

December 3, 2019

To: Morgan Tracy, AICP – BPS

From: Michael Saling, PE – PWB

Subject: Residential Infill Project – Water Supply Impact

House Bill 2001, passed by the State of Oregon, requires cities of 25,000 people and larger to allow duplexes on all lots where single houses are currently allowed, and triplexes and fourplexes in areas zoned for residential use. The Residential Infill Project is considering new rules to allow these housing types and thereby increase density of housing in the R2.5, R5, and R7 single-family residential zones. Additionally, the RIP proposal includes allowances for two accessory dwelling units with a house, or one accessory dwelling unit with a duplex. Furthermore, RIP includes provisions for up to 6 dwelling units, when certain levels of affordable housing units are proposed, which are anticipated in very limited occurrences based on the financial feasibility of such projects.

The Residential Infill Project (RIP) will have no significant impact on the overall water supply. PWB's supply and water distribution system is sized to meet City fire suppression needs which far surpass the day-to-day demand from residential customers. While it is possible that the additional densities allowed through the RIP could exacerbate existing local capacity issues in isolated areas, we do not anticipate the project to cause significant problems for either current water users or the overall system. However, there may be some infrastructure improvements required to meet local capacity issues. We will look at those here.

To ascertain and analyze potential impacts from proposed changes to the City's single dwelling residential zones, BPS revised and reran the Comprehensive Plan land capacity and growth allocation model (BLI model). Based on household growth forecasts provided by Metro, BPS is **not** projecting an overall increase in total households resulting from the Residential Infill Project (RIP) over the 2015-2035 planning period. In other words, they are estimating total growth of roughly 105,000 households under current zoning allowances, and 105,000 households under the allowances with RIP.. The real change is the distribution of where those households are and the type and intensity of development. Up to six units are allowed on most R2.5, R5, and R7 lots as part of the RIP. The overall structure size is capped under RIP, but building coverage limits stay the same. While the demand in certain locations is increased from additional residents, the demand for irrigation should remain the same or decrease.

There are three water service areas that were identified in the Citywide Systems Plan as having at least one type of service goal deficiency and that show an increase in households from the Comprehensive Plan estimates due to the Residential infill Project. These service areas include the Bertha service area (additional 54 households), the Stephenson Pumped service area (51 additional households), and the Vernon 362 service area (20 additional households).

PWB's Distribution System Master Plan was completed in 2007. This Plan focused on the large diameter pipelines, pump station and tanks that distribute water to the system. Demands were developed for the individual service areas out to 2030 and compared against the existing supply infrastructure capacities in the service areas.

Service connection totals and demands for the three service areas are below:

Service Area	Connections (2007)	Connections (2019)	Connections (2030)	Connections w/RIP (2030)
Bertha	1730	1914	2074	2128
Stephenson Pumped	379	388	758	809
Vernon 362	18,545	20,339	22,206	22,226

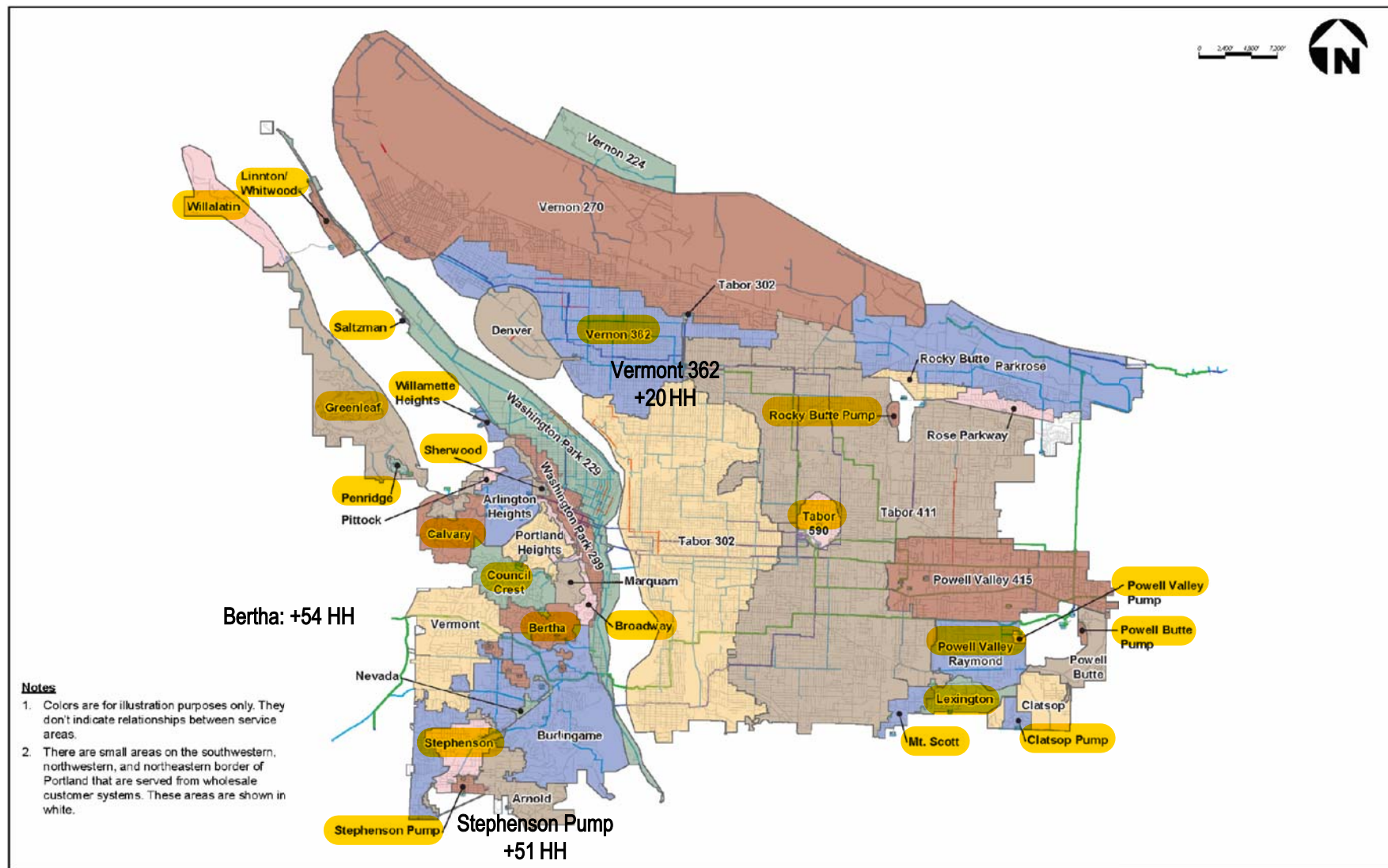
Service Area	Peak Day Demand (2007)	Peak Day Demand (2030)	Peak Day Demand w/RIP (2030)	Fire Flow Demand	PDD + FF w/RIP (2030)
Bertha	695 gpm	833 gpm	855 gpm	3500 gpm **	4355 gpm
Stephenson Pumped	70 gpm	140 gpm	150 gpm	1750 gpm **	1900 gpm
Vernon	10,555 gpm*	12,639 gpm*	12,650 gpm*	7250 gpm **	19,900 gpm

