0.01	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	EWEB	M-179
@	Str 1/1 - Willow Creek (EWEB)	1.02	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	EWEB	
		1.03											
		1.03											
115	**Big Eddy - Chenoweth 1**												
	Big Eddy - Str 1/1	0.09	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		M-143
	Str 1/1 - Str 1/2	0.08	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		
	Str 1/2 - Str 1/5	0.23	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		
	Str 1/5 - OR/WA Border	0.43	SSC	SPEC	1272 kcmil ACSR Pheasant	29.50	0.082	0.783	0.368	2.439	5.403		
		0.83											
	OR/WA Border - Str 2/3	0.67	SSC	SPEC	1272 kcmil ACSR Pheasant	29.50	0.082	0.783	0.368	2.439	5.403		
	Str 2/3 - Str 6/4	3.69	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		
	Str 6/4 - WA/OR Border	0.30	SSC	J5	1272 kcmil ACSR Pheasant	34.96	0.082	0.803	0.368	2.397	5.260		
		4.66											
	WA/OR Border - Str 6/7	0.21	SSC	J5	1272 kcmil ACSR Pheasant	34.96	0.082	0.803	0.368	2.397	5.260		
	Str 6/7 - Chenoweth	0.80	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		
		1.01											
		6.50											
115	**Big Eddy - De Moss 1**												
	Big Eddy - Str 11/6	10.57	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 11/6 - Twr 12/10	0.97	WSP	SPEC	397.5 kcmil ACSR Ibis	14.80	0.253	0.768	0.539	2.675	5.510		
	Twr 12/10 - Twr 13/1	0.81	SSC	J15	795 kcmil ACSR Mallard	37.17	0.126	0.832	0.412	2.403	5.059		
	Twr 13/1 - Str 20/9	7.29	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 20/9 - Str 24/11	3.84	WSP	SPEC	397.5 kcmil ACSR Ibis	14.80	0.253	0.768	0.539	2.675	5.510		
	Str 24/11 - De Moss	0.50	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		23.98											
		23.98											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Benton - HEW 451B 1														
0.451	1.371		0.960	4.752		4.89	0.00341	0.01037		0.00726	0.03593		0.00065	
0.451	1.371	1.443	0.960	4.752	4.848	4.89	0.00341	0.01037	0.01091	0.00726	0.03593	0.03666	0.00065	
0.677	2.057		1.440	7.128		7.33	0.00512	0.01555		0.01089	0.05390		0.00097	
0.076	0.224		0.162	0.815		0.85	0.00057	0.00169		0.00122	0.00616		0.00011	
0.753	2.281	2.402	1.602	7.943	8.103	8.18	0.00569	0.01724	0.01816	0.01211	0.06006	0.06127	0.00108	
1.204	**3.652**	**3.845**	**2.562**	**12.695**	**12.951**	**13.07**	**0.00910**	**0.02761**	**0.02907**	**0.01937**	**0.09599**	**0.09792**	**0.00173**	
115 Benton - Othello Sw Sta(AVA)														
4.121	8.690		7.250	29.469		29.09	0.03116	0.06571		0.05482	0.22283		0.00385	
4.121	8.690	9.618	7.250	29.469	30.348	29.09	0.03116	0.06571	0.07273	0.05482	0.22283	0.22947	0.00385	
0.977	1.755		1.563	5.680		5.13	0.00739	0.01327		0.01182	0.04295		0.00068	
0.196	0.432		0.344	1.377		1.34	0.00148	0.00326		0.00260	0.01041		0.00018	
8.878	12.781		13.105	41.321		36.60	0.06713	0.09664		0.09910	0.31244		0.00484	
3.259	5.070		4.958	16.641		14.91	0.02464	0.03834		0.03749	0.12583		0.00197	
13.310	20.038	24.056	19.971	65.019	68.017	57.98	0.10065	0.15151	0.18189	0.15101	0.49163	0.51430	0.00767	
1.520	2.364		2.312	7.760		6.95	0.01149	0.01788		0.01748	0.05868		0.00092	
1.520	2.364	2.811	2.312	7.760	8.097	6.95	0.01149	0.01788	0.02125	0.01748	0.05868	0.06123	0.00092	
18.951	**31.092**	**36.413**	**29.533**	**102.248**	**106.427**	**94.03**	**0.14330**	**0.23510**	**0.27533**	**0.22331**	**0.77314**	**0.80474**	**0.01243**	
115 Benton - Scooteney 1														
0.036	0.209		0.116	0.725		0.79	0.00027	0.00158		0.00088	0.00548		0.00010	
0.103	0.328		0.220	1.064		1.08	0.00078	0.00248		0.00167	0.00804		0.00014	
0.042	0.246		0.136	0.855		0.94	0.00032	0.00186		0.00103	0.00646		0.00012	
0.870	4.966		2.820	17.919		19.85	0.00658	0.03755		0.02132	0.13549		0.00262	
1.050	5.749	5.844	3.293	20.563	20.824	22.65	0.00794	0.04347	0.04419	0.02490	0.15548	0.15746	0.00300	
2.403	5.068		4.228	17.186		16.97	0.01817	0.03832		0.03197	0.12995		0.00224	
2.403	5.068	5.609	4.228	17.186	17.698	16.97	0.01817	0.03832	0.04241	0.03197	0.12995	0.13382	0.00224	
1.706	3.599		3.002	12.202		12.05	0.01290	0.02721		0.02270	0.09227		0.00159	
1.706	3.599	3.983	3.002	12.202	12.566	12.05	0.01290	0.02721	0.03011	0.02270	0.09227	0.09502	0.00159	
0.591	1.247		1.040	4.229		4.17	0.00447	0.00943		0.00787	0.03198		0.00055	
0.591	1.247	1.380	1.040	4.229	4.355	4.17	0.00447	0.00943	0.01044	0.00787	0.03198	0.03293	0.00055	
5.751	**15.663**	**16.686**	**11.563**	**54.180**	**55.400**	**55.84**	**0.04349**	**0.11843**	**0.12617**	**0.08743**	**0.40968**	**0.41890**	**0.00739**	
115 Benton - White Bluffs														
0.014	0.080		0.045	0.289		0.32	0.00011	0.00061		0.00034	0.00219		0.00004	2-7 NO 8 ALWLD
0.098	0.308		0.206	1.030		1.00	0.00074	0.00233		0.00156	0.00779		0.00013	2-7 NO 8 ALWLD
1.263	3.979		2.668	13.305		12.92	0.00955	0.03009		0.02017	0.10060		0.00171	
0.124	0.389		0.261	1.301		1.26	0.00093	0.00294		0.00197	0.00984		0.00017	2-3/8 IN 7Str ST
1.499	4.757	4.987	3.180	15.924	16.239	15.50	0.01133	0.03597	0.03771	0.02405	0.12041	0.12279	0.00205	
0.041	0.233		0.132	0.841		0.93	0.00031	0.00176		0.00100	0.00636		0.00012	2-7 NO 8 ALWLD
0.019	0.109		0.062	0.394		0.44	0.00014	0.00083		0.00047	0.00298		0.00006	2-3/8 IN SM STL
0.075	0.235		0.158	0.786		0.76	0.00056	0.00178		0.00119	0.00594		0.00010	2-3/8 IN SM STL
0.170	0.535		0.359	1.788		1.74	0.00128	0.00404		0.00271	0.01352		0.00023	
0.395	2.155		1.282	8.350		9.47	0.00299	0.01629		0.00969	0.06313		0.00125	
0.056	0.306		0.182	1.185		1.34	0.00042	0.00231		0.00138	0.00896		0.00018	1-7 NO 8 ALWLD
0.011	0.063		0.037	0.242		0.27	0.00009	0.00047		0.00028	0.00183		0.00004	2-7 NO 8 ALWLD
0.767	3.635	3.716	2.211	13.586	13.765	14.95	0.00580	0.02749	0.02809	0.01672	0.10273	0.10408	0.00198	
2.266	**8.392**	**8.693**	**5.392**	**29.511**	**29.999**	**30.45**	**0.01713**	**0.06346**	**0.06573**	**0.04077**	**0.22314**	**0.22684**	**0.00403**	
115 Bertelsen - Willow Creek (EWEB) 1														
0.001	0.007		0.004	0.026		0.03	0.00001	0.00006		0.00003	0.00020		0.00000	
0.258	0.786		0.550	2.723		2.80	0.00195	0.00594		0.00416	0.02059		0.00037	
0.260	0.793	0.835	0.554	2.749	2.805	2.83	0.00196	0.00600	0.00631	0.00419	0.02079	0.02121	0.00037	
0.260	**0.793**	**0.835**	**0.554**	**2.749**	**2.805**	**2.83**	**0.00196**	**0.00600**	**0.00631**	**0.00419**	**0.02079**	**0.02121**	**0.00037**	
115 Big Eddy - Chenoweth 1														
0.008	0.070		0.033	0.224		0.25	0.00006	0.00053		0.00025	0.00169		0.00003	2-3/8 IN HS STL
0.007	0.062		0.030	0.199		0.22	0.00005	0.00047		0.00022	0.00151		0.00003	
0.019	0.179		0.085	0.573		0.63	0.00015	0.00135		0.00064	0.00433		0.00008	2-3/8 IN HS STL
0.035	0.337		0.158	1.049		1.16	0.00027	0.00254		0.00120	0.00793		0.00015	2-5/8 IN HS STL
0.069	0.647	0.651	0.306	2.045	2.067	2.26	0.00052	0.00489	0.00492	0.00232	0.01546	0.01563	0.00030	
0.055	0.524		0.246	1.634		1.81	0.00041	0.00397		0.00186	0.01235		0.00024	2-5/8 IN HS STL
0.310	2.866		1.366	9.189		10.12	0.00235	0.02167		0.01033	0.06948		0.00134	
0.025	0.241		0.110	0.719		0.79	0.00019	0.00182		0.00083	0.00544		0.00010	2-5/8 IN HS STL
0.390	3.632	3.653	1.723	11.542	11.670	12.72	0.00295	0.02746	0.02762	0.01302	0.08727	0.08824	0.00168	
0.017	0.169		0.077	0.503		0.55	0.00013	0.00128		0.00058	0.00381		0.00007	2-5/8 IN HS STL
0.067	0.621		0.296	1.992		2.19	0.00051	0.00470		0.00224	0.01506		0.00029	2-3/8 IN HS STL
0.084	0.790	0.795	0.373	2.496	2.523	2.75	0.00064	0.00597	0.00601	0.00282	0.01887	0.01908	0.00036	
0.543	**5.069**	**5.098**	**2.402**	**16.082**	**16.260**	**17.73**	**0.00411**	**0.03833**	**0.03855**	**0.01816**	**0.12160**	**0.12295**	**0.00234**	
115 Big Eddy - De Moss 1														
2.678	8.142		5.701	28.217		29.02	0.02025	0.06156		0.04311	0.21336		0.00384	
0.246	0.745		0.523	2.595		2.67	0.00186	0.00563		0.00396	0.01962		0.00035	
0.102	0.674		0.334	1.947		2.05	0.00077	0.00509		0.00253	0.01472		0.00027	
1.847	5.615		3.932	19.461		20.01	0.01397	0.04246		0.02973	0.14715		0.00265	
0.973	2.948		2.071	10.271		10.58	0.00736	0.02229		0.01566	0.07766		0.00140	
0.127	0.385		0.270	1.335		1.37	0.00096	0.00291		0.00204	0.01009		0.00018	
5.974	18.508	19.448	12.832	63.825	65.103	65.71	0.04517	0.13995	0.14706	0.09703	0.48261	0.49227	0.00869	
5.974	**18.508**	**19.448**	**12.832**	**63.825**	**65.103**	**65.71**	**0.04517**	**0.13995**	**0.14706**	**0.09703**	**0.48261**	**0.49227**	**0.00869**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Big Eddy 230/115 kV Transformer Bank 1 Tie 1**												
		0.17	SSC	SPEC	1590 kcmil AAC Coreopsis	16.03	0.069	0.708	0.355	2.586	6.042		
		0.17											
		0.17											
115	**Bigelow - Green Bluff**												
	Operating Name (Green Bluff Tap to Bell - Trentwood No 2)												
		7.35	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		7.35											
		7.35											
115	**Blue River - Tap (Cougar - Thurston 1)**												
		0.32	WHF	H7	666.6 kcmil ACSR Flamingo	15.12	0.152	0.742	0.438	2.641	5.719		
		0.32											
		0.32											
115	**Boardman - Tower Road 1**												
	Was Formerly McNary - Dalreed 1 230 kV Boardman Tap (Design McNary - Maupin 1)												
	Boardman - Str 1/7	0.36	WSP	H24	556.5 kcmil ACSR/TW Parakeet	12.44	0.186	0.740	0.472	2.710	5.733		M-119
	Str 1/7 - Tap (Str 1/8)	0.03	WHF	H7	556.5 kcmil ACSR/TW Parakeet	15.12	0.186	0.763	0.472	2.663	5.549		
	Tap (Str 1/8) - Str 1/10	0.20	SSC	J9	1272 kcmil ACSR Pheasant	33.14	0.082	0.797	0.368	2.410	5.304		
	Str 1/10 - Tower Road SW Station	7.94	SSC	J9	1272 kcmil ACSR Pheasant	33.14	0.082	0.797	0.368	2.410	5.304		
		8.53											M-200
		8.53											
115	**Bonners Ferry - Troy 1**												
	Bonners Ferry - Str 1/8	0.51	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 1/8 - Str 6/2 Dis Sw	4.63	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 6/2 Dis Sw - Movie	1.09	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		6.23											
	Movie - Str 7/7 Dis Sw	0.42	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 7/7 Dis Sw - ID/MT Border	6.78	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		7.20											
	ID/MT Border - Yaak	4.38	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		4.38											
	Yaak - Str 19/1 Dis Sw	0.25	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	19/1 Dis Sw - ASARCO(31/3)	12.13	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		12.38											
	ASARCO(31/3) - Troy	0.03	WHF	H22	1272 kcmil AAC Narcissus	14.49	0.084	0.710	0.370	2.624	6.031		
		0.03											
		30.22											
115	**Bonneville - Alcoa 1**												
	Twr 38/2 - Twr 40/1	1.84	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
		1.84											
		1.84											
115	**Bonneville - Alcoa 2**												
	* Line Section Operated in Parallel with old (Bonneville - Alcoa 1) / Only Single Circuit Parameters Shown												
	Bonneville - OR/WA Border	0.41	SSC	J4	801.9 kcmil ACSR Special HS	37.80	0.121	0.816	0.407	2.382	5.124		M-121
		0.41											
	OR/WA Border - Twr 1/2	0.17	SSC	J4	801.9 kcmil ACSR Special HS	37.80	0.121	0.816	0.407	2.382	5.124		M-122
	Twr 1/2 - Twr 1/3	0.09	SSC	J3	795 kcmil ACSR Mallard	34.02	0.126	0.821	0.412	2.425	5.127		M-126
	Twr 1/3 - Underwood Tap	0.26	SSC	J8	500 kcmil Cu 37 Str	22.68	0.130	0.822	0.416	2.573	5.181		M-168
		0.52											
	Underwood Tap - Camas (Clark PUD) Tap	20.96	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		M-189
		20.96											
	Camas (Clark PUD) Tap - Twr 38/2	15.52	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		M-190
*	Twr 38/2 - Twr 40/1	1.84	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
	Twr 40/1 - Alcoa	1.84	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
		19.20											
		41.09											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Big Eddy 230/115 kV Transformer Bank 1 Tie 1														
0.012	0.120		0.060	0.440		0.51	0.00009	0.00091		0.00046	0.00332		0.00007	
0.012	0.120	0.121	0.060	0.440	0.444	0.51	0.00009	0.00091	0.00091	0.00046	0.00332	0.00336	0.00007	
0.012	**0.120**	**0.121**	**0.060**	**0.440**	**0.444**	**0.51**	**0.00009**	**0.00091**	**0.00091**	**0.00046**	**0.00332**	**0.00336**	**0.00007**	
115 Bigelow - Green Bluff														
2.769	5.839		4.871	19.799		19.55	0.02094	0.04415		0.03683	0.14971		0.00258	
2.769	5.839	6.462	4.871	19.799	20.389	19.55	0.02094	0.04415	0.04886	0.03683	0.14971	0.15417	0.00258	
2.769	**5.839**	**6.462**	**4.871**	**19.799**	**20.389**	**19.55**	**0.02094**	**0.04415**	**0.04886**	**0.03683**	**0.14971**	**0.15417**	**0.00258**	
115 Blue River - Tap (Cougar - Thurston 1)														
0.049	0.237		0.140	0.845		0.92	0.00037	0.00179		0.00106	0.00639		0.00012	
0.049	0.237	0.242	0.140	0.845	0.857	0.92	0.00037	0.00179	0.00183	0.00106	0.00639	0.00648	0.00012	
0.049	**0.237**	**0.242**	**0.140**	**0.845**	**0.857**	**0.92**	**0.00037**	**0.00179**	**0.00183**	**0.00106**	**0.00639**	**0.00648**	**0.00012**	
115 Boardman - Tower Road 1														
0.067	0.266		0.170	0.976		1.03	0.00051	0.00201		0.00128	0.00738		0.00014	3/8" EHS Steel
0.006	0.023		0.014	0.080		0.08	0.00004	0.00017		0.00011	0.00060		0.00001	
0.016	0.159		0.074	0.482		0.53	0.00012	0.00120		0.00056	0.00365		0.00007	
0.650	6.327		2.921	19.139		21.06	0.00492	0.04784		0.02209	0.14472		0.00278	
0.739	6.775	6.815	3.179	20.676	20.919	22.70	0.00559	0.05123	0.05153	0.02404	0.15634	0.15818	0.00300	
0.739	**6.775**	**6.815**	**3.179**	**20.676**	**20.919**	**22.70**	**0.00559**	**0.05123**	**0.05153**	**0.02404**	**0.15634**	**0.15818**	**0.00300**	
115 Bonners Ferry - Troy 1														
0.192	0.402		0.338	1.379		1.37	0.00145	0.00304		0.00256	0.01043		0.00018	2-3/8 IN HS STL
1.744	3.654		3.068	12.520		12.40	0.01319	0.02763		0.02320	0.09467		0.00164	
0.411	0.860		0.722	2.947		2.92	0.00310	0.00650		0.00546	0.02229		0.00039	
2.347	4.917	5.448	4.129	16.846	17.344	16.68	0.01775	0.03718	0.04120	0.03122	0.12738	0.13115	0.00221	
0.158	0.331		0.278	1.136		1.12	0.00120	0.00251		0.00210	0.00859		0.00015	
2.554	5.351		4.493	18.333		18.15	0.01931	0.04046		0.03397	0.13862		0.00240	
2.712	5.682	6.296	4.771	19.469	20.045	19.28	0.02051	0.04297	0.04761	0.03608	0.14721	0.15157	0.00255	
1.650	3.457		2.903	11.844		11.73	0.01248	0.02614		0.02195	0.08955		0.00155	
1.650	3.457	3.830	2.903	11.844	12.194	11.73	0.01248	0.02614	0.02896	0.02195	0.08955	0.09220	0.00155	
0.094	0.197		0.166	0.676		0.67	0.00071	0.00149		0.00125	0.00511		0.00009	
4.569	9.573		8.039	32.800		32.47	0.03455	0.07239		0.06078	0.24801		0.00429	
4.664	9.770	10.826	8.204	33.476	34.466	33.14	0.03526	0.07388	0.08186	0.06204	0.25312	0.26061	0.00438	
0.003	0.021		0.011	0.079		0.09	0.00002	0.00016		0.00008	0.00060		0.00001	
0.003	0.021	0.021	0.011	0.079	0.080	0.09	0.00002	0.00016	0.00016	0.00008	0.00060	0.00060	0.00001	
11.375	**23.848**	**26.422**	**20.018**	**81.713**	**84.129**	**80.91**	**0.08601**	**0.18032**	**0.19979**	**0.15136**	**0.61786**	**0.63614**	**0.01070**	
115 Bonneville - Alcoa 1														
0.240	1.426		0.766	4.907		5.07	0.00181	0.01078		0.00579	0.03710		0.00067	
0.240	1.426	1.446	0.766	4.907	4.966	5.07	0.00181	0.01078	0.01093	0.00579	0.03710	0.03755	0.00067	
0.240	**1.426**	**1.446**	**0.766**	**4.907**	**4.966**	**5.07**	**0.00181**	**0.01078**	**0.01093**	**0.00579**	**0.03710**	**0.03755**	**0.00067**	
115 Bonneville - Alcoa 2														
0.049	0.335		0.167	0.976		1.05	0.00037	0.00253		0.00126	0.00738		0.00014	
0.049	0.335	0.338	0.167	0.976	0.991	1.05	0.00037	0.00253	0.00256	0.00126	0.00738	0.00749	0.00014	
0.021	0.139		0.069	0.405		0.44	0.00016	0.00105		0.00052	0.00306		0.00006	
0.011	0.074		0.037	0.218		0.23	0.00009	0.00056		0.00028	0.00165		0.00003	
0.034	0.214		0.108	0.669		0.67	0.00026	0.00162		0.00082	0.00506		0.00009	
0.066	0.426	0.431	0.215	1.292	1.310	1.34	0.00050	0.00322	0.00326	0.00162	0.00977	0.00990	0.00018	
2.733	16.240		8.728	55.894		57.71	0.02067	0.12279		0.06599	0.42264		0.00763	
2.733	16.240	16.468	8.728	55.894	56.571	57.71	0.02067	0.12279	0.12452	0.06599	0.42264	0.42776	0.00763	
2.024	12.025		6.463	41.387		42.73	0.01530	0.09092		0.04887	0.31295		0.00565	
0.240	1.426		0.766	4.907		5.07	0.00181	0.01078		0.00579	0.03710		0.00067	
0.240	1.426		0.766	4.907		5.07	0.00181	0.01078		0.00579	0.03710		0.00067	
2.504	14.876	15.085	7.995	51.201	51.821	52.87	0.01893	0.11248	0.11407	0.06045	0.38715	0.39184	0.00699	
5.352	**31.876**	**32.322**	**17.104**	**109.363**	**110.693**	**112.97**	**0.04047**	**0.24103**	**0.24440**	**0.12933**	**0.82694**	**0.83700**	**0.01494**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Bonneville - Hood River 1**												
	Bonneville - Str 1/1	0.05	SSC		795 kcmil ACSR Mallard	18.90	0.126	0.750	0.412	2.568	5.631		
	Str 1/1 - Str 1/2	0.09	SDC		795 kcmil ACSR Mallard	39.06	0.126	0.838	0.412	2.391	5.022		
	Str 1/2 - Acton (1/3)	0.22	SSC		795 kcmil ACSR Mallard	37.17	0.126	0.832	0.412	2.403	5.059		
		0.36											
	Acton (1/3) - Str 1/4	0.11	SSC	J8	795 kcmil ACSR Mallard	22.68	0.126	0.772	0.412	2.523	5.464		
	Str 1/4 - Str 1/5	0.09	SSC	J8	397.5 kcmil ACSR Ibis	22.68	0.253	0.819	0.539	2.571	5.151		
	Str 1/5 - Str 2/4	0.72	SSC	H10	397.5 kcmil ACSR Ibis	19.53	0.253	0.801	0.539	2.607	5.271		
	Str 2/4 - Str 2/5	0.51	SSC	H10	397.5 kcmil ACSR Lark	19.53	0.251	0.796	0.537	2.602	5.295		
	Str 2/5 - Str 4/4	1.69	SSC	H10	397.5 kcmil ACSR Ibis	19.53	0.253	0.801	0.539	2.607	5.271		
	Str 4/4 - Str 7/1	2.47	WHF	H7	556.5 kcmil ACSR/TW Parakeet	15.12	0.186	0.763	0.472	2.663	5.549		
	Str 7/1 - Cascade Locks Tap	0.01	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		5.60											
	Cascade Locks Tap - Str 7/2	0.02	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 7/2 - Str 12/5	5.28	WHF	H7	556.5 kcmil ACSR/TW Parakeet	15.12	0.186	0.763	0.472	2.663	5.549		
	Str 12/5 - Str 19/10	7.46	SSC	H10	397.5 kcmil ACSR Ibis	19.53	0.253	0.801	0.539	2.607	5.271		
	Str 19/10 - Str 23/9	3.37	WHF	H7	556.5 kcmil ACSR/TW Parakeet	15.12	0.186	0.763	0.472	2.663	5.549		
	Str 23/9 - Hood River	0.51	WHF	H7	556.5 kcmil ACSR/TW Parakeet	15.12	0.186	0.763	0.472	2.663	5.549		
		16.64											
		22.60											
115	**Bonneville - North Camas 1**												
	Bonneville - OR/WA Border	0.42	SSC	J4	801.9 kcmil ACSR Special HS	37.80	0.121	0.816	0.407	2.382	5.124		M-126
		0.42											
	OR/WA Border - Twr 1/2	0.17	SSC	J4	801.9 kcmil ACSR Special HS	37.80	0.121	0.816	0.407	2.382	5.124		M-168
	Twr 1/2 - Twr 1/3	0.09	SSC	J3	795 kcmil ACSR Mallard	34.02	0.126	0.821	0.412	2.425	5.127		M-189
	Twr 1/3 - Underwood Tap	0.22	SSC	J8	500 kcmil Cu 37 Str	22.68	0.130	0.822	0.416	2.573	5.181		M-190
		0.48											
	Underwood Tap - Cape Horn	11.54	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
		11.54											
	Cape Horn - Evans	7.72	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
		7.72											
@	Evans - North Camas	1.81	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
		1.81											
		21.97											
115	**Box Canyon - Tap (Colville - Boundary 1)**												
		2.39	WHF	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
		2.39											
		2.39											
115	**Box Canyon(PUD) - USK(PUD) 1**												
	Box Canyon - Cusick	35.86	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	PPUD	
		35.86											
	Cusick - USK	4.46	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	PPUD	
		4.46											
		40.32											
115	**Boyer(PP&L) - Tillamook 1**												
	Boyer - Hebo Tap (14/3)	12.94	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-128
		12.94											
	Hebo Tap (14/3) - Beaver	4.53	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-153
		4.53											
	Beaver - Trask River Tap (30/1)	10.44	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		10.44											
	Trask River Tap (30/1) - Str 31/14	1.93	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 31/14 - Str 33/5	1.27	WSP	H16	4/0 ACSR Penguin (6/1)	11.79	0.563	0.852	0.849	2.842	5.420		
	Str 33/5 - Str 33/12	0.30	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
	Str 33/12 - Str 33/17	0.25	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
	Str 33/17 - Str 33/20	0.09	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
	Str 33/20 - Str 33/23	0.12	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
	Str 33/23 - Tillamook	0.05	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
		4.01											
		31.92											
115	**Bremerton - U S Navy Station H**												
	Bremerton - Station G	0.57	WSP		1272 kcmil AAC Narcissus	11.00	0.084	0.676	0.370	2.691	6.343	USN	
	Station G - U S Navy Station H	1.07	WSP		1272 kcmil AAC Narcissus	11.00	0.084	0.676	0.370	2.691	6.343	USN	
		1.64											
		1.64											
115	**Bronx(AVA) - Tap (Albeni Falls - Bonners Ferry 1)**												
		0.19	WSP		2/0 Cu 7 Str	10.21	0.477	0.814	0.763	2.856	5.280		
		0.19											
		0.19											
115	**Burbank - Tap (Franklin - Walla Walla)**												
		0.02	WHF	H7	4/0 Cu 7 Str	15.12	0.300	0.833	0.586	2.732	5.150		
		0.02											
		0.02											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Bonneville - Hood River 1														
0.006	0.037		0.021	0.128		0.14	0.00005	0.00028		0.00016	0.00097		0.00002	1-5/8 IN HS STL
0.011	0.075		0.037	0.215		0.23	0.00009	0.00057		0.00028	0.00163		0.00003	
0.028	0.183		0.091	0.529		0.56	0.00021	0.00138		0.00069	0.00400		0.00007	
0.046	0.296	0.299	0.148	0.872	0.885	0.92	0.00034	0.00224	0.00226	0.00112	0.00660	0.00669	0.00012	
0.014	0.085		0.045	0.278		0.30	0.00011	0.00064		0.00034	0.00210		0.00004	
0.023	0.074		0.049	0.231		0.23	0.00017	0.00056		0.00037	0.00175		0.00003	1-5/8 IN HS STL
0.182	0.577		0.388	1.877		1.90	0.00138	0.00436		0.00294	0.01420		0.00025	
0.128	0.406		0.274	1.327		1.35	0.00097	0.00307		0.00207	0.01003		0.00018	
0.428	1.354		0.912	4.407		4.45	0.00324	0.01024		0.00689	0.03332		0.00059	
0.459	1.885		1.165	6.577		6.85	0.00347	0.01426		0.00881	0.04973		0.00091	
0.003	0.008		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
1.237	4.389	4.560	2.838	14.723	14.994	15.11	0.00935	0.03318	0.03448	0.02146	0.11133	0.11338	0.00200	
0.005	0.015		0.011	0.053		0.05	0.00004	0.00012		0.00008	0.00040		0.00001	
0.980	4.030		2.491	14.059		14.65	0.00741	0.03048		0.01883	0.10630		0.00194	
1.890	5.978		4.024	19.452		19.66	0.01429	0.04520		0.03043	0.14708		0.00260	
0.626	2.572		1.590	8.973		9.35	0.00473	0.01945		0.01202	0.06785		0.00124	
0.095	0.389		0.241	1.358		1.42	0.00072	0.00294		0.00182	0.01027		0.00019	1-3/8 IN HS STL
3.596	12.985	13.474	8.355	43.895	44.683	45.13	0.02719	0.09819	0.10188	0.06318	0.33191	0.33787	0.00597	
4.879	**17.670**	**18.331**	**11.342**	**59.490**	**60.562**	**61.17**	**0.03689**	**0.13361**	**0.13861**	**0.08576**	**0.44983**	**0.45793**	**0.00809**	
115 Bonneville - North Camas 1														
0.051	0.343		0.171	1.000		1.08	0.00038	0.00259		0.00129	0.00756		0.00014	
0.051	0.343	0.346	0.171	1.000	1.015	1.08	0.00038	0.00259	0.00262	0.00129	0.00756	0.00767	0.00014	
0.021	0.139		0.069	0.405		0.44	0.00016	0.00105		0.00052	0.00306		0.00006	
0.011	0.074		0.037	0.218		0.23	0.00009	0.00056		0.00028	0.00165		0.00003	
0.029	0.181		0.092	0.566		0.57	0.00022	0.00137		0.00069	0.00428		0.00008	
0.061	0.393	0.398	0.198	1.189	1.206	1.24	0.00046	0.00297	0.00301	0.00150	0.00899	0.00912	0.00016	
1.505	8.941		4.805	30.774		31.78	0.01138	0.06761		0.03633	0.23269		0.00420	
1.505	8.941	9.067	4.805	30.774	31.147	31.78	0.01138	0.06761	0.06856	0.03633	0.23269	0.23551	0.00420	
1.007	5.981		3.215	20.587		21.26	0.00761	0.04523		0.02431	0.15567		0.00281	
1.007	5.981	6.065	3.215	20.587	20.836	21.26	0.00761	0.04523	0.04586	0.02431	0.15567	0.15755	0.00281	
0.236	1.402		0.754	4.827		4.98	0.00178	0.01060		0.00570	0.03650		0.00066	
0.236	1.402	1.422	0.754	4.827	4.885	4.98	0.00178	0.01060	0.01075	0.00570	0.03650	0.03694	0.00066	
2.859	**17.061**	**17.299**	**9.142**	**58.377**	**59.088**	**60.33**	**0.02162**	**0.12900**	**0.13080**	**0.06913**	**0.44141**	**0.44679**	**0.00798**	
115 Box Canyon - Tap (Colville - Boundary 1)														
0.606	1.766		1.289	6.530		6.85	0.00458	0.01335		0.00975	0.04938		0.00091	
0.606	1.766	1.867	1.289	6.530	6.656	6.85	0.00458	0.01335	0.01412	0.00975	0.04938	0.05033	0.00091	
0.606	**1.766**	**1.867**	**1.289**	**6.530**	**6.656**	**6.85**	**0.00458**	**0.01335**	**0.01412**	**0.00975**	**0.04938**	**0.05033**	**0.00091**	
115 Box Canyon(PUD) - USK(PUD) 1														
4.572	26.111		14.828	94.220		104.35	0.03457	0.19743		0.11212	0.71243		0.01380	
4.572	26.111	26.508	14.828	94.220	95.379	104.35	0.03457	0.19743	0.20044	0.11212	0.71243	0.72120	0.01380	
0.569	3.247		1.844	11.718		12.98	0.00430	0.02456		0.01394	0.08861		0.00172	
0.569	3.247	3.297	1.844	11.718	11.863	12.98	0.00430	0.02456	0.02493	0.01394	0.08861	0.08970	0.00172	
5.141	**29.358**	**29.805**	**16.672**	**105.938**	**107.242**	**117.33**	**0.03887**	**0.22199**	**0.22537**	**0.12607**	**0.80104**	**0.81090**	**0.01552**	
115 Boyer(PP&L) - Tillamook 1														
4.874	10.279		8.575	34.856		34.41	0.03686	0.07773		0.06484	0.26356		0.00455	
4.874	10.279	11.376	8.575	34.856	35.896	34.41	0.03686	0.07773	0.08602	0.06484	0.26356	0.27142	0.00455	
1.706	3.599		3.002	12.202		12.05	0.01290	0.02721		0.02270	0.09227		0.00159	
1.706	3.599	3.983	3.002	12.202	12.566	12.05	0.01290	0.02721	0.03011	0.02270	0.09227	0.09502	0.00159	
3.933	8.239		6.919	28.230		27.95	0.02974	0.06230		0.05231	0.21346		0.00370	
3.933	8.239	9.130	6.919	28.230	29.065	27.95	0.02974	0.06230	0.06903	0.05231	0.21346	0.21978	0.00370	
1.087	1.703		1.639	5.369		5.03	0.00822	0.01288		0.01239	0.04060		0.00067	
0.715	1.083		1.078	3.610		3.44	0.00541	0.00819		0.00815	0.02729		0.00046	
0.038	0.209		0.124	0.807		0.91	0.00029	0.00158		0.00094	0.00610		0.00012	
0.032	0.174		0.103	0.673		0.76	0.00024	0.00132		0.00078	0.00509		0.00010	1-3/8 IN EHS STL
0.011	0.063		0.037	0.242		0.27	0.00009	0.00047		0.00028	0.00183		0.00004	
0.015	0.084		0.050	0.323		0.37	0.00012	0.00063		0.00038	0.00244		0.00005	1-3/8 IN EHS STL
0.006	0.035		0.021	0.135		0.15	0.00005	0.00026		0.00016	0.00102		0.00002	1-3/8 IN EHS STL
1.905	3.350	3.854	3.052	11.158	11.567	10.94	0.01440	0.02533	0.02914	0.02308	0.08437	0.08747	0.00145	
12.419	**25.467**	**28.334**	**21.548**	**86.446**	**89.091**	**85.34**	**0.09390**	**0.19257**	**0.21425**	**0.16293**	**0.65366**	**0.67366**	**0.01129**	
115 Bremerton - U S Navy Station H														
0.048	0.385		0.211	1.534		1.81	0.00036	0.00291		0.00160	0.01160		0.00024	1-3/8 IN EHS STL
0.090	0.724		0.396	2.880		3.39	0.00068	0.00547		0.00299	0.02177		0.00045	1-3/8 IN EHS STL
0.138	1.109	1.117	0.607	4.414	4.455	5.20	0.00104	0.00839	0.00845	0.00459	0.03337	0.03369	0.00069	
0.138	**1.109**	**1.117**	**0.607**	**4.414**	**4.455**	**5.20**	**0.00104**	**0.00839**	**0.00845**	**0.00459**	**0.03337**	**0.03369**	**0.00069**	
115 Bronx(AVA) - Tap (Albeni Falls - Bonners Ferry 1)														
0.091	0.155		0.145	0.543		0.50	0.00068	0.00117		0.00110	0.00410		0.00007	
0.091	0.155	0.179	0.145	0.543	0.562	0.50	0.00068	0.00117	0.00135	0.00110	0.00410	0.00425	0.00007	
0.091	**0.155**	**0.179**	**0.145**	**0.543**	**0.562**	**0.50**	**0.00068**	**0.00117**	**0.00135**	**0.00110**	**0.00410**	**0.00425**	**0.00007**	
115 Burbank - Tap (Franklin - Walla Walla)														
0.006	0.017		0.012	0.055		0.05	0.00005	0.00013		0.00009	0.00041		0.00001	
0.006	0.017	0.018	0.012	0.055	0.056	0.05	0.00005	0.00013	0.00013	0.00009	0.00041	0.00042	0.00001	
0.006	**0.017**	**0.018**	**0.012**	**0.055**	**0.056**	**0.05**	**0.00005**	**0.00013**	**0.00013**	**0.00009**	**0.00041**	**0.00042**	**0.00001**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Cardwell - Cowlitz 1**												
	Cardwell - Str 6/8	5.15	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-157
	Str 6/8 - Str 6/9	0.19	SSC	J15	795 kcmil ACSR Drake	37.17	0.128	0.837	0.414	2.409	5.038		
	Str 6/9 - Str 8/4	1.28	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 8/4 - Str 8/21	0.62	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
	Str 8/21 - Cowlitz	0.46	WSP	H21	795 kcmil ACSR Drake	11.68	0.128	0.697	0.414	2.690	6.091		
		7.70											
		7.70											
115	**Carlton - McMinnville 1**												
	Carlton - Twr 1/2	0.12	WHF	H18	556.5 kcmil ACSR Dove	20.16	0.181	0.785	0.467	2.579	5.386		M-153
	Twr 1/2 - Windishar	3.75	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
		3.87											
	Windishar - Twr 6/4	1.43	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
	Twr 6/4 - McMinnville	0.05	WSP	H15	556.5 kcmil ACSR Dove	11.34	0.181	0.715	0.467	2.719	5.932		
		1.48											
		5.35											
115	**Carlton - Tap (Forest Grove - McMinnville 1)**												
		0.03	WSP		266.8 kcmil ACSR Partridge	11.71	0.377	0.763	0.663	2.756	5.542		
		0.03											
		0.03											
115	**Carmen Smith - Tap (Cougar - Thurston)**												
	Section 1	17.00	WHF		666.6 kcmil ACSR Flamingo	15.10	0.152	0.742	0.438	2.641	5.720	EWEB	
	Section 2	1.00	CHF		666.6 kcmil ACSR Flamingo	15.68	0.152	0.746	0.438	2.632	5.684	EWEB	
		18.00											
		18.00											
115	**Carson - Tap (Underwood Tap Line)**												
		1.24	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
		1.24											
		1.24											
115	**Cascade Locks - Tap (Bonneville - Hood River 1)**												
		0.07	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.07											
		0.07											
115	**Cedarville JCT - Tap (Alturas - Cogswell Junction PP&L Line)**												
		0.03	WSP		795 kcmil ACSR Drake	12.60	0.128	0.706	0.414	2.672	6.009		
		0.03											
		0.03											
115	**Chandler - Tap (Grandview - Richland 1)**												
		2.87	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		2.87											
		2.87											
115	**Chehalis - Raymond 1**												
	Chehalis - 230 kV DE	0.07	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		M-195
	230 kV DE - Str 1/2	0.06	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		M-196
	Str 1/2 - Str 1/12	0.83	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		M-210
	Str 1/12 - Pe Ell (LEW)	18.70	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
		19.66											
	Pe Ell (LEW) - Holcomb Tap	13.64	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
		13.64											
	Holcomb Tap - Str 43/9	9.96	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
	Str 43/9 - Str 43/10	0.11	WSP	H27	250 kcmil Cu PH D 1319 HSC	12.46	0.265	0.766	0.551	2.735	5.505		
	Str 43/10 - Str 44/1	0.10	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 44/1 - Str 44/6	0.31	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 44/6 - Str 44/9	0.13	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 44/9 - Str 44/10	0.11	WSP	H27	250 kcmil Cu PH D 1319 HSC	12.46	0.265	0.766	0.551	2.735	5.505		
	Str 44/10 - Str 45/7	1.05	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
	Str 45/7 - Raymond	0.51	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
		12.28											
		45.58											
115	**Chemawa - Salem 2**												
	Chemawa - Twr 1/3	0.15	WHF	H7	2000 kcmil AAC Cowslip	15.12	0.057	0.687	0.343	2.586	6.236		M-167
	Twr 1/3 - Twr 2/1	0.79	TDC	J26	2000 kcmil AAC Cowslip	23.25	0.057	0.739	0.343	2.482	5.776		
	Twr 2/1 - Twr 2/7	0.88	TDC	J27	2000 kcmil AAC Cowslip	25.20	0.057	0.749	0.343	2.462	5.698		
	Twr 2/7 - Hughes (SEC)	6.70	TDC	J26	2000 kcmil AAC Cowslip	23.25	0.057	0.739	0.343	2.482	5.776		
		8.52											
	Hughes (SEC) - Twr 11/2	1.52	TDC	J26	2000 kcmil AAC Cowslip	23.25	0.057	0.739	0.343	2.482	5.776		
	Twr 11/2 - Salem	0.37	WHF	H7	2000 kcmil AAC Cowslip	15.12	0.057	0.687	0.343	2.586	6.236		
		1.89											
		10.41											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Cardwell - Cowlitz 1														
0.657	3.750		2.130	13.531		14.99	0.00497	0.02835		0.01610	0.10232		0.00198	
0.024	0.159		0.079	0.458		0.48	0.00018	0.00120		0.00059	0.00346		0.00006	
0.163	0.932		0.529	3.363		3.72	0.00123	0.00705		0.00400	0.02543		0.00049	
0.079	0.432		0.256	1.668		1.89	0.00060	0.00327		0.00194	0.01261		0.00025	
0.059	0.321		0.190	1.237		1.40	0.00044	0.00242		0.00144	0.00936		0.00019	1-3/8 IN HS STL
0.982	5.593	5.679	3.184	20.257	20.506	22.48	0.00742	0.04229	0.04294	0.02408	0.15317	0.15506	0.00297	
0.982	**5.593**	**5.679**	**3.184**	**20.257**	**20.506**	**22.48**	**0.00742**	**0.04229**	**0.04294**	**0.02408**	**0.15317**	**0.15506**	**0.00297**	
115 Carlton - McMinnville 1														
0.022	0.094		0.056	0.310		0.32	0.00016	0.00071		0.00042	0.00234		0.00004	
0.680	2.821		1.752	9.916		10.55	0.00514	0.02133		0.01325	0.07498		0.00140	
0.702	2.915	2.998	1.808	10.225	10.384	10.87	0.00531	0.02204	0.02267	0.01367	0.07732	0.07852	0.00144	
0.259	1.076		0.668	3.781		4.02	0.00196	0.00813		0.00505	0.02859		0.00053	
0.009	0.036		0.023	0.136		0.15	0.00007	0.00027		0.00018	0.00103		0.00002	
0.268	1.111	1.143	0.692	3.917	3.978	4.17	0.00203	0.00840	0.00865	0.00523	0.02962	0.03008	0.00055	
0.970	**4.027**	**4.142**	**2.500**	**14.142**	**14.361**	**15.05**	**0.00733**	**0.03045**	**0.03132**	**0.01890**	**0.10694**	**0.10859**	**0.00199**	
115 Carlton - Tap (Forest Grove - McMinnville 1)														
0.011	0.023		0.020	0.083		0.08	0.00009	0.00017		0.00015	0.00063		0.00001	
0.011	0.023	0.026	0.020	0.083	0.085	0.08	0.00009	0.00017	0.00019	0.00015	0.00063	0.00064	0.00001	
0.011	**0.023**	**0.026**	**0.020**	**0.083**	**0.085**	**0.08**	**0.00009**	**0.00017**	**0.00019**	**0.00015**	**0.00063**	**0.00064**	**0.00001**	
115 Carmen Smith - Tap (Cougar - Thurston)														
2.591	12.607		7.453	44.903		48.62	0.01959	0.09533		0.05635	0.33953		0.00643	
0.152	0.746		0.438	2.632		2.84	0.00115	0.00564		0.00331	0.01990		0.00038	
2.743	13.353	13.632	7.891	47.535	48.186	51.46	0.02074	0.10097	0.10308	0.05967	0.35944	0.36435	0.00681	
2.743	**13.353**	**13.632**	**7.891**	**47.535**	**48.186**	**51.46**	**0.02074**	**0.10097**	**0.10308**	**0.05967**	**0.35944**	**0.36435**	**0.00681**	
115 Carson - Tap (Underwood Tap Line)														
0.311	0.966		0.666	3.268		3.36	0.00235	0.00730		0.00504	0.02471		0.00044	
0.311	0.966	1.015	0.666	3.268	3.335	3.36	0.00235	0.00730	0.00767	0.00504	0.02471	0.02522	0.00044	
0.311	**0.966**	**1.015**	**0.666**	**3.268**	**3.335**	**3.36**	**0.00235**	**0.00730**	**0.00767**	**0.00504**	**0.02471**	**0.02522**	**0.00044**	
115 Cascade Locks - Tap (Bonneville - Hood River 1)														
0.018	0.054		0.038	0.187		0.19	0.00013	0.00041		0.00029	0.00141		0.00003	
0.018	0.054	0.057	0.038	0.187	0.191	0.19	0.00013	0.00041	0.00043	0.00029	0.00141	0.00144	0.00003	
0.018	**0.054**	**0.057**	**0.038**	**0.187**	**0.191**	**0.19**	**0.00013**	**0.00041**	**0.00043**	**0.00029**	**0.00141**	**0.00144**	**0.00003**	
115 Cedarville JCT - Tap (Alturas - Cogswell Junction PP&L Line)														
0.004	0.021		0.012	0.080		0.09	0.00003	0.00016		0.00009	0.00061		0.00001	
0.004	0.021	0.022	0.012	0.080	0.081	0.09	0.00003	0.00016	0.00016	0.00009	0.00061	0.00061	0.00001	
0.004	**0.021**	**0.022**	**0.012**	**0.080**	**0.081**	**0.09**	**0.00003**	**0.00016**	**0.00016**	**0.00009**	**0.00061**	**0.00061**	**0.00001**	
115 Chandler - Tap (Grandview - Richland 1)														
1.081	2.265		1.902	7.760		7.68	0.00817	0.01713		0.01438	0.05868		0.00102	
1.081	2.265	2.510	1.902	7.760	7.990	7.68	0.00817	0.01713	0.01898	0.01438	0.05868	0.06042	0.00102	
1.081	**2.265**	**2.510**	**1.902**	**7.760**	**7.990**	**7.68**	**0.00817**	**0.01713**	**0.01898**	**0.01438**	**0.05868**	**0.06042**	**0.00102**	
115 Chehalis - Raymond 1														
0.019	0.055		0.039	0.188		0.19	0.00014	0.00042		0.00029	0.00142		0.00002	2-7 NO 8 ALWLD
0.016	0.047		0.033	0.161		0.16	0.00012	0.00036		0.00025	0.00122		0.00002	
0.220	0.655		0.457	2.231		2.21	0.00166	0.00495		0.00345	0.01687		0.00029	2-3/8 IN EHS STL
4.946	14.757		10.294	50.274		49.89	0.03740	0.11159		0.07784	0.38015		0.00660	
5.200	15.515	16.363	10.823	52.855	53.952	52.45	0.03932	0.11732	0.12373	0.08184	0.39966	0.40795	0.00694	
3.608	10.764		7.509	36.671		36.39	0.02728	0.08139		0.05678	0.27728		0.00481	
3.608	10.764	11.353	7.509	36.671	37.432	36.39	0.02728	0.08139	0.08584	0.05678	0.27728	0.28304	0.00481	
2.634	7.860		5.483	26.777		26.57	0.01992	0.05943		0.04146	0.20247		0.00351	
0.029	0.084		0.061	0.301		0.30	0.00022	0.00064		0.00046	0.00228		0.00004	
0.025	0.075		0.054	0.272		0.28	0.00019	0.00056		0.00041	0.00205		0.00004	
0.079	0.228		0.167	0.849		0.89	0.00059	0.00172		0.00126	0.00642		0.00012	
0.033	0.097		0.070	0.353		0.37	0.00025	0.00073		0.00053	0.00267		0.00005	
0.029	0.084		0.061	0.301		0.30	0.00022	0.00064		0.00046	0.00228		0.00004	
0.278	0.829		0.578	2.823		2.80	0.00210	0.00627		0.00437	0.02135		0.00037	
0.135	0.402		0.281	1.371		1.36	0.00102	0.00304		0.00212	0.01037		0.00018	2-3/8 IN EHS STL
3.242	9.659	10.189	6.754	33.047	33.730	32.89	0.02451	0.07304	0.07704	0.05107	0.24988	0.25505	0.00435	
12.050	**35.939**	**37.905**	**25.086**	**122.573**	**125.114**	**121.73**	**0.09111**	**0.27175**	**0.28662**	**0.18968**	**0.92683**	**0.94604**	**0.01610**	
115 Chemawa - Salem 2														
0.009	0.103		0.051	0.388		0.47	0.00006	0.00078		0.00039	0.00293		0.00006	1-7 NO 8 ALWLD
0.045	0.584		0.271	1.961		2.28	0.00034	0.00442		0.00205	0.01483		0.00030	1-7 NO 8 ALWLD
0.050	0.659		0.302	2.167		2.51	0.00038	0.00498		0.00228	0.01638		0.00033	1-7 NO 8 ALWLD
0.383	4.952		2.299	16.628		19.35	0.00289	0.03745		0.01738	0.12573		0.00256	1-7 NO 8 ALWLD
0.486	6.298	6.317	2.923	21.144	21.345	24.61	0.00368	0.04762	0.04777	0.02210	0.15988	0.16140	0.00325	
0.087	1.124		0.522	3.772		4.39	0.00066	0.00850		0.00394	0.02852		0.00058	1-7 NO 8 ALWLD
0.021	0.254		0.127	0.957		1.15	0.00016	0.00192		0.00096	0.00724		0.00015	1-7 NO 8 ALWLD
0.108	1.378	1.382	0.648	4.729	4.774	5.54	0.00082	0.01042	0.01045	0.00490	0.03576	0.03609	0.00073	
0.594	**7.676**	**7.699**	**3.572**	**25.873**	**26.118**	**30.15**	**0.00449**	**0.05804**	**0.05822**	**0.02701**	**0.19564**	**0.19749**	**0.00399**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Chemawa - Salem Alumina (SEC) 1**												
@	Chemawa - Str 1/1	0.04	WSP	H16	1272 kcmil AAC Narcissus	11.79	0.084	0.685	0.370	2.674	6.262		
@	Str 1/1 - Str 1/3	0.10	WSP	H16	1272 kcmil AAC Narcissus	11.79	0.084	0.685	0.370	2.674	6.262		
@	Str 1/3 - Str 2/4	1.07	WSP	H16	250 kcmil Cu 19 Str	11.79	0.257	0.786	0.543	2.776	5.436		
@	Str 2/4 - Str 2/5	0.05	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
@	Str 2/5 - Str 3/1	0.78	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
@	Str 3/1 - Read Tap (3/12)	0.56	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
		2.60											
@	Read Tap (3/12) - Str 3/13	0.08	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
@	Str 3/13 - Str 3/19 Switch	0.34	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
@	Str 3/19 - University (PGE) Tap	0.11	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
		0.53											
	University (PGE) Tap - Str 3/24	0.11	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
	Str 3/24 - Str 3/25	0.03	WSP	H16	556.5 kcmil ACSR Dove	11.79	0.181	0.720	0.467	2.709	5.892		
	Str 3/25 - Salem Alumina (SEC)	0.03	WSP	H16	556.5 kcmil ACSR Dove	11.79	0.181	0.720	0.467	2.709	5.892		
		0.17											
		3.30											
115	**Cheney - Tap (Silver Lake - Sunset AVA Line)**												
	Cheney - Str 3/8	1.68	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 3/8 - Str 3/7	0.22	WHF	H11	397.5 kcmil ACSR Lark	17.64	0.251	0.783	0.537	2.626	5.381		
	Str 3/7 - Four Lakes	2.42	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		4.32											
	Four Lakes - Str 3/4	2.51	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 3/4 - Tap	2.20	WSP	H27	266.8 kcmil ACSR Partridge	12.46	0.377	0.771	0.663	2.741	5.486		
		4.71											
		9.03											
115	**Chenoweth - Goldendale 1**												
	Chenoweth - Str 1/8	0.65	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-143
	Str 1/8 - Str 1/10	0.19	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/10 - OR/WA Border	0.23	SDC	SPEC	397.5 kcmil ACSR Lark	15.70	0.251	0.769	0.537	2.655	5.483		
		1.07											
	OR/WA Border - Str 2/2	0.29	SDC	SPEC	397.5 kcmil ACSR Lark	15.70	0.251	0.769	0.537	2.655	5.483		
	Str 2/2 - Spearfish (KLI) Tap	2.48	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		2.77											
	Spearfish (KLI) Tap - Str 24/3	19.66	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 24/3 - John Day Tap	0.51	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		20.17											
	John Day TP - Goldendale	0.07	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		0.07											
		24.08											
115	**Chenoweth - Harvey 1**												
		1.15	SDC	SPEC	795 kcmil ACSR Drake	16.67	0.128	0.740	0.414	2.604	5.723		M-129
		1.15											
		1.15											
115	**Chenoweth - Harvey 2**												
		1.15	SDC	SPEC	795 kcmil ACSR Drake	16.67	0.128	0.740	0.414	2.604	5.723		
		1.15											
		1.15											
115	**Chenoweth 230/115 - Chenoweth**												
		0.02	WHF	SPEC	1272 kcmil AAC Narcissus	20.16	0.084	0.750	0.370	2.544	5.694		
		0.02											
		0.02											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Chemawa - Salem Alumina (SEC) 1														
0.003	0.027		0.015	0.107		0.13	0.00003	0.00021		0.00011	0.00081		0.00002	2-3/8 IN HS STL
0.008	0.068		0.037	0.267		0.31	0.00006	0.00052		0.00028	0.00202		0.00004	
0.275	0.841		0.581	2.970		2.91	0.00208	0.00636		0.00439	0.02246		0.00038	
0.009	0.038		0.024	0.138		0.14	0.00007	0.00029		0.00018	0.00104		0.00002	
0.144	0.597		0.367	2.149		2.18	0.00109	0.00452		0.00277	0.01625		0.00029	2.4kV UNDERBUIL
0.103	0.429		0.263	1.543		1.56	0.00078	0.00324		0.00199	0.01167		0.00021	
0.543	2.001	2.074	1.287	7.175	7.290	7.23	0.00411	0.01513	0.01568	0.00973	0.05425	0.05512	0.00096	
0.015	0.061		0.038	0.220		0.22	0.00011	0.00046		0.00028	0.00167		0.00003	
0.063	0.260		0.160	0.937		0.95	0.00047	0.00197		0.00121	0.00708		0.00013	1-3/8 IN HS STL
0.020	0.084		0.052	0.303		0.31	0.00015	0.00064		0.00039	0.00229		0.00004	1-3/8 IN HS STL
0.098	0.406	0.417	0.249	1.460	1.482	1.48	0.00074	0.00307	0.00316	0.00189	0.01104	0.01120	0.00020	
0.020	0.084		0.052	0.303		0.31	0.00015	0.00064		0.00039	0.00229		0.00004	1-3/8 IN HS STL
0.005	0.022		0.014	0.081		0.09	0.00004	0.00016		0.00011	0.00061		0.00001	1-3/8 IN HS STL
0.005	0.022		0.014	0.081		0.09	0.00004	0.00016		0.00011	0.00061		0.00001	2-3/8 IN HS STL
0.031	0.127	0.131	0.080	0.466	0.472	0.48	0.00024	0.00096	0.00099	0.00060	0.00352	0.00357	0.00006	
0.672	**2.535**	**2.622**	**1.616**	**9.101**	**9.244**	**9.19**	**0.00508**	**0.01917**	**0.01983**	**0.01222**	**0.06882**	**0.06989**	**0.00122**	
115 Cheney - Tap (Silver Lake - Sunset AVA Line)														
0.633	1.335		1.113	4.525		4.47	0.00479	0.01009		0.00842	0.03422		0.00059	
0.055	0.172		0.118	0.578		0.59	0.00042	0.00130		0.00089	0.00437		0.00008	
0.912	1.922		1.604	6.519		6.44	0.00689	0.01454		0.01213	0.04929		0.00085	
1.600	3.429	3.784	2.835	11.622	11.963	11.49	0.01210	0.02593	0.02861	0.02144	0.08788	0.09046	0.00152	
0.946	1.994		1.663	6.761		6.67	0.00715	0.01508		0.01258	0.05112		0.00088	
0.829	1.696		1.458	6.029		6.03	0.00627	0.01282		0.01102	0.04559		0.00080	
1.774	3.690	4.094	3.121	12.791	13.166	12.71	0.01342	0.02790	0.03096	0.02360	0.09671	0.09955	0.00168	
3.374	**7.119**	**7.878**	**5.957**	**24.412**	**25.129**	**24.20**	**0.02551**	**0.05383**	**0.05957**	**0.04504**	**0.18459**	**0.19001**	**0.00320**	
115 Chenoweth - Goldendale 1														
0.165	0.501		0.351	1.735		1.78	0.00125	0.00379		0.00265	0.01312		0.00024	2-3/8 IN HS STL
0.048	0.146		0.102	0.507		0.52	0.00036	0.00111		0.00077	0.00384		0.00007	
0.058	0.177		0.124	0.611		0.63	0.00044	0.00134		0.00093	0.00462		0.00008	1-7/16 IN HS STL
0.271	0.824	0.867	0.577	2.853	2.911	2.94	0.00205	0.00623	0.00656	0.00436	0.02157	0.02201	0.00039	
0.073	0.223		0.156	0.770		0.80	0.00055	0.00169		0.00118	0.00582		0.00011	1-7/16 IN HS STL
1.396	2.189		2.106	6.899		6.46	0.01056	0.01655		0.01592	0.05217		0.00085	
1.469	2.412	2.824	2.261	7.669	7.995	7.26	0.01111	0.01824	0.02135	0.01710	0.05799	0.06046	0.00096	
11.069	17.351		16.691	54.691		51.23	0.08369	0.13120		0.12621	0.41355		0.00678	
0.287	0.450		0.433	1.419		1.33	0.00217	0.00340		0.00327	0.01073		0.00018	2-3/8 IN HS STL
11.356	17.801	21.115	17.124	56.110	58.665	52.56	0.08587	0.13460	0.15966	0.12948	0.42427	0.44359	0.00695	
0.039	0.062		0.059	0.195		0.18	0.00030	0.00047		0.00045	0.00147		0.00002	2-3/8 IN HS STL
0.039	0.062	0.073	0.059	0.195	0.204	0.18	0.00030	0.00047	0.00055	0.00045	0.00147	0.00154	0.00002	
13.135	**21.099**	**24.853**	**20.022**	**66.827**	**69.762**	**62.94**	**0.09932**	**0.15954**	**0.18793**	**0.15139**	**0.50531**	**0.52750**	**0.00832**	
115 Chenoweth - Harvey 1														
0.147	0.851		0.476	2.994		3.29	0.00111	0.00643		0.00360	0.02264		0.00044	
0.147	0.851	0.864	0.476	2.994	3.032	3.29	0.00111	0.00643	0.00653	0.00360	0.02264	0.02292	0.00044	
0.147	**0.851**	**0.864**	**0.476**	**2.994**	**3.032**	**3.29**	**0.00111**	**0.00643**	**0.00653**	**0.00360**	**0.02264**	**0.02292**	**0.00044**	
115 Chenoweth - Harvey 2														
0.147	0.851		0.476	2.994		3.29	0.00111	0.00643		0.00360	0.02264		0.00044	
0.147	0.851	0.864	0.476	2.994	3.032	3.29	0.00111	0.00643	0.00653	0.00360	0.02264	0.02292	0.00044	
0.147	**0.851**	**0.864**	**0.476**	**2.994**	**3.032**	**3.29**	**0.00111**	**0.00643**	**0.00653**	**0.00360**	**0.02264**	**0.02292**	**0.00044**	
115 Chenoweth 230/115 - Chenoweth														
0.002	0.015		0.007	0.051		0.06	0.00001	0.00011		0.00006	0.00038		0.00001	3/8 Inch EHS
0.002	0.015	0.015	0.007	0.051	0.051	0.06	0.00001	0.00011	0.00011	0.00006	0.00038	0.00039	0.00001	
0.002	**0.015**	**0.015**	**0.007**	**0.051**	**0.051**	**0.06**	**0.00001**	**0.00011**	**0.00011**	**0.00006**	**0.00038**	**0.00039**	**0.00001**	

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115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

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IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Columbia - Moxee 1**												
	Columbia - Str 1/2	0.13	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-106
	Str 1/2 - Twr 1/4	0.10	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-107
	Twr 1/4 - Twr 3/2	2.32	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		M-108
	Twr 3/2 - Twr 21/3	17.95	SSC	J3	795 kcmil ACSR Mallard	34.02	0.126	0.821	0.412	2.425	5.127		
	Twr 21/3 - Twr 22/1	0.92	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Twr 22/1 - Twr24/3	1.87	WHF	J34	795 kcmil ACSR Drake	27.72	0.128	0.802	0.414	2.480	5.269		
	Twr 24/3 - Jenkins (Kittatas PUD)	0.38	WHF	J34	795 kcmil ACSR Drake	27.72	0.128	0.802	0.414	2.480	5.269		
		23.67											
	Jenkins (Kittatas PUD) - Schultz East	1.65	WHF	J34	795 kcmil ACSR Drake	27.72	0.128	0.802	0.414	2.480	5.269		
		1.65											
	Schultz East - Schultz West	0.04	SDE		795 kcmil ACSR Drake	37.80	0.128	0.839	0.414	2.405	5.025		
		0.04											
	Schultz West - Str 27/2	0.85	WHF	J34	795 kcmil ACSR Drake	27.72	0.128	0.802	0.414	2.480	5.269		
	Str 27/2 - East Ellensburg (COE) Tap	7.72	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		8.57											
	East Ellensburg (COE) Tap - Str 35/1	0.06	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 35/1 - Ellensburg	1.03	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
		1.09											
	Ellensburg - Str 60/1	23.31	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
	Str 60/1 - Str 66/10	1.56	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
	Str 66/10 - Moxee	5.92	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
		30.79											
		65.81											
115	**Columbia - Valhalla 1**												
		5.26	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-106
		5.26											M-144
		5.26											
115	**Columbia - Valhalla 2**												
		5.21	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-106
		5.21											M-144
		5.21											
115	**Columbia Falls - Kalispell 1**												
	Columbia Falls - Str 1/2	0.08	WSP	H12	4/0 ACSR Penguin (6/1)	8.82	0.563	0.817	0.849	2.913	5.686		
	Str 1/2 - Str 1/6	0.48	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 1/6 - Str 11/4	9.68	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 11/4 - Kalispell	0.56	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		10.80											
		10.80											
115	**Columbia Falls - Trego 1**												
	Columbia Falls - Str 1/2	0.07	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-152
	Str 1/2 - Str 1/3	0.15	WSP	H15	266.8 kcmil ACSR Partridge	11.34	0.377	0.759	0.663	2.763	5.571		
	Str 1/3 - Str 1/5	0.18	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 1/5 - Str 1/7	0.18	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 1/7 - Stillwater	17.99	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		18.57											
	Stillwater - Trego	27.38	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		27.38											
		45.95											
115	**Columbia Falls 230/115 kV Tie**												
	Columbia Falls 230 DE - CH 1	0.02	WSP	H15	1.3 In AAC/TW Hood	11.34	0.069	0.681	0.355	2.685	6.308		
	CH 1 - CH 2	0.11	WSP	H24	1.3 In AAC/TW Hood	12.44	0.069	0.692	0.355	2.663	6.200		
	CH 2 - Columbia Falls 115 DE	0.04	WSP	H15	1.3 In AAC/TW Hood	11.34	0.069	0.681	0.355	2.685	6.308		
		0.17											
		0.17											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Columbia - Moxee 1														
0.049	0.103		0.086	0.350		0.35	0.00037	0.00078		0.00065	0.00265		0.00005	
0.013	0.073		0.041	0.263		0.29	0.00010	0.00055		0.00031	0.00199		0.00004	
0.296	1.918		0.959	5.639		5.92	0.00224	0.01450		0.00725	0.04264		0.00078	
2.269	14.735		7.403	43.528		46.02	0.01716	0.11142		0.05597	0.32914		0.00609	
0.117	0.760		0.380	2.236		2.35	0.00089	0.00575		0.00288	0.01691		0.00031	
0.238	1.499		0.773	4.638		4.93	0.00180	0.01134		0.00585	0.03507		0.00065	
0.048	0.305		0.157	0.943		1.00	0.00037	0.00230		0.00119	0.00713		0.00013	
3.031	19.393	19.628	9.800	57.597	58.425	60.85	0.02292	0.14664	0.14842	0.07410	0.43552	0.44178	0.00805	
0.210	1.323		0.682	4.093		4.35	0.00159	0.01000		0.00516	0.03095		0.00057	
0.210	1.323	1.339	0.682	4.093	4.149	4.35	0.00159	0.01000	0.01013	0.00516	0.03095	0.03137	0.00057	
0.005	0.034		0.017	0.096		0.10	0.00004	0.00025		0.00013	0.00073		0.00001	
0.005	0.034	0.034	0.017	0.096	0.098	0.10	0.00004	0.00025	0.00026	0.00013	0.00073	0.00074	0.00001	
0.108	0.681		0.351	2.108		2.24	0.00082	0.00515		0.00266	0.01594		0.00030	
2.908	6.133		5.116	20.795		20.53	0.02199	0.04637		0.03868	0.15724		0.00271	
3.016	6.814	7.452	5.468	22.903	23.547	22.77	0.02281	0.05152	0.05635	0.04134	0.17318	0.17805	0.00301	
0.023	0.048		0.040	0.162		0.16	0.00017	0.00036		0.00030	0.00122		0.00002	
0.265	0.841		0.559	2.797		2.69	0.00200	0.00636		0.00423	0.02115		0.00036	
0.288	0.888	0.934	0.599	2.959	3.019	2.85	0.00217	0.00672	0.00706	0.00453	0.02237	0.02283	0.00038	
6.165	18.395		12.832	62.668		62.19	0.04662	0.13910		0.09703	0.47386		0.00822	
0.400	1.231		0.846	4.194		4.17	0.00303	0.00931		0.00640	0.03171		0.00055	
1.566	4.672		3.259	15.916		15.79	0.01184	0.03533		0.02464	0.12035		0.00209	
8.131	24.299	25.623	16.937	82.778	84.493	82.15	0.06149	0.18373	0.19375	0.12807	0.62592	0.63889	0.01086	
14.682	**52.750**	**54.755**	**33.503**	**170.426**	**173.688**	**173.07**	**0.11101**	**0.39887**	**0.41403**	**0.25333**	**1.28867**	**1.31333**	**0.02289**	
115 Columbia - Valhalla 1														
0.671	3.830		2.175	13.820		15.31	0.00507	0.02896		0.01645	0.10450		0.00202	
0.671	3.830	3.888	2.175	13.820	13.990	15.31	0.00507	0.02896	0.02940	0.01645	0.10450	0.10579	0.00202	
0.671	**3.830**	**3.888**	**2.175**	**13.820**	**13.990**	**15.31**	**0.00507**	**0.02896**	**0.02940**	**0.01645**	**0.10450**	**0.10579**	**0.00202**	
115 Columbia - Valhalla 2														
0.664	3.794		2.154	13.689		15.16	0.00502	0.02868		0.01629	0.10351		0.00201	
0.664	3.794	3.851	2.154	13.689	13.857	15.16	0.00502	0.02868	0.02912	0.01629	0.10351	0.10478	0.00201	
0.664	**3.794**	**3.851**	**2.154**	**13.689**	**13.857**	**15.16**	**0.00502**	**0.02868**	**0.02912**	**0.01629**	**0.10351**	**0.10478**	**0.00201**	
115 Columbia Falls - Kalispell 1														
0.045	0.065		0.068	0.233		0.23	0.00034	0.00049		0.00051	0.00176		0.00003	1-3/8 IN EHS STL
0.270	0.424		0.408	1.335		1.25	0.00204	0.00320		0.00308	0.01010		0.00017	2-3/8 IN HS STL
5.450	8.543		8.218	26.928		25.22	0.04121	0.06460		0.06214	0.20362		0.00334	
0.315	0.494		0.475	1.558		1.46	0.00238	0.00374		0.00360	0.01178		0.00019	2-3/8 IN HS STL
6.080	9.526	11.302	9.169	30.055	31.422	28.16	0.04598	0.07203	0.08546	0.06933	0.22726	0.23760	0.00372	
6.080	**9.526**	**11.302**	**9.169**	**30.055**	**31.422**	**28.16**	**0.04598**	**0.07203**	**0.08546**	**0.06933**	**0.22726**	**0.23760**	**0.00372**	
115 Columbia Falls - Trego 1														
0.026	0.056		0.046	0.189		0.19	0.00020	0.00042		0.00035	0.00143		0.00002	2-7 NO 8 ALWLD
0.057	0.114		0.099	0.415		0.42	0.00043	0.00086		0.00075	0.00313		0.00006	1-7 NO 8 ALWLD
0.068	0.143		0.119	0.485		0.48	0.00051	0.00108		0.00090	0.00367		0.00006	2-7 NO 8 ALWLD
0.068	0.143		0.119	0.485		0.48	0.00051	0.00108		0.00090	0.00367		0.00006	2-3/8 IN HS STL
6.777	14.291		11.922	48.459		47.84	0.05124	0.10806		0.09015	0.36642		0.00633	
6.995	14.746	16.321	12.306	50.032	51.523	49.40	0.05289	0.11150	0.12341	0.09305	0.37831	0.38959	0.00653	
10.314	21.750		18.145	73.753		72.81	0.07799	0.16446		0.13720	0.55768		0.00963	
10.314	21.750	24.072	18.145	73.753	75.952	72.81	0.07799	0.16446	0.18202	0.13720	0.55768	0.57431	0.00963	
17.309	**36.496**	**40.393**	**30.451**	**123.785**	**127.475**	**122.21**	**0.13088**	**0.27597**	**0.30543**	**0.23025**	**0.93599**	**0.96390**	**0.01616**	
115 Columbia Falls 230/115 kV Tie														
0.001	0.014		0.007	0.054		0.06	0.00001	0.00010		0.00005	0.00041		0.00001	2-3/8 IN EHS STL
0.008	0.076		0.039	0.293		0.34	0.00006	0.00058		0.00030	0.00221		0.00005	1-3/8 IN EHS STL
0.003	0.027		0.014	0.107		0.13	0.00002	0.00021		0.00011	0.00081		0.00002	2-3/8 IN EHS STL
0.012	0.117	0.118	0.060	0.454	0.458	0.53	0.00009	0.00088	0.00089	0.00046	0.00343	0.00346	0.00007	
0.012	**0.117**	**0.118**	**0.060**	**0.454**	**0.458**	**0.53**	**0.00009**	**0.00088**	**0.00089**	**0.00046**	**0.00343**	**0.00346**	**0.00007**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Colville - Boundary 1**												
	Colville - Str 1/4	0.29	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		M-176
	Str 1/4 - Str 18/2	17.03	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		M-201
	Str 18/2 - Spirit (AVA) Tap	0.10	WSP	H32	1.3 In AAC/TW Hood	18.90	0.069	0.743	0.355	2.561	5.757		M-202
		17.42											
	Spirit (AVA) Tap - Str 18/6	0.11	WSP	H32	1.3 In AAC/TW Hood	18.90	0.069	0.743	0.355	2.561	5.757		
	Str 18/6 - Str 18/8	0.28	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 18/8 - Str 22/3	3.85	SDC	J12	1.6 In AAC/TW Jefferson	24.08	0.050	0.746	0.336	2.476	5.723		
	Str 22/3 - Str 26/1	3.58	SDC	J24	1780 kcmil ACSR Chukar	23.25	0.061	0.737	0.347	2.480	5.759		
	Str 26/1 - Str 30/1	4.04	SDC	J12	1780 kcmil ACSR Chukar	24.08	0.061	0.741	0.347	2.471	5.724		
	Str 30/1 - Box Canyon Tap	0.11	WSP	H22	1.3 In AAC/TW Hood	14.49	0.069	0.711	0.355	2.625	6.031		
		11.97											
	Box Canyon Tap - Str 30/6	0.24	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		
	Str 30/6 - Str 30/7	0.10	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		
	Str 30/7 - Str 34/4	4.31	SDC	J24	1780 kcmil ACSR Chukar	23.25	0.061	0.737	0.347	2.480	5.759		
	Str 34/4 - Str 34/5	0.09	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		
	Str 34/5 - Metaline Falls (POPD) Tap	0.01	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		
		4.75											
	Metaline Falls (POPD) Tap - Str 41/6	8.29	WHF		795 kcmil ACSR Drake	11.10	0.128	0.691	0.414	2.702	6.148		
	Str 41/6 - Boundary	0.60	WHF		795 kcmil ACSR Drake	11.10	0.128	0.691	0.414	2.702	6.148		
		8.89											
		43.03											
115	**Colville - Republic 1**												
	Colville - Str 1/3	0.23	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-201
	Str 1/3 - Kettle Falls Tap	13.07	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-202
		13.30											
	Kettle Falls(AVA) - Str 14/7	0.42	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 14/7 - Str 14/8	0.49	SSC	SPEC	262.96 kcmil ACSR Special	36.54	0.431	0.880	0.717	2.458	4.827		