*includes Vernon 224, Vernon 270, and Vernon 362

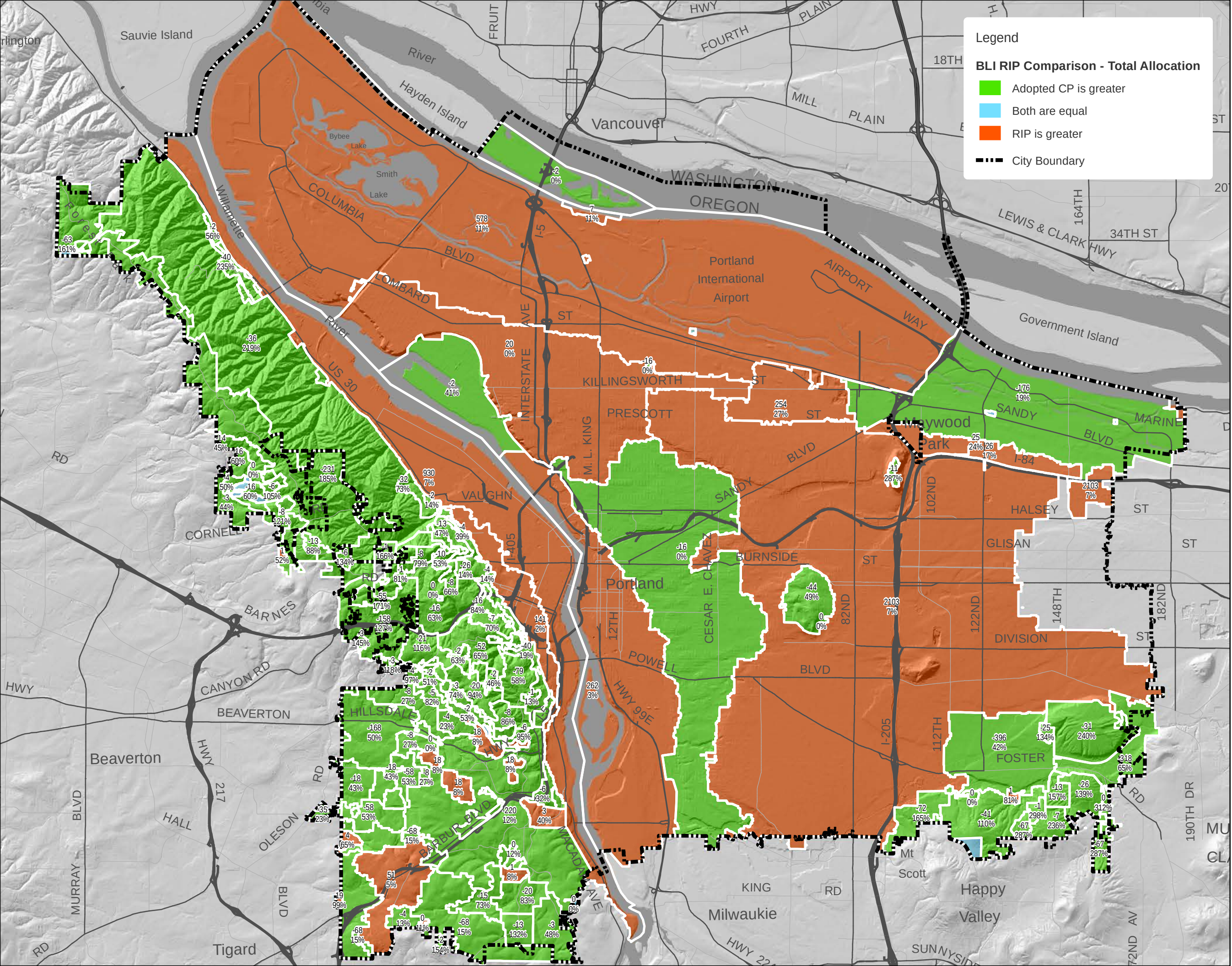
Service Area	PDD + FF w/RIP (2030)	Supply Capacity	Met?
Bertha	4355 gpm	5200 gpm	Yes
Stephenson Pumped	1900 gpm	2250 gpm	Yes
Vernon	19,900 gpm*	20,300 gpm	Yes

Based on demand increases from the proposed additional households as part of the Residential Infill project, the affected service areas will not be significantly impacted. Distribution piping within the service areas is sized to meet fire flows, so there should not be supply issues to individual lots.

Figure 1: City of Portland Water Retail Service Areas



Note: Highlighted areas are identified in the Citywide Systems Plan as having one or more service constraints. Only 3 service areas reflect additional forecasted households from RIP than current zoning. The number of additional households is shown as: +## HH



Legend

BLI RIP Comparison - Total Allocation

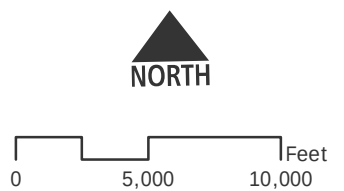
- Adopted CP is greater
- Both are equal
- RIP is greater
- City Boundary

January 8, 2019

City of Portland, Oregon
Bureau of Planning & Sustainability
Geographic Information System

Water Pressure Zones BLI Comparison

Residential Infill Project Scenario



The information on this map was derived from City of Portland GIS databases. Care was taken in the creation of this map but it is provided "as is". The City of Portland cannot accept any responsibility for error, omissions or positional accuracy.



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Ted Wheeler, Mayor • Susan Anderson, Director

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11x17_BLI_RIP_comparison_total_allo_water
pressure_zones_190108.mxd