	Str 14/8 - Cooke Mountain Tap	26.55	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		27.46											
	Cooke Mountain Tap - Str 44/6	3.18	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 44/6 - Republic	0.53	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.71											
		44.47											
115	**Connell - Tap (Benton - Scooteney 1)**												
	Connell - Hatton Tap	3.00	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-158
		3.00											
	HattonTap - Tap	4.67	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		4.67											
		7.67											
115	**Cooke Mountain - Tap (Colville - Republic 1)**												
		1.50			336.4 kcmil ACSR Linnet	10.21	0.299	0.733	0.585	2.775	5.782	FCPUD	
		1.50											
		1.50											
115	**Cosmopolis - Aberdeen 1**												
	Cosmopolis - Twr 5	0.17	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Twr 5 - Twr 1	0.80	SDC	SPEC	4/0 Cu 7 Str	12.33	0.300	0.808	0.586	2.782	5.316	GHPU	
	Twr 1 - Str 3/3	1.45	WHF	H7	4/0 Cu 7 Str	15.12	0.300	0.833	0.586	2.732	5.150	GHPU	
	Str 3/3 - Str 4/5	1.40	WHF	H11	4/0 Cu 7 Str	17.64	0.300	0.852	0.586	2.695	5.032	GHPU	
	Str 4/5 - Wey Pulp Tap (5/3)	0.28	WHF	H21	4/0 Cu 7 Str	11.68	0.300	0.802	0.586	2.795	5.362	GHPU	
		4.10											
	Wey Pulp Tap (5/3) - Aberdeen	2.69	WHF	H7	4/0 Cu 7 Str	15.12	0.300	0.833	0.586	2.732	5.150	GHPU	
		2.69											
		6.79											
115	**Cottage Grove(Drain Tap) - Drain 1**												
	Cottage Grove - Latham Tap	1.87	WHF	H7	0.951 In ACSR/TW Toutle	15.12	0.130	0.751	0.416	2.650	5.671		
		1.87											
	Latham Tap - Martin Creek	1.02	WHF	H7	0.951 In ACSR/TW Toutle	15.12	0.130	0.751	0.416	2.650	5.671		
		1.02											
	Martin Creek - Drain	12.47	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		12.47											
		15.36											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Colville - Boundary 1														
0.020	0.208		0.103	0.758		0.87	0.00015	0.00157		0.00078	0.00573		0.00011	2-3/8 IN EHS STL
1.175	13.399		6.046	42.120		46.17	0.00889	0.10132		0.04571	0.31849		0.00611	
0.007	0.074		0.036	0.256		0.29	0.00005	0.00056		0.00027	0.00194		0.00004	
1.202	13.681	13.734	6.184	43.134	43.575	47.33	0.00909	0.10345	0.10385	0.04676	0.32616	0.32949	0.00626	
0.008	0.082		0.039	0.282		0.32	0.00006	0.00062		0.00030	0.00213		0.00004	
0.019	0.220		0.099	0.693		0.76	0.00015	0.00167		0.00075	0.00524		0.00010	
0.193	2.872		1.294	9.532		11.02	0.00146	0.02171		0.00978	0.07207		0.00146	
0.218	2.639		1.242	8.878		10.31	0.00165	0.01996		0.00939	0.06713		0.00136	
0.246	2.996		1.401	9.984		11.56	0.00186	0.02265		0.01060	0.07550		0.00153	
0.008	0.078		0.039	0.289		0.33	0.00006	0.00059		0.00030	0.00218		0.00004	
0.691	8.887	8.914	4.115	29.657	29.941	34.30	0.00523	0.06720	0.06740	0.03111	0.22425	0.22640	0.00454	
0.017	0.172		0.085	0.628		0.72	0.00013	0.00130		0.00064	0.00475		0.00009	
0.007	0.072		0.036	0.262		0.30	0.00005	0.00054		0.00027	0.00198		0.00004	
0.262	3.177		1.495	10.688		12.41	0.00198	0.02403		0.01131	0.08082		0.00164	
0.006	0.064		0.032	0.235		0.27	0.00005	0.00049		0.00024	0.00178		0.00004	
0.001	0.007		0.004	0.026		0.03	0.00001	0.00005		0.00003	0.00020		0.00000	
0.293	3.492	3.505	1.651	11.839	11.954	13.73	0.00221	0.02641	0.02650	0.01249	0.08952	0.09039	0.00182	
1.057	5.725		3.428	22.403		25.48	0.00799	0.04329		0.02592	0.16940		0.00337	
0.077	0.414		0.248	1.621		1.84	0.00058	0.00313		0.00188	0.01226		0.00024	2-3/8 IN EHS STL
1.133	6.140	6.243	3.676	24.025	24.304	27.33	0.00857	0.04642	0.04721	0.02780	0.18166	0.18377	0.00361	
3.320	**32.200**	**32.370**	**15.626**	**108.655**	**109.773**	**122.68**	**0.02510**	**0.24348**	**0.24477**	**0.11816**	**0.82159**	**0.83004**	**0.01622**	
115 Colville - Republic 1														
0.087	0.183		0.152	0.620		0.61	0.00066	0.00138		0.00115	0.00468		0.00008	2-7 NO 8 ALWLD
4.923	10.383		8.661	35.206		34.76	0.03723	0.07851		0.06549	0.26621		0.00460	
5.010	10.565	11.693	8.814	35.826	36.894	35.37	0.03788	0.07989	0.08842	0.06665	0.27090	0.27897	0.00468	
0.158	0.334		0.278	1.131		1.12	0.00120	0.00252		0.00210	0.00855		0.00015	
0.211	0.431		0.351	1.204		1.18	0.00160	0.00326		0.00266	0.00911		0.00016	
10.001	21.091		17.595	71.517		70.60	0.07562	0.15948		0.13304	0.54077		0.00934	
10.371	21.855	24.191	18.224	73.853	76.068	72.90	0.07842	0.16526	0.18292	0.13780	0.55843	0.57518	0.00964	
1.198	2.526		2.107	8.566		8.46	0.00906	0.01910		0.01593	0.06477		0.00112	
0.200	0.421		0.351	1.428		1.41	0.00151	0.00318		0.00266	0.01080		0.00019	2-3/8 HS STL
1.398	2.947	3.262	2.459	9.994	10.292	9.87	0.01057	0.02228	0.02466	0.01859	0.07557	0.07782	0.00130	
16.778	**35.368**	**39.146**	**29.497**	**119.672**	**123.254**	**118.14**	**0.12687**	**0.26743**	**0.29600**	**0.22304**	**0.90489**	**0.93198**	**0.01562**	
115 Connell - Tap (Benton - Scooteney 1)														
1.130	2.383		1.988	8.081		7.98	0.00855	0.01802		0.01503	0.06110		0.00106	
1.130	2.383	2.638	1.988	8.081	8.322	7.98	0.00855	0.01802	0.01994	0.01503	0.06110	0.06293	0.00106	
1.759	3.710		3.095	12.579		12.42	0.01330	0.02805		0.02340	0.09512		0.00164	
1.759	3.710	4.106	3.095	12.579	12.955	12.42	0.01330	0.02805	0.03105	0.02340	0.09512	0.09796	0.00164	
2.889	**6.093**	**6.743**	**5.083**	**20.660**	**21.277**	**20.40**	**0.02185**	**0.04607**	**0.05099**	**0.03843**	**0.15622**	**0.16088**	**0.00270**	
115 Cooke Mountain - Tap (Colville - Republic 1)														
0.449	1.099		0.878	4.162		4.34	0.00339	0.00831		0.00664	0.03147		0.00057	
0.449	1.099	1.187	0.878	4.162	4.254	4.34	0.00339	0.00831	0.00898	0.00664	0.03147	0.03217	0.00057	
0.449	**1.099**	**1.187**	**0.878**	**4.162**	**4.254**	**4.34**	**0.00339**	**0.00831**	**0.00898**	**0.00664**	**0.03147**	**0.03217**	**0.00057**	
115 Cosmopolis - Aberdeen 1														
0.043	0.131		0.092	0.454		0.47	0.00033	0.00099		0.00069	0.00343		0.00006	
0.240	0.647		0.469	2.226		2.13	0.00182	0.00489		0.00355	0.01683		0.00028	
0.435	1.208		0.850	3.962		3.73	0.00329	0.00913		0.00643	0.02996		0.00049	
0.420	1.192		0.821	3.773		3.52	0.00318	0.00902		0.00621	0.02853		0.00047	
0.084	0.224		0.164	0.783		0.75	0.00064	0.00170		0.00124	0.00592		0.00010	
1.223	3.403	3.616	2.396	11.197	11.450	10.60	0.00925	0.02573	0.02734	0.01812	0.08466	0.08658	0.00140	
0.808	2.241		1.577	7.350		6.93	0.00611	0.01695		0.01193	0.05558		0.00092	
0.808	2.241	2.382	1.577	7.350	7.517	6.93	0.00611	0.01695	0.01801	0.01193	0.05558	0.05684	0.00092	
2.031	**5.644**	**5.998**	**3.973**	**18.547**	**18.968**	**17.53**	**0.01536**	**0.04267**	**0.04535**	**0.03004**	**0.14024**	**0.14342**	**0.00232**	
115 Cottage Grove(Drain Tap) - Drain 1														
0.243	1.405		0.777	4.956		5.30	0.00183	0.01062		0.00588	0.03748		0.00070	
0.243	1.405	1.426	0.777	4.956	5.017	5.30	0.00183	0.01062	0.01078	0.00588	0.03748	0.03794	0.00070	
0.132	0.766		0.424	2.703		2.89	0.00100	0.00579		0.00321	0.02044		0.00038	
0.132	0.766	0.778	0.424	2.703	2.737	2.89	0.00100	0.00579	0.00588	0.00321	0.02044	0.02069	0.00038	
7.021	11.006		10.587	34.690		32.50	0.05309	0.08322		0.08005	0.26231		0.00430	
7.021	11.006	13.054	10.587	34.690	36.269	32.50	0.05309	0.08322	0.09871	0.08005	0.26231	0.27425	0.00430	
7.395	**13.177**	**15.110**	**11.788**	**42.350**	**43.960**	**40.69**	**0.05592**	**0.09963**	**0.11425**	**0.08914**	**0.32023**	**0.33240**	**0.00538**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Cougar - Thurston(EWEB) 1**												
	Cougar - Carmen Smith Tap	2.12	SSC	H13	666.6 kcmil ACSR Flamingo	17.01	0.152	0.756	0.438	2.612	5.607		
		2.12											
	Carmen Smith Tap - Blue River Tap	3.63	SSC	H13	666.6 kcmil ACSR Flamingo	17.01	0.152	0.756	0.438	2.612	5.607		
		3.63											
	Blue River Tap - Twr 9/5	3.51	SSC	H13	666.6 kcmil ACSR Flamingo	17.01	0.152	0.756	0.438	2.612	5.607		
	Twr 9/5 - Twr 28/2	18.24	WHF	H7	666.6 kcmil ACSR Flamingo	15.12	0.152	0.742	0.438	2.641	5.719		
	Twr 28/2 - Twr 39/5	11.63	SSC	H13	666.6 kcmil ACSR Flamingo	17.01	0.152	0.756	0.438	2.612	5.607		
	Twr 39/5 - Str 40/2	0.02	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	EWEB	
	Str 40/2 - Twr 40/3	0.11	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	EWEB	
	Twr 40/3 - Twr 40/9	0.63	WDC		795 kcmil ACSR Drake	15.54	0.128	0.731	0.414	2.621	5.792	EWEB	
	Twr 40/9 - Str 40/10	0.07	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	EWEB	
	Str 40/10 - Thurston	0.03	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	EWEB	
		34.24											
		39.99											
115	**Davis Creek - Tap (Alturas - Cogswell Junction PP&L)**												
	Davis Creek - Pole 11	0.08	WSP	G6	266.8 kcmil ACSR Partridge	10.08	0.377	0.745	0.663	2.792	5.682		
	Pole 11 - Pole 2	0.36	WSP	G9	266.8 kcmil ACSR Partridge	12.21	0.377	0.768	0.663	2.746	5.504		
	Pole 2 - Tap (15/35)	0.04	WSP	G3	266.8 kcmil ACSR Partridge	12.60	0.377	0.772	0.663	2.738	5.476		
		0.48											
		0.48											
115	**Dayton - Tap (Olympia - Shelton 1)**												
		8.70	WSP		795 kcmil AAC Arbutus (37)	8.48	0.131	0.674	0.417	2.784	6.372	Mason	
		8.70											
		8.70											
115	**Dexter - Tap (Alvey - Lookout Point 1)**												
		0.76	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		0.76											
		0.76											
115	**Dorena - Tap (Alvey - Drain 1)**												
		4.67	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		4.67											
		4.67											
115	**Drummond - Macks Inn 1**												
	Drummond - Green Timber Tap	6.50	WHF		266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	FREC	
		6.50											
	Green Timber Tap - Str 13/10 SW	6.47	WHF		266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	FREC	
	Str 13/10 SW - Str 31/8 SW	17.85	WHF		266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	FREC	
	Str 31/8 SW - Macks Inn	6.94	WHF		266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	FREC	
		31.26											
		37.76											
115	**Dworshak PH - Orofino(AVA) 1**												
	Dworshak PH - Ahsahka Tap (BPA)	0.83	SSC	H18	795 kcmil ACSR Drake	20.16	0.128	0.763	0.414	2.558	5.544		M-169
		0.83											
	Ahsahka Tap - CH 1 (AVA)	0.01	WHF		556.5 kcmil ACSR Parakeet	12.60	0.182	0.731	0.468	2.696	5.810	AVA	
	CH 1 - CH 2 (AVA)	0.37	WHF		556.5 kcmil ACSR Dove	18.27	0.181	0.773	0.467	2.603	5.473	AVA	
	CH 2 - CH 3 (AVA)	0.28	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
	CH 3 - CH 4 (AVA)	1.58	WHF		556.5 kcmil ACSR Parakeet	18.27	0.182	0.776	0.468	2.606	5.460	AVA	
	CH 4 - Orofino (AVA)	1.38	WHF		556.5 kcmil ACSR Parakeet	18.27	0.182	0.776	0.468	2.606	5.460	AVA	
		3.62											
		4.45											
115	**East Ellensburg (COE) - Tap (Columbia - Moxee 1)**												
	East Ellensburg (COE) - Str 3/15	0.50	WSP	H24	4/0 ACSR/AW Penguin	12.44	0.456	0.859	0.742	2.829	5.374		
	Str 3/15 - Tap	2.70	WSP	H27	4/0 ACSR/AW Penguin	12.46	0.456	0.859	0.742	2.829	5.372		
		3.20											
		3.20											
115	**East Omak - Omak 1**												
		0.72	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	OKAN	
		0.72											
		0.72											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Cougar - Thurston(EWEB) 1														
0.323	1.603		0.929	5.538		5.94	0.00244	0.01212		0.00703	0.04188		0.00079	
0.323	1.603	1.635	0.929	5.538	5.616	5.94	0.00244	0.01212	0.01236	0.00703	0.04188	0.04246	0.00079	
0.553	2.744		1.591	9.483		10.18	0.00418	0.02075		0.01203	0.07171		0.00135	
0.553	2.744	2.800	1.591	9.483	9.616	10.18	0.00418	0.02075	0.02117	0.01203	0.07171	0.07271	0.00135	
0.535	2.654		1.539	9.170		9.84	0.00404	0.02007		0.01164	0.06934		0.00130	
2.780	13.529		7.996	48.173		52.16	0.02102	0.10230		0.06046	0.36425		0.00690	
1.772	8.793		5.099	30.383		32.60	0.01340	0.06648		0.03855	0.22974		0.00431	
0.003	0.015		0.008	0.053		0.06	0.00002	0.00011		0.00006	0.00040		0.00001	
0.014	0.080		0.045	0.289		0.32	0.00011	0.00061		0.00034	0.00219		0.00004	
0.080	0.461		0.261	1.651		1.82	0.00061	0.00348		0.00197	0.01248		0.00024	
0.009	0.051		0.029	0.184		0.20	0.00007	0.00039		0.00022	0.00139		0.00003	
0.004	0.022		0.013	0.079		0.09	0.00003	0.00017		0.00009	0.00060		0.00001	
5.197	25.605	26.127	14.990	89.981	91.221	97.09	0.03930	0.19361	0.19756	0.11334	0.68039	0.68976	0.01284	
6.073	**29.952**	**30.561**	**17.510**	**105.003**	**106.453**	**113.21**	**0.04592**	**0.22648**	**0.23109**	**0.13240**	**0.79397**	**0.80494**	**0.01497**	
115 Davis Creek - Tap (Alturas - Cogswell Junction PP&L)														
0.030	0.060		0.053	0.223		0.23	0.00023	0.00045		0.00040	0.00169		0.00003	
0.136	0.277		0.239	0.988		0.99	0.00103	0.00209		0.00180	0.00747		0.00013	
0.015	0.031		0.027	0.110		0.11	0.00011	0.00023		0.00020	0.00083		0.00001	
0.181	0.367	0.409	0.318	1.321	1.359	1.33	0.00137	0.00278	0.00309	0.00241	0.00999	0.01028	0.00018	
0.181	**0.367**	**0.409**	**0.318**	**1.321**	**1.359**	**1.33**	**0.00137**	**0.00278**	**0.00309**	**0.00241**	**0.00999**	**0.01028**	**0.00018**	
115 Dayton - Tap (Olympia - Shelton 2)														
1.140	5.863		3.628	24.219		27.72	0.00862	0.04434		0.02743	0.18313		0.00367	
1.140	5.863	5.973	3.628	24.219	24.489	27.72	0.00862	0.04434	0.04517	0.02743	0.18313	0.18517	0.00367	
1.140	**5.863**	**5.973**	**3.628**	**24.219**	**24.489**	**27.72**	**0.00862**	**0.04434**	**0.04517**	**0.02743**	**0.18313**	**0.18517**	**0.00367**	
115 Dexter - Tap (Alvey - Lookout Point 1)														
0.138	0.570		0.355	2.013		2.15	0.00104	0.00431		0.00269	0.01522		0.00028	
0.138	0.570	0.586	0.355	2.013	2.044	2.15	0.00104	0.00431	0.00443	0.00269	0.01522	0.01546	0.00028	
0.138	**0.570**	**0.586**	**0.355**	**2.013**	**2.044**	**2.15**	**0.00104**	**0.00431**	**0.00443**	**0.00269**	**0.01522**	**0.01546**	**0.00028**	
115 Dorena - Tap (Alvey - Drain 1)														
1.759	3.710		3.095	12.579		12.42	0.01330	0.02805		0.02340	0.09512		0.00164	
1.759	3.710	4.106	3.095	12.579	12.955	12.42	0.01330	0.02805	0.03105	0.02340	0.09512	0.09796	0.00164	
1.759	**3.710**	**4.106**	**3.095**	**12.579**	**12.955**	**12.42**	**0.01330**	**0.02805**	**0.03105**	**0.02340**	**0.09512**	**0.09796**	**0.00164**	
115 Drummond - Macks Inn 1														
2.449	5.163		4.308	17.509		17.28	0.01851	0.03904		0.03257	0.13239		0.00229	
2.449	5.163	5.715	4.308	17.509	18.031	17.28	0.01851	0.03904	0.04321	0.03257	0.13239	0.13634	0.00229	
2.437	5.140		4.288	17.428		17.21	0.01843	0.03886		0.03242	0.13178		0.00228	
6.724	14.180		11.829	48.082		47.47	0.05084	0.10722		0.08945	0.36357		0.00628	
2.614	5.513		4.599	18.694		18.45	0.01977	0.04169		0.03478	0.14135		0.00244	
11.776	24.832	27.483	20.716	84.204	86.715	83.13	0.08904	0.18777	0.20781	0.15664	0.63671	0.65569	0.01099	
14.224	**29.996**	**33.197**	**25.024**	**101.713**	**104.746**	**100.41**	**0.10756**	**0.22681**	**0.25102**	**0.18921**	**0.76910**	**0.79203**	**0.01328**	
115 Dworshak PH - Orofino(AVA) 1														
0.106	0.633		0.343	2.123		2.30	0.00080	0.00479		0.00260	0.01605		0.00030	
0.106	0.633	0.642	0.343	2.123	2.150	2.30	0.00080	0.00479	0.00486	0.00260	0.01605	0.01626	0.00030	
0.002	0.007		0.005	0.027		0.03	0.00001	0.00006		0.00004	0.00020		0.00000	
0.067	0.286		0.173	0.963		1.01	0.00051	0.00216		0.00131	0.00728		0.00013	
0.051	0.205		0.131	0.751		0.81	0.00038	0.00155		0.00099	0.00568		0.00011	
0.288	1.226		0.740	4.118		4.31	0.00218	0.00927		0.00559	0.03114		0.00057	
0.251	1.070		0.646	3.596		3.77	0.00190	0.00809		0.00489	0.02719		0.00050	
0.659	2.795	2.871	1.694	9.455	9.606	9.93	0.00498	0.02113	0.02171	0.01281	0.07149	0.07263	0.00131	
0.765	**3.428**	**3.512**	**2.038**	**11.578**	**11.756**	**12.23**	**0.00578**	**0.02592**	**0.02656**	**0.01541**	**0.08754**	**0.08889**	**0.00162**	
115 East Ellensburg (COE) - Tap (Columbia - Moxee 1)														
0.228	0.429		0.371	1.415		1.34	0.00172	0.00325		0.00280	0.01070		0.00018	
1.230	2.320		2.003	7.638		7.25	0.00930	0.01754		0.01514	0.05775		0.00096	
1.458	2.749	3.112	2.373	9.052	9.358	8.60	0.01103	0.02079	0.02353	0.01795	0.06845	0.07076	0.00114	
1.458	**2.749**	**3.112**	**2.373**	**9.052**	**9.358**	**8.60**	**0.01103**	**0.02079**	**0.02353**	**0.01795**	**0.06845**	**0.07076**	**0.00114**	
115 East Omak - Omak 1														
0.271	0.572		0.477	1.939		1.91	0.00205	0.00432		0.00361	0.01467		0.00025	1-7 NO 8 ALWLD
0.271	0.572	0.633	0.477	1.939	1.997	1.91	0.00205	0.00432	0.00479	0.00361	0.01467	0.01510	0.00025	
0.271	**0.572**	**0.633**	**0.477**	**1.939**	**1.997**	**1.91**	**0.00205**	**0.00432**	**0.00479**	**0.00361**	**0.01467**	**0.01510**	**0.00025**	

Bonneville Power Administration

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IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**East Omak - Oroville 1**												
	East Omak - Twr 2/3	1.12	SDC	J24	795 kcmil ACSR Drake NL	23.25	0.128	0.780	0.414	2.523	5.417		M-181
	Twr 2/3 - Twr 7/1	4.67	SDC	J12	795 kcmil ACSR Drake NL	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 7/1 - Twr 7/3	0.45	SDC	J25	795 kcmil ACSR Drake NL	24.71	0.128	0.788	0.414	2.508	5.365		
	Twr 7/3 - Twr 20/3	12.97	SDC	J12	795 kcmil ACSR Drake NL	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 20/3 - Twr 21/2	0.63	SDC	J22	795 kcmil ACSR Drake NL	23.49	0.128	0.782	0.414	2.521	5.408		
	Twr 21/2 - Twr 21/8	0.37	WDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326		
	Twr 21/8 - Twr 21/9	0.05	WDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326		
	Twr 21/9 - Tonasket (PUD) Tap	0.03	WDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326	OKAN	
		20.29											
	Tonasket (PUD) Tap - Twr 22/4	0.15	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354	OKAN	
	Str 22/4 - Str 22/5	0.28	WHF	SPEC	397.5 kcmil ACSR Lark	17.32	0.251	0.781	0.537	2.631	5.397	OKAN	
	Str 22/5 - Str 29/4	7.31	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354	OKAN	
	Str 29/4 - Whitestone (PUD)	0.32	WHF	H22	4/0 ACSR Penguin (6/1)	14.49	0.563	0.877	0.849	2.792	5.246	OKAN	
		8.06											
	Whitestone - Ellisford Tap	2.50	WHF	H22	4/0 ACSR Penguin (6/1)	14.49	0.563	0.877	0.849	2.792	5.246	OKAN	
		2.50											
	Ellisford Tap - Oroville	8.16	WHF	H22	4/0 ACSR Penguin (6/1)	14.49	0.563	0.877	0.849	2.792	5.246	OKAN	
		8.16											
		39.01											
115	**East Omak - Tap (Grand Coulee - Foster Creek (NVEC)) 1**												
	East Omak 230 - East Omak 115	0.05	SSC		1272 kcmil ACSR Bittern	22.68	0.083	0.756	0.369	2.508	5.615		
		0.05											
	East Omak 115 - Str 32/3	2.78	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
	Str 32/3 - Str 22/2	10.27	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Str 22/2 - Str 21/4	0.70	SDC	J25	1272 kcmil ACSR Bittern	24.71	0.083	0.767	0.369	2.487	5.536		
	Str 21/4 - Str 20/2	1.26	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Str 20/2 - Str 19/3	0.84	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
	Str 19/3 - Str 5/2	14.14	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Str 5/2 - Str 4/2	1.19	SDC	SPEC	1272 kcmil ACSR Bittern	23.49	0.083	0.761	0.369	2.500	5.582		
	Str 4/2 - Str 3/3	0.52	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Str 3/3 - Str 2/3	1.27	SDC	J11	1272 kcmil ACSR Bittern	32.76	0.083	0.801	0.369	2.419	5.291		
	Str 2/3 - Str 1/2	0.54	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
	Str 1/2 - Tap (G Coulee - Foster Creek (NVEC) 1)	0.22	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		33.73											
		33.78											
115	**East Omak - Tonasket 2**												
	East Omak - Twr 2/3	1.12	SDC	J24	795 kcmil ACSR Drake NL	23.25	0.128	0.780	0.414	2.523	5.417		M-181
	Twr 2/3 - Twr 7/1	4.67	SDC	J12	795 kcmil ACSR Drake NL	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 7/1 - Twr 7/3	0.45	SDC	J25	795 kcmil ACSR Drake NL	24.71	0.128	0.788	0.414	2.508	5.365		
	Twr 7/3 - Twr 20/3	12.97	SDC	J12	795 kcmil ACSR Drake NL	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 20/3 - Twr 21/2	0.63	SDC	J22	795 kcmil ACSR Drake NL	23.49	0.128	0.782	0.414	2.521	5.408		
	Twr 21/2 - Twr 21/8	0.37	TDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326		
	Twr 21/8 - Twr 21/9	0.06	TDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326		
	Twr 21/9 - Twr 21/10	0.03	TDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326		
	Twr 21/10 - Tonasket	0.01	TDC	H29	795 kcmil ACSR Drake NL	9.51	0.128	0.672	0.414	2.740	6.326	OKAN	
		20.31											
		20.31											
115	**Elbe(Lewis County PUD) - Tap (Alder - La Grande(TCL) 1&2)**												
	Elbe - Str 1/4	6.33	WSP	H27	397.5 kcmil ACSR Ibis NL	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 1/4 - Str 1/1	0.38	WHF	H7	397.5 kcmil ACSR Ibis NL	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/1 - Tap	0.03	WHF	H7	336.4 kcmil ACSR Merlin	15.12	0.303	0.792	0.589	2.691	5.372	TCL	
		6.74											
		6.74											
115	**Ellisford - Tap (East Omak - Oroville 1)**												
		0.46	WSP	H24	266.8 kcmil ACSR Partridge	12.44	0.377	0.771	0.663	2.741	5.487	OKAN	
		0.46											
		0.46											
115	**Eltopia - Tap(Franklin County PUD)**												
	Eltopia - Str 5/7	0.88	WSP	H24	266.8 kcmil ACSR/AW Partridge	12.44	0.365	0.771	0.651	2.741	5.489		
	Str 5/7 - Tap	2.95	WSP	H27	266.8 kcmil ACSR/AW Partridge	12.46	0.365	0.771	0.651	2.741	5.487		
		3.83											
		3.83											
115	**Eugene - Alvey 2**												
	Eugene - Str 3/4	2.31	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-137
	Str 3/4 - Str 4/4	1.01	CDC	H14	397.5 kcmil ACSR Ibis	12.86	0.253	0.751	0.539	2.709	5.639		M-179
	Str 4/4 - Dillard (EWEB) Tap	6.04	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		9.36											
	Dillard (EWEB) Tap - Alvey	3.31	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		3.31											
		12.67											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 East Omak - Oroville 1														
0.143	0.874		0.463	2.826		3.03	0.00108	0.00661		0.00350	0.02137		0.00040	
0.595	3.664		1.931	11.743		12.58	0.00450	0.02771		0.01460	0.08879		0.00166	
0.057	0.354		0.186	1.129		1.21	0.00043	0.00268		0.00141	0.00853		0.00016	
1.654	10.176		5.363	32.613		34.93	0.01250	0.07695		0.04055	0.24660		0.00462	
0.080	0.492		0.261	1.588		1.70	0.00061	0.00372		0.00197	0.01201		0.00023	
0.047	0.249		0.153	1.014		1.17	0.00036	0.00188		0.00116	0.00767		0.00015	
0.006	0.034		0.021	0.137		0.16	0.00005	0.00025		0.00016	0.00104		0.00002	1-7 NO 8 ALWLD
0.004	0.020		0.012	0.082		0.09	0.00003	0.00015		0.00009	0.00062		0.00001	
2.587	15.863	16.073	8.390	51.131	51.815	54.88	0.01956	0.11995	0.12153	0.06344	0.38662	0.39179	0.00726	
0.057	0.118		0.099	0.406		0.40	0.00043	0.00090		0.00075	0.00307		0.00005	
0.070	0.219		0.150	0.737		0.76	0.00053	0.00165		0.00114	0.00557		0.00010	
2.754	5.769		4.844	19.766		19.57	0.02082	0.04362		0.03663	0.14946		0.00259	
0.180	0.281		0.272	0.894		0.84	0.00136	0.00212		0.00205	0.00676		0.00011	
3.061	6.387	7.082	5.366	21.802	22.453	21.57	0.02314	0.04829	0.05355	0.04057	0.16485	0.16977	0.00285	
1.408	2.194		2.123	6.980		6.56	0.01064	0.01659		0.01605	0.05278		0.00087	
1.408	2.194	2.606	2.123	6.980	7.296	6.56	0.01064	0.01659	0.01971	0.01605	0.05278	0.05517	0.00087	
4.594	7.160		6.928	22.784		21.40	0.03474	0.05414		0.05238	0.17228		0.00283	
4.594	7.160	8.507	6.928	22.784	23.814	21.40	0.03474	0.05414	0.06432	0.05238	0.17228	0.18007	0.00283	
11.649	**31.604**	**33.682**	**22.806**	**102.698**	**105.200**	**104.41**	**0.08808**	**0.23897**	**0.25469**	**0.17245**	**0.77654**	**0.79546**	**0.01381**	
115 East Omak - Tap (Grand Coulee - Foster Creek (NVEC)) 1														
0.004	0.038		0.018	0.125		0.14	0.00003	0.00029		0.00014	0.00095		0.00002	
0.004	0.038	0.038	0.018	0.125	0.127	0.14	0.00003	0.00029	0.00029	0.00014	0.00095	0.00096	0.00002	
0.230	2.111		1.025	6.956		7.77	0.00174	0.01596		0.00775	0.05260		0.00103	
0.850	7.843		3.788	25.609		28.55	0.00643	0.05931		0.02864	0.19364		0.00378	
0.058	0.537		0.258	1.741		1.94	0.00044	0.00406		0.00195	0.01317		0.00026	
0.104	0.962		0.465	3.142		3.50	0.00079	0.00728		0.00351	0.02376		0.00046	
0.070	0.638		0.310	2.102		2.35	0.00053	0.00482		0.00234	0.01589		0.00031	
1.171	10.799		5.215	35.260		39.31	0.00885	0.08166		0.03943	0.26661		0.00520	
0.099	0.905		0.439	2.975		3.32	0.00075	0.00684		0.00332	0.02249		0.00044	
0.043	0.397		0.192	1.297		1.45	0.00033	0.00300		0.00145	0.00980		0.00019	
0.105	1.017		0.468	3.072		3.36	0.00080	0.00769		0.00354	0.02323		0.00044	
0.045	0.410		0.199	1.351		1.51	0.00034	0.00310		0.00151	0.01022		0.00020	
0.124	0.194		0.187	0.612		0.57	0.00094	0.00147		0.00141	0.00463		0.00008	
2.898	25.815	25.977	12.545	84.116	85.047	93.63	0.02192	0.19520	0.19642	0.09486	0.63604	0.64307	0.01238	
2.903	**25.852**	**26.015**	**12.564**	**84.242**	**85.173**	**93.77**	**0.02195**	**0.19548**	**0.19671**	**0.09500**	**0.63699**	**0.64403**	**0.01240**	
115 East Omak - Tonasket 2														
0.143	0.874		0.463	2.826		3.03	0.00108	0.00661		0.00350	0.02137		0.00040	
0.595	3.664		1.931	11.743		12.58	0.00450	0.02771		0.01460	0.08879		0.00166	
0.057	0.354		0.186	1.129		1.21	0.00043	0.00268		0.00141	0.00853		0.00016	
1.654	10.176		5.363	32.613		34.93	0.01250	0.07695		0.04055	0.24660		0.00462	
0.080	0.492		0.261	1.588		1.70	0.00061	0.00372		0.00197	0.01201		0.00023	
0.047	0.249		0.153	1.014		1.17	0.00036	0.00188		0.00116	0.00767		0.00015	
0.008	0.040		0.025	0.164		0.19	0.00006	0.00030		0.00019	0.00124		0.00003	1-7 NO 8 ALWLD
0.004	0.020		0.012	0.082		0.09	0.00003	0.00015		0.00009	0.00062		0.00001	2-7 NO 8 ALWLD
0.001	0.007		0.004	0.027		0.03	0.00001	0.00005		0.00003	0.00021		0.00000	2-7 NO 8 ALWLD
2.590	15.877	16.087	8.398	51.186	51.870	54.94	0.01958	0.12005	0.12164	0.06350	0.38704	0.39221	0.00727	
2.590	**15.877**	**16.087**	**8.398**	**51.186**	**51.870**	**54.94**	**0.01958**	**0.12005**	**0.12164**	**0.06350**	**0.38704**	**0.39221**	**0.00727**	
115 Elbe(Lewis County PUD) - Tap (Alder - La Grande(TCL) 1&2)														
1.604	4.727		3.414	17.196		17.94	0.01213	0.03574		0.02582	0.13002		0.00237	
0.096	0.293		0.205	1.014		1.04	0.00073	0.00221		0.00155	0.00767		0.00014	
0.009	0.024		0.018	0.081		0.08	0.00007	0.00018		0.00013	0.00061		0.00001	
1.709	5.044	5.325	3.637	18.291	18.649	19.07	0.01293	0.03814	0.04027	0.02750	0.13830	0.14101	0.00252	
1.709	**5.044**	**5.325**	**3.637**	**18.291**	**18.649**	**19.07**	**0.01293**	**0.03814**	**0.04027**	**0.02750**	**0.13830**	**0.14101**	**0.00252**	
115 Ellisford - Tap (East Omak - Oroville 1)														
0.173	0.355		0.305	1.261		1.26	0.00131	0.00268		0.00231	0.00953		0.00017	
0.173	0.355	0.395	0.305	1.261	1.297	1.26	0.00131	0.00268	0.00298	0.00231	0.00953	0.00981	0.00017	
0.173	**0.355**	**0.395**	**0.305**	**1.261**	**1.297**	**1.26**	**0.00131**	**0.00268**	**0.00298**	**0.00231**	**0.00953**	**0.00981**	**0.00017**	
115 Eltopia - Tap(Franklin County PUD)														
0.322	0.678		0.573	2.412		2.42	0.00243	0.00513		0.00433	0.01824		0.00032	
1.078	2.274		1.922	8.085		8.09	0.00815	0.01720		0.01453	0.06113		0.00107	
1.399	2.952	3.267	2.495	10.497	10.789	10.51	0.01058	0.02232	0.02470	0.01886	0.07937	0.08158	0.00139	
1.399	**2.952**	**3.267**	**2.495**	**10.497**	**10.789**	**10.51**	**0.01058**	**0.02232**	**0.02470**	**0.01886**	**0.07937**	**0.08158**	**0.00139**	
115 Eugene - Alvey 2														
0.585	1.779		1.246	6.167		6.34	0.00443	0.01345		0.00942	0.04663		0.00084	
0.256	0.758		0.545	2.736		2.85	0.00194	0.00573		0.00412	0.02069		0.00038	
1.531	4.652		3.258	16.124		16.58	0.01157	0.03518		0.02463	0.12192		0.00219	
2.372	7.190	7.571	5.049	25.027	25.531	25.77	0.01793	0.05436	0.05725	0.03818	0.18924	0.19305	0.00341	
0.839	2.550		1.785	8.836		9.09	0.00634	0.01928		0.01350	0.06681		0.00120	
0.839	2.550	2.684	1.785	8.836	9.015	9.09	0.00634	0.01928	0.02029	0.01350	0.06681	0.06816	0.00120	
3.211	**9.739**	**10.255**	**6.834**	**33.863**	**34.546**	**34.86**	**0.02428**	**0.07364**	**0.07754**	**0.05168**	**0.25605**	**0.26122**	**0.00461**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Eugene - Bertelsen(EWEB) 1**												
	Eugene - Str 3/4	2.28	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-179
	Str 3/4 - Bertelsen	0.01	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	EWEB	
		2.29											
		2.29											
115	**Eugene - Lane 1**												
	Eugene - Str 2/6	1.54	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-149
	Str 2/6 - Lane	3.93	RCD	H8	795 kcmil AAC Arbutus (37)	12.86	0.131	0.724	0.417	2.683	5.907		M-179
		5.47											
		5.47											
115	**Fairview - Bandon 1**												
	Fairview - Str 1/1	0.11	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		M-164
	Str 1/1 - Str 1/4	0.23	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 1/4 - Str 4/6	3.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 4/6 - Norway Tap	9.23	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		12.58											
	Norway Tap - Pacificorp Tap Myrtle Point	0.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.01											
	Pacificorp Tap Myrtle Point - Str 19/2	5.12	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 19/2 - Str 20/4	1.06	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 20/4 - Str 22/4	2.35	SSC	H10	397.5 kcmil ACSR Ibis	19.53	0.253	0.801	0.539	2.607	5.271		
	Str 22/4 - Morrision (CECC) Tap	1.73	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		10.26											
	Morrision (CECC) Tap - Bandon	2.31	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.31											
		25.16											
115	**Fairview - Bandon 2**												
	Fairview - Twr 2/2	1.47	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		M-164
	Twr 2/2 - Twr 3/5	1.41	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Twr 3/5 - Twr 8/4	4.63	SDC	J25	1272 kcmil ACSR Bittern	24.71	0.083	0.767	0.369	2.487	5.536		
	Twr 8/4 - Twr 9/3	1.25	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
	Twr 9/3 - Twr 10/5	0.95	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Twr 10/5 - Twr 12/1	1.34	SDC	J25	1272 kcmil ACSR Bittern	24.71	0.083	0.767	0.369	2.487	5.536		
	Twr 12/1 - Twr 13/2	1.28	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
	Twr 13/2 - Twr 14/3	1.06	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Twr 14/3 - Twr 16/4	2.36	SDC	J25	1272 kcmil ACSR Bittern	24.71	0.083	0.767	0.369	2.487	5.536		
	Twr 16/4 - Twr 20/2	3.41	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
	Twr 20/2 - Str 20/4	0.15	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 20/4 - Bandon	0.42	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		19.73											
		19.73											
115	**Fidalgo - Lopez Island 4**												
	Fidalgo - East Decatur	4.71			3-400mm2 OF Cable (Sub)	0.00	0.095	0.198	0.449	0.244	79.520		
	East Decatur - West Decatur	1.72			3-500mm2 OF Cable (Land)	0.00	0.079	0.191	1.141	0.236	72.660		
	West Decatur - Lopez Island	2.05			3-400mm2 OF Cable (Sub)	0.00	0.095	0.198	0.449	0.244	79.520		
		8.48											
		8.48											
115	**Filbert - Tap (Forest Grove - McMinnville 1)**												
	Filbert - Str 1/10	0.10	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 1/10 - Str 1/8	0.11	WSP	H12	397.5 kcmil ACSR Ibis	8.82	0.253	0.705	0.539	2.800	6.019		
	Str 1/8 - Str 1/4	0.25	WSP	H24	397.5 kcmil ACSR Ibis	12.44	0.253	0.747	0.539	2.717	5.671		
	Str 1/4 - Tap	0.25	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
		0.71											
		0.71											
115	**Forest Grove - McMinnville 1**												
	Forest Grove - Filbert Tap	0.77	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		M-153
		0.77											
	Filbert Tap - Str 2/3	0.33	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
	Str 2/3 - Str 19/1	16.97	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 19/1 - Carlton Tap	0.44	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
		17.74											
	Carlton Tap - Str 19/10	0.11	WSP	H21	556.5 kcmil ACSR Dove	11.68	0.181	0.718	0.467	2.712	5.901		
	Str 19/10 - Walnut City (MCM) Tap	2.92	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
		3.03											
	Walnut City (MCM) Tap - McMinnville	2.18	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
		2.18											
		23.72											
115	**Fort Rock - Buffalo Flats**												
		27.00	TSP		0.951 In ACSR/TW Toutle	16.29	0.130	0.760	0.416	2.632	5.600	MEC	
		27.00											
		27.00											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Eugene - Bertelsen(EWEB) 1														
0.578	1.756		1.230	6.087		6.26	0.00437	0.01328		0.00930	0.04602		0.00083	
0.001	0.007		0.004	0.026		0.03	0.00001	0.00006		0.00003	0.00020		0.00000	
0.579	1.764	1.856	1.234	6.113	6.236	6.29	0.00438	0.01334	0.01404	0.00933	0.04622	0.04716	0.00083	
0.579	**1.764**	**1.856**	**1.234**	**6.113**	**6.236**	**6.29**	**0.00438**	**0.01334**	**0.01404**	**0.00933**	**0.04622**	**0.04716**	**0.00083**	
115 Eugene - Lane 1														
0.196	1.121		0.637	4.046		4.48	0.00148	0.00848		0.00482	0.03060		0.00059	
0.515	2.847		1.639	10.543		11.61	0.00389	0.02153		0.01239	0.07972		0.00154	
0.711	3.969	4.032	2.276	14.589	14.766	16.09	0.00538	0.03001	0.03049	0.01721	0.11032	0.11165	0.00213	
0.711	**3.969**	**4.032**	**2.276**	**14.589**	**14.766**	**16.09**	**0.00538**	**0.03001**	**0.03049**	**0.01721**	**0.11032**	**0.11165**	**0.00213**	
115 Fairview - Bandon 1														
0.028	0.087		0.059	0.290		0.29	0.00021	0.00066		0.00045	0.00219		0.00004	
0.087	0.183		0.152	0.620		0.61	0.00066	0.00138		0.00115	0.00468		0.00008	2-3/8 IN EHS STL
1.134	2.391		1.995	8.108		8.00	0.00857	0.01808		0.01508	0.06131		0.00106	
3.477	7.332		6.117	24.863		24.54	0.02629	0.05544		0.04625	0.18800		0.00325	
4.725	9.993	11.054	8.323	33.880	34.887	33.46	0.03573	0.07556	0.08358	0.06294	0.25618	0.26380	0.00442	
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
0.004	0.008	0.009	0.007	0.027	0.028	0.03	0.00003	0.00006	0.00007	0.00005	0.00020	0.00021	0.00000	
1.929	4.067		3.393	13.792		13.62	0.01458	0.03075		0.02566	0.10428		0.00180	
0.269	0.816		0.572	2.830		2.91	0.00203	0.00617		0.00432	0.02140		0.00038	
0.595	1.883		1.268	6.127		6.19	0.00450	0.01424		0.00958	0.04633		0.00082	
0.438	1.333		0.933	4.618		4.75	0.00331	0.01008		0.00706	0.03492		0.00063	
3.231	8.099	8.720	6.166	27.367	28.053	27.47	0.02443	0.06124	0.06594	0.04662	0.20694	0.21212	0.00363	
0.585	1.779		1.246	6.167		6.34	0.00443	0.01345		0.00942	0.04663		0.00084	
0.585	1.779	1.873	1.246	6.167	6.291	6.34	0.00443	0.01345	0.01416	0.00942	0.04663	0.04757	0.00084	
8.546	**19.879**	**21.638**	**15.741**	**67.440**	**69.253**	**67.29**	**0.06462**	**0.15032**	**0.16362**	**0.11903**	**0.50995**	**0.52365**	**0.00890**	
115 Fairview - Bandon 2														
0.122	1.116		0.542	3.678		4.11	0.00092	0.00844		0.00410	0.02781		0.00054	
0.117	1.077		0.520	3.516		3.92	0.00088	0.00814		0.00393	0.02659		0.00052	
0.383	3.551		1.708	11.516		12.82	0.00290	0.02685		0.01291	0.08708		0.00169	
0.104	0.949		0.461	3.128		3.49	0.00078	0.00718		0.00349	0.02365		0.00046	
0.079	0.726		0.350	2.369		2.64	0.00059	0.00549		0.00265	0.01791		0.00035	
0.111	1.028		0.494	3.333		3.71	0.00084	0.00777		0.00374	0.02520		0.00049	
0.106	0.972		0.472	3.203		3.58	0.00080	0.00735		0.00357	0.02422		0.00047	
0.088	0.810		0.391	2.643		2.95	0.00066	0.00612		0.00296	0.01999		0.00039	
0.195	1.810		0.870	5.870		6.53	0.00148	0.01368		0.00658	0.04439		0.00086	
0.282	2.604		1.258	8.503		9.48	0.00213	0.01969		0.00951	0.06430		0.00125	
0.038	0.116		0.081	0.400		0.41	0.00029	0.00087		0.00061	0.00303		0.00005	
0.106	0.324		0.227	1.121		1.15	0.00080	0.00245		0.00171	0.00848		0.00015	
1.731	15.081	15.180	7.374	49.281	49.830	54.79	0.01309	0.11403	0.11478	0.05576	0.37264	0.37678	0.00725	
1.731	**15.081**	**15.180**	**7.374**	**49.281**	**49.830**	**54.79**	**0.01309**	**0.11403**	**0.11478**	**0.05576**	**0.37264**	**0.37678**	**0.00725**	
115 Fidalgo - Lopez Island 4														
0.447	0.933		2.115	1.149		422.77	0.00338	0.00705		0.01599	0.00869		0.05591	
0.136	0.329		1.963	0.406		148.49	0.00103	0.00248		0.01484	0.00307		0.01964	
0.195	0.406		0.920	0.500		184.01	0.00147	0.00307		0.00696	0.00378		0.02434	
0.778	1.667	1.840	4.998	2.055	5.404	755.27	0.00588	0.01260	0.01391	0.03779	0.01554	0.04086	0.09988	
0.778	**1.667**	**1.840**	**4.998**	**2.055**	**5.404**	**755.27**	**0.00588**	**0.01260**	**0.01391**	**0.03779**	**0.01554**	**0.04086**	**0.09988**	
115 Filbert - Tap (Forest Grove - McMinnville 1)														
0.025	0.074		0.054	0.274		0.29	0.00019	0.00056		0.00041	0.00207		0.00004	1-3/8 IN EHS STL
0.028	0.078		0.059	0.308		0.33	0.00021	0.00059		0.00045	0.00233		0.00004	1-3/8 IN EHS STL
0.063	0.187		0.135	0.679		0.71	0.00048	0.00141		0.00102	0.00514		0.00009	1-3/8 IN EHS STL
0.063	0.187		0.135	0.679		0.71	0.00048	0.00141		0.00102	0.00514		0.00009	1-3/8 IN EHS STL
0.180	0.524	0.554	0.383	1.940	1.978	2.04	0.00136	0.00397	0.00419	0.00290	0.01467	0.01495	0.00027	
0.180	**0.524**	**0.554**	**0.383**	**1.940**	**1.978**	**2.04**	**0.00136**	**0.00397**	**0.00419**	**0.00290**	**0.01467**	**0.01495**	**0.00027**	
115 Forest Grove - McMinnville 1														
0.290	0.588		0.510	2.122		2.13	0.00219	0.00444		0.00386	0.01605		0.00028	
0.290	0.588	0.655	0.510	2.122	2.183	2.13	0.00219	0.00444	0.00495	0.00386	0.01605	0.01651	0.00028	
0.124	0.252		0.219	0.910		0.91	0.00094	0.00190		0.00165	0.00688		0.00012	
6.393	13.481		11.246	45.712		45.13	0.04834	0.10193		0.08504	0.34565		0.00597	
0.166	0.336		0.292	1.213		1.22	0.00125	0.00254		0.00220	0.00917		0.00016	
6.683	14.068	15.575	11.756	47.834	49.258	47.26	0.05053	0.10638	0.11777	0.08889	0.36169	0.37246	0.00625	
0.020	0.079		0.051	0.298		0.32	0.00015	0.00060		0.00039	0.00226		0.00004	
0.529	2.197		1.365	7.721		8.22	0.00400	0.01661		0.01032	0.05838		0.00109	
0.549	2.276	2.341	1.416	8.019	8.143	8.54	0.00415	0.01721	0.01770	0.01071	0.06064	0.06157	0.00113	
0.395	1.640		1.019	5.764		6.13	0.00299	0.01240		0.00770	0.04359		0.00081	
0.395	1.640	1.687	1.019	5.764	5.854	6.13	0.00299	0.01240	0.01275	0.00770	0.04359	0.04426	0.00081	
7.917	**18.571**	**20.188**	**14.701**	**63.740**	**65.413**	**64.07**	**0.05987**	**0.14042**	**0.15265**	**0.11116**	**0.48197**	**0.49462**	**0.00847**	
115 Fort Rock - Buffalo Flats														
3.502	20.526		11.224	71.075		75.61	0.02648	0.15521		0.08487	0.53743		0.01000	1-3/8 IN HS STL
3.502	20.526	20.823	11.224	71.075	71.956	75.61	0.02648	0.15521	0.15745	0.08487	0.53743	0.54409	0.01000	
3.502	**20.526**	**20.823**	**11.224**	**71.075**	**71.956**	**75.61**	**0.02648**	**0.15521**	**0.15745**	**0.08487**	**0.53743**	**0.54409**	**0.01000**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Foster Creek (Nespelem Valley Elec.Co-op) - Okanogan**												
	Foster Creek ((NVEC) Open) - Foster Cr. (DPUD)	0.04	WHF	H22	4/0 ACSR Penguin (6/1)	14.49	0.563	0.877	0.849	2.792	5.246		
		0.04											
	Foster Cr. (DPUD) - Str 43/7	9.69	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646	OKAN	
	Str 43/7 - Twr 44/2	0.56	SSC	J5	556.5 kcmil ACSR Dove	34.96	0.181	0.851	0.467	2.446	4.951	OKAN	
	Str 44/2 - Str 45/5	1.22	WSP	H21	556.5 kcmil ACSR Dove	11.68	0.181	0.718	0.467	2.712	5.901	OKAN	
	Str 45/5 - Pateros	0.01	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646	OKAN	
		11.48											
	Pateros - Brewster	0.43	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646	OKAN	
		0.43											
	Brewster - Str 46/1	0.02	WHF	H7	1/0 Cu 7 Str	15.12	0.601	0.875	0.887	2.775	4.890	OKAN	
	Str 46/1 - Str 52/14	6.96	WSP	SPEC	1/0 Cu 7 Str	10.50	0.601	0.831	0.887	2.863	5.163	OKAN	
	Str 52/14 - Ophir	0.09	WSP	SPEC	4/0 ACSR Penguin (6/1)	10.50	0.563	0.838	0.849	2.870	5.523	OKAN	
		7.07											
	Ophir - Str 53/4	0.10	WSP	SPEC	4/0 ACSR Penguin (6/1)	10.50	0.563	0.838	0.849	2.870	5.523	OKAN	
	Str 53/4 - Str 60/9	7.53	WSP	SPEC	1/0 Cu 7 Str	10.50	0.601	0.831	0.887	2.863	5.163	OKAN	
	Str 60/9 - Str 61/2	0.46	WHF	SPEC	1/0 Cu 7 Str	13.20	0.601	0.859	0.887	2.808	4.989	OKAN	
	Str 61/2 - Str 62/2	1.13	WHF	SPEC	266.8 kcmil ACSR Partridge	13.20	0.377	0.778	0.663	2.727	5.435	OKAN	
	Str 62/2 - Str 66/1	3.80	WHF	SPEC	1/0 Cu 7 Str	13.20	0.601	0.859	0.887	2.808	4.989	OKAN	
	Str 66/1 - Str 66/9	0.63	WSP	SPEC	1/0 Cu 7 Str	10.50	0.601	0.831	0.887	2.863	5.163	OKAN	
	Str 66/9 - Str 67/6	0.94	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212	OKAN	
	Str 67/6 - Str 67/10	0.44	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212	OKAN	
	Str 67/10 - Okanogan	0.09	WSP	SPEC	1/0 Cu 7 Str	10.50	0.601	0.831	0.887	2.863	5.163	OKAN	
		15.12											
		34.14											
115	**Foster Dam - Tap (Green Peter - Lebanon)**												
		3.77	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
		3.77											
		3.77											
115	**Foster Wells - North Pasco**												
	Foster Wells - Ch 1	1.33	WSP		556.5 kcmil ACSR Dove	10.89	0.181	0.710	0.467	2.729	5.974	FPUD	
	Ch 1 - North Pasco	1.33	WSP		556.5 kcmil ACSR Dove	9.29	0.181	0.691	0.467	2.767	6.148	FPUD	
		2.66											
		2.66											
115	**Foster Wells - Tap(Franklin - Riverview 1)**												
	Foster Wells - Ch 1	0.14	WSP		556.5 kcmil ACSR Dove	10.08	0.181	0.701	0.467	2.747	6.057	FPUD	
	Ch 1 - Ch 2	0.44	WSP		556.5 kcmil ACSR Dove	8.00	0.181	0.673	0.467	2.804	6.320	FPUD	
	Ch 2 - Ch 3	0.15	WSP		556.5 kcmil ACSR Dove	10.89	0.181	0.710	0.467	2.729	5.974	FPUD	
	Ch 3 - Tap	2.18	WSP		556.5 kcmil ACSR Dove	9.29	0.181	0.691	0.467	2.767	6.148	FPUD	
		2.91											
		2.91											
115	**Four Lakes - Tap(Sunset - East Colfax AVA Line)**												
		5.92	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		5.92											
		5.92											
115	**Franklin - Angus (BPUD) 1**												
	Franklin - Str 1/8	0.34	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022		
	Str 1/8 - Str 1/10	0.17	TSP	H34	1272 kcmil ACSR Bittern	16.29	0.083	0.716	0.369	2.588	5.943		
	Str 1/10 - Pasco	2.75	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022	FPUD	
		3.26											
	Pasco - Columbia River	0.70	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022	FPUD	
	Columbia River - Vista Tap	2.00	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022	BPUD	
		2.70											
	Vista Tap - Angus (BPUD)	0.40	WSP	H16	336.4 kcmil AAC Tulip (19)	11.79	0.305	0.768	0.591	2.758	5.569	BPUD	
		0.40											
		6.36											
115	**Franklin - Badger Canyon 1**												
	Franklin - Twr 1/4	0.29	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-127
	Twr 1/4 - Twr 2/5	1.72	SDC	J18	795 kcmil ACSR Drake	27.68	0.128	0.802	0.414	2.481	5.270		M-193
	Twr 2/5 - Twr 4/1	1.26	SDC	SPEC	1.171 In Al/Alwld	28.58	0.125	0.799	0.411	2.466	5.292		
	Twr 4/1 - Twr 4/6	0.82	SDC	J18	795 kcmil ACSR Drake	27.68	0.128	0.802	0.414	2.481	5.270		
	Twr 4/6 - Twr 15/3	10.45	SDC	J12	795 kcmil ACSR Drake	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 15/3 - Badger Canyon	1.23	SDC	J18	795 kcmil ACSR Drake	27.68	0.128	0.802	0.414	2.481	5.270		
		15.77											
		15.77											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Foster Creek (Nespelem Valley Elec.Co-op) - Okanogan														
0.023	0.035		0.034	0.112		0.10	0.00017	0.00027		0.00026	0.00084		0.00001	
0.023	0.035	0.042	0.034	0.112	0.117	0.10	0.00017	0.00027	0.00032	0.00026	0.00084	0.00088	0.00001	
1.757	7.265		4.528	25.670		27.36	0.01328	0.05494		0.03424	0.19410		0.00362	
0.102	0.477		0.262	1.370		1.39	0.00077	0.00361		0.00198	0.01036		0.00018	2-7 NO 8 ALWLD
0.221	0.877		0.570	3.308		3.60	0.00167	0.00663		0.00431	0.02502		0.00048	
0.002	0.007		0.005	0.026		0.03	0.00001	0.00006		0.00004	0.00020		0.00000	
2.081	8.626	8.874	5.365	30.374	30.844	32.37	0.01574	0.06523	0.06710	0.04056	0.22967	0.23323	0.00428	
0.078	0.322		0.201	1.139		1.21	0.00059	0.00244		0.00152	0.00861		0.00016	
0.078	0.322	0.332	0.201	1.139	1.157	1.21	0.00059	0.00244	0.00251	0.00152	0.00861	0.00875	0.00016	
0.012	0.018		0.018	0.055		0.05	0.00009	0.00013		0.00013	0.00042		0.00001	
4.181	5.784		6.171	19.927		17.97	0.03161	0.04374		0.04666	0.15068		0.00238	
0.051	0.075		0.076	0.258		0.25	0.00038	0.00057		0.00058	0.00195		0.00003	
4.244	5.877	7.249	6.266	20.241	21.189	18.27	0.03209	0.04444	0.05481	0.04738	0.15305	0.16022	0.00242	
0.056	0.084		0.085	0.287		0.28	0.00043	0.00063		0.00064	0.00217		0.00004	
4.523	6.258		6.677	21.559		19.44	0.03420	0.04732		0.05049	0.16302		0.00257	
0.276	0.395		0.408	1.291		1.15	0.00209	0.00299		0.00308	0.00977		0.00015	
0.426	0.879		0.749	3.081		3.07	0.00322	0.00665		0.00566	0.02330		0.00041	
2.283	3.264		3.369	10.669		9.48	0.01726	0.02468		0.02548	0.08067		0.00125	
0.378	0.524		0.559	1.804		1.63	0.00286	0.00396		0.00422	0.01364		0.00022	
0.529	0.830		0.798	2.615		2.45	0.00400	0.00627		0.00603	0.01977		0.00032	
0.248	0.388		0.374	1.224		1.15	0.00187	0.00294		0.00282	0.00926		0.00015	2-3/8 IN HS STL
0.054	0.075		0.080	0.258		0.23	0.00041	0.00057		0.00060	0.00195		0.00003	2-3/8 IN HS STL
8.774	12.696	15.432	13.098	42.788	44.748	38.87	0.06634	0.09600	0.11669	0.09904	0.32354	0.33836	0.00514	
15.199	**27.556**	**31.470**	**24.963**	**94.653**	**97.890**	**90.82**	**0.11493**	**0.20837**	**0.23796**	**0.18876**	**0.71572**	**0.74019**	**0.01201**	
115 Foster Dam - Tap (Green Peter - Lebanon)														
0.947	2.936		2.025	9.935		10.20	0.00716	0.02220		0.01531	0.07512		0.00135	
0.947	2.936	3.085	2.025	9.935	10.139	10.20	0.00716	0.02220	0.02333	0.01531	0.07512	0.07667	0.00135	
0.947	**2.936**	**3.085**	**2.025**	**9.935**	**10.139**	**10.20**	**0.00716**	**0.02220**	**0.02333**	**0.01531**	**0.07512**	**0.07667**	**0.00135**	
115 Foster Wells - North Pasco														
0.241	0.944		0.622	3.629		3.97	0.00182	0.00714		0.00470	0.02744		0.00053	
0.241	0.919		0.622	3.680		4.09	0.00182	0.00695		0.00470	0.02783		0.00054	
0.482	1.863	1.924	1.243	7.310	7.415	8.06	0.00365	0.01409	0.01455	0.00940	0.05527	0.05607	0.00107	
0.482	**1.863**	**1.924**	**1.243**	**7.310**	**7.415**	**8.06**	**0.00365**	**0.01409**	**0.01455**	**0.00940**	**0.05527**	**0.05607**	**0.00107**	
115 Foster Wells - Tap(Franklin - Riverview 1)														
0.025	0.098		0.065	0.385		0.42	0.00019	0.00074		0.00049	0.00291		0.00006	
0.080	0.296		0.206	1.234		1.39	0.00060	0.00224		0.00155	0.00933		0.00018	
0.027	0.106		0.070	0.409		0.45	0.00021	0.00081		0.00053	0.00309		0.00006	
0.395	1.506		1.019	6.033		6.70	0.00299	0.01139		0.00770	0.04562		0.00089	
0.528	2.006	2.074	1.360	8.060	8.174	8.96	0.00399	0.01517	0.01569	0.01028	0.06095	0.06181	0.00119	
0.528	**2.006**	**2.074**	**1.360**	**8.060**	**8.174**	**8.96**	**0.00399**	**0.01517**	**0.01569**	**0.01028**	**0.06095**	**0.06181**	**0.00119**	
115 Four Lakes - Tap(Sunset - East Colfax AVA Line)														
2.230	4.703		3.923	15.947		15.74	0.01686	0.03556		0.02966	0.12058		0.00208	
2.230	4.703	5.205	3.923	15.947	16.422	15.74	0.01686	0.03556	0.03935	0.02966	0.12058	0.12417	0.00208	
2.230	**4.703**	**5.205**	**3.923**	**15.947**	**16.422**	**15.74**	**0.01686**	**0.03556**	**0.03935**	**0.02966**	**0.12058**	**0.12417**	**0.00208**	
115 Franklin - Angus (BPUD) 1														
0.028	0.240		0.125	0.886		1.02	0.00021	0.00182		0.00095	0.00670		0.00014	2-3/8 IN EHS STL
0.014	0.122		0.063	0.440		0.51	0.00011	0.00092		0.00047	0.00333		0.00007	
0.228	1.945		1.014	7.168		8.28	0.00172	0.01471		0.00767	0.05420		0.00110	
0.270	2.307	2.323	1.202	8.494	8.579	9.81	0.00204	0.01745	0.01756	0.00909	0.06423	0.06487	0.00130	
0.058	0.495		0.258	1.825		2.11	0.00044	0.00374		0.00195	0.01380		0.00028	
0.166	1.414		0.738	5.213		6.02	0.00125	0.01070		0.00558	0.03942		0.00080	
0.224	1.910	1.923	0.996	7.038	7.108	8.13	0.00169	0.01444	0.01454	0.00753	0.05321	0.05374	0.00108	
0.122	0.307		0.236	1.103		1.11	0.00092	0.00232		0.00179	0.00834		0.00015	
0.122	0.307	0.331	0.236	1.103	1.128	1.11	0.00092	0.00232	0.00250	0.00179	0.00834	0.00853	0.00015	
0.615	**4.524**	**4.566**	**2.434**	**16.635**	**16.812**	**19.05**	**0.00465**	**0.03421**	**0.03452**	**0.01841**	**0.12579**	**0.12713**	**0.00252**	
115 Franklin - Badger Canyon 1														
0.037	0.211		0.120	0.762		0.84	0.00028	0.00160		0.00091	0.00576		0.00011	
0.219	1.379		0.711	4.267		4.53	0.00166	0.01042		0.00538	0.03226		0.00060	
0.158	1.006		0.518	3.107		3.33	0.00119	0.00761		0.00392	0.02350		0.00044	
0.105	0.657		0.339	2.034		2.16	0.00079	0.00497		0.00256	0.01538		0.00029	
1.332	8.199		4.321	26.276		28.15	0.01007	0.06200		0.03267	0.19869		0.00372	
0.157	0.986		0.509	3.051		3.24	0.00119	0.00745		0.00385	0.02307		0.00043	
2.008	12.438	12.599	6.518	39.498	40.032	42.26	0.01518	0.09405	0.09527	0.04929	0.29866	0.30270	0.00559	
2.008	**12.438**	**12.599**	**6.518**	**39.498**	**40.032**	**42.26**	**0.01518**	**0.09405**	**0.09527**	**0.04929**	**0.29866**	**0.30270**	**0.00559**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Franklin - Badger Canyon 2**												
	Franklin - Str 2/8	2.01	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-127
	Str 2/8 - Str 4/1	1.22	SDC	SPEC	795 kcmil ACSR Mallard	28.58	0.126	0.800	0.412	2.467	5.267		M-193
	Str 4/1 - Franklin/Hedges (BPUD) 1 Tie	0.19	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
		3.42											
	Franklin/Hedges (BPUD) 1 Tie - Str 5/1	0.07	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
	Str 5/1 - Gum Street (PUD)	2.07	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
		2.14											
	Gum Street (PUD) - Kennewick (BPUD) Tap	0.56	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
		0.56											
	Kennewick (BPUD) Tap - Str 8/3	0.29	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 8/3 - Str 9/11	1.36	WSP	H20	397.5 kcmil ACSR Ibis	9.12	0.253	0.709	0.539	2.792	5.983		
	Str 9/11 - Ely (PUD)	0.05	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
		1.70											
	Ely (PUD) - Str 9/13	0.06	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 9/13 - Angus (BPUD) Tap	0.70	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.76											
	Angus (BPUD) Tap - Highlands (BPUD)	1.22	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.22											
	Highlands (BPUD) - Orchard View	1.48	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
		1.48											
	Orchard View - Str 15/1	1.23	WHF	H7	1272 kcmil ACSR Pheasant	15.12	0.082	0.702	0.368	2.601	6.051		
	Str 15/1 - Badger Canyon	0.84	TDC	H26	795 kcmil ACSR Drake	12.97	0.128	0.710	0.414	2.665	5.978		
		2.07											
		13.35											
115	**Franklin - Hedges (BPUD) 1**												
	Franklin - Str 2/6	1.88	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-127
	Str 2/6 - Twr 2/7	0.12	WHF	H11	795 kcmil ACSR Drake	17.64	0.128	0.747	0.414	2.590	5.669		
	Twr 2/7 - Twr 4/1	1.21	SDC	SPEC	795 kcmil ACSR Mallard	28.58	0.126	0.800	0.412	2.467	5.267		
	Twr 4/1 - Str 4/3	0.19	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 4/3 - Franklin/Badger Canyon 2 Tie	0.20	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		3.60											
	Franklin/Badger Canyon 2 Tie - Hedges (BPUD)	1.37	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.37											
		4.97											
115	**Franklin - Riverview 1**												
@	Franklin - Str 1/2	0.09	WHF	H7	1.1 In ACSR/TW Rogue	15.12	0.100	0.735	0.386	2.634	5.813		
@	Str 1/2 - Str 1/3	0.09	WHF	H7	1.1 In ACSR/TW Rogue	15.12	0.100	0.735	0.386	2.634	5.813		
@	Str 1/3 - Str 1/8	0.49	TDC	H35	1.1 In ACSR/TW Rogue	15.43	0.100	0.737	0.386	2.629	5.793		
@	Str 1/8 - Str 1/10	0.25	TSP	H34	1.1 In ACSR/TW Rogue	16.29	0.100	0.744	0.386	2.616	5.739		
@	Str 1/10 - Str 3/1	1.12	WHF	H7	1.1 In ACSR/TW Rogue	15.12	0.100	0.735	0.386	2.634	5.813		
@	Str 3/1 - Str 3/10	0.60	WSP	H21	1.1 In ACSR/TW Rogue	11.68	0.100	0.704	0.386	2.697	6.084		
@	Str 3/10 - Foster Wells Tap	0.04	WSP	H21	1.1 In ACSR/TW Rogue	11.68	0.100	0.704	0.386	2.697	6.084		
		2.68											
@	Foster Wells Tap - Str 3/11	0.03	WSP	H21	1.1 In ACSR/TW Rogue	11.68	0.100	0.704	0.386	2.697	6.084		
@	Str 3/11 - Str 3/12	0.09	WHF	H11	1.1 In ACSR/TW Rogue	17.64	0.100	0.754	0.386	2.597	5.663		
@	Str 3/12 - Court Street(4/1)	0.21	WSP	H21	1.1 In ACSR/TW Rogue	11.68	0.100	0.704	0.386	2.697	6.084		
		0.33											
@	Court Street (PUD) - Str 4/22	0.95	WSP	H21	1.1 In ACSR/TW Rogue	11.68	0.100	0.704	0.386	2.697	6.084		
@	Str 4/22 - Str 5/11	0.53	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
@	Str 5/11 - Riverview	0.38	CSP	H9	266.8 kcmil ACSR Partridge	13.61	0.377	0.782	0.663	2.719	5.408		
		1.86											
		4.87											
115	**Franklin - Walla Walla 1**												
	Franklin - Str 1/3	0.30	SDC	H5	1780 kcmil ACSR Chukar	15.66	0.061	0.689	0.347	2.576	6.176		M-145
	Str 1/3 - Str 1/9	0.42	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/9 - Str 2/8	1.22	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 2/8 - Str 5/2	1.65	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 5/2 - Str 5/4	0.59	SSC	H18	397.5 kcmil ACSR Ibis	20.16	0.253	0.805	0.539	2.600	5.245		
	Str 5/4 - Burbank Tap	0.11	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		4.29											
	Burbank Tap - Joso (CREA) Tap	9.79	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		9.79											
	Joso (CREA) Tap - Str 37/3	21.43	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 37/3 - Walla Walla	0.45	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		21.88											
		35.96											
115	**Franklin/Hedges (BPUD) 1 - Franklin/Badger Canyon 2 Tie**												
	Operating Name (Hedges Tap to Franklin - Badger Canyon 2)												
		0.33	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.33											
		0.33											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Franklin - Badger Canyon 2														
0.169	1.437		0.744	5.254		6.01	0.00128	0.01086		0.00562	0.03973		0.00080	
0.154	0.976		0.503	3.010		3.21	0.00117	0.00738		0.00380	0.02276		0.00042	
0.016	0.133		0.070	0.494		0.57	0.00012	0.00101		0.00053	0.00374		0.00008	
0.339	2.546	2.568	1.317	8.759	8.857	9.80	0.00256	0.01925	0.01942	0.00996	0.06623	0.06697	0.00130	
0.006	0.049		0.026	0.182		0.21	0.00004	0.00037		0.00019	0.00138		0.00003	
0.170	1.452		0.762	5.384		6.26	0.00128	0.01098		0.00576	0.04071		0.00083	
0.175	1.501	1.512	0.787	5.566	5.621	6.47	0.00133	0.01135	0.01143	0.00595	0.04209	0.04250	0.00086	
0.046	0.393		0.206	1.456		1.69	0.00035	0.00297		0.00156	0.01101		0.00022	
0.046	0.393	0.396	0.206	1.456	1.471	1.69	0.00035	0.00297	0.00299	0.00156	0.01101	0.01112	0.00022	
0.073	0.223		0.156	0.774		0.80	0.00056	0.00169		0.00118	0.00585		0.00011	
0.345	0.964		0.734	3.797		4.07	0.00261	0.00729		0.00555	0.02871		0.00054	
0.013	0.037		0.027	0.137		0.14	0.00010	0.00028		0.00020	0.00104		0.00002	
0.431	1.224	1.298	0.917	4.709	4.797	5.01	0.00326	0.00926	0.00981	0.00693	0.03560	0.03627	0.00066	
0.015	0.044		0.032	0.164		0.17	0.00011	0.00033		0.00024	0.00124		0.00002	
0.177	0.539		0.378	1.869		1.92	0.00134	0.00408		0.00286	0.01413		0.00025	
0.193	0.583	0.614	0.410	2.033	2.074	2.09	0.00146	0.00441	0.00464	0.00310	0.01537	0.01568	0.00028	
0.309	0.940		0.658	3.257		3.35	0.00234	0.00711		0.00498	0.02463		0.00044	
0.309	0.940	0.989	0.658	3.257	3.323	3.35	0.00234	0.00711	0.00748	0.00498	0.02463	0.02512	0.00044	
0.121	1.038		0.544	3.849		4.48	0.00092	0.00785		0.00412	0.02911		0.00059	
0.121	1.038	1.045	0.544	3.849	3.888	4.48	0.00092	0.00785	0.00790	0.00412	0.02911	0.02940	0.00059	
0.101	0.863		0.453	3.199		3.72	0.00076	0.00653		0.00342	0.02419		0.00049	
0.107	0.596		0.347	2.238		2.51	0.00081	0.00451		0.00263	0.01692		0.00033	1-7 NO 8 ALWLD
0.208	1.459	1.474	0.800	5.437	5.496	6.23	0.00157	0.01103	0.01114	0.00605	0.04111	0.04156	0.00082	
1.822	**9.684**	**9.854**	**5.640**	**35.066**	**35.517**	**39.13**	**0.01377**	**0.07323**	**0.07451**	**0.04264**	**0.26515**	**0.26856**	**0.00518**	
115 Franklin - Hedges (BPUD) 1														
0.476	1.448		1.014	5.019		5.16	0.00360	0.01095		0.00767	0.03795		0.00068	
0.015	0.090		0.050	0.311		0.34	0.00012	0.00068		0.00038	0.00235		0.00004	
0.153	0.968		0.499	2.985		3.19	0.00116	0.00732		0.00377	0.02257		0.00042	
0.024	0.138		0.079	0.499		0.55	0.00018	0.00105		0.00059	0.00377		0.00007	
0.051	0.154		0.108	0.534		0.55	0.00038	0.00116		0.00082	0.00404		0.00007	
0.720	2.798	2.889	1.749	9.348	9.510	9.79	0.00544	0.02116	0.02184	0.01323	0.07068	0.07191	0.00129	
0.347	1.055		0.739	3.657		3.76	0.00263	0.00798		0.00559	0.02765		0.00050	
0.347	1.055	1.111	0.739	3.657	3.731	3.76	0.00263	0.00798	0.00840	0.00559	0.02765	0.02821	0.00050	
1.067	**3.853**	**3.998**	**2.488**	**13.005**	**13.241**	**13.55**	**0.00807**	**0.02913**	**0.03023**	**0.01881**	**0.09834**	**0.10012**	**0.00179**	
115 Franklin - Riverview 1														
0.009	0.066		0.035	0.237		0.26	0.00007	0.00050		0.00026	0.00179		0.00003	2-3/8 IN EHS STL
0.009	0.066		0.035	0.237		0.26	0.00007	0.00050		0.00026	0.00179		0.00003	1-3/8 IN EHS STL
0.049	0.361		0.189	1.288		1.42	0.00037	0.00273		0.00143	0.00974		0.00019	1-3/8 IN EHS STL
0.025	0.186		0.096	0.654		0.72	0.00019	0.00141		0.00073	0.00495		0.00009	
0.112	0.823		0.432	2.950		3.26	0.00084	0.00622		0.00327	0.02231		0.00043	
0.060	0.422		0.231	1.618		1.83	0.00045	0.00319		0.00175	0.01224		0.00024	
0.004	0.028		0.015	0.108		0.12	0.00003	0.00021		0.00012	0.00082		0.00002	
0.267	1.953	1.971	1.033	7.093	7.168	7.86	0.00202	0.01477	0.01490	0.00781	0.05363	0.05420	0.00104	
0.003	0.021		0.012	0.081		0.09	0.00002	0.00016		0.00009	0.00061		0.00001	
0.009	0.068		0.035	0.234		0.25	0.00007	0.00051		0.00026	0.00177		0.00003	
0.021	0.148		0.081	0.566		0.64	0.00016	0.00112		0.00061	0.00428		0.00008	
0.033	0.237	0.239	0.127	0.881	0.890	0.98	0.00025	0.00179	0.00181	0.00096	0.00666	0.00673	0.00013	
0.095	0.668		0.366	2.562		2.89	0.00072	0.00505		0.00277	0.01937		0.00038	
0.200	0.404		0.351	1.461		1.47	0.00151	0.00306		0.00266	0.01105		0.00019	
0.143	0.297		0.252	1.033		1.03	0.00108	0.00225		0.00190	0.00781		0.00014	
0.437	1.370	1.438	0.969	5.056	5.148	5.39	0.00331	0.01036	0.01087	0.00733	0.03823	0.03893	0.00071	
0.737	**3.559**	**3.635**	**2.130**	**13.030**	**13.203**	**14.23**	**0.00557**	**0.02691**	**0.02748**	**0.01611**	**0.09852**	**0.09983**	**0.00188**	
115 Franklin - Walla Walla 1														
0.018	0.207		0.104	0.773		0.93	0.00014	0.00156		0.00079	0.00584		0.00012	2-7 NO 8 ALWLD
0.106	0.324		0.227	1.121		1.15	0.00080	0.00245		0.00171	0.00848		0.00015	2-3/8 IN HS STL
0.309	0.940		0.658	3.257		3.35	0.00234	0.00711		0.00498	0.02463		0.00044	
0.419	1.308		0.891	4.441		4.40	0.00317	0.00989		0.00674	0.03358		0.00058	
0.150	0.475		0.318	1.534		1.55	0.00113	0.00359		0.00241	0.01160		0.00020	2-3/8 IN HS STL
0.028	0.087		0.059	0.296		0.29	0.00021	0.00066		0.00045	0.00224		0.00004	
1.031	3.340	3.495	2.258	11.422	11.643	11.67	0.00779	0.02525	0.02643	0.01707	0.08637	0.08804	0.00154	
2.488	7.758		5.288	26.353		26.09	0.01881	0.05866		0.03998	0.19926		0.00345	
2.488	7.758	8.148	5.288	26.353	26.878	26.09	0.01881	0.05866	0.06161	0.03998	0.19926	0.20323	0.00345	
5.445	16.983		11.574	57.685		57.11	0.04117	0.12842		0.08752	0.43618		0.00755	
0.114	0.357		0.243	1.211		1.20	0.00086	0.00270		0.00184	0.00916		0.00016	2-3/8 IN HS STL
5.560	17.340	18.209	11.817	58.896	60.070	58.30	0.04204	0.13111	0.13769	0.08936	0.44534	0.45422	0.00771	
9.078	**28.438**	**29.852**	**19.362**	**96.671**	**98.591**	**96.06**	**0.06864**	**0.21503**	**0.22572**	**0.14641**	**0.73097**	**0.74549**	**0.01270**	
115 Franklin/Hedges (BPUD) 1 - Franklin/Badger Canyon 2 Tie														
0.084	0.254		0.178	0.881		0.91	0.00063	0.00192		0.00135	0.00666		0.00012	
0.084	0.254	0.268	0.178	0.881	0.899	0.91	0.00063	0.00192	0.00202	0.00135	0.00666	0.00680	0.00012	
0.084	**0.254**	**0.268**	**0.178**	**0.881**	**0.899**	**0.91**	**0.00063**	**0.00192**	**0.00202**	**0.00135**	**0.00666**	**0.00680**	**0.00012**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Franz Holmes - Tap (Cowlitz - La Grande 1/2 (TCL))**												
	Franz Holmes - Str 1/1	0.89	WSP	H28	397.5 kcmil ACSR Ibis	10.67	0.253	0.728	0.539	2.754	5.821		
	Str 1/1 - Tap	0.02	WSP		397.5 kcmil ACSR Ibis	10.67	0.253	0.728	0.539	2.754	5.821		
		0.91											
		0.91											
115	**Frenchtown - Tap (MPC)**												
		0.04	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.04											
		0.04											
115	**Froman - Tap (Albany - Lebanon 1)**												
		0.04	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
		0.04											
		0.04											
115	**Garibaldi - Tap (Seaside - Mohler PP&L)**												
		0.04	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.04											
		0.04											
115	**Goshen - Drummond**												
	Constructed at 161 KV												
	Goshen - Str 1/3	0.10	WHF	H18	0.915 In AAC/TW Mazama	20.16	0.132	0.795	0.418	2.589	5.375		M-207
	Str 1/3 - Str 22/4	21.05	WDC	J30	0.915 In AAC/TW Mazama	27.13	0.132	0.831	0.418	2.517	5.132		
	Str 22/4 - Str 23/3	0.68	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
	Str 23/3 - Str 34/18	11.63	WSP	H33	0.915 In AAC/TW Mazama	15.65	0.132	0.764	0.418	2.651	5.602		
	Str 34/18 - Str 35/4	0.52	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
	Str 35/4 - Str 35/5	0.25	WHF	J7	795 kcmil ACSR Drake	25.20	0.128	0.790	0.414	2.503	5.348		
	Str 35/5 - Str 36/6	0.94	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
	Str 36/6 - Str 38/17	2.22	WSP	H33	0.915 In AAC/TW Mazama	15.65	0.132	0.764	0.418	2.651	5.602		
	Str 38/17 - Str 42/9	4.08	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
	Str 42/9 - Str 43/6	0.79	WDC	J30	0.915 In AAC/TW Mazama	27.13	0.132	0.831	0.418	2.517	5.132		
	Str 43/6 - Str 44/1	0.42	WDC	J30	795 kcmil ACSR Drake	27.13	0.128	0.799	0.414	2.486	5.286		
	Str 44/1 - Str 44/2	0.08	WDC	J30	0.915 In AAC/TW Mazama	27.13	0.132	0.831	0.418	2.517	5.132		
	Str 44/2 - Str 53/2	8.86	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
	Str 53/2 - Str 58/10	5.41	WSP	H33	0.915 In AAC/TW Mazama	15.65	0.132	0.764	0.418	2.651	5.602		
	Str 58/10 - Str 58/11	0.37	WHF	J7	795 kcmil ACSR Drake	25.20	0.128	0.790	0.414	2.503	5.348		
	Str 58/11 - Str 60/2	1.27	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
	Str 60/2 - Str 66/1	5.82	WSP	H33	0.915 In AAC/TW Mazama	15.65	0.132	0.764	0.418	2.651	5.602		
	Str 66/1 - Drummond	8.27	WHF	J7	0.915 In AAC/TW Mazama	25.20	0.132	0.822	0.418	2.535	5.191		
		72.76											
		72.76											
115	**Grand Coulee - Bell 1**												
	Grand Coulee - Twr 1/4	0.56	TSP	H25	556.5 kcmil ACSR Dove	15.48	0.181	0.753	0.467	2.643	5.624		M-113
	Twr 1/4 - Wagner Lake Tap	17.44	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-114
		18.00											
	Wagner Lake Tap - Creston	10.23	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-183
		10.23											
	Creston - Larene	16.73	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-184
		16.73											
	Larene - Spring Hill	27.15	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		27.15											
	Spring Hill - Str 83/7	9.28	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 83/7 - Bell	0.64	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		9.92											
		82.03											
115	**Grand Coulee - Bell 2**												
	Grand Coulee - Twr 1/4	0.56	TSP	H25	556.5 kcmil ACSR Dove	15.48	0.181	0.753	0.467	2.643	5.624		M-113
	Twr 1/4 - Grant County PUD	1.03	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-114
		1.59											
	Grant County PUD - Wagner Lake Tap	16.47	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-183
		16.47											
	Wagner Lake Tap - Creston	10.21	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-184
		10.21											
	Creston - Larene	16.73	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		16.73											
	Larene - Spring Hill	27.16	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		27.16											
	Spring Hill - Str 83/7	9.28	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 83/7 - Bell	0.64	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		9.92											
		82.08											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Franz Holmes - Tap (Cowlitz - La Grande 1/2 (TCL))														
0.226	0.648		0.480	2.451		2.59	0.00171	0.00490		0.00363	0.01853		0.00034	
0.005	0.015		0.011	0.055		0.06	0.00004	0.00011		0.00008	0.00042		0.00001	
0.231	0.662	0.701	0.491	2.506	2.554	2.65	0.00174	0.00501	0.00530	0.00371	0.01895	0.01931	0.00035	
0.231	**0.662**	**0.701**	**0.491**	**2.506**	**2.554**	**2.65**	**0.00174**	**0.00501**	**0.00530**	**0.00371**	**0.01895**	**0.01931**	**0.00035**	
115 Frenchtown - Tap (MPC)														
0.015	0.032		0.027	0.108		0.11	0.00011	0.00024		0.00020	0.00081		0.00001	
0.015	0.032	0.035	0.027	0.108	0.111	0.11	0.00011	0.00024	0.00027	0.00020	0.00081	0.00084	0.00001	
0.015	**0.032**	**0.035**	**0.027**	**0.108**	**0.111**	**0.11**	**0.00011**	**0.00024**	**0.00027**	**0.00020**	**0.00081**	**0.00084**	**0.00001**	
115 Froman - Tap (Albany - Lebanon 1)														
0.015	0.031		0.027	0.110		0.11	0.00011	0.00023		0.00020	0.00083		0.00001	
0.015	0.031	0.034	0.027	0.110	0.113	0.11	0.00011	0.00023	0.00026	0.00020	0.00083	0.00086	0.00001	
0.015	**0.031**	**0.034**	**0.027**	**0.110**	**0.113**	**0.11**	**0.00011**	**0.00023**	**0.00026**	**0.00020**	**0.00083**	**0.00086**	**0.00001**	
115 Garibaldi - Tap (Seaside - Mohler PP&L)														
0.010	0.031		0.022	0.107		0.11	0.00008	0.00023		0.00016	0.00081		0.00001	
0.010	0.031	0.032	0.022	0.107	0.109	0.11	0.00008	0.00023	0.00025	0.00016	0.00081	0.00082	0.00001	
0.010	**0.031**	**0.032**	**0.022**	**0.107**	**0.109**	**0.11**	**0.00008**	**0.00023**	**0.00025**	**0.00016**	**0.00081**	**0.00082**	**0.00001**	
115 Goshen - Drummond														
0.013	0.079		0.042	0.259		0.27	0.00010	0.00060		0.00032	0.00196		0.00004	2-3/8 IN EHS STL
2.779	17.490		8.799	52.990		54.02	0.02101	0.13225		0.06653	0.40068		0.00714	2-3/8 IN EHS STL
0.090	0.559		0.284	1.724		1.76	0.00068	0.00423		0.00215	0.01304		0.00023	2-3/8 IN EHS STL
1.535	8.887		4.861	30.830		32.57	0.01161	0.06720		0.03676	0.23312		0.00431	2-3/8 IN EHS STL
0.069	0.427		0.217	1.318		1.35	0.00052	0.00323		0.00164	0.00997		0.00018	2-3/8 IN EHS STL
0.032	0.198		0.103	0.626		0.67	0.00024	0.00149		0.00078	0.00473		0.00009	2-3/8 IN EHS STL
0.124	0.773		0.393	2.383		2.44	0.00094	0.00584		0.00297	0.01802		0.00032	2-3/8 IN EHS STL
0.293	1.696		0.928	5.885		6.22	0.00222	0.01283		0.00702	0.04450		0.00082	2-3/8 IN EHS STL
0.539	3.353		1.705	10.344		10.59	0.00407	0.02536		0.01290	0.07821		0.00140	2-3/8 IN EHS STL
0.104	0.656		0.330	1.989		2.03	0.00079	0.00496		0.00250	0.01504		0.00027	2-3/8 IN EHS STL
0.054	0.336		0.174	1.044		1.11	0.00040	0.00254		0.00131	0.00789		0.00015	2-3/8 IN EHS STL
0.011	0.066		0.033	0.201		0.21	0.00008	0.00050		0.00025	0.00152		0.00003	2-3/8 IN EHS STL
1.170	7.282		3.703	22.462		23.00	0.00884	0.05506		0.02800	0.16985		0.00304	2-3/8 IN EHS STL
0.714	4.134		2.261	14.341		15.15	0.00540	0.03126		0.01710	0.10844		0.00200	2-3/8 IN EHS STL
0.047	0.292		0.153	0.926		0.99	0.00036	0.00221		0.00116	0.00700		0.00013	2-3/8 IN EHS STL
0.168	1.044		0.531	3.220		3.30	0.00127	0.00789		0.00401	0.02435		0.00044	2-3/8 IN EHS STL
0.768	4.447		2.433	15.428		16.30	0.00581	0.03363		0.01840	0.11666		0.00216	2-3/8 IN EHS STL
1.092	6.797		3.457	20.967		21.46	0.00825	0.05140		0.02614	0.15854		0.00284	2-3/8 IN EHS STL
9.600	58.518	59.300	30.409	186.938	189.395	193.43	0.07259	0.44248	0.44839	0.22994	1.41352	1.43210	0.02558	
9.600	**58.518**	**59.300**	**30.409**	**186.938**	**189.395**	**193.43**	**0.07259**	**0.44248**	**0.44839**	**0.22994**	**1.41352**	**1.43210**	**0.02558**	
115 Grand Coulee - Bell 1														
0.102	0.421		0.262	1.480		1.57	0.00077	0.00319		0.00198	0.01119		0.00021	1-7 NO 8 ALWLD
3.218	13.881		8.206	47.005		46.79	0.02433	0.10496		0.06205	0.35542		0.00619	
3.319	14.303	14.683	8.467	48.485	49.219	48.36	0.02510	0.10815	0.11102	0.06402	0.36662	0.37217	0.00640	
1.887	8.142		4.813	27.572		27.45	0.01427	0.06157		0.03639	0.20849		0.00363	
1.887	8.142	8.358	4.813	27.572	27.989	27.45	0.01427	0.06157	0.06320	0.03639	0.20849	0.21164	0.00363	
3.087	13.316		7.871	45.091		44.88	0.02334	0.10069		0.05952	0.34096		0.00594	
3.087	13.316	13.669	7.871	45.091	45.773	44.88	0.02334	0.10069	0.10336	0.05952	0.34096	0.34611	0.00594	
5.009	21.610		12.774	73.176		72.84	0.03788	0.16340		0.09659	0.55331		0.00963	
5.009	21.610	22.183	12.774	73.176	74.282	72.84	0.03788	0.16340	0.16773	0.09659	0.55331	0.56168	0.00963	
1.712	7.386		4.366	25.012		24.90	0.01295	0.05585		0.03302	0.18913		0.00329	
0.118	0.509		0.301	1.725		1.72	0.00089	0.00385		0.00228	0.01304		0.00023	2-1/0 CU Str
1.830	7.896	8.105	4.667	26.737	27.141	26.61	0.01384	0.05970	0.06129	0.03529	0.20217	0.20523	0.00352	
15.133	**65.266**	**66.998**	**38.593**	**221.061**	**224.405**	**220.15**	**0.11443**	**0.49351**	**0.50660**	**0.29182**	**1.67154**	**1.69682**	**0.02911**	
115 Grand Coulee - Bell 2														
0.102	0.421		0.262	1.480		1.57	0.00077	0.00319		0.00198	0.01119		0.00021	1-7 NO 8 ALWLD
0.190	0.820		0.485	2.776		2.76	0.00144	0.00620		0.00366	0.02099		0.00037	
0.292	1.241	1.275	0.746	4.256	4.321	4.34	0.00220	0.00939	0.00964	0.00564	0.03218	0.03268	0.00057	
3.039	13.109		7.749	44.391		44.19	0.02298	0.09912		0.05859	0.33566		0.00584	
3.039	13.109	13.457	7.749	44.391	45.062	44.19	0.02298	0.09912	0.10175	0.05859	0.33566	0.34073	0.00584	
1.884	8.127		4.804	27.518		27.39	0.01424	0.06145		0.03632	0.20808		0.00362	
1.884	8.127	8.342	4.804	27.518	27.935	27.39	0.01424	0.06145	0.06308	0.03632	0.20808	0.21123	0.00362	
3.087	13.316		7.871	45.091		44.88	0.02334	0.10069		0.05952	0.34096		0.00594	
3.087	13.316	13.669	7.871	45.091	45.773	44.88	0.02334	0.10069	0.10336	0.05952	0.34096	0.34611	0.00594	
5.011	21.618		12.779	73.203		72.87	0.03789	0.16346		0.09663	0.55352		0.00964	
5.011	21.618	22.191	12.779	73.203	74.310	72.87	0.03789	0.16346	0.16779	0.09663	0.55352	0.56189	0.00964	
1.712	7.386		4.366	25.012		24.90	0.01295	0.05585		0.03302	0.18913		0.00329	
0.118	0.509		0.301	1.725		1.72	0.00089	0.00385		0.00228	0.01304		0.00023	2-1/0 CU Str
1.830	7.896	8.105	4.667	26.737	27.141	26.61	0.01384	0.05970	0.06129	0.03529	0.20217	0.20523	0.00352	
15.142	**65.306**	**67.039**	**38.617**	**221.196**	**224.542**	**220.29**	**0.11450**	**0.49381**	**0.50691**	**0.29200**	**1.67256**	**1.69786**	**0.02913**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Grand Coulee - Foster Creek 1 (Nespelem Valley Elec. Co-op)**												
	This was part of Grand Coulee - Okanogan 1 line												
	Grand Coulee - Str 1/3	0.11	WSP	H15	4/0 ACSR Penguin (6/1)	11.34	0.563	0.848	0.849	2.852	5.454		M-110
	Str 1/3 - Cable Spr Yd	0.27	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		M-181
		0.38											
	Cable Spr Yd - Str 2/8	1.51	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 2/8 - Nilles Corner	18.34	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		19.85											
	Nilles Corner - Str 31/6	10.46	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 31/6 - East Omak Tap	0.83	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		11.29											
	East Omak Tap - Str 33/5	0.77	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 33/5 - Str 33/7	0.19	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 33/7 - Foster Creek (NVEC)	0.18	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		1.14											
		32.66											
115	**Grand Coulee - Okanogan 2**												
	Grand Coulee - Cable Spr Yd	0.44	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-110
		0.44											
	Cable Spr Yd - Keller Tap	0.81	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.81											
	Keller Tap - Nespelem (NVEC) Tap	5.32	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		5.32											
	Nespelem (NVEC) Tap - Str 16/7	9.41	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 16/7 - Str 17/1	0.37	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
	Str 17/1 - Goose Lake (NVEC)	4.71	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		14.49											
	Goose Lake (NVEC) - Str 41/5	19.49	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 41/5 - Okanogan	0.53	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		20.02											
		41.08											
115	**Grand Ronde - Boyer(PP&L) 1**												
	Grand Ronde - Str 34/6	5.60	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 34/6 - Boyer	0.02	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		5.62											
		5.62											
115	**Grandview - Richland 1**												
	Grandview - Str 1/3	0.13	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-193
	Str 1/3 - Str 1/11	0.52	WSP	H21	266.8 kcmil AAC Laurel (19)	11.68	0.384	0.781	0.670	2.774	5.473		
	Str 1/11 - Str 6/5	4.81	WHF	H7	266.8 kcmil AAC Laurel (19)	15.12	0.384	0.812	0.670	2.712	5.253		
	Str 6/5 - Prosser (BPUD) Tap	0.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		5.47											
	Prosser (BPUD) Tap - Str 6/6	0.04	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 6/6 - Snipes	4.81	WHF	H7	266.8 kcmil AAC Laurel (19)	15.12	0.384	0.812	0.670	2.712	5.253		
		4.85											
	Snipes - Str 14/5	3.15	WHF	H7	266.8 kcmil AAC Laurel (19)	15.12	0.384	0.812	0.670	2.712	5.253		
	Str 14/5 - Chandler Tap	0.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.16											
	Chandler Tap - Str 14/6	0.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 14/6 - Benton City (BPUD)	4.86	WHF	H7	266.8 kcmil AAC Laurel (19)	15.12	0.384	0.812	0.670	2.712	5.253		
		4.87											
	Benton City (BPUD) - Str 23/9	4.43	WHF	H7	266.8 kcmil AAC Laurel (19)	15.12	0.384	0.812	0.670	2.712	5.253		
	Str 23/9 - White Bluffs Tap	0.06	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
		4.49											
	White Bluffs Tap - Str 24/10	1.00	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
	Str 24/10 - Str 24/11	0.11	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
	Str 24/11 - Str 25/11	1.01	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
	Str 25/11 - Ledbeder (BREA)	0.64	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
		2.76											
	Ledbeder (BREA) - Str 27/1	0.54	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
	Str 27/1 - Str 29/2	1.98	WHF	H7	0.915 In AAC/TW Mazama	15.12	0.132	0.760	0.418	2.659	5.634		
	Str 29/2 - Str 29/3	0.07	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 29/3 - Str 29/7	0.39	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 29/7 - Richland	0.22	SSC	J15	795 kcmil ACSR Drake	37.17	0.128	0.837	0.414	2.409	5.038		
		3.20											
		28.80											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Grand Coulee - Foster Creek 1 (Nespelem Valley Elec. Co-op)														
0.062	0.093		0.093	0.314		0.30	0.00047	0.00071		0.00071	0.00237		0.00004	
0.152	0.238		0.229	0.751		0.70	0.00115	0.00180		0.00173	0.00568		0.00009	
0.214	0.332	0.395	0.323	1.065	1.113	1.00	0.00162	0.00251	0.00298	0.00244	0.00805	0.00841	0.00013	
0.850	1.333		1.282	4.201		3.93	0.00643	0.01008		0.00969	0.03176		0.00052	
6.909	14.569		12.154	49.402		48.77	0.05224	0.11016		0.09190	0.37355		0.00645	
7.759	15.902	17.693	13.436	53.603	55.261	52.70	0.05867	0.12024	0.13379	0.10159	0.40531	0.41785	0.00697	
3.940	8.309		6.932	28.176		27.82	0.02979	0.06283		0.05241	0.21305		0.00368	
0.467	0.733		0.705	2.309		2.16	0.00353	0.00554		0.00533	0.01746		0.00029	
4.408	9.042	10.059	7.637	30.485	31.427	29.98	0.03333	0.06837	0.07606	0.05774	0.23051	0.23763	0.00396	
0.434	0.680		0.654	2.142		2.01	0.00328	0.00514		0.00494	0.01620		0.00027	
0.072	0.151		0.126	0.512		0.51	0.00054	0.00114		0.00095	0.00387		0.00007	
0.101	0.159		0.153	0.501		0.47	0.00077	0.00120		0.00116	0.00379		0.00006	
0.606	0.989	1.160	0.932	3.155	3.289	2.98	0.00459	0.00748	0.00877	0.00705	0.02385	0.02487	0.00039	
12.987	**26.264**	**29.300**	**22.328**	**88.307**	**91.086**	**86.67**	**0.09820**	**0.19859**	**0.22155**	**0.16883**	**0.66773**	**0.68874**	**0.01146**	
115 Grand Coulee - Okanogan 2														
0.111	0.339		0.237	1.175		1.21	0.00084	0.00256		0.00179	0.00888		0.00016	
0.111	0.339	0.357	0.237	1.175	1.198	1.21	0.00084	0.00256	0.00270	0.00179	0.00888	0.00906	0.00016	
0.205	0.624		0.437	2.162		2.22	0.00155	0.00472		0.00330	0.01635		0.00029	
0.205	0.624	0.657	0.437	2.162	2.206	2.22	0.00155	0.00472	0.00497	0.00330	0.01635	0.01668	0.00029	
1.348	4.098		2.870	14.202		14.61	0.01019	0.03098		0.02170	0.10739		0.00193	
1.348	4.098	4.314	2.870	14.202	14.489	14.61	0.01019	0.03098	0.03262	0.02170	0.10739	0.10956	0.00193	
2.384	7.248		5.076	25.121		25.83	0.01803	0.05481		0.03838	0.18995		0.00342	
0.093	0.283		0.199	0.986		1.02	0.00070	0.00214		0.00150	0.00745		0.00013	
1.194	3.628		2.541	12.574		12.93	0.00902	0.02743		0.01921	0.09507		0.00171	
3.671	11.159	11.747	7.815	38.680	39.461	39.79	0.02776	0.08438	0.08883	0.05909	0.29247	0.29838	0.00526	
4.939	15.012		10.513	52.030		53.51	0.03734	0.11351		0.07949	0.39342		0.00708	
0.134	0.408		0.286	1.415		1.46	0.00102	0.00309		0.00216	0.01070		0.00019	2-3/8 IN HS STL
5.073	15.421	16.234	10.799	53.445	54.525	54.96	0.03836	0.11660	0.12275	0.08165	0.40412	0.41228	0.00727	
10.409	**31.640**	**33.308**	**22.158**	**109.663**	**111.879**	**112.78**	**0.07871**	**0.23924**	**0.25186**	**0.16754**	**0.82921**	**0.84597**	**0.01492**	
115 Grand Ronde - Boyer(PP&L) 1														
3.153	4.942		4.754	15.578		14.59	0.02384	0.03737		0.03595	0.11780		0.00193	
0.008	0.016		0.013	0.054		0.05	0.00006	0.00012		0.00010	0.00041		0.00001	
3.160	4.958	5.880	4.768	15.632	16.343	14.65	0.02390	0.03749	0.04446	0.03605	0.11820	0.12358	0.00194	
3.160	**4.958**	**5.880**	**4.768**	**15.632**	**16.343**	**14.65**	**0.02390**	**0.03749**	**0.04446**	**0.03605**	**0.11820**	**0.12358**	**0.00194**	
115 Grandview - Richland 1														
0.049	0.103		0.086	0.350		0.35	0.00037	0.00078		0.00065	0.00265		0.00005	2-3/8 IN HS STL
0.200	0.406		0.349	1.443		1.42	0.00151	0.00307		0.00264	0.01091		0.00019	1-3/8 IN HS STL
1.848	3.908		3.224	13.043		12.63	0.01398	0.02955		0.02438	0.09863		0.00167	
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
2.101	4.425	4.898	3.665	14.863	15.308	14.43	0.01589	0.03346	0.03704	0.02772	0.11239	0.11575	0.00191	
0.015	0.032		0.027	0.108		0.11	0.00011	0.00024		0.00020	0.00081		0.00001	
1.848	3.908		3.224	13.043		12.63	0.01398	0.02955		0.02438	0.09863		0.00167	
1.864	3.939	4.358	3.251	13.151	13.547	12.74	0.01409	0.02979	0.03295	0.02458	0.09944	0.10243	0.00168	
1.211	2.559		2.111	8.542		8.27	0.00915	0.01935		0.01597	0.06459		0.00109	
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
1.214	2.567	2.840	2.118	8.569	8.827	8.30	0.00918	0.01941	0.02147	0.01602	0.06479	0.06674	0.00110	
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
1.868	3.948		3.258	13.179		12.76	0.01412	0.02985		0.02463	0.09965		0.00169	
1.871	3.956	4.376	3.264	13.206	13.603	12.79	0.01415	0.02991	0.03309	0.02468	0.09985	0.10286	0.00169	
1.702	3.599		2.969	12.013		11.63	0.01287	0.02721		0.02245	0.09083		0.00154	
0.008	0.046		0.025	0.160		0.17	0.00006	0.00034		0.00019	0.00121		0.00002	
1.710	3.644	4.026	2.995	12.172	12.535	11.80	0.01293	0.02756	0.03044	0.02264	0.09204	0.09478	0.00156	
0.132	0.760		0.418	2.659		2.82	0.00100	0.00575		0.00316	0.02011		0.00037	
0.015	0.084		0.046	0.293		0.31	0.00011	0.00063		0.00035	0.00221		0.00004	
0.133	0.768		0.422	2.686		2.85	0.00101	0.00580		0.00319	0.02031		0.00038	
0.084	0.486		0.268	1.702		1.80	0.00064	0.00368		0.00202	0.01287		0.00024	2-3/8 IN HS STL
0.364	2.097	2.129	1.154	7.339	7.430	7.77	0.00275	0.01586	0.01610	0.00872	0.05550	0.05618	0.00103	
0.071	0.410		0.226	1.436		1.52	0.00054	0.00310		0.00171	0.01086		0.00020	2-3/8 IN HS STL
0.261	1.505		0.828	5.265		5.58	0.00198	0.01138		0.00626	0.03981		0.00074	
0.009	0.051		0.029	0.184		0.20	0.00007	0.00039		0.00022	0.00139		0.00003	
0.050	0.284		0.161	1.025		1.13	0.00038	0.00215		0.00122	0.00775		0.00015	2-7 NO 8 ALWLD
0.028	0.184		0.091	0.530		0.55	0.00021	0.00139		0.00069	0.00401		0.00007	2-7 NO 8 ALWLD
0.419	2.434	2.470	1.335	8.440	8.545	8.99	0.00317	0.01841	0.01868	0.01009	0.06382	0.06461	0.00119	
9.544	**23.063**	**24.960**	**17.781**	**77.740**	**79.748**	**76.83**	**0.07217**	**0.17439**	**0.18874**	**0.13445**	**0.58783**	**0.60301**	**0.01016**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Grays River - Tap (Allston - Astoria 1)**												
	Operating Name (Naselle - Tap)												
	Grays River - Twr 24/1	1.40	SSC	K2	795 kcmil ACSR Drake	42.84	0.128	0.854	0.414	2.375	4.933		
	Twr 24/1 - Twr 21/1	3.25	SSC	J10	795 kcmil ACSR Drake	29.36	0.128	0.809	0.414	2.466	5.222		
	Twr 21/1 - Twr 19/6	1.12	SSC	J14	795 kcmil ACSR Drake	30.87	0.128	0.815	0.414	2.454	5.181		
	Twr 19/6 - Twr 18/1	1.70	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
	Twr 18/1 - Twr 15/2	2.90	SSC	J14	795 kcmil ACSR Drake	30.87	0.128	0.815	0.414	2.454	5.181		
	Twr 15/2 - Twr 11/4	3.76	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
	Twr 11/4 - Twr 9/9	1.77	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Twr 9/9 - Str 9/1	0.77	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 9/1 - Str 8/8	0.65	WHF	H11	266.8 kcmil ACSR Partridge	17.64	0.377	0.813	0.663	2.656	5.192		
	Str 8/8 - Str 6/10	1.14	WSP	H27	266.8 kcmil ACSR Partridge	12.46	0.377	0.771	0.663	2.741	5.486		
	Str 6/10 - Str 6/7	0.14	WSP	H24	266.8 kcmil ACSR Partridge	12.44	0.377	0.771	0.663	2.741	5.487		
	Str 6/7 - Str 6/5	0.13	WSP	H20	266.8 kcmil ACSR Partridge	9.12	0.377	0.733	0.663	2.816	5.779		
	Str 6/5 - Cathlamet	0.22	WSP	H15	266.8 kcmil ACSR Partridge	11.34	0.377	0.759	0.663	2.763	5.571		
		18.95											
	Cathlamet - Str 5/1	0.05	WHF	H11	266.8 kcmil ACSR Partridge	17.64	0.377	0.813	0.663	2.656	5.192		
	Str 5/1 - Str 4/7	0.71	SSC	J15	262.96 kcmil ACSR Special	37.17	0.431	0.882	0.717	2.454	4.816		
	Str 4/7 - Str 2/3	1.96	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 2/3 - WA/OR Border	0.42	SSC	J15	262.96 kcmil ACSR Special	37.17	0.431	0.882	0.717	2.454	4.816		
		3.14											
	WA/OR Border - Str 2/1	0.38	SSC	J15	262.96 kcmil ACSR Special	37.17	0.431	0.882	0.717	2.454	4.816		
	Str 2/1 - Tap	1.06	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		1.44											
		23.53											
115	**Green Peter - Lebanon 1**												
	Green Peter - Foster Dam Tap	6.31	SSC	H13	795 kcmil ACSR Drake	17.01	0.128	0.742	0.414	2.599	5.704		
		6.31											
	Foster Dam Tap - Lebanon	11.78	SSC	H13	795 kcmil ACSR Drake	17.01	0.128	0.742	0.414	2.599	5.704		
		11.78											
		18.09											
115	**Hagen - Tap (Naselle - Tarlett (PACP) 2)**												
		2.00	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	PCPUD	
		2.00											
		2.00											
115	**Hanford 2 - Tap(Benton - HEW 451B 1)**												
	Hanford 2 - Str 2/9	0.11	WSP	H24	4/0 ACSR Penguin (6/1)	12.44	0.563	0.859	0.849	2.829	5.374		
	Str 2/9 - Tap	1.83	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		1.94											
		1.94											
115	**Hanna - Tap (Valhalla - Eastmont PUD 1)**												
		0.43	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226	DOUG	
		0.43											
		0.43											
115	**Harrisburg - Tap (Albany - Eugene)**												
		0.04	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.04											
		0.04											
115	**Hatton - Tap (Connell Tap Line)**												
	Hatton - Str 15/15	0.54	WSP	H24	266.8 kcmil ACSR/AW Partridge	12.44	0.365	0.771	0.651	2.741	5.489		
	Str 15/15 - Tap	14.80	WSP	H27	266.8 kcmil ACSR/AW Partridge	12.46	0.365	0.771	0.651	2.741	5.487		
		15.34											
		15.34											
115	**Hawkins(EWEB) - Alvey 1**												
	Hawkins - Str 1/1 (EWEB)	0.71	CDC	H14	795 kcmil ACSR Drake	12.86	0.128	0.708	0.414	2.667	5.987		M-137
	Str 1/1 - Str 6/2	4.61	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-179
	Str 6/2 - Hideaway Tap	0.03	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		5.35											
	Hideaway Tap - Str 6/3	0.05	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 6/3 - Str 8/1	1.77	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 8/1 - Alvey	0.61	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.43											
		7.78											
115	**Hebo - Tap (Boyer(PP&L) - Tillamook 1)**												
		0.04	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.04											
		0.04											
115	**Hideaway - Tap (Hawkins - Alvey 1)**												
		0.11	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.11											
		0.11											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Grays River - Tap (Allston - Astoria 1)														
0.179	1.196		0.579	3.325		3.45	0.00135	0.00905		0.00438	0.02514		0.00046	
0.414	2.628		1.344	8.016		8.49	0.00313	0.01987		0.01016	0.06061		0.00112	
0.143	0.913		0.463	2.749		2.90	0.00108	0.00690		0.00350	0.02078		0.00038	
0.217	1.400		0.703	4.143		4.36	0.00164	0.01058		0.00532	0.03133		0.00058	
0.370	2.363		1.199	7.117		7.51	0.00280	0.01787		0.00907	0.05382		0.00099	
0.479	3.096		1.555	9.163		9.64	0.00362	0.02341		0.01176	0.06929		0.00127	
0.226	1.463		0.732	4.302		4.52	0.00171	0.01106		0.00553	0.03253		0.00060	
0.290	0.612		0.510	2.074		2.05	0.00219	0.00463		0.00386	0.01568		0.00027	
0.245	0.529		0.431	1.727		1.69	0.00185	0.00400		0.00326	0.01306		0.00022	
0.429	0.879		0.755	3.124		3.13	0.00325	0.00665		0.00571	0.02362		0.00041	
0.053	0.108		0.093	0.384		0.38	0.00040	0.00082		0.00070	0.00290		0.00005	
0.049	0.095		0.086	0.366		0.38	0.00037	0.00072		0.00065	0.00277		0.00005	
0.083	0.167		0.146	0.608		0.61	0.00063	0.00126		0.00110	0.00460		0.00008	
3.176	15.447	15.771	8.596	47.097	47.875	49.10	0.02402	0.11680	0.11925	0.06500	0.35612	0.36201	0.00649	
0.019	0.041		0.033	0.133		0.13	0.00014	0.00031		0.00025	0.00100		0.00002	
0.306	0.626		0.509	1.742		1.71	0.00231	0.00473		0.00385	0.01317		0.00023	
0.738	1.557		1.299	5.280		5.21	0.00558	0.01177		0.00982	0.03992		0.00069	
0.181	0.370		0.301	1.031		1.01	0.00137	0.00280		0.00228	0.00779		0.00013	
1.244	2.594	2.877	2.142	8.185	8.461	8.06	0.00941	0.01961	0.02175	0.01620	0.06189	0.06397	0.00107	
0.164	0.335		0.272	0.932		0.91	0.00124	0.00253		0.00206	0.00705		0.00012	
0.399	0.842		0.702	2.855		2.82	0.00302	0.00637		0.00531	0.02159		0.00037	
0.563	1.177	1.305	0.975	3.788	3.911	3.73	0.00426	0.00890	0.00987	0.00737	0.02864	0.02957	0.00049	
4.983	**19.218**	**19.854**	**11.713**	**59.070**	**60.220**	**60.89**	**0.03768**	**0.14532**	**0.15012**	**0.08857**	**0.44665**	**0.45535**	**0.00805**	
115 Green Peter - Lebanon 1														
0.805	4.685		2.609	16.399		18.00	0.00608	0.03542		0.01973	0.12400		0.00238	
0.805	4.685	4.753	2.609	16.399	16.605	18.00	0.00608	0.03542	0.03594	0.01973	0.12400	0.12556	0.00238	
1.502	8.746		4.871	30.614		33.60	0.01136	0.06613		0.03683	0.23149		0.00444	
1.502	8.746	8.874	4.871	30.614	30.999	33.60	0.01136	0.06613	0.06710	0.03683	0.23149	0.23440	0.00444	
2.306	**13.430**	**13.627**	**7.480**	**47.013**	**47.604**	**51.59**	**0.01744**	**0.10155**	**0.10304**	**0.05656**	**0.35549**	**0.35996**	**0.00682**	
115 Hagen - Tap (Naselle - Tarlett (PACP) 2)														
0.262	1.488		0.834	5.287		5.74	0.00198	0.01125		0.00631	0.03998		0.00076	
0.262	1.488	1.511	0.834	5.287	5.352	5.74	0.00198	0.01125	0.01143	0.00631	0.03998	0.04047	0.00076	
0.262	**1.488**	**1.511**	**0.834**	**5.287**	**5.352**	**5.74**	**0.00198**	**0.01125**	**0.01143**	**0.00631**	**0.03998**	**0.04047**	**0.00076**	
115 Hanford 2 - Tap(Benton - HEW 451B 1)														
0.062	0.094		0.093	0.311		0.30	0.00047	0.00071		0.00071	0.00235		0.00004	
1.030	1.615		1.554	5.091		4.77	0.00779	0.01221		0.01175	0.03849		0.00063	
1.092	1.710	2.029	1.647	5.402	5.648	5.06	0.00826	0.01293	0.01534	0.01245	0.04085	0.04270	0.00067	
1.092	**1.710**	**2.029**	**1.647**	**5.402**	**5.648**	**5.06**	**0.00826**	**0.01293**	**0.01534**	**0.01245**	**0.04085**	**0.04270**	**0.00067**	
115 Hanna - Tap (Valhalla - Eastmont PUD 1)														
0.111	0.351		0.234	1.168		1.12	0.00084	0.00265		0.00177	0.00883		0.00015	
0.111	0.351	0.368	0.234	1.168	1.191	1.12	0.00084	0.00265	0.00278	0.00177	0.00883	0.00900	0.00015	
0.111	**0.351**	**0.368**	**0.234**	**1.168**	**1.191**	**1.12**	**0.00084**	**0.00265**	**0.00278**	**0.00177**	**0.00883**	**0.00900**	**0.00015**	
115 Harrisburg - Tap (Albany - Eugene)														
0.010	0.031		0.022	0.107		0.11	0.00008	0.00023		0.00016	0.00081		0.00001	
0.010	0.031	0.032	0.022	0.107	0.109	0.11	0.00008	0.00023	0.00025	0.00016	0.00081	0.00082	0.00001	
0.010	**0.031**	**0.032**	**0.022**	**0.107**	**0.109**	**0.11**	**0.00008**	**0.00023**	**0.00025**	**0.00016**	**0.00081**	**0.00082**	**0.00001**	
115 Hatton - Tap (Connell Tap Line)														
0.197	0.416		0.352	1.480		1.48	0.00149	0.00315		0.00266	0.01119		0.00020	
5.408	11.409		9.641	40.561		40.61	0.04089	0.08627		0.07290	0.30670		0.00537	
5.605	11.825	13.087	9.992	42.041	43.213	42.09	0.04238	0.08942	0.09895	0.07556	0.31789	0.32675	0.00557	
5.605	**11.825**	**13.087**	**9.992**	**42.041**	**43.213**	**42.09**	**0.04238**	**0.08942**	**0.09895**	**0.07556**	**0.31789**	**0.32675**	**0.00557**	
115 Hawkins(EWEB) - Alvey 1														
0.091	0.503		0.294	1.893		2.13	0.00068	0.00380		0.00222	0.01432		0.00028	
1.168	3.551		2.487	12.307		12.66	0.00883	0.02685		0.01880	0.09306		0.00167	
0.008	0.023		0.016	0.080		0.08	0.00006	0.00017		0.00012	0.00061		0.00001	
1.266	4.077	4.269	2.796	14.280	14.551	14.86	0.00958	0.03083	0.03228	0.02114	0.10798	0.11003	0.00197	
0.013	0.039		0.027	0.133		0.14	0.00010	0.00029		0.00020	0.00101		0.00002	
0.449	1.363		0.955	4.725		4.86	0.00339	0.01031		0.00722	0.03573		0.00064	
0.155	0.470		0.329	1.628		1.67	0.00117	0.00355		0.00249	0.01231		0.00022	2-3/8 IN HS STL
0.616	1.872	1.970	1.311	6.487	6.618	6.67	0.00466	0.01415	0.01490	0.00991	0.04905	0.05004	0.00088	
1.882	**5.949**	**6.239**	**4.107**	**20.767**	**21.169**	**21.54**	**0.01423**	**0.04498**	**0.04718**	**0.03106**	**0.15703**	**0.16007**	**0.00285**	
115 Hebo - Tap (Boyer(PP&L) - Tillamook 1)														
0.015	0.032		0.027	0.108		0.11	0.00011	0.00024		0.00020	0.00081		0.00001	
0.015	0.032	0.035	0.027	0.108	0.111	0.11	0.00011	0.00024	0.00027	0.00020	0.00081	0.00084	0.00001	
0.015	**0.032**	**0.035**	**0.027**	**0.108**	**0.111**	**0.11**	**0.00011**	**0.00024**	**0.00027**	**0.00020**	**0.00081**	**0.00084**	**0.00001**	
115 Hideaway - Tap (Hawkins - Alvey 1)														
0.028	0.085		0.059	0.294		0.30	0.00021	0.00064		0.00045	0.00222		0.00004	
0.028	0.085	0.089	0.059	0.294	0.300	0.30	0.00021	0.00064	0.00067	0.00045	0.00222	0.00227	0.00004	
0.028	**0.085**	**0.089**	**0.059**	**0.294**	**0.300**	**0.30**	**0.00021**	**0.00064**	**0.00067**	**0.00045**	**0.00222**	**0.00227**	**0.00004**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Hills Creek - Lookout Point 1**												
	Hills Creek - Str 1/3	0.37	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
	Str 1/3 - Str 5/1	3.58	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 5/1 - Oakridge	0.84	WSP	SPEC	266.8 kcmil ACSR Partridge	9.05	0.377	0.732	0.663	2.818	5.787		
		4.79											
	Oakridge - Lookout Point	20.01	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		20.01											
		24.80											
115	**Holcomb - Naselle 1**												
	Holcomb - Valley Tap (2/5)	1.49	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		1.49											
	Valley Tap (2/5) - Str 21/6	19.15	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 21/6 - Naselle	0.47	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		19.62											
		21.11											
115	**Holcomb - Tap (Chehalis - Raymond 1)**												
		0.01	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		0.01											
		0.01											
115	**Hood River - The Dalles 1**												
@	Hood River - Str 1/7	0.59	WHF	H7	795 kcmil AAC/TW Arbutus	15.12	0.130	0.759	0.416	2.658	5.638		
@	Str 1/7 - Str 2/1	0.30	WHF	H7	795 kcmil AAC/TW Arbutus	15.12	0.130	0.759	0.416	2.658	5.638		
@	Str 2/1 - The Dalles	15.13	WHF	H7	795 kcmil AAC/TW Arbutus	15.12	0.130	0.759	0.416	2.658	5.638		
		16.02											
		16.02											
115	**Ice Harbor - Franklin 1**												
	Ice Harbor - Twr 1/4	1.07	SSC	J6	1780 kcmil ACSR Chukar	28.98	0.061	0.764	0.347	2.426	5.550		M-145
	Twr 1/4 - Twr 9/3	7.41	SDC	H4	1780 kcmil ACSR Chukar	15.43	0.061	0.687	0.347	2.579	6.192		
	Twr 9/3 - Franklin	0.86	SSC	H13	1780 kcmil ACSR Chukar	17.01	0.061	0.699	0.347	2.556	6.083		
		9.34											
		9.34											
115	**Ice Harbor - Franklin 2**												
	Ice Harbor - Sacajawea Tap	0.30	SSC	J6	1780 kcmil ACSR Chukar	28.98	0.061	0.764	0.347	2.426	5.550		M-145
		0.30											
	Sacajawea Tap - Twr 1/4	0.74	SSC	J6	1780 kcmil ACSR Chukar	28.98	0.061	0.764	0.347	2.426	5.550		
	Twr 1/4 - Martindale (PUD)	2.83	SDC	H4	1780 kcmil ACSR Chukar	15.43	0.061	0.687	0.347	2.579	6.192		
		3.57											
	Martindale (PUD) - Twr 9/3	4.58	SDC	H4	1780 kcmil ACSR Chukar	15.43	0.061	0.687	0.347	2.579	6.192		
	Twr 9/3 - Franklin	0.62	SSC	H13	1780 kcmil ACSR Chukar	17.01	0.061	0.699	0.347	2.556	6.083		
		5.20											
		9.07											
115	**Ice Harbor - Franklin 3**												
	Ice Harbor - Levey (1/1)	0.87	SSC	J6	1780 kcmil ACSR Chukar	28.98	0.061	0.764	0.347	2.426	5.550		M-145
		0.87											
	Levey - Twr 1/4	0.13	SSC	J6	1780 kcmil ACSR Chukar	28.98	0.061	0.764	0.347	2.426	5.550		
	Twr 1/4 - Twr 8/4	6.47	SDC	H6	1780 kcmil ACSR Chukar	17.90	0.061	0.705	0.347	2.543	6.028		
	Twr 8/4 - Twr 9/1	0.63	SDC	H4	1780 kcmil ACSR Chukar	15.43	0.061	0.687	0.347	2.579	6.192		
	Twr 9/1 - Franklin	0.97	SDC	H5	1780 kcmil ACSR Chukar	15.66	0.061	0.689	0.347	2.576	6.176		
		8.20											
		9.07											
115	**Jim Creek - East Arlington (U S Dept of Navy)**												
	Jim Creek - Str 10/2	0.31	WHF	H13	266.8 kcmil ACSR Partridge	17.01	0.377	0.809	0.663	2.665	5.221		
	Str 10/2 - Str 2/1	8.17	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 2/1 - Str 1/7	0.48	WHF	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
	Str 1/7 - East Arlington	0.64	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		9.60											
		9.60											
115	**John Day (Klickitat Co PUD) - Tap (Chenoweth - Goldendale 1)**												
	Section 1 (Klickitat PUD)	9.10	WHF		4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212	KLICK	
	Section 2	0.01	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		9.11											
		9.11											
115	**Junction City (BLC) - Tap(Albany - Eugene 1)**												
		0.06	WHF	H22	397.5 kcmil ACSR Ibis	14.49	0.253	0.765	0.539	2.680	5.529		
		0.06											
		0.06											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Hills Creek - Lookout Point 1														
0.093	0.288		0.199	0.975		1.00	0.00070	0.00218		0.00150	0.00737		0.00013	
1.349	2.844		2.372	9.643		9.52	0.01020	0.02150		0.01794	0.07292		0.00126	
0.316	0.615		0.557	2.367		2.43	0.00239	0.00465		0.00421	0.01790		0.00032	
1.758	3.747	4.139	3.128	12.986	13.357	12.95	0.01329	0.02833	0.03130	0.02365	0.09819	0.10100	0.00171	
11.266	17.660		16.988	55.665		52.14	0.08518	0.13354		0.12846	0.42091		0.00690	
11.266	17.660	20.947	16.988	55.665	58.200	52.14	0.08518	0.13354	0.15839	0.12846	0.42091	0.44007	0.00690	
13.024	**21.407**	**25.058**	**20.116**	**68.651**	**71.537**	**65.10**	**0.09848**	**0.16187**	**0.18947**	**0.15211**	**0.51910**	**0.54093**	**0.00861**	
115 Holcomb - Naselle 1														
0.839	1.315		1.265	4.145		3.88	0.00634	0.00994		0.00957	0.03134		0.00051	
0.839	1.315	1.560	1.265	4.145	4.334	3.88	0.00634	0.00994	0.01179	0.00957	0.03134	0.03277	0.00051	
10.781	16.901		16.258	53.273		49.90	0.08152	0.12780		0.12294	0.40282		0.00660	
0.265	0.415		0.399	1.307		1.22	0.00200	0.00314		0.00302	0.00989		0.00016	2-7 NO 8 ALWLD
11.046	17.316	20.539	16.657	54.580	57.065	51.13	0.08352	0.13093	0.15531	0.12595	0.41270	0.43150	0.00676	
11.885	**18.631**	**22.099**	**17.922**	**58.725**	**61.399**	**55.01**	**0.08987**	**0.14088**	**0.16710**	**0.13552**	**0.44405**	**0.46427**	**0.00728**	
115 Holcomb - Tap (Chehalis - Raymond 1)														
0.006	0.009		0.008	0.028		0.03	0.00004	0.00007		0.00006	0.00021		0.00000	
0.006	0.009	0.010	0.008	0.028	0.029	0.03	0.00004	0.00007	0.00008	0.00006	0.00021	0.00022	0.00000	
0.006	**0.009**	**0.010**	**0.008**	**0.028**	**0.029**	**0.03**	**0.00004**	**0.00007**	**0.00008**	**0.00006**	**0.00021**	**0.00022**	**0.00000**	
115 Hood River - The Dalles 1														
0.076	0.448		0.245	1.568		1.66	0.00058	0.00339		0.00185	0.01186		0.00022	
0.039	0.228		0.125	0.798		0.85	0.00029	0.00172		0.00094	0.00603		0.00011	
1.961	11.485		6.288	40.221		42.65	0.01483	0.08684		0.04755	0.30413		0.00564	
2.076	12.160	12.336	6.658	42.587	43.104	45.16	0.01570	0.09195	0.09328	0.05034	0.32202	0.32593	0.00597	
2.076	**12.160**	**12.336**	**6.658**	**42.587**	**43.104**	**45.16**	**0.01570**	**0.09195**	**0.09328**	**0.05034**	**0.32202**	**0.32593**	**0.00597**	
115 Ice Harbor - Franklin 1														
0.065	0.817		0.371	2.596		2.97	0.00049	0.00618		0.00281	0.01963		0.00039	
0.451	5.094		2.571	19.113		22.94	0.00341	0.03852		0.01944	0.14452		0.00303	
0.052	0.601		0.298	2.198		2.62	0.00040	0.00455		0.00226	0.01662		0.00035	
0.569	6.513	6.538	3.240	23.907	24.126	28.53	0.00430	0.04925	0.04944	0.02450	0.18078	0.18243	0.00377	
0.569	**6.513**	**6.538**	**3.240**	**23.907**	**24.126**	**28.53**	**0.00430**	**0.04925**	**0.04944**	**0.02450**	**0.18078**	**0.18243**	**0.00377**	
115 Ice Harbor - Franklin 2														
0.018	0.229		0.104	0.728		0.83	0.00014	0.00173		0.00079	0.00550		0.00011	
0.018	0.229	0.230	0.104	0.728	0.735	0.83	0.00014	0.00173	0.00174	0.00079	0.00550	0.00556	0.00011	
0.045	0.565		0.257	1.796		2.05	0.00034	0.00427		0.00194	0.01358		0.00027	
0.172	1.946		0.982	7.300		8.76	0.00130	0.01471		0.00742	0.05520		0.00116	
0.217	2.511	2.520	1.238	9.095	9.179	10.82	0.00164	0.01899	0.01906	0.00936	0.06877	0.06941	0.00143	
0.279	3.149		1.589	11.814		14.18	0.00211	0.02381		0.01201	0.08933		0.00188	
0.038	0.434		0.215	1.585		1.89	0.00029	0.00328		0.00163	0.01198		0.00025	
0.317	3.582	3.596	1.804	13.398	13.519	16.07	0.00239	0.02709	0.02719	0.01364	0.10131	0.10222	0.00212	
0.552	**6.322**	**6.346**	**3.146**	**23.221**	**23.434**	**27.71**	**0.00418**	**0.04781**	**0.04799**	**0.02379**	**0.17559**	**0.17719**	**0.00367**	
115 Ice Harbor - Franklin 3														
0.053	0.665		0.302	2.111		2.41	0.00040	0.00503		0.00228	0.01596		0.00032	1-7 NO 8 ALWLD
0.053	0.665	0.667	0.302	2.111	2.132	2.41	0.00040	0.00503	0.00504	0.00228	0.01596	0.01612	0.00032	
0.008	0.099		0.045	0.315		0.36	0.00006	0.00075		0.00034	0.00239		0.00005	1-7 NO 8 ALWLD
0.394	4.565		2.244	16.456		19.50	0.00298	0.03451		0.01697	0.12443		0.00258	1-7 NO 8 ALWLD
0.038	0.433		0.219	1.625		1.95	0.00029	0.00327		0.00165	0.01229		0.00026	1-7 NO 8 ALWLD
0.059	0.669		0.336	2.499		3.00	0.00045	0.00506		0.00254	0.01889		0.00040	1-7 NO 8 ALWLD
0.499	5.766	5.787	2.845	20.894	21.087	24.81	0.00378	0.04360	0.04376	0.02151	0.15799	0.15945	0.00328	
0.552	**6.430**	**6.454**	**3.146**	**23.005**	**23.220**	**27.22**	**0.00418**	**0.04862**	**0.04880**	**0.02379**	**0.17395**	**0.17557**	**0.00360**	
115 Jim Creek - East Arlington (U S Dept of Navy)														
0.117	0.251		0.205	0.826		0.81	0.00088	0.00190		0.00155	0.00625		0.00011	
3.078	6.490		5.414	22.007		21.73	0.02327	0.04907		0.04094	0.16641		0.00287	
0.121	0.374		0.258	1.265		1.30	0.00091	0.00283		0.00195	0.00956		0.00017	
0.241	0.508		0.424	1.724		1.70	0.00182	0.00384		0.00321	0.01304		0.00023	
3.556	7.623	8.412	6.302	25.822	26.580	25.54	0.02689	0.05764	0.06360	0.04765	0.19525	0.20098	0.00338	
3.556	**7.623**	**8.412**	**6.302**	**25.822**	**26.580**	**25.54**	**0.02689**	**0.05764**	**0.06360**	**0.04765**	**0.19525**	**0.20098**	**0.00338**	
115 John Day (Klickitat Co PUD) - Tap (Chenoweth - Goldendale 1)														
5.123	8.031		7.726	25.315		23.71	0.03874	0.06073		0.05842	0.19142		0.00314	
0.006	0.009		0.008	0.028		0.03	0.00004	0.00007		0.00006	0.00021		0.00000	
5.129	8.040	9.537	7.734	25.343	26.497	23.74	0.03878	0.06080	0.07211	0.05848	0.19163	0.20035	0.00314	
5.129	**8.040**	**9.537**	**7.734**	**25.343**	**26.497**	**23.74**	**0.03878**	**0.06080**	**0.07211**	**0.05848**	**0.19163**	**0.20035**	**0.00314**	
115 Junction City (BLC) - Tap(Albany - Eugene 1)														
0.015	0.046		0.032	0.161		0.17	0.00011	0.00035		0.00024	0.00122		0.00002	
0.015	0.046	0.048	0.032	0.161	0.164	0.17	0.00011	0.00035	0.00037	0.00024	0.00122	0.00124	0.00002	
0.015	**0.046**	**0.048**	**0.032**	**0.161**	**0.164**	**0.17**	**0.00011**	**0.00035**	**0.00037**	**0.00024**	**0.00122**	**0.00124**	**0.00002**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Kalispell - Kerr 1**												
	Kalispell - Str 23/6	4.76	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		M-152
	Str 23/6 - Str 24/1	0.44	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
	Str 24/1 - Elmo	23.39	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		28.59											
	Elmo - Kerr	12.80	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		12.80											
		41.39											
115	**Keeler - Forest Grove 2**												
		10.51	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-133
		10.51											
		10.51											
115	**Keeler - Oregon City 2**												
	Keeler - Str 4/9	4.02	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-131
	Str 4/9 - OREGON CITY	17.41	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-133
		21.43											
		21.43											
115	**Keeler - Pennwalt**												
	Keeler - Springville Junction	3.97	WHF		795 kcmil ACSR Drake	14.90	0.128	0.726	0.414	2.631	5.835		
		3.97											
	Springville Junction - Str 9/1	4.10	WHF		350 kcmil Cu 19 Str	14.40	0.185	0.790	0.471	2.707	5.408		
	Str 9/1 - 9/4	0.20	WHF		795 kcmil AAC Arbutus (37)	13.05	0.131	0.726	0.417	2.679	5.892		
	Str 9/4 - Pennwalt Annex	0.50	WSP		795 kcmil AAC Arbutus (37)	13.05	0.131	0.726	0.417	2.679	5.892		
		4.80											
	Pennwalt Annex - Pennwalt	0.08	WSP		795 kcmil AAC Arbutus (37)	9.60	0.131	0.689	0.417	2.754	6.226		
		0.08											
		8.85											
115	**Keeler - Tillamook 1**												
	Keeler - Forest Grove	10.53	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-129
		10.53											
	Forest Grove - Str 13/4	1.40	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-133
	Str 13/4 - Thatcher Junction Tap	0.50	WSP	H21	556.5 kcmil ACSR Dove	11.68	0.181	0.718	0.467	2.712	5.901		
		1.90											
	Thatcher Junction Tap - Str 14/2	0.22	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
	Str 14/2 - Timber Tap	7.82	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		8.04											
	Timber Tap - Str 37/6	15.93	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 37/6 - Str 48/1	10.21	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
	Str 48/1 - Str 56/6	8.95	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 56/6 - Str 57/2	0.35	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		
	Str 57/2 - Str 58/5	1.78	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		
	Str 58/5 - Tillamook	0.13	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		
		37.35											
		57.82											
115	**Keeler 230/115 kV Tie 1**												
		0.14	SSC	SPEC	1590 kcmil AAC Coreopsis	16.03	0.069	0.708	0.355	2.586	6.042		
		0.14											
		0.14											
115	**Keeler 230/115 kV Tie 2**												
		0.36	SSC	J6	1780 kcmil ACSR Chukar	28.98	0.061	0.764	0.347	2.426	5.550		
		0.36											
		0.36											
115	**Keller - Tap (Grand Coulee - Okanogan 2)**												
	Keller - Str 20/8	0.22	WHF	J7	795 kcmil ACSR Drake	25.20	0.128	0.790	0.414	2.503	5.348		
	Str 20/8 - Str 20/5	0.51	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Str 20/5 - Str 18/2	1.88	WHF	J7	795 kcmil ACSR Drake	25.20	0.128	0.790	0.414	2.503	5.348		
	Twr 18/2 - Tolman Tap (17/5)	0.94	SSC	J3	1272 kcmil ACSR Bittern	34.02	0.083	0.806	0.369	2.410	5.260		
		3.55											
	Tolman Tap (17/5) - Twr 16/4	0.91	SSC	J3	1272 kcmil ACSR Bittern	34.02	0.083	0.806	0.369	2.410	5.260		
	Twr 16/4 - Twr 13/1	3.66	SSC	J3	1272 kcmil ACSR Bittern	34.02	0.083	0.806	0.369	2.410	5.260		
	Twr 13/1 - Twr 4/2	8.43	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		
	Twr 4/2 - Twr 3/3	1.05	SSC	J15	1272 kcmil ACSR Pheasant	37.17	0.082	0.811	0.368	2.383	5.210		
	Twr 3/3 - Twr 2/6	0.75	SSC	J3	1272 kcmil ACSR Pheasant	34.02	0.082	0.800	0.368	2.404	5.282		
	Twr 2/6 - Twr 2/3	0.42	SSC	J3	1272 kcmil ACSR Pheasant	34.02	0.082	0.800	0.368	2.404	5.282		
	Twr 2/3 - Str 1/4	1.07	SSC	J5	1272 kcmil ACSR Pheasant	34.96	0.082	0.803	0.368	2.397	5.260		
	Str 1/4 - Tap	0.30	WHF	J7	1272 kcmil AAC Narcissus	25.20	0.084	0.777	0.370	2.490	5.487		
		16.59											
		20.14											
115	**Kennewick (BPUD) - Tap (Franklin - Badger Canyon 2)**												
		0.54	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
		0.54											
		0.54											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Kalispell - Kerr 1														
2.680	4.201		4.041	13.242		12.40	0.02026	0.03177		0.03056	0.10013		0.00164	
0.110	0.336		0.236	1.172		1.21	0.00084	0.00254		0.00179	0.00886		0.00016	
13.169	20.643		19.858	65.068		60.95	0.09957	0.15609		0.15016	0.49201		0.00806	
15.959	25.181	29.812	24.136	79.482	83.065	74.57	0.12067	0.19040	0.22542	0.18250	0.60100	0.62809	0.00986	
7.206	11.297		10.867	35.608		33.36	0.05449	0.08542		0.08217	0.26925		0.00441	
7.206	11.297	13.400	10.867	35.608	37.229	33.36	0.05449	0.08542	0.10132	0.08217	0.26925	0.28151	0.00441	
23.165	**36.478**	**43.212**	**35.003**	**115.090**	**120.295**	**107.92**	**0.17516**	**0.27582**	**0.32674**	**0.26467**	**0.87024**	**0.90960**	**0.01427**	
115 Keeler - Forest Grove 2														
1.905	7.880		4.911	27.842		29.67	0.01441	0.05959		0.03714	0.21052		0.00392	
1.905	7.880	8.107	4.911	27.842	28.272	29.67	0.01441	0.05959	0.06130	0.03714	0.21052	0.21377	0.00392	
1.905	**7.880**	**8.107**	**4.911**	**27.842**	**28.272**	**29.67**	**0.01441**	**0.05959**	**0.06130**	**0.03714**	**0.21052**	**0.21377**	**0.00392**	
115 Keeler - Oregon City 2														
0.729	3.014		1.879	10.649		11.35	0.00551	0.02279		0.01420	0.08052		0.00150	
3.270	13.800		8.249	46.867		46.78	0.02472	0.10435		0.06237	0.35438		0.00619	
3.998	16.814	17.283	10.127	57.516	58.401	58.13	0.03023	0.12714	0.13069	0.07658	0.43491	0.44160	0.00769	
3.998	**16.814**	**17.283**	**10.127**	**57.516**	**58.401**	**58.13**	**0.03023**	**0.12714**	**0.13069**	**0.07658**	**0.43491**	**0.44160**	**0.00769**	
115 Keeler - Pennwalt														
0.506	2.884		1.642	10.445		11.58	0.00383	0.02180		0.01241	0.07898		0.00153	
0.506	2.884	2.928	1.642	10.445	10.573	11.58	0.00383	0.02180	0.02214	0.01241	0.07898	0.07995	0.00153	
0.756	3.239		1.929	11.099		11.09	0.00572	0.02449		0.01459	0.08392		0.00147	
0.026	0.145		0.083	0.536		0.59	0.00020	0.00110		0.00063	0.00405		0.00008	
0.066	0.363		0.209	1.340		1.47	0.00050	0.00275		0.00158	0.01013		0.00019	
0.848	3.747	3.842	2.221	12.974	13.163	13.15	0.00641	0.02834	0.02905	0.01679	0.09811	0.09953	0.00174	
0.010	0.055		0.033	0.220		0.25	0.00008	0.00042		0.00025	0.00167		0.00003	
0.010	0.055	0.056	0.033	0.220	0.223	0.25	0.00008	0.00042	0.00042	0.00025	0.00167	0.00168	0.00003	
1.365	**6.686**	**6.824**	**3.896**	**23.640**	**23.959**	**24.98**	**0.01032**	**0.05056**	**0.05160**	**0.02946**	**0.17875**	**0.18116**	**0.00330**	
115 Keeler - Tillamook 1														
1.909	7.895		4.921	27.895		29.73	0.01444	0.05970		0.03721	0.21092		0.00393	
1.909	7.895	8.123	4.921	27.895	28.325	29.73	0.01444	0.05970	0.06142	0.03721	0.21092	0.21418	0.00393	
0.254	1.050		0.654	3.709		3.95	0.00192	0.00794		0.00495	0.02804		0.00052	
0.091	0.359		0.234	1.356		1.48	0.00069	0.00272		0.00177	0.01025		0.00020	
0.344	1.409	1.450	0.888	5.065	5.142	5.43	0.00260	0.01065	0.01097	0.00671	0.03830	0.03888	0.00072	
0.083	0.168		0.146	0.606		0.61	0.00063	0.00127		0.00110	0.00459		0.00008	
2.946	6.212		5.182	21.065		20.80	0.02227	0.04697		0.03919	0.15928		0.00275	
3.029	6.380	7.062	5.328	21.671	22.316	21.40	0.02290	0.04824	0.05340	0.04029	0.16386	0.16874	0.00283	
6.001	12.572		10.557	43.075		42.65	0.04537	0.09506		0.07982	0.32571		0.00564	
3.846	7.791		6.766	28.142		28.30	0.02908	0.05891		0.05116	0.21279		0.00374	
3.371	7.063		5.931	24.201		23.96	0.02549	0.05341		0.04485	0.18299		0.00317	
0.132	0.267		0.232	0.965		0.97	0.00100	0.00202		0.00175	0.00729		0.00013	
0.227	1.300		0.736	4.668		5.16	0.00172	0.00983		0.00557	0.03530		0.00068	
0.017	0.094		0.054	0.343		0.38	0.00013	0.00071		0.00041	0.00259		0.00005	
13.594	29.088	32.108	24.276	101.393	104.259	101.42	0.10279	0.21995	0.24278	0.18356	0.76668	0.78835	0.01341	
18.876	**44.772**	**48.588**	**35.413**	**156.024**	**159.992**	**157.98**	**0.14273**	**0.33854**	**0.36740**	**0.26777**	**1.17976**	**1.20977**	**0.02089**	
115 Keeler 230/115 kV Tie 1														
0.010	0.099		0.050	0.362		0.42	0.00007	0.00075		0.00038	0.00274		0.00006	
0.010	0.099	0.100	0.050	0.362	0.365	0.42	0.00007	0.00075	0.00075	0.00038	0.00274	0.00276	0.00006	
0.010	**0.099**	**0.100**	**0.050**	**0.362**	**0.365**	**0.42**	**0.00007**	**0.00075**	**0.00075**	**0.00038**	**0.00274**	**0.00276**	**0.00006**	
115 Keeler 230/115 kV Tie 2														
0.022	0.275		0.125	0.874		1.00	0.00017	0.00208		0.00094	0.00661		0.00013	
0.022	0.275	0.276	0.125	0.874	0.882	1.00	0.00017	0.00208	0.00209	0.00094	0.00661	0.00667	0.00013	
0.022	**0.275**	**0.276**	**0.125**	**0.874**	**0.882**	**1.00**	**0.00017**	**0.00208**	**0.00209**	**0.00094**	**0.00661**	**0.00667**	**0.00013**	
115 Keller - Tap (Grand Coulee - Okanogan 2)														
0.028	0.174		0.091	0.551		0.59	0.00021	0.00131		0.00069	0.00416		0.00008	
0.065	0.422		0.211	1.240		1.30	0.00049	0.00319		0.00159	0.00937		0.00017	
0.240	1.485		0.777	4.706		5.03	0.00181	0.01123		0.00588	0.03559		0.00066	
0.078	0.757		0.347	2.265		2.47	0.00059	0.00573		0.00262	0.01713		0.00033	
0.411	2.838	2.868	1.426	8.762	8.877	9.39	0.00310	0.02146	0.02168	0.01078	0.06625	0.06713	0.00124	
0.075	0.733		0.336	2.193		2.39	0.00057	0.00554		0.00254	0.01658		0.00032	
0.303	2.949		1.350	8.820		9.63	0.00229	0.02230		0.01021	0.06669		0.00127	
0.709	6.548		3.120	20.992		23.13	0.00536	0.04951		0.02359	0.15873		0.00306	
0.086	0.851		0.386	2.502		2.74	0.00065	0.00644		0.00292	0.01892		0.00036	
0.061	0.600		0.276	1.803		1.98	0.00046	0.00454		0.00209	0.01363		0.00026	
0.034	0.336		0.155	1.010		1.11	0.00026	0.00254		0.00117	0.00763		0.00015	
0.088	0.860		0.394	2.565		2.81	0.00066	0.00650		0.00298	0.01940		0.00037	
0.025	0.233		0.111	0.747		0.82	0.00019	0.00176		0.00084	0.00565		0.00011	
1.382	13.110	13.182	6.127	40.631	41.090	44.61	0.01045	0.09913	0.09968	0.04633	0.30723	0.31070	0.00590	
1.793	**15.948**	**16.048**	**7.553**	**49.393**	**49.967**	**54.00**	**0.01355**	**0.12059**	**0.12135**	**0.05711**	**0.37348**	**0.37782**	**0.00714**	
115 Kennewick (BPUD) - Tap (Franklin - Badger Canyon 2)														
0.143	0.426		0.297	1.452		1.44	0.00108	0.00322		0.00225	0.01098		0.00019	
0.143	0.426	0.449	0.297	1.452	1.482	1.44	0.00108	0.00322	0.00340	0.00225	0.01098	0.01121	0.00019	
0.143	**0.426**	**0.449**	**0.297**	**1.452**	**1.482**	**1.44**	**0.00108**	**0.00322**	**0.00340**	**0.00225**	**0.01098**	**0.01121**	**0.00019**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Kerr - US Indian Irrigation Service**												
	Kerr - Str 1 (MPC Tap)	0.02	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 1 (MPC Tap) - US Indian Irrigation Service	0.08	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		0.10											
		0.10											
115	**Kitsap - Bangor 1**												
	Kitsap - Twr 14/4	13.55	SSC	H13	556.5 kcmil ACSR Dove	17.01	0.181	0.764	0.467	2.620	5.537		
	Twr 14/4 - Bangor	0.47	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
		14.02											
		14.02											
115	**Kitsap - Bremerton 1**												
	Kitsap - Str 2/1	0.53	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		
	Str 2/1 - Str 3/8	1.62	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		
	Str 3/8 - Str 4/2	0.46	CSP	H19	1272 kcmil AAC Narcissus	14.17	0.084	0.707	0.370	2.630	6.055		
	Str 4/2 - Str 4/7	0.26	WSP	H24	1272 kcmil AAC Narcissus	12.44	0.084	0.691	0.370	2.661	6.200		
	Str 4/7 - Bremerton Tie(4/20)	0.57	WSP	H16	1272 kcmil AAC Narcissus	11.79	0.084	0.685	0.370	2.674	6.262		
		3.44											
	Bremerton Tie (4/20) - U S Navy Station H	0.02	WSP	H15	1272 kcmil AAC Narcissus	11.34	0.084	0.680	0.370	2.684	6.307		
		0.02											
		3.46											
115	**Kitsap/Bremerton - Bremerton/Puget Sound Naval Shipyard Tie**												
		0.06	WSP	H15	1272 kcmil AAC Narcissus	11.34	0.084	0.680	0.370	2.684	6.307		
		0.06											
		0.06											
115	**Lane - Danebo(EWEB) 1**												
		3.87	CDC		795 kcmil AAC Arbutus (37)	12.60	0.131	0.722	0.417	2.688	5.929	EWEB	M-149
		3.87											
		3.87											
115	**Lane - Wendson 1**												
	Lane - Str 1/2	0.11	WSP	H23	1272 kcmil AAC Narcissus	11.52	0.084	0.682	0.370	2.680	6.289		M-149