ZONEID	ZONEHGL	ZONESOUF	ZONESTRE	ZONECOM	ZoneName	COMMENT	DELIVERY	ET_Index	Grid_ID	ADU_Alloc	SFR_Alloc	MFR_Alloc	Total_Alloc	Adpt_CP	ADU_Alloc	SFR_Alloc	MFR_Alloc	Total_Alloc	ADU_Alloc	SFR_Alloc	MFR_Alloc	Total_Alloc	ADU_Alloc	SFR_Alloc	MFR_Alloc	Total_Alloc	Total_Alloc_RIP_AVG	Total_Alloc_RIP_AVG_dif
100153	690	GREENLEA	BIRKENDENE		GREENLEAI <Null>	Pumped		162--57	36248	0.153194	0	0	0.153194	0.153194	0	0	0.153194	0.153194	0	0	0.153194	0.153194	0	0.153194	0.153194	0.153194	both are equal	
100151	705	GREENLEA	SILVER RIDGE		GREENLEAI <Null>	Pumped		160--56	35669	0.022529	0	0	0.022529	0.022529	0	0	0.022529	0.022529	0	0	0.022529	0.022529	0	0.022529	0.022529	0.022529	both are equal	
100185	328	DENVER	TANK	UNKNOWN	DENVER 32 UNKNOWN	Gravity		184--151	43037	0.140087	0	0	0.140087	0.140087	2.101265	0	0	2.241351	0.140087	0.681085	0.821171	0	0.241351	0.140087	0.681085	0.821171	1.531261	RIP is greater
100059	800	LAKE OSWI	ALTO PARK OUTSIDE A	LAKE OSWI <Null>		Pumped		8--126	321	0.394442	0.499466	0	0.893908	0.394442	0.270244	0	0.664686	0.394442	0.104542	0.498984	0	0.664686	0.394442	0.104542	0.498984	0.581835	Adopted CP is greater	
100188	670	ALTO PARK TANK	UNKNOWN	ALTO PARK NO SERVIC		Pumped		10--125	480	0	0.266411	0	0.266411	0	0.141416	0	0.144146	0	0.055762	0.055762	0	0.144146	0	0.055762	0.055762	0.099954	Adopted CP is greater	
100196	600	POWELL BI	<Null>	<Null>	POWELL BI <Null>	Pumped		77--346	13490	0	2.4858	0	2.4858	0	0.947332	0	0.947332	0	0.258226	0.258226	0	0.947332	0	0.258226	0.258226	0.602779	Adopted CP is greater	
100182	802	WILLALATI	RED CEDAF <Null>		WILLALATII <Null>	Pumped		240--1	57881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100193	962	WILLALATI	SKYVIEW <Null>		WILLALATII <Null>	Pumped		240--8	57888	0	1.76005	0	1.76005	0	1.135853	0	1.135853	0	0.439396	0.439396	0	1.135853	0	0.439396	0.439396	0.787624	Adopted CP is greater	
100117	990	ARLINGTON	<Null>		ARLINGTON <Null>	Pumped		124--123	25932	0.37451	0	0	0.37451	0.37451	0	0	0.37451	0.37451	0	0	0.37451	0	0.37451	0	0.37451	0.37451	0.37451	both are equal
100066	473	BURLINGAI	PLUM		BURLINGAI <Null>	Pumped		35--144	2977	2.980443	1.178433	0	4.158876	2.980443	1.123687	0	4.19413	2.980443	0.283916	3.264358	0	4.19413	2.980443	0.283916	3.264358	3.729244	Adopted CP is greater	
100010	575	LEXINGTON	118TH		LEXINGTON <Null>	Pumped		52--298	6787	0.830862	0.624215	0	1.455077	0.830862	0.978285	0	1.809147	0.830862	0.266663	1.097525	0	1.809147	0.830862	0.266663	1.097525	1.453336	Adopted CP is greater	
100158	577	WHITWO	TANK		WHITWO <Null>	Pumped		223--64	53688	0.301206	11.83154	0	12.132746	0.301206	5.674204	0	5.97541	0.301206	0.797599	1.098805	0	5.97541	0.301206	0.797599	1.098805	3.537107	Adopted CP is greater	
100145	1092	GREENLEAI	HAZELTINE		GREENLEAI <Null>	Pumped		155--72	34244	0.419031	0.416852	0	0.835883	0.419031	0.225545	0	0.644576	0.419031	0.08725	0.506281	0	0.644576	0.419031	0.08725	0.506281	0.575428	Adopted CP is greater	
100147	991	GREENLEAI	PINNACLE		GREENLEAI <Null>	Pumped		158--68	35106	0.261331	11.0872	0	11.348528	0.261331	7.856727	0	8.118058	0.261331	2.717584	2.978915	0	8.118058	0.261331	2.717584	2.978915	5.548487	Adopted CP is greater	
100146	1101	GREENLEAI	PINNACLE		GREENLEAI <Null>	Pumped		163--69	36550	0.166711	0.892535	0	1.059247	0.166711	0.504573	0	0.671284	0.166711	0.19519	0.361901	0	0.671284	0.166711	0.19519	0.361901	0.516592	Adopted CP is greater	
100345	892	GREENLEAI	BIRKENDENE		GREENLEAI <Null>	Pumped		164--63	36835	0.261331	2.094137	0	2.355468	0.261331	1.133165	0	1.394496	0.261331	0.438356	0.699687	0	1.394496	0.261331	0.438356	0.699687	1.047091	Adopted CP is greater	
100053	545	ARNOLD	BOONES FERRY		ARNOLD 5<Null>	Pumped		9--150	422	0.615329	22.39419	0	23.009521	0.615329	13.42441	0	14.03974	0.615329	5.193157	5.808486	0	14.03974	0.615329	5.193157	5.808486	9.924112	Adopted CP is greater	
100167	937	BERTHA	18TH		BERTHA 93 <Null>	Pumped		81--140	14362	0.072858	0.432891	0	0.505749	0.072858	0.234253	0	0.307111	0.072858	0.090619	0.163477	0	0.307111	0.072858	0.090619	0.163477	0.235294	Adopted CP is greater	
100084	819	BERTHA	19TH		BERTHA 81 <Null>	Pumped		80--138	14090	0.17486	0	0	0.17486	0.17486	0	0	0.17486	0.17486	0	0	0.17486	0	0.17486	0	0.17486	0.17486	0.17486	both are equal
100085	874	BERTHA	SEYMOUR		BERTHA 87 <Null>	Pumped		78--139	13554	1.29453	4.449636	0	5.744166	1.29453	3.281681	0	4.576211	1.29453	1.268313	2.562843	0	4.576211	1.29453	1.268313	2.562843	3.569527	Adopted CP is greater	
100105	992	COUNCIL C	TALBOT		COUNCIL C <Null>	Pumped		104--130	20559	1.346293	3.440408	0	4.786701	1.346293	2.293873	0	3.640166	1.346293	0.887366	2.23366	0	3.640166	1.346293	0.887366	2.23366	2.936913	Adopted CP is greater	