	Str 1/2 - Rainbow Valley Tap	0.75	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		
		0.86											
	Rainbow Valley Tap - Fern Ridge	5.57	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		5.57											
	Fern Ridge - Noti(PP&L)	2.76	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		2.76											
	Noti(PP&L) - Str 19/6	9.08	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 19/6 - Str 19/11	0.36	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 19/11 - Walton	0.14	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		9.58											
	Walton - Str 20/7	0.43	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 20/7 - Str 33/8	13.76	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 33/8 - Str 33/11	0.35	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 33/11 - Mapleton	0.05	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		14.59											
	Mapleton - Str 34/1	0.05	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 34/1 - Str 34/5	0.47	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 34/5 - Str 41/5	7.27	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 41/5 - Wendson	0.21	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		8.00											
		41.36											
115	**Langlois - Tap (Bandon - Rogue 1)**												
		0.28	WHF	SPEC	266.8 kcmil ACSR Partridge	17.01	0.377	0.809	0.663	2.665	5.221		
		0.28											
		0.28											
115	**LaPine - Fort Rock 1**												
	LaPine - Str 4/5	3.41	WSP	H23	0.915 In AAC/TW Mazama	11.52	0.132	0.727	0.418	2.725	5.902		
	Str 4/5 - Fort Rock	43.60	TSP	H34	0.951 In ACSR/TW Toutle	16.29	0.130	0.760	0.416	2.632	5.600		
		47.01											
		47.01											
115	**Latham - Tap (Alvey - Drain 1)**												
	Latham - Str 2/6	0.56	WSP	H23	0.951 In ACSR/TW Toutle	11.52	0.130	0.718	0.416	2.716	5.943		
	Str 2/6 - Tap	1.50	WSP	H23	0.951 In ACSR/TW Toutle	11.52	0.130	0.718	0.416	2.716	5.943		
		2.06											
		2.06											
115	**Lexington - Delameter 1 (Cowlitz County PUD)**												
	Section 1	2.29	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
	Section 2	3.94	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		6.23											
		6.23											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Kerr - US Indian Irrigation Service														
0.011	0.018		0.017	0.056		0.05	0.00009	0.00013		0.00013	0.00042		0.00001	
0.045	0.071		0.068	0.223		0.21	0.00034	0.00053		0.00051	0.00168		0.00003	
0.056	0.088	0.105	0.085	0.278	0.291	0.26	0.00043	0.00067	0.00079	0.00064	0.00210	0.00220	0.00003	
0.056	**0.088**	**0.105**	**0.085**	**0.278**	**0.291**	**0.26**	**0.00043**	**0.00067**	**0.00079**	**0.00064**	**0.00210**	**0.00220**	**0.00003**	
115 Kitsap - Bangor 1														
2.457	10.353		6.332	35.508		37.51	0.01858	0.07828		0.04788	0.26849		0.00496	
0.085	0.354		0.220	1.243		1.32	0.00064	0.00267		0.00166	0.00940		0.00017	
2.542	10.707	11.004	6.552	36.750	37.330	38.83	0.01922	0.08096	0.08321	0.04954	0.27789	0.28227	0.00514	
2.542	**10.707**	**11.004**	**6.552**	**36.750**	**37.330**	**38.83**	**0.01922**	**0.08096**	**0.08321**	**0.04954**	**0.27789**	**0.28227**	**0.00514**	
115 Kitsap - Bremerton 1														
0.045	0.379		0.196	1.385		1.59	0.00034	0.00286		0.00148	0.01048		0.00021	2-3/8 IN EHS STL
0.136	1.158		0.600	4.235		4.85	0.00103	0.00876		0.00453	0.03202		0.00064	
0.039	0.325		0.170	1.210		1.39	0.00029	0.00246		0.00129	0.00915		0.00018	
0.022	0.180		0.096	0.692		0.81	0.00017	0.00136		0.00073	0.00523		0.00011	
0.048	0.390		0.211	1.524		1.78	0.00036	0.00295		0.00160	0.01153		0.00024	1-3/8 IN EHS STL
0.289	2.432	2.449	1.273	9.046	9.136	10.42	0.00219	0.01839	0.01852	0.00963	0.06840	0.06908	0.00138	
0.002	0.014		0.007	0.054		0.06	0.00001	0.00010		0.00006	0.00041		0.00001	1-3/8 IN EHS STL
0.002	0.014	0.014	0.007	0.054	0.054	0.06	0.00001	0.00010	0.00010	0.00006	0.00041	0.00041	0.00001	
0.291	**2.445**	**2.463**	**1.281**	**9.100**	**9.190**	**10.48**	**0.00220**	**0.01849**	**0.01862**	**0.00968**	**0.06881**	**0.06949**	**0.00139**	
115 Kitsap/Bremerton - Bremerton/Puget Sound Naval Shipyard Tie														
0.005	0.041		0.022	0.161		0.19	0.00004	0.00031		0.00017	0.00122		0.00003	1-3/8 IN EHS STL
0.005	0.041	0.041	0.022	0.161	0.163	0.19	0.00004	0.00031	0.00031	0.00017	0.00122	0.00123	0.00003	
0.005	**0.041**	**0.041**	**0.022**	**0.161**	**0.163**	**0.19**	**0.00004**	**0.00031**	**0.00031**	**0.00017**	**0.00122**	**0.00123**	**0.00003**	
115 Lane - Danebo(EWEB) 1														
0.507	2.794		1.614	10.401		11.47	0.00383	0.02113		0.01220	0.07865		0.00152	
0.507	2.794	2.840	1.614	10.401	10.526	11.47	0.00383	0.02113	0.02147	0.01220	0.07865	0.07959	0.00152	
0.507	**2.794**	**2.840**	**1.614**	**10.401**	**10.526**	**11.47**	**0.00383**	**0.02113**	**0.02147**	**0.01220**	**0.07865**	**0.07959**	**0.00152**	
115 Lane - Wendson 1														
0.009	0.075		0.041	0.295		0.35	0.00007	0.00057		0.00031	0.00223		0.00005	1-7 NO 8 ALWLD
0.063	0.536		0.278	1.961		2.24	0.00048	0.00405		0.00210	0.01482		0.00030	
0.072	0.611	0.615	0.318	2.255	2.278	2.59	0.00055	0.00462	0.00465	0.00241	0.01705	0.01722	0.00034	
3.136	4.916		4.729	15.495		14.51	0.02371	0.03717		0.03576	0.11716		0.00192	
3.136	4.916	5.831	4.729	15.495	16.201	14.51	0.02371	0.03717	0.04409	0.03576	0.11716	0.12250	0.00192	
1.554	2.436		2.343	7.678		7.19	0.01175	0.01842		0.01772	0.05806		0.00095	
1.554	2.436	2.889	2.343	7.678	8.028	7.19	0.01175	0.01842	0.02185	0.01772	0.05806	0.06070	0.00095	
5.112	8.014		7.709	25.259		23.66	0.03865	0.06060		0.05829	0.19100		0.00313	
0.203	0.318		0.306	1.001		0.94	0.00153	0.00240		0.00231	0.00757		0.00012	2-7 NO 8 ALWLD
0.079	0.124		0.119	0.389		0.36	0.00060	0.00093		0.00090	0.00294		0.00005	2-3/8 IN HS STL
5.394	8.455	10.029	8.133	26.650	27.864	24.96	0.04078	0.06393	0.07583	0.06150	0.20151	0.21069	0.00330	
0.242	0.380		0.365	1.196		1.12	0.00183	0.00287		0.00276	0.00905		0.00015	2-7 NO 8 ALWLD
7.747	12.144		11.682	38.278		35.86	0.05858	0.09183		0.08833	0.28944		0.00474	
0.197	0.309		0.297	0.974		0.91	0.00149	0.00234		0.00225	0.00736		0.00012	2-3/8 IN HS STL
0.028	0.044		0.042	0.139		0.13	0.00021	0.00033		0.00032	0.00105		0.00002	2-7 NO 8 ALWLD
8.214	12.877	15.274	12.387	40.587	42.436	38.02	0.06211	0.09737	0.11549	0.09366	0.30690	0.32087	0.00503	
0.019	0.040		0.033	0.135		0.13	0.00014	0.00030		0.00025	0.00102		0.00002	2-7 NO 8 ALWLD
0.177	0.373		0.311	1.266		1.25	0.00134	0.00282		0.00236	0.00957		0.00017	2-3/8 IN HS STL
2.739	5.775		4.818	19.583		19.33	0.02071	0.04367		0.03643	0.14808		0.00256	
0.079	0.167		0.139	0.566		0.56	0.00060	0.00126		0.00105	0.00428		0.00007	2-7 NO 8 ALWLD
3.014	6.355	7.033	5.302	21.549	22.192	21.27	0.02279	0.04805	0.05318	0.04009	0.16294	0.16780	0.00281	
21.383	**35.650**	**41.571**	**33.212**	**114.215**	**118.946**	**108.55**	**0.16169**	**0.26956**	**0.31434**	**0.25113**	**0.86363**	**0.89941**	**0.01436**	
115 Langlois - Tap (Bandon - Rogue 1)														
0.105	0.226		0.186	0.746		0.73	0.00080	0.00171		0.00140	0.00564		0.00010	
0.105	0.226	0.250	0.186	0.746	0.769	0.73	0.00080	0.00171	0.00189	0.00140	0.00564	0.00581	0.00010	
0.105	**0.226**	**0.250**	**0.186**	**0.746**	**0.769**	**0.73**	**0.00080**	**0.00171**	**0.00189**	**0.00140**	**0.00564**	**0.00581**	**0.00010**	
115 LaPine - Fort Rock 1														
0.450	2.479		1.425	9.293		10.06	0.00340	0.01874		0.01078	0.07027		0.00133	1-3/8 IN EHS STL
5.655	33.146		18.125	114.773		122.09	0.04276	0.25063		0.13705	0.86785		0.01615	1-3/8 IN EHS STL
6.105	35.625	36.144	19.550	124.066	125.596	132.15	0.04616	0.26938	0.27330	0.14783	0.93811	0.94969	0.01748	
6.105	**35.625**	**36.144**	**19.550**	**124.066**	**125.596**	**132.15**	**0.04616**	**0.26938**	**0.27330**	**0.14783**	**0.93811**	**0.94969**	**0.01748**	
115 Latham - Tap (Alvey - Drain 1)														
0.073	0.402		0.233	1.521		1.66	0.00055	0.00304		0.00176	0.01150		0.00022	1-3/8 IN EHS STL
0.195	1.077		0.624	4.075		4.46	0.00147	0.00815		0.00471	0.03081		0.00059	
0.267	1.479	1.503	0.856	5.596	5.661	6.12	0.00202	0.01119	0.01137	0.00648	0.04231	0.04281	0.00081	
0.267	**1.479**	**1.503**	**0.856**	**5.596**	**5.661**	**6.12**	**0.00202**	**0.01119**	**0.01137**	**0.00648**	**0.04231**	**0.04281**	**0.00081**	
115 Lexington - Delameter 1 (Cowlitz County PUD)														
0.415	1.717		1.070	6.066		6.46	0.00314	0.01298		0.00809	0.04587		0.00085	
0.727	3.136		1.854	10.619		10.57	0.00550	0.02371		0.01402	0.08030		0.00140	
1.142	4.853	4.986	2.924	16.686	16.940	17.04	0.00864	0.03670	0.03770	0.02211	0.12617	0.12809	0.00225	
1.142	**4.853**	**4.986**	**2.924**	**16.686**	**16.940**	**17.04**	**0.00864**	**0.03670**	**0.03770**	**0.02211**	**0.12617**	**0.12809**	**0.00225**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Lexington - Longview 1**												
	Lexington - Str 2/8	2.25	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-115
	Str 2/8 - Str 6/6	3.82	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		M-116
	Str 6/6 - Pacific Way	0.08	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		6.15											
	Pacific Way - Str 6/7	0.13	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 6/7 - Str 9/3	2.53	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 9/3 - Str 9/5	0.21	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 9/5 - Str 9/8	0.24	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
	Str 9/8 - Longview	0.17	SDC	H2	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
		3.28											
		9.43											
115	**Libby - Libby (FEC) 1**												
	Libby - Twr 2/2	1.15	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		M-174
	Twr 2/2 - Str 13/5	11.10	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 13/5 - Libby(FEC)	0.01	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	PP&L	
		12.26											
		12.26											
115	**Longview - Allston 4**												
	* Line Section operated in Parallel with (Longview - Dead End)(Twr 1/2 - Twr 2/1)/Parallel Circuit parameters shown												
	Longview - Twr 1/1	0.04	SDC	H4	1.1 In ACSR/TW Rogue	15.43	0.100	0.737	0.386	2.629	5.793		M-115
	Twr 1/1 - Twr 1/2	0.17	SDC	H4	1.1 In ACSR/TW Rogue	15.43	0.100	0.737	0.386	2.629	5.793		M-116
*	Twr 1/2 - Twr 2/1	0.85	SDC	H4	2-250 kcmil Cu 12 Str	24.63	0.129	0.467	0.415	2.188	9.088		
	Twr 2/1 - Twr 2/2	0.25	SDC	H4	1.1 In ACSR/TW Rogue	15.43	0.100	0.737	0.386	2.629	5.793		
	Twr 2/2 - WA/OR Border	0.95	SDC	H1	715.5 kcmil SSAC Redwing	30.67	0.140	0.815	0.426	2.457	5.167		
		2.26											
	WA/OR Brd - Donald Nys TP (CRPUD)	1.32	SDC	H1	715.5 kcmil SSAC Redwing	30.67	0.140	0.815	0.426	2.457	5.167		
		1.32											
	Donald Nys TAP (Twr 4/2) - Twr 5/1	0.48	SDC	J22	1272 kcmil ACSR Bittern	23.49	0.083	0.761	0.369	2.500	5.582		
	Twr 5/1 - Twr 5/2	0.20	SSC	J3	1272 kcmil ACSR Bittern	34.02	0.083	0.806	0.369	2.410	5.260		
	Twr 5/2 - Allston 230	0.31	SSC	J3	1272 kcmil ACSR Bittern	34.02	0.083	0.806	0.369	2.410	5.260		
		0.99											
	Allston 230 - Allston	0.03	SSC	J7	795 kcmil ACSR Drake	25.20	0.128	0.790	0.414	2.503	5.348		
		0.03											
		4.60											
115	**Longview - Cowlitz 1**												
	Longview - Twr 1/2	0.17	SDC	H2	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		M-115
	Twr 1/2 - Cowlitz	3.44	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-116
		3.61											
		3.61											
115	**Longview - Dead End(2/1)**												
		1.13	SDC	H4	250 kcmil Cu 19 Str	15.43	0.257	0.819	0.543	2.711	5.209		M-115
		1.13											M-116
		1.13											
115	**Lookout Point - Alvey 1**												
	Lookout Point - Dexter Tap	2.37	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-134
		2.37											
	Dexter Tap - Pleasant Hill Tap	6.74	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-137
		6.74											
	Pleasant Hill Tap (PUD) - Alvey	6.66	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-208
		6.66											
		15.77											
115	**Lookout Point - Alvey 2**												
	Lookout Point - Mt Vernon (SUB) Tap	14.10	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-134
		14.10											
	Mt Vernon (SUB) Tap - Alvey	1.74	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-137
		1.74											M-208
		15.84											
115	**Lookout Point PH - Lookout Point Switching Station 1**												
		0.21	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		0.21											
		0.21											
115	**Lynch Creek - Tap (La Grande - Cowlitz (TCL) 1 & 2)**												
	Lynch Creek - Str 4/3	0.26	WSP	H24	397.5 kcmil ACSR Ibis NL	12.44	0.253	0.747	0.539	2.717	5.671		
	Str 4/3 - Str 3/6	1.08	WSP	H27	397.5 kcmil ACSR Ibis NL	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 3/6 - Str 3/3	0.14	WSP	H12	397.5 kcmil ACSR Ibis NL	8.82	0.253	0.705	0.539	2.800	6.019		
	Str 3/3 - Str 2/4	0.92	WSP	H27	397.5 kcmil ACSR Ibis NL	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 2/4 - Str 2/1	0.21	WSP	H24	397.5 kcmil ACSR Ibis NL	12.44	0.253	0.747	0.539	2.717	5.671		
	Str 2/1 - Tap	0.68	WSP	H27	397.5 kcmil ACSR Ibis NL	12.46	0.253	0.747	0.539	2.717	5.669		
		3.29											
		3.29											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Lexington - Longview 1														
0.408	1.687		1.051	5.960		6.35	0.00308	0.01276		0.00795	0.04507		0.00084	
0.705	3.040		1.797	10.296		10.25	0.00533	0.02299		0.01359	0.07785		0.00136	
0.015	0.064		0.038	0.216		0.21	0.00011	0.00048		0.00028	0.00163		0.00003	
1.127	4.791	4.922	2.886	16.472	16.723	16.82	0.00853	0.03623	0.03722	0.02183	0.12455	0.12645	0.00222	
0.024	0.103		0.061	0.350		0.35	0.00018	0.00078		0.00046	0.00265		0.00005	
0.467	2.014		1.190	6.819		6.79	0.00353	0.01523		0.00900	0.05156		0.00090	
0.039	0.167		0.099	0.566		0.56	0.00029	0.00126		0.00075	0.00428		0.00007	2-7 NO 8 ALWLD
0.044	0.180		0.112	0.636		0.68	0.00033	0.00136		0.00085	0.00481		0.00009	2-7 NO 8 ALWLD
0.031	0.128		0.079	0.450		0.48	0.00023	0.00097		0.00060	0.00340		0.00006	2-7 NO 8 ALWLD
0.604	2.592	2.662	1.542	8.821	8.954	8.86	0.00457	0.01960	0.02013	0.01166	0.06670	0.06771	0.00117	
1.731	**7.383**	**7.584**	**4.428**	**25.292**	**25.677**	**25.67**	**0.01309**	**0.05583**	**0.05734**	**0.03348**	**0.19125**	**0.19416**	**0.00339**	
115 Libby - Libby (FEC) 1														
0.289	0.896		0.618	3.031		3.11	0.00218	0.00677		0.00467	0.02292		0.00041	
2.813	8.550		5.987	29.632		30.47	0.02127	0.06465		0.04527	0.22406		0.00403	
0.003	0.008		0.005	0.027		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
3.104	9.453	9.950	6.610	32.689	33.351	33.61	0.02347	0.07148	0.07523	0.04998	0.24718	0.25218	0.00445	
3.104	**9.453**	**9.950**	**6.610**	**32.689**	**33.351**	**33.61**	**0.02347**	**0.07148**	**0.07523**	**0.04998**	**0.24718**	**0.25218**	**0.00445**	
115 Longview - Allston 4														
0.004	0.029		0.015	0.105		0.12	0.00003	0.00022		0.00012	0.00080		0.00002	
0.017	0.125		0.066	0.447		0.49	0.00013	0.00095		0.00050	0.00338		0.00007	1-3/8 IN HS STL
0.109	0.397		0.352	1.860		3.86	0.00083	0.00300		0.00266	0.01406		0.00051	2-3/8 IN HS STL
0.025	0.184		0.096	0.657		0.72	0.00019	0.00139		0.00073	0.00497		0.00010	1-3/8 IN HS STL
0.133	0.774		0.405	2.334		2.45	0.00101	0.00585		0.00306	0.01765		0.00032	
0.288	1.510	1.537	0.935	5.403	5.484	7.65	0.00218	0.01142	0.01162	0.00707	0.04086	0.04146	0.00101	
0.185	1.075		0.563	3.243		3.41	0.00140	0.00813		0.00425	0.02452		0.00045	
0.185	1.075	1.091	0.563	3.243	3.291	3.41	0.00140	0.00813	0.00825	0.00425	0.02452	0.02489	0.00045	
0.040	0.365		0.177	1.200		1.34	0.00030	0.00276		0.00134	0.00907		0.00018	
0.017	0.161		0.074	0.482		0.53	0.00013	0.00122		0.00056	0.00364		0.00007	1-7 NO 8 ALWLD
0.026	0.250		0.114	0.747		0.82	0.00019	0.00189		0.00086	0.00565		0.00011	2-7 NO 8 ALWLD
0.082	0.776	0.780	0.365	2.429	2.456	2.68	0.00062	0.00587	0.00590	0.00276	0.01837	0.01857	0.00035	
0.004	0.024		0.012	0.075		0.08	0.00003	0.00018		0.00009	0.00057		0.00001	2-7 NO 8 ALWLD
0.004	0.024	0.024	0.012	0.075	0.076	0.08	0.00003	0.00018	0.00018	0.00009	0.00057	0.00058	0.00001	
0.559	**3.385**	**3.431**	**1.875**	**11.150**	**11.306**	**13.82**	**0.00423**	**0.02560**	**0.02594**	**0.01418**	**0.08431**	**0.08549**	**0.00183**	
115 Longview - Cowlitz 1														
0.022	0.124		0.070	0.446		0.49	0.00016	0.00094		0.00053	0.00337		0.00007	
0.439	2.505		1.422	9.038		10.01	0.00332	0.01894		0.01076	0.06834		0.00132	
0.460	2.629	2.669	1.493	9.484	9.601	10.50	0.00348	0.01988	0.02018	0.01129	0.07171	0.07260	0.00139	
0.460	**2.629**	**2.669**	**1.493**	**9.484**	**9.601**	**10.50**	**0.00348**	**0.01988**	**0.02018**	**0.01129**	**0.07171**	**0.07260**	**0.00139**	
115 Longview - Dead End(2/1)														
0.291	0.925		0.614	3.063		2.94	0.00220	0.00700		0.00464	0.02316		0.00039	
0.291	0.925	0.970	0.614	3.063	3.124	2.94	0.00220	0.00700	0.00733	0.00464	0.02316	0.02362	0.00039	
0.291	**0.925**	**0.970**	**0.614**	**3.063**	**3.124**	**2.94**	**0.00220**	**0.00700**	**0.00733**	**0.00464**	**0.02316**	**0.02362**	**0.00039**	
115 Lookout Point - Alvey 1														
0.430	1.777		1.108	6.278		6.69	0.00325	0.01344		0.00837	0.04747		0.00088	
0.430	1.777	1.828	1.108	6.278	6.375	6.69	0.00325	0.01344	0.01382	0.00837	0.04747	0.04821	0.00088	
1.222	5.053		3.150	17.855		19.03	0.00924	0.03821		0.02382	0.13501		0.00252	
1.222	5.053	5.199	3.150	17.855	18.130	19.03	0.00924	0.03821	0.03931	0.02382	0.13501	0.13709	0.00252	
1.207	4.994		3.112	17.643		18.80	0.00913	0.03776		0.02353	0.13341		0.00249	
1.207	4.994	5.137	3.112	17.643	17.915	18.80	0.00913	0.03776	0.03885	0.02353	0.13341	0.13546	0.00249	
2.859	**11.824**	**12.165**	**7.369**	**41.776**	**42.421**	**44.52**	**0.02162**	**0.08941**	**0.09198**	**0.05572**	**0.31589**	**0.32076**	**0.00589**	
115 Lookout Point - Alvey 2														
2.556	10.572		6.589	37.352		39.80	0.01933	0.07994		0.04982	0.28243		0.00526	
2.556	10.572	10.877	6.589	37.352	37.929	39.80	0.01933	0.07994	0.08224	0.04982	0.28243	0.28680	0.00526	
0.315	1.305		0.813	4.609		4.91	0.00239	0.00986		0.00615	0.03485		0.00065	
0.315	1.305	1.342	0.813	4.609	4.681	4.91	0.00239	0.00986	0.01015	0.00615	0.03485	0.03539	0.00065	
2.872	**11.876**	**12.219**	**7.402**	**41.961**	**42.609**	**44.72**	**0.02171**	**0.08980**	**0.09239**	**0.05597**	**0.31729**	**0.32219**	**0.00591**	
115 Lookout Point PH - Lookout Point Switching Station 1														
0.038	0.157		0.098	0.556		0.59	0.00029	0.00119		0.00074	0.00421		0.00008	3/8 IN HS STL
0.038	0.157	0.162	0.098	0.556	0.565	0.59	0.00029	0.00119	0.00122	0.00074	0.00421	0.00427	0.00008	
0.038	**0.157**	**0.162**	**0.098**	**0.556**	**0.565**	**0.59**	**0.00029**	**0.00119**	**0.00122**	**0.00074**	**0.00421**	**0.00427**	**0.00008**	
115 Lynch Creek - Tap (La Grande - Cowlitz (TCL) 1 & 2)														
0.066	0.194		0.140	0.706		0.74	0.00050	0.00147		0.00106	0.00534		0.00010	1-3/8 IN EHS STL
0.274	0.807		0.583	2.934		3.06	0.00207	0.00610		0.00440	0.02218		0.00040	
0.035	0.099		0.076	0.392		0.42	0.00027	0.00075		0.00057	0.00296		0.00006	
0.233	0.687		0.496	2.499		2.61	0.00176	0.00519		0.00375	0.01890		0.00034	
0.053	0.157		0.113	0.571		0.60	0.00040	0.00119		0.00086	0.00431		0.00008	
0.172	0.508		0.367	1.847		1.93	0.00130	0.00384		0.00277	0.01397		0.00025	
0.834	2.451	2.589	1.775	8.949	9.124	9.35	0.00630	0.01853	0.01958	0.01342	0.06767	0.06899	0.00124	
0.834	**2.451**	**2.589**	**1.775**	**8.949**	**9.124**	**9.35**	**0.00630**	**0.01853**	**0.01958**	**0.01342**	**0.06767**	**0.06899**	**0.00124**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Macks Inn - Madison**												
	Macks Inn - Str 1/2	0.20	WSP	H15	795 kcmil ACSR Drake NL	11.34	0.128	0.693	0.414	2.697	6.124		
	Str 1/2 - Str 1/4	0.19	WHF	H7	795 kcmil ACSR Drake NL	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 1/4 - Str 2/1	0.31	WHF	H7	397.5 kcmil ACSR Lark NL	15.12	0.251	0.765	0.537	2.664	5.517		
	Str 2/1 - ID/MT Border	7.86	WHF	H7	795 kcmil ACSR Drake NL	15.12	0.128	0.728	0.414	2.627	5.820		
		8.56											
	ID/MT Border - Madison	8.55	WHF	H7	795 kcmil ACSR Drake NL	15.12	0.128	0.728	0.414	2.627	5.820		
		8.55											
		17.11											
115	**McCullough - McCullough Tie (Brookdale Tap Line (TPU))**												
	McCullough - Tie	1.20	WSP	H28	795 kcmil ACSR Drake	10.67	0.128	0.686	0.414	2.712	6.193		
		1.20											
		1.20											
115	**McCullough - Tap (Alder - Cowlitz 2 (TPU))**												
	McCullough - Str 2/16 (Tie)	0.19	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 2/16 (Tie) - Tap	1.99	WSP	H28	397.5 kcmil ACSR Ibis	10.67	0.253	0.728	0.539	2.754	5.821		
		2.18											
		2.18											
115	**McNary - Badger Canyon 1**												
	McNary - Twr 1/9	0.54	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-193
	Twr 1/9 - OR/WA Border	0.54	SDC	SPEC	795 kcmil ACSR Mallard	28.58	0.126	0.800	0.412	2.467	5.267		
		1.08											
	OR/WA Border - Twr 1/12	0.42	SDC	SPEC	795 kcmil ACSR Mallard	28.58	0.126	0.800	0.412	2.467	5.267		
	Twr 1/12 - CARMA (PUD)	0.08	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		0.50											
	CARMA (PUD) - Str 2/3	0.11	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 2/3 - Berrian (PUD)	1.18	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.29											
	Berrian (PUD) - H2F (PUD)	2.14	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.14											
	H2F (PUD) - Twr 21/1	14.90	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Twr 21/1 - Twr 28/3	7.26	SDC	J12	795 kcmil ACSR Drake	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 28/3 - Badger Canyon	1.23	SDC	J18	795 kcmil ACSR Drake	27.68	0.128	0.802	0.414	2.481	5.270		
		23.39											
		28.40											
115	**McNary - Westland 1**												
	McNary - CH 1	0.21	TSP		954 kcmil ACSR Rail (45/7)	17.76	0.109	0.744	0.395	2.585	5.711	UEC	M-211
	Ch 1 - Umatilla GOAB	4.04	TDC		954 kcmil ACSR Rail (45/7)	17.76	0.109	0.744	0.395	2.585	5.711	UEC	
		4.25											
	Umatilla GOAB - Rock Pile GOAB	1.12	TDC		954 kcmil ACSR Rail (45/7)	17.76	0.109	0.744	0.395	2.585	5.711	UEC	
		1.12											
	Rock Pile GOAB - Pond GOAB	2.01	TDC		954 kcmil ACSR Rail (45/7)	17.76	0.109	0.744	0.395	2.585	5.711	UEC	
		2.01											
	Pond GOAB - (US Gen Area)	4.17	TDC		954 kcmil ACSR Rail (45/7)	17.76	0.109	0.744	0.395	2.585	5.711	UEC	
	(US Gen Area - Westland	0.38	TDC		954 kcmil ACSR Rail (45/7)	17.76	0.109	0.744	0.395	2.585	5.711	UEC	
		4.55											
		11.93											
115	**McNary PH - McNary 6**												
		1.39	SSC	J3	1272 kcmil ACSR Pheasant	34.02	0.082	0.800	0.368	2.404	5.282		M-124
		1.39											
		1.39											
115	**Metaline Falls (POPD) - Tap (Colville - Boundary 1)**												
	Metaline Falls (POPD) - Str 1/1	0.95	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 1/1 - Tap	0.12	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		
		1.07											
		1.07											
115	**Midway - Benton 1**												
@	Midway - Scooteney Tap	13.91	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		M-180
		13.91											
	Scooteney Tap - Benton	14.85	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		14.85											
		28.76											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Macks Inn - Madison														
0.026	0.139		0.083	0.539		0.61	0.00019	0.00105		0.00063	0.00408		0.00008	1-3/8 IN EHS STL
0.024	0.138		0.079	0.499		0.55	0.00018	0.00105		0.00059	0.00377		0.00007	2-3/8 IN EHS STL
0.078	0.237		0.167	0.826		0.86	0.00059	0.00179		0.00126	0.00624		0.00011	2-3/8 IN EHS STL
1.002	5.723		3.250	20.652		22.87	0.00758	0.04327		0.02458	0.15616		0.00302	2-3/8 IN EHS STL
1.130	6.237	6.339	3.578	22.516	22.799	24.89	0.00854	0.04716	0.04793	0.02705	0.17025	0.17239	0.00329	
1.090	6.225		3.535	22.464		24.88	0.00824	0.04707		0.02673	0.16986		0.00329	2-3/8 IN EHS STL
1.090	6.225	6.320	3.535	22.464	22.741	24.88	0.00824	0.04707	0.04779	0.02673	0.16986	0.17195	0.00329	
2.220	**12.463**	**12.659**	**7.113**	**44.981**	**45.540**	**49.77**	**0.01679**	**0.09423**	**0.09572**	**0.05379**	**0.34012**	**0.34434**	**0.00658**	
115 McCullough - McCullough Tie (Brookdale Tap Line (TPU))														
0.153	0.823		0.496	3.254		3.72	0.00116	0.00622		0.00375	0.02461		0.00049	
0.153	0.823	0.837	0.496	3.254	3.292	3.72	0.00116	0.00622	0.00633	0.00375	0.02461	0.02489	0.00049	
0.153	**0.823**	**0.837**	**0.496**	**3.254**	**3.292**	**3.72**	**0.00116**	**0.00622**	**0.00633**	**0.00375**	**0.02461**	**0.02489**	**0.00049**	
115 McCullough - Tap (Alder - Cowlitz 2 (TPU))														
0.048	0.142		0.102	0.516		0.54	0.00036	0.00107		0.00077	0.00390		0.00007	
0.504	1.449		1.073	5.481		5.79	0.00381	0.01095		0.00812	0.04144		0.00077	
0.552	1.591	1.684	1.176	5.997	6.111	6.33	0.00418	0.01203	0.01273	0.00889	0.04535	0.04621	0.00084	
0.552	**1.591**	**1.684**	**1.176**	**5.997**	**6.111**	**6.33**	**0.00418**	**0.01203**	**0.01273**	**0.00889**	**0.04535**	**0.04621**	**0.00084**	
115 McNary - Badger Canyon 1														
0.069	0.393		0.223	1.419		1.57	0.00052	0.00297		0.00169	0.01073		0.00021	
0.068	0.432		0.223	1.332		1.42	0.00052	0.00327		0.00168	0.01007		0.00019	
0.137	0.825	0.836	0.446	2.751	2.787	2.99	0.00104	0.00624	0.00632	0.00337	0.02080	0.02107	0.00040	
0.053	0.336		0.173	1.036		1.11	0.00040	0.00254		0.00131	0.00784		0.00015	
0.010	0.058		0.033	0.210		0.23	0.00008	0.00044		0.00025	0.00159		0.00003	
0.063	0.394	0.399	0.206	1.246	1.263	1.34	0.00048	0.00298	0.00302	0.00156	0.00942	0.00955	0.00018	
0.014	0.080		0.045	0.289		0.32	0.00011	0.00061		0.00034	0.00219		0.00004	
0.299	0.909		0.636	3.150		3.24	0.00226	0.00687		0.00481	0.02382		0.00043	
0.313	0.989	1.037	0.682	3.439	3.506	3.56	0.00237	0.00748	0.00784	0.00516	0.02600	0.02651	0.00047	
0.542	1.648		1.154	5.713		5.88	0.00410	0.01246		0.00873	0.04320		0.00078	
0.542	1.648	1.735	1.154	5.713	5.828	5.88	0.00410	0.01246	0.01312	0.00873	0.04320	0.04407	0.00078	
3.776	11.477		8.037	39.776		40.91	0.02855	0.08678		0.06077	0.30077		0.00541	
0.926	5.696		3.002	18.255		19.55	0.00700	0.04307		0.02270	0.13804		0.00259	
0.157	0.986		0.509	3.051		3.24	0.00119	0.00745		0.00385	0.02307		0.00043	
4.858	18.159	18.797	11.548	61.083	62.165	63.70	0.03673	0.13731	0.14214	0.08732	0.46187	0.47006	0.00842	
5.914	**22.015**	**22.796**	**14.036**	**74.232**	**75.548**	**77.47**	**0.04472**	**0.16647**	**0.17237**	**0.10613**	**0.56130**	**0.57125**	**0.01025**	
115 McNary - Westland 1														
0.023	0.156		0.083	0.543		0.60	0.00017	0.00118		0.00063	0.00410		0.00008	1-57mm**2 6-Fibre
0.440	3.007		1.595	10.443		11.54	0.00332	0.02273		0.01206	0.07896		0.00153	2-57mm**2 6-Fibre
0.462	3.163	3.196	1.678	10.986	11.113	12.14	0.00350	0.02392	0.02417	0.01269	0.08307	0.08403	0.00160	
0.122	0.834		0.442	2.895		3.20	0.00092	0.00630		0.00334	0.02189		0.00042	2-57mm**2 6-Fibre
0.122	0.834	0.842	0.442	2.895	2.929	3.20	0.00092	0.00630	0.00637	0.00334	0.02189	0.02215	0.00042	
0.219	1.496		0.794	5.196		5.74	0.00165	0.01131		0.00600	0.03929		0.00076	2-57mm**2 6-Fibre
0.219	1.496	1.512	0.794	5.196	5.256	5.74	0.00165	0.01131	0.01143	0.00600	0.03929	0.03974	0.00076	
0.454	3.103		1.646	10.779		11.91	0.00343	0.02347		0.01245	0.08151		0.00157	2-57mm**2 6-Fibre
0.041	0.283		0.150	0.982		1.09	0.00031	0.00214		0.00113	0.00743		0.00014	1-57mm**2 6-Fibre
0.495	3.386	3.422	1.796	11.761	11.898	12.99	0.00374	0.02560	0.02588	0.01358	0.08893	0.08996	0.00172	
1.298	**8.878**	**8.973**	**4.710**	**30.838**	**31.196**	**34.07**	**0.00981**	**0.06713**	**0.06785**	**0.03561**	**0.23318**	**0.23588**	**0.00451**	
115 McNary PH - McNary 6														
0.114	1.112		0.511	3.342		3.67	0.00086	0.00841		0.00387	0.02527		0.00049	
0.114	1.112	1.118	0.511	3.342	3.381	3.67	0.00086	0.00841	0.00845	0.00387	0.02527	0.02556	0.00049	
0.114	**1.112**	**1.118**	**0.511**	**3.342**	**3.381**	**3.67**	**0.00086**	**0.00841**	**0.00845**	**0.00387**	**0.02527**	**0.02556**	**0.00049**	
115 Metaline Falls (POPD) - Tap (Colville - Boundary 1)														
0.535	0.838		0.807	2.643		2.48	0.00404	0.00634		0.00610	0.01998		0.00033	
0.008	0.086		0.043	0.314		0.36	0.00006	0.00065		0.00032	0.00237		0.00005	
0.543	0.924	1.072	0.849	2.957	3.076	2.83	0.00411	0.00699	0.00811	0.00642	0.02236	0.02326	0.00037	
0.543	**0.924**	**1.072**	**0.849**	**2.957**	**3.076**	**2.83**	**0.00411**	**0.00699**	**0.00811**	**0.00642**	**0.02236**	**0.02326**	**0.00037**	
115 Midway - Benton 1														
3.535	11.023		7.513	37.443		37.07	0.02673	0.08335		0.05681	0.28312		0.00490	
3.535	11.023	11.576	7.513	37.443	38.189	37.07	0.02673	0.08335	0.08753	0.05681	0.28312	0.28876	0.00490	
3.773	11.768		8.020	39.973		39.57	0.02853	0.08899		0.06065	0.30225		0.00523	
3.773	11.768	12.359	8.020	39.973	40.770	39.57	0.02853	0.08899	0.09345	0.06065	0.30225	0.30828	0.00523	
7.308	**22.792**	**23.935**	**15.533**	**77.416**	**78.959**	**76.64**	**0.05526**	**0.17234**	**0.18098**	**0.11745**	**0.58537**	**0.59704**	**0.01014**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Midway - Grandview 1**												
	Midway - Cold Creek(PUD)	4.21	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		M-119
		4.21											
	Cold Creek - Blackrock(REA)	4.55	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		4.55											
	Blackrock(REA) - Str 25/5	15.80	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 25/5 - Str 25/9	0.45	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 25/9 - Sunnyside Port T	0.01	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		16.26											
	Sunnyside Port T - Grandview	0.06	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		0.06											
		25.08											
115	**Midway - Moxee 1**												
	Midway - Rattlesnake	16.61	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		M-119
		16.61											
	Rattlesnake - Moxee	17.37	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
		17.37											
		33.98											
115	**Mountain Avenue - Tap (Oak Knoll - Ashland (Pacificorp))**												
	There is three spans GMD 9.13' Distance unknown												
	Mountain Avenue - Tap (Oak Knoll - Ashland (Pacificorp))												
	Mountain Ave - Tap	0.81	SWP		556.5 kcmil AAC Dahlia (19)	10.65	0.186	0.725	0.472	2.752	5.914		
		0.81											
		0.81											
115	**Moxee - Roza 1**												
		5.30	WSP	H21	266.8 kcmil ACSR Partridge	11.68	0.377	0.763	0.663	2.756	5.544		M-208
		5.30											
		5.30											
115	**Mt Vernon (SUB) - Tap (Lookout Point - Alvey 2)**												
	Mt Vernon (SUB) - Str 5/2	0.05	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985	SUB	M-134
	Str 5/2 - Twr 4/4	0.39	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Twr 4/4 - Twr 59/2	1.35	SSC	J5	795 kcmil ACSR Drake	34.96	0.128	0.830	0.414	2.424	5.084		
	Twr 59/2 - Twr 60/3	0.49	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Twr 60/3 - Twr 61/2	1.22	SSC	J5	795 kcmil ACSR Drake	34.96	0.128	0.830	0.414	2.424	5.084		
	Twr 61/2 - Tap	0.39	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
		3.89											
		3.89											
115	**Mt Vernon (SUB) Tap - Alvey**												
	Operating Name (Mount Vernon Tap to Lookout Point - Alvey No 2)												
		0.98	SSC	J5	795 kcmil ACSR Drake	34.96	0.128	0.830	0.414	2.424	5.084		M-134
		0.98											
		0.98											
115	**Naselle (BPA) - Naselle (PCPUD)**												
@		0.05	WSP	G3	397.5 kcmil ACSR Ibis	12.60	0.253	0.748	0.539	2.714	5.659		
		0.05											
		0.05											
115	**Naselle - Grays River**												
	Operating Name (Naselle - Tap)												
	Naselle - Twr 34/2	1.08	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Twr 34/2 - Twr 29/4	4.24	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
	Twr 29/4 - Twr 26/1	3.60	SSC	J4	795 kcmil ACSR Drake	37.80	0.128	0.839	0.414	2.405	5.025		
	Twr 26/1 - Grays River	0.71	SSC	K2	795 kcmil ACSR Drake	42.84	0.128	0.854	0.414	2.375	4.933		
		9.63											
		9.63											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Midway - Grandview 1														
2.370	3.716		3.574	11.712		10.97	0.01792	0.02810		0.02703	0.08856		0.00145	
2.370	3.716	4.407	3.574	11.712	12.245	10.97	0.01792	0.02810	0.03333	0.02703	0.08856	0.09259	0.00145	
2.562	4.016		3.863	12.657		11.86	0.01937	0.03036		0.02921	0.09571		0.00157	
2.562	4.016	4.763	3.863	12.657	13.234	11.86	0.01937	0.03036	0.03602	0.02921	0.09571	0.10007	0.00157	
8.895	13.945		13.414	43.953		41.17	0.06726	0.10544		0.10143	0.33235		0.00545	
0.253	0.397		0.382	1.252		1.17	0.00192	0.00300		0.00289	0.00947		0.00016	2-3/8 IN HS STL
0.006	0.009		0.008	0.028		0.03	0.00004	0.00007		0.00006	0.00021		0.00000	2-3/8 IN HS STL
9.154	14.351	17.022	13.805	45.233	47.293	42.37	0.06922	0.10851	0.12871	0.10438	0.34203	0.35760	0.00560	
0.034	0.053		0.051	0.167		0.16	0.00026	0.00040		0.00039	0.00126		0.00002	2-3/8 IN HS STL
0.034	0.053	0.063	0.051	0.167	0.175	0.16	0.00026	0.00040	0.00047	0.00039	0.00126	0.00132	0.00002	
14.120	**22.135**	**26.255**	**21.293**	**69.769**	**72.946**	**65.35**	**0.10677**	**0.16737**	**0.19853**	**0.16101**	**0.52756**	**0.55158**	**0.00864**	
115 Midway - Moxee 1														
4.393	13.108		9.144	44.655		44.32	0.03322	0.09912		0.06914	0.33766		0.00586	
4.393	13.108	13.825	9.144	44.655	45.582	44.32	0.03322	0.09912	0.10453	0.06914	0.33766	0.34467	0.00586	
4.594	13.708		9.562	46.699		46.34	0.03474	0.10365		0.07230	0.35311		0.00613	
4.594	13.708	14.457	9.562	46.699	47.668	46.34	0.03474	0.10365	0.10932	0.07230	0.35311	0.36044	0.00613	
8.988	**26.816**	**28.282**	**18.706**	**91.354**	**93.250**	**90.66**	**0.06796**	**0.20277**	**0.21385**	**0.14144**	**0.69077**	**0.70510**	**0.01199**	
115 Mountain Avenue - Tap (Oak Knoll - Ashland (Pacificorp))														
0.150	0.587		0.382	2.229		2.40	0.00114	0.00444		0.00289	0.01686		0.00032	
0.150	0.587	0.606	0.382	2.229	2.262	2.40	0.00114	0.00444	0.00459	0.00289	0.01686	0.01710	0.00032	
0.150	**0.587**	**0.606**	**0.382**	**2.229**	**2.262**	**2.40**	**0.00114**	**0.00444**	**0.00459**	**0.00289**	**0.01686**	**0.01710**	**0.00032**	
115 Moxee - Roza 1														
1.997	4.044		3.512	14.609		14.69	0.01510	0.03058		0.02656	0.11046		0.00194	
1.997	4.044	4.510	3.512	14.609	15.025	14.69	0.01510	0.03058	0.03410	0.02656	0.11046	0.11361	0.00194	
1.997	**4.044**	**4.510**	**3.512**	**14.609**	**15.025**	**14.69**	**0.01510**	**0.03058**	**0.03410**	**0.02656**	**0.11046**	**0.11361**	**0.00194**	
115 Mt Vernon (SUB) - Tap (Lookout Point - Alvey 2)														
0.004	0.036		0.019	0.131		0.15	0.00003	0.00027		0.00014	0.00099		0.00002	
0.050	0.322		0.161	0.948		1.00	0.00038	0.00244		0.00122	0.00717		0.00013	
0.172	1.120		0.558	3.272		3.43	0.00130	0.00847		0.00422	0.02474		0.00045	
0.062	0.405		0.203	1.191		1.25	0.00047	0.00306		0.00153	0.00901		0.00017	
0.156	1.012		0.504	2.957		3.10	0.00118	0.00766		0.00381	0.02236		0.00041	
0.050	0.322		0.161	0.948		1.00	0.00038	0.00244		0.00122	0.00717		0.00013	
0.494	3.218	3.256	1.606	9.447	9.583	9.92	0.00373	0.02433	0.02462	0.01215	0.07144	0.07246	0.00131	
0.494	**3.218**	**3.256**	**1.606**	**9.447**	**9.583**	**9.92**	**0.00373**	**0.02433**	**0.02462**	**0.01215**	**0.07144**	**0.07246**	**0.00131**	
115 Mt Vernon (SUB) Tap - Alvey														
0.125	0.813		0.405	2.376		2.49	0.00094	0.00615		0.00306	0.01796		0.00033	
0.125	0.813	0.823	0.405	2.376	2.410	2.49	0.00094	0.00615	0.00622	0.00306	0.01796	0.01822	0.00033	
0.125	**0.813**	**0.823**	**0.405**	**2.376**	**2.410**	**2.49**	**0.00094**	**0.00615**	**0.00622**	**0.00306**	**0.01796**	**0.01822**	**0.00033**	
115 Naselle (BPA) - Naselle (PCPUD)														
0.013	0.037		0.027	0.136		0.14	0.00010	0.00028		0.00020	0.00103		0.00002	
0.013	0.037	0.039	0.027	0.136	0.138	0.14	0.00010	0.00028	0.00030	0.00020	0.00103	0.00105	0.00002	
0.013	**0.037**	**0.039**	**0.027**	**0.136**	**0.138**	**0.14**	**0.00010**	**0.00028**	**0.00030**	**0.00020**	**0.00103**	**0.00105**	**0.00002**	
115 Naselle - Grays River														
0.138	0.893		0.447	2.625		2.76	0.00104	0.00675		0.00338	0.01985		0.00036	
0.541	3.491		1.753	10.333		10.87	0.00409	0.02640		0.01326	0.07813		0.00144	
0.459	3.022		1.489	8.658		9.04	0.00347	0.02285		0.01126	0.06547		0.00120	
0.091	0.607		0.294	1.686		1.75	0.00068	0.00459		0.00222	0.01275		0.00023	
1.228	8.012	8.105	3.982	23.302	23.640	24.42	0.00928	0.06058	0.06129	0.03011	0.17620	0.17875	0.00323	
1.228	**8.012**	**8.105**	**3.982**	**23.302**	**23.640**	**24.42**	**0.00928**	**0.06058**	**0.06129**	**0.03011**	**0.17620**	**0.17875**	**0.00323**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Naselle - Tarlett (PACP) 1**												
	Long Beach renamed Tarlett by Pacific County PUD (Operating name Naselle - Tarlett No 1)												
	Naselle - Str 1/2	0.10	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-175
	Str 1/2 - Str 1/7	0.40	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 1/7 - Str 2/8	1.38	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 2/8 - Str 3/1	0.22	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
		2.10											
	Naselle River Crossing	0.17	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
		0.17											
	Str 3/2 - Str 3/3	0.09	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
	Str 3/3 - Str 3/8	0.50	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 3/8 - Str 3/9	0.06	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 3/9 - Str 6/2	2.19	WDC	J30	397.5 kcmil ACSR Ibis	27.13	0.253	0.841	0.539	2.528	5.013		
	Str 6/2 - Str 6/5	0.32	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 6/5 - Str 6/7	0.22	WHF	H11	266.8 kcmil ACSR Partridge	17.64	0.377	0.813	0.663	2.656	5.192		
	Str 6/7 - Str 7/1	0.33	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 7/1 - Str 13/2	6.04	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 13/2 - Str 14/4	1.74	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 14/4 - Str 15/6	0.51	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 15/6 - Str 15/7	0.13	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 15/7 - Str 16/11	1.12	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 16/11 - Str 17/1	0.04	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
	Str 17/1 - Hagen (PCPUD)Tap (Str 17/8)	0.30	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
		13.59											
	Hagen (PCPUD) Tap (Str 17/8) - Str 17/9	0.02	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
	Str 17/9 - Tarlett (PCPUD)	0.01	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
		0.03											
		15.89											
115	**Naselle - Tarlett (PACP) 2**												
	Long Beach renamed Tarlett by Pacific County PUD (Operating name Naselle - Tarlett No 2)												
	Naselle - Str 1/2	0.10	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-175
	Str 1/2 - Str 1/7	0.44	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/7 - Str 3/1	1.59	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.13											
	Naselle River Crossing	0.17	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.17											
	Str 3/2 - Str 3/9	0.63	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 3/9 - Str 6/2	2.19	WDC	J30	397.5 kcmil ACSR Ibis	27.13	0.253	0.841	0.539	2.528	5.013		
	Str 6/2 - Str 10/7	4.51	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 10/7 - Str 11/6	1.24	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 11/6 - Hagan Tap (PCPUD)	2.16	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		10.73											
	Hagan Tap (PCPUD) - Str 15/2	1.05	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 15/2 - Str 15/9	0.37	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 15/9 - Str 15/10	0.15	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 15/10 - Str 16/16	1.10	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 16/16 - Str 16/17	0.12	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 16/17 - Str 17/17	0.88	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 17/17 - Tarlett (PCPUD)	0.61	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
		4.28											
		17.31											
115	**Nespelem (NVEC) - Tap (Grand Coulee - Okanogan 2)**												
		10.20	WHF	H7	3/0 ACSR Pigeon (6/1)	15.12	0.638	0.902	0.924	2.801	5.121		
		10.20											
		10.20											
115	**North Camas - Camas (Clark PUD) 1**												
@	North Camas - Ch1	0.07	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744		
@	Ch1 - Camas (Clark PUD)	1.58	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		1.65											
		1.65											
115	**North Camas - Sifton 1**												
	Was Bonneville - Sifton 1												
	North Camas - Sifton 1												
	North Camas - Twr 8/3	7.51	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		
	Twr 8/3 - Sifton	0.21	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		7.72											
		7.72											
115	**Norway - Tap (Bandon - Fairview 1)**												
		0.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.01											
		0.01											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Naselle - Tarlett (PACP) 1														
0.038	0.079		0.066	0.269		0.27	0.00028	0.00060		0.00050	0.00204		0.00004	2-7 NO 8 ALWLD
0.151	0.318		0.265	1.077		1.06	0.00114	0.00240		0.00200	0.00815		0.00014	2-3/8 IN HS STL
0.520	1.096		0.915	3.717		3.67	0.00393	0.00829		0.00692	0.02811		0.00049	
0.055	0.168		0.118	0.586		0.61	0.00042	0.00127		0.00089	0.00443		0.00008	
0.763	1.662	1.829	1.364	5.650	5.812	5.61	0.00577	0.01256	0.01383	0.01031	0.04272	0.04395	0.00074	
0.043	0.130		0.091	0.453		0.47	0.00032	0.00098		0.00069	0.00342		0.00006	
0.043	0.130	0.137	0.091	0.453	0.462	0.47	0.00032	0.00098	0.00103	0.00069	0.00342	0.00349	0.00006	
0.023	0.069		0.048	0.240		0.25	0.00017	0.00052		0.00037	0.00181		0.00003	
0.188	0.397		0.331	1.347		1.33	0.00142	0.00300		0.00251	0.01018		0.00018	
0.015	0.047		0.032	0.158		0.16	0.00011	0.00036		0.00024	0.00119		0.00002	
0.555	1.842		1.181	5.536		5.49	0.00420	0.01393		0.00893	0.04186		0.00073	
0.081	0.252		0.173	0.842		0.86	0.00061	0.00191		0.00131	0.00637		0.00011	
0.083	0.179		0.146	0.584		0.57	0.00063	0.00135		0.00110	0.00442		0.00008	
0.084	0.260		0.178	0.869		0.88	0.00063	0.00197		0.00135	0.00657		0.00012	
2.275	4.798		4.003	16.270		16.06	0.01720	0.03628		0.03027	0.12302		0.00212	
0.441	1.340		0.939	4.645		4.78	0.00333	0.01013		0.00710	0.03512		0.00063	
0.129	0.376		0.275	1.395		1.47	0.00098	0.00284		0.00208	0.01055		0.00019	
0.033	0.100		0.070	0.347		0.36	0.00025	0.00076		0.00053	0.00262		0.00005	
0.284	0.826		0.604	3.064		3.22	0.00215	0.00624		0.00457	0.02317		0.00043	
0.015	0.030		0.027	0.110		0.11	0.00011	0.00023		0.00020	0.00083		0.00001	
0.113	0.228		0.199	0.828		0.83	0.00085	0.00173		0.00150	0.00626		0.00011	1-7 NO 8 ALWLD
4.319	10.746	11.582	8.206	36.235	37.152	36.36	0.03266	0.08126	0.08757	0.06205	0.27398	0.28092	0.00481	
0.008	0.015		0.013	0.055		0.06	0.00006	0.00012		0.00010	0.00042		0.00001	1-3/8 IN HS STL
0.004	0.008		0.007	0.028		0.03	0.00003	0.00006		0.00005	0.00021		0.00000	1-7 NO 8 ALWLD
0.011	0.023	0.025	0.020	0.083	0.085	0.08	0.00009	0.00017	0.00019	0.00015	0.00063	0.00064	0.00001	
5.136	**12.561**	**13.570**	**9.681**	**42.420**	**43.511**	**42.52**	**0.03884**	**0.09498**	**0.10261**	**0.07320**	**0.32076**	**0.32901**	**0.00562**	
115 Naselle - Tarlett (PACP) 2														
0.025	0.077		0.054	0.267		0.27	0.00019	0.00058		0.00041	0.00202		0.00004	2-3/8 IN HS STL
0.111	0.339		0.237	1.175		1.21	0.00084	0.00256		0.00179	0.00888		0.00016	2-7 NO 8 ALWLD
0.403	1.225		0.858	4.245		4.37	0.00305	0.00926		0.00649	0.03210		0.00058	
0.540	1.641	1.727	1.149	5.686	5.801	5.85	0.00408	0.01241	0.01306	0.00869	0.04300	0.04386	0.00077	
0.043	0.131		0.092	0.454		0.47	0.00033	0.00099		0.00069	0.00343		0.00006	
0.043	0.131	0.138	0.092	0.454	0.463	0.47	0.00033	0.00099	0.00104	0.00069	0.00343	0.00350	0.00006	
0.160	0.485		0.340	1.682		1.73	0.00121	0.00367		0.00257	0.01272		0.00023	
0.555	1.842		1.181	5.536		5.49	0.00420	0.01393		0.00893	0.04186		0.00073	
1.143	3.474		2.433	12.040		12.38	0.00864	0.02627		0.01839	0.09104		0.00164	
0.314	0.978		0.669	3.264		3.32	0.00238	0.00740		0.00506	0.02468		0.00044	
0.547	1.664		1.165	5.766		5.93	0.00414	0.01258		0.00881	0.04360		0.00078	
2.719	8.443	8.870	5.788	28.287	28.873	28.85	0.02056	0.06384	0.06707	0.04376	0.21389	0.21832	0.00382	
0.266	0.828		0.566	2.764		2.81	0.00201	0.00626		0.00428	0.02090		0.00037	
0.094	0.273		0.200	1.012		1.06	0.00071	0.00206		0.00151	0.00765		0.00014	
0.038	0.116		0.081	0.400		0.41	0.00029	0.00087		0.00061	0.00303		0.00005	
0.279	0.811		0.593	3.009		3.16	0.00211	0.00613		0.00449	0.02275		0.00042	
0.030	0.092		0.065	0.320		0.33	0.00023	0.00070		0.00049	0.00242		0.00004	
0.223	0.649		0.475	2.407		2.53	0.00169	0.00491		0.00359	0.01820		0.00033	
0.155	0.450		0.329	1.669		1.75	0.00117	0.00340		0.00249	0.01262		0.00023	2-7 NO 8 ALWLD
1.085	3.219	3.396	2.309	11.582	11.810	12.06	0.00820	0.02434	0.02568	0.01746	0.08757	0.08930	0.00159	
4.386	**13.434**	**14.132**	**9.337**	**46.009**	**46.947**	**47.22**	**0.03317**	**0.10158**	**0.10686**	**0.07060**	**0.34789**	**0.35499**	**0.00625**	
115 Nespelem (NVEC) - Tap (Grand Coulee - Okanogan 2)														
6.508	9.196		9.425	28.569		26.12	0.04921	0.06953		0.07127	0.21602		0.00345	
6.508	9.196	11.266	9.425	28.569	30.083	26.12	0.04921	0.06953	0.08518	0.07127	0.21602	0.22747	0.00345	
6.508	**9.196**	**11.266**	**9.425**	**28.569**	**30.083**	**26.12**	**0.04921**	**0.06953**	**0.08518**	**0.07127**	**0.21602**	**0.22747**	**0.00345**	
115 North Camas - Camas (Clark PUD) 1														
0.009	0.052		0.029	0.185		0.20	0.00007	0.00039		0.00022	0.00140		0.00003	
0.890	1.394		1.341	4.395		4.12	0.00673	0.01054		0.01014	0.03324		0.00054	
0.899	1.447	1.703	1.371	4.580	4.781	4.32	0.00680	0.01094	0.01288	0.01036	0.03463	0.03615	0.00057	
0.899	**1.447**	**1.703**	**1.371**	**4.580**	**4.781**	**4.32**	**0.00680**	**0.01094**	**0.01288**	**0.01036**	**0.03463**	**0.03615**	**0.00057**	
115 North Camas - Sifton 1														
0.979	5.819		3.127	20.027		20.68	0.00740	0.04400		0.02365	0.15143		0.00273	
0.027	0.153		0.087	0.552		0.61	0.00020	0.00116		0.00066	0.00417		0.00008	
1.006	5.972	6.056	3.214	20.579	20.828	21.29	0.00761	0.04515	0.04579	0.02430	0.15560	0.15749	0.00282	
1.006	**5.972**	**6.056**	**3.214**	**20.579**	**20.828**	**21.29**	**0.00761**	**0.04515**	**0.04579**	**0.02430**	**0.15560**	**0.15749**	**0.00282**	
115 Norway - Tap (Bandon - Fairview 1)														
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
0.004	0.008	0.009	0.007	0.027	0.028	0.03	0.00003	0.00006	0.00007	0.00005	0.00020	0.00021	0.00000	
0.004	**0.008**	**0.009**	**0.007**	**0.027**	**0.028**	**0.03**	**0.00003**	**0.00006**	**0.00007**	**0.00005**	**0.00020**	**0.00021**	**0.00000**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Oak Knoll - Ashland 1 (Pacificorp line)**												
	Mountain Avenue - tap (BPA SUB and Tap line)												
	Oak Knoll - 3/3	0.85	SWP		397.5 kcmil ACSR Ibis	9.13	0.253	0.709	0.539	2.792	5.982		
	3/3 - 7/7 Tap (Mountain Ave.)	4.19	SWP		556.5 kcmil AAC Dahlia (19)	9.13	0.186	0.707	0.472	2.790	6.078		
	7/7 Tap (MTN Ave) - Ashland	0.33	SWP		556.5 kcmil AAC Dahlia (19)	9.13	0.186	0.707	0.472	2.790	6.078		
		5.37											
		5.37											
115	**Odessa - Odessa(AVA)**												
		0.03	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		0.03											
		0.03											
115	**Okanogan - East Omak 1**												
	Okanogan - Str 1/1	0.09	WSP	H15	1/0 Cu 7 Str	11.34	0.601	0.840	0.887	2.844	5.103	OKAN	M-181
	Str 1/1 - Str 6/5	5.05	WHF		1/0 F CuW Cu (6/1)	13.23	0.627	0.860	0.913	2.808	5.025	OKAN	
	Str 6/5 - Str 7/12	0.91	WSP		556.5 kcmil ACSR Dove	12.44	0.181	0.726	0.467	2.696	5.837	OKAN	
	Str 7/12 - East Omak	0.14	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	OKAN	
		6.19											
		6.19											
115	**Olympia - Cosmopolis 1**												
	Olympia - South Elma	21.15	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-135
		21.15											
	South Elma - Satsop Construction	4.96	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		M-136
		4.96											
	Satsop Construction - Aberdeen Tap	5.85	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		5.85											
	Aberdeen Tap - Str 41/6	9.12	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 41/6 - Cosmopolis	0.09	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		9.21											
		41.17											
115	**Olympia - Shelton 1**												
	Olympia - Str 1/5	0.48	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-135
	Str 1/5 - Str 12/3	11.12	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-197
	Str 12/3 - Str 12/4	0.23	SDC	H4	397.5 kcmil ACSR Ibis	15.43	0.253	0.773	0.539	2.665	5.473		
	Str 12/4 - Dayton Tap (Mason 3)	6.13	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		17.96											
	Dayton Tap - Str 19/6	1.23	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 19/6 - Shelton	0.56	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.79											
		19.75											
115	**Olympia - Shelton 2**												
	Olympia - Str 1/2	0.13	WHF	J3	397.5 kcmil ACSR Ibis	34.02	0.253	0.869	0.539	2.473	4.850		M-135
	Str 1/2 - Twr 1/3	0.12	WHF	J3	397.5 kcmil ACSR Ibis	34.02	0.253	0.869	0.539	2.473	4.850		M-136
	Twr 1/3 - Twr 6/1	4.92	TDC	J20	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		M-197
	Twr 6/1 - Twr 7/2	1.12	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-198
	Twr 7/2 - Str 9/1	1.75	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 9/1 - Twr 12/3	3.57	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Twr 12/3 - Twr 12/4	0.23	SDC	H2	397.5 kcmil ACSR Ibis	15.43	0.253	0.773	0.539	2.665	5.473		
	Twr 12/4 - Skookum (13/3)	0.93	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		12.77											
@	Skookum (13/3) - Str 19/6	6.41	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		6.41											
	Str 19/6 - Shelton	0.55	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.55											
		19.73											
115	**Oregon City - Chemawa 1 (De-Energized)**												
	Oregon City - Str 1/7	0.58	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-167
	Str 1/7 - Str 3/13	2.01	WSP	H17	250 kcmil Cu PH D 1319 HSC	12.72	0.265	0.768	0.551	2.730	5.486		
	Str 3/13 - Str 4/1	0.37	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 4/1 - Str 4/4	0.25	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		
@	Str 4/4 - Str 6/11	2.29	WSP	H17	250 kcmil Cu PH D 1319 HSC	12.72	0.265	0.768	0.551	2.730	5.486		
	Str 6/11 - Str 13/9	6.95	WSP	H17	250 kcmil Cu PH D 1319 HSC	12.72	0.265	0.768	0.551	2.730	5.486		
	Str 13/9 - Str 14/3	0.61	WSP	H17	250 kcmil Cu PH D 1319 HSC	12.72	0.265	0.768	0.551	2.730	5.486		
	Str 14/3 - Str 26/3	11.97	WSP	H17	250 kcmil Cu PH D 1319 HSC	12.72	0.265	0.768	0.551	2.730	5.486		
	Str 26/3 - Chemawa	0.12	WSP	H17	250 kcmil Cu PH D 1319 HSC	12.72	0.265	0.768	0.551	2.730	5.486		
		25.15											
		25.15											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Oak Knoll - Ashland 1 (Pacificorp line)														
0.215	0.603		0.458	2.373		2.54	0.00163	0.00456		0.00347	0.01794		0.00034	
0.778	2.961		1.976	11.688		12.73	0.00588	0.02239		0.01494	0.08838		0.00168	
0.061	0.233		0.156	0.921		1.00	0.00046	0.00176		0.00118	0.00696		0.00013	
1.054	3.797	3.940	2.590	14.982	15.204	16.28	0.00797	0.02871	0.02979	0.01959	0.11328	0.11496	0.00215	
1.054	**3.797**	**3.940**	**2.590**	**14.982**	**15.204**	**16.28**	**0.00797**	**0.02871**	**0.02979**	**0.01959**	**0.11328**	**0.11496**	**0.00215**	
115 Odessa - Odessa(AVA)														
0.017	0.026		0.025	0.083		0.08	0.00013	0.00020		0.00019	0.00063		0.00001	
0.017	0.026	0.031	0.025	0.083	0.087	0.08	0.00013	0.00020	0.00024	0.00019	0.00063	0.00066	0.00001	
0.017	**0.026**	**0.031**	**0.025**	**0.083**	**0.087**	**0.08**	**0.00013**	**0.00020**	**0.00024**	**0.00019**	**0.00063**	**0.00066**	**0.00001**	
115 Okanogan - East Omak 1														
0.054	0.076		0.080	0.256		0.23	0.00041	0.00057		0.00060	0.00194		0.00003	
3.166	4.345		4.611	14.182		12.69	0.02394	0.03285		0.03486	0.10723		0.00168	
0.165	0.661		0.425	2.454		2.66	0.00125	0.00500		0.00322	0.01855		0.00035	
0.025	0.103		0.065	0.375		0.40	0.00019	0.00078		0.00049	0.00284		0.00005	
3.411	5.184	6.205	5.181	17.267	18.027	15.98	0.02579	0.03920	0.04692	0.03918	0.13056	0.13631	0.00211	
3.411	**5.184**	**6.205**	**5.181**	**17.267**	**18.027**	**15.98**	**0.02579**	**0.03920**	**0.04692**	**0.03918**	**0.13056**	**0.13631**	**0.00211**	
115 Olympia - Cosmopolis 1														
5.359	16.291		11.408	56.461		58.06	0.04052	0.12318		0.08626	0.42693		0.00768	
5.359	16.291	17.150	11.408	56.461	57.602	58.06	0.04052	0.12318	0.12968	0.08626	0.42693	0.43555	0.00768	
2.792	4.378		4.211	13.798		12.93	0.02112	0.03310		0.03184	0.10433		0.00171	
2.792	4.378	5.192	4.211	13.798	14.426	12.93	0.02112	0.03310	0.03926	0.03184	0.10433	0.10908	0.00171	
3.294	5.163		4.967	16.274		15.24	0.02490	0.03904		0.03756	0.12305		0.00202	
3.294	5.163	6.124	4.967	16.274	17.015	15.24	0.02490	0.03904	0.04631	0.03756	0.12305	0.12866	0.00202	
5.135	8.049		7.743	25.371		23.77	0.03882	0.06086		0.05855	0.19184		0.00314	
0.023	0.069		0.049	0.240		0.25	0.00017	0.00052		0.00037	0.00182		0.00003	
5.157	8.118	9.618	7.791	25.611	26.770	24.01	0.03900	0.06139	0.07273	0.05891	0.19366	0.20242	0.00318	
16.603	**33.950**	**37.792**	**28.377**	**112.144**	**115.679**	**110.25**	**0.12554**	**0.25671**	**0.28576**	**0.21457**	**0.84797**	**0.87470**	**0.01458**	
115 Olympia - Shelton 1														
0.122	0.370		0.259	1.281		1.32	0.00092	0.00280		0.00196	0.00969		0.00017	2-3/8 IN HS STL
2.818	8.565		5.998	29.685		30.53	0.02131	0.06477		0.04535	0.22446		0.00404	
0.058	0.178		0.124	0.613		0.63	0.00044	0.00134		0.00094	0.00463		0.00008	
1.553	4.722		3.307	16.364		16.83	0.01175	0.03570		0.02500	0.12374		0.00223	
4.551	13.834	14.564	9.688	47.944	48.913	49.30	0.03441	0.10461	0.11012	0.07325	0.36253	0.36985	0.00652	
0.312	0.947		0.663	3.284		3.38	0.00236	0.00716		0.00502	0.02483		0.00045	
0.142	0.431		0.302	1.495		1.54	0.00107	0.00326		0.00228	0.01130		0.00020	2-3/8 IN HS STL
0.454	1.379	1.451	0.966	4.779	4.875	4.91	0.00343	0.01043	0.01098	0.00730	0.03613	0.03686	0.00065	
5.005	**15.213**	**16.015**	**10.653**	**52.723**	**53.788**	**54.22**	**0.03784**	**0.11503**	**0.12110**	**0.08055**	**0.39866**	**0.40672**	**0.00717**	
115 Olympia - Shelton 2														
0.033	0.113		0.070	0.321		0.32	0.00025	0.00085		0.00053	0.00243		0.00004	2-3/8 IN HS STL
0.030	0.104		0.065	0.297		0.29	0.00023	0.00079		0.00049	0.00224		0.00004	1-7 NO 8 ALWLD
0.407	3.737		1.814	12.310		13.76	0.00308	0.02825		0.01372	0.09308		0.00182	
0.284	0.863		0.604	2.990		3.07	0.00215	0.00652		0.00457	0.02261		0.00041	
0.443	1.381		0.944	4.606		4.69	0.00335	0.01044		0.00714	0.03483		0.00062	
0.905	2.750		1.926	9.530		9.80	0.00684	0.02079		0.01456	0.07206		0.00130	
0.058	0.178		0.124	0.613		0.63	0.00044	0.00134		0.00094	0.00463		0.00008	
0.236	0.716		0.502	2.483		2.55	0.00178	0.00542		0.00379	0.01877		0.00034	
2.397	9.841	10.129	6.049	33.151	33.698	35.11	0.01812	0.07441	0.07659	0.04574	0.25067	0.25481	0.00464	
1.624	4.937		3.458	17.112		17.60	0.01228	0.03733		0.02614	0.12939		0.00233	
1.624	4.937	5.198	3.458	17.112	17.458	17.60	0.01228	0.03733	0.03930	0.02614	0.12939	0.13201	0.00233	
0.139	0.424		0.297	1.468		1.51	0.00105	0.00320		0.00224	0.01110		0.00020	
0.139	0.424	0.446	0.297	1.468	1.498	1.51	0.00105	0.00320	0.00337	0.00224	0.01110	0.01133	0.00020	
4.160	**15.202**	**15.761**	**9.803**	**51.731**	**52.651**	**54.22**	**0.03146**	**0.11495**	**0.11918**	**0.07412**	**0.39116**	**0.39812**	**0.00717**	
115 Oregon City - Chemawa 1 (De-Energized)														
0.109	0.460		0.275	1.561		1.56	0.00082	0.00348		0.00208	0.01181		0.00021	
0.532	1.544		1.107	5.488		5.51	0.00402	0.01168		0.00837	0.04150		0.00073	
0.094	0.285		0.200	0.988		1.02	0.00071	0.00215		0.00151	0.00747		0.00013	
0.066	0.197		0.138	0.672		0.67	0.00050	0.00149		0.00104	0.00508		0.00009	
0.606	1.759		1.261	6.253		6.28	0.00458	0.01330		0.00953	0.04728		0.00083	
1.838	5.339		3.826	18.976		19.06	0.01390	0.04037		0.02893	0.14349		0.00252	
0.161	0.469		0.336	1.666		1.67	0.00122	0.00354		0.00254	0.01259		0.00022	LINE SEC REMOVE
3.166	9.195		6.589	32.683		32.83	0.02394	0.06953		0.04983	0.24713		0.00434	
0.032	0.092		0.066	0.328		0.33	0.00024	0.00070		0.00050	0.00248		0.00004	LINE SEC REMOVE
6.604	19.340	20.437	13.796	68.615	69.988	68.94	0.04993	0.14624	0.15453	0.10432	0.51882	0.52921	0.00912	
6.604	**19.340**	**20.437**	**13.796**	**68.615**	**69.988**	**68.94**	**0.04993**	**0.14624**	**0.15453**	**0.10432**	**0.51882**	**0.52921**	**0.00912**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Oregon City - Chemawa 2**												
	Oregon City - Str 1/7	0.58	WHF	H7	250 kcmil Cu PH D 1319 HSC	15.12	0.265	0.789	0.551	2.688	5.336		M-167
	Str 1/7 - Str 3/12	2.02	WSP	H16	250 kcmil Cu PH D 1319 HSC	11.79	0.265	0.759	0.551	2.749	5.555		
	Str 3/12 - Str 3/15	0.36	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 3/15 - Str 4/3	0.26	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 4/3 - Str 7/12	3.40	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
	Str 7/12 - Fargo (PGE)	0.04	WSP	H15	556.5 kcmil ACSR Dove	11.34	0.181	0.715	0.467	2.719	5.932		
		6.66											
	Fargo (PGE) - Str 7/15	0.04	WSP	H15	556.5 kcmil ACSR Dove	11.34	0.181	0.715	0.467	2.719	5.932		
	Str 7/15 - Str 23/13	15.96	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
	Str 23/13 - Str 24/13	1.08	WSP	H16	250 kcmil Cu 19 Str	11.79	0.257	0.786	0.543	2.776	5.436		
	Str 24/13 - Str 25/14	0.99	WSP	H16	350 kcmil Cu 19 Str	11.79	0.185	0.766	0.471	2.756	5.587		
	Str 25/14 Str 25/23	0.42	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 25/23 - Str 25/24	0.04	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
	Str 25/24 - Chemawa	0.02	WHF	H7	350 kcmil Cu 19 Str	15.12	0.185	0.796	0.471	2.695	5.366		
		18.55											
		25.21											
115	**Oregon City - Sherwood(PGE) 1 (Non-Operating)**												
	Str 20/7 - Twr 17/1	0.04	WHF	H11	795 kcmil AAC Arbutus (37)	17.64	0.131	0.763	0.417	2.606	5.597		M-131
	Twr 17/1 - Twr 17/5	0.73	SDC		1272 kcmil AAC Narcissus	22.89	0.084	0.765	0.370	2.513	5.575	PGE	M-132
	Twr 17/5 - Sherwood	0.18	WSP		795 kcmil AAC Arbutus (37)	9.46	0.131	0.687	0.417	2.757	6.243		M-161
		0.95											
		0.95											
115	**Oregon City - Tap (St Johns - Keeler 2)(Leased to PGE)**												
	Operating Name (Oregon City Stub)												
	Oregon City - Str 20/7 0pen	3.53	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-131
	Str 20/7 - PGE Tap	11.12	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374	PGE	M-132
		14.65											
	PGE Tap - Str 6/10 Open	2.49	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374	PGE	
	Str 6/10 - Str 6/9	0.16	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		
		2.65											
		17.30											
115	**Palisades - Goshen 1**												
@		51.71	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-207
		51.71											
		51.71											
115	**Palisades - Snake River**												
	Palisades - ID/WY Border	12.60	WHF		954 kcmil ACSR Cardinal	15.75	0.107	0.724	0.393	2.608	5.856	LVPL	
		12.60											
	ID/WY Border - Clingers Corner	3.46	WHF		954 kcmil ACSR Cardinal	15.75	0.107	0.724	0.393	2.608	5.856	LVPL	
		3.46											
	Clingers Corner - Snake River	1.40	TDC		556.5 kcmil ACSR Dove	15.75	0.181	0.755	0.467	2.639	5.608	LVPL	
		1.40											
		17.46											
115	**Palisades - Swan Valley 1**												
	Palisades - Str 13/2	12.32	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
	Str 13/2 - Swan Valley	0.16	WSP	H12	556.5 kcmil ACSR Dove	8.82	0.181	0.684	0.467	2.780	6.206		
		12.48											
		12.48											
115	**Parker (BLC) - Tap(Albany - Eugene)**												
		0.06	PCH	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.06											
		0.06											
115	**Pennwalt - Tap (Harborton - Station E(PGE))**												
		0.43			4/0 Cu 7 Str	13.05	0.300	0.815	0.586	2.768	5.269		
		0.43											
		0.43											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Oregon City - Chemawa 2														
0.153	0.458		0.319	1.559		1.55	0.00116	0.00346		0.00241	0.01179		0.00020	2-3/8 IN HS STL
0.534	1.533		1.112	5.553		5.61	0.00404	0.01159		0.00841	0.04199		0.00074	
0.091	0.277		0.194	0.961		0.99	0.00069	0.00210		0.00147	0.00727		0.00013	
0.067	0.212		0.141	0.706		0.68	0.00051	0.00160		0.00107	0.00534		0.00009	
0.627	2.604		1.600	9.369		9.50	0.00474	0.01969		0.01210	0.07084		0.00126	
0.007	0.029		0.019	0.109		0.12	0.00005	0.00022		0.00014	0.00082		0.00002	
1.480	5.113	5.323	3.385	18.257	18.568	18.44	0.01119	0.03866	0.04025	0.02560	0.13805	0.14040	0.00244	
0.007	0.029		0.019	0.109		0.12	0.00005	0.00022		0.00014	0.00082		0.00002	
2.945	12.221		7.509	43.980		44.58	0.02227	0.09241		0.05678	0.33255		0.00590	
0.278	0.849		0.587	2.998		2.94	0.00210	0.00642		0.00444	0.02267		0.00039	
0.183	0.758		0.466	2.728		2.77	0.00138	0.00573		0.00352	0.02063		0.00037	
0.077	0.334		0.198	1.132		1.13	0.00059	0.00253		0.00149	0.00856		0.00015	1-3/8 IN HS STL
0.007	0.032		0.019	0.108		0.11	0.00006	0.00024		0.00014	0.00082		0.00001	
0.004	0.016		0.009	0.054		0.05	0.00003	0.00012		0.00007	0.00041		0.00001	2-3/8 IN HS STL
3.501	14.239	14.663	8.806	51.108	51.861	51.69	0.02647	0.10767	0.11087	0.06659	0.38645	0.39215	0.00684	
4.981	**19.352**	**19.983**	**12.191**	**69.365**	**70.428**	**70.13**	**0.03767**	**0.14633**	**0.15110**	**0.09218**	**0.52450**	**0.53254**	**0.00928**	
115 Oregon City - Sherwood(PGE) 1 (Non-Operating)														
0.005	0.031		0.017	0.104		0.11	0.00004	0.00023		0.00013	0.00079		0.00001	
0.061	0.559		0.270	1.835		2.03	0.00046	0.00422		0.00204	0.01387		0.00027	
0.024	0.124		0.075	0.496		0.56	0.00018	0.00094		0.00057	0.00375		0.00007	
0.090	0.713	0.718	0.362	2.435	2.462	2.71	0.00068	0.00539	0.00543	0.00274	0.01841	0.01862	0.00036	
0.090	**0.713**	**0.718**	**0.362**	**2.435**	**2.462**	**2.71**	**0.00068**	**0.00539**	**0.00543**	**0.00274**	**0.01841**	**0.01862**	**0.00036**	
115 Oregon City - Tap (St Johns - Keeler 2)(Leased to PGE)														
0.663	2.798		1.673	9.503		9.48	0.00501	0.02116		0.01265	0.07185		0.00125	
2.088	8.814		5.269	29.935		29.88	0.01579	0.06665		0.03984	0.22635		0.00395	
2.751	11.613	11.934	6.941	39.437	40.043	39.36	0.02080	0.08781	0.09024	0.05249	0.29820	0.30279	0.00521	
0.468	1.974		1.180	6.703		6.69	0.00354	0.01492		0.00892	0.05068		0.00088	
0.030	0.127		0.076	0.431		0.43	0.00023	0.00096		0.00057	0.00326		0.00006	
0.498	2.101	2.159	1.256	7.134	7.243	7.12	0.00376	0.01588	0.01632	0.00949	0.05394	0.05477	0.00094	
3.249	**13.713**	**14.093**	**8.197**	**46.571**	**47.287**	**46.48**	**0.02457**	**0.10369**	**0.10656**	**0.06198**	**0.35214**	**0.35756**	**0.00615**	
115 Palisades - Goshen 1														
9.375	38.771		24.164	136.984		145.98	0.07089	0.29316		0.18272	1.03579		0.01931	
9.375	38.771	39.888	24.164	136.984	139.099	145.98	0.07089	0.29316	0.30161	0.18272	1.03579	1.05179	0.01931	
9.375	**38.771**	**39.888**	**24.164**	**136.984**	**139.099**	**145.98**	**0.07089**	**0.29316**	**0.30161**	**0.18272**	**1.03579**	**1.05179**	**0.01931**	
115 Palisades - Snake River														
1.353	9.123		4.957	32.866		36.89	0.01023	0.06898		0.03748	0.24852		0.00488	
1.353	9.123	9.222	4.957	32.866	33.238	36.89	0.01023	0.06898	0.06973	0.03748	0.24852	0.25133	0.00488	
0.372	2.505		1.361	9.025		10.13	0.00281	0.01894		0.01029	0.06824		0.00134	
0.372	2.505	2.532	1.361	9.025	9.127	10.13	0.00281	0.01894	0.01915	0.01029	0.06824	0.06902	0.00134	
0.254	1.057		0.654	3.695		3.93	0.00192	0.00799		0.00495	0.02794		0.00052	2 PAIR FIBER OPT
0.254	1.057	1.087	0.654	3.695	3.752	3.93	0.00192	0.00799	0.00822	0.00495	0.02794	0.02837	0.00052	
1.979	**12.684**	**12.838**	**6.972**	**45.587**	**46.117**	**50.95**	**0.01496**	**0.09591**	**0.09707**	**0.05272**	**0.34470**	**0.34871**	**0.00674**	
115 Palisades - Swan Valley 1														
2.234	9.237		5.757	32.637		34.78	0.01689	0.06985		0.04353	0.24678		0.00460	2-3/8 IN HS STL
0.029	0.109		0.075	0.445		0.50	0.00022	0.00083		0.00057	0.00336		0.00007	1-3/8 IN HS STL
2.263	9.347	9.617	5.832	33.081	33.592	35.28	0.01711	0.07067	0.07272	0.04410	0.25014	0.25400	0.00467	
2.263	**9.347**	**9.617**	**5.832**	**33.081**	**33.592**	**35.28**	**0.01711**	**0.07067**	**0.07272**	**0.04410**	**0.25014**	**0.25400**	**0.00467**	
115 Parker (BLC) - Tap(Albany - Eugene)														
0.023	0.048		0.040	0.162		0.16	0.00017	0.00036		0.00030	0.00122		0.00002	
0.023	0.048	0.053	0.040	0.162	0.166	0.16	0.00017	0.00036	0.00040	0.00030	0.00122	0.00126	0.00002	
0.023	**0.048**	**0.053**	**0.040**	**0.162**	**0.166**	**0.16**	**0.00017**	**0.00036**	**0.00040**	**0.00030**	**0.00122**	**0.00126**	**0.00002**	
115 Pennwalt - Tap (Harborton - Station E(PGE))														
0.129	0.351		0.252	1.190		1.13	0.00098	0.00265		0.00191	0.00900		0.00015	
0.129	0.351	0.374	0.252	1.190	1.217	1.13	0.00098	0.00265	0.00282	0.00191	0.00900	0.00920	0.00015	
0.129	**0.351**	**0.374**	**0.252**	**1.190**	**1.217**	**1.13**	**0.00098**	**0.00265**	**0.00282**	**0.00191**	**0.00900**	**0.00920**	**0.00015**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Pine Street (Pend) - Rathdrum (AVA)**												
@	Pinestreet - CH 2	0.06	WHF		795 kcmil ACSR Drake	12.64	0.128	0.706	0.414	2.671	6.006	PPUD	
@	CH 2 - CH 3	1.08	WSP	T	556.5 kcmil ACSR Dove	10.09	0.181	0.701	0.467	2.747	6.056	AVA	
@	CH 3 - Blanchard	5.51	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
		6.65											
@	Blanchard - Hoo Doo Tap	6.50	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
		6.50											
@	Hoo Doo Tap - Spirit Lake Tap	6.41	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
		6.41											
@	Spirit Lake Tap - Athol (KEC & NLI) Tap	2.02	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
		2.02											
@	Athol (KEC & NLI) Tap - Scarcello Tap	5.56	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
		5.56											
@	Scarcello Tap - CH 4	4.99	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
@	CH 4 - CH 5	0.22	WSP	T	556.5 kcmil AAC Dahlia (19)	10.54	0.186	0.724	0.472	2.755	5.925	AVA	
@	CH 5 - CH 6	0.81	WDC		556.5 kcmil AAC Dahlia (19)	10.13	0.186	0.719	0.472	2.764	5.966	AVA	
@	CH 6 - Rathdrum	0.12	WSP	T	556.5 kcmil AAC Dahlia (19)	10.54	0.186	0.724	0.472	2.755	5.925	AVA	
		6.14											
		33.28											
115	**Pinestreet - USK(PUD) 1**												
		15.10	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	PPUD	
		15.10											
		15.10											
115	**Pomeroy - Tap (Walla Walla - North Lewiston AVA 1)**												
		0.06	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
		0.06											
		0.06											
115	**Port Angeles - Sappho 1**												
		42.03	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		42.03											
		42.03											
115	**Potlatch - Tap (Shelton - Fairmount 1)**												
		0.03	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.03											
		0.03											
115	**Priest River - Tap (Albeni Falls - Bonners Ferry 1)**												
		3.05	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
		3.05											
		3.05											
115	**Prosser (BPUD) - Tap (Grandview - Richland 1)**												
		6.34	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		6.34											
		6.34											
115	**Radar (USBR) - Tap (Scooteney Tap Line)**												
		1.94	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		1.94											
		1.94											
115	**Rainbow Valley - Tap (Lane - Wendson 1)**												
		3.29	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.29											
		3.29											
115	**Ralston - Tap (East Colfax - Lind(AVA) Line)**												
	Ralston - Str 9/5	0.70	WSP	H24	266.8 kcmil ACSR/AW Partridge	12.44	0.365	0.771	0.651	2.741	5.489		
	Str 9/5 - Tap	5.24	WSP	H27	266.8 kcmil ACSR/AW Partridge	12.46	0.365	0.771	0.651	2.741	5.487		
		5.94											
		5.94											

PER SECTION														OVERHEAD GROUNDWIRE LOCATION
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Pine Street (Pend) - Rathdrum (AVA)														
0.008	0.042		0.025	0.160		0.18	0.00006	0.00032		0.00019	0.00121		0.00002	
0.196	0.757		0.505	2.967		3.27	0.00148	0.00572		0.00382	0.02243		0.00043	
0.999	4.042		2.575	14.775		15.91	0.00755	0.03056		0.01947	0.11172		0.00210	
1.202	4.841	4.988	3.104	17.902	18.169	19.36	0.00909	0.03661	0.03772	0.02347	0.13537	0.13739	0.00256	
1.178	4.768		3.037	17.430		18.77	0.00891	0.03605		0.02297	0.13179		0.00248	
1.178	4.768	4.912	3.037	17.430	17.692	18.77	0.00891	0.03605	0.03714	0.02297	0.13179	0.13378	0.00248	
1.162	4.702		2.995	17.188		18.51	0.00879	0.03556		0.02265	0.12997		0.00245	
1.162	4.702	4.844	2.995	17.188	17.447	18.51	0.00879	0.03556	0.03663	0.02265	0.12997	0.13193	0.00245	
0.366	1.482		0.944	5.417		5.83	0.00277	0.01120		0.00714	0.04096		0.00077	
0.366	1.482	1.526	0.944	5.417	5.498	5.83	0.00277	0.01120	0.01154	0.00714	0.04096	0.04157	0.00077	
1.008	4.079		2.598	14.909		16.06	0.00762	0.03084		0.01965	0.11273		0.00212	
1.008	4.079	4.201	2.598	14.909	15.134	16.06	0.00762	0.03084	0.03177	0.01965	0.11273	0.11443	0.00212	
0.905	3.661		2.332	13.381		14.41	0.00684	0.02768		0.01763	0.10118		0.00191	
0.041	0.159		0.104	0.606		0.65	0.00031	0.00120		0.00078	0.00458		0.00009	
0.150	0.583		0.382	2.239		2.42	0.00114	0.00440		0.00289	0.01693		0.00032	
0.022	0.087		0.057	0.331		0.36	0.00017	0.00066		0.00043	0.00250		0.00005	
1.118	4.489	4.626	2.874	16.556	16.804	17.83	0.00845	0.03395	0.03498	0.02173	0.12519	0.12706	0.00236	
6.035	**24.361**	**25.098**	**15.553**	**89.402**	**90.745**	**96.36**	**0.04564**	**0.18421**	**0.18978**	**0.11761**	**0.67601**	**0.68616**	**0.01274**	
115 Pinestreet - USK(PUD) 1														
1.925	10.995		6.244	39.674		43.94	0.01456	0.08314		0.04721	0.29999		0.00581	
1.925	10.995	11.162	6.244	39.674	40.162	43.94	0.01456	0.08314	0.08440	0.04721	0.29999	0.30369	0.00581	
1.925	**10.995**	**11.162**	**6.244**	**39.674**	**40.162**	**43.94**	**0.01456**	**0.08314**	**0.08440**	**0.04721**	**0.29999**	**0.30369**	**0.00581**	
115 Pomeroy - Tap (Walla Walla - North Lewiston AVA 1)														
0.015	0.047		0.033	0.161		0.16	0.00012	0.00036		0.00025	0.00122		0.00002	
0.015	0.047	0.050	0.033	0.161	0.165	0.16	0.00012	0.00036	0.00038	0.00025	0.00122	0.00124	0.00002	
0.015	**0.047**	**0.050**	**0.033**	**0.161**	**0.165**	**0.16**	**0.00012**	**0.00036**	**0.00038**	**0.00025**	**0.00122**	**0.00124**	**0.00002**	
115 Port Angeles - Sappho 1														
10.650	32.374		22.671	112.201		115.39	0.08053	0.24479		0.17143	0.84840		0.01526	
10.650	32.374	34.081	22.671	112.201	114.469	115.39	0.08053	0.24479	0.25770	0.17143	0.84840	0.86555	0.01526	
10.650	**32.374**	**34.081**	**22.671**	**112.201**	**114.469**	**115.39**	**0.08053**	**0.24479**	**0.25770**	**0.17143**	**0.84840**	**0.86555**	**0.01526**	
115 Potlatch - Tap (Shelton - Fairmount 1)														
0.011	0.024		0.020	0.081		0.08	0.00009	0.00018		0.00015	0.00061		0.00001	
0.011	0.024	0.026	0.020	0.081	0.083	0.08	0.00009	0.00018	0.00020	0.00015	0.00061	0.00063	0.00001	
0.011	**0.024**	**0.026**	**0.020**	**0.081**	**0.083**	**0.08**	**0.00009**	**0.00018**	**0.00020**	**0.00015**	**0.00061**	**0.00063**	**0.00001**	
115 Priest River - Tap (Albeni Falls - Bonners Ferry 1)														
1.149	2.322		2.021	8.417		8.47	0.00869	0.01756		0.01528	0.06364		0.00112	
1.149	2.322	2.591	2.021	8.417	8.656	8.47	0.00869	0.01756	0.01959	0.01528	0.06364	0.06545	0.00112	
1.149	**2.322**	**2.591**	**2.021**	**8.417**	**8.656**	**8.47**	**0.00869**	**0.01756**	**0.01959**	**0.01528**	**0.06364**	**0.06545**	**0.00112**	
115 Prosser (BPUD) - Tap (Grandview - Richland 1)														
2.388	5.036		4.202	17.078		16.86	0.01806	0.03808		0.03177	0.12913		0.00223	
2.388	5.036	5.574	4.202	17.078	17.587	16.86	0.01806	0.03808	0.04215	0.03177	0.12913	0.13298	0.00223	
2.388	**5.036**	**5.574**	**4.202**	**17.078**	**17.587**	**16.86**	**0.01806**	**0.03808**	**0.04215**	**0.03177**	**0.12913**	**0.13298**	**0.00223**	
115 Radar (USBR) - Tap (Scooteney Tap Line)														
1.092	1.712		1.647	5.397		5.06	0.00826	0.01295		0.01245	0.04081		0.00067	
1.092	1.712	2.031	1.647	5.397	5.643	5.06	0.00826	0.01295	0.01536	0.01245	0.04081	0.04267	0.00067	
1.092	**1.712**	**2.031**	**1.647**	**5.397**	**5.643**	**5.06**	**0.00826**	**0.01295**	**0.01536**	**0.01245**	**0.04081**	**0.04267**	**0.00067**	
115 Rainbow Valley - Tap (Lane - Wendson 1)														
1.239	2.613		2.180	8.862		8.75	0.00937	0.01976		0.01649	0.06701		0.00116	
1.239	2.613	2.892	2.180	8.862	9.126	8.75	0.00937	0.01976	0.02187	0.01649	0.06701	0.06901	0.00116	
1.239	**2.613**	**2.892**	**2.180**	**8.862**	**9.126**	**8.75**	**0.00937**	**0.01976**	**0.02187**	**0.01649**	**0.06701**	**0.06901**	**0.00116**	
115 Ralston - Tap (East Colfax - Lind(AVA) Line)														
0.256	0.539		0.456	1.919		1.92	0.00193	0.00408		0.00345	0.01451		0.00025	
1.915	4.039		3.413	14.361		14.38	0.01448	0.03054		0.02581	0.10859		0.00190	
2.170	4.579	5.067	3.869	16.280	16.733	16.30	0.01641	0.03462	0.03832	0.02926	0.12310	0.12653	0.00216	
2.170	**4.579**	**5.067**	**3.869**	**16.280**	**16.733**	**16.30**	**0.01641**	**0.03462**	**0.03832**	**0.02926**	**0.12310**	**0.12653**	**0.00216**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Rathdrum - Post Falls 1**												
	Rathdrum - CH 1	0.13	WSP		556.5 kcmil AAC Dahlia (19)	10.54	0.186	0.724	0.472	2.755	5.925	AVA	
	CH 1 - CH 2	0.81	WDC		556.5 kcmil AAC Dahlia (19)	10.13	0.186	0.719	0.472	2.764	5.966	AVA	
	CH 2 - CH 3	0.06	WSP		556.5 kcmil AAC Dahlia (19)	12.60	0.186	0.746	0.472	2.711	5.745	AVA	
	CH 3 - CH 4	3.99	WHF		556.5 kcmil ACSR Dove	13.23	0.181	0.734	0.467	2.681	5.775	AVA	
	CH 4 - CH 5	0.58	WHF		556.5 kcmil ACSR Parakeet	13.23	0.182	0.737	0.468	2.684	5.761	AVA	
	CH 5 - Applegay Tap	0.63	WSP		556.5 kcmil AAC Dahlia (19)	10.54	0.186	0.724	0.472	2.755	5.925	AVA	
		6.20											
	Applegay Tap - Prairie (KEC & AVA)	2.58	WHF		250 kcmil Cu 19 Str	13.23	0.257	0.800	0.543	2.748	5.336	AVA	
		2.58											
	Prairie (KEC & AVA) - CH 6	2.94	WHF		250 kcmil Cu 19 Str	13.23	0.257	0.800	0.543	2.748	5.336	AVA	
	CH 6 - CH 7	1.08	WHF		397.5 kcmil ACSR Ibis	13.23	0.253	0.754	0.539	2.702	5.613	AVA	
	CH 7 - CH 8	0.23	WHF		556.5 kcmil ACSR Parakeet	18.90	0.182	0.780	0.468	2.598	5.430	AVA	
	CH 8 - Post Falls	0.16	WHF		556.5 kcmil AAC Dahlia (19)	13.23	0.186	0.752	0.472	2.700	5.697	AVA	
		4.41											
		13.19											
115	**Raymond - Cosmopolis 1**												
	Raymond - Twr 167	18.14	SSC	SPEC	4/0 Cu 7 Str	14.76	0.300	0.830	0.586	2.738	5.169		
	Twr 167 - Cosmopolis	0.19	WHF	H7	4/0 Cu 7 Str	15.12	0.300	0.833	0.586	2.732	5.150		
		18.33											
		18.33											
115	**Raymond - Henkle Street**												
	Raymond - Twr 1/2 (Jumpers)	0.08	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M210
		0.08											
	Twr 1/2 - Twr 2/3	1.32	SSC	SPEC	4/0 Cu 7 Str	16.79	0.300	0.846	0.586	2.707	5.069		
	Twr 2/3 - Twr 2/4 (end BPA)	0.12	SSC	SPEC	4/0 Cu 7 Str	15.12	0.300	0.833	0.586	2.732	5.150		
		1.44											
	Twr 2/4 - Henkle Street (PCPUD)	0.84	WSP	SPEC	795 kcmil AAC Arbutus (37)	11.91	0.131	0.715	0.417	2.701	5.988	PCPUD	
		0.84											
		2.36											
115	**Raymond - Willapa River (PAC PUD) 1**												
	Willapa River Substation sold to Pacific County PUD												
	Raymond - Str 4/3	3.32	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 4/3 - Str 4/6	0.51	SSC	J5	397.5 kcmil ACSR Lark	34.96	0.251	0.866	0.537	2.460	4.851		
	Str 4/6 - Willapa River (PAC PUD)	0.68	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		4.51											
		4.51											
115	**Redmond - Harney 1**												
	Redmond - Str 1/7	0.67	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/7 - Str 9/3 PP&L Tie	7.58	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		8.25											
	Tie - Christmas Valley(Coop)	46.66	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		46.66											
	Christmas Valley - Hampton(Coop)	2.36	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		2.36											
	Hampton - Riley(Coop)	46.54	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		46.54											
	Riley(Coop) - Str 125/4	21.14	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 125/4 - Harney	0.61	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		21.75											
		125.56											
115	**Reedsport - Fairview 1**												
	Reedsport - Str 1/7	0.49	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-164
	Str 1/7 - Lakeside(PUD)	8.86	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		9.35											
	Lakeside(PUD) - Hauser	3.94	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.94											
	Hauser - Glasgow(Central Lincoln)	5.81	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		5.81											
	Glasgow(PUD) - Str 28/1	7.73	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 28/1 - Str 29/5	1.57	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 29/5 - Str 29/6	0.25	WHF	J7	397.5 kcmil ACSR Ibis	25.20	0.253	0.832	0.539	2.546	5.069		
	Str 29/6 - Str 30/5	0.88	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 30/5 - Str 31/1	0.48	WHF	J7	397.5 kcmil ACSR Ibis	25.20	0.253	0.832	0.539	2.546	5.069		
	Str 31/1 - Str 31/2	0.30	WHF	H11	397.5 kcmil ACSR Ibis	17.64	0.253	0.789	0.539	2.632	5.356		
	Str 31/2 - Sumner (34/1)	2.81	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		14.02											
	Sumner (34/1) - Str 35/1	1.38	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 35/1 - Str 35/2	0.59	WHF	J6	795 kcmil ACSR Drake	28.98	0.128	0.807	0.414	2.470	5.232		
	Str 35/2 - Str 38/7	2.90	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 38/7 - Str 39/1	0.11	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 39/1 - Fairview	0.38	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		5.36											
		38.48											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Rathdrum - Post Falls 1														
0.024	0.094		0.061	0.358		0.39	0.00018	0.00071		0.00046	0.00271		0.00005	
0.150	0.583		0.382	2.239		2.42	0.00114	0.00440		0.00289	0.01693		0.00032	
0.011	0.045		0.028	0.163		0.17	0.00008	0.00034		0.00021	0.00123		0.00002	
0.723	2.927		1.865	10.699		11.52	0.00547	0.02213		0.01410	0.08090		0.00152	
0.106	0.427		0.272	1.557		1.67	0.00080	0.00323		0.00205	0.01177		0.00022	
0.117	0.456		0.297	1.735		1.87	0.00088	0.00345		0.00225	0.01312		0.00025	
1.132	4.532	4.671	2.905	16.751	17.001	18.03	0.00856	0.03427	0.03532	0.02196	0.12666	0.12855	0.00238	
0.664	2.064		1.401	7.090		6.88	0.00502	0.01561		0.01060	0.05361		0.00091	
0.664	2.064	2.168	1.401	7.090	7.227	6.88	0.00502	0.01561	0.01640	0.01060	0.05361	0.05465	0.00091	
0.756	2.352		1.597	8.079		7.84	0.00572	0.01779		0.01208	0.06109		0.00104	
0.274	0.814		0.583	2.918		3.03	0.00207	0.00616		0.00440	0.02207		0.00040	
0.042	0.179		0.108	0.598		0.62	0.00032	0.00136		0.00081	0.00452		0.00008	
0.030	0.120		0.075	0.432		0.46	0.00022	0.00091		0.00057	0.00327		0.00006	
1.101	3.466	3.637	2.363	12.027	12.257	11.96	0.00833	0.02621	0.02750	0.01787	0.09094	0.09268	0.00158	
2.897	**10.062**	**10.471**	**6.669**	**35.868**	**36.483**	**36.87**	**0.02190**	**0.07609**	**0.07918**	**0.05043**	**0.27121**	**0.27586**	**0.00488**	
115 Raymond - Cosmopolis 1														
5.447	15.059		10.635	49.671		46.89	0.04119	0.11387		0.08042	0.37559		0.00620	
0.057	0.158		0.111	0.519		0.49	0.00043	0.00120		0.00084	0.00393		0.00006	
5.504	15.217	16.182	10.747	50.191	51.328	47.37	0.04162	0.11506	0.12236	0.08126	0.37951	0.38812	0.00627	
5.504	**15.217**	**16.182**	**10.747**	**50.191**	**51.328**	**47.37**	**0.04162**	**0.11506**	**0.12236**	**0.08126**	**0.37951**	**0.38812**	**0.00627**	
115 Raymond - Henkle Street														
0.030	0.064		0.053	0.215		0.21	0.00023	0.00048		0.00040	0.00163		0.00003	
0.030	0.064	0.070	0.053	0.215	0.222	0.21	0.00023	0.00048	0.00053	0.00040	0.00163	0.00168	0.00003	
0.396	1.116		0.774	3.573		3.35	0.00300	0.00844		0.00585	0.02702		0.00044	
0.036	0.100		0.070	0.328		0.31	0.00027	0.00076		0.00053	0.00248		0.00004	
0.432	1.216	1.291	0.844	3.901	3.991	3.65	0.00327	0.00920	0.00976	0.00638	0.02950	0.03018	0.00048	
0.110	0.601		0.350	2.269		2.51	0.00083	0.00454		0.00265	0.01716		0.00033	
0.110	0.601	0.611	0.350	2.269	2.296	2.51	0.00083	0.00454	0.00462	0.00265	0.01716	0.01736	0.00033	
0.573	**1.881**	**1.966**	**1.248**	**6.386**	**6.506**	**6.38**	**0.00433**	**0.01422**	**0.01487**	**0.00943**	**0.04828**	**0.04920**	**0.00084**	
115 Raymond - Willapa River (PAC PUD) 1														
1.869	2.930		2.819	9.236		8.65	0.01413	0.02216		0.02131	0.06984		0.00114	
0.128	0.442		0.274	1.255		1.24	0.00097	0.00334		0.00207	0.00949		0.00016	
0.383	0.600		0.577	1.892		1.77	0.00289	0.00454		0.00437	0.01430		0.00023	
2.380	3.972	4.631	3.670	12.382	12.915	11.66	0.01800	0.03003	0.03501	0.02775	0.09363	0.09765	0.00154	
2.380	**3.972**	**4.631**	**3.670**	**12.382**	**12.915**	**11.66**	**0.01800**	**0.03003**	**0.03501**	**0.02775**	**0.09363**	**0.09765**	**0.00154**	
115 Redmond - Harney 1														
0.170	0.516		0.361	1.789		1.84	0.00128	0.00390		0.00273	0.01352		0.00024	2-3/8 IN HS STL
1.921	5.839		4.089	20.235		20.81	0.01452	0.04415		0.03092	0.15301		0.00275	
2.091	6.355	6.690	4.450	22.024	22.469	22.65	0.01581	0.04805	0.05058	0.03365	0.16653	0.16990	0.00300	
11.824	35.940		25.168	124.562		128.10	0.08940	0.27176		0.19031	0.94186		0.01694	
11.824	35.940	37.835	25.168	124.562	127.079	128.10	0.08940	0.27176	0.28609	0.19031	0.94186	0.96090	0.01694	
0.598	1.818		1.273	6.300		6.48	0.00452	0.01375		0.00963	0.04764		0.00086	
0.598	1.818	1.914	1.273	6.300	6.427	6.48	0.00452	0.01375	0.01447	0.00963	0.04764	0.04860	0.00086	
11.793	35.848		25.104	124.241		127.77	0.08917	0.27106		0.18982	0.93944		0.01690	
11.793	35.848	37.738	25.104	124.241	126.752	127.77	0.08917	0.27106	0.28535	0.18982	0.93944	0.95843	0.01690	
5.357	16.283		11.403	56.434		58.04	0.04051	0.12312		0.08622	0.42673		0.00768	
0.155	0.470		0.329	1.628		1.67	0.00117	0.00355		0.00249	0.01231		0.00022	2-3/8 IN HS STL
5.511	16.753	17.636	11.732	58.063	59.236	59.71	0.04167	0.12668	0.13336	0.08871	0.43904	0.44791	0.00790	
31.817	**96.713**	**101.813**	**67.727**	**335.190**	**341.963**	**344.71**	**0.24058**	**0.73129**	**0.76985**	**0.51211**	**2.53451**	**2.58573**	**0.04559**	
115 Reedsport - Fairview 1														
0.185	0.389		0.325	1.320		1.30	0.00140	0.00294		0.00246	0.00998		0.00017	2-3/8 IN HS STL
3.338	7.038		5.872	23.866		23.56	0.02524	0.05322		0.04440	0.18046		0.00312	
3.522	7.427	8.220	6.196	25.186	25.937	24.86	0.02663	0.05616	0.06216	0.04685	0.19044	0.19612	0.00329	
1.484	3.130		2.611	10.613		10.48	0.01122	0.02367		0.01974	0.08025		0.00139	
1.484	3.130	3.464	2.611	10.613	10.930	10.48	0.01122	0.02367	0.02619	0.01974	0.08025	0.08264	0.00139	
2.189	4.615		3.850	15.650		15.45	0.01655	0.03490		0.02911	0.11834		0.00204	
2.189	4.615	5.108	3.850	15.650	16.117	15.45	0.01655	0.03490	0.03862	0.02911	0.11834	0.12187	0.00204	
2.912	6.141		5.123	20.822		20.56	0.02202	0.04643		0.03873	0.15745		0.00272	
0.398	1.209		0.847	4.191		4.31	0.00301	0.00914		0.00640	0.03169		0.00057	
0.063	0.208		0.135	0.636		0.63	0.00048	0.00157		0.00102	0.00481		0.00008	
0.223	0.678		0.475	2.349		2.42	0.00169	0.00513		0.00359	0.01776		0.00032	
0.122	0.399		0.259	1.222		1.22	0.00092	0.00302		0.00196	0.00924		0.00016	
0.076	0.237		0.162	0.790		0.80	0.00057	0.00179		0.00122	0.00597		0.00011	
1.059	2.232		1.862	7.569		7.47	0.00800	0.01688		0.01408	0.05723		0.00099	
4.852	11.104	12.118	8.862	37.580	38.610	37.41	0.03669	0.08396	0.09163	0.06701	0.28416	0.29195	0.00495	
0.520	1.096		0.915	3.717		3.67	0.00393	0.00829		0.00692	0.02811		0.00049	
0.075	0.476		0.244	1.457		1.54	0.00057	0.00360		0.00184	0.01102		0.00020	
1.092	2.304		1.922	7.812		7.71	0.00826	0.01742		0.01453	0.05907		0.00102	
0.041	0.087		0.073	0.296		0.29	0.00031	0.00066		0.00055	0.00224		0.00004	3/8 IN HS STL
0.096	0.293		0.205	1.014		1.04	0.00073	0.00221		0.00155	0.00767		0.00014	3/8 IN HS STL
1.825	4.256	4.631	3.358	14.297	14.686	14.26	0.01380	0.03218	0.03502	0.02539	0.10810	0.11105	0.00189	
13.872	**30.533**	**33.537**	**24.878**	**103.326**	**106.278**	**102.46**	**0.10490**	**0.23087**	**0.25358**	**0.18811**	**0.78129**	**0.80362**	**0.01355**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Ritzville - Tap (AVA)**												
		0.02	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		0.02											
		0.02											
115	**Rogue - Gold Beach 1**												
	Rogue - Str 1/4	0.21	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022		M-164
	Str 1/4 - Str 5/2	3.38	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 5/2 - Str 5/3	0.52	WHF	SPEC	397.5 kcmil ACSR Ibis	28.98	0.253	0.849	0.539	2.512	4.965		
	Str 5/3 - Str 6/4	0.89	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Twr 6/4 - Str 6/6	0.44	SDC	H5	556.5 kcmil ACSR Dove	15.66	0.181	0.754	0.467	2.641	5.613		
	Twr 6/6 - Gold Beach	0.03	SDC	H5	556.5 kcmil ACSR Dove	15.66	0.181	0.754	0.467	2.641	5.613		
		5.47											
		5.47											
115	**Rogue - Gold Beach 2**												
	Rogue - Str 1/5	0.23	WHF	H7	1272 kcmil ACSR Bittern	15.12	0.083	0.707	0.369	2.607	6.022		M-164
	Str 1/5 - Str 5/1	3.43	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 5/1 - Str 5/2	0.49	SSC	J16	556.5 kcmil ACSR Dove	32.76	0.181	0.844	0.467	2.461	4.999		
	Str 5/2 - Twr 6/4	0.87	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Twr 6/4 - Coos Curry Tap (6/6)	0.44	SDC	H5	556.5 kcmil ACSR Dove	15.66	0.181	0.754	0.467	2.641	5.613		
		5.46											
	Coos Curry Tap - Gold Beach	0.03	SDC	H5	556.5 kcmil ACSR Dove	15.66	0.181	0.754	0.467	2.641	5.613		
		0.03											
		5.49											
115	**Ross - Alcoa 1**												
	@ ? Line Section Operated in Parallel with (Ross - Alcoa 2) (TWR 4/2 - TWR 4/9) / Only Single Circuit Parameters Shown												
?	Twr 4/2 - Twr 4/8	0.94	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		M-121
		0.94											M-122
		0.94											
115	**Ross - Alcoa 2**												
	@ ? Line Section Operated in Parallel with (Ross - Alcoa 4) (TWR 4/2 - TWR 4/8) / Only Single Circuit Parameters Shown												
	Ross - Twr 1/2 (Jump 4)	0.23	SDC	H4	1.3 In AAC/TW Hood	15.43	0.069	0.718	0.355	2.610	5.964		M-121
?	Twr 1/2 (Jump 4) - Twr 4/2	2.97	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		M-122
?	Twr 4/2 - Twr 4/9	0.95	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
	Twr 4/9 - Alcoa	0.06	SDC	H4	1.3 In AAC/TW Hood	15.43	0.069	0.718	0.355	2.610	5.964		
		4.21											
		4.21											
115	**Ross - Alcoa 4**												
	@ ? Line Sections Operated in Parallel with (Ross - Alcoa 2) / Only Single Circuit Parameters Shown												
?	Twr 1/1 - Twr 1/3 (Jump 4)	0.04	WHF	J7	1272 kcmil ACSR Pheasant	25.20	0.082	0.764	0.368	2.477	5.543		M-121
?	Twr 1/3 - Twr 2/1	0.91	SDC	J2	1272 kcmil ACSR Pheasant	27.68	0.082	0.775	0.368	2.454	5.458		M-122
?	Twr 2/1 - Twr 3/3	1.18	SDC	J2	1272 kcmil ACSR Pheasant	27.68	0.082	0.775	0.368	2.454	5.458		
?	Twr 3/3 - Twr 4/2	0.91	SDC	J12	1272 kcmil ACSR Pheasant	24.08	0.082	0.758	0.368	2.488	5.584		
?	Twr 4/2 - Twr 4/8	0.94	SDC	J2	1272 kcmil ACSR Pheasant	27.68	0.082	0.775	0.368	2.454	5.458		
		3.98											
		3.98											
115	**Ross - Carborundum (Clark PUD) 1**												
	Ross - Twr 1/2	0.23	SDC	H4	1.3 In AAC/TW Hood	15.43	0.069	0.718	0.355	2.610	5.964		M-121
	Twr 1/2 - Twr 4/2	2.97	SDC	H4	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		M-122
	Twr 4/2 - Str 4/3	0.01	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
	Str 4/3 - Str 4/5	0.16	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		
	Str 4/5 - Carborundum (Clark PUD)	0.95	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		4.32											
		4.32											
115	**Ross - Clark County PUD 1**												
	Ross - CH 1	0.11	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		
	CH 1 - Tap	0.09	WHF	G1	250 kcmil Cu 19 Str	10.08	0.257	0.767	0.543	2.814	5.576	CPUD	
		0.20											
		0.20											
115	**Ross - Clark County PUD 2**												
		0.12	WHF	H22	350 kcmil Cu PH D 1319HSC2	14.49	0.188	0.788	0.474	2.702	5.411		
		0.12											
		0.12											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Ritzville - Tap (AVA)														
0.008	0.016		0.013	0.054		0.05	0.00006	0.00012		0.00010	0.00041		0.00001	
0.008	0.016	0.018	0.013	0.054	0.055	0.05	0.00006	0.00012	0.00013	0.00010	0.00041	0.00042	0.00001	
0.008	**0.016**	**0.018**	**0.013**	**0.054**	**0.055**	**0.05**	**0.00006**	**0.00012**	**0.00013**	**0.00010**	**0.00041**	**0.00042**	**0.00001**	
115 Rogue - Gold Beach 1														
0.017	0.149		0.077	0.547		0.63	0.00013	0.00112		0.00059	0.00414		0.00008	2-7 NO 8 ALWLD
1.273	2.685		2.240	9.105		8.99	0.00963	0.02030		0.01694	0.06884		0.00119	
0.132	0.442		0.280	1.306		1.29	0.00100	0.00334		0.00212	0.00988		0.00017	
0.335	0.707		0.590	2.397		2.37	0.00254	0.00535		0.00446	0.01813		0.00031	
0.080	0.332		0.206	1.162		1.23	0.00060	0.00251		0.00155	0.00879		0.00016	2-7 NO 8 ALWLD
0.005	0.023		0.014	0.079		0.08	0.00004	0.00017		0.00011	0.00060		0.00001	1-7 NO 8 ALWLD
1.843	4.336	4.712	3.407	14.597	14.989	14.60	0.01393	0.03279	0.03563	0.02576	0.11037	0.11334	0.00193	
1.843	**4.336**	**4.712**	**3.407**	**14.597**	**14.989**	**14.60**	**0.01393**	**0.03279**	**0.03563**	**0.02576**	**0.11037**	**0.11334**	**0.00193**	
115 Rogue - Gold Beach 2														
0.019	0.163		0.085	0.600		0.69	0.00014	0.00123		0.00064	0.00453		0.00009	2-7 NO 8 ALWLD
0.869	2.642		1.850	9.157		9.42	0.00657	0.01998		0.01399	0.06924		0.00125	
0.089	0.413		0.229	1.206		1.22	0.00067	0.00313		0.00173	0.00912		0.00016	
0.220	0.670		0.469	2.323		2.39	0.00167	0.00507		0.00355	0.01756		0.00032	
0.080	0.332		0.206	1.162		1.23	0.00060	0.00251		0.00155	0.00879		0.00016	2-7 NO 8 ALWLD
1.277	4.220	4.409	2.839	14.447	14.723	14.96	0.00966	0.03191	0.03334	0.02147	0.10924	0.11133	0.00198	
0.005	0.023		0.014	0.079		0.08	0.00004	0.00017		0.00011	0.00060		0.00001	1-7 NO 8 ALWLD
0.005	0.023	0.023	0.014	0.079	0.080	0.08	0.00004	0.00017	0.00018	0.00011	0.00060	0.00061	0.00001	
1.283	**4.243**	**4.432**	**2.853**	**14.526**	**14.803**	**15.04**	**0.00970**	**0.03208**	**0.03351**	**0.02157**	**0.10984**	**0.11193**	**0.00199**	
115 Ross - Alcoa 1														
0.170	0.707		0.439	2.486		2.64	0.00129	0.00535		0.00332	0.01879		0.00035	
0.170	0.707	0.727	0.439	2.486	2.524	2.64	0.00129	0.00535	0.00550	0.00332	0.01879	0.01909	0.00035	
0.170	**0.707**	**0.727**	**0.439**	**2.486**	**2.524**	**2.64**	**0.00129**	**0.00535**	**0.00550**	**0.00332**	**0.01879**	**0.01909**	**0.00035**	
115 Ross - Alcoa 2														
0.016	0.165		0.082	0.600		0.69	0.00012	0.00125		0.00062	0.00454		0.00009	
0.538	2.234		1.388	7.853		8.36	0.00407	0.01689		0.01049	0.05938		0.00111	
0.172	0.715		0.444	2.512		2.67	0.00130	0.00540		0.00336	0.01899		0.00035	
0.004	0.043		0.021	0.157		0.18	0.00003	0.00033		0.00016	0.00118		0.00002	
0.731	3.157	3.241	1.935	11.122	11.289	11.89	0.00553	0.02387	0.02450	0.01463	0.08410	0.08536	0.00157	
0.731	**3.157**	**3.241**	**1.935**	**11.122**	**11.289**	**11.89**	**0.00553**	**0.02387**	**0.02450**	**0.01463**	**0.08410**	**0.08536**	**0.00157**	
115 Ross - Alcoa 4														
0.003	0.031		0.015	0.099		0.11	0.00002	0.00023		0.00011	0.00075		0.00001	
0.075	0.705		0.335	2.233		2.48	0.00056	0.00533		0.00253	0.01689		0.00033	2-7 NO 8 ALWLD
0.097	0.914		0.434	2.896		3.22	0.00073	0.00691		0.00328	0.02190		0.00043	
0.075	0.690		0.335	2.264		2.54	0.00056	0.00522		0.00253	0.01712		0.00034	
0.077	0.728		0.346	2.307		2.57	0.00058	0.00551		0.00261	0.01744		0.00034	2-7 NO 8 ALWLD
0.326	3.068	3.086	1.464	9.799	9.908	10.92	0.00246	0.02320	0.02333	0.01107	0.07410	0.07492	0.00144	
0.326	**3.068**	**3.086**	**1.464**	**9.799**	**9.908**	**10.92**	**0.00246**	**0.02320**	**0.02333**	**0.01107**	**0.07410**	**0.07492**	**0.00144**	
115 Ross - Carborundum (Clark PUD) 1														
0.016	0.165		0.082	0.600		0.69	0.00012	0.00125		0.00062	0.00454		0.00009	
0.538	2.234		1.388	7.853		8.36	0.00407	0.01689		0.01049	0.05938		0.00111	
0.002	0.007		0.005	0.026		0.03	0.00001	0.00006		0.00004	0.00020		0.00000	
0.030	0.127		0.076	0.431		0.43	0.00023	0.00096		0.00057	0.00326		0.00006	
0.172	0.712		0.444	2.517		2.68	0.00130	0.00539		0.00336	0.01903		0.00035	
0.758	3.246	3.333	1.994	11.427	11.600	12.18	0.00573	0.02454	0.02521	0.01508	0.08641	0.08771	0.00161	
0.758	**3.246**	**3.333**	**1.994**	**11.427**	**11.600**	**12.18**	**0.00573**	**0.02454**	**0.02521**	**0.01508**	**0.08641**	**0.08771**	**0.00161**	
115 Ross - Clark County PUD 1														
0.021	0.087		0.052	0.296		0.30	0.00016	0.00066		0.00039	0.00224		0.00004	
0.023	0.069		0.049	0.253		0.25	0.00018	0.00052		0.00037	0.00192		0.00003	
0.044	0.156	0.162	0.101	0.549	0.559	0.55	0.00033	0.00118	0.00123	0.00076	0.00415	0.00422	0.00007	
0.044	**0.156**	**0.162**	**0.101**	**0.549**	**0.559**	**0.55**	**0.00033**	**0.00118**	**0.00123**	**0.00076**	**0.00415**	**0.00422**	**0.00007**	
115 Ross - Clark County PUD 2														
0.023	0.095		0.057	0.324		0.32	0.00017	0.00071		0.00043	0.00245		0.00004	
0.023	0.095	0.097	0.057	0.324	0.329	0.32	0.00017	0.00071	0.00073	0.00043	0.00245	0.00249	0.00004	
0.023	**0.095**	**0.097**	**0.057**	**0.324**	**0.329**	**0.32**	**0.00017**	**0.00071**	**0.00073**	**0.00043**	**0.00245**	**0.00249**	**0.00004**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Ross - VanCouver Shipyard (Clark PUD) 1**												
	Ross - Twr 1/2	0.13	SSC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		M-189
	Twr 1/2 - Str 1/4	0.10	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-190
	Str 1/4 - Str 1/9	0.30	CDC	H8	795 kcmil ACSR Drake	12.86	0.128	0.708	0.414	2.667	5.987		
	Str 1/9 - Grand Avenue (PUD)	0.31	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		0.84											
	Grand Avenue - Str 4/9	2.41	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 4/9 - Mill Plain (Clark PUD)	0.42	CSC	H19	795 kcmil ACSR Drake	14.17	0.128	0.720	0.414	2.643	5.886		
		2.83											
	Mill Plain (Clark PUD) - Str 5/4	0.13	CDC	H8	250 kcmil Cu 19 Str	12.86	0.257	0.797	0.543	2.755	5.360		
	Str 5/4 - Str 5/14	0.67	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 5/14 - VanCouver Shipyard (Clark PUD)	0.26	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.06											
		4.73											
115	**Sacajawea - Sun Harbor 1**												
		2.14	WSP	SPEC	397.5 kcmil ACSR Ibis	12.02	0.253	0.742	0.539	2.725	5.704		
		2.14											
		2.14											
115	**Sacajawea - Tap (Ice Harbor - Franklin 2)**												
	Sacajawea - Str 1/2	0.38	WHF	H7	2-1272 kcmil AAC Narcissus	15.12	0.042	0.498	0.328	2.397	8.489		
	Str 1/2 - Tap	0.14	WHF	H7	1780 kcmil ACSR Chukar	15.12	0.061	0.685	0.347	2.584	6.216		
		0.52											
		0.52											
115	**Sacheen - Albeni Falls 1**												
	Sacheen - Str 1/5	0.55	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 1/5 - Diamond Lake Tap (PUD)	5.07	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		5.62											
	Diamond Lake Tap - WA/ID Border	5.52	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		5.52											
	WA/ID Border - Str 14/4	1.96	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 14/4 - Str 14/6	0.31	SSC	H18	795 kcmil ACSR Drake	20.16	0.128	0.763	0.414	2.558	5.544		
	Str 14/6 - Str 14/11	0.21	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
	Str 14/11 - Albeni Falls	0.11	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
		2.59											
		13.73											
115	**Sagehill - Tap (Scooteney Tap Line)**												
		3.15	WSP		336.4 kcmil AAC Tulip (19)	10.08	0.305	0.749	0.591	2.796	5.717	FRANK	M-158
		3.15											
		3.15											
115	**Salem - Albany 1**												
	Salem - Str 2/1	0.51	SSC	H10	397.5 kcmil ACSR Ibis	19.53	0.253	0.801	0.539	2.607	5.271		M-128
	Str 2/1 - Str 14/5	12.25	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-140
	Str 14/5 - Str 14/8	0.39	SSC	H10	397.5 kcmil ACSR Ibis	19.53	0.253	0.801	0.539	2.607	5.271		
	Str 14/8 - Conser Tap PP&L	4.41	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		17.56											
	Conser Tap PP&L - Str 22/5	3.43	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 22/5 - Str 23/7	1.21	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 23/7 - Albany	1.71	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		6.35											
		23.91											
115	**Salem - Albany 2**												
	Salem - Monmouth	9.10	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		9.10											
	Monmouth - Adair Tap	11.31	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		11.31											
	Adair Tap - Str 21/6	0.03	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 21/6 - Str 28/8	7.25	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 28/8 - Albany	0.17	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		7.45											
		27.86											
115	**Salem - Grand Ronde 1**												
	Salem - Str 24/6	23.60	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 24/6 - Str 28/5	3.97	WHF	H7	3/0 ACSR Pigeon (6/1)	15.12	0.638	0.902	0.924	2.801	5.121		
	Str 28/5 - Grand Ronde	0.24	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		27.81											
		27.81											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Ross - VanCouver Shipyard (Clark PUD) 1														
0.017	0.101		0.054	0.347		0.36	0.00013	0.00076		0.00041	0.00262		0.00005	
0.013	0.073		0.041	0.263		0.29	0.00010	0.00055		0.00031	0.00199		0.00004	
0.038	0.213		0.124	0.800		0.90	0.00029	0.00161		0.00094	0.00605		0.00012	
0.040	0.226		0.128	0.815		0.90	0.00030	0.00171		0.00097	0.00616		0.00012	
0.107	0.612	0.621	0.348	2.224	2.251	2.45	0.00081	0.00463	0.00470	0.00263	0.01682	0.01702	0.00032	
0.307	1.755		0.997	6.332		7.01	0.00232	0.01327		0.00754	0.04788		0.00093	
0.054	0.303		0.174	1.110		1.24	0.00040	0.00229		0.00131	0.00839		0.00016	
0.361	2.057	2.089	1.170	7.442	7.534	8.25	0.00273	0.01556	0.01579	0.00885	0.05627	0.05697	0.00109	
0.033	0.104		0.071	0.358		0.35	0.00025	0.00078		0.00053	0.00271		0.00005	
0.172	0.547		0.364	1.819		1.75	0.00130	0.00414		0.00275	0.01376		0.00023	
0.066	0.200		0.140	0.694		0.71	0.00050	0.00151		0.00106	0.00525		0.00009	
0.272	0.851	0.893	0.575	2.872	2.929	2.81	0.00205	0.00643	0.00675	0.00435	0.02171	0.02214	0.00037	
0.740	**3.520**	**3.597**	**2.093**	**12.538**	**12.711**	**13.51**	**0.00560**	**0.02662**	**0.02720**	**0.01582**	**0.09480**	**0.09612**	**0.00179**	
115 Sacajawea - Sun Harbor 1														
0.542	1.589		1.154	5.832		6.10	0.00410	0.01201		0.00873	0.04410		0.00081	
0.542	1.589	1.679	1.154	5.832	5.945	6.10	0.00410	0.01201	0.01269	0.00873	0.04410	0.04495	0.00081	
0.542	**1.589**	**1.679**	**1.154**	**5.832**	**5.945**	**6.10**	**0.00410**	**0.01201**	**0.01269**	**0.00873**	**0.04410**	**0.04495**	**0.00081**	
115 Sacajawea - Tap (Ice Harbor - Franklin 2)														
0.016	0.189		0.125	0.911		1.61	0.00012	0.00143		0.00094	0.00689		0.00021	
0.009	0.096		0.049	0.362		0.44	0.00006	0.00073		0.00037	0.00274		0.00006	
0.025	0.285	0.286	0.173	1.273	1.284	2.05	0.00019	0.00215	0.00216	0.00131	0.00962	0.00971	0.00027	
0.025	**0.285**	**0.286**	**0.173**	**1.273**	**1.284**	**2.05**	**0.00019**	**0.00215**	**0.00216**	**0.00131**	**0.00962**	**0.00971**	**0.00027**	
115 Sacheen - Albeni Falls 1														
0.070	0.400		0.227	1.445		1.60	0.00053	0.00303		0.00172	0.01093		0.00021	1-7 NO 8 ALWLD
0.646	3.692		2.096	13.321		14.75	0.00489	0.02791		0.01585	0.10073		0.00195	
0.717	4.092	4.154	2.324	14.766	14.948	16.35	0.00542	0.03094	0.03141	0.01757	0.11165	0.11303	0.00216	
0.704	4.019		2.283	14.503		16.06	0.00532	0.03039		0.01726	0.10967		0.00212	
0.704	4.019	4.080	2.283	14.503	14.682	16.06	0.00532	0.03039	0.03085	0.01726	0.10967	0.11102	0.00212	
0.250	1.427		0.810	5.150		5.70	0.00189	0.01079		0.00613	0.03894		0.00075	
0.040	0.237		0.128	0.793		0.86	0.00030	0.00179		0.00097	0.00600		0.00011	1-7 NO 8 ALWLD
0.027	0.146		0.087	0.566		0.64	0.00020	0.00110		0.00066	0.00428		0.00008	1-7 NO 8 ALWLD
0.014	0.076		0.045	0.296		0.34	0.00011	0.00058		0.00034	0.00224		0.00004	1-7 NO 8 ALWLD
0.330	1.886	1.915	1.071	6.805	6.888	7.54	0.00250	0.01426	0.01448	0.00810	0.05145	0.05209	0.00100	
1.751	**9.997**	**10.150**	**5.677**	**36.074**	**36.518**	**39.96**	**0.01324**	**0.07560**	**0.07675**	**0.04293**	**0.27277**	**0.27613**	**0.00528**	
115 Sagehill - Tap (Scooteney Tap Line)														
0.961	2.360		1.862	8.807		9.00	0.00726	0.01784		0.01408	0.06660		0.00119	
0.961	2.360	2.548	1.862	8.807	9.002	9.00	0.00726	0.01784	0.01926	0.01408	0.06660	0.06807	0.00119	
0.961	**2.360**	**2.548**	**1.862**	**8.807**	**9.002**	**9.00**	**0.00726**	**0.01784**	**0.01926**	**0.01408**	**0.06660**	**0.06807**	**0.00119**	
115 Salem - Albany 1														
0.129	0.409		0.275	1.330		1.34	0.00098	0.00309		0.00208	0.01006		0.00018	
3.104	9.436		6.608	32.702		33.63	0.02347	0.07135		0.04996	0.24727		0.00445	
0.099	0.313		0.210	1.017		1.03	0.00075	0.00236		0.00159	0.00769		0.00014	
1.117	3.397		2.379	11.773		12.11	0.00845	0.02568		0.01799	0.08902		0.00160	
4.450	13.554	14.265	9.472	46.822	47.770	48.11	0.03365	0.10249	0.10787	0.07162	0.35404	0.36121	0.00636	
0.869	2.642		1.850	9.157		9.42	0.00657	0.01998		0.01399	0.06924		0.00125	
0.311	0.988		0.657	3.286		3.16	0.00235	0.00747		0.00497	0.02485		0.00042	
0.433	1.317		0.922	4.565		4.69	0.00328	0.00996		0.00697	0.03452		0.00062	
1.614	4.947	5.203	3.430	17.007	17.350	17.27	0.01220	0.03741	0.03935	0.02593	0.12860	0.13119	0.00228	
6.063	**18.501**	**19.469**	**12.902**	**63.829**	**65.120**	**65.38**	**0.04585**	**0.13989**	**0.14721**	**0.09756**	**0.48264**	**0.49240**	**0.00865**	
115 Salem - Albany 2														
2.306	7.009		4.909	24.293		24.98	0.01744	0.05300		0.03712	0.18369		0.00330	
2.306	7.009	7.379	4.909	24.293	24.784	24.98	0.01744	0.05300	0.05580	0.03712	0.18369	0.18740	0.00330	
2.866	8.712		6.101	30.193		31.05	0.02167	0.06587		0.04613	0.22830		0.00411	
2.866	8.712	9.171	6.101	30.193	30.803	31.05	0.02167	0.06587	0.06935	0.04613	0.22830	0.23291	0.00411	
0.008	0.023		0.016	0.080		0.08	0.00006	0.00017		0.00012	0.00061		0.00001	
1.865	5.918		3.938	19.688		18.94	0.01410	0.04475		0.02978	0.14887		0.00251	
0.043	0.131		0.092	0.454		0.47	0.00033	0.00099		0.00069	0.00343		0.00006	
1.915	6.072	6.367	4.046	20.222	20.623	19.49	0.01448	0.04592	0.04815	0.03059	0.15291	0.15594	0.00258	
7.087	**21.793**	**22.917**	**15.055**	**74.708**	**76.210**	**75.53**	**0.05359**	**0.16479**	**0.17328**	**0.11384**	**0.56490**	**0.57626**	**0.00999**	
115 Salem - Grand Ronde 1														
13.287	20.829		20.036	65.652		61.50	0.10047	0.15749		0.15150	0.49642		0.00813	
2.533	3.579		3.668	11.119		10.17	0.01915	0.02706		0.02774	0.08408		0.00134	
0.135	0.212		0.204	0.668		0.63	0.00102	0.00160		0.00154	0.00505		0.00008	
15.955	24.620	29.337	23.908	77.439	81.046	72.29	0.12064	0.18616	0.22183	0.18078	0.58555	0.61282	0.00956	
15.955	**24.620**	**29.337**	**23.908**	**77.439**	**81.046**	**72.29**	**0.12064**	**0.18616**	**0.22183**	**0.18078**	**0.58555**	**0.61282**	**0.00956**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Sand Creek - Bonners Ferry 1**												
	* Line Sections Operated in Parallel with (Albeni Falls - Bonners Ferry 2)/ Only Single Circuit Parameters Shown												
	Sand Creek - Str 31/4 Jump	0.09	WHF	H7	1272 kcmil AAC Narcissus NL	15.12	0.084	0.715	0.370	2.614	5.985		
*	Str 31/4 - Str 32/4	1.12	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
*	Str 32/4 - Str 32/5 Jump/LO	0.04	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
*	Str 32/5 - Selle	0.05	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
		1.30											
*	Selle - Twr 32/6 Jumpers	0.08	SDC	J24	1272 kcmil AAC Narcissus NL	23.25	0.084	0.767	0.370	2.510	5.560		
*	Twr 32/6 - Twr 38/2	5.66	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 38/2 - Samuels (NLI)	0.05	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
		5.79											
*	Samuels (NLI) - Twr 38/3 Jump/LO	0.05	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 38/3 - Twr 39/2	0.86	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 39/2 - Twr 41/1	1.97	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
*	Twr 41/1 - Twr 44/6	3.56	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
*	Twr 44/6 - Twr 45/2	0.56	TDC	J26	1272 kcmil AAC Narcissus NL	23.25	0.084	0.767	0.370	2.510	5.560		
*	Twr 45/2 - Twr 46/5	1.61	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
*	Twr 46/5 - Twr 48/2	1.54	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
*	Twr 48/2 - Twr 55/4	7.54	SDC	J12	1272 kcmil ACSR Bittern	24.08	0.083	0.764	0.369	2.494	5.560		
*	Twr 55/4 - Twr 57/3 Jumpers	1.49	SDC	J24	1272 kcmil ACSR Bittern	23.25	0.083	0.759	0.369	2.502	5.592		
	Twr 57/3 - Bonners Ferry 115 Bus	0.19	WHF	H7	1272 kcmil AAC Narcissus NL	15.12	0.084	0.715	0.370	2.614	5.985		
		19.37											
	Bonners Ferry 115 Bus - Smith Falls	0.03	WHF	H7	1272 kcmil AAC Narcissus NL	15.12	0.084	0.715	0.370	2.614	5.985		
		0.03											
	Smith Falls - Twr 57/5(Bonners Ferry)	0.01	WHF	H7	1272 kcmil AAC Narcissus NL	15.12	0.084	0.715	0.370	2.614	5.985		
		0.01											
		26.50											
115	**Sand Creek - Sandpoint 1**												
	Sand Creek - Str 31/2	0.09	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 31/2 - Str 30/8A	0.34	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 30/8A - Str 30/7	0.12	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 30/7 - Str 30/5	0.24	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 30/5 - Str 30/4	0.02	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 30/4 - Str 30/3	0.06	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 30/3 - Str 29/7	0.69	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 29/7 - Str 29/5	0.15	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 29/5 - Str 26/3	3.20	WDC	J28	1272 kcmil AAC Narcissus NL	18.19	0.084	0.737	0.370	2.569	5.795		
	Str 26/3 - Str 26/2	0.10	WSP	J32	1272 kcmil AAC Narcissus NL	18.90	0.084	0.742	0.370	2.560	5.757		
	Str 26/2 - Sandpoint	1.65	TSP		266.8 kcmil ACSR Partridge	10.04	0.377	0.745	0.663	2.793	5.686	AVA	
		6.66											
		6.66											
115	**Scarcello - Tap (Albeni Falls (BPA) - Rathdrum(AVA) 1)**												
		0.04			397.5 kcmil ACSR Ibis	12.60	0.253	0.748	0.539	2.714	5.659		
		0.04											
		0.04											
115	**Schrag - Tap (Warden - Ruff (Grant County PUD Line))**												
	Operating Name (Schrag Tap to Grant County PUD)												
	Schrag - Str 11/14	0.30	WSP	H12	266.8 kcmil ACSR/AW Partridge	8.82	0.365	0.729	0.651	2.824	5.814		
	Str 11/14 - Str 11/10	0.26	WSP	H24	266.8 kcmil ACSR/AW Partridge	12.44	0.365	0.771	0.651	2.741	5.489		
	Str 11/10 - Interconnect	10.50	WSP	H27	266.8 kcmil ACSR/AW Partridge	12.46	0.365	0.771	0.651	2.741	5.487		
		11.06											
	Interconnect - Tap (PUD)	0.08	WSP	H27	266.8 kcmil ACSR/AW Partridge	12.46	0.365	0.771	0.651	2.741	5.487	GRAN	
		0.08											
		11.14											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Sand Creek - Bonners Ferry 1														
0.008	0.064		0.033	0.235		0.27	0.00006	0.00049		0.00025	0.00178		0.00004	
0.094	0.826		0.415	2.878		3.25	0.00071	0.00624		0.00313	0.02176		0.00043	
0.003	0.029		0.015	0.103		0.12	0.00003	0.00022		0.00011	0.00078		0.00002	
0.004	0.037		0.019	0.128		0.14	0.00003	0.00028		0.00014	0.00097		0.00002	
0.109	0.956	0.963	0.481	3.344	3.378	3.78	0.00083	0.00723	0.00728	0.00364	0.02529	0.02555	0.00050	
0.007	0.061		0.030	0.201		0.22	0.00005	0.00046		0.00022	0.00152		0.00003	
0.469	4.299		2.087	14.162		15.83	0.00354	0.03250		0.01578	0.10709		0.00209	
0.004	0.038		0.018	0.125		0.14	0.00003	0.00029		0.00014	0.00095		0.00002	
0.480	4.398	4.424	2.135	14.488	14.644	16.19	0.00363	0.03325	0.03345	0.01615	0.10955	0.11073	0.00214	
0.004	0.038		0.018	0.125		0.14	0.00003	0.00029		0.00014	0.00095		0.00002	
0.071	0.653		0.317	2.152		2.40	0.00054	0.00494		0.00240	0.01627		0.00032	
0.163	1.505		0.727	4.912		5.48	0.00123	0.01138		0.00549	0.03714		0.00072	
0.299	2.624		1.318	9.146		10.31	0.00226	0.01984		0.00996	0.06916		0.00136	
0.047	0.430		0.207	1.405		1.56	0.00036	0.00325		0.00157	0.01063		0.00021	
0.133	1.230		0.594	4.015		4.48	0.00101	0.00930		0.00449	0.03036		0.00059	
0.128	1.170		0.568	3.853		4.31	0.00096	0.00884		0.00429	0.02914		0.00057	
0.624	5.758		2.781	18.802		20.96	0.00472	0.04354		0.02103	0.14217		0.00277	
0.123	1.132		0.550	3.728		4.17	0.00093	0.00856		0.00416	0.02819		0.00055	1-3/8 IN HS STL
0.016	0.136		0.070	0.497		0.57	0.00012	0.00103		0.00053	0.00376		0.00008	2-3/8 IN HS STL
1.609	14.675	14.763	7.149	48.636	49.158	54.37	0.01217	0.11096	0.11163	0.05406	0.36776	0.37171	0.00719	
0.003	0.021		0.011	0.078		0.09	0.00002	0.00016		0.00008	0.00059		0.00001	2-3/8 IN HS STL
0.003	0.021	0.022	0.011	0.078	0.079	0.09	0.00002	0.00016	0.00016	0.00008	0.00059	0.00060	0.00001	
0.001	0.007		0.004	0.026		0.03	0.00001	0.00005		0.00003	0.00020		0.00000	2-3/8 IN HS STL
0.001	0.007	0.007	0.004	0.026	0.026	0.03	0.00001	0.00005	0.00005	0.00003	0.00020	0.00020	0.00000	
2.202	**20.057**	**20.178**	**9.781**	**66.572**	**67.287**	**74.45**	**0.01665**	**0.15166**	**0.15257**	**0.07396**	**0.50338**	**0.50879**	**0.00985**	
115 Sand Creek - Sandpoint 1														
0.008	0.066		0.033	0.231		0.26	0.00006	0.00050		0.00025	0.00175		0.00003	
0.029	0.251		0.126	0.874		0.99	0.00022	0.00190		0.00095	0.00661		0.00013	
0.010	0.089		0.044	0.307		0.35	0.00008	0.00067		0.00034	0.00232		0.00005	
0.020	0.177		0.089	0.617		0.70	0.00015	0.00134		0.00067	0.00466		0.00009	
0.002	0.015		0.007	0.051		0.06	0.00001	0.00011		0.00006	0.00039		0.00001	
0.005	0.045		0.022	0.154		0.17	0.00004	0.00034		0.00017	0.00116		0.00002	
0.058	0.509		0.255	1.773		2.00	0.00044	0.00385		0.00193	0.01340		0.00026	
0.013	0.111		0.056	0.384		0.43	0.00010	0.00084		0.00042	0.00290		0.00006	
0.269	2.359		1.184	8.222		9.27	0.00203	0.01784		0.00896	0.06217		0.00123	
0.008	0.074		0.037	0.256		0.29	0.00006	0.00056		0.00028	0.00194		0.00004	
0.622	1.229		1.093	4.609		4.69	0.00470	0.00929		0.00827	0.03485		0.00062	
1.043	4.924	5.034	2.948	17.476	17.723	19.20	0.00789	0.03723	0.03806	0.02229	0.13214	0.13401	0.00254	
1.043	**4.924**	**5.034**	**2.948**	**17.476**	**17.723**	**19.20**	**0.00789**	**0.03723**	**0.03806**	**0.02229**	**0.13214**	**0.13401**	**0.00254**	
115 Scarcello - Tap (Albeni Falls (BPA) - Rathdrum(AVA) 1)														
0.010	0.030		0.022	0.109		0.11	0.00008	0.00023		0.00016	0.00082		0.00001	
0.010	0.030	0.032	0.022	0.109	0.111	0.11	0.00008	0.00023	0.00024	0.00016	0.00082	0.00084	0.00001	
0.010	**0.030**	**0.032**	**0.022**	**0.109**	**0.111**	**0.11**	**0.00008**	**0.00023**	**0.00024**	**0.00016**	**0.00082**	**0.00084**	**0.00001**	
115 Schrag - Tap (Warden - Ruff (Grant County PUD Line))														
0.110	0.219		0.195	0.847		0.87	0.00083	0.00165		0.00148	0.00641		0.00012	
0.095	0.200		0.169	0.713		0.71	0.00072	0.00152		0.00128	0.00539		0.00009	
3.837	8.094		6.840	28.777		28.81	0.02901	0.06120		0.05172	0.21759		0.00381	
4.041	8.513	9.424	7.204	30.337	31.180	30.39	0.03056	0.06437	0.07126	0.05448	0.22939	0.23577	0.00402	
0.029	0.062		0.052	0.219		0.22	0.00022	0.00047		0.00039	0.00166		0.00003	
0.029	0.062	0.068	0.052	0.219	0.225	0.22	0.00022	0.00047	0.00052	0.00039	0.00166	0.00170	0.00003	
4.071	**8.575**	**9.492**	**7.257**	**30.556**	**31.406**	**30.61**	**0.03078**	**0.06484**	**0.07177**	**0.05487**	**0.23105**	**0.23747**	**0.00405**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Scooteney - Tap (Midway - Benton 1)**												
	Scooteney - Str 28/9	0.08	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		M-158
	Str 28/9 - Str 28/4	0.48	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 28/4 - Str 26/4	2.27	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 26/4 - Str 25/8	0.31	WBH	21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 25/8 - Radar Pumping Plant Tap	4.11	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		7.25											
	Radar Pumping Plant Tap - Str 20/6	1.34	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 20/6 - Eagle Lake	0.58	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.92											
	Eagle Lake - Twr 19/7	0.05	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 19/7 - Str 19/5	0.11	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Str 19/5 - Str 19/4	0.06	WSP	H15	397.5 kcmil ACSR Ibis	11.34	0.253	0.735	0.539	2.739	5.761		