100161	336	WHITWO	GERMANTOWN		WHITWO <Null>	Pumped		232--62	55935	0	0.429156	0.188066	0.617223	0	0	0.191776	0.191776	0	0.079033	0.079033	0	0.191776	0	0.079033	0.079033	0.135404	Adopted CP is greater	
100156	362	SALTZMAN	TANK		SALTZMAN CHANGED	Pumped		196--87	46640	0	26.14792	0	26.147919	0	14.15408	0	14.15408	0	1.989579	1.989579	0	14.15408	0	1.989579	1.989579	8.07183	Adopted CP is greater	
100013	463	LEXINGTON	133RD		LEXINGTON <Null>	Pumped		53--310	7070	0.313102	0	0	0.313102	0.313102	2.078023	0	2.391124	0.313102	0.566576	0.879678	0	2.391124	0.313102	0.566576	0.879678	1.635401	RIP is greater	
100184	653	WESTWOC	TANK	UNKNOWN	WESTWOC UNKNOWN	Pumped		77--144	13288	0.041368	0	0	0.041368	0.041368	0	0	0.041368	0.041368	0	0	0.041368	0	0.041368	0	0.041368	0.041368	0.041368	Adopted CP is greater
100148	751	GREENLEAI	BARTHOLOMEW		GREENLEAI <Null>	Pumped		157--64	34815	0.243308	0	0	0.243308	0.243308	0	0	0.243308	0.243308	0	0	0.243308	0	0.243308	0	0.243308	0.243308	0.243308	both are equal
100177	745	GREENLEAI	BIRKENDENE		GREENLEAI <Null>	Pumped		164--61	36833	0.027034	0	0	0.027034	0.027034	0	0	0.027034	0.027034	0	0	0.027034	0	0.027034	0	0.027034	0.027034	0.027034	both are equal
100057	759	LAKE OSWI	ARROWWOC OUTSIDE A	LAKE OSWI LAKE OSWI		Pumped		13--121	742	0	0.998933	0	0.998933	0	0.540489	0	0.540489	0	0.209084	0.209084	0	0.540489	0	0.209084	0.209084	0.374786	Adopted CP is greater	
100058	884	LAKE OSWI	ARROWWOC OUTSIDE A	LAKE OSWEGO 884 AR		Pumped		8--121	317	0	3.590664	0	3.590664	0	2.039031	0	2.039031	0	0.788783	0.788783	0	2.039031	0	0.788783	0.788783	1.413907	Adopted CP is greater	
100074	681	BERTHA	CHELTENHAM		BERTHA 68 <Null>	Pumped		74--144	12475	0.351627	0.69161	0	1.043237	0.351627	0.468819	0	0.820446	0.351627	0.181359	0.532986	0	0.820446	0.351627	0.181359	0.532986	0.676716	Adopted CP is greater	
100178	522	CLATSOP	BARBARA WELCH		CLATSOP 5 <Null>	Pumped		51--327	6547	0.057249	20.66883	0	20.726075	0.057249	12.58938	0	12.64663	0.057249	3.431643	3.488892	0	12.64663	0.057249	3.431643	3.488892	8.06776	Adopted CP is greater	
100076	845	BERTHA	WESTWOOD		BERTHA 84 <Null>	Pumped		75--143	12745	2.771646	10.30636	0	13.078006	2.771646	5.681967	0	8.453613	2.771646	2.198023	4.969669	0	8.453613	2.771646	2.198023	4.969669	6.711641	Adopted CP is greater	
100091	962	BERTHA	MITCHELL		BERTHA 96 <Null>	Pumped		78--141	13556	2.117411	3.498521	0	5.615931	2.117411	2.754784	0	4.872194	2.117411	1.065666	3.180377	0	4.872194	2.117411	1.065666	3.180377	4.027635	Adopted CP is greater	
100090	1048	BERTHA	TANK		BERTHA 10 <Null>	Pumped		81--141	14363	4.471003	12.54516	0	17.016163	4.471003	6.759894	0	11.2309	4.471003	2.615011	7.086013	0	11.2309	4.471003	2.615011	7.086013	9.158455	Adopted CP is greater	
100176	1082	GREENLEAI	BIRKENDENE		GREENLEAI <Null>	Pumped		164--67	36839	0.171217	1.578224	0	1.749441	0.171217	0.980924	0	1.15214	0.171217	0.379462	0.550679	0	1.15214	0.171217	0.379462	0.550679	0.85141	Adopted CP is greater	
100016	325	ROSE PARK	TANK		ROSE PARK <Null>	Gravity		160--333	35933	0	40.30233	86.2233	126.552628	0	26.03117	111.2721	137.3032	0	167.6863	167.6863	0	137.3032	0	167.6863	167.6863	152.494774	RIP is greater	
100160	372	WHITWO	SPRINGVILLE		WHITWO <Null>	Pumped		227--66	54691	0.104767	2.599158	0	2.703925	0.104767	1.123725	0	1.228492	0.104767	0.157957	0.262725	0	1.228492	0.104767	0.157957	0.262725	0.745608	Adopted CP is greater	
100122	963	CALVARY	WOODSIDE		CALVARY 9 <Null>	Pumped		132--109	27985	0.514951	1.299327	0	1.814278	0.514951	0.703022	0	1.217973	0.514951	0.271958	0.78691	0	1.217973	0.514951	0.271958	0.78691	1.002441	Adopted CP is greater	
100068	545	BURLINGAI	TERWILLIGER		BURLINGAI <Null>	Pumped		48--154	5592	0.040551	5.174431	0	5.214982	0.040551	12.46187	0	12.50243	0.040551	4.874178	4.91473	0	12.50243	0.040551	4.874178	4.91473	8.708577	RIP is greater	
100065	487	BURLINGAI	6TH		BURLINGAI <Null>	Pumped		35--146	2979	2.346306	0.932355	0	3.279561	2.346306	0.881505	0	3.227811	2.346306	0.341003	2.687309	0	3.227811	2.346306	0.341003	2.687309	2.95756	Adopted CP is greater	
100129	412	BROADWA	VIEW POINT		BROADWA <Null>	Pumped		82--154	14646	1.070106	13.41323	35.45611	49.93944	1.070106	0	34.73055	35.80065	1.070106	43.97718	45.04728	0	34.73055	35.80065	1.070106	43.97718	45.04728	40.423967	Adopted CP is greater
100130	396	BROADWA	GIBBS		BROADWA <Null>	Pumped		99--156	19244	0	3.578953	1.077048	4.656	0	0	1.621547	1.621547	0	2.053267	2.053267	0	1.621547	0	2.053267	2.053267	1.837407	Adopted CP is greater	
100099	846	COUNCIL C	ALTADENA		COUNCIL C <Null>	Pumped		90--127	16791																			