	Twr 19/4 - Sagehill Tap	4.02	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
		4.24											
	Sagehill Tap - Twr 8/1	7.72	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
	Twr 8/1 - Twr 6/3	1.52	SSC	J5	795 kcmil ACSR Drake	34.96	0.128	0.830	0.414	2.424	5.084		
	Twr 6/3 - Twr 4/4	1.94	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
	Twr 4/4 - Twr 1/2	3.75	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
	Twr 1/2 - Tap	0.01	SSC	J9	795 kcmil ACSR Drake	33.14	0.128	0.823	0.414	2.437	5.125		
		14.94											
	Tap - Twr 1/2	0.11	WHF	H11	795 kcmil ACSR Drake	12.64	0.128	0.706	0.414	2.671	6.006		
		0.11											
		28.46											
115	**Shelton - Fairmount 1**												
	Shelton - Potlatch Tap	13.33	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-197
		13.33											
	Potlatch Tap - Duckabush	23.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		M-198
		23.01											
	Duckabush - Str 50/2	12.83	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 50/2 - Quilcene (PSE)	0.02	WHF	H7	397.5 kcmil ACSR Chickadee	15.12	0.256	0.782	0.542	2.681	5.445		
		12.85											
	Quilcene (PSE) - Str 50/3	0.02	WHF	H7	397.5 kcmil ACSR Chickadee	15.12	0.256	0.782	0.542	2.681	5.445		
	Str 50/3 - Fairmount	11.02	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		11.04											
		60.23											
115	**Shelton - Fairmount 2**												
	Shelton - Str 9/4	8.41	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-197
	Str 9/4 - Str 9/5	0.33	SDC	J19	795 kcmil ACSR Drake	31.90	0.128	0.819	0.414	2.446	5.155		M-198
	Str 9/5 - Tie (Cushman - Pearl)	4.56	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		13.30											
	Tie (Cushman - Pearl) - Fairmount	46.87	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		46.87											
		60.17											
115	**Shelton - Kitsap 2**												
	Shelton - Str 2/2	0.66	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-197
	Str 2/2 - Str 13/4	11.42	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-198
	Str 13/4 - Benson Tap	0.06	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		12.14											
	Benson Tap - Str 13/5	0.09	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 13/5 - Str 18/2 Disc Sw	4.42	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 18/2 - Belfair (MN3) Tap 21/7	2.78	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		7.29											
	Belfair (MN3) Tap 21/7 - Str 32/1	10.56	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 32/1 - Kitsap	0.38	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		10.94											
		30.37											
115	**Shelton - Mason (MN3) 1**												
	Shelton - Mountain View	0.10	WSP	H16	250 kcmil Cu 19 Str	11.79	0.257	0.786	0.543	2.776	5.436		
		0.10											
	Mountain View - Mason (MN3)	2.19	WSP	H16	250 kcmil Cu 19 Str	11.79	0.257	0.786	0.543	2.776	5.436		
		2.19											
		2.29											
115	**Sifton - Fishers Road (Clark PUD) 1**												
@	Sifton - Str 1/6	0.75	TDC	H26	1.1 In ACSR/TW Rogue	12.97	0.100	0.716	0.386	2.671	5.971		M-189
@	Str 1/6 - Fishers Road (Clark PUD) 1	1.45	TDC	H26	1.1 In ACSR/TW Rogue	12.97	0.100	0.716	0.386	2.671	5.971		M-189B
		2.20											
		2.20											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Scooteney - Tap (Midway - Benton 1)														
0.020	0.059		0.043	0.219		0.23	0.00015	0.00044		0.00033	0.00166		0.00003	2-3/8 IN HS STL
0.122	0.370		0.259	1.281		1.32	0.00092	0.00280		0.00196	0.00969		0.00017	2-3/8 IN HS STL
0.575	1.748		1.224	6.060		6.23	0.00435	0.01322		0.00926	0.04582		0.00082	
0.079	0.229		0.167	0.847		0.89	0.00059	0.00173		0.00126	0.00640		0.00012	
1.041	3.166		2.217	10.972		11.28	0.00788	0.02394		0.01676	0.08296		0.00149	
1.837	5.572	5.867	3.911	19.379	19.770	19.95	0.01389	0.04213	0.04436	0.02957	0.14654	0.14949	0.00264	
0.340	1.032		0.723	3.577		3.68	0.00257	0.00780		0.00547	0.02705		0.00049	
0.147	0.447		0.313	1.548		1.59	0.00111	0.00338		0.00237	0.01171		0.00021	2-7 NO 8 ALWLD
0.487	1.479	1.557	1.036	5.126	5.229	5.27	0.00368	0.01118	0.01177	0.00783	0.03876	0.03954	0.00070	
0.013	0.037		0.027	0.137		0.14	0.00010	0.00028		0.00020	0.00104		0.00002	2-7 NO 8 ALWLD
0.028	0.081		0.059	0.301		0.32	0.00021	0.00061		0.00045	0.00228		0.00004	1-7 NO 8 ALWLD
0.015	0.044		0.032	0.164		0.17	0.00011	0.00033		0.00024	0.00124		0.00002	2-7 NO 8 ALWLD
0.513	3.310		1.662	9.797		10.30	0.00388	0.02503		0.01257	0.07408		0.00136	
0.568	3.472	3.518	1.781	10.399	10.551	10.94	0.00430	0.02625	0.02660	0.01347	0.07863	0.07978	0.00145	
0.984	6.356		3.192	18.814		19.78	0.00744	0.04806		0.02414	0.14226		0.00262	
0.194	1.261		0.629	3.684		3.86	0.00147	0.00954		0.00475	0.02786		0.00051	
0.247	1.603		0.802	4.715		4.95	0.00187	0.01212		0.00607	0.03566		0.00065	
0.478	3.088		1.551	9.139		9.61	0.00362	0.02335		0.01172	0.06910		0.00127	
0.001	0.008		0.004	0.024		0.03	0.00001	0.00006		0.00003	0.00018		0.00000	
1.905	12.317	12.463	6.178	36.377	36.897	38.24	0.01440	0.09313	0.09424	0.04671	0.27506	0.27900	0.00506	
0.014	0.078		0.045	0.294		0.33	0.00011	0.00059		0.00034	0.00222		0.00004	
0.014	0.078	0.079	0.045	0.294	0.297	0.33	0.00011	0.00059	0.00060	0.00034	0.00222	0.00225	0.00004	
4.811	**22.917**	**23.416**	**12.950**	**71.575**	**72.737**	**74.73**	**0.03638**	**0.17328**	**0.17706**	**0.09792**	**0.54121**	**0.54999**	**0.00988**	
115 Shelton - Fairmount 1														
5.021	10.589		8.834	35.907		35.45	0.03797	0.08007		0.06680	0.27151		0.00469	
5.021	10.589	11.719	8.834	35.907	36.977	35.45	0.03797	0.08007	0.08861	0.06680	0.27151	0.27960	0.00469	
8.668	18.279		15.249	61.981		61.19	0.06554	0.13821		0.11530	0.46867		0.00809	
8.668	18.279	20.230	15.249	61.981	63.830	61.19	0.06554	0.13821	0.15297	0.11530	0.46867	0.48264	0.00809	
4.833	10.192		8.502	34.560		34.12	0.03654	0.07707		0.06429	0.26132		0.00451	
0.005	0.016		0.011	0.054		0.05	0.00004	0.00012		0.00008	0.00041		0.00001	
4.838	10.207	11.296	8.513	34.613	35.645	34.17	0.03658	0.07718	0.08541	0.06437	0.26173	0.26953	0.00452	
0.005	0.016		0.011	0.054		0.05	0.00004	0.00012		0.00008	0.00041		0.00001	
4.151	8.754		7.303	29.684		29.30	0.03139	0.06619		0.05522	0.22446		0.00388	
4.156	8.770	9.705	7.314	29.738	30.624	29.36	0.03143	0.06631	0.07338	0.05530	0.22486	0.23156	0.00388	
22.684	**47.845**	**52.950**	**39.910**	**162.240**	**167.076**	**160.17**	**0.17152**	**0.36178**	**0.40038**	**0.30177**	**1.22676**	**1.26334**	**0.02118**	
115 Shelton - Fairmount 2														
1.525	6.306		3.930	22.279		23.74	0.01153	0.04768		0.02972	0.16846		0.00314	
0.042	0.270		0.136	0.807		0.85	0.00032	0.00204		0.00103	0.00610		0.00011	
0.827	3.419		2.131	12.080		12.87	0.00625	0.02585		0.01611	0.09134		0.00170	
2.394	9.995	10.277	6.197	35.166	35.708	37.47	0.01810	0.07557	0.07771	0.04686	0.26590	0.27000	0.00495	
8.498	35.142		21.902	124.162		132.32	0.06425	0.26572		0.16561	0.93884		0.01750	
8.498	35.142	36.155	21.902	124.162	126.079	132.32	0.06425	0.26572	0.27338	0.16561	0.93884	0.95334	0.01750	
10.891	**45.137**	**46.432**	**28.100**	**159.328**	**161.787**	**169.78**	**0.08235**	**0.34130**	**0.35109**	**0.21247**	**1.20475**	**1.22334**	**0.02245**	
115 Shelton - Kitsap 2														
0.167	0.508		0.356	1.762		1.81	0.00126	0.00384		0.00269	0.01332		0.00024	2-3/8 IN HS STL
2.894	8.796		6.160	30.486		31.35	0.02188	0.06651		0.04658	0.23052		0.00415	
0.015	0.046		0.032	0.160		0.16	0.00011	0.00035		0.00024	0.00121		0.00002	
3.076	9.351	9.844	6.548	32.408	33.063	33.33	0.02326	0.07071	0.07443	0.04951	0.24505	0.25001	0.00441	
0.023	0.069		0.049	0.240		0.25	0.00017	0.00052		0.00037	0.00182		0.00003	
1.120	3.405		2.384	11.799		12.13	0.00847	0.02574		0.01803	0.08922		0.00160	
0.704	2.141		1.500	7.421		7.63	0.00533	0.01619		0.01134	0.05612		0.00101	
1.847	5.615	5.911	3.932	19.461	19.854	20.01	0.01397	0.04246	0.04470	0.02973	0.14715	0.15013	0.00265	
2.676	8.134		5.696	28.191		28.99	0.02023	0.06150		0.04307	0.21316		0.00383	
0.096	0.293		0.205	1.014		1.04	0.00073	0.00221		0.00155	0.00767		0.00014	2-3/8 IN HS STL
2.772	8.427	8.871	5.901	29.205	29.795	30.03	0.02096	0.06372	0.06708	0.04462	0.22083	0.22529	0.00397	
7.696	**23.393**	**24.626**	**16.382**	**81.074**	**82.713**	**83.38**	**0.05819**	**0.17688**	**0.18621**	**0.12387**	**0.61304**	**0.62543**	**0.01103**	
115 Shelton - Mason (MN3) 1														
0.026	0.079		0.054	0.278		0.27	0.00019	0.00059		0.00041	0.00210		0.00004	
0.026	0.079	0.083	0.054	0.278	0.283	0.27	0.00019	0.00059	0.00063	0.00041	0.00210	0.00214	0.00004	
0.563	1.722		1.190	6.079		5.95	0.00426	0.01302		0.00900	0.04597		0.00079	
0.563	1.722	1.811	1.190	6.079	6.195	5.95	0.00426	0.01302	0.01370	0.00900	0.04597	0.04684	0.00079	
0.589	**1.800**	**1.894**	**1.244**	**6.357**	**6.478**	**6.22**	**0.00445**	**0.01361**	**0.01432**	**0.00941**	**0.04807**	**0.04898**	**0.00082**	
115 Sifton - Fishers Road (Clark PUD) 1														
0.075	0.537		0.289	2.004		2.24	0.00056	0.00406		0.00219	0.01515		0.00030	3/8 EHS Str
0.144	1.039		0.559	3.873		4.33	0.00109	0.00785		0.00423	0.02929		0.00057	
0.219	1.576	1.591	0.848	5.877	5.938	6.57	0.00166	0.01191	0.01203	0.00641	0.04444	0.04490	0.00087	
0.219	**1.576**	**1.591**	**0.848**	**5.877**	**5.938**	**6.57**	**0.00166**	**0.01191**	**0.01203**	**0.00641**	**0.04444**	**0.04490**	**0.00087**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Sifton - Ross 1**												
	Sifton - Twr 1/4	0.19	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-126
	Twr 1/4 - Twr 9/5	8.06	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		M-189
	Twr 9/5 - Ross	0.24	SDC	H4	500 kcmil Cu 37 Str	15.43	0.130	0.775	0.416	2.667	5.507		M-190
		8.49											
		8.49											
115	**Sifton - Wafertech**												
	Feeder 5												
@	Sifton - Str 1/6	0.75	TDC	H26	1.1 In ACSR/TW Rogue	12.97	0.100	0.716	0.386	2.671	5.971		
@	Str 1/6 - Fishers Road (Clark PUD)	1.46	TDC	H26	1.1 In ACSR/TW Rogue	12.97	0.100	0.716	0.386	2.671	5.971		
		2.21											
@	Fishers Road (Clark PUD) - Ch 1	0.30	WDC	Special	900 kcmil ACSR Canary (54/7)	13.86	0.114	0.712	0.400	2.643	5.959	ClarkP	M-189
@	Ch 1 - Ch 2	0.20	TDC	Special	900 kcmil ACSR Canary (54/7)	13.86	0.114	0.712	0.400	2.643	5.959	ClarkP	M-189B
@	Ch 2 - Ch 3	0.25	WSP	Special	900 kcmil ACSR Canary (54/7)	13.86	0.114	0.712	0.400	2.643	5.959	ClarkP	
@	Ch 3 - Wafertech	1.63	WSP	Special	900 kcmil ACSR Canary (54/7)	10.53	0.114	0.679	0.400	2.710	6.263	ClarkP	
		2.38											
		4.59											
115	**Smith Creek Falls - Bonners Ferry**												
		31.00	TSP		397.5 kcmil ACSR Chickadee	10.00	0.256	0.732	0.542	2.782	5.834		
		31.00											
		31.00											
115	**Snake River - Tincup**												
	Snake River - CH 1	3.14	TDC		556.5 kcmil ACSR Dove	12.50	0.181	0.727	0.467	2.695	5.832	LVPL	
	CH 1 - Tincup	11.33	WSP		556.5 kcmil ACSR Dove	12.93	0.181	0.731	0.467	2.687	5.798	LVPL	
		14.47											
		14.47											
115	**Snohomish - Beverly Park(SPD) 3**												
	Snohomish - Str 2/2	1.28	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		M-141
	Str 2/2 - Str 2/6	0.32	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-142
	Str 2/6 - Str 3/2	0.59	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		
	Str 3/2 - Str 4/1	0.85	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 4/1 - Str 4/2	0.13	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		
	Str 4/2 - Str 5/7 (Sylvan Crest)	1.44	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		4.61											
	Str 5/7 (Sylvan Crest) - SR 5	0.10	H		795 kcmil ACSR Drake	12.60	0.128	0.706	0.414	2.672	6.009	SNOH	
	SR 5 - Scenic Drive	0.42	TP		795 kcmil AAC Arbutus (37)	8.50	0.131	0.674	0.417	2.783	6.369	SNOH	
	Scenic Drive - Beverly Park	0.10	TP		1272 kcmil AAC Narcissus	8.50	0.084	0.645	0.370	2.754	6.667	SNOH	
		0.62											
		5.23											
115	**Snohomish - Beverly Park(SPD) 4**												
	Snohomish - Str 2/2	1.32	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		M-141
	Str 2/2 - Str 2/6	0.32	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-142
	Str 2/6 - Str 3/2	0.59	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		
	Str 3/2 - Str 4/1	0.84	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 4/1 - Str 4/2	0.13	SDC	H4	795 kcmil ACSR Drake	15.43	0.128	0.731	0.414	2.623	5.800		
	Str 4/2 - Str 5/9	1.80	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		5.00											
	Str 5/9 - Beverly Park	0.14	HP		1272 kcmil AAC Narcissus	8.48	0.084	0.645	0.370	2.754	6.670	PSE	
		0.14											
		5.14											
115	**Snohomish - Boeing(SPD)**												
	Operating Name (Snohomish - PUD No 9)												
	Snohomish - Str 1/2	0.06	WHF	H7	1.3 In AAC/TW Hood	15.12	0.069	0.716	0.355	2.615	5.985		M-141
	Str 1/2 - Str 1/3	0.09	WHF	H15	1.3 In AAC/TW Hood	11.34	0.069	0.681	0.355	2.685	6.308		M-142
	Str 1/3 - Str 2/1	0.90	TDC	J33	1.3 In AAC/TW Hood	20.18	0.069	0.751	0.355	2.545	5.693		
	Str 2/1 - Str 2/3	0.27	TDC	J33	1.3 In AAC/TW Hood	20.18	0.069	0.751	0.355	2.545	5.693		
	Str 2/3 - Str 2/6	0.25	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 2/6 - Str 5/8	3.21	TDC	J33	1.3 In AAC/TW Hood	20.18	0.069	0.751	0.355	2.545	5.693		
		4.78											
	Str 5/8 - Str 6/2	0.18	TDC		1272 kcmil AAC Narcissus	20.16	0.084	0.750	0.370	2.544	5.694	SNOH	
	Str 6/2 - Str 6/11A	0.60	TDC		1272 kcmil AAC Narcissus	10.71	0.084	0.673	0.370	2.698	6.375	SNOH	
	Str 6/11A - Evergreen Way	0.65	TSP		795 kcmil AAC Arbutus (37)	8.50	0.131	0.674	0.417	2.783	6.369	SNOH	
		1.43											
	Evergreen Way - Glenwood Tap	0.57	TSP		795 kcmil AAC Arbutus (37)	8.50	0.131	0.674	0.417	2.783	6.369	SNOH	
		0.57											
	Glenwood Tap - Boeing	1.11	TSP		795 kcmil AAC Arbutus (37)	8.50	0.131	0.674	0.417	2.783	6.369	SNOH	
		1.11											
		7.89											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Sifton - Ross 1														
0.024	0.138		0.079	0.499		0.55	0.00018	0.00105		0.00059	0.00377		0.00007	
1.051	6.245		3.356	21.494		22.19	0.00795	0.04722		0.02538	0.16252		0.00294	
0.031	0.186		0.100	0.640		0.66	0.00024	0.00141		0.00076	0.00484		0.00009	
1.107	6.569	6.662	3.535	22.633	22.907	23.41	0.00837	0.04967	0.05037	0.02673	0.17114	0.17321	0.00310	
1.107	**6.569**	**6.662**	**3.535**	**22.633**	**22.907**	**23.41**	**0.00837**	**0.04967**	**0.05037**	**0.02673**	**0.17114**	**0.17321**	**0.00310**	
115 Sifton - Wafertech														
0.075	0.537		0.289	2.004		2.24	0.00056	0.00406		0.00219	0.01515		0.00030	3/8 EHS Str
0.145	1.046		0.563	3.900		4.36	0.00110	0.00791		0.00426	0.02949		0.00058	
0.220	1.583	1.598	0.852	5.904	5.965	6.60	0.00166	0.01197	0.01208	0.00644	0.04464	0.04510	0.00087	
0.034	0.214		0.120	0.793		0.89	0.00026	0.00162		0.00091	0.00600		0.00012	
0.023	0.142		0.080	0.529		0.60	0.00017	0.00108		0.00060	0.00400		0.00008	
0.028	0.178		0.100	0.661		0.74	0.00021	0.00135		0.00076	0.00500		0.00010	
0.185	1.106		0.652	4.417		5.10	0.00140	0.00836		0.00493	0.03340		0.00068	
0.271	1.640	1.662	0.951	6.399	6.469	7.34	0.00205	0.01240	0.01257	0.00719	0.04839	0.04892	0.00097	
0.491	**3.223**	**3.260**	**1.803**	**12.303**	**12.434**	**13.94**	**0.00371**	**0.02437**	**0.02465**	**0.01364**	**0.09303**	**0.09402**	**0.00184**	
115 Smith Creek Falls - Bonners Ferry														
7.945	22.685		16.811	86.229		90.43	0.06008	0.17153		0.12712	0.65201		0.01196	
7.945	22.685	24.036	16.811	86.229	87.852	90.43	0.06008	0.17153	0.18175	0.12712	0.65201	0.66429	0.01196	
7.945	**22.685**	**24.036**	**16.811**	**86.229**	**87.852**	**90.43**	**0.06008**	**0.17153**	**0.18175**	**0.12712**	**0.65201**	**0.66429**	**0.01196**	
115 Snake River - Tincup														
0.569	2.282		1.467	8.463		9.16	0.00430	0.01725		0.01110	0.06399		0.00121	
2.054	8.280		5.295	30.444		32.85	0.01553	0.06261		0.04003	0.23020		0.00434	
2.623	10.562	10.883	6.762	38.907	39.491	42.00	0.01984	0.07986	0.08229	0.05113	0.29420	0.29861	0.00555	
2.623	**10.562**	**10.883**	**6.762**	**38.907**	**39.491**	**42.00**	**0.01984**	**0.07986**	**0.08229**	**0.05113**	**0.29420**	**0.29861**	**0.00555**	
115 Snohomish - Beverly Park(SPD) 3														
0.163	0.935		0.529	3.357		3.71	0.00123	0.00707		0.00400	0.02538		0.00049	1-3/8 IN HS STL
0.041	0.233		0.132	0.841		0.93	0.00031	0.00176		0.00100	0.00636		0.00012	
0.075	0.431		0.244	1.547		1.71	0.00057	0.00326		0.00184	0.01170		0.00023	
0.108	0.619		0.351	2.233		2.47	0.00082	0.00468		0.00266	0.01689		0.00033	
0.017	0.095		0.054	0.341		0.38	0.00013	0.00072		0.00041	0.00258		0.00005	
0.184	1.049		0.595	3.783		4.19	0.00139	0.00793		0.00450	0.02861		0.00055	
0.588	3.362	3.413	1.906	12.103	12.252	13.39	0.00444	0.02542	0.02580	0.01441	0.09151	0.09264	0.00177	
0.013	0.071		0.041	0.267		0.30	0.00010	0.00053		0.00031	0.00202		0.00004	
0.055	0.283		0.175	1.169		1.34	0.00042	0.00214		0.00132	0.00884		0.00018	
0.008	0.064		0.037	0.275		0.33	0.00006	0.00049		0.00028	0.00208		0.00004	
0.076	0.418	0.425	0.254	1.711	1.730	1.97	0.00058	0.00316	0.00321	0.00192	0.01294	0.01308	0.00026	
0.664	**3.780**	**3.838**	**2.160**	**13.814**	**13.982**	**15.37**	**0.00502**	**0.02858**	**0.02902**	**0.01633**	**0.10445**	**0.10572**	**0.00203**	
115 Snohomish - Beverly Park(SPD) 4														
0.168	0.964		0.546	3.462		3.83	0.00127	0.00729		0.00413	0.02618		0.00051	
0.041	0.233		0.132	0.841		0.93	0.00031	0.00176		0.00100	0.00636		0.00012	
0.075	0.431		0.244	1.547		1.71	0.00057	0.00326		0.00184	0.01170		0.00023	
0.107	0.612		0.347	2.207		2.44	0.00081	0.00462		0.00263	0.01669		0.00032	
0.017	0.095		0.054	0.341		0.38	0.00013	0.00072		0.00041	0.00258		0.00005	
0.230	1.311		0.744	4.729		5.24	0.00174	0.00991		0.00563	0.03576		0.00069	
0.638	3.646	3.701	2.068	13.127	13.289	14.53	0.00482	0.02757	0.02798	0.01563	0.09926	0.10048	0.00192	
0.012	0.090		0.052	0.386		0.47	0.00009	0.00068		0.00039	0.00292		0.00006	
0.012	0.090	0.091	0.052	0.386	0.389	0.47	0.00009	0.00068	0.00069	0.00039	0.00292	0.00294	0.00006	
0.649	**3.736**	**3.792**	**2.119**	**13.513**	**13.678**	**15.00**	**0.00491**	**0.02825**	**0.02867**	**0.01603**	**0.10218**	**0.10342**	**0.00198**	
115 Snohomish - Boeing(SPD)														
0.004	0.043		0.021	0.157		0.18	0.00003	0.00032		0.00016	0.00119		0.00002	
0.006	0.061		0.032	0.242		0.28	0.00005	0.00046		0.00024	0.00183		0.00004	
0.062	0.676		0.320	2.291		2.56	0.00047	0.00511		0.00242	0.01732		0.00034	
0.019	0.203		0.096	0.687		0.77	0.00014	0.00153		0.00072	0.00520		0.00010	
0.017	0.197		0.089	0.618		0.68	0.00013	0.00149		0.00067	0.00468		0.00009	
0.221	2.410		1.140	8.170		9.14	0.00167	0.01823		0.00862	0.06178		0.00121	
0.330	3.590	3.605	1.697	12.164	12.282	13.61	0.00249	0.02714	0.02726	0.01283	0.09198	0.09287	0.00180	
0.015	0.135		0.067	0.458		0.51	0.00011	0.00102		0.00050	0.00346		0.00007	
0.050	0.404		0.222	1.619		1.91	0.00038	0.00305		0.00168	0.01224		0.00025	
0.085	0.438		0.271	1.809		2.07	0.00064	0.00331		0.00205	0.01368		0.00027	
0.151	0.977	0.989	0.560	3.886	3.926	4.50	0.00114	0.00739	0.00747	0.00423	0.02938	0.02968	0.00059	
0.075	0.384		0.238	1.586		1.82	0.00056	0.00291		0.00180	0.01200		0.00024	
0.075	0.384	0.392	0.238	1.586	1.604	1.82	0.00056	0.00291	0.00296	0.00180	0.01200	0.01213	0.00024	
0.145	0.748		0.463	3.089		3.54	0.00110	0.00566		0.00350	0.02336		0.00047	
0.145	0.748	0.762	0.463	3.089	3.124	3.54	0.00110	0.00566	0.00576	0.00350	0.02336	0.02362	0.00047	
0.701	**5.700**	**5.742**	**2.957**	**20.726**	**20.936**	**23.46**	**0.00530**	**0.04310**	**0.04342**	**0.02236**	**0.15672**	**0.15830**	**0.00310**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Snohomish - Swamp Creek**												
	Operating Name (Snohomish - PUD No 8)												
	Snohomish - Str 1/2	0.13	WHF	H15	1.3 In AAC/TW Hood	11.34	0.069	0.681	0.355	2.685	6.308		M-141
	Str 1/2 - Str 1/3	0.06	WHF	H24	1.3 In AAC/TW Hood	12.44	0.069	0.692	0.355	2.663	6.200		M-142
	Str 1/3 - Str 2/1	0.90	TDC	J33	1.3 In AAC/TW Hood	20.18	0.069	0.751	0.355	2.545	5.693		
	Str 2/1 - Str 2/3	0.27	TDC	J33	1.3 In AAC/TW Hood	20.18	0.069	0.751	0.355	2.545	5.693		
	Str 2/3 - Str 2/6	0.25	WDC	J30	1.3 In AAC/TW Hood	27.13	0.069	0.787	0.355	2.473	5.422		
	Str 2/6 - Str 5/8	3.21	TDC	J33	1.3 In AAC/TW Hood	20.18	0.069	0.751	0.355	2.545	5.693		
		4.82											
	Str 5/8 - Str 6/2	0.18	TDC		1272 kcmil AAC Narcissus	20.16	0.084	0.750	0.370	2.544	6.694	SNOH	
	Str 6/2 - Str 6/11B	0.60	TDC		1272 kcmil AAC Narcissus	10.71	0.084	0.673	0.370	2.698	6.375	SNOH	
	Str 6/11B - Tie	0.76	HP		1272 kcmil AAC Narcissus	9.54	0.084	0.659	0.370	2.726	6.518	SNOH	
		1.54											
	Tie - Str 1/10	0.27	V		1272 kcmil AAC Narcissus	12.60	0.084	0.693	0.370	2.658	6.185	SNOH	
	Str 1/10 - Silver Lake Tap	0.60	HP		1272 kcmil AAC Narcissus	9.54	0.084	0.659	0.370	2.726	6.518	SNOH	
		0.87											
	Silver Lake Tap - Martha Lake Tap	3.70	HP		1272 kcmil AAC Narcissus	9.54	0.084	0.659	0.370	2.726	6.518	SNOH	
		3.70											
	Martha Lake Tap - Str 6/5	1.32	HP		1272 kcmil AAC Narcissus	9.54	0.084	0.659	0.370	2.726	6.518	SNOH	
	Str 6/5 - Swamp Creek	0.06	H		795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	SNOH	
		1.38											
		12.31											
115	**Snohomish - Waterfront**												
	Operating Name (Snohomish - PUD No 3)												
	Snohomish - Str 1/6	0.47	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-141
	Str 1/6 - Str 4/10	3.59	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-142
		4.06											
	Str 4/10 - Str 0/13	0.88	HP		795 kcmil AAC Arbutus (37)	10.07	0.131	0.695	0.417	2.742	6.172	SNOH	
	Str 0/13 - Pinehurst Tap	0.39	WB		795 kcmil AAC Arbutus (37)	11.35	0.131	0.709	0.417	2.713	6.039	SNOH	
		1.27											
	Pinehurst Tap - Str 2/1	0.75	WB		795 kcmil AAC Arbutus (37)	11.35	0.131	0.709	0.417	2.713	6.039	SNOH	
	Str 2/1 - 52nd Street	0.23	WB		795 kcmil AAC Arbutus (37)	11.35	0.131	0.709	0.417	2.713	6.039	SNOH	
		0.98											
	52nd Street - Str 2/9	0.26	HP		795 kcmil AAC Arbutus (37)	9.54	0.131	0.688	0.417	2.755	6.234	SNOH	
	Str 2/9 - Str 3/5	0.84	WB		795 kcmil AAC Arbutus (37)	11.35	0.131	0.709	0.417	2.713	6.039	SNOH	
	Str 3/5 - Str 3/14	0.57	HP		795 kcmil ACSR Drake	9.54	0.128	0.672	0.414	2.739	6.323	SNOH	
	Str 3/14 - Federal Street	1.64	WB		795 kcmil AAC Arbutus (37)	8.50	0.131	0.674	0.417	2.783	6.369	SNOH	
		3.31											
	Federal Street - Waterfront	0.20	WB		795 kcmil AAC Arbutus (37)	10.71	0.131	0.702	0.417	2.727	6.103	SNOH	
		0.20											
		9.82											
115	**Spearfish (KPUD) - Tap (Chenoweth - Goldendale 1)**												
		3.22	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		3.22											
		3.22											
115	**Spirit(AVA) - Tap (Colville - Boundary 1)**												
		5.23	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		5.23											
		5.23											
115	**St Helens - Allston 1**												
	St Helens (PGE) - Str 22/4	1.95			795 kcmil AAC Arbutus (37)	9.46	0.131	0.687	0.417	2.757	6.243	PGE	
	Str 22/4 - Rosehill Tap (GRPUD)	5.64	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		M-170
		7.59											
	Rosehill Tap - PGE (Goble)	6.08	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		6.08											
	PGE (Goble) - PGE (Trojan Tap)	1.57	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		1.57											
	PGE (Trojan Tap) - PGE (Rainier)	3.73	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		3.73											
	PGE (Rainier) - Str 6/8	5.05	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
	Str 6/8 - Str 5/5	1.09	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 5/5 - Allston	0.10	WHF	H22	795 kcmil ACSR Drake	14.49	0.128	0.723	0.414	2.638	5.863		
		6.24											
		25.21											
115	**St Johns - Keeler 2**												
	St Johns - Str 1/11	0.90	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-131
	Str 1/11 - Str 2/2	1.06	SDC	H1	801.9 kcmil ACSR Special HS	30.67	0.121	0.791	0.407	2.432	5.292		M-132
	Str 2/2 - Str 6/9	3.48	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-133
	Str 6/9(O C Tap) - Keeler	3.99	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		9.43											
		9.43											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Snohomish - Swamp Creek														
0.009	0.089		0.046	0.349		0.41	0.00007	0.00067		0.00035	0.00264		0.00005	
0.004	0.042		0.021	0.160		0.19	0.00003	0.00031		0.00016	0.00121		0.00002	
0.062	0.676		0.320	2.291		2.56	0.00047	0.00511		0.00242	0.01732		0.00034	
0.019	0.203		0.096	0.687		0.77	0.00014	0.00153		0.00072	0.00520		0.00010	
0.017	0.197		0.089	0.618		0.68	0.00013	0.00149		0.00067	0.00468		0.00009	
0.221	2.410		1.140	8.170		9.14	0.00167	0.01823		0.00862	0.06178		0.00121	
0.333	3.616	3.631	1.711	12.275	12.393	13.74	0.00251	0.02734	0.02745	0.01294	0.09281	0.09371	0.00182	
0.015	0.135		0.067	0.458		0.51	0.00011	0.00102		0.00050	0.00346		0.00007	
0.050	0.404		0.222	1.619		1.91	0.00038	0.00305		0.00168	0.01224		0.00025	
0.064	0.501		0.281	2.072		2.48	0.00048	0.00379		0.00213	0.01566		0.00033	
0.130	1.039	1.048	0.570	4.148	4.187	4.90	0.00098	0.00786	0.00792	0.00431	0.03137	0.03166	0.00065	
0.023	0.187		0.100	0.718		0.84	0.00017	0.00141		0.00076	0.00543		0.00011	
0.050	0.395		0.222	1.636		1.96	0.00038	0.00299		0.00168	0.01237		0.00026	
0.073	0.582	0.587	0.322	2.353	2.375	2.79	0.00055	0.00440	0.00444	0.00243	0.01779	0.01796	0.00037	
0.311	2.438		1.369	10.086		12.06	0.00235	0.01843		0.01035	0.07626		0.00159	
0.311	2.438	2.458	1.369	10.086	10.178	12.06	0.00235	0.01843	0.01858	0.01035	0.07626	0.07696	0.00159	
0.111	0.870		0.489	3.598		4.30	0.00084	0.00658		0.00369	0.02721		0.00057	
0.008	0.045		0.025	0.159		0.17	0.00006	0.00034		0.00019	0.00120		0.00002	
0.119	0.914	0.922	0.514	3.757	3.792	4.47	0.00090	0.00691	0.00697	0.00388	0.02841	0.02867	0.00059	
0.965	**8.590**	**8.644**	**4.486**	**32.619**	**32.926**	**37.97**	**0.00730**	**0.06495**	**0.06536**	**0.03392**	**0.24664**	**0.24896**	**0.00502**	
115 Snohomish - Waterfront														
0.119	0.362		0.254	1.255		1.29	0.00090	0.00274		0.00192	0.00949		0.00017	2-3/8 IN HS STL
0.910	2.765		1.936	9.584		9.86	0.00688	0.02091		0.01464	0.07247		0.00130	
1.029	3.127	3.292	2.190	10.838	11.057	11.15	0.00778	0.02365	0.02489	0.01656	0.08195	0.08361	0.00147	
0.115	0.611		0.367	2.413		2.72	0.00087	0.00462		0.00277	0.01825		0.00036	
0.051	0.277		0.163	1.058		1.18	0.00039	0.00209		0.00123	0.00800		0.00016	
0.166	0.888	0.904	0.530	3.471	3.511	3.89	0.00126	0.00672	0.00683	0.00400	0.02625	0.02655	0.00051	
0.098	0.532		0.313	2.035		2.26	0.00074	0.00402		0.00236	0.01539		0.00030	
0.030	0.163		0.096	0.624		0.69	0.00023	0.00123		0.00073	0.00472		0.00009	
0.128	0.695	0.707	0.409	2.659	2.690	2.96	0.00097	0.00526	0.00535	0.00309	0.02010	0.02034	0.00039	
0.034	0.179		0.108	0.716		0.81	0.00026	0.00135		0.00082	0.00542		0.00011	
0.110	0.596		0.350	2.279		2.54	0.00083	0.00451		0.00265	0.01723		0.00034	
0.073	0.383		0.236	1.561		1.80	0.00055	0.00290		0.00178	0.01181		0.00024	
0.215	1.106		0.684	4.564		5.22	0.00162	0.00836		0.00517	0.03451		0.00069	
0.432	2.264	2.304	1.378	9.121	9.225	10.37	0.00326	0.01712	0.01743	0.01042	0.06897	0.06975	0.00137	
0.026	0.140		0.083	0.545		0.61	0.00020	0.00106		0.00063	0.00412		0.00008	
0.026	0.140	0.143	0.083	0.545	0.552	0.61	0.00020	0.00106	0.00108	0.00063	0.00412	0.00417	0.00008	
1.781	**7.115**	**7.334**	**4.590**	**26.635**	**27.027**	**28.98**	**0.01347**	**0.05380**	**0.05546**	**0.03471**	**0.20140**	**0.20437**	**0.00383**	
115 Spearfish (KPUD) - Tap (Chenoweth - Goldendale 1)														
1.213	2.558		2.134	8.674		8.56	0.00917	0.01934		0.01614	0.06559		0.00113	
1.213	2.558	2.831	2.134	8.674	8.932	8.56	0.00917	0.01934	0.02141	0.01614	0.06559	0.06754	0.00113	
1.213	**2.558**	**2.831**	**2.134**	**8.674**	**8.932**	**8.56**	**0.00917**	**0.01934**	**0.02141**	**0.01614**	**0.06559**	**0.06754**	**0.00113**	
115 Spirit(AVA) - Tap (Colville - Boundary 1)														
2.944	4.616		4.440	14.549		13.63	0.02226	0.03490		0.03357	0.11001		0.00180	
2.944	4.616	5.475	4.440	14.549	15.212	13.63	0.02226	0.03490	0.04140	0.03357	0.11001	0.11502	0.00180	
2.944	**4.616**	**5.475**	**4.440**	**14.549**	**15.212**	**13.63**	**0.02226**	**0.03490**	**0.04140**	**0.03357**	**0.11001**	**0.11502**	**0.00180**	
115 St Helens - Allston 1														
0.255	1.340		0.813	5.377		6.09	0.00193	0.01013		0.00615	0.04065		0.00081	
1.023	4.229		2.636	14.941		15.92	0.00773	0.03198		0.01993	0.11297		0.00211	
1.278	5.569	5.714	3.449	20.317	20.608	22.01	0.00966	0.04211	0.04320	0.02608	0.15363	0.15583	0.00291	
1.102	4.559		2.841	16.106		17.16	0.00834	0.03447		0.02148	0.12179		0.00227	
1.102	4.559	4.690	2.841	16.106	16.355	17.16	0.00834	0.03447	0.03546	0.02148	0.12179	0.12367	0.00227	
0.285	1.177		0.734	4.159		4.43	0.00215	0.00890		0.00555	0.03145		0.00059	
0.285	1.177	1.211	0.734	4.159	4.223	4.43	0.00215	0.00890	0.00916	0.00555	0.03145	0.03193	0.00059	
0.676	2.797		1.743	9.881		10.53	0.00511	0.02115		0.01318	0.07471		0.00139	
0.676	2.797	2.877	1.743	9.881	10.034	10.53	0.00511	0.02115	0.02176	0.01318	0.07471	0.07587	0.00139	
0.916	3.786		2.360	13.378		14.26	0.00692	0.02863		0.01784	0.10116		0.00189	
0.139	0.794		0.451	2.864		3.17	0.00105	0.00600		0.00341	0.02166		0.00042	
0.013	0.072		0.041	0.264		0.29	0.00010	0.00055		0.00031	0.00199		0.00004	2-3/8 IN EHS STL
1.067	4.652	4.773	2.852	16.506	16.750	17.72	0.00807	0.03518	0.03609	0.02156	0.12481	0.12665	0.00234	
4.408	**18.754**	**19.265**	**11.619**	**66.969**	**67.970**	**71.86**	**0.03333**	**0.14180**	**0.14567**	**0.08785**	**0.50638**	**0.51395**	**0.00950**	
115 St Johns - Keeler 2														
0.169	0.713		0.426	2.423		2.42	0.00128	0.00539		0.00322	0.01832		0.00032	
0.128	0.838		0.431	2.578		2.80	0.00097	0.00634		0.00326	0.01950		0.00037	
0.654	2.758		1.649	9.368		9.35	0.00494	0.02086		0.01247	0.07084		0.00124	
0.723	2.992		1.865	10.570		11.26	0.00547	0.02262		0.01410	0.07992		0.00149	
1.674	7.301	7.491	4.371	24.939	25.319	25.84	0.01266	0.05521	0.05664	0.03305	0.18857	0.19145	0.00342	
1.674	**7.301**	**7.491**	**4.371**	**24.939**	**25.319**	**25.84**	**0.01266**	**0.05521**	**0.05664**	**0.03305**	**0.18857**	**0.19145**	**0.00342**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**St Johns - St Helens(PGE) 1**												
	St Johns - Str 1/2	0.09	WHF	H11	556.5 kcmil ACSR Dove	17.64	0.181	0.768	0.467	2.612	5.504		M-130
	Str 1/2 - Twr 1/11	0.82	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-131
	Twr 1/11 - Twr 2/2	1.06	SDC	H1	801.9 kcmil ACSR Special HS	30.67	0.121	0.791	0.407	2.432	5.292		M-132
	Twr 2/2 - Str 3/1	0.16	WHF	H18	397.5 kcmil ACSR Ibis	20.16	0.253	0.805	0.539	2.600	5.245		
	Str 3/1 - Str 7/3	4.27	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 7/3 - Str 7/8	0.64	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 7/8 - Str 8/6	0.58	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 8/6 - Str 8/9	0.32	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 8/9 - Str 9/1	0.29	WSP	H23	397.5 kcmil ACSR Lark	11.52	0.251	0.732	0.537	2.730	5.774		
@	Str 9/1 - Dutch Canyon Tap (CRPUD)	4.59	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		12.82											
@	Dutch Canyon Tap (CRPUD) - Warren/Tarbell Ta	5.37	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
		5.37											
	Warren/Tarbell Tap - Str 22/4	3.31	WHF	H7	253 kcmil Cu GC LS 19238	15.12	0.254	0.792	0.540	2.692	5.329		
	Str 22/4- St Helens(PGE)	1.77			336.4 kcmil ACSR Linnet	12.60	0.299	0.758	0.585	2.724	5.580	PGE	M-160
		5.08											
		23.27											
115	**St Johns - Stub 1 (De-Energized) Twr 1/1 - Twr 1/5**												
		0.90	SDC	J2	1272 kcmil ACSR Pheasant	27.68	0.082	0.775	0.368	2.454	5.458		
		0.90											
		0.90											
115	**St Johns - Tap (Keeler - Oregon City 2)**												
	Str 3/4 - Str 6/1 De-Energized	2.44	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-131
	Str 6/1 - Tap	0.56	WHF	H7	350 kcmil Cu PH D 1319HSC2	15.12	0.188	0.793	0.474	2.692	5.374		M-132
		3.00											
		3.00											
115	**St Johns 230/115 kV Tx - 115 kV Bus**												
		0.18	SSC	J7	1590 kcmil AAC Coreopsis	25.20	0.069	0.763	0.355	2.477	5.589		
		0.18											
		0.18											
115	**Sullivan (VID) - Tap (Vera Tap Line)**												
	Operating Name (Vera Tap to Trentwood - Valley Way)												
		0.04	TSP		556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		0.04											
		0.04											
115	**Swan Valley - Teton 1**												
	Line energized Oct 2000												
@	Swan Valley - Str 5/1	4.24	SSC	H13	556.5 kcmil ACSR Dove	17.01	0.181	0.764	0.467	2.620	5.537		
@	Str 5/1 - Str 6/3	1.30	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	Str 6/3 - Str 6/5	0.27	TDC	SPEC	556.5 kcmil ACSR Dove	16.66	0.181	0.762	0.467	2.626	5.556		
@	Str 6/5 - Str 7/1	0.47	WHF	H11	556.5 kcmil ACSR Dove	17.64	0.181	0.768	0.467	2.612	5.504		
@	Str7/1 - Str11/1	3.94	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	Str 11/1 - Targhee Tap	7.26	SSC	H13	556.5 kcmil ACSR Dove	17.01	0.181	0.764	0.467	2.620	5.537		
		17.48											
@	Targhee Tap - Str19/7	1.64	SSC	H13	556.5 kcmil ACSR Dove	17.01	0.181	0.764	0.467	2.620	5.537		
@	Str19/7 - Str 20/9	0.86	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	Str 20/9 - ID/WY Border (22/8)	1.99	TSP	H34	556.5 kcmil ACSR Dove	16.29	0.181	0.759	0.467	2.631	5.576		
		4.49											
@	ID/WY Border - Str 23/9	1.01	TSP	H34	556.5 kcmil ACSR Dove	16.29	0.181	0.759	0.467	2.631	5.576		
@	Str 23/9 - Str 26/2	2.44	TSP	SPEC	556.5 kcmil ACSR Dove	18.09	0.181	0.772	0.467	2.606	5.481		
@	Str 26/2 - Str 27/5	1.24	SDC	SPEC	556.5 kcmil ACSR Dove	16.44	0.181	0.760	0.467	2.629	5.568		
@	Str 27/5 - Str 28/2	1.04	SDC	H2	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
@	Str 28/2 - Str 29/4	1.07	SDC	SPEC	556.5 kcmil ACSR Dove	16.44	0.181	0.760	0.467	2.629	5.568		
@	Str 29/4 - Str 30/6	0.94	TSP	SPEC	556.5 kcmil ACSR Dove	21.42	0.181	0.792	0.467	2.565	5.335		
@	Str 30/6 - Str 35/1	4.46	TSP	SPEC	556.5 kcmil ACSR Dove	18.09	0.181	0.772	0.467	2.606	5.481		
@	Str 35/1 - 36/4	1.21	TDC	H26	556.5 kcmil ACSR Dove	12.97	0.181	0.731	0.467	2.686	5.795		
@	Str 36/4 - Teton	0.08	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		13.49											
		35.46											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 St Johns - St Helens(PGE) 1														
0.016	0.069		0.042	0.235		0.25	0.00012	0.00052		0.00032	0.00178		0.00003	
0.154	0.650		0.389	2.207		2.20	0.00116	0.00491		0.00294	0.01669		0.00029	
0.128	0.838		0.431	2.578		2.80	0.00097	0.00634		0.00326	0.01950		0.00037	
0.041	0.129		0.086	0.416		0.42	0.00031	0.00097		0.00065	0.00315		0.00006	
1.085	3.384		2.306	11.494		11.38	0.00820	0.02559		0.01744	0.08691		0.00150	
0.162	0.472		0.345	1.751		1.84	0.00123	0.00357		0.00261	0.01324		0.00024	
0.147	0.460		0.313	1.561		1.55	0.00111	0.00348		0.00237	0.01181		0.00020	
0.081	0.236		0.173	0.875		0.92	0.00061	0.00178		0.00131	0.00662		0.00012	
0.073	0.212		0.156	0.792		0.84	0.00055	0.00160		0.00118	0.00599		0.00011	
1.166	3.638		2.479	12.355		12.23	0.00882	0.02750		0.01875	0.09342		0.00162	
3.054	10.087	10.539	6.720	34.265	34.918	34.43	0.02309	0.07627	0.07969	0.05081	0.25909	0.26403	0.00455	
1.365	4.256		2.900	14.455		14.31	0.01032	0.03218		0.02193	0.10930		0.00189	
1.365	4.256	4.469	2.900	14.455	14.743	14.31	0.01032	0.03218	0.03379	0.02193	0.10930	0.11148	0.00189	
0.841	2.623		1.788	8.910		8.82	0.00636	0.01983		0.01352	0.06737		0.00117	
0.530	1.342		1.036	4.821		4.94	0.00400	0.01015		0.00783	0.03646		0.00065	
1.371	3.965	4.195	2.824	13.731	14.018	13.76	0.01036	0.02998	0.03172	0.02135	0.10383	0.10600	0.00182	
5.789	**18.308**	**19.201**	**12.444**	**62.451**	**63.679**	**62.49**	**0.04377**	**0.13843**	**0.14519**	**0.09409**	**0.47222**	**0.48150**	**0.00826**	
115 St Johns - Stub 1 (De-Energized) Twr 1/1 - Twr 1/5														
0.074	0.697		0.331	2.209		2.46	0.00056	0.00527		0.00250	0.01670		0.00032	
0.074	0.697	0.701	0.331	2.209	2.233	2.46	0.00056	0.00527	0.00530	0.00250	0.01670	0.01689	0.00032	
0.074	**0.697**	**0.701**	**0.331**	**2.209**	**2.233**	**2.46**	**0.00056**	**0.00527**	**0.00530**	**0.00250**	**0.01670**	**0.01689**	**0.00032**	
115 St Johns - Tap (Keeler - Oregon City 2)														
0.458	1.934		1.156	6.568		6.56	0.00346	0.01462		0.00874	0.04967		0.00087	
0.105	0.444		0.265	1.508		1.50	0.00080	0.00336		0.00201	0.01140		0.00020	
0.563	2.378	2.444	1.421	8.076	8.200	8.06	0.00426	0.01798	0.01848	0.01075	0.06107	0.06200	0.00107	
0.563	**2.378**	**2.444**	**1.421**	**8.076**	**8.200**	**8.06**	**0.00426**	**0.01798**	**0.01848**	**0.01075**	**0.06107**	**0.06200**	**0.00107**	
115 St Johns 230/115 kV Tx - 115 kV Bus														
0.012	0.137		0.064	0.446		0.50	0.00009	0.00104		0.00048	0.00337		0.00007	
0.012	0.137	0.138	0.064	0.446	0.450	0.50	0.00009	0.00104	0.00104	0.00048	0.00337	0.00341	0.00007	
0.012	**0.137**	**0.138**	**0.064**	**0.446**	**0.450**	**0.50**	**0.00009**	**0.00104**	**0.00104**	**0.00048**	**0.00337**	**0.00341**	**0.00007**	
115 Sullivan (VID) - Tap (Vera Tap Line)														
0.007	0.030		0.019	0.106		0.11	0.00005	0.00023		0.00014	0.00080		0.00001	
0.007	0.030	0.031	0.019	0.106	0.108	0.11	0.00005	0.00023	0.00023	0.00014	0.00080	0.00081	0.00001	
0.007	**0.030**	**0.031**	**0.019**	**0.106**	**0.108**	**0.11**	**0.00005**	**0.00023**	**0.00023**	**0.00014**	**0.00080**	**0.00081**	**0.00001**	
115 Swan Valley - Teton 1														
0.769	3.240		1.981	11.111		11.74	0.00581	0.02450		0.01498	0.08401		0.00155	2 - 7No. 8 Alumoweld
0.236	0.975		0.607	3.444		3.67	0.00178	0.00737		0.00459	0.02604		0.00049	2 - 7No. 8 Alumoweld
0.049	0.206		0.126	0.709		0.75	0.00037	0.00155		0.00095	0.00536		0.00010	1/2" EHS Steel
0.085	0.361		0.220	1.227		1.29	0.00064	0.00273		0.00166	0.00928		0.00017	2 - 1/2" EHS Steel
0.714	2.954		1.841	10.437		11.12	0.00540	0.02234		0.01392	0.07892		0.00147	2 - 7No. 8 Alumoweld
1.316	5.547		3.393	19.025		20.10	0.00995	0.04194		0.02565	0.14385		0.00266	2 - 7No. 8 Alumoweld
3.169	13.282	13.655	8.168	45.953	46.674	48.67	0.02396	0.10043	0.10325	0.06176	0.34747	0.35292	0.00644	
0.297	1.253		0.766	4.298		4.54	0.00225	0.00948		0.00579	0.03250		0.00060	2 - 7No. 8 Alumoweld
0.156	0.645		0.402	2.278		2.43	0.00118	0.00488		0.00304	0.01723		0.00032	2 - 7No. 8 Alumoweld
0.361	1.510		0.930	5.236		5.55	0.00273	0.01142		0.00703	0.03959		0.00073	1/2" EHS Steel
0.814	3.408	3.504	2.098	11.811	11.996	12.52	0.00616	0.02577	0.02649	0.01587	0.08931	0.09071	0.00166	
0.183	0.766		0.472	2.657		2.82	0.00138	0.00580		0.00357	0.02009		0.00037	1/2" EHS Steel
0.442	1.883		1.140	6.358		6.69	0.00334	0.01423		0.00862	0.04807		0.00088	1/2" EHS Steel
0.225	0.942		0.579	3.260		3.45	0.00170	0.00713		0.00438	0.02465		0.00046	2 - 1/2" EHS Steel
0.189	0.782		0.486	2.750		2.93	0.00143	0.00592		0.00367	0.02079		0.00039	1/2" EHS Steel
0.194	0.813		0.500	2.813		2.98	0.00147	0.00615		0.00378	0.02127		0.00039	2 - 1/2" EHS Steel
0.170	0.745		0.439	2.411		2.51	0.00129	0.00563		0.00332	0.01823		0.00033	1/2" EHS Steel
0.809	3.441		2.084	11.621		12.22	0.00611	0.02602		0.01576	0.08787		0.00162	1/2" EHS Steel
0.219	0.885		0.565	3.250		3.51	0.00166	0.00669		0.00428	0.02458		0.00046	1/2" EHS Steel
0.015	0.060		0.037	0.212		0.23	0.00011	0.00045		0.00028	0.00160		0.00003	2 - 1/2" EHS Steel
2.446	10.317	10.603	6.304	35.331	35.889	37.32	0.01849	0.07801	0.08017	0.04767	0.26715	0.27137	0.00494	
6.429	**27.007**	**27.762**	**16.570**	**93.096**	**94.559**	**98.51**	**0.04861**	**0.20421**	**0.20992**	**0.12530**	**0.70394**	**0.71500**	**0.01303**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Swan Valley - Teton 2**												
	Line energized Oct 2000												
@	Swan Valley - Str 6/3	5.53	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	Str 6/3 - Str 6/5	0.27	TDC	SPEC	556.5 kcmil ACSR Dove	16.66	0.181	0.762	0.467	2.626	5.556		
@	Str 6/5 - Str 7/3	0.63	WHF	H13	556.5 kcmil ACSR Dove	17.01	0.181	0.764	0.467	2.620	5.537		
@	Str 7/3 - Str 20/9	13.53	TSP	H34	556.5 kcmil ACSR Dove	16.29	0.181	0.759	0.467	2.631	5.576		
@	Str 20/9 - Str 21/4	0.60	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		20.56											
@	Str 21/4 - ID/WY Border (Str 22/8)	1.37	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	ID/WY Border (Str 22/8) - Str 26/2	3.45	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		4.82											
@	Str 26/2 - Str 27/5	1.24	SDC	SPEC	556.5 kcmil ACSR Dove	15.18	0.181	0.750	0.467	2.648	5.642		
@	Str 27/5 - Str 28/2	1.04	SDC	H2	556.5 kcmil ACSR Dove	15.43	0.181	0.752	0.467	2.644	5.627		
@	Str 28/2 - Str 29/4	1.07	SDC	SPEC	556.5 kcmil ACSR Dove	15.18	0.181	0.750	0.467	2.648	5.642		
@	Str 29/4 - Str 32/8	2.97	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	Str 32/8 - Str 34/5	2.18	WHF	H13	556.5 kcmil ACSR Dove	17.01	0.181	0.764	0.467	2.620	5.537		
@	Str 34/5 - Str 35/1	0.25	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
@	Str 35/1 - Str 36/4	1.21	TDC	H26	556.5 kcmil ACSR Dove	12.97	0.181	0.731	0.467	2.686	5.795		
@	Str 36/4 - Teton	0.05	WHF	H7	556.5 kcmil ACSR Dove	15.12	0.181	0.750	0.467	2.649	5.646		
		10.01											
		35.39											
115	**Tahkenitch - Gardiner**												
		1.64	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		1.64											
		1.64											
115	**Tahkenitch - Reedsport 1**												
	Tahkenitch - Str 2/6	1.82	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 2/6 - Str 3/5	1.29	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
	Str 3/5 - Str 4/23	0.83	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 4/23 - Str 5/8	0.39	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 5/8 - Reedsport	0.05	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		4.38											
		4.38											
115	**Tanner(Tanner EL Coop) - Tap (Lake Tradition - Snoquamie 1 PSE)**												
	Tanner Tap line projected energization date September 2000												
@	Tanner - Tap	4.50	TSP	H24	795 kcmil AAC Arbutus (37)	12.44	0.131	0.720	0.417	2.691	5.942		
		4.50											
		4.50											
115	**Targhee - Drummond**												
		26.80	WHF		336.4 kcmil ACSR Linnet	15.12	0.299	0.780	0.585	2.680	5.417	FREC	
		26.80											
		26.80											
115	**Targhee - Tap(Swan Valley - Teton 1)**												
	Targhee - Str 3/9	2.94	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 3/9 - Victor (FRREC) Tap	0.09	WHF	H15	266.8 kcmil ACSR Partridge	11.34	0.377	0.759	0.663	2.763	5.571		
		3.03											
	Victor Tap (FRREC) - Str 4/1	0.03	WHF	H15	266.8 kcmil ACSR Partridge	11.34	0.377	0.759	0.663	2.763	5.571		
	Str 4/1 - Tap	7.89	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		7.92											
		10.95											
115	**Taylor Flats - Tap (Benton - Franklin 2)**												
@	Taylor Flats - Twr 9/16	0.21	TDC	H25	397.5 kcmil ACSR Ibis	15.48	0.253	0.773	0.539	2.664	5.470		M-174
@	Str 9/16 - North Pasco	6.90	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
		7.11											
@	North Pasco - Str 1/1	1.50	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
@	Str 1/1 - Tap	0.02	WHF	SPEC	397.5 kcmil ACSR Ibis	17.32	0.253	0.787	0.539	2.637	5.372		
@	Tap - Glade	0.01	WHF	SPEC	397.5 kcmil ACSR Ibis	17.32	0.253	0.787	0.539	2.637	5.372		
		1.53											
		8.64											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Swan Valley - Teton 2														
1.003	4.146		2.584	14.649		15.61	0.00758	0.03135		0.01954	0.11077		0.00206	2 - 1/2" EHS Steel
0.049	0.206		0.126	0.709		0.75	0.00037	0.00155		0.00095	0.00536		0.00010	1/2" EHS Steel
0.114	0.481		0.294	1.651		1.74	0.00086	0.00364		0.00223	0.01248		0.00023	2 - 1/2" EHS Steel
2.453	10.267		6.323	35.597		37.72	0.01855	0.07763		0.04781	0.26917		0.00499	1/2" EHS Steel
0.109	0.450		0.280	1.589		1.69	0.00082	0.00340		0.00212	0.01202		0.00022	2 - 1/2" EHS Steel
3.728	15.550	15.990	9.608	54.196	55.041	57.52	0.02819	0.11758	0.12091	0.07265	0.40980	0.41619	0.00761	
0.248	1.027		0.640	3.629		3.87	0.00188	0.00777		0.00484	0.02744		0.00051	2 - 7 No 8 Alumoweld
0.625	2.587		1.612	9.139		9.74	0.00473	0.01956		0.01219	0.06911		0.00129	2 - 7 No 8 Alumoweld
0.874	3.614	3.718	2.252	12.769	12.966	13.61	0.00661	0.02733	0.02811	0.01703	0.09655	0.09804	0.00180	
0.225	0.930		0.579	3.284		3.50	0.00170	0.00703		0.00438	0.02483		0.00046	2 - 7 No 8 Alumoweld
0.189	0.782		0.486	2.750		2.93	0.00143	0.00592		0.00367	0.02079		0.00039	7 No 8 Alumoweld
0.194	0.803		0.500	2.833		3.02	0.00147	0.00607		0.00378	0.02143		0.00040	2 - 7 No 8 Alumoweld
0.538	2.227		1.388	7.868		8.38	0.00407	0.01684		0.01049	0.05949		0.00111	2 - 7 No 8 Alumoweld
0.395	1.666		1.019	5.713		6.04	0.00299	0.01259		0.00770	0.04320		0.00080	2 - 7 No 8 Alumoweld
0.045	0.187		0.117	0.662		0.71	0.00034	0.00142		0.00088	0.00501		0.00009	2 - 7 No 8 Alumoweld
0.219	0.885		0.565	3.250		3.51	0.00166	0.00669		0.00428	0.02458		0.00046	7 No 8 Alumoweld
0.009	0.037		0.023	0.132		0.14	0.00007	0.00028		0.00018	0.00100		0.00002	2 - 7 No 8 Alumoweld
1.815	7.518	7.734	4.678	26.493	26.902	28.22	0.01372	0.05684	0.05848	0.03537	0.20032	0.20342	0.00373	
6.416	**26.681**	**27.442**	**16.538**	**93.457**	**94.909**	**99.35**	**0.04852**	**0.20175**	**0.20750**	**0.12505**	**0.70667**	**0.71765**	**0.01314**	
115 Tahkenitch - Gardiner														
0.618	1.303		1.087	4.418		4.36	0.00467	0.00985		0.00822	0.03340		0.00058	
0.618	1.303	1.442	1.087	4.418	4.549	4.36	0.00467	0.00985	0.01090	0.00822	0.03340	0.03440	0.00058	
0.618	**1.303**	**1.442**	**1.087**	**4.418**	**4.549**	**4.36**	**0.00467**	**0.00985**	**0.01090**	**0.00822**	**0.03340**	**0.03440**	**0.00058**	
115 Tahkenitch - Reedsport 1														
0.461	1.402		0.982	4.859		5.00	0.00349	0.01060		0.00742	0.03674		0.00066	
0.324	0.986		0.693	3.436		3.56	0.00245	0.00746		0.00524	0.02598		0.00047	
0.210	0.613		0.448	2.268		2.38	0.00159	0.00464		0.00339	0.01715		0.00031	
0.099	0.288		0.210	1.066		1.12	0.00075	0.00218		0.00159	0.00806		0.00015	
0.013	0.039		0.027	0.133		0.14	0.00010	0.00029		0.00020	0.00101		0.00002	
1.107	3.328	3.507	2.360	11.762	11.996	12.19	0.00837	0.02517	0.02652	0.01784	0.08894	0.09071	0.00161	
1.107	**3.328**	**3.507**	**2.360**	**11.762**	**11.996**	**12.19**	**0.00837**	**0.02517**	**0.02652**	**0.01784**	**0.08894**	**0.09071**	**0.00161**	
115 Tanner(Tanner EL Coop) - Tap (Lake Tradition - Snoquamie 1 PSE)														
0.590	3.242		1.877	12.108		13.37	0.00446	0.02451		0.01419	0.09156		0.00177	
0.590	3.242	3.295	1.877	12.108	12.253	13.37	0.00446	0.02451	0.02492	0.01419	0.09156	0.09265	0.00177	
0.590	**3.242**	**3.295**	**1.877**	**12.108**	**12.253**	**13.37**	**0.00446**	**0.02451**	**0.02492**	**0.01419**	**0.09156**	**0.09265**	**0.00177**	
115 Targhee - Drummond														
8.019	20.915		15.683	71.816		72.59	0.06063	0.15814		0.11859	0.54303		0.00960	
8.019	20.915	22.399	15.683	71.816	73.508	72.59	0.06063	0.15814	0.16937	0.11859	0.54303	0.55583	0.00960	
8.019	**20.915**	**22.399**	**15.683**	**71.816**	**73.508**	**72.59**	**0.06063**	**0.15814**	**0.16937**	**0.11859**	**0.54303**	**0.55583**	**0.00960**	
115 Targhee - Tap(Swan Valley - Teton 1)														
1.107	2.335		1.948	7.919		7.82	0.00837	0.01766		0.01473	0.05988		0.00103	2-7 NO 8 ALWLD
0.034	0.068		0.060	0.249		0.25	0.00026	0.00052		0.00045	0.00188		0.00003	2-7 NO 8 ALWLD
1.141	2.404	2.661	2.008	8.168	8.411	8.07	0.00863	0.01818	0.02012	0.01518	0.06176	0.06360	0.00107	
0.011	0.023		0.020	0.083		0.08	0.00009	0.00017		0.00015	0.00063		0.00001	2-7 NO 8 ALWLD
2.972	6.268		5.229	21.253		20.98	0.02247	0.04739		0.03954	0.16070		0.00277	2-7 NO 8 ALWLD
2.983	6.290	6.962	5.249	21.336	21.972	21.06	0.02256	0.04756	0.05264	0.03969	0.16133	0.16614	0.00279	
4.125	**8.694**	**9.623**	**7.257**	**29.504**	**30.383**	**29.13**	**0.03119**	**0.06574**	**0.07276**	**0.05487**	**0.22309**	**0.22974**	**0.00385**	
115 Taylor Flats - Tap (Benton - Franklin 2)														
0.053	0.162		0.113	0.559		0.57	0.00040	0.00123		0.00086	0.00423		0.00008	
1.748	5.087		3.722	18.875		19.82	0.01322	0.03847		0.02814	0.14272		0.00262	
1.802	5.249	5.550	3.835	19.435	19.809	20.40	0.01362	0.03969	0.04197	0.02900	0.14695	0.14979	0.00270	
0.380	1.106		0.809	4.103		4.31	0.00287	0.00836		0.00612	0.03103		0.00057	
0.005	0.016		0.011	0.053		0.05	0.00004	0.00012		0.00008	0.00040		0.00001	
0.003	0.008		0.005	0.026		0.03	0.00002	0.00006		0.00004	0.00020		0.00000	
0.388	1.129	1.194	0.825	4.182	4.263	4.39	0.00293	0.00854	0.00903	0.00624	0.03163	0.03223	0.00058	
2.189	**6.379**	**6.744**	**4.660**	**23.617**	**24.073**	**24.78**	**0.01655**	**0.04823**	**0.05100**	**0.03524**	**0.17858**	**0.18202**	**0.00328**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Teton - Snake River**												
	Teton - CH 1	0.23	TDC		556.5 kcmil ACSR Dove	12.50	0.181	0.727	0.467	2.695	5.832	LVPL	
	CH 1 - Wilson	2.11	TDC		556.5 kcmil ACSR Dove	12.50	0.181	0.727	0.467	2.695	5.832	LVPL	
		2.34											
	Wilson - Jackson 1	5.07	TDC		556.5 kcmil ACSR Dove	12.50	0.181	0.727	0.467	2.695	5.832	LVPL	
		5.07											
	Jackson 1 - Rafter J	4.10	WHF		556.5 kcmil ACSR Dove	15.75	0.181	0.755	0.467	2.639	5.608	LVPL	
		4.10											
	Rafter J - Hoback	8.20	WHF		556.5 kcmil ACSR Dove	15.75	0.181	0.755	0.467	2.639	5.608	LVPL	
		8.20											
	Hoback - Clingers Corner	21.10	WHF		556.5 kcmil ACSR Dove	15.75	0.181	0.755	0.467	2.639	5.608	LVPL	
	Clingers Corner - Snake River	1.40	DC		556.5 kcmil ACSR Dove	12.50	0.181	0.727	0.467	2.695	5.832	LVPL	
		22.50											
		42.21											
115	**Thatcher Junction - Tap (Keeler - Tillamook)**												
	Section 1	0.01	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Section 2	0.74	WSP		336.4 kcmil ACSR Oriole	12.00	0.297	0.747	0.583	2.730	5.654	FGRO	
		0.75											
		0.75											
115	**The Dalles - Chenoweth 1**												
		2.03	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		2.03											
		2.03											
115	**The Dalles PH - Big Eddy 1**												
		0.81	SSC	K3	1780 kcmil ACSR Chukar	45.36	0.061	0.818	0.347	2.318	5.169		M-125
		0.81											
		0.81											
115	**The Dalles PH - Big Eddy 2**												
	Section 1	0.65	SSC	J3	1272 kcmil ACSR Pheasant	34.02	0.082	0.800	0.368	2.404	5.282		M-125
	Section 2	0.17	SSC	K3	1780 kcmil ACSR Chukar	45.36	0.061	0.818	0.347	2.318	5.169		
		0.82											
		0.82											
115	**Thurston - Willakenzie 1**												
	Thurston - Str 1/2	0.10	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	EWEB	
	Str 1/2 - Str 1/8	0.63	WDC		795 kcmil AAC Arbutus (37)	15.54	0.131	0.747	0.417	2.637	5.718	EWEB	
	Str 1/8 - Str 1/10	0.12	WHF	H7	795 kcmil AAC Arbutus (37)	15.12	0.131	0.744	0.417	2.643	5.744	EWEB	
		0.85											
	Str 1/10 - Twr 3/3	1.52	SSC	H13	666.6 kcmil ACSR Flamingo	17.01	0.152	0.756	0.438	2.612	5.607		
	Twr 3/3 - Twr 4/1	0.78	SSC	J5	795 kcmil ACSR Mallard	34.96	0.126	0.824	0.412	2.418	5.106		
	Twr 4/1 - Twr 8/3	4.13	SSC	H13	666.6 kcmil ACSR Flamingo	17.01	0.152	0.756	0.438	2.612	5.607		
	Twr 8/3 - Willakenzie	0.46	SSC	H13	666.6 kcmil ACSR Flamingo	20.16	0.152	0.777	0.438	2.571	5.453		
		6.89											
		7.74											
115	**Tillamook - Trask River 1**												
	Tillamook - Twr 33/24	0.05	WSP	H21	652.4 AAAC/6201 Elgin	11.68	0.182	0.727	0.468	2.720	5.901	TPUD	M-128
	Twr 33/24 - CH 1	0.45	WSP	H21	652.4 AAAC/6201 Elgin	11.68	0.182	0.727	0.468	2.720	5.901	TPUD	M-153
	Ch 1 - Twr 39/5	1.70	WSP	H21	652.4 AAAC/6201 Elgin	11.68	0.182	0.727	0.468	2.720	5.901	TPUD	
	Twr 39/5 - Twr 36/4	3.19	SDC	J12	795 kcmil ACSR Drake	24.08	0.128	0.785	0.414	2.514	5.387		
	Twr 36/4 - Twr 36/1	0.58	SDC	J2	795 kcmil ACSR Drake	27.68	0.128	0.802	0.414	2.481	5.270		
	Twr 36/1 - Tillamook	0.25	WSP	H21	652.4 AAAC/6201 Elgin	11.68	0.182	0.727	0.468	2.720	5.901	TPUD	
		6.22											
		6.22											
115	**Timber - Tap (Keeler - Tillamook 1)**												
	Section 1	0.49	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Section 2	0.32	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
	Section 3	10.40	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		11.21											
		11.21											
115	**Tower Road - Alkali (CBEC) 1**												
	Was Formerly McNary - Santiam 1 230 kV												
	Tower Road - 12/1	10.88	SSC	J9	1272 kcmil ACSR Pheasant	33.14	0.082	0.797	0.368	2.410	5.304		M-199
	12/1 - 14/7	1.92	SP	SPEC	397.5 kcmil ACSR Ibis	9.86	0.253	0.718	0.539	2.773	5.902		
	14/7 - 14/8	0.11	SSC	J9	397.5 kcmil ACSR Ibis	33.14	0.253	0.865	0.539	2.479	4.868		
	14/8 - 21/1	6.76	SSC	J9	1272 kcmil ACSR Pheasant	33.14	0.082	0.797	0.368	2.410	5.304		
	21/1 - CH1 (PP77 South off of BPA ROW)	0.71	SSC	SPEC	397.5 kcmil ACSR Ibis	9.86	0.253	0.718	0.539	2.773	5.902		
	CH1 - Alkali	5.04	SSC	SPEC	397.5 kcmil ACSR Ibis	9.86	0.253	0.718	0.539	2.773	5.902		
		25.42											M-200
		25.42											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Teton - Snake River														
0.042	0.167		0.107	0.620		0.67	0.00032	0.00126		0.00081	0.00469		0.00009	
0.383	1.533		0.986	5.687		6.15	0.00289	0.01159		0.00746	0.04300		0.00081	
0.424	1.700	1.753	1.093	6.307	6.401	6.82	0.00321	0.01286	0.01325	0.00827	0.04769	0.04840	0.00090	
0.919	3.684		2.369	13.665		14.78	0.00695	0.02786		0.01791	0.10333		0.00196	
0.919	3.684	3.797	2.369	13.665	13.869	14.78	0.00695	0.02786	0.02871	0.01791	0.10333	0.10487	0.00196	
0.743	3.094		1.916	10.821		11.50	0.00562	0.02340		0.01449	0.08182		0.00152	
0.743	3.094	3.182	1.916	10.821	10.989	11.50	0.00562	0.02340	0.02406	0.01449	0.08182	0.08309	0.00152	
1.487	6.189		3.832	21.641		22.99	0.01124	0.04680		0.02897	0.16364		0.00304	
1.487	6.189	6.365	3.832	21.641	21.978	22.99	0.01124	0.04680	0.04813	0.02897	0.16364	0.16618	0.00304	
3.825	15.925		9.860	55.686		59.16	0.02893	0.12041		0.07456	0.42107		0.00782	
0.254	1.017		0.654	3.773		4.08	0.00192	0.00769		0.00495	0.02853		0.00054	
4.079	16.942	17.426	10.514	59.460	60.382	63.24	0.03084	0.12811	0.13177	0.07950	0.44960	0.45658	0.00836	
7.653	**31.610**	**32.523**	**19.725**	**111.893**	**113.619**	**119.34**	**0.05787**	**0.23902**	**0.24592**	**0.14915**	**0.84608**	**0.85912**	**0.01578**	
115 Thatcher Junction - Tap (Keeler - Tillamook)														
0.004	0.008		0.007	0.027		0.03	0.00003	0.00006		0.00005	0.00020		0.00000	
0.219	0.553		0.431	2.020		2.09	0.00166	0.00418		0.00326	0.01528		0.00028	
0.223	0.560	0.603	0.438	2.047	2.093	2.12	0.00169	0.00424	0.00456	0.00331	0.01548	0.01583	0.00028	
0.223	**0.560**	**0.603**	**0.438**	**2.047**	**2.093**	**2.12**	**0.00169**	**0.00424**	**0.00456**	**0.00331**	**0.01548**	**0.01583**	**0.00028**	
115 The Dalles - Chenoweth 1														
0.259	1.478		0.839	5.334		5.91	0.00196	0.01118		0.00635	0.04033		0.00078	2-3/8IN HS STL
0.259	1.478	1.501	0.839	5.334	5.399	5.91	0.00196	0.01118	0.01135	0.00635	0.04033	0.04083	0.00078	
0.259	**1.478**	**1.501**	**0.839**	**5.334**	**5.399**	**5.91**	**0.00196**	**0.01118**	**0.01135**	**0.00635**	**0.04033**	**0.04083**	**0.00078**	
115 The Dalles PH - Big Eddy 1														
0.049	0.663		0.281	1.877		2.09	0.00037	0.00501		0.00212	0.01420		0.00028	
0.049	0.663	0.665	0.281	1.877	1.898	2.09	0.00037	0.00501	0.00503	0.00212	0.01420	0.01435	0.00028	
0.049	**0.663**	**0.665**	**0.281**	**1.877**	**1.898**	**2.09**	**0.00037**	**0.00501**	**0.00503**	**0.00212**	**0.01420**	**0.01435**	**0.00028**	
115 The Dalles PH - Big Eddy 2														
0.053	0.520		0.239	1.563		1.72	0.00040	0.00393		0.00181	0.01182		0.00023	
0.010	0.139		0.059	0.394		0.44	0.00008	0.00105		0.00045	0.00298		0.00006	
0.064	0.659	0.662	0.298	1.957	1.979	2.16	0.00048	0.00498	0.00501	0.00225	0.01480	0.01497	0.00029	
0.064	**0.659**	**0.662**	**0.298**	**1.957**	**1.979**	**2.16**	**0.00048**	**0.00498**	**0.00501**	**0.00225**	**0.01480**	**0.01497**	**0.00029**	
115 Thurston - Willakenzie 1														
0.013	0.074		0.042	0.264		0.29	0.00010	0.00056		0.00032	0.00200		0.00004	
0.083	0.471		0.263	1.661		1.80	0.00062	0.00356		0.00199	0.01256		0.00024	
0.016	0.089		0.050	0.317		0.34	0.00012	0.00068		0.00038	0.00240		0.00005	
0.111	0.635	0.644	0.354	2.243	2.271	2.43	0.00084	0.00480	0.00487	0.00268	0.01696	0.01717	0.00032	
0.232	1.149		0.666	3.971		4.26	0.00175	0.00869		0.00504	0.03003		0.00056	
0.099	0.643		0.322	1.886		1.99	0.00075	0.00486		0.00243	0.01426		0.00026	
0.629	3.122		1.811	10.789		11.58	0.00476	0.02361		0.01369	0.08158		0.00153	
0.070	0.357		0.202	1.183		1.25	0.00053	0.00270		0.00152	0.00894		0.00017	2-3/8 IN HS STL
1.030	5.272	5.371	3.000	17.829	18.080	19.09	0.00779	0.03986	0.04061	0.02269	0.13482	0.13671	0.00252	
1.141	**5.906**	**6.016**	**3.355**	**20.072**	**20.351**	**21.52**	**0.00863**	**0.04466**	**0.04549**	**0.02537**	**0.15177**	**0.15388**	**0.00285**	
115 Tillamook - Trask River 1														
0.009	0.036		0.023	0.136		0.15	0.00007	0.00027		0.00018	0.00103		0.00002	1-3/8 IN EHS STL
0.082	0.327		0.210	1.224		1.33	0.00062	0.00247		0.00159	0.00926		0.00018	1-3/8 IN EHS STL
0.309	1.236		0.795	4.624		5.02	0.00234	0.00934		0.00601	0.03497		0.00066	
0.407	2.503		1.319	8.021		8.59	0.00308	0.01893		0.00997	0.06065		0.00114	
0.074	0.465		0.240	1.439		1.53	0.00056	0.00352		0.00181	0.01088		0.00020	2-7 NO 8 ALWLD
0.045	0.182		0.117	0.680		0.74	0.00034	0.00137		0.00088	0.00514		0.00010	1-3/8 IN EHS STL
0.926	4.748	4.838	2.705	16.124	16.350	17.35	0.00700	0.03590	0.03658	0.02045	0.12192	0.12363	0.00229	
0.926	**4.748**	**4.838**	**2.705**	**16.124**	**16.350**	**17.35**	**0.00700**	**0.03590**	**0.03658**	**0.02045**	**0.12192**	**0.12363**	**0.00229**	
115 Timber - Tap (Keeler - Tillamook 1)														
0.185	0.389		0.325	1.320		1.30	0.00140	0.00294		0.00246	0.00998		0.00017	
0.080	0.245		0.172	0.852		0.88	0.00061	0.00185		0.00130	0.00645		0.00012	
3.918	8.262		6.892	28.014		27.66	0.02962	0.06247		0.05211	0.21183		0.00366	
4.183	8.895	9.830	7.389	30.187	31.078	29.84	0.03163	0.06726	0.07433	0.05587	0.22825	0.23499	0.00395	
4.183	**8.895**	**9.830**	**7.389**	**30.187**	**31.078**	**29.84**	**0.03163**	**0.06726**	**0.07433**	**0.05587**	**0.22825**	**0.23499**	**0.00395**	
115 Tower Road - Alkali (CBEC) 1														
0.891	8.669		4.003	26.226		28.85	0.00674	0.06555		0.03027	0.19830		0.00382	
0.487	1.379		1.036	5.325		5.67	0.00368	0.01043		0.00783	0.04026		0.00075	
0.028	0.095		0.059	0.273		0.27	0.00021	0.00072		0.00045	0.00206		0.00004	
0.554	5.386		2.487	16.295		17.93	0.00419	0.04073		0.01881	0.12321		0.00237	
0.180	0.510		0.383	1.969		2.10	0.00136	0.00386		0.00290	0.01489		0.00028	
1.277	3.621		2.719	13.977		14.87	0.00966	0.02738		0.02056	0.10569		0.00197	
3.416	19.661	19.955	10.686	64.064	64.949	69.68	0.02583	0.14866	0.15089	0.08080	0.48442	0.49111	0.00922	
3.416	**19.661**	**19.955**	**10.686**	**64.064**	**64.949**	**69.68**	**0.02583**	**0.14866**	**0.15089**	**0.08080**	**0.48442**	**0.49111**	**0.00922**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOR-EIGN OWNER SHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Trask River - Tap (Boyer - Tillamook 1)**												
	Trask River - Tap (Boyer - Tillamook 1)	0.25	WSP	H21	652.4 AAAC/6201 Elgin	11.68	0.182	0.727	0.468	2.720	5.901	TPUD	
		0.25											
		0.25											
115	**Trentwood (IP&L) - Tap (Bell - Trentwood 1)**												
	Trentwood (IP&L) is located within confines of BPA Trentwood Substation												
	Trentwood(IP&L) - Tap(Bell - Trentwood 1)												
@	Trentwood(IP&L) - Tap(Bell - Trentwood 1)	0.06	WHF	H22	556.5 kcmil ACSR Dove	14.49	0.181	0.745	0.467	2.659	5.687		
		0.06											
		0.06											
115	**Trentwood - Valley Way 1**												
	Trentwood - Str 1/8	0.70	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 1/8 - Vera Tap	0.07	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
		0.77											
	Vera Tap - Str 3/2	1.44	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
	Str 3/2 - AVA Tap	0.25	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
		1.69											
	AVA Tap - Valley Way	0.25	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226		
		0.25											
		2.71											
115	**Underwood - Tap (Bonneville-Alcoa 2/Bonneville-Sifton 1)**												
	Underwood - Twr 26/14	0.49	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		M-126
	Twr 26/14 - Twr 26/2	0.46	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		M-168
	Twr 26/2 - Bald Mountain Tap	0.03	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
		0.98											
	Bald Mountain Tap - Twr 26/1	0.01	WSP	H23	266.8 kcmil ACSR Partridge	11.52	0.377	0.761	0.663	2.760	5.557		
	Twr 26/1 - Twr 17/4	8.44	SSC	J3	500 kcmil Cu PH D 1251	34.02	0.129	0.821	0.415	2.426	5.094		
	Twr 17/4 - Twr 14/7	2.22	SSC	J3	1272 kcmil ACSR Pheasant	34.02	0.082	0.800	0.368	2.404	5.282		
	Twr 14/7 - Twr 12/4	1.98	SDC	J2	1272 kcmil ACSR Pheasant	27.68	0.082	0.775	0.368	2.454	5.458		
	Twr 12/4 - Carson Tap	2.74	SSC	J3	500 kcmil Cu PH D 1251	34.02	0.129	0.821	0.415	2.426	5.094		
		15.39											
	Carson Tap - Stevenson	3.55	SSC	J3	500 kcmil Cu PH D 1251	34.02	0.129	0.821	0.415	2.426	5.094		
		3.55											
	Stevenson - Twr 2/1	4.20	SSC	J3	500 kcmil Cu PH D 1251	34.02	0.129	0.821	0.415	2.426	5.094		
	Twr 2/1 - Twr 1/7	0.99	SSC	J3	500 kcmil Cu PH D 1251	34.02	0.129	0.821	0.415	2.426	5.094		
	Twr 1/7 - Twr 1/6	0.07	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
		5.26											
	Twr 1/6 - Twr 1/4	0.14	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
	Twr 1/4 - Tap	0.07	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		
		0.21											
		25.39											
115	**Underwood - Tap (Bonneville-Alcoa 2/Bonneville-Sifton 1)(Line Open)**												
	Twr 1/4 - Tap (Bonneville - Sifton 1)	0.06	SSC	H13	397.5 kcmil ACSR Lark	17.01	0.251	0.779	0.537	2.635	5.412		M-168
		0.06											
		0.06											
115	**USK - Ponderay Paper Plant 1**												
		0.25	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	PPUD	
		0.25											
		0.25											
115	**Valhalla - Eastmont (PUD) 1**												
	Valhalla - Str 2/6	1.44	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	DOUG	M-144
	Str 2/6 - Hanna Tap	0.54	WHF	H7	250 kcmil Cu 19 Str	15.12	0.257	0.816	0.543	2.716	5.226	DOUG	
		1.98											
	Hanna Tap - CH 1	8.16	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318	DOUG	
	CH 1 - Eastmont	0.09	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	DOUG	
		8.25											
		10.23											
115	**Valhalla - McKenzie (Chelan County PUD)**												
		0.10	WHF		2750 kcmil Alum Bitteroot	14.50	0.045	0.663	0.331	2.577	6.477	CHELN	
		0.10											
		0.10											
115	**VERA - Tap (Trentwood - Valley Way)**												
	Vera - Sullivan (VID) Tap	0.48	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 4/7 - Sullivan (VID) Tap 2/7	2.04	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
		2.52											
	Sullivan (VID) Tap 2/7 - Str 1/9	0.49	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 1/9 - Tap	0.79	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		1.28											
		3.80											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Trask River - Tap (Boyer - Tillamook 1)														
0.045	0.182		0.117	0.680		0.74	0.00034	0.00137		0.00088	0.00514		0.00010	1-3/8 IN EHS STL
0.045	0.182	0.187	0.117	0.680	0.690	0.74	0.00034	0.00137	0.00142	0.00088	0.00514	0.00522	0.00010	
0.045	**0.182**	**0.187**	**0.117**	**0.680**	**0.690**	**0.74**	**0.00034**	**0.00137**	**0.00142**	**0.00088**	**0.00514**	**0.00522**	**0.00010**	
115 Trentwood (IP&L) - Tap (Bell - Trentwood 1)														
0.011	0.045		0.028	0.160		0.17	0.00008	0.00034		0.00021	0.00121		0.00002	
0.011	0.045	0.046	0.028	0.160	0.162	0.17	0.00008	0.00034	0.00035	0.00021	0.00121	0.00123	0.00002	
0.011	**0.045**	**0.046**	**0.028**	**0.160**	**0.162**	**0.17**	**0.00008**	**0.00034**	**0.00035**	**0.00021**	**0.00121**	**0.00123**	**0.00002**	
115 Trentwood - Valley Way 1														
0.180	0.571		0.380	1.901		1.83	0.00136	0.00432		0.00288	0.01437		0.00024	2-3/8 IN HS STL
0.018	0.057		0.038	0.190		0.18	0.00014	0.00043		0.00029	0.00144		0.00002	
0.198	0.629	0.659	0.418	2.091	2.132	2.01	0.00150	0.00475	0.00498	0.00316	0.01581	0.01612	0.00027	
0.370	1.176		0.782	3.911		3.76	0.00280	0.00889		0.00591	0.02957		0.00050	
0.064	0.204		0.136	0.679		0.65	0.00049	0.00154		0.00103	0.00513		0.00009	2-3/8 IN HS STL
0.435	1.380	1.446	0.918	4.589	4.680	4.42	0.00329	0.01043	0.01094	0.00694	0.03470	0.03539	0.00058	
0.064	0.204		0.136	0.679		0.65	0.00049	0.00154		0.00103	0.00513		0.00009	2-3/8 IN HS STL
0.064	0.204	0.214	0.136	0.679	0.692	0.65	0.00049	0.00154	0.00162	0.00103	0.00513	0.00524	0.00009	
0.697	**2.212**	**2.319**	**1.472**	**7.359**	**7.505**	**7.08**	**0.00527**	**0.01673**	**0.01754**	**0.01113**	**0.05565**	**0.05675**	**0.00094**	
115 Underwood - Tap (Bonneville-Alcoa 2/Bonneville-Sifton 1)														
0.185	0.373		0.325	1.352		1.36	0.00140	0.00282		0.00246	0.01022		0.00018	2-7 NO 8 ALWLD
0.173	0.350		0.305	1.269		1.28	0.00131	0.00265		0.00231	0.00960		0.00017	
0.011	0.023		0.020	0.083		0.08	0.00009	0.00017		0.00015	0.00063		0.00001	
0.369	0.746	0.832	0.649	2.704	2.781	2.72	0.00279	0.00564	0.00629	0.00491	0.02045	0.02103	0.00036	
0.004	0.008		0.007	0.028		0.03	0.00003	0.00006		0.00005	0.00021		0.00000	
1.092	6.933		3.506	20.472		21.50	0.00826	0.05242		0.02651	0.15479		0.00284	
0.182	1.776		0.817	5.337		5.86	0.00137	0.01343		0.00618	0.04036		0.00078	
0.162	1.534		0.728	4.859		5.40	0.00123	0.01160		0.00551	0.03674		0.00071	
0.355	2.251		1.138	6.646		6.98	0.00268	0.01702		0.00861	0.05025		0.00092	
1.794	12.502	12.630	6.196	37.341	37.852	39.77	0.01357	0.09453	0.09550	0.04685	0.28235	0.28621	0.00526	
0.459	2.916		1.475	8.611		9.04	0.00347	0.02205		0.01115	0.06511		0.00120	
0.459	2.916	2.952	1.475	8.611	8.736	9.04	0.00347	0.02205	0.02232	0.01115	0.06511	0.06606	0.00120	
0.543	3.450		1.745	10.187		10.70	0.00411	0.02609		0.01319	0.07703		0.00141	
0.128	0.813		0.411	2.401		2.52	0.00097	0.00615		0.00311	0.01816		0.00033	2-5/8 IN HS STL
0.018	0.055		0.038	0.184		0.19	0.00013	0.00041		0.00028	0.00139		0.00003	
0.689	4.318	4.372	2.194	12.773	12.960	13.41	0.00521	0.03265	0.03306	0.01659	0.09658	0.09800	0.00177	
0.035	0.109		0.075	0.369		0.38	0.00027	0.00082		0.00057	0.00279		0.00005	
0.018	0.055		0.038	0.184		0.19	0.00013	0.00041		0.00028	0.00139		0.00003	
0.053	0.164	0.172	0.113	0.553	0.565	0.57	0.00040	0.00124	0.00130	0.00085	0.00418	0.00427	0.00008	
3.365	**20.645**	**20.918**	**10.626**	**61.983**	**62.887**	**65.51**	**0.02544**	**0.15611**	**0.15817**	**0.08035**	**0.46868**	**0.47552**	**0.00866**	
115 Underwood - Tap (Bonneville-Alcoa 2/Bonneville-Sifton 1)(Line Open)														
0.015	0.047		0.032	0.158		0.16	0.00011	0.00035		0.00024	0.00120		0.00002	
0.015	0.047	0.049	0.032	0.158	0.161	0.16	0.00011	0.00035	0.00037	0.00024	0.00120	0.00122	0.00002	
0.015	**0.047**	**0.049**	**0.032**	**0.158**	**0.161**	**0.16**	**0.00011**	**0.00035**	**0.00037**	**0.00024**	**0.00120**	**0.00122**	**0.00002**	
115 USK - Ponderay Paper Plant 1														
0.032	0.182		0.103	0.657		0.73	0.00024	0.00138		0.00078	0.00497		0.00010	
0.032	0.182	0.185	0.103	0.657	0.665	0.73	0.00024	0.00138	0.00140	0.00078	0.00497	0.00503	0.00010	
0.032	**0.182**	**0.185**	**0.103**	**0.657**	**0.665**	**0.73**	**0.00024**	**0.00138**	**0.00140**	**0.00078**	**0.00497**	**0.00503**	**0.00010**	
115 Valhalla - Eastmont (PUD) 1														
0.365	1.109		0.777	3.844		3.95	0.00276	0.00839		0.00587	0.02907		0.00052	
0.139	0.441		0.293	1.466		1.41	0.00105	0.00333		0.00222	0.01109		0.00019	
0.504	1.550	1.630	1.070	5.311	5.417	5.36	0.00381	0.01172	0.01232	0.00809	0.04016	0.04096	0.00071	
3.074	6.482		5.408	21.980		21.70	0.02324	0.04901		0.04089	0.16620		0.00287	
0.023	0.069		0.049	0.240		0.25	0.00017	0.00052		0.00037	0.00182		0.00003	
3.097	6.551	7.246	5.456	22.221	22.881	21.95	0.02342	0.04954	0.05479	0.04126	0.16802	0.17301	0.00290	
3.600	**8.101**	**8.865**	**6.526**	**27.531**	**28.294**	**27.31**	**0.02722**	**0.06126**	**0.06704**	**0.04935**	**0.20818**	**0.21394**	**0.00361**	
115 Valhalla - McKenzie (Chelan County PUD)														
0.004	0.066		0.033	0.258		0.32	0.00003	0.00050		0.00025	0.00195		0.00004	
0.004	0.066	0.066	0.033	0.258	0.260	0.32	0.00003	0.00050	0.00050	0.00025	0.00195	0.00196	0.00004	
0.004	**0.066**	**0.066**	**0.033**	**0.258**	**0.260**	**0.32**	**0.00003**	**0.00050**	**0.00050**	**0.00025**	**0.00195**	**0.00196**	**0.00004**	
115 VERA - Tap (Trentwood - Valley Way)														
0.122	0.355		0.259	1.311		1.38	0.00092	0.00268		0.00196	0.00992		0.00018	
0.517	1.507		1.100	5.574		5.85	0.00391	0.01140		0.00832	0.04215		0.00077	
0.639	1.862	1.969	1.359	6.885	7.018	7.22	0.00483	0.01408	0.01489	0.01028	0.05206	0.05307	0.00096	
0.124	0.362		0.264	1.339		1.40	0.00094	0.00274		0.00200	0.01012		0.00019	1-3/8 IN HS STL
0.200	0.609		0.426	2.109		2.17	0.00151	0.00460		0.00322	0.01595		0.00029	
0.324	0.971	1.023	0.690	3.448	3.516	3.57	0.00245	0.00734	0.00774	0.00522	0.02607	0.02659	0.00047	
0.963	**2.833**	**2.992**	**2.050**	**10.333**	**10.534**	**10.80**	**0.00728**	**0.02142**	**0.02262**	**0.01550**	**0.07813**	**0.07965**	**0.00143**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**Victor(FRREC) - Tap (Targhee Tap Line)**												
		0.05	WSP	H15	266.8 kcmil ACSR Partridge	11.34	0.377	0.759	0.663	2.763	5.571		
		0.05											
		0.05											
115	**VIT Plant - Tap (Midway - Benton 1)**												
		3.00	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	RREC	
		3.00											
		3.00											
115	**Wagner Lake - Tap(Grand Coulee - Bell 1/2)**												
	Wagner Lake - Wilbur Tap	10.65	WSP	H23	3/0 ACSR Pigeon (6/1)	11.52	0.638	0.869	0.924	2.867	5.342		
		10.65											
	Wilbur Tap - Tap	5.32	WSP		4/0 ACSR Penguin (6/1)	10.70	0.563	0.841	0.849	2.866	5.506	AVA	
		5.32											
		15.97											
115	**Walla Walla - North Lewiston (AVA) 1**												
	Walla Walla - Str 7/7	6.88	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		M-148
	Str 7/7 - Str 9/6	1.82	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 9/6 - Pomeroy Tap	44.36	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
		53.06											
	Pomeroy Tap - Str 77/6	23.16	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
	Str 77/6 - Str 77/9	0.18	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
	Str 77/9 - Str 78/2	0.41	WHF	H7	397.5 kcmil ACSR Lark	15.12	0.251	0.765	0.537	2.664	5.517		
	Str 78/2 - Clarkston	0.23	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
		23.98											
	Clarkston - WA/ID Border	3.00	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
		3.00											
	WA/ID Border - Str 81/4	0.06	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
	Str 81/4 - Str 81/7	0.35	WHF	H7	250 kcmil Cu Anac 902R1	15.12	0.257	0.789	0.543	2.689	5.341		
	Str 81/7 - North Lewiston	0.30	WHF		556.5 kcmil ACSR Parakeet	13.23	0.182	0.737	0.468	2.684	5.761	AVA	
		0.71											
		80.75											
115	**Walnut City (MCM) - Tap (Forest Grove - McMinnville 1)**												
	Line energized 11/2000												
	Walnut City (MCM) - Baker Creek Tap (5/4)	1.23	WSP	WB	266.8 kcmil ACSR Partridge	13.59	0.377	0.781	0.663	2.720	5.409		
		1.23											
	Baker Creek Tap (5/4) - Tap	4.40	WSP	WB	266.8 kcmil ACSR Partridge	13.59	0.377	0.781	0.663	2.720	5.409		
		4.40											
		5.63											
115	**Wendson - Florence (CLP) 1**												
	Wendson - Str 1/3	0.25	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-149
	Str 1/3 - Str 1/4	0.12	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 1/4 - Florence (CLP)	3.89	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		4.26											
		4.26											
115	**Wendson - Tahkenitch 1**												
	Wendson - Str 1/3	0.21	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-149
	Str 1/3 - Str 1/4	0.12	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 1/4 - Berrydale Tap	6.03	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		6.36											
	Berrydale Tap - Str 21/2	13.66	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
	Str 21/2 - Tahkenitch	0.28	WHF	H7	266.8 kcmil ACSR Partridge	15.12	0.377	0.794	0.663	2.694	5.318		
		13.94											
		20.30											
115	**Wendson Sub 230/115 kV Tie 1**												
		0.12	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		0.12											
		0.12											
115	**White Bluffs - HEW 451B 1**												
	White Bluffs - Twr 1/5	0.29	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		M-120
	Twr 1/5 - Twr 2/3	0.67	SDC	J2	795 kcmil ACSR Drake	27.68	0.128	0.802	0.414	2.481	5.270		
	Twr 2/3 - HEW 451B	5.23	SSC	J3	795 kcmil ACSR Drake	34.02	0.128	0.827	0.414	2.431	5.105		
		6.19											
		6.19											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 Victor(FRREC) - Tap (Targhee Tap Line)														
0.019	0.038		0.033	0.138		0.14	0.00014	0.00029		0.00025	0.00104		0.00002	1-7 NO 8 ALWLD
0.019	0.038	0.042	0.033	0.138	0.142	0.14	0.00014	0.00029	0.00032	0.00025	0.00104	0.00107	0.00002	
0.019	**0.038**	**0.042**	**0.033**	**0.138**	**0.142**	**0.14**	**0.00014**	**0.00029**	**0.00032**	**0.00025**	**0.00104**	**0.00107**	**0.00002**	
115 VIT Plant - Tap (Midway - Benton 1)														
0.383	2.184		1.241	7.882		8.73	0.00289	0.01652		0.00938	0.05960		0.00115	
0.383	2.184	2.218	1.241	7.882	7.979	8.73	0.00289	0.01652	0.01677	0.00938	0.05960	0.06033	0.00115	
0.383	**2.184**	**2.218**	**1.241**	**7.882**	**7.979**	**8.73**	**0.00289**	**0.01652**	**0.01677**	**0.00938**	**0.05960**	**0.06033**	**0.00115**	
115 Wagner Lake - Tap(Grand Coulee - Bell 1/2)														
6.795	9.250		9.841	30.532		28.44	0.05138	0.06995		0.07441	0.23087		0.00376	
6.795	9.250	11.478	9.841	30.532	32.079	28.44	0.05138	0.06995	0.08679	0.07441	0.23087	0.24256	0.00376	
2.995	4.472		4.517	15.246		14.65	0.02265	0.03382		0.03415	0.11528		0.00194	
2.995	4.472	5.382	4.517	15.246	15.901	14.65	0.02265	0.03382	0.04070	0.03415	0.11528	0.12023	0.00194	
9.790	**13.722**	**16.857**	**14.357**	**45.778**	**47.977**	**43.09**	**0.07403**	**0.10376**	**0.12746**	**0.10856**	**0.34615**	**0.36277**	**0.00570**	
115 Walla Walla - North Lewiston (AVA) 1														
1.765	5.430		3.732	18.497		18.37	0.01334	0.04106		0.02822	0.13986		0.00243	
0.461	1.402		0.982	4.859		5.00	0.00349	0.01060		0.00742	0.03674		0.00066	
11.378	35.010		24.065	119.263		118.47	0.08604	0.26472		0.18197	0.90180		0.01567	
13.604	41.841	43.997	28.779	142.618	145.493	141.84	0.10287	0.31638	0.33268	0.21761	1.07840	1.10014	0.01876	
5.941	18.278		12.564	62.266		61.85	0.04492	0.13821		0.09500	0.47082		0.00818	
0.046	0.142		0.098	0.484		0.48	0.00035	0.00107		0.00074	0.00366		0.00006	
0.103	0.313		0.220	1.092		1.13	0.00078	0.00237		0.00167	0.00826		0.00015	
0.059	0.182		0.125	0.618		0.61	0.00045	0.00137		0.00094	0.00468		0.00008	
6.149	18.915	19.890	13.007	64.461	65.760	64.08	0.04649	0.14303	0.15039	0.09835	0.48741	0.49724	0.00847	
0.770	2.368		1.628	8.066		8.01	0.00582	0.01790		0.01231	0.06099		0.00106	
0.770	2.368	2.490	1.628	8.066	8.228	8.01	0.00582	0.01790	0.01882	0.01231	0.06099	0.06222	0.00106	
0.015	0.047		0.033	0.161		0.16	0.00012	0.00036		0.00025	0.00122		0.00002	
0.090	0.276		0.190	0.941		0.93	0.00068	0.00209		0.00144	0.00712		0.00012	2-3/8 IN HS STL
0.055	0.221		0.140	0.805		0.86	0.00041	0.00167		0.00106	0.00609		0.00011	
0.160	0.545	0.568	0.363	1.908	1.942	1.96	0.00121	0.00412	0.00429	0.00274	0.01442	0.01468	0.00026	
20.682	**63.669**	**66.944**	**43.777**	**217.052**	**221.422**	**215.88**	**0.15639**	**0.48143**	**0.50619**	**0.33101**	**1.64122**	**1.67427**	**0.02855**	
115 Walnut City (MCM) - Tap (Forest Grove - McMinnville 1)														
0.463	0.961		0.815	3.345		3.33	0.00350	0.00727		0.00616	0.02529		0.00044	
0.463	0.961	1.067	0.815	3.345	3.443	3.33	0.00350	0.00727	0.00807	0.00616	0.02529	0.02603	0.00044	
1.657	3.438		2.916	11.966		11.90	0.01253	0.02600		0.02205	0.09048		0.00157	
1.657	3.438	3.817	2.916	11.966	12.316	11.90	0.01253	0.02600	0.02886	0.02205	0.09048	0.09313	0.00157	
2.121	**4.399**	**4.884**	**3.731**	**15.311**	**15.759**	**15.23**	**0.01604**	**0.03327**	**0.03693**	**0.02821**	**0.11577**	**0.11916**	**0.00201**	
115 Wendson - Florence (CLP) 1														
0.021	0.179		0.093	0.654		0.75	0.00016	0.00135		0.00070	0.00494		0.00010	
0.045	0.095		0.080	0.323		0.32	0.00034	0.00072		0.00060	0.00244		0.00004	
1.465	3.090		2.578	10.478		10.34	0.01108	0.02337		0.01949	0.07923		0.00137	
1.532	3.364	3.696	2.750	11.455	11.781	11.41	0.01158	0.02544	0.02795	0.02079	0.08662	0.08908	0.00151	
1.532	**3.364**	**3.696**	**2.750**	**11.455**	**11.781**	**11.41**	**0.01158**	**0.02544**	**0.02795**	**0.02079**	**0.08662**	**0.08908**	**0.00151**	
115 Wendson - Tahkenitch 1														
0.018	0.150		0.078	0.549		0.63	0.00013	0.00114		0.00059	0.00415		0.00008	
0.045	0.095		0.080	0.323		0.32	0.00034	0.00072		0.00060	0.00244		0.00004	
2.272	4.790		3.996	16.243		16.04	0.01718	0.03622		0.03022	0.12282		0.00212	
2.334	5.036	5.550	4.153	17.115	17.612	16.98	0.01765	0.03808	0.04197	0.03141	0.12941	0.13317	0.00225	
5.146	10.851		9.052	36.796		36.32	0.03891	0.08205		0.06845	0.27823		0.00480	
0.105	0.222		0.186	0.754		0.74	0.00080	0.00168		0.00140	0.00570		0.00010	2-3/8 IN HS STL
5.251	11.074	12.256	9.238	37.550	38.670	37.07	0.03971	0.08373	0.09267	0.06985	0.28393	0.29240	0.00490	
7.586	**16.109**	**17.806**	**13.391**	**54.665**	**56.281**	**54.05**	**0.05736**	**0.12181**	**0.13464**	**0.10126**	**0.41335**	**0.42557**	**0.00715**	
115 Wendson Sub 230/115 kV Tie 1														
0.015	0.087		0.050	0.315		0.35	0.00012	0.00066		0.00038	0.00238		0.00005	
0.015	0.087	0.089	0.050	0.315	0.319	0.35	0.00012	0.00066	0.00067	0.00038	0.00238	0.00241	0.00005	
0.015	**0.087**	**0.089**	**0.050**	**0.315**	**0.319**	**0.35**	**0.00012**	**0.00066**	**0.00067**	**0.00038**	**0.00238**	**0.00241**	**0.00005**	
115 White Bluffs - HEW 451B 1														
0.037	0.211		0.120	0.762		0.84	0.00028	0.00160		0.00091	0.00576		0.00011	2-7 NO 8 ALWLD
0.085	0.537		0.277	1.662		1.77	0.00065	0.00406		0.00209	0.01257		0.00023	2-7 NO 8 ALWLD
0.667	4.323		2.163	12.712		13.35	0.00504	0.03269		0.01635	0.09612		0.00177	2-7 NO 8 ALWLD
0.789	5.071	5.132	2.560	15.136	15.351	15.96	0.00597	0.03834	0.03880	0.01935	0.11445	0.11608	0.00211	
0.789	**5.071**	**5.132**	**2.560**	**15.136**	**15.351**	**15.96**	**0.00597**	**0.03834**	**0.03880**	**0.01935**	**0.11445**	**0.11608**	**0.00211**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
115	**White Bluffs - Richland 1**												
	White Bluffs - Str 1/14	0.53	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		M-129
	Str 1/14 - Str 4/28	3.10	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
	Str 4/28 - Sandhill Crane	0.66	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		4.29											
	Sandhill Crane - First Street	1.10	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		1.10											
	First Street - Str 8/5	1.51	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 8/5 - Str 9/4	0.83	LWP	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
	Str 9/4 - Stevens Drive (COR)	0.33	LWP	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820		
		2.67											
	Stevens Drive (COR) - Str 9/20	0.22	WSP	H21	250 kcmil Cu 12 Str	11.68	0.257	0.779	0.543	2.772	5.483		
	Str 9/20 - Thayer Drive (COR)	1.34	WSP	H21	397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
		1.56											
	Thayer Drive (COR) - Str 12/3	1.05	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
	Str 12/3 - Str 12/8	0.25	WSP	H23	795 kcmil ACSR Drake	11.52	0.128	0.695	0.414	2.693	6.107		
	Str 12/8 - Richland	0.08	WHF	H7	250 kcmil Cu 12 Str	15.12	0.257	0.810	0.543	2.710	5.262		
		1.38											
		11.00											
115	**White Bluffs - Tap (Grandview - Richland 1)**												
	White Bluffs - Str 1/6	0.53	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		M-120
	Str 1/6 - Str 3/9	2.23	WHF	H7	1272 kcmil AAC Narcissus	15.12	0.084	0.715	0.370	2.614	5.985		
	Str 3/9 - Str 6/7	2.49	WSP	H23	1272 kcmil AAC Narcissus	11.52	0.084	0.682	0.370	2.680	6.289		
	Str 6/7 - Horn Rapids (BNTPD)	0.51	WSP	H23	1272 kcmil AAC Narcissus	11.52	0.084	0.682	0.370	2.680	6.289		
		5.76											
	Horn Rapids (BNTPD) - Str 7/9	0.57	WSP		397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 7/9 - Str 10/13	3.30	WSP		397.5 kcmil ACSR Ibis	11.68	0.253	0.739	0.539	2.732	5.732		
	Str 10/13 - Tap	0.07	WHF		397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		3.94											
		9.70											
115	**Willow Creek (EWEB) - Hawkins (EWEB) 1**												
@	Willow Creek (EWEB) - 1/1	0.03	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	EWEB	M-179
@	1/1 - 1/2	0.06	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	EWEB	
@	1/2 - 1/5	0.52	WHF	H7	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	EWEB	
@	1/5 - 3/6	1.67	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	EWEB	
		2.28											
	3/6 - Hawkins (EWEB)	0.71	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491	EWEB	
		0.71											
		2.99											
115	**Winthrop - Tap (Okanogan - Twisp PUD Line)**												
	Winthrop - Str 9/4	2.50	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 9/4 - Str 9/3	0.61	WHF	J6	397.5 kcmil ACSR Lark	28.98	0.251	0.844	0.537	2.506	4.986		
	Str 9/3 - Str 8/1	1.02	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 8/1 - Str 7/9	0.34	WHF	H11	397.5 kcmil ACSR Lark	17.64	0.251	0.783	0.537	2.626	5.381		
	Str 7/9 - Str 6/1	1.37	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
	Str 6/1 - Str 5/8	0.53	WHF	J6	397.5 kcmil ACSR Lark	28.98	0.251	0.844	0.537	2.506	4.986		
	Str 5/8 - Tap	5.01	WHF	H7	4/0 ACSR Penguin (6/1)	15.12	0.563	0.883	0.849	2.782	5.212		
		11.38											
		11.38											
69	**Black Canyon - Emmett**												
	Section 1	3.75	WSP		No 2 Cu 3 Str	8.22	0.955	0.827	1.241	2.948	5.248		
	Section 2	0.77	WDC		No 2 Cu 3 Str	7.56	0.955	0.816	1.241	2.968	5.317	IPC	
		4.52											
		4.52											
69	**Boardman - Ione**												
	Boardman - Str 1/6	0.53	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		M-199
	Str 1/6 - Str 2/9	0.78	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		M-200
	Str 2/9 - Str 2/13	0.27	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 2/13 - Str 3/4	0.60	WSP	H27	397.5 kcmil ACSR Ibis	12.46	0.253	0.747	0.539	2.717	5.669		
	Str 3/4 - Sand Hollow Tap	24.21	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		26.39											
	Sand Hollow Tap - Ione	3.70	WSP	SPEC	336.4 kcmil ACSR Linnet	8.18	0.299	0.706	0.585	2.829	6.010		
		3.70											
		30.09											
69	**Canby (BPA) - Canby (SVEC)**												
		0.84	WHF	J7	0.951 In ACSR/TW Toutle	25.20	0.130	0.813	0.416	2.527	5.222		
		0.84											
		0.84											
69	**Centralia - B Street 1 (City of Centralia)**												
		0.24	WSP	G5	266.8 kcmil ACSR Partridge	9.70	0.377	0.741	0.663	2.801	5.719		
		0.24											
		0.24											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
115 White Bluffs - Richland 1														
0.068	0.368		0.219	1.428		1.62	0.00051	0.00279		0.00166	0.01079		0.00021	1-7 NO 8 ALWLD
0.395	2.155		1.282	8.350		9.47	0.00299	0.01629		0.00969	0.06313		0.00125	
0.084	0.481		0.273	1.734		1.92	0.00064	0.00363		0.00206	0.01311		0.00025	
0.547	3.004	3.053	1.774	11.511	11.647	13.00	0.00414	0.02271	0.02309	0.01341	0.08704	0.08807	0.00172	
0.140	0.801		0.455	2.890		3.20	0.00106	0.00606		0.00344	0.02185		0.00042	
0.140	0.801	0.813	0.455	2.890	2.926	3.20	0.00106	0.00606	0.00615	0.00344	0.02185	0.02212	0.00042	
0.193	1.099		0.624	3.967		4.39	0.00146	0.00831		0.00472	0.03000		0.00058	
0.106	0.604		0.343	2.181		2.42	0.00080	0.00457		0.00260	0.01649		0.00032	
0.042	0.240		0.136	0.867		0.96	0.00032	0.00182		0.00103	0.00656		0.00013	
0.340	1.944	1.974	1.104	7.015	7.102	7.77	0.00257	0.01470	0.01492	0.00835	0.05305	0.05370	0.00103	
0.057	0.171		0.120	0.610		0.60	0.00043	0.00130		0.00090	0.00461		0.00008	
0.340	0.990		0.723	3.661		3.84	0.00257	0.00749		0.00547	0.02768		0.00051	
0.396	1.162	1.227	0.842	4.271	4.353	4.44	0.00300	0.00878	0.00928	0.00637	0.03230	0.03292	0.00059	
0.270	0.851		0.570	2.845		2.76	0.00204	0.00643		0.00431	0.02151		0.00037	
0.032	0.174		0.103	0.673		0.76	0.00024	0.00131		0.00078	0.00509		0.00010	1-3/8 IN SM STL
0.021	0.065		0.043	0.217		0.21	0.00016	0.00049		0.00033	0.00164		0.00003	1-3/8 IN SM STL
0.323	1.090	1.136	0.717	3.735	3.804	3.74	0.00244	0.00824	0.00859	0.00542	0.02825	0.02876	0.00049	
1.746	**8.000**	**8.189**	**4.892**	**29.423**	**29.827**	**32.15**	**0.01321**	**0.06049**	**0.06192**	**0.03699**	**0.22248**	**0.22554**	**0.00425**	
115 White Bluffs - Tap (Grandview - Richland 1)														
0.045	0.379		0.196	1.385		1.59	0.00034	0.00286		0.00148	0.01048		0.00021	2-3/8 IN EHS STL
0.188	1.594		0.825	5.829		6.67	0.00142	0.01205		0.00624	0.04408		0.00088	
0.209	1.698		0.922	6.673		7.83	0.00158	0.01284		0.00697	0.05046		0.00104	
0.043	0.348		0.189	1.367		1.60	0.00032	0.00263		0.00143	0.01034		0.00021	1-3/8 IN EHS STL
0.484	4.018	4.047	2.132	15.255	15.403	17.69	0.00366	0.03038	0.03060	0.01612	0.11535	0.11647	0.00234	
0.144	0.421		0.307	1.557		1.63	0.00109	0.00318		0.00232	0.01178		0.00022	1-6M ALUMOWELD
0.836	2.438		1.780	9.016		9.46	0.00632	0.01844		0.01346	0.06818		0.00125	
0.018	0.054		0.038	0.187		0.19	0.00013	0.00041		0.00029	0.00141		0.00003	
0.998	2.914	3.080	2.125	10.760	10.968	11.28	0.00755	0.02203	0.02329	0.01607	0.08136	0.08294	0.00149	
1.483	**6.932**	**7.089**	**4.257**	**26.016**	**26.362**	**28.98**	**0.01121**	**0.05241**	**0.05360**	**0.03219**	**0.19672**	**0.19933**	**0.00383**	
115 Willow Creek (EWEB) - Hawkins (EWEB) 1														
0.008	0.023		0.016	0.080		0.08	0.00006	0.00017		0.00012	0.00061		0.00001	
0.015	0.046		0.032	0.160		0.16	0.00011	0.00035		0.00024	0.00121		0.00002	2 - 1/2 EHS Steel
0.066	0.379		0.215	1.366		1.51	0.00050	0.00286		0.00163	0.01033		0.00020	2 - 1/2 EHS Steel
0.423	1.286		0.901	4.458		4.58	0.00320	0.00973		0.00681	0.03371		0.00061	
0.512	1.734	1.808	1.164	6.065	6.175	6.35	0.00387	0.01311	0.01367	0.00880	0.04586	0.04670	0.00084	
0.180	0.547		0.383	1.895		1.95	0.00136	0.00414		0.00290	0.01433		0.00026	
0.180	0.547	0.576	0.383	1.895	1.934	1.95	0.00136	0.00414	0.00435	0.00290	0.01433	0.01462	0.00026	
0.692	**2.281**	**2.384**	**1.547**	**7.960**	**8.109**	**8.29**	**0.00523**	**0.01725**	**0.01803**	**0.01170**	**0.06019**	**0.06132**	**0.00110**	
115 Winthrop - Tap (Okanogan - Twisp PUD Line)														
1.408	2.206		2.123	6.955		6.51	0.01064	0.01668		0.01605	0.05259		0.00086	
0.153	0.515		0.328	1.529		1.52	0.00116	0.00389		0.00248	0.01156		0.00020	
0.574	0.900		0.866	2.838		2.66	0.00434	0.00681		0.00655	0.02146		0.00035	
0.085	0.266		0.183	0.893		0.91	0.00065	0.00201		0.00138	0.00675		0.00012	
0.771	1.209		1.163	3.811		3.57	0.00583	0.00914		0.00879	0.02882		0.00047	
0.133	0.447		0.285	1.328		1.32	0.00101	0.00338		0.00215	0.01004		0.00017	
2.821	4.422		4.253	13.937		13.06	0.02133	0.03343		0.03216	0.10538		0.00173	
5.945	9.965	11.604	9.200	31.290	32.615	29.55	0.04496	0.07535	0.08774	0.06957	0.23660	0.24661	0.00391	
5.945	**9.965**	**11.604**	**9.200**	**31.290**	**32.615**	**29.55**	**0.04496**	**0.07535**	**0.08774**	**0.06957**	**0.23660**	**0.24661**	**0.00391**	
69 Black Canyon - Emmett														
3.583	3.100		4.655	11.054		9.84	0.07525	0.06510		0.09778	0.23218		0.00047	
0.736	0.629		0.956	2.285		2.05	0.01545	0.01320		0.02008	0.04800		0.00010	
4.318	3.728	5.705	5.611	13.339	14.471	11.89	0.09070	0.07831	0.11983	0.11786	0.28018	0.30396	0.00057	
4.318	**3.728**	**5.705**	**5.611**	**13.339**	**14.471**	**11.89**	**0.09070**	**0.07831**	**0.11983**	**0.11786**	**0.28018**	**0.30396**	**0.00057**	
69 Boardman - Ione														
0.134	0.408		0.286	1.415		1.46	0.00282	0.00857		0.00600	0.02972		0.00007	
0.198	0.582		0.421	2.119		2.21	0.00415	0.01223		0.00884	0.04450		0.00011	
0.068	0.208		0.146	0.721		0.74	0.00144	0.00437		0.00306	0.01514		0.00004	
0.152	0.448		0.324	1.630		1.70	0.00319	0.00941		0.00680	0.03423		0.00008	
6.135	18.648		13.059	64.630		66.47	0.12886	0.39168		0.27429	1.35749		0.00316	
6.687	20.295	21.368	14.235	70.514	71.937	72.57	0.14046	0.42627	0.44881	0.29899	1.48108	1.51096	0.00346	
1.107	2.612		2.165	10.466		11.12	0.02325	0.05486		0.04548	0.21984		0.00053	
1.107	2.612	2.837	2.165	10.466	10.688	11.12	0.02325	0.05486	0.05958	0.04548	0.21984	0.22449	0.00053	
7.794	**22.906**	**24.196**	**16.400**	**80.981**	**82.625**	**83.69**	**0.16371**	**0.48112**	**0.50821**	**0.34447**	**1.70092**	**1.73545**	**0.00398**	
69 Canby (BPA) - Canby (SVEC)														
0.109	0.683		0.349	2.122		2.19	0.00229	0.01435		0.00733	0.04458		0.00010	
0.109	0.683	0.692	0.349	2.122	2.151	2.19	0.00229	0.01435	0.01453	0.00733	0.04458	0.04518	0.00010	
0.109	**0.683**	**0.692**	**0.349**	**2.122**	**2.151**	**2.19**	**0.00229**	**0.01435**	**0.01453**	**0.00733**	**0.04458**	**0.04518**	**0.00010**	
69 Centralia - B Street 1 (City of Centralia)														
0.090	0.178		0.159	0.672		0.69	0.00190	0.00373		0.00334	0.01412		0.00003	
0.090	0.178	0.199	0.159	0.672	0.691	0.69	0.00190	0.00373	0.00419	0.00334	0.01412	0.01451	0.00003	
0.090	**0.178**	**0.199**	**0.159**	**0.672**	**0.691**	**0.69**	**0.00190**	**0.00373**	**0.00419**	**0.00334**	**0.01412**	**0.01451**	**0.00003**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
69	**Chehalis - Centralia 1**												
	Chehalis - Str 1/2	0.12	WHF	G11	266.8 kcmil ACSR Partridge	12.60	0.377	0.772	0.663	2.738	5.476		M-195
	Str 1/2 - Str 9/11	8.31	WSP	G10	266.8 kcmil ACSR Partridge	8.43	0.377	0.723	0.663	2.835	5.858		M-196
	Str 9/11 - Str 10/7	1.12	WHF	G1	266.8 kcmil ACSR Partridge	10.08	0.377	0.745	0.663	2.792	5.682		
	Str 10/7 - Centralia	1.45	WSP	G10	266.8 kcmil ACSR Partridge	8.43	0.377	0.723	0.663	2.835	5.858		
		11.00											
		11.00											
69	**Chehalis - Centralia 2**												
	Chehalis - Str 12/2	11.17	WHF	G1	266.8 kcmil ACSR Partridge	10.08	0.377	0.745	0.663	2.792	5.682		
	Str 12/2 - Fords Prairie Tap	0.62	WSP	G10	266.8 kcmil ACSR Partridge	8.43	0.377	0.723	0.663	2.835	5.858		
		11.79											
	Fords Prairie Tap - IM&A CO	1.31	WSP	G10	266.8 kcmil ACSR Partridge	8.43	0.377	0.723	0.663	2.835	5.858		
		1.31											
	IM&A CO - Centralia	1.82	WSP	G10	266.8 kcmil ACSR Partridge	8.43	0.377	0.723	0.663	2.835	5.858		
		1.82											
		14.92											
69	**Corvallis - Tap Montana Power Co**												
		0.08	WSP	H15	4/0 ACSR Penguin (6/1)	11.34	0.563	0.848	0.849	2.852	5.454		
		0.08											
		0.08											
69	**Dayton - Tap (Mill Creek - Dry Gulch PP&L)**												
		0.25	WHF	H11	795 kcmil ACSR Drake	17.64	0.128	0.747	0.414	2.590	5.669		
		0.25											
		0.25											
69	**De Moss - Fossil 1**												
	De Moss - Gordon Hollow Tap	0.11	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		0.11											
	Gordon Hollow Tap - Str 2/8	1.80	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 2/8 - Str 4/9	1.55	WSP	SPEC	266.8 kcmil ACSR Partridge	14.35	0.377	0.788	0.663	2.706	5.363		
	Str 4/9 - Str 6/4	2.00	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 6/4 - Str 9/4	2.67	WSP	SPEC	266.8 kcmil ACSR Partridge	14.35	0.377	0.788	0.663	2.706	5.363		
	Str 9/4 - Str 13/4	4.30	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 13/4 - Str 14/1	0.42	WHF	SPEC	397.5 kcmil ACSR Lark	28.98	0.251	0.844	0.537	2.506	4.986		
	Str 14/1 - Condon	21.65	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		34.39											
	Condon - Str 38/8	2.92	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 38/8 - Str 39/12	0.92	WSP	SPEC	266.8 kcmil ACSR Partridge	14.35	0.377	0.788	0.663	2.706	5.363		
	Str 39/12 - Str 40/10	1.39	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 40/10 - Str 42/3	1.68	WHF	H22	397.5 kcmil ACSR Lark	14.49	0.251	0.759	0.537	2.674	5.555		
	Str 42/3 - Str 46/8	4.29	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 46/8 - Str 47/12	0.76	WSP	SPEC	266.8 kcmil ACSR Partridge	14.35	0.377	0.788	0.663	2.706	5.363		
	Str 47/12 - Str 48/4	0.85	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
	Str 48/4 - Str 48/5	0.29	WHF	H18	397.5 kcmil ACSR Lark	20.16	0.251	0.799	0.537	2.594	5.269		
	Str 48/5 - PP&L Tap	5.29	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		18.39											
	PP&L Tap - Fossil	0.04	WHF	H22	266.8 kcmil ACSR Partridge	14.49	0.377	0.789	0.663	2.704	5.354		
		0.04											
		52.93											
69	**Fords Prairie - Tap (Chehalis - Centralia 2)**												
		0.08	WSP	G10	266.8 kcmil ACSR Partridge	8.43	0.377	0.723	0.663	2.835	5.858		
		0.08											
		0.08											
69	**Fossil - Maupin (Line Leased)**												
	Fossil - Pole A	0.42	WHF		397.5 kcmil ACSR Ibis	12.60	0.253	0.748	0.539	2.714	5.659	CPC	
	Pole A - Muddy Ranch Tap	14.23	WSP		397.5 kcmil ACSR Ibis	10.22	0.253	0.723	0.539	2.765	5.865	CPC	
		14.65											
	Muddy Ranch Tap - Pole 8	13.21	WSP		397.5 kcmil ACSR Ibis	10.22	0.253	0.723	0.539	2.765	5.865	CPC	
	Pole 8 - Pole 1	0.44	WSP		397.5 kcmil ACSR Ibis	8.40	0.253	0.699	0.539	2.812	6.072	CPC	
	Pole 1 - Antelope	0.05	WSP		397.5 kcmil ACSR Ibis	10.22	0.253	0.723	0.539	2.765	5.865	CPC	
		13.70											
	Antelope - Pole 331	0.44	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
	Pole 331 - Pole 310	2.21	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
	Pole 310 - Pole 183	10.25	WSP		397.5 kcmil ACSR Ibis	10.22	0.253	0.723	0.539	2.765	5.865	WEC	
	Pole 183 - Pole 159	2.28	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
	Pole 159 - Pole 87	5.77	WSP		397.5 kcmil ACSR Ibis	10.22	0.253	0.723	0.539	2.765	5.865	WEC	
	Pole 87 - Bakeoven	0.41	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
		21.36											
	Bakeoven - Pole 6	6.49	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
	Pole 6 - DE Str	0.48	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
	DE Str - Maupin	0.03	WSP		397.5 kcmil ACSR Ibis	9.35	0.253	0.712	0.539	2.786	5.957	WEC	
		7.00											
		56.71											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
69 Chehalis - Centralia 1														
0.045	0.093		0.080	0.329		0.33	0.00095	0.00195		0.00167	0.00690		0.00002	
3.130	6.012		5.507	23.563		24.34	0.06575	0.12628		0.11567	0.49491		0.00116	
0.422	0.835		0.742	3.127		3.18	0.00886	0.01753		0.01559	0.06568		0.00015	
0.546	1.049		0.961	4.111		4.25	0.01147	0.02203		0.02018	0.08636		0.00020	
4.144	7.988	8.999	7.290	31.130	31.972	32.10	0.08703	0.16779	0.18902	0.15311	0.65385	0.67154	0.00153	
4.144	**7.988**	**8.999**	**7.290**	**31.130**	**31.972**	**32.10**	**0.08703**	**0.16779**	**0.18902**	**0.15311**	**0.65385**	**0.67154**	**0.00153**	
69 Chehalis - Centralia 2														
4.208	8.324		7.402	31.187		31.73	0.08838	0.17483		0.15548	0.65506		0.00151	
0.234	0.449		0.411	1.758		1.82	0.00491	0.00942		0.00863	0.03692		0.00009	
4.441	8.772	9.832	7.813	32.945	33.859	33.55	0.09328	0.18425	0.20652	0.16411	0.69199	0.71118	0.00160	
0.493	0.948		0.868	3.714		3.84	0.01036	0.01991		0.01823	0.07802		0.00018	
0.493	0.948	1.069	0.868	3.714	3.815	3.84	0.01036	0.01991	0.02244	0.01823	0.07802	0.08012	0.00018	
0.686	1.317		1.206	5.161		5.33	0.01440	0.02766		0.02533	0.10839		0.00025	
0.686	1.317	1.485	1.206	5.161	5.300	5.33	0.01440	0.02766	0.03118	0.02533	0.10839	0.11131	0.00025	
5.620	**11.037**	**12.385**	**9.887**	**41.820**	**42.973**	**42.72**	**0.11805**	**0.23181**	**0.26014**	**0.20768**	**0.87840**	**0.90261**	**0.00203**	
69 Corvallis - Tap Montana Power Co														
0.045	0.068		0.068	0.228		0.22	0.00095	0.00142		0.00143	0.00479		0.00001	
0.045	0.068	0.081	0.068	0.228	0.238	0.22	0.00095	0.00142	0.00171	0.00143	0.00479	0.00500	0.00001	
0.045	**0.068**	**0.081**	**0.068**	**0.228**	**0.238**	**0.22**	**0.00095**	**0.00142**	**0.00171**	**0.00143**	**0.00479**	**0.00500**	**0.00001**	
69 Dayton - Tap (Mill Creek - Dry Gulch PP&L)														
0.032	0.187		0.103	0.648		0.71	0.00067	0.00392		0.00217	0.01360		0.00003	
0.032	0.187	0.189	0.103	0.648	0.656	0.71	0.00067	0.00392	0.00398	0.00217	0.01360	0.01377	0.00003	
0.032	**0.187**	**0.189**	**0.103**	**0.648**	**0.656**	**0.71**	**0.00067**	**0.00392**	**0.00398**	**0.00217**	**0.01360**	**0.01377**	**0.00003**	
69 De Moss - Fossil 1														
0.041	0.087		0.073	0.297		0.29	0.00087	0.00182		0.00153	0.00625		0.00001	2-3/8 IN HS STL
0.041	0.087	0.096	0.073	0.297	0.306	0.29	0.00087	0.00182	0.00202	0.00153	0.00625	0.00643	0.00001	
0.678	1.421		1.193	4.867		4.82	0.01424	0.02984		0.02505	0.10223		0.00023	
0.584	1.221		1.027	4.195		4.16	0.01226	0.02566		0.02157	0.08811		0.00020	
0.753	1.578		1.325	5.408		5.35	0.01582	0.03315		0.02784	0.11359		0.00025	
1.006	2.104		1.769	7.226		7.16	0.02113	0.04419		0.03716	0.15177		0.00034	
1.620	3.394		2.850	11.627		11.51	0.03402	0.07128		0.05985	0.24422		0.00055	
0.105	0.354		0.226	1.053		1.05	0.00222	0.00744		0.00474	0.02211		0.00005	
8.156	17.086		14.347	58.542		57.96	0.17130	0.35888		0.30135	1.22961		0.00276	
12.902	27.159	30.068	22.738	92.917	95.659	92.01	0.27099	0.57044	0.63154	0.47758	1.95164	2.00922	0.00438	
1.100	2.305		1.935	7.896		7.82	0.02310	0.04840		0.04064	0.16584		0.00037	
0.347	0.725		0.610	2.490		2.47	0.00728	0.01523		0.01281	0.05230		0.00012	
0.524	1.097		0.921	3.759		3.72	0.01100	0.02304		0.01935	0.07894		0.00018	
0.422	1.276		0.902	4.493		4.67	0.00886	0.02680		0.01895	0.09436		0.00022	
1.616	3.386		2.843	11.600		11.49	0.03394	0.07111		0.05971	0.24365		0.00055	
0.286	0.599		0.504	2.057		2.04	0.00601	0.01258		0.01058	0.04320		0.00010	
0.320	0.671		0.563	2.298		2.28	0.00673	0.01409		0.01183	0.04828		0.00011	
0.073	0.232		0.156	0.752		0.76	0.00153	0.00487		0.00327	0.01580		0.00004	
1.993	4.175		3.506	14.304		14.16	0.04186	0.08769		0.07363	0.30044		0.00067	
6.680	14.465	15.933	11.940	49.649	51.064	49.40	0.14031	0.30381	0.33465	0.25078	1.04282	1.07255	0.00235	
0.015	0.032		0.027	0.108		0.11	0.00032	0.00066		0.00056	0.00227		0.00001	
0.015	0.032	0.035	0.027	0.108	0.111	0.11	0.00032	0.00066	0.00073	0.00056	0.00227	0.00234	0.00001	
19.639	**41.742**	**46.131**	**34.777**	**142.972**	**147.140**	**141.81**	**0.41249**	**0.87674**	**0.96893**	**0.73045**	**3.00298**	**3.09054**	**0.00675**	
69 Fords Prairie - Tap (Chehalis - Centralia 2)														
0.030	0.058		0.053	0.227		0.23	0.00063	0.00122		0.00111	0.00476		0.00001	
0.030	0.058	0.065	0.053	0.227	0.233	0.23	0.00063	0.00122	0.00137	0.00111	0.00476	0.00489	0.00001	
0.030	**0.058**	**0.065**	**0.053**	**0.227**	**0.233**	**0.23**	**0.00063**	**0.00122**	**0.00137**	**0.00111**	**0.00476**	**0.00489**	**0.00001**	
69 Fossil - Maupin (Line Leased)														
0.106	0.314		0.227	1.140		1.19	0.00224	0.00660		0.00476	0.02394		0.00006	1-3/8 IN HS STL
3.606	10.284		7.676	39.340		41.73	0.07574	0.21601		0.16122	0.82631		0.00199	
3.712	10.599	11.230	7.902	40.480	41.244	42.92	0.07797	0.22261	0.23588	0.16598	0.85025	0.86629	0.00204	
3.347	9.547		7.125	36.520		38.74	0.07031	0.20053		0.14966	0.76708		0.00184	
0.111	0.308		0.237	1.237		1.34	0.00234	0.00646		0.00499	0.02599		0.00006	1-3/8 IN HS STL
0.013	0.036		0.027	0.138		0.15	0.00027	0.00076		0.00057	0.00290		0.00001	
3.472	9.891	10.482	7.390	37.896	38.610	40.22	0.07292	0.20775	0.22017	0.15521	0.79597	0.81096	0.00191	
0.111	0.313		0.237	1.226		1.31	0.00234	0.00658		0.00499	0.02575		0.00006	1-3/8 IN EHS STL
0.560	1.573		1.192	6.158		6.58	0.01176	0.03305		0.02504	0.12933		0.00031	
2.597	7.408		5.529	28.337		30.06	0.05455	0.15560		0.11613	0.59520		0.00143	
0.578	1.623		1.230	6.353		6.79	0.01214	0.03409		0.02583	0.13343		0.00032	
1.462	4.170		3.112	15.952		16.92	0.03071	0.08759		0.06537	0.33505		0.00081	
0.104	0.292		0.221	1.142		1.22	0.00218	0.00613		0.00465	0.02399		0.00006	
5.413	15.380	16.305	11.522	59.167	60.279	62.88	0.11369	0.32304	0.34246	0.24200	1.24275	1.26609	0.00299	
1.645	4.620		3.501	18.082		19.33	0.03454	0.09705		0.07353	0.37980		0.00092	
0.122	0.342		0.259	1.337		1.43	0.00255	0.00718		0.00544	0.02809		0.00007	1-3/8 IN EHS STL
0.008	0.021		0.016	0.084		0.09	0.00016	0.00045		0.00034	0.00176		0.00000	
1.774	4.984	5.290	3.776	19.503	19.866	20.85	0.03726	0.10467	0.11111	0.07931	0.40965	0.41726	0.00099	
14.370	**40.853**	**43.307**	**30.589**	**157.047**	**159.998**	**166.87**	**0.30183**	**0.85808**	**0.90961**	**0.64250**	**3.29861**	**3.36060**	**0.00794**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
69	**Fossil - Service Creek (Line Leased)**												
	Fossil - Pole A	0.42	WHF		1/0 ACSR Raven (6/1)	12.60	1.041	0.908	1.327	2.874	5.082	CPC	
	Pole A - Kinzua	8.48	WSP		2/0 ACSR Quail (6/1)	8.25	0.853	0.846	1.139	2.966	5.531	CPC	
		8.90											
	Kinzua - Service Creek	14.80	WSP		1/0 ACSR Raven (6/1)	8.25	1.041	0.857	1.327	2.977	5.429	CPC	
		14.80											
		23.70											
69	**Freewater - Milton**												
		3.72	WSP		397.5 kcmil ACSR Ibis	10.56	0.253	0.727	0.539	2.757	5.832	MFP&L	
		3.72											
		3.72											
69	**Goodnoe - Tap (Klickitat PUD)**												
	Goodnoe - Str 2/4	1.48	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
	Str 2/4 - Str 2/1	0.72	WHF	J6	397.5 kcmil ACSR Ibis	28.98	0.253	0.849	0.539	2.512	4.965		
	Str 2/1 - Str 1/6	0.34	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
	Str 1/6 - Tap (16/7)	0.37	WSP	H23	397.5 kcmil ACSR Ibis	11.52	0.253	0.737	0.539	2.736	5.745		
		2.91											
		2.91											
69	**Guthrie - Tap (Powerdale - Dee PP&L)**												
	Operating Name (Guthrie Tap to PP&L)												
	Section 1	0.08	CSP	G3	266.8 kcmil ACSR Partridge	12.60	0.377	0.772	0.663	2.738	5.476		
	Section 2	0.33			1/0 Cu 7 Str	6.82	0.601	0.779	0.887	2.968	5.529	PP&L	
		0.41											
		0.41											
69	**Lagoon - Tap (Walla Walla - Pendleton 1)**												
		0.02	WSP		1/0 Cu 7 Str	10.56	0.601	0.832	0.887	2.862	5.159	MFP&L	
		0.02											
		0.02											
69	**Maupin - Tygh Valley (PUD) 1**												
	Maupin - Str 2/6	0.07	WHF	H32	397.5 kcmil ACSR Ibis	18.90	0.253	0.797	0.539	2.615	5.298		
	Str 2/6 - Str 5/3	2.12	WHF	H22	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045		
	Str 5/3 - Str 4/3	0.60	WHF	J4	2/0 K CuW Cu	37.80	0.535	1.011	0.821	2.576	4.532		
	Str 4/3 - Tygh Valley(BPA)	0.41	WHF	H22	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045		
		3.20											
	Tygh Valley - Tygh Valley(PUD)	1.98	WHF	H22	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045	NWPU	
		1.98											
		5.18											
69	**Milton - Tap (Walla Walla - Pendleton 1)**												
	Milton - Coop Tie	0.48	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
		0.48											
	Coop Tie - Str 5/7	0.60	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
	Str 5/7 - Str 4/6	0.89	WSP	SPEC	1/0 Cu 7 Str	11.40	0.601	0.841	0.887	2.843	5.099		
	Str 4/6 - Str 4/5	0.17	WHF	G1	397.5 kcmil ACSR Lark	10.08	0.251	0.715	0.537	2.762	5.909		
	Str 4/5 - Str 4/1	0.27	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
	Str 4/1 - Str 3/10	0.22	WHF	G1	397.5 kcmil ACSR Lark	10.08	0.251	0.715	0.537	2.762	5.909		
	Str 3/10 - Tap	2.84	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
		4.99											
		5.47											
69	**Mossyrock - Tap (Silver Creek - Glenoma)**												
	Mossyrock - Str 1/1	0.01	WSP	G8	1/0 Cu 7 Str	9.33	0.601	0.817	0.887	2.892	5.259		
	Str 1/1 - Tap	0.04	WSP	G8	4/0 ACSR Penguin (6/1)	9.33	0.563	0.824	0.849	2.899	5.632		
		0.05											
		0.05											
69	**Muddy Ranch - Tap (Fossil - Maupin 1)**												
		6.80	WSP		266.8 kcmil ACSR Partridge	10.61	0.377	0.751	0.663	2.780	5.633	WEC	
		6.80											
		6.80											
69	**Pendleton - Tap (Roundup - Pendleton)**												
		0.15	WP	T	1/0 Cu 7 Str	7.00	0.601	0.782	0.887	2.961	5.505		
		0.15											
		0.15											
69	**Pine Hollow - Tap(The Dalles - Tygh Valley PP&L)**												
		0.20	WSP	G10	4/0 ACSR Penguin (6/1)	8.43	0.563	0.812	0.849	2.924	5.729		
		0.20											
		0.20											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
69 Fossil - Service Creek (Line Leased)														
0.437	0.382		0.557	1.207		1.07	0.00918	0.00801		0.01171	0.02535		0.00005	1-3/8 IN HS STL
7.233	7.175		9.659	25.151		23.45	0.15193	0.15069		0.20287	0.52827		0.00112	
7.671	7.556	10.767	10.216	26.358	28.268	24.52	0.16111	0.15871	0.22616	0.21458	0.55362	0.59375	0.00117	
15.407	12.684		19.640	44.058		40.17	0.32360	0.26642		0.41251	0.92539		0.00191	
15.407	12.684	19.957	19.640	44.058	48.237	40.17	0.32360	0.26642	0.41917	0.41251	0.92539	1.01317	0.00191	
23.077	**20.241**	**30.696**	**29.856**	**70.416**	**76.484**	**64.69**	**0.48472**	**0.42513**	**0.64474**	**0.62709**	**1.47901**	**1.60646**	**0.00308**	
69 Freewater - Milton														
0.943	2.703		2.007	10.255		10.85	0.01980	0.05678		0.04215	0.21539		0.00052	
0.943	2.703	2.863	2.007	10.255	10.449	10.85	0.01980	0.05678	0.06013	0.04215	0.21539	0.21948	0.00052	
0.943	**2.703**	**2.863**	**2.007**	**10.255**	**10.449**	**10.85**	**0.01980**	**0.05678**	**0.06013**	**0.04215**	**0.21539**	**0.21948**	**0.00052**	
69 Goodnoe - Tap (Klickitat PUD)														
0.375	1.091		0.798	4.049		4.25	0.00788	0.02292		0.01677	0.08504		0.00020	
0.182	0.611		0.388	1.808		1.79	0.00383	0.01284		0.00816	0.03798		0.00009	
0.086	0.262		0.183	0.908		0.93	0.00181	0.00550		0.00385	0.01906		0.00004	
0.094	0.273		0.200	1.012		1.06	0.00197	0.00573		0.00419	0.02126		0.00005	
0.737	2.237	2.356	1.570	7.777	7.934	8.04	0.01549	0.04699	0.04948	0.03297	0.16334	0.16664	0.00038	
0.737	**2.237**	**2.356**	**1.570**	**7.777**	**7.934**	**8.04**	**0.01549**	**0.04699**	**0.04948**	**0.03297**	**0.16334**	**0.16664**	**0.00038**	
69 Guthrie - Tap (Powerdale - Dee PP&L)														
0.030	0.062		0.053	0.219		0.22	0.00063	0.00130		0.00111	0.00460		0.00001	
0.198	0.257		0.293	0.979		0.91	0.00416	0.00540		0.00615	0.02057		0.00004	
0.228	0.319	0.392	0.346	1.198	1.247	1.13	0.00480	0.00669	0.00824	0.00726	0.02517	0.02620	0.00005	
0.228	**0.319**	**0.392**	**0.346**	**1.198**	**1.247**	**1.13**	**0.00480**	**0.00669**	**0.00824**	**0.00726**	**0.02517**	**0.02620**	**0.00005**	
69 Lagoon - Tap (Walla Walla - Pendleton 1)														
0.012	0.017		0.018	0.057		0.05	0.00025	0.00035		0.00037	0.00120		0.00000	
0.012	0.017	0.021	0.018	0.057	0.060	0.05	0.00025	0.00035	0.00043	0.00037	0.00120	0.00126	0.00000	
0.012	**0.017**	**0.021**	**0.018**	**0.057**	**0.060**	**0.05**	**0.00025**	**0.00035**	**0.00043**	**0.00037**	**0.00120**	**0.00126**	**0.00000**	
69 Maupin - Tygh Valley (PUD) 1														
0.018	0.056		0.038	0.183		0.19	0.00037	0.00117		0.00079	0.00385		0.00001	2-3/8 IN HS STL
1.062	1.818		1.668	5.877		5.35	0.02231	0.03818		0.03504	0.12344		0.00025	
0.321	0.606		0.493	1.546		1.36	0.00674	0.01274		0.01035	0.03247		0.00006	
0.205	0.352		0.323	1.137		1.03	0.00431	0.00738		0.00678	0.02387		0.00005	
1.606	2.831	3.255	2.521	8.743	9.099	7.93	0.03374	0.05947	0.06838	0.05296	0.18363	0.19111	0.00038	
0.992	1.698		1.558	5.489		4.99	0.02084	0.03566		0.03273	0.11529		0.00024	
0.992	1.698	1.966	1.558	5.489	5.706	4.99	0.02084	0.03566	0.04130	0.03273	0.11529	0.11985	0.00024	
2.598	**4.529**	**5.222**	**4.080**	**14.232**	**14.805**	**12.92**	**0.05457**	**0.09513**	**0.10967**	**0.08569**	**0.29892**	**0.31096**	**0.00062**	
69 Milton - Tap (Walla Walla - Pendleton 1)														
0.288	0.397		0.426	1.379		1.25	0.00606	0.00833		0.00894	0.02897		0.00006	
0.288	0.397	0.490	0.426	1.379	1.443	1.25	0.00606	0.00833	0.01030	0.00894	0.02897	0.03031	0.00006	
0.360	0.496		0.532	1.724		1.56	0.00757	0.01041		0.01117	0.03621		0.00007	
0.535	0.749		0.789	2.530		2.27	0.01123	0.01572		0.01658	0.05315		0.00011	
0.043	0.122		0.091	0.470		0.50	0.00090	0.00255		0.00192	0.00986		0.00002	
0.162	0.223		0.239	0.776		0.70	0.00341	0.00468		0.00503	0.01629		0.00003	
0.055	0.157		0.118	0.608		0.65	0.00116	0.00331		0.00248	0.01276		0.00003	
1.706	2.346		2.518	8.159		7.38	0.03583	0.04928		0.05289	0.17138		0.00035	
2.861	4.092	4.993	4.288	14.266	14.897	13.06	0.06010	0.08596	0.10488	0.09007	0.29965	0.31290	0.00062	
3.149	**4.489**	**5.484**	**4.714**	**15.646**	**16.340**	**14.31**	**0.06615**	**0.09428**	**0.11518**	**0.09901**	**0.32862**	**0.34321**	**0.00068**	
69 Mossyrock - Tap (Silver Creek - Glenoma)														
0.006	0.008		0.009	0.029		0.03	0.00013	0.00017		0.00019	0.00061		0.00000	
0.023	0.033		0.034	0.116		0.11	0.00047	0.00069		0.00071	0.00244		0.00001	
0.029	0.041	0.050	0.043	0.145	0.151	0.14	0.00060	0.00086	0.00105	0.00090	0.00304	0.00317	0.00001	
0.029	**0.041**	**0.050**	**0.043**	**0.145**	**0.151**	**0.14**	**0.00060**	**0.00086**	**0.00105**	**0.00090**	**0.00304**	**0.00317**	**0.00001**	
69 Muddy Ranch - Tap (Fossil - Maupin 1)														
2.562	5.109		4.506	18.902		19.15	0.05380	0.10732		0.09465	0.39701		0.00091	
2.562	5.109	5.716	4.506	18.902	19.431	19.15	0.05380	0.10732	0.12005	0.09465	0.39701	0.40814	0.00091	
2.562	**5.109**	**5.716**	**4.506**	**18.902**	**19.431**	**19.15**	**0.05380**	**0.10732**	**0.12005**	**0.09465**	**0.39701**	**0.40814**	**0.00091**	
69 Pendleton - Tap (Roundup - Pendleton)														
0.090	0.117		0.133	0.444		0.41	0.00189	0.00246		0.00279	0.00933		0.00002	
0.090	0.117	0.148	0.133	0.444	0.464	0.41	0.00189	0.00246	0.00311	0.00279	0.00933	0.00974	0.00002	
0.090	**0.117**	**0.148**	**0.133**	**0.444**	**0.464**	**0.41**	**0.00189**	**0.00246**	**0.00311**	**0.00279**	**0.00933**	**0.00974**	**0.00002**	
69 Pine Hollow - Tap(The Dalles - Tygh Valley PP&L)														
0.113	0.162		0.170	0.585		0.57	0.00237	0.00341		0.00357	0.01228		0.00003	
0.113	0.162	0.198	0.170	0.585	0.609	0.57	0.00237	0.00341	0.00415	0.00357	0.01228	0.01279	0.00003	
0.113	**0.162**	**0.198**	**0.170**	**0.585**	**0.609**	**0.57**	**0.00237**	**0.00341**	**0.00415**	**0.00357**	**0.01228**	**0.01279**	**0.00003**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
69	**Pomeroy - Jerita (Line Leased From IP&L)**												
	Pomeroy - PP&L Tap	8.00	WSP		2/0 ACSR Quail (6/1)	8.21	0.853	0.845	1.139	2.967	5.535		
		8.00											
	PP&L Tap - Mayview Tap	6.77	WSP		2/0 ACSR Quail (6/1)	8.21	0.853	0.845	1.139	2.967	5.535		
		6.77											
	Mayview Tap - Str 25/2	9.36	WSP		2/0 ACSR Quail (6/1)	8.21	0.853	0.845	1.139	2.967	5.535		
	Str 25/2 - Str 25/4	0.34	WHF		1/0 F CuW Cu (6/1)	11.97	0.627	0.848	0.913	2.833	5.101		
	Str 25/4 - Riperia Tap	4.40	WSP		2/0 ACSR Quail (6/1)	8.21	0.853	0.845	1.139	2.967	5.535		
		14.10											
	Riperia Tap - Jerita	3.60	WSP		2/0 ACSR Quail (6/1)	8.21	0.853	0.845	1.139	2.967	5.535		
		3.60											
		32.47											
69	**Riparia - Tap (Jerita - Pomeroy)**												
		15.12	WSP		2/0 ACSR Quail (6/1)	9.22	0.853	0.860	1.139	2.939	5.432	IP&L	
		15.12											
		15.12											
69	**Roundup - Pendleton (PP&L)**												
	Roundup - Pendleton (UEC) Tap	3.51	SA-69		397.5 kcmil ACSR Ibis	7.99	0.253	0.693	0.539	2.824	6.127	PP&L	
	Pendleton (UEC) Tap - Pendleton (PP&L)	1.32	HS-69		397.5 kcmil ACSR Ibis	12.60	0.253	0.748	0.539	2.714	5.659	PP&L	
		4.83											
		4.83											
69	**Roundup - Ukiah**												
	Operating Name (Pilot Rock - Ukiah)												
	Roundup - Pilot Rock	14.07	WP	T	1/0 F CuW Cu (6/1)	8.00	0.627	0.799	0.913	2.930	5.432	PP&L	
		14.07											
	Pilot Rock - Ukiah (Leased)	27.50	WP		1/0 ACSR Raven (6/1)	8.25	1.041	0.857	1.327	2.977	5.429		
		27.50											
		41.57											
69	**Sand Hollow - Tap (Boardman - Ione)**												
		11.00	WSP		2F CuW Cu (6/1)	9.35	0.985	0.846	1.271	2.921	5.115	CBEC	
		11.00											
		11.00											
69	**Silver Creek - Glenoma 1**												
	Silver Creek - Str 1/8	0.45	WHF	G1	4/0 ACSR Penguin (6/1)	10.08	0.563	0.833	0.849	2.880	5.560		
	Str 1/8 - Str 2/2	0.75	WHF	G1	4/0 ACSR Penguin (6/1)	10.08	0.563	0.833	0.849	2.880	5.560		
	Str 2/2 - Str 3/1	0.89	WHF	SPEC	397.5 kcmil ACSR Lark	17.32	0.251	0.781	0.537	2.631	5.397		
	Str 3/1 - Str 5/3	2.19	WHF	G1	4/0 ACSR Penguin (6/1)	10.08	0.563	0.833	0.849	2.880	5.560		
	Str 5/3 - Mossyrock Tap	0.35	WSP	G8	4/0 ACSR Penguin (6/1)	9.33	0.563	0.824	0.849	2.899	5.632		
		4.63											
	Mossyrock Tap - Str 6/1	0.01	WSP	G8	4/0 ACSR Penguin (6/1)	9.33	0.563	0.824	0.849	2.899	5.632		
	Str 6/1 - Str 6/7	0.31	WSP	G8	1/0 Cu 7 Str	9.33	0.601	0.817	0.887	2.892	5.259		
	Str 6/7 - Str 6/14	0.45	WSP	G8	1/0 Cu 7 Str	9.33	0.601	0.817	0.887	2.892	5.259		
	Str 6/14 - Str 6/16	0.12	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
	Str 6/16 - Str 8/14	1.86	WSP	G8	1/0 Cu 7 Str	9.33	0.601	0.817	0.887	2.892	5.259		
	Str 8/14 - Str 9/2 (Line Switch)	0.35	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
	Str 9/2 - Mossyrock Hydro	0.42	WHF	G1	4/0 ACSR Penguin (6/1)	10.08	0.563	0.833	0.849	2.880	5.560		
		3.52											
	Mossyrock Hydro - Str 10/1	0.56	WHF	SPEC	397.5 kcmil ACSR Lark	17.32	0.251	0.781	0.537	2.631	5.397		