100126	1056	COUNCIL C GALE	COUNCIL C <Null>	Pumped	93--138	17612	3.721741	13.58274	0	17.304477	3.721741	8.080232	0	11.80197	3.721741	3.125773	6.847514	9.324743	Adopted CP is greater
100089	1144	COUNCIL C TANK	COUNCIL C <Null>	Pumped	84--140	15171	5.624658	35.04653	0	40.671186	5.624658	23.13576	0	28.76042	5.624658	7.63638	13.26104	21.010727	Adopted CP is greater
100170	381	SHERWOOD 29TH	SHERWOOD <Null>	Pumped	151--126	33134	5.407871	1.5	0	6.907871	5.407871	1.5	0	6.907871	5.407871	0.453937	5.861808	6.384839	Adopted CP is greater
100144	329	WILLAMET 32ND	WILLAMET <Null>	Pumped	155--124	34288	9.943504	2.68081	0	12.624314	9.943504	1.794481	0	11.73799	9.943504	0.508707	10.45221	11.095098	Adopted CP is greater
100199	577	CLATSOP NEHALEM <Null>	CLATSOP 5 <Null>	Unknown	46--340	5256	0	5.042854	0	5.042854	0	3.613458	0	0.566179	0.566179	0.566179	0.566179	2.098818	Adopted CP is greater
100036	530	POWELL BL FLAVEL CH CHANGED	POWELL BL Powell But Gravity	51--340	6560	0	0.120676	0	0	0.120676	0	0.045989	0	0.045989	0	0.012536	0.012536	0.029263	Adopted CP is greater
100082	688	BERTHA 26TH	BERTHA 68 <Null>	Pumped	79--127	13812	4.194584	15.7115	0	19.906086	4.194584	17.31972	0	21.5143	4.194584	6.699993	10.89458	16.204438	Adopted CP is greater
100310	871	SUNRISE MT SCOTT OUTSIDE A	SUNRISE 8' (2) PWB SV Unknown	35--298	3027	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100014	522	MT SCOTT TANK	MT SCOTT <Null>	Pumped	37--270	3280	14.37934	87.51117	14.47675	116.367255	14.37934	27.16535	17.91002	59.4547	14.37934	14.08096	28.4603	43.9575	Adopted CP is greater
100054	560	BURLINGAI TERWILLIGER	BURLINGAI <Null>	Pumped	4--159	83	4.383744	4.765325	0	9.149069	4.383744	2.578356	0	6.962099	4.383744	0.997416	5.38116	6.17163	Adopted CP is greater
100063	468	BURLINGAI MAPLECREST	BURLINGAI <Null>	Pumped	30--147	2443	2.82949	3.157194	0	5.986683	2.82949	5.420156	0	8.249645	2.82949	1.911154	4.740644	6.495144	RIP is greater
100052	458	BURLINGAI ARNOLD	BURLINGAI <Null>	Pumped	20--142	1449	6.961672	35.92114	0	42.882811	6.961672	24.081	0	31.04267	6.961672	8.736199	15.69787	23.370269	Adopted CP is greater
100051	547	BURLINGAI LANCASTER	BURLINGAI <Null>	Pumped	18--138	1244	5.289477	30.84665	0	36.136124	5.289477	22.64137	0	27.93084	5.289477	8.454441	13.74392	20.83738	Adopted CP is greater
100064	525	BURLINGAI 12TH	BURLINGAI <Null>	Pumped	36--142	3101	0.987673	4.066196	0	5.053869	0.987673	2.118258	0	3.10593	0.987673	0.760127	1.7478	2.426865	Adopted CP is greater
100155	1088	GREENLEA THOMPSON	GREENLEA <Null>	Pumped	167--122	37700	19.06446	24.20822	0.7504	44.023081	19.06446	16.26109	1.12	36.44555	19.06446	5.314407	24.37887	30.412209	Adopted CP is greater
100132	690	PORTLAND DAMENPORT	PORTLAND <Null>	Pumped	108--146	21652	1.51764	9.853737	0	11.371377	1.51764	6.111812	0	7.629452	1.51764	2.083943	3.601583	5.615517	Adopted CP is greater
100131	582	PORTLAND BROADWAY	PORTLAND <Null>	Pumped	107--144	21381	0.538517	31.27217	8.533859	40.344551	0.538517	6.118489	12.60212	19.25913	0.538517	19.73217	20.27068	19.764906	Adopted CP is greater
100365	760	BACKPIPE <Null>	BACKPIPE (LATIGO PU BACKPIPE <Null>	Unknown	<Null>	<Null>	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100370	<Null>	CONDUIT <Null>	CONDUIT (CONDUITS PRESSURE <Null>	Unknown	<Null>	<Null>	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100360	652	BACKPIPE LUSTED RD BACKPIPE (	LUSTED 65 BACKPIPE <Null>	Unknown	<Null>	<Null>	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100220	643	TVWD FLORENCE	WHEELED TVWD 643 PWB MAIN Unknown	41--88	3798	0	0	0	0	0	0.918831	0	0.918831	0	0.355442	0.355442	0.637136	RIP is greater	
100198	498	TVWD LOCUST	WHEELED TVWD 498 PREVIOUSLY Unknown	23--87	1691	0.238459	0	0	0	0.238459	0.238459	27.2931	0	27.53156	0.238459	10.83923	11.07769	19.304624	RIP is greater
100017	440	ROCKWOOD HANCOCK	OUTSIDE A ROCKWOOD Unknown	150--343	33066	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100340	426	TVWD CANBY	WHEELED TVWD 426 SERVES (1) Unknown	<Null>	<Null>	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100335	800	WEST SLOF PRESLYNN	WHEELED WEST SLOF SVCS TAPP Unknown	95--91	18103	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100320	640	VALLEY VIE SHATTUCK	WHEELED VALLEY VIE PWB CUSTI Unknown	<Null>	<Null>	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100175	935	CALVARY SCHOLLS FERRY	CALVARY 9 <Null>	Pumped	108--97	21603	0	5.006518	0	5.006518	0	2.942547	0	2.942547	0	1.138301	1.138301	2.040424	Adopted CP is greater
100095	703	COUNCIL C JERALD	COUNCIL C <Null>	Pumped	87--126	15968	1.661987	9.993868	0	11.655856	1.661987	6.841618	0	8.503606	1.661987	2.646625	4.308612	6.406109	Adopted CP is greater
100101	942	COUNCIL C CHESAPEAKE	COUNCIL C <Null>	Pumped	88--132	16248	2.316893	5.529361	0	7.846254	2.316893	3.149171	0	5.466064	2.316893	1.218275	3.535168	4.500616	Adopted CP is greater
100083	805	BERTHA 25TH	BERTHA 80 <Null>	Pumped	83--133	14895	1.981745	4.495344	0	6.477089	1.981745	3.243011	0	5.224756	1.981745	1.254533	3.262788	4.230517	Adopted CP is greater
100100	850	COUNCIL C TWOMBLY	COUNCIL C <Null>	Pumped	88--131	16247	0.072858	0	0	0.072858	0.072858	0	0	0.072858	0.072858	0	0.072858	0.072858	both are equal
100021	183	VERNON BRIDGETON	VERNON 1 <Null>	Gravity	247--179	59854	0	0	61.13557	61.135571	0	0	69.57547	69.57547	0	67.05778	67.05778	68.316623	RIP is greater
100154	840	GREENLEA RYAN	GREENLEA <Null>	Pumped	150--68	32805	0	10.1895	0	10.189495	0	5.513189	0	5.513189	0	2.132733	2.132733	3.822691	Adopted CP is greater
100150	697	GREENLEA MILLER	GREENLEA <Null>	Pumped	149--60	32522	4.34503	4.380048	0	8.725079	4.34503	2.474616	0	6.819647	4.34503	0.957286	5.302316	6.060981	Adopted CP is greater
100152	742	GREENLEA VILLAGE HEIGHTS	GREENLEA <Null>	Pumped	161--53	35955	2.083759	3.544203	6.497457	12.125419	2.083759	0.270322	9.700791	12.05487	2.083759	2.036264	4.120022	8.087447	Adopted CP is greater
100163	1055	WILLALATI SKYVIEW	WILLALATI <Null>	Pumped	240--10	57890	0	0.378104	0	0.378104	0	0.234669	0	0.234669	0	0.090797	0.090797	0.162733	Adopted CP is greater
100157	1196	WILLALATI TANK	WILLALATI <Null>	Pumped	219--38	52649	0	101.0274	1.148488	102.175928	0	61.92306	1.699341	63.62241	0	14.80847	14.80847	39.215436	Adopted CP is greater
100350	292	MILWAUKI JOHNSON (OUTSIDE A	MILWAUKI SERVES (1) Unknown	41--228	3911	0	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100162	326	WHITWOOD HARBOR	WHITWOOD <Null>	Pumped	234--59	56432	0.458357	9.542731	0	10.001088	0.458357	4.216698	0	4.675055	0.458357	0.592723	1.05108	2.863068	Adopted CP is greater
100165	332	LINNTON WILARK	LINNTON 3 <Null>	Pumped	240--56	57936	0.458357	5.615563	0	6.07392	0.458357	2.737204	0	3.195561	0.458357	0.384757	0.843114	2.019338	Adopted CP is greater
100159	493	WHITWOOD SPRINGVILLE	WHITWOOD <Null>	Pumped	224--64	53937	1.79414	55.82866	0	57.622795	1.79414	26.72765	0	28.52179	1.79414	4.112628	5.906768	17.21428	Adopted CP is greater
100189	54	GROUNDVA TANK	UNKNOWN* GROUNDVA UNKNOWN	Pumped	178--348	41306	0	0	0	0	0	0	0	0	0	0	0	0	both are equal
100041	280	KELLY BUT	KELLY BUT <Null>	Gravity	35--182	3015	312.8948	486.2673	8819.266	9618.427759	312.8948	257.7816	8951.969	9522.646	312.8948	9924.879	10237.77	9880.209827	RIP is greater
100094	347	RALEIGH TERRI	WHEELED RALEIGH 3- SVCS TAPP Gravity	70--88	11348	0	11.77661	25.13242	0	36.909034	0	0	45.25492	45.25492	0	9.011488	9.011488	27.133201	Adopted CP is greater
100173	970	GREENLEA HAWKINS	GREENLEA <Null>	Pumped	145--71	31450	0.441559	13.83736	0	14.278921	0.441559	8.676831	0	9.11839	0.441559	3.356595	3.798154	6.458272	Adopted CP is greater
100174	824	GREENLEA ASH	GREENLEA <Null>	Pumped	138--71	29588	0	0.920907	0	0.920907	0	2.824552	0	2.824552	0	0.997481	0.997481	1.911016	RIP is greater
100134	444	WILLAMET TANK	WILLAMET <Null>	Pumped	151--118	33126	24.59709	46.32048	4.476639	75.394209	24.59709	24.28485	4.564937	53.44687	24.59709	8.96053	33.55762	43.502246	Adopted CP is greater
100000	<Null>	NO SERVIC NO SERVIC UNKNOWN	<Null>	NO SERVIC Unknown	137--95	29340	1.486798	50.24049	0	51.727284	1.486798	24.75334	0	26.24014	1.486798	4.696905	6.183703	16.211921	Adopted CP is greater
100210	279	BURLINGAI MOUNTAIN WHEELED	BURLINGAI SUPPLIES 4 Unknown	274--32	65249	0.078575	2.961471	0	0	3.040047	0.078575	1.420362	0	1.498937	0.078575	0.199654	0.27823	0.888583	Adopted CP is greater
100070	458	VERMONT VERMONT	VERMONT <Null>	Pumped	56--92	7651	17.94618	41.76115	0	59.707322	17.94618	35.04518	0.525	53.51635	17.94618	12.1642	30.11038	41.813362	Adopted CP is greater
100098	747	COUNCIL C PATTON	COUNCIL C <Null>	Pumped	97--112	18662	1.719302	6.521203	0	8.240505	1.719302	3.56687	0	5.286172	1.719302	1.379815	3.099117	4.192645	Adopted CP is greater
100023	272	DENVER SWAN ISLAND	DENVER 27 <Null>	Gravity	171--144	38972	0.130748	5.738387	0	5.869135	0.130748	5.542772	0	5.67352	0.130748	2.508304	6.239052	4.156286	Adopted CP is greater
100001	211	VERNON HAYDEN ISLAND	VERNON 2 <Null>	Gravity	250--185	60625	0	20.79859	773.2505	794.049124	0	2.536463	803.5614	806.0979	0	778.6252	778.6252	792.36151	Adopted CP is greater
100187	246	ALMA TANK	UNKNOWN* ALMA 246 NO SERVIC Gravity	224--96	53969	0.141774	0.492794	0.266992	0	0.90156	0.141774	0	0.255083	0.396858	0.141774	0.105123	0.246897	0.321877	Adopted CP is greater
100305	886	SUNRISE CLATSOP OUTSIDE A	SUNRISE 8 (3) PWB CL Unknown	35--306	3033	0	1.228801	0	0	1.228801	0	1.281021	0	1.281021	0	0.349184	0.349184	0.815103	Adopted CP is greater
100200	943	CALVARY 54TH	CALVARY 9 VALLEY VIE Pumped	104--103	20532	0	1.132124	0	0	1.132124	0	0.694268	0	0.694268	0	0.268572	0.268572	0.48142	Adopted CP is greater
100080	511	VERMONT BEAVERTON HILLSDAL	VERMONT <Null>	Gravity	57--103	7921	41.5832	342.4359	118.7769	502.796018	41.5832	180.706	149.0269	371.3161	41.5832	257.5043	299.0875	335.201819	Adopted CP is greater
100172	583	VALLEY VIE SCHOLLS F WHEELED	VALLEY VIE PWB CUSTI Pumped	94--91	17834	0.021452	2.722858	0	0	2.74431	0.021452	1.379711	0	1.401163	0.021452	0.5337			