	Str 10/1 - Str 13/2	2.91	WHF	G1	4/0 ACSR Penguin (6/1)	10.08	0.563	0.833	0.849	2.880	5.560		
	Str 13/2 - Highland Summit	0.61	WHF	G1	1/0 Cu 7 Str	10.08	0.601	0.826	0.887	2.873	5.196		
		4.08											
	Highland Summit - Morton West (LEW)	3.43	TDC	DTS1	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	LEWIS	
		3.43											
	Morton West (LEW) - CH 1	0.17	WSP	N21	795 kcmil ACSR Drake	8.57	0.128	0.659	0.414	2.765	6.452	LEWIS	
	CH 1 - Morton (LEW)	0.02	WSP	N21	1/0 Cu 7 Str	8.57	0.601	0.806	0.887	2.912	5.329	LEWIS	
		0.19											
	Morton (LEW) - CH 2	0.03	WSP	N21	4/0 ACSR Penguin (6/1)	8.57	0.563	0.814	0.849	2.920	5.713	LEWIS	
	CH 2 - Morton East (LEW)	0.14	WSP	N21	795 kcmil ACSR Drake	8.57	0.128	0.659	0.414	2.765	6.452	LEWIS	
		0.17											
	Morton East (LEW) - WTD Tap	3.14	TDC	DTS1	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	LEWIS	
		3.14											
	WTD Tap - Glenoma	3.74	TDC	DTS1	795 kcmil ACSR Drake	15.12	0.128	0.728	0.414	2.627	5.820	LEWIS	
		3.74											
		22.90											
69	**Stateline - Tap (Walla Walla - Pendleton 1)**												
		1.31	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457	CREA	
		1.31											
		1.31											
69	**Stevensville - Tap (To MPC)**												
		0.05	WSP	G7	No 2 ACSR Sparate (7/1)	9.26	1.566	0.891	1.852	2.969	5.165		
		0.05											
		0.05											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
69 Pomeroy - Jerita (Line Leased From IP&L)														
6.824	6.764		9.112	23.737		22.14	0.14333	0.14207		0.19139	0.49856		0.00105	
6.824	6.764	9.608	9.112	23.737	25.425	22.14	0.14333	0.14207	0.20181	0.19139	0.49856	0.53403	0.00105	
5.775	5.724		7.711	20.087		18.74	0.12129	0.12022		0.16196	0.42191		0.00089	
5.775	5.724	8.131	7.711	20.087	21.516	18.74	0.12129	0.12022	0.17078	0.16196	0.42191	0.45193	0.00089	
7.984	7.914		10.661	27.772		25.91	0.16770	0.16622		0.22392	0.58332		0.00123	
0.213	0.288		0.310	0.963		0.87	0.00448	0.00606		0.00652	0.02023		0.00004	
3.753	3.720		5.012	13.055		12.18	0.07883	0.07814		0.10526	0.27421		0.00058	
11.950	11.922	16.880	15.983	41.790	44.742	38.95	0.25101	0.25041	0.35456	0.33571	0.87775	0.93976	0.00185	
3.071	3.044		4.100	10.681		9.96	0.06450	0.06393		0.08612	0.22435		0.00047	
3.071	3.044	4.324	4.100	10.681	11.441	9.96	0.06450	0.06393	0.09081	0.08612	0.22435	0.24032	0.00047	
27.620	**27.453**	**38.943**	**36.906**	**96.295**	**103.125**	**89.79**	**0.58013**	**0.57663**	**0.81796**	**0.77518**	**2.02258**	**2.16604**	**0.00427**	
69 Riparia - Tap (Jerita - Pomeroy)														
12.897	12.996		17.222	44.436		41.06	0.27090	0.27297		0.36172	0.93334		0.00196	
12.897	12.996	18.310	17.222	44.436	47.657	41.06	0.27090	0.27297	0.38458	0.36172	0.93334	1.00098	0.00196	
12.897	**12.996**	**18.310**	**17.222**	**44.436**	**47.657**	**41.06**	**0.27090**	**0.27297**	**0.38458**	**0.36172**	**0.93334**	**1.00098**	**0.00196**	
69 Roundup - Pendleton (PP&L)														
0.889	2.432		1.893	9.913		10.75	0.01868	0.05108		0.03977	0.20822		0.00051	
0.334	0.988		0.712	3.582		3.73	0.00703	0.02074		0.01496	0.07524		0.00018	
1.224	3.419	3.632	2.605	13.496	13.745	14.49	0.02571	0.07182	0.07628	0.05472	0.28346	0.28870	0.00069	
1.224	**3.419**	**3.632**	**2.605**	**13.496**	**13.745**	**14.49**	**0.02571**	**0.07182**	**0.07628**	**0.05472**	**0.28346**	**0.28870**	**0.00069**	
69 Roundup - Ukiah														
8.822	11.246		12.846	41.230		38.21	0.18529	0.23622		0.26982	0.86600		0.00182	
8.822	11.246	14.294	12.846	41.230	43.185	38.21	0.18529	0.23622	0.30022	0.26982	0.86600	0.90706	0.00182	
28.628	23.569		36.493	81.864		74.65	0.60129	0.49504		0.76649	1.71948		0.00355	
28.628	23.569	37.081	36.493	81.864	89.630	74.65	0.60129	0.49504	0.77886	0.76649	1.71948	1.88258	0.00355	
37.449	**34.816**	**51.133**	**49.338**	**123.094**	**132.614**	**112.86**	**0.78659**	**0.73127**	**1.07400**	**1.03630**	**2.58547**	**2.78543**	**0.00537**	
69 Sand Hollow - Tap (Boardman - Ione)														
10.835	9.309		13.981	32.126		28.13	0.22758	0.19552		0.29366	0.67477		0.00134	
10.835	9.309	14.285	13.981	32.126	35.036	28.13	0.22758	0.19552	0.30003	0.29366	0.67477	0.73590	0.00134	
10.835	**9.309**	**14.285**	**13.981**	**32.126**	**35.036**	**28.13**	**0.22758**	**0.19552**	**0.30003**	**0.29366**	**0.67477**	**0.73590**	**0.00134**	
69 Silver Creek - Glenoma 1														
0.253	0.375		0.382	1.296		1.25	0.00532	0.00788		0.00802	0.02722		0.00006	2-3/8 IN HS STL
0.422	0.625		0.637	2.160		2.09	0.00887	0.01313		0.01337	0.04537		0.00010	
0.223	0.695		0.478	2.341		2.40	0.00469	0.01460		0.01004	0.04918		0.00011	
1.233	1.825		1.859	6.308		6.09	0.02590	0.03833		0.03905	0.13249		0.00029	
0.197	0.288		0.297	1.015		0.99	0.00414	0.00606		0.00624	0.02131		0.00005	1-3/8 IN HS STL
2.329	3.809	4.464	3.653	13.120	13.619	12.81	0.04892	0.08000	0.09377	0.07673	0.27558	0.28606	0.00061	
0.006	0.008		0.008	0.029		0.03	0.00012	0.00017		0.00018	0.00061		0.00000	1-3/8 IN HS STL
0.186	0.253		0.275	0.896		0.82	0.00391	0.00532		0.00577	0.01883		0.00004	1-3/8 IN HS STL
0.270	0.368		0.399	1.301		1.18	0.00568	0.00772		0.00838	0.02733		0.00006	
0.072	0.099		0.106	0.345		0.31	0.00151	0.00208		0.00223	0.00724		0.00001	
1.117	1.519		1.649	5.379		4.89	0.02347	0.03191		0.03464	0.11297		0.00023	
0.210	0.289		0.310	1.006		0.91	0.00442	0.00607		0.00652	0.02112		0.00004	
0.236	0.350		0.357	1.210		1.17	0.00497	0.00735		0.00749	0.02541		0.00006	
2.098	2.886	3.568	3.105	10.165	10.629	9.31	0.04407	0.06062	0.07495	0.06522	0.21351	0.22325	0.00044	
0.141	0.437		0.301	1.473		1.51	0.00295	0.00919		0.00632	0.03095		0.00007	
1.638	2.425		2.471	8.382		8.09	0.03441	0.05094		0.05189	0.17605		0.00039	
0.366	0.504		0.541	1.753		1.58	0.00770	0.01058		0.01136	0.03681		0.00008	
2.145	3.366	3.992	3.312	11.607	12.071	11.19	0.04506	0.07071	0.08385	0.06957	0.24380	0.25353	0.00053	
0.437	2.497		1.418	9.012		9.98	0.00919	0.05246		0.02979	0.18929		0.00048	
0.437	2.497	2.535	1.418	9.012	9.123	9.98	0.00919	0.05246	0.05326	0.02979	0.18929	0.19162	0.00048	
0.022	0.112		0.070	0.470		0.55	0.00046	0.00235		0.00148	0.00987		0.00003	
0.012	0.016		0.018	0.058		0.05	0.00025	0.00034		0.00037	0.00122		0.00000	
0.034	0.128	0.133	0.088	0.528	0.536	0.60	0.00071	0.00269	0.00278	0.00185	0.01110	0.01125	0.00003	
0.017	0.024		0.025	0.088		0.09	0.00035	0.00051		0.00053	0.00184		0.00000	
0.018	0.092		0.058	0.387		0.45	0.00037	0.00194		0.00122	0.00813		0.00002	
0.035	0.117	0.122	0.083	0.475	0.482	0.54	0.00073	0.00245	0.00256	0.00175	0.00997	0.01012	0.00003	
0.400	2.286		1.298	8.250		9.14	0.00841	0.04802		0.02727	0.17329		0.00044	
0.400	2.286	2.321	1.298	8.250	8.352	9.14	0.00841	0.04802	0.04875	0.02727	0.17329	0.17542	0.00044	
0.477	2.723		1.546	9.827		10.88	0.01002	0.05720		0.03248	0.20640		0.00052	
0.477	2.723	2.765	1.546	9.827	9.948	10.88	0.01002	0.05720	0.05807	0.03248	0.20640	0.20894	0.00052	
7.956	**17.813**	**19.509**	**14.505**	**62.985**	**64.634**	**64.44**	**0.16710**	**0.37415**	**0.40977**	**0.30466**	**1.32293**	**1.35756**	**0.00307**	
69 Stateline - Tap (Walla Walla - Pendleton 1)														
0.836	1.117		1.210	3.798		3.57	0.01755	0.02345		0.02542	0.07977		0.00017	
0.836	1.117	1.395	1.210	3.798	3.986	3.57	0.01755	0.02345	0.02930	0.02542	0.07977	0.08373	0.00017	
0.836	**1.117**	**1.395**	**1.210**	**3.798**	**3.986**	**3.57**	**0.01755**	**0.02345**	**0.02930**	**0.02542**	**0.07977**	**0.08373**	**0.00017**	
69 Stevensville - Tap (To MPC)														
0.078	0.045		0.093	0.148		0.13	0.00164	0.00094		0.00194	0.00312		0.00001	
0.078	0.045	0.090	0.093	0.148	0.175	0.13	0.00164	0.00094	0.00189	0.00194	0.00312	0.00367	0.00001	
0.078	**0.045**	**0.090**	**0.093**	**0.148**	**0.175**	**0.13**	**0.00164**	**0.00094**	**0.00189**	**0.00194**	**0.00312**	**0.00367**	**0.00001**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
69	**The Dalles - Tygh Valley**												
	The Dalles - CH 1	2.57	WP	T	1/0 Cu 7 Str	7.00	0.601	0.782	0.887	2.961	5.505	PP&L	
	CH 1 - Columbia Heights	0.28	WP	T	1/0 Cu 7 Str	7.60	0.601	0.792	0.887	2.942	5.432	PP&L	
		2.85											
	Columbia Heights - CH 2	9.82	WP	H	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045	PP&L	
	CH 2 - Dufur	0.62	WP	T	2/0 F CuW Cu (6/1)	11.20	0.501	0.826	0.787	2.835	5.247	PP&L	
		10.44											
	Dufur - Pine Hollow Tap	0.43	WP	T	2/0 F CuW Cu (6/1)	7.00	0.501	0.769	0.787	2.949	5.662	PP&L	
		0.43											
	Pine Hollow Tap - CH 4	0.06	WP	T	2/0 F CuW Cu (6/1)	7.00	0.501	0.769	0.787	2.949	5.662	PP&L	
	CH 4 - CH 5	2.79	WP	H	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045	PP&L	
	CH 5 - CH 6	2.18	WP	T	2/0 F CuW Cu (6/1)	9.50	0.501	0.806	0.787	2.875	5.385	PP&L	
	CH 6 - CH 7	0.53	WP	H	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045	PP&L	
	CH 7 - CH 8	0.58	WP	T	2/0 F CuW Cu (6/1)	9.50	0.501	0.806	0.787	2.875	5.385	PP&L	
	CH 8 - CH 9	4.95	WP	T	2/0 F CuW Cu (6/1)	7.00	0.501	0.769	0.787	2.949	5.662	PP&L	
	CH 9 - CH 10	2.75	WP	H	2/0 F CuW Cu (6/1)	14.49	0.501	0.857	0.787	2.772	5.045	PP&L	
	CH 10 - Tygh Valley	1.05	WP	T	2/0 F CuW Cu (6/1)	9.50	0.501	0.806	0.787	2.875	5.385	PP&L	
		14.89											
		28.61											
69	**Vansycle Ridge Windfarm - Tap(Pndltn - Walla Walla)**												
		0.01	WHF	G1	336.4 kcmil ACSR Linnet	10.08	0.299	0.731	0.585	2.778	5.795		
		0.01											
		0.01											
69	**Walla Walla - Freewater 1 (Milton-Freewater LT & PWR)**												
	Walla Walla - Twr 1/4	0.30	TDC	H25	397.5 kcmil ACSR Ibis	15.48	0.253	0.773	0.539	2.664	5.470		M-173
	Twr 1/4 - Twr 4/7	3.12	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
	Twr 4/7 - Twr 5/7	1.08	TDC	H25	397.5 kcmil ACSR Ibis	15.48	0.253	0.773	0.539	2.664	5.470		
	Twr 5/7 - WA/OR Border	1.29	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
		5.79											
	WA/OR Border - Twr 9/7	2.72	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
	Twr 9/7 - Freewater	3.23	WSP		397.5 kcmil ACSR Ibis	10.56	0.253	0.727	0.539	2.757	5.832	MFP&L	
		5.95											
		11.74											
69	**Walla Walla - Pendleton 1**												
	Walla Walla - Twr 1/4	0.30	TDC	H25	397.5 kcmil ACSR Ibis	15.48	0.253	0.773	0.539	2.664	5.470		M-173
	Twr 1/4 - Twr 2/8	1.23	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
	Twr 2/8 - Twr 4/7	1.89	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
	Twr 4/7 - Twr 5/7	1.08	TDC	H25	397.5 kcmil ACSR Ibis	15.48	0.253	0.773	0.539	2.664	5.470		
	Twr 5/7 - WA/OR Border	1.29	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
		5.79											
	WA/OR Border - Twr 9/7	2.72	TDC	H26	397.5 kcmil ACSR Ibis	12.97	0.253	0.752	0.539	2.707	5.631		
	Twr 9/7 - Milton Tap	1.04	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457		
		3.76											
	Milton Tap - Lagoon Tap	1.10	WSP	G5	3/0 ACSR Pigeon (6/1)	9.70	0.638	0.848	0.924	2.909	5.491		
		1.10											
	Lagoon Tap(11/11) - Str 13/4	1.36	WSP	G5	3/0 ACSR Pigeon (6/1)	9.70	0.638	0.848	0.924	2.909	5.491		
	Str 13/4 - Stateline Tap	2.26	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457		
		3.62											
	Stateline Tp - Vansycle Ridge Wndfrm Tp	4.60	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		4.60											
	Vansycle Ridge Wndfrm Tp - Str 25/7	5.81	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457		
	Str 25/7 - Str 33/4	7.41	WSP	G5	3/0 ACSR Pigeon (6/1)	9.70	0.638	0.848	0.924	2.909	5.491		
	Str 33/4 - Mission Tap (Coop)	0.22	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457		
		13.44											
	Mission Tap (Coop) - Str 39/4	6.11	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457		
	Str 39/4 - Pendleton	0.57	WHF	G1	3/0 ACSR Pigeon (6/1)	10.08	0.638	0.852	0.924	2.899	5.457		
		6.68											
		38.99											
34.5	**Almira(Lincoln Electric Coop) - Tap (Creston - Davenport 1)**												
	Almira - Str 3/1 Coop Tap	2.01	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		2.01											
	Str 3/1 Coop Tap - Str 3/3	0.23	WSP	E1	2A CuW Cu (2/1)	5.89	0.979	0.807	1.265	3.050	5.659		
	Str 3/3 - Draper (Coop)	7.76	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		7.99											
	Draper (Coop) - Wagner Lake	0.04	WSP	E1	266.8 kcmil ACSR Partridge	5.89	0.377	0.680	0.663	2.922	6.248		
		0.04											
	Wagner Lake - Str 11/6	0.04	WSP	E1	266.8 kcmil ACSR Partridge	5.89	0.377	0.680	0.663	2.922	6.248		
	Str 11/6 - Odessa (15/6)	3.97	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		4.01											
	Odessa - South Creston(18/10)	3.65	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		3.65											
	South Creston(18/10) - Tap	1.44	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		1.44											
		19.14											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
69 The Dalles - Tygh Valley														
1.544	2.009		2.279	7.611		7.07	0.03243	0.04220		0.04786	0.15986		0.00034	
0.168	0.222		0.248	0.824		0.76	0.00353	0.00466		0.00521	0.01730		0.00004	
1.712	2.231	2.812	2.527	8.435	8.805	7.84	0.03596	0.04686	0.05907	0.05308	0.17716	0.18494	0.00037	
4.920	8.420		7.728	27.223		24.77	0.10334	0.17685		0.16233	0.57179		0.00118	
0.311	0.512		0.488	1.758		1.63	0.00652	0.01076		0.01025	0.03691		0.00008	
5.230	8.932	10.351	8.216	28.980	30.123	26.40	0.10986	0.18761	0.21741	0.17257	0.60871	0.63270	0.00126	
0.215	0.331		0.338	1.268		1.22	0.00452	0.00695		0.00711	0.02663		0.00006	
0.215	0.331	0.395	0.338	1.268	1.312	1.22	0.00452	0.00695	0.00829	0.00711	0.02663	0.02756	0.00006	
0.030	0.046		0.047	0.177		0.17	0.00063	0.00097		0.00099	0.00372		0.00001	
1.398	2.392		2.196	7.734		7.04	0.02936	0.05024		0.04612	0.16245		0.00034	
1.092	1.757		1.716	6.267		5.87	0.02294	0.03691		0.03604	0.13163		0.00028	
0.266	0.454		0.417	1.469		1.34	0.00558	0.00954		0.00876	0.03086		0.00006	
0.291	0.468		0.456	1.667		1.56	0.00610	0.00982		0.00959	0.03502		0.00007	
2.480	3.807		3.896	14.596		14.01	0.05209	0.07997		0.08182	0.30658		0.00067	
1.378	2.358		2.164	7.624		6.94	0.02894	0.04952		0.04546	0.16012		0.00033	
0.526	0.846		0.826	3.018		2.83	0.01105	0.01778		0.01736	0.06340		0.00013	
7.460	12.129	14.240	11.718	42.553	44.137	39.75	0.15669	0.25476	0.29909	0.24613	0.89378	0.92705	0.00189	
14.618	**23.623**	**27.780**	**22.800**	**81.236**	**84.375**	**75.20**	**0.30703**	**0.49618**	**0.58349**	**0.47890**	**1.70628**	**1.77221**	**0.00358**	
69 Vansycle Ridge Windfarm - Tap(Pndltn - Walla Walla)														
0.003	0.007		0.006	0.028		0.03	0.00006	0.00015		0.00012	0.00058		0.00000	
0.003	0.007	0.008	0.006	0.028	0.028	0.03	0.00006	0.00015	0.00017	0.00012	0.00058	0.00060	0.00000	
0.003	**0.007**	**0.008**	**0.006**	**0.028**	**0.028**	**0.03**	**0.00006**	**0.00015**	**0.00017**	**0.00012**	**0.00058**	**0.00060**	**0.00000**	
69 Walla Walla - Freewater 1 (Milton-Freewater LT & PWR)														
0.076	0.232		0.162	0.799		0.82	0.00160	0.00487		0.00340	0.01679		0.00004	
0.791	2.345		1.683	8.445		8.79	0.01661	0.04926		0.03535	0.17738		0.00042	
0.274	0.835		0.583	2.877		2.95	0.00575	0.01754		0.01224	0.06043		0.00014	
0.327	0.970		0.696	3.492		3.63	0.00687	0.02037		0.01462	0.07334		0.00017	
1.467	4.382	4.621	3.123	15.613	15.922	16.19	0.03082	0.09203	0.09705	0.06560	0.32794	0.33443	0.00077	
0.689	2.044		1.467	7.362		7.66	0.01448	0.04294		0.03082	0.15464		0.00036	
0.818	2.347		1.742	8.904		9.42	0.01719	0.04930		0.03659	0.18702		0.00045	
1.508	4.392	4.643	3.209	16.266	16.580	17.08	0.03167	0.09224	0.09753	0.06741	0.34166	0.34825	0.00081	
2.975	**8.773**	**9.264**	**6.333**	**31.879**	**32.502**	**33.27**	**0.06249**	**0.18428**	**0.19458**	**0.13301**	**0.66960**	**0.68268**	**0.00158**	
69 Walla Walla - Pendleton 1														
0.076	0.232		0.162	0.799		0.82	0.00160	0.00487		0.00340	0.01679		0.00004	1-7 NO 8 ALWLD
0.312	0.925		0.663	3.329		3.46	0.00655	0.01942		0.01394	0.06993		0.00016	1-7 NO 8 ALWLD
0.479	1.421		1.019	5.116		5.32	0.01006	0.02984		0.02141	0.10745		0.00025	1-7 NO 8 ALWLD
0.274	0.835		0.583	2.877		2.95	0.00575	0.01754		0.01224	0.06043		0.00014	
0.327	0.970		0.696	3.492		3.63	0.00687	0.02037		0.01462	0.07334		0.00017	
1.467	4.382	4.621	3.123	15.613	15.922	16.19	0.03082	0.09203	0.09705	0.06560	0.32794	0.33443	0.00077	
0.689	2.044		1.467	7.362		7.66	0.01448	0.04294		0.03082	0.15464		0.00036	
0.664	0.886		0.961	3.015		2.84	0.01394	0.01862		0.02018	0.06333		0.00014	
1.353	2.931	3.228	2.428	10.378	10.658	10.50	0.02841	0.06156	0.06780	0.05100	0.21797	0.22386	0.00050	
0.702	0.932		1.016	3.199		3.02	0.01474	0.01959		0.02135	0.06720		0.00014	
0.702	0.932	1.167	1.016	3.199	3.357	3.02	0.01474	0.01959	0.02451	0.02135	0.06720	0.07051	0.00014	
0.868	1.153		1.257	3.956		3.73	0.01822	0.02422		0.02639	0.08309		0.00018	
1.442	1.926		2.088	6.552		6.17	0.03029	0.04046		0.04386	0.13763		0.00029	
2.310	3.079	3.849	3.345	10.508	11.028	9.90	0.04851	0.06468	0.08085	0.07026	0.22071	0.23162	0.00047	
1.166	3.543		2.481	12.280		12.63	0.02448	0.07442		0.05212	0.25793		0.00060	
1.166	3.543	3.730	2.481	12.280	12.528	12.63	0.02448	0.07442	0.07834	0.05212	0.25793	0.26314	0.00060	
3.707	4.952		5.368	16.845		15.85	0.07786	0.10402		0.11276	0.35381		0.00075	
4.728	6.281		6.847	21.553		20.35	0.09930	0.13194		0.14381	0.45269		0.00097	
0.140	0.188		0.203	0.638		0.60	0.00295	0.00394		0.00427	0.01340		0.00003	
8.575	11.421	14.282	12.419	39.035	40.963	36.80	0.18010	0.23989	0.29998	0.26084	0.81990	0.86039	0.00175	
3.898	5.208		5.646	17.715		16.67	0.08188	0.10939		0.11858	0.37208		0.00079	
0.364	0.486		0.527	1.653		1.56	0.00764	0.01020		0.01106	0.03471		0.00007	1-7 NO 8 ALWLD
4.262	5.694	7.112	6.172	19.367	20.327	18.23	0.08952	0.11959	0.14938	0.12964	0.40679	0.42695	0.00087	
19.834	**31.983**	**37.633**	**30.985**	**110.380**	**114.647**	**107.26**	**0.41658**	**0.67176**	**0.79045**	**0.65080**	**2.31843**	**2.40804**	**0.00511**	
34.5 Almira(Lincoln Electric Coop) - Tap (Creston - Davenport 1)														
3.105	1.679		3.680	6.186		5.47	0.26091	0.14104		0.30920	0.51973		0.00007	
3.105	1.679	3.530	3.680	6.186	7.198	5.47	0.26091	0.14104	0.29659	0.30920	0.51973	0.60475	0.00007	
0.225	0.186		0.291	0.701		0.65	0.01892	0.01560		0.02444	0.05893		0.00001	
11.989	6.481		14.209	23.883		21.13	1.00728	0.54450		1.19375	2.00652		0.00025	
12.214	6.667	13.915	14.500	24.584	28.541	21.78	1.02620	0.56010	1.16910	1.21819	2.06545	2.39793	0.00026	
0.015	0.027		0.027	0.117		0.12	0.00127	0.00229		0.00223	0.00982		0.00000	
0.015	0.027	0.031	0.027	0.117	0.120	0.12	0.00127	0.00229	0.00261	0.00223	0.00982	0.01007	0.00000	
0.015	0.027		0.027	0.117		0.12	0.00127	0.00229		0.00223	0.00982		0.00000	
6.134	3.316		7.269	12.218		10.81	0.51532	0.27857		0.61072	1.02653		0.00013	
6.149	3.343	6.999	7.296	12.335	14.331	10.94	0.51659	0.28085	0.58800	0.61295	1.03635	1.20405	0.00013	
5.639	3.048		6.683	11.233		9.94	0.47379	0.25611		0.56149	0.94379		0.00012	
5.639	3.048	6.410	6.683	11.233	13.071	9.94	0.47379	0.25611	0.53858	0.56149	0.94379	1.09819	0.00012	
2.225	1.203		2.637	4.432		3.92	0.18692	0.10104		0.22152	0.37234		0.00005	
2.225	1.203	2.529	2.637	4.432	5.157	3.92	0.18692	0.10104	0.21248	0.22152	0.37234	0.43326	0.00005	
29.348	**15.966**	**33.410**	**34.822**	**58.888**	**68.413**	**52.18**	**2.46567**	**1.34142**	**2.80695**	**2.92558**	**4.94749**	**5.74776**	**0.00062**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
34.5	**Creston - Davenport (Lincoln Electric Coop) 1**												
	Creston - Coop Tap	0.02	WSP	G8	1/0 Cu 7 Str	9.33	0.601	0.817	0.887	2.892	5.259		
		0.02											
	Coop Tap - Almira Tap	10.74	WSP	G8	1/0 Cu 7 Str	9.33	0.601	0.817	0.887	2.892	5.259		
		10.74											
	Almira Tap - Coop Pump	5.00	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		5.00											
	Coop Pump - Davenport	7.94	WSP	E1	4A CuW Cu (2/1)	5.89	1.545	0.835	1.831	3.078	5.446		
		7.94											
		23.70											
34.5	**Drain - Elkton (Douglas Electric Coop) 1**												
		0.07	WSP	E1	No 2 Cu 3 Str	5.89	0.955	0.786	1.241	3.029	5.535		
		0.07											
		0.07											
34.5	**Drain - Oakland (Douglas Electric Coop) 2**												
		0.14	WSP	E1	No 2 Cu 3 Str	5.89	0.955	0.786	1.241	3.029	5.535		
		0.14											
		0.14											
34.5	**East Hills - Albion 1**												
		5.92	WSP		No 5 Cu 3 Str	5.58	1.916	0.822	2.202	3.084	5.281		
		5.92											
		5.92											
34.5	**Ferry - Pella (Leased to Unity Power & Light)**												
	Str 4/3 - Str 6/3	2.00	WSP		No 1 Cu 7 Str	5.58	0.758	0.768	1.044	3.031	5.607		
		2.00											
		2.00											
34.5	**Fidalgo - Lopez Island 2**												
	Fidalgo - Splice Box 1	0.06			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
	Splice Box 1 - Splice Box 2	4.70			500 kcmil Cu 3/C Cable-DA	0.00	0.159	0.233	1.267	0.137	17.330		
	Splice Box 2 - Splice Box 3	0.01			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
	Splice Box 3 - Str 5/9	0.33			1000 kcmil AL XLPE Cable	0.00	0.117	0.146	0.552	0.177	50.680		
	Str 5/9 - Str 7/6	1.19	WDC	G2	397.5 kcmil ACSR Ibis	6.02	0.253	0.659	0.539	2.893	6.460		
	Str 7/6 - Splice Box 4	0.15			1000 kcmil Alum 1/C Cable	0.00	0.117	0.146	0.552	0.177	50.680		
	Splice Box 4 - Splice Box 5	0.03			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
	Splice Box 5 - Splice Box 6	1.97			500 kcmil Cu 3/C Cable-SA	0.00	0.159	0.233	1.267	0.137	17.330		
	Splice Box 6 - Lopez	0.05			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
		8.49											
		8.49											
34.5	**Fidalgo - Lopez Island 3**												
	Fidalgo - Splice Box 1	0.06			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
	Splice Box 1 - Splice Box 2	4.60			500 kcmil Cu 3/C Cable-DA	0.00	0.159	0.233	1.267	0.137	17.330		
	Splice Box 2 - Splice Box 3	0.05			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
	Splice Box 3 - Str 5/9	0.30			1000 kcmil AL XLPE Cable	0.00	0.117	0.146	0.552	0.177	50.680		
	Str 5/9 - Str 7/6	1.19	WDC	G2	397.5 kcmil ACSR Ibis	6.02	0.253	0.659	0.539	2.893	6.460		
	Str 7/6 - Splice Box 4	0.15			1000 kcmil Alum 1/C Cable	0.00	0.117	0.146	0.552	0.177	50.680		
	Splice Box 4 - Splice Box 5	0.03			700 kcmil Cu 1/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
	Splice Box 5 - Splice Box 6	2.14			500 kcmil Cu 3/C Cable-SA	0.00	0.159	0.233	1.267	0.137	17.330		
	Splice Box 6 - Lopez	0.05			700 kcmil Cu 3/C Cable	0.00	0.102	0.385	1.135	0.107	32.330		
		8.57											
		8.57											
34.5	**Jackson Tap (IP) - First Lift 1**												
	Jackson(IP) Tap - Newcomb	1.30	WSP		2/0 Cu 7 Str	5.58	0.477	0.740	0.763	3.002	5.832		
		1.30											
	Newcomb - Canal	4.20	WSP		2/0 Cu 7 Str	5.58	0.477	0.740	0.763	3.002	5.832		
		4.20											
	Canal - Second Lift	1.00	WSP		2/0 Cu 7 Str	5.58	0.477	0.740	0.763	3.002	5.832		
		1.00											
	Second Lift - CH 1	0.85	WSP		2/0 Cu 7 Str	5.58	0.477	0.740	0.763	3.002	5.832		
	CH 1 - First Lift	0.64	WSP		No 1 Cu 7 Str	5.58	0.758	0.768	1.044	3.031	5.607		
		1.49											
		7.99											
34.5	**Jackson Tap (IP) - First Lift 2**												
	Jackson (IP) Tap - Canal	5.50	WSP		2/0 Cu 7 Str	5.58	0.477	0.740	0.763	3.002	5.832		
		5.50											
	Canal - Second Lift	1.00	WSP		2/0 Cu 7 Str	5.58	0.477	0.740	0.763	3.002	5.832		
		1.00											
	Second Lift - First Lift	1.35	WSP		No 1 Cu 7 Str	5.58	0.758	0.768	1.044	3.031	5.607		
		1.35											
		7.85											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
34.5 Creston - Davenport (Lincoln Electric Coop) 1														
0.012	0.016		0.018	0.058		0.05	0.00101	0.00137		0.00149	0.00486		0.00000	
0.012	0.016	0.020	0.018	0.058	0.060	0.05	0.00101	0.00137	0.00170	0.00149	0.00486	0.00508	0.00000	
6.452	8.772		9.523	31.058		28.24	0.54203	0.73695		0.80010	2.60933		0.00034	
6.452	8.772	10.889	9.523	31.058	32.485	28.24	0.54203	0.73695	0.91482	0.80010	2.60933	2.72924	0.00034	
7.725	4.176		9.155	15.388		13.62	0.64902	0.35084		0.76917	1.29286		0.00016	
7.725	4.176	8.781	9.155	15.388	17.906	13.62	0.64902	0.35084	0.73778	0.76917	1.29286	1.50436	0.00016	
12.267	6.631		14.538	24.437		21.62	1.03065	0.55713		1.22144	2.05307		0.00026	
12.267	6.631	13.945	14.538	24.437	28.434	21.62	1.03065	0.55713	1.17159	1.22144	2.05307	2.38893	0.00026	
26.456	**19.595**	**32.922**	**33.234**	**70.940**	**78.339**	**63.53**	**2.22271**	**1.64629**	**2.76599**	**2.79219**	**5.96011**	**6.58174**	**0.00076**	
34.5 Drain - Elkton (Douglas Electric Coop) 1														
0.067	0.055		0.087	0.212		0.19	0.00562	0.00462		0.00730	0.01781		0.00000	
0.067	0.055	0.087	0.087	0.212	0.229	0.19	0.00562	0.00462	0.00728	0.00730	0.01781	0.01925	0.00000	
0.067	**0.055**	**0.087**	**0.087**	**0.212**	**0.229**	**0.19**	**0.00562**	**0.00462**	**0.00728**	**0.00730**	**0.01781**	**0.01925**	**0.00000**	
34.5 Drain - Oakland (Douglas Electric Coop) 2														
0.134	0.110		0.174	0.424		0.39	0.01124	0.00925		0.01460	0.03562		0.00000	
0.134	0.110	0.173	0.174	0.424	0.458	0.39	0.01124	0.00925	0.01455	0.01460	0.03562	0.03850	0.00000	
0.134	**0.110**	**0.173**	**0.174**	**0.424**	**0.458**	**0.39**	**0.01124**	**0.00925**	**0.01455**	**0.01460**	**0.03562**	**0.03850**	**0.00000**	
34.5 East Hills - Albion 1														
11.341	4.865		13.034	18.257		15.63	0.95282	0.40872		1.09507	1.53387		0.00019	
11.341	4.865	12.340	13.034	18.257	22.432	15.63	0.95282	0.40872	1.03678	1.09507	1.53387	1.88466	0.00019	
11.341	**4.865**	**12.340**	**13.034**	**18.257**	**22.432**	**15.63**	**0.95282**	**0.40872**	**1.03678**	**1.09507**	**1.53387**	**1.88466**	**0.00019**	
34.5 Ferry - Pella (Leased to Unity Power & Light)														
1.516	1.537		2.088	6.061		5.61	0.12737	0.12913		0.17543	0.50924		0.00007	
1.516	1.537	2.159	2.088	6.061	6.411	5.61	0.12737	0.12913	0.18137	0.17543	0.50924	0.53861	0.00007	
1.516	**1.537**	**2.159**	**2.088**	**6.061**	**6.411**	**5.61**	**0.12737**	**0.12913**	**0.18137**	**0.17543**	**0.50924**	**0.53861**	**0.00007**	
34.5 Fidalgo - Lopez Island 2														
0.006	0.023		0.068	0.006		3.97	0.00051	0.00194		0.00572	0.00054		0.00005	
0.747	1.095		5.955	0.644		275.73	0.06279	0.09201		0.50031	0.05410		0.00328	
0.001	0.004		0.011	0.001		0.66	0.00009	0.00032		0.00095	0.00009		0.00001	
0.039	0.048		0.182	0.058		24.86	0.00324	0.00405		0.01530	0.00491		0.00030	
0.302	0.784		0.642	3.443		3.84	0.02533	0.06584		0.05393	0.28924		0.00005	2-7 NO 8 ALWLD
0.018	0.022		0.083	0.027		11.30	0.00147	0.00184		0.00696	0.00223		0.00013	
0.003	0.012		0.034	0.003		1.98	0.00026	0.00097		0.00286	0.00027		0.00002	
0.313	0.459		2.496	0.270		115.57	0.02632	0.03856		0.20970	0.02268		0.00138	
0.005	0.019		0.057	0.005		3.31	0.00043	0.00162		0.00477	0.00045		0.00004	
1.434	2.466	2.852	9.528	4.458	10.519	441.23	0.12044	0.20715	0.23962	0.80050	0.37450	0.88377	0.00525	
1.434	**2.466**	**2.852**	**9.528**	**4.458**	**10.519**	**441.23**	**0.12044**	**0.20715**	**0.23962**	**0.80050**	**0.37450**	**0.88377**	**0.00525**	
34.5 Fidalgo - Lopez Island 3														
0.006	0.023		0.068	0.006		3.97	0.00051	0.00194		0.00572	0.00054		0.00005	
0.731	1.072		5.828	0.630		269.86	0.06145	0.09005		0.48966	0.05295		0.00321	
0.005	0.019		0.057	0.005		3.31	0.00043	0.00162		0.00477	0.00045		0.00004	
0.035	0.044		0.166	0.053		22.60	0.00295	0.00368		0.01391	0.00446		0.00027	
0.302	0.784		0.642	3.443		3.84	0.02533	0.06584		0.05393	0.28924		0.00005	2-7 NO 8 ALWLD
0.018	0.022		0.083	0.027		11.30	0.00147	0.00184		0.00696	0.00223		0.00013	
0.003	0.012		0.034	0.003		1.98	0.00026	0.00097		0.00286	0.00027		0.00002	
0.340	0.499		2.711	0.293		125.54	0.02859	0.04189		0.22780	0.02463		0.00149	
0.005	0.019		0.057	0.005		3.31	0.00043	0.00162		0.00477	0.00045		0.00004	
1.445	2.493	2.882	9.646	4.466	10.629	445.72	0.12142	0.20944	0.24209	0.81038	0.37522	0.89303	0.00531	
1.445	**2.493**	**2.882**	**9.646**	**4.466**	**10.629**	**445.72**	**0.12142**	**0.20944**	**0.24209**	**0.81038**	**0.37522**	**0.89303**	**0.00531**	
34.5 Jackson Tap (IP) - First Lift 1														
0.620	0.962		0.991	3.903		3.79	0.05205	0.08085		0.08329	0.32793		0.00005	
0.620	0.962	1.145	0.991	3.903	4.027	3.79	0.05205	0.08085	0.09616	0.08329	0.32793	0.33834	0.00005	
2.002	3.109		3.203	12.610		12.25	0.16818	0.26122		0.26910	1.05946		0.00015	
2.002	3.109	3.698	3.203	12.610	13.011	12.25	0.16818	0.26122	0.31067	0.26910	1.05946	1.09310	0.00015	
0.477	0.740		0.763	3.002		2.92	0.04004	0.06219		0.06407	0.25225		0.00003	
0.477	0.740	0.880	0.763	3.002	3.098	2.92	0.04004	0.06219	0.07397	0.06407	0.25225	0.26026	0.00003	
0.405	0.629		0.648	2.552		2.48	0.03404	0.05287		0.05446	0.21442		0.00003	
0.485	0.492		0.668	1.940		1.79	0.04076	0.04132		0.05614	0.16296		0.00002	
0.890	1.121	1.432	1.316	4.492	4.681	4.27	0.07479	0.09419	0.12027	0.11060	0.37737	0.39325	0.00005	
3.988	**5.933**	**7.149**	**6.273**	**24.008**	**24.814**	**23.23**	**0.33507**	**0.49845**	**0.60060**	**0.52705**	**2.01702**	**2.08474**	**0.00028**	
34.5 Jackson Tap (IP) - First Lift 2														
2.621	4.071		4.194	16.513		16.04	0.22023	0.34207		0.35239	1.38739		0.00019	
2.621	4.071	4.842	4.194	16.513	17.038	16.04	0.22023	0.34207	0.40683	0.35239	1.38739	1.43144	0.00019	
0.477	0.740		0.763	3.002		2.92	0.04004	0.06219		0.06407	0.25225		0.00003	
0.477	0.740	0.880	0.763	3.002	3.098	2.92	0.04004	0.06219	0.07397	0.06407	0.25225	0.26026	0.00003	
1.023	1.037		1.409	4.091		3.78	0.08597	0.08716		0.11841	0.34374		0.00005	
1.023	1.037	1.457	1.409	4.091	4.327	3.78	0.08597	0.08716	0.12243	0.11841	0.34374	0.36356	0.00005	
4.121	**5.849**	**7.155**	**6.366**	**23.607**	**24.451**	**22.74**	**0.34625**	**0.49143**	**0.60115**	**0.53487**	**1.98338**	**2.05424**	**0.00027**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
34.5	**Magic Valley Co-gen - Hay Mill**												
	Magic Valley Co-gen - Hay Mill	0.23	WSP		4/0 ACSR Penguin (6/1)	5.58	0.563	0.762	0.849	3.024	6.161		
		0.23											
		0.23											
34.5	**Minidoka PH - Idahome 1**												
	Minidoka PH - Twr 06	0.64	SDC	G4	397.5 kcmil AAC Canna (19)	10.40	0.258	0.743	0.544	2.778	5.769		
	Twr 0/6 - CH 1	0.27	WDC	G4	397.5 kcmil AAC Canna (19)	10.40	0.258	0.743	0.544	2.778	5.769		
	CH 1 - Murphy	2.70	WSP		336.4 kcmil ACSR Oriole	5.83	0.297	0.659	0.583	2.905	6.432	RREC	
		3.61											
	Murphy - Delco	4.00	WSP		336.4 kcmil ACSR Oriole	5.83	0.297	0.659	0.583	2.905	6.432	RREC	
		4.00											
	Declo - Cotrell	4.00	WSP		336.4 kcmil ACSR Oriole	5.83	0.297	0.659	0.583	2.905	6.432	RREC	
		4.00											
	Cotrell - Yale Tap	0.80	WSP		336.4 kcmil ACSR Oriole	5.83	0.297	0.659	0.583	2.905	6.432	RREC	
		0.80											
	Yale Tap - Idahome	6.30	WSP		336.4 kcmil ACSR Oriole	5.83	0.297	0.659	0.583	2.905	6.432	RREC	
		6.30											
		18.71											
34.5	**Second Lift - Third Lift**												
	Operating Name (Third Lift Tap to Minidoka Powerhouse - Second Lift No 2)												
		0.58	WSP		No 1 Cu 7 Str	5.58	0.758	0.768	1.044	3.031	5.607		
		0.58											
		0.58											
34.5	**Warren - Vernonia**												
		16.20			1/0 ACSR Raven (6/1)	8.00	1.041	0.853	1.327	2.984	5.456	WOEC	
		16.20											
		16.20											
24.9	**Lopez Island - Decatur(OP&L) 1**												
	Lopez - Str 9/1	1.72			500 kcmil Cu 3/C Cable	0.00	0.159	0.233	1.267	0.137	17.330	ORCAS	
	Str 9/1 - Str 7/10	2.04			300 kcmil Cu 3/C Cable	0.00	0.224	0.290	1.069	0.919	46.260	ORCAS	
	Str 7/10 - Decatur	1.19	WSP	G8	397.5 kcmil ACSR Ibis	9.33	0.253	0.712	0.539	2.787	5.959	ORCAS	
		4.95											
		4.95											
24.9	**Tillamook - Tillamook Air Base**												
	Tillamook - Str 33/23	0.05	WSP	C12	1/0 Cu 7 Str	4.41	0.601	0.726	0.887	3.074	5.955		M-128
	Str 33/23 - Str 31/15	1.97	WSP	C12	1/0 Cu 7 Str	4.41	0.601	0.726	0.887	3.074	5.955		
	Str 31/15 - Trask Tap	0.73	WHF	C8	1/0 Cu 7 Str	7.49	0.601	0.790	0.887	2.945	5.445		
		2.75											
	Trask Tap - Str 30/1	1.24	WHF	C8	1/0 Cu 7 Str	7.49	0.601	0.790	0.887	2.945	5.445		
	Str 30/1 - Tillamook Air Base	0.24	WSP	C12	1/0 Cu 7 Str	4.41	0.601	0.726	0.887	3.074	5.955		
		1.48											
		4.23											
13.8	**Bell - Kaiser Plant Feeder 1**												
		0.16	WHF		3-1250 kcmil Cu 61 Str	5.67	0.019	0.451	0.305	2.708	9.276		M-112
		0.16											
		0.16											
13.8	**Bell - Kaiser Plant Feeder 2**												
		0.15	WHF		3-1250 kcmil Cu 61 Str	5.67	0.019	0.451	0.305	2.708	9.276		
		0.15											
		0.15											
13.8	**Bell - Kaiser Plant Feeder 3**												
		0.15	WHF		2-1000 kcmil Cu 37 Str	5.67	0.034	0.478	0.320	2.734	8.864		
		0.15											
		0.15											
13.8	**Bell - Kaiser Plant Feeder 4**												
		0.19	WHF		2-1000 kcmil Cu 37 Str	5.67	0.034	0.478	0.320	2.734	8.864		
		0.19											
		0.19											
13.8	**Bell - Kaiser Plant Feeder 5**												
		0.24	WHF		2-1000 kcmil Cu 37 Str	5.67	0.034	0.478	0.320	2.734	8.864		
		0.24											
		0.24											
13.8	**Bell - Kaiser Plant Feeder 6**												
		0.24	WHF		2-1000 kcmil Cu 37 Str	5.67	0.034	0.478	0.320	2.734	8.864		
		0.24											
		0.24											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
34.5 Magic Valley Co-gen - Hay Mill														
0.129	0.175		0.195	0.695		0.71	0.01088	0.01472		0.01641	0.05843		0.00001	
0.129	0.175	0.218	0.195	0.695	0.722	0.71	0.01088	0.01472	0.01830	0.01641	0.05843	0.06069	0.00001	
0.129	**0.175**	**0.218**	**0.195**	**0.695**	**0.722**	**0.71**	**0.01088**	**0.01472**	**0.01830**	**0.01641**	**0.05843**	**0.06069**	**0.00001**	
34.5 Minidoka PH - Idahome 1														
0.165	0.475		0.348	1.778		1.85	0.01389	0.03994		0.02927	0.14939		0.00002	
0.070	0.201		0.147	0.750		0.78	0.00586	0.01685		0.01235	0.06302		0.00001	
0.801	1.779		1.573	7.844		8.68	0.06726	0.14950		0.13214	0.65903		0.00010	
1.036	2.455	2.665	2.068	10.372	10.577	11.31	0.08701	0.20628	0.22388	0.17376	0.87145	0.88860	0.00013	
1.186	2.636		2.330	11.621		12.86	0.09964	0.22148		0.19576	0.97635		0.00015	
1.186	2.636	2.891	2.330	11.621	11.852	12.86	0.09964	0.22148	0.24286	0.19576	0.97635	0.99578	0.00015	
1.186	2.636		2.330	11.621		12.86	0.09964	0.22148		0.19576	0.97635		0.00015	
1.186	2.636	2.891	2.330	11.621	11.852	12.86	0.09964	0.22148	0.24286	0.19576	0.97635	0.99578	0.00015	
0.237	0.527		0.466	2.324		2.57	0.01993	0.04430		0.03915	0.19527		0.00003	
0.237	0.527	0.578	0.466	2.324	2.370	2.57	0.01993	0.04430	0.04857	0.03915	0.19527	0.19916	0.00003	
1.868	4.152		3.670	18.303		20.26	0.15694	0.34882		0.30832	1.53775		0.00024	
1.868	4.152	4.553	3.670	18.303	18.667	20.26	0.15694	0.34882	0.38250	0.30832	1.53775	1.56835	0.00024	
5.513	**12.407**	**13.576**	**10.864**	**54.242**	**55.319**	**59.87**	**0.46317**	**1.04235**	**1.14062**	**0.91274**	**4.55716**	**4.64766**	**0.00071**	
34.5 Second Lift - Third Lift														
0.440	0.446		0.606	1.758		1.63	0.03694	0.03745		0.05087	0.14768		0.00002	
0.440	0.446	0.626	0.606	1.758	1.859	1.63	0.03694	0.03745	0.05260	0.05087	0.14768	0.15620	0.00002	
0.440	**0.446**	**0.626**	**0.606**	**1.758**	**1.859**	**1.63**	**0.03694**	**0.03745**	**0.05260**	**0.05087**	**0.14768**	**0.15620**	**0.00002**	
34.5 Warren - Vernonia														
16.864	13.824		21.497	48.347		44.19	1.41686	1.16142		1.80612	4.06188		0.00053	
16.864	13.824	21.806	21.497	48.347	52.911	44.19	1.41686	1.16142	1.83205	1.80612	4.06188	4.44533	0.00053	
16.864	**13.824**	**21.806**	**21.497**	**48.347**	**52.911**	**44.19**	**1.41686**	**1.16142**	**1.83205**	**1.80612**	**4.06188**	**4.44533**	**0.00053**	
24.9 Lopez Island - Decatur(OP&L) 1														
0.273	0.401		2.179	0.236		100.90	0.04411	0.06464		0.35148	0.03801		0.00063	
0.457	0.592		2.181	1.875		149.19	0.07370	0.09542		0.35173	0.30238		0.00092	
0.302	0.847		0.642	3.316		3.55	0.04864	0.13659		0.10353	0.53486		0.00002	
1.032	1.839	2.109	5.002	5.427	7.380	253.63	0.16645	0.29665	0.34015	0.80674	0.87524	1.19033	0.00157	
1.032	**1.839**	**2.109**	**5.002**	**5.427**	**7.380**	**253.63**	**0.16645**	**0.29665**	**0.34015**	**0.80674**	**0.87524**	**1.19033**	**0.00157**	
24.9 Tillamook - Tillamook Air Base														
0.030	0.036		0.044	0.154		0.15	0.00484	0.00585		0.00715	0.02479		0.00000	
1.183	1.430		1.747	6.055		5.87	0.19086	0.23061		0.28174	0.97660		0.00004	
0.439	0.577		0.647	2.150		1.99	0.07073	0.09302		0.10440	0.34675		0.00001	
1.652	2.043	2.627	2.438	8.359	8.707	8.00	0.26644	0.32948	0.42373	0.39329	1.34814	1.40434	0.00005	
0.745	0.980		1.100	3.652		3.38	0.12014	0.15801		0.17734	0.58900		0.00002	
0.144	0.174		0.213	0.738		0.71	0.02325	0.02809		0.03432	0.11898		0.00000	
0.889	1.154	1.457	1.312	4.390	4.582	4.09	0.14339	0.18610	0.23494	0.21166	0.70798	0.73894	0.00003	
2.541	**3.197**	**4.084**	**3.751**	**12.748**	**13.288**	**12.09**	**0.40983**	**0.51559**	**0.65863**	**0.60495**	**2.05612**	**2.14327**	**0.00007**	
13.8 Bell - Kaiser Plant Feeder 1														
0.003	0.072		0.049	0.433		0.74	0.00159	0.03793		0.02562	0.22750		0.00000	
0.003	0.072	0.072	0.049	0.433	0.436	0.74	0.00159	0.03793	0.03796	0.02562	0.22750	0.22894	0.00000	
0.003	**0.072**	**0.072**	**0.049**	**0.433**	**0.436**	**0.74**	**0.00159**	**0.03793**	**0.03796**	**0.02562**	**0.22750**	**0.22894**	**0.00000**	
13.8 Bell - Kaiser Plant Feeder 2														
0.003	0.068		0.046	0.406		0.70	0.00149	0.03556		0.02402	0.21328		0.00000	
0.003	0.068	0.068	0.046	0.406	0.409	0.70	0.00149	0.03556	0.03559	0.02402	0.21328	0.21463	0.00000	
0.003	**0.068**	**0.068**	**0.046**	**0.406**	**0.409**	**0.70**	**0.00149**	**0.03556**	**0.03559**	**0.02402**	**0.21328**	**0.21463**	**0.00000**	
13.8 Bell - Kaiser Plant Feeder 3														
0.005	0.072		0.048	0.410		0.66	0.00270	0.03761		0.02523	0.21533		0.00000	
0.005	0.072	0.072	0.048	0.410	0.413	0.66	0.00270	0.03761	0.03771	0.02523	0.21533	0.21681	0.00000	
0.005	**0.072**	**0.072**	**0.048**	**0.410**	**0.413**	**0.66**	**0.00270**	**0.03761**	**0.03771**	**0.02523**	**0.21533**	**0.21681**	**0.00000**	
13.8 Bell - Kaiser Plant Feeder 4														
0.007	0.091		0.061	0.519		0.84	0.00342	0.04764		0.03196	0.27276		0.00000	
0.007	0.091	0.091	0.061	0.519	0.523	0.84	0.00342	0.04764	0.04776	0.03196	0.27276	0.27462	0.00000	
0.007	**0.091**	**0.091**	**0.061**	**0.519**	**0.523**	**0.84**	**0.00342**	**0.04764**	**0.04776**	**0.03196**	**0.27276**	**0.27462**	**0.00000**	
13.8 Bell - Kaiser Plant Feeder 5														
0.008	0.115		0.077	0.656		1.06	0.00432	0.06018		0.04037	0.34453		0.00000	
0.008	0.115	0.115	0.077	0.656	0.661	1.06	0.00432	0.06018	0.06033	0.04037	0.34453	0.34689	0.00000	
0.008	**0.115**	**0.115**	**0.077**	**0.656**	**0.661**	**1.06**	**0.00432**	**0.06018**	**0.06033**	**0.04037**	**0.34453**	**0.34689**	**0.00000**	
13.8 Bell - Kaiser Plant Feeder 6														
0.008	0.115		0.077	0.656		1.06	0.00432	0.06018		0.04037	0.34453		0.00000	
0.008	0.115	0.115	0.077	0.656	0.661	1.06	0.00432	0.06018	0.06033	0.04037	0.34453	0.34689	0.00000	
0.008	**0.115**	**0.115**	**0.077**	**0.656**	**0.661**	**1.06**	**0.00432**	**0.06018**	**0.06033**	**0.04037**	**0.34453**	**0.34689**	**0.00000**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

Prepared by
RDH & TKL / TOP

IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
13.8	**Bell - Kaiser Plant Feeder 7**												
		0.29	WHF		3-1033.5 kcmil AAC Bluebell	5.67	0.034	0.479	0.320	2.736	8.729		
		0.29											
		0.29											
13.8	**Bell - Kaiser Plant Feeder 8**												
		0.25	WHF		3-1033.5 kcmil ACSR Curlew	5.67	0.033	0.484	0.319	2.740	8.608		
		0.25											
		0.25											
13.8	**Bell - Pacific NW Alloys Feeder 1**												
		0.90	WHF		500 kcmil Cu 37 Str	10.15	0.130	0.724	0.416	2.768	5.912		
		0.90											
		0.90											
13.8	**Bell - Pacific NW Alloys Feeder 2**												
		0.90	WHF		500 kcmil Cu 37 Str	10.15	0.130	0.724	0.416	2.768	5.912		
		0.90											
		0.90											
13.8	**Big Cliff - Detroit PH 1**												
	Big Cliff - Detroit Tap	2.64	SDC		795 kcmil ACSR Drake	6.62	0.128	0.628	0.414	2.828	6.788		M-130
		2.64											
	Detroit Tap - Detroit	0.19			795 kcmil ACSR Drake	6.62	0.128	0.628	0.414	2.828	6.788		
		0.19											
		2.83											
13.8	**Big Cliff - Detroit PH 2**												
		2.83	SDC		795 kcmil ACSR Drake	6.62	0.128	0.628	0.414	2.828	6.788		M-130
		2.83											
		2.83											
13.8	**Chief Joseph - Foster Creek (NVEC) 1**												
	Operating Name (Foster Creek - Chief Joseph 1)												
	Chief Joseph - Str 1/8	0.27	WSP	SPEC	795 kcmil ACSR Drake	5.45	0.128	0.604	0.414	2.875	7.064		
	Str 1/8 - Foster Creek (NVEC)	0.13			No 2 Alum 1/C Cable	0.00	1.687	0.425	3.156	0.225	79.620		
		0.40											
		0.40											
13.8	**Detroit - Detroit PH**												
		0.19			4/0 Cu 3/C PI Cable	0.00	0.310	0.176	2.930	0.253	84.750	USCE	
		0.19											
		0.19											
13.8	**Detroit - Tap (Big Cliff - Detroit PH 1)**												
		0.04	SSC		795 kcmil ACSR Drake	6.93	0.128	0.633	0.414	2.817	6.726		
		0.04											
		0.04											
13.8	**John Day - John Day PH**												
	Operating Name (John Day Powerhouse - Substation Service No 1)												
	John Day - Twr 1/1	0.01	WHF	G8	4/0 ACSR Penguin (6/1)	9.33	0.563	0.824	0.849	2.899	5.632		M-165
	Twr 1/1 - Twr 1/2	0.30	SSC	H18	397.5 kcmil ACSR Lark	20.16	0.251	0.799	0.537	2.594	5.269		M-199
	Twr 1/2 - John Day PH	3.00	SSC	H18	4/0 ACSR Penguin (6/1)	20.16	0.563	0.917	0.849	2.712	4.990		M-200
		3.31											
		3.31											
13.8	**Midway - Riverland (AEC)**												
	Operating Name (Riverland - Midway)												
		2.36	WSP	C4	1/0 ACSR Raven (6/1)	4.53	1.041	0.784	1.327	3.122	6.009		
		2.36											
		2.36											
13.8	**Wauna (CLT) - Driscoll 1**												
	Wauna (CLT) - Str 1/1	0.26			1/0 Alum 19 Str 1/C Cable	0.00	1.060	0.365	2.250	0.216	94.260		
	Str 1/1 - Driscoll	0.17	WSP	E1	4/0 ACSR Penguin (6/1)	5.89	0.563	0.768	0.849	3.011	6.101		
		0.43											
		0.43											
13.2	**Big Eddy - Celilo Feeder 1**												
		0.77			750 kcmil Alum 3/C Cable	0.00	0.176	0.180	1.030	1.357	86.940		
		0.77											
		0.77											
13.2	**Big Eddy - Celilo Feeder 2**												
		0.91			750 kcmil Alum 3/C Cable	0.00	0.176	0.180	1.030	1.357	86.940		
		0.91											
		0.91											

PER SECTION														
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							OVERHEAD GROUNDWIRE LOCATION
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
13.8 Bell - Kaiser Plant Feeder 7														
0.010	0.139		0.093	0.793		1.27	0.00518	0.07299		0.04873	0.41658		0.00000	
0.010	0.139	0.139	0.093	0.793	0.799	1.27	0.00518	0.07299	0.07317	0.04873	0.41658	0.41942	0.00000	
0.010	**0.139**	**0.139**	**0.093**	**0.793**	**0.799**	**1.27**	**0.00518**	**0.07299**	**0.07317**	**0.04873**	**0.41658**	**0.41942**	**0.00000**	
13.8 Bell - Kaiser Plant Feeder 8														
0.008	0.121		0.080	0.685		1.08	0.00436	0.06350		0.04190	0.35970		0.00000	
0.008	0.121	0.121	0.080	0.685	0.690	1.08	0.00436	0.06350	0.06365	0.04190	0.35970	0.36213	0.00000	
0.008	**0.121**	**0.121**	**0.080**	**0.685**	**0.690**	**1.08**	**0.00436**	**0.06350**	**0.06365**	**0.04190**	**0.35970**	**0.36213**	**0.00000**	
13.8 Bell - Pacific NW Alloys Feeder 1														
0.117	0.652		0.375	2.492		2.66	0.06163	0.34214		0.19679	1.30829		0.00001	
0.117	0.652	0.662	0.375	2.492	2.520	2.66	0.06163	0.34214	0.34764	0.19679	1.30829	1.32301	0.00001	
0.117	**0.652**	**0.662**	**0.375**	**2.492**	**2.520**	**2.66**	**0.06163**	**0.34214**	**0.34764**	**0.19679**	**1.30829**	**1.32301**	**0.00001**	
13.8 Bell - Pacific NW Alloys Feeder 2														
0.117	0.652		0.375	2.492		2.66	0.06163	0.34214		0.19679	1.30829		0.00001	
0.117	0.652	0.662	0.375	2.492	2.520	2.66	0.06163	0.34214	0.34764	0.19679	1.30829	1.32301	0.00001	
0.117	**0.652**	**0.662**	**0.375**	**2.492**	**2.520**	**2.66**	**0.06163**	**0.34214**	**0.34764**	**0.19679**	**1.30829**	**1.32301**	**0.00001**	
13.8 Big Cliff - Detroit PH 1														
0.337	1.658		1.092	7.466		8.96	0.17675	0.87045		0.57322	3.92017		0.00002	
0.337	1.658	1.692	1.092	7.466	7.545	8.96	0.17675	0.87045	0.88821	0.57322	3.92017	3.96185	0.00002	
0.024	0.119		0.079	0.537		0.64	0.01272	0.06265		0.04125	0.28213		0.00000	
0.024	0.119	0.122	0.079	0.537	0.543	0.64	0.01272	0.06265	0.06392	0.04125	0.28213	0.28513	0.00000	
0.361	**1.777**	**1.813**	**1.170**	**8.003**	**8.088**	**9.60**	**0.18947**	**0.93309**	**0.95213**	**0.61447**	**4.20230**	**4.24699**	**0.00002**	
13.8 Big Cliff - Detroit PH 2														
0.361	1.777		1.170	8.003		9.60	0.18947	0.93309		0.61447	4.20230		0.00002	
0.361	1.777	1.813	1.170	8.003	8.088	9.60	0.18947	0.93309	0.95213	0.61447	4.20230	4.24699	0.00002	
0.361	**1.777**	**1.813**	**1.170**	**8.003**	**8.088**	**9.60**	**0.18947**	**0.93309**	**0.95213**	**0.61447**	**4.20230**	**4.24699**	**0.00002**	
13.8 Chief Joseph - Foster Creek (NVEC) 1														
0.034	0.163		0.112	0.776		0.95	0.01808	0.08568		0.05862	0.40762		0.00000	
0.219	0.055		0.410	0.029		5.18	0.11516	0.02901		0.21544	0.01536		0.00001	
0.254	0.218	0.335	0.522	0.806	0.960	6.13	0.13324	0.11469	0.17580	0.27406	0.42298	0.50400	0.00001	
0.254	**0.218**	**0.335**	**0.522**	**0.806**	**0.960**	**6.13**	**0.13324**	**0.11469**	**0.17580**	**0.27406**	**0.42298**	**0.50400**	**0.00001**	
13.8 Detroit - Detroit PH														
0.059	0.033		0.557	0.048		8.05	0.03093	0.01756		0.29232	0.02524		0.00002	
0.059	0.033	0.068	0.557	0.048	0.559	8.05	0.03093	0.01756	0.03557	0.29232	0.02524	0.29341	0.00002	
0.059	**0.033**	**0.068**	**0.557**	**0.048**	**0.559**	**8.05**	**0.03093**	**0.01756**	**0.03557**	**0.29232**	**0.02524**	**0.29341**	**0.00002**	
13.8 Detroit - Tap (Big Cliff - Detroit PH 1)														
0.005	0.025		0.017	0.113		0.13	0.00268	0.01331		0.00869	0.05916		0.00000	
0.005	0.025	0.026	0.017	0.113	0.114	0.13	0.00268	0.01331	0.01357	0.00869	0.05916	0.05980	0.00000	
0.005	**0.025**	**0.026**	**0.017**	**0.113**	**0.114**	**0.13**	**0.00268**	**0.01331**	**0.01357**	**0.00869**	**0.05916**	**0.05980**	**0.00000**	
13.8 John Day - John Day PH														
0.006	0.008		0.008	0.029		0.03	0.00296	0.00433		0.00446	0.01522		0.00000	
0.075	0.240		0.161	0.778		0.79	0.03956	0.12594		0.08461	0.40864		0.00000	
1.689	2.752		2.547	8.136		7.48	0.88689	1.44530		1.33743	4.27229		0.00001	
1.770	3.001	3.484	2.717	8.943	9.347	8.30	0.92941	1.57556	1.82926	1.42650	4.69615	4.90803	0.00002	
1.770	**3.001**	**3.484**	**2.717**	**8.943**	**9.347**	**8.30**	**0.92941**	**1.57556**	**1.82926**	**1.42650**	**4.69615**	**4.90803**	**0.00002**	
13.8 Midway - Riverland (AEC)														
2.457	1.851		3.132	7.369		7.09	1.29004	0.97195		1.64447	3.86935		0.00001	
2.457	1.851	3.076	3.132	7.369	8.007	7.09	1.29004	0.97195	1.61521	1.64447	3.86935	4.20430	0.00001	
2.457	**1.851**	**3.076**	**3.132**	**7.369**	**8.007**	**7.09**	**1.29004**	**0.97195**	**1.61521**	**1.64447**	**3.86935**	**4.20430**	**0.00001**	
13.8 Wauna (CLT) - Driscoll 1														
0.276	0.095		0.585	0.056		12.25	0.14472	0.04983		0.30718	0.02949		0.00002	
0.096	0.131		0.144	0.512		0.52	0.05026	0.06857		0.07579	0.26875		0.00000	
0.371	0.225	0.434	0.729	0.568	0.924	12.77	0.19497	0.11840	0.22811	0.38297	0.29824	0.48540	0.00002	
0.371	**0.225**	**0.434**	**0.729**	**0.568**	**0.924**	**12.77**	**0.19497**	**0.11840**	**0.22811**	**0.38297**	**0.29824**	**0.48540**	**0.00002**	
13.2 Big Eddy - Celilo Feeder 1														
0.136	0.139		0.793	1.045		110.47	0.07778	0.07955		0.45518	0.59968		0.00019	
0.136	0.139	0.194	0.793	1.045	1.312	110.47	0.07778	0.07955	0.11125	0.45518	0.59968	0.75287	0.00019	
0.136	**0.139**	**0.194**	**0.793**	**1.045**	**1.312**	**110.47**	**0.07778**	**0.07955**	**0.11125**	**0.45518**	**0.59968**	**0.75287**	**0.00019**	
13.2 Big Eddy - Celilo Feeder 2														
0.160	0.164		0.937	1.235		130.56	0.09192	0.09401		0.53794	0.70872		0.00023	
0.160	0.164	0.229	0.937	1.235	1.550	130.56	0.09192	0.09401	0.13148	0.53794	0.70872	0.88975	0.00023	
0.160	**0.164**	**0.229**	**0.937**	**1.235**	**1.550**	**130.56**	**0.09192**	**0.09401**	**0.13148**	**0.53794**	**0.70872**	**0.88975**	**0.00023**	

Bonneville Power Administration

115 KV & BELOW TRANSMISSION LINE DATA AT 50° C

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IMPEDANCE BASE KV	LINE NAME / LINE SECTIONS	LENGTH MILES	STRUCT	CONFIG	CONDUCTOR	EQUIV SPAC. FT	PER MILE POSITIVE SEQUENCE OHMS R1	X1	ZERO SEQUENCE OHMS R0	X0	SUSC 10-6 MHOS B	FOREIGN OWNERSHIP	LINE MUTUAL IMPE DIAGRAM LOCATION
13.2	**Big Eddy - Celilo Feeder 3**												
		0.93			750 kcmil Alum 3/C Cable	0.00	0.176	0.180	1.030	1.357	86.940		
		0.93											
		0.93											
13.2	**Big Eddy - Celilo Feeder 4**												
		0.85			500 kcmil Alum 1/C Cable	0.00	0.225	0.422	1.028	0.261	89.600		
		0.85											
		0.85											
13.2	**Big Eddy - Celilo Feeder 5**												
		1.05			500 kcmil Alum 1/C Cable	0.00	0.225	0.422	1.028	0.261	89.600		
		1.05											
		1.05											
13.2	**Lake Creek Hydro - Troy**												
	Lake Creek Hydro - Troy	0.62	WSP	C4	266.8 kcmil ACSR Partridge	4.53	0.377	0.648	0.663	2.986	6.567	NLGHT	
		0.62											
		0.62											
12.5	**Albany - Bureau of Mines**												
		0.31	WSP	C11	4/0 ACSR Penguin (6/1)	3.09	0.563	0.690	0.849	3.167	6.908		
		0.31											
		0.31											
12.5	**Drain - Drain (City of)**												
	Operating Name (Service to City of Drain)												
		0.10	WSP		2/0 MHD Cu	4.50	0.471	0.754	0.757	3.094	6.056		
		0.10											
		0.10											
12.5	**Hood River - Hood River Electric Coop**												
	Hood River - Str 1/13	0.57	WSP	C9	250 kcmil Cu PH D 1319 HSC	4.65	0.265	0.646	0.551	2.975	6.561		
	Str 1/13 - Str 1/14	0.30	WHF	H7	397.5 kcmil ACSR Ibis	15.12	0.253	0.770	0.539	2.670	5.491		
		0.87											
		0.87											
12.5	**Pella - Tap(Beverly - Second Lift)**												
		1.16	WSP		No 1 Cu 7 Str	5.58	0.758	0.768	1.044	3.031	5.607		
		1.16											
		1.16											
12	**Grand Coulee - Lone Pine (NVEC)**												
	Grand Coulee - CH 1	0.08			500 kcmil Cu 3/C Cable	0.00	0.134	0.146	2.190	0.222	94.120	CCITY	
	CH 1 - CH 2	1.93			250 kcmil Cu 19 Str	4.80	0.257	0.677	0.543	2.994	6.357	CCITY	
	CH 2 - CH 3	0.69	WHF	J7	397.5 kcmil ACSR Ibis	25.20	0.253	0.832	0.539	2.546	5.069	CCITY	
	CH 3 - Coulee City	0.03			4/0 Cu 7 Str	4.80	0.300	0.694	0.586	3.011	6.245	CCITY	
		2.73											
	Coulee City - Lone Pine (NVEC)	0.05			4/0 Cu 7 Str	4.80	0.300	0.694	0.586	3.011	6.245	CCITY	
		0.05											
		2.78											
7.2	**Heybrook VHF Radio Station Power Service**												
		0.36	WSP		No 4 ACSR Swanate (7/1)	7.00	2.446	0.890	2.732	3.070	5.202		
		0.36											
		0.36											
7.2	**Teanaway MWR Station Power Service**												
		1.80	WSP		No 2 ACSR Sparate (7/1)	7.00	1.566	0.857	1.852	3.037	5.396		
		1.80											
		1.80											
5	**Little Goose PH - SW YD 1**												
		1.33			No 2 Alum 1/C Cable	0.00	1.687	0.425	3.156	0.225	79.620		
		1.33											
		1.33											
5	**Little Goose PH - SW YD 2**												
		1.33			No 2 Alum 1/C Cable	0.00	1.687	0.425	3.156	0.225	79.620		
		1.33											
		1.33											

PER SECTION														OVERHEAD GROUNDWIRE LOCATION
OHMS						SUSC 10-6 MHOS	PER UNIT ON 100 MVA BASE							
POSITIVE SEQUENCE			ZERO SEQUENCE											REMARKS
R1	X1	Z1	R0	X0	Z0	B/2	R1	X1	Z1	R0	X0	Z0	B/2	
13.2 Big Eddy - Celilo Feeder 3														
0.164	0.167		0.958	1.262		133.43	0.09394	0.09607		0.54976	0.72429		0.00023	
0.164	0.167	0.234	0.958	1.262	1.584	133.43	0.09394	0.09607	0.13437	0.54976	0.72429	0.90931	0.00023	
0.164	**0.167**	**0.234**	**0.958**	**1.262**	**1.584**	**133.43**	**0.09394**	**0.09607**	**0.13437**	**0.54976**	**0.72429**	**0.90931**	**0.00023**	
13.2 Big Eddy - Celilo Feeder 4														
0.191	0.359		0.874	0.222		80.58	0.10976	0.20587		0.50149	0.12732		0.00014	
0.191	0.359	0.407	0.874	0.222	0.902	80.58	0.10976	0.20587	0.23330	0.50149	0.12732	0.51740	0.00014	
0.191	**0.359**	**0.407**	**0.874**	**0.222**	**0.902**	**80.58**	**0.10976**	**0.20587**	**0.23330**	**0.50149**	**0.12732**	**0.51740**	**0.00014**	
13.2 Big Eddy - Celilo Feeder 5														
0.236	0.443		1.079	0.274		99.54	0.13559	0.25430		0.61949	0.15728		0.00017	
0.236	0.443	0.502	1.079	0.274	1.114	99.54	0.13559	0.25430	0.28819	0.61949	0.15728	0.63914	0.00017	
0.236	**0.443**	**0.502**	**1.079**	**0.274**	**1.114**	**99.54**	**0.13559**	**0.25430**	**0.28819**	**0.61949**	**0.15728**	**0.63914**	**0.00017**	
13.2 Lake Creek Hydro - Troy														
0.234	0.402		0.411	1.851		2.04	0.13404	0.23062		0.23581	1.06258		0.00000	
0.234	0.402	0.465	0.411	1.851	1.896	2.04	0.13404	0.23062	0.26675	0.23581	1.06258	1.08843	0.00000	
0.234	**0.402**	**0.465**	**0.411**	**1.851**	**1.896**	**2.04**	**0.13404**	**0.23062**	**0.26675**	**0.23581**	**1.06258**	**1.08843**	**0.00000**	
12.5 Albany - Bureau of Mines														
0.175	0.214		0.263	0.982		1.07	0.11170	0.13688		0.16844	0.62837		0.00000	
0.175	0.214	0.276	0.263	0.982	1.016	1.07	0.11170	0.13688	0.17667	0.16844	0.62837	0.65056	0.00000	
0.175	**0.214**	**0.276**	**0.263**	**0.982**	**1.016**	**1.07**	**0.11170**	**0.13688**	**0.17667**	**0.16844**	**0.62837**	**0.65056**	**0.00000**	
12.5 Drain - Drain (City of)														
0.047	0.075		0.076	0.309		0.30	0.03012	0.04822		0.04842	0.19802		0.00000	
0.047	0.075	0.089	0.076	0.309	0.319	0.30	0.03012	0.04822	0.05686	0.04842	0.19802	0.20385	0.00000	
0.047	**0.075**	**0.089**	**0.076**	**0.309**	**0.319**	**0.30**	**0.03012**	**0.04822**	**0.05686**	**0.04842**	**0.19802**	**0.20385**	**0.00000**	
12.5 Hood River - Hood River Electric Coop														
0.151	0.368		0.314	1.696		1.87	0.09649	0.23569		0.20082	1.08514		0.00000	
0.076	0.231		0.162	0.801		0.82	0.04865	0.14789		0.10356	0.51255		0.00000	
0.227	0.599	0.641	0.476	2.496	2.541	2.69	0.14514	0.38358	0.41012	0.30439	1.59770	1.62644	0.00000	
0.227	**0.599**	**0.641**	**0.476**	**2.496**	**2.541**	**2.69**	**0.14514**	**0.38358**	**0.41012**	**0.30439**	**1.59770**	**1.62644**	**0.00000**	
12.5 Pella - Tap(Beverly - Second Lift)														
0.879	0.891		1.211	3.516		3.25	0.56274	0.57051		0.77507	2.24995		0.00001	
0.879	0.891	1.252	1.211	3.516	3.718	3.25	0.56274	0.57051	0.80135	0.77507	2.24995	2.37970	0.00001	
0.879	**0.891**	**1.252**	**1.211**	**3.516**	**3.718**	**3.25**	**0.56274**	**0.57051**	**0.80135**	**0.77507**	**2.24995**	**2.37970**	**0.00001**	
12 Grand Coulee - Lone Pine (NVEC)														
0.011	0.012		0.175	0.018		11.76	0.00744	0.00811		0.12167	0.01233		0.00002	
0.496	1.307		1.048	5.779		6.13	0.34472	0.90751		0.72804	4.01292		0.00001	
0.175	0.574		0.372	1.756		1.75	0.12142	0.39878		0.25846	1.21976		0.00000	
0.009	0.021		0.018	0.090		0.09	0.00626	0.01446		0.01221	0.06273		0.00000	
0.691	1.914	2.034	1.613	7.643	7.812	19.74	0.47984	1.32886	1.41284	1.12038	5.30774	5.42469	0.00003	
0.015	0.035		0.029	0.151		0.16	0.01043	0.02409		0.02036	0.10454		0.00000	
0.015	0.035	0.038	0.029	0.151	0.153	0.16	0.01043	0.02409	0.02625	0.02036	0.10454	0.10651	0.00000	
0.706	**1.948**	**2.072**	**1.643**	**7.794**	**7.965**	**19.90**	**0.49027**	**1.35295**	**1.43904**	**1.14074**	**5.41228**	**5.53119**	**0.00003**	
7.2 Heybrook VHF Radio Station Power Service														
0.881	0.320		0.984	1.105		0.94	1.69861	0.61814		1.89722	2.13178		0.00000	
0.881	0.320	0.937	0.984	1.105	1.479	0.94	1.69861	0.61814	1.80759	1.89722	2.13178	2.85376	0.00000	
0.881	**0.320**	**0.937**	**0.984**	**1.105**	**1.479**	**0.94**	**1.69861**	**0.61814**	**1.80759**	**1.89722**	**2.13178**	**2.85376**	**0.00000**	
7.2 Teanaway MWR Station Power Service														
2.819	1.543		3.334	5.466		4.86	5.43750	2.97611		6.43056	10.54430		0.00000	
2.819	1.543	3.213	3.334	5.466	6.402	4.86	5.43750	2.97611	6.19868	6.43056	10.54430	12.35048	0.00000	
2.819	**1.543**	**3.213**	**3.334**	**5.466**	**6.402**	**4.86**	**5.43750**	**2.97611**	**6.19868**	**6.43056**	**10.54430**	**12.35048**	**0.00000**	
5 Little Goose PH - SW YD 1														
2.244	0.565		4.197	0.299		52.95	8.97484	2.26100		16.78992	1.19700		0.00001	
2.244	0.565	2.314	4.197	0.299	4.208	52.95	8.97484	2.26100	9.25526	16.78992	1.19700	16.83253	0.00001	
2.244	**0.565**	**2.314**	**4.197**	**0.299**	**4.208**	**52.95**	**8.97484**	**2.26100**	**9.25526**	**16.78992**	**1.19700**	**16.83253**	**0.00001**	
5 Little Goose PH - SW YD 2														
2.244	0.565		4.197	0.299		52.95	8.97484	2.26100		16.78992	1.19700		0.00001	
2.244	0.565	2.314	4.197	0.299	4.208	52.95	8.97484	2.26100	9.25526	16.78992	1.19700	16.83253	0.00001	
2.244	**0.565**	**2.314**	**4.197**	**0.299**	**4.208**	**52.95**	**8.97484**	**2.26100**	**9.25526**	**16.78992**	**1.19700**	**16.83253**	**0.00001**	