100300	<Null>	NO SERVICE NO SERVICE UNKNOWN	<Null>	NO SERVICE	Unknown	66--335	10521	0.132166	44.38683	0	44.518996	0.132166	20.36212	0	20.49429	0.132166	5.550356	5.682521	13.088405	Adopted CP is greater		
100110	1134	GREENLEA ROYAL	GREENLEAI	<Null>	Pumped	135--92	28791	0	11.333245	0	11.333245	0	7.22692	0	7.22692	0	2.47313	2.47313	4.850025	Adopted CP is greater		
100112	1140	GREENLEAI SKYLINE	GREENLEAI	<Null>	Pumped	121--102	25101	2.785418	84.43249	0	87.217911	2.785418	42.47199	0	45.2574	2.785418	16.26894	19.05436	32.15588	Adopted CP is greater		
100120	1250	GREENLEAI TANK	<Null>	GREENLEAI	<Null>	Pumped	126--103	26437	8.724098	344.3709	2.400039	355.495055	8.724098	168.9195	3.11518	180.7588	8.724098	60.30105	69.02515	124.891975	Adopted CP is greater	
100395	576	CLATSOP TENINO	CLATSOP 5	CLATSOP 5	PEACH TREE	Pumped	43--341	4474	0	15.76258	0	15.762581	0	6.007076	0	6.007076	0	1.637423	1.637423	3.822249	Adopted CP is greater	
100062	584	BURLINGAI CANBY	BURLINGAI	<Null>	Pumped	45--129	4784	1.172438	52.30845	175.6666	229.147446	1.172438	1.406002	169.729	172.3074	1.172438	215.5761	216.7485	194.52797	Adopted CP is greater		
100092	496	BROADWA TANK	BROADWA	<Null>	Pumped	83--153	14915	27.32907	66.58338	159.6922	253.604682	27.32907	13.94457	195.5412	236.8148	27.32907	162.2628	189.5919	213.203366	Adopted CP is greater		
100141	369	SHERWOOD PARK	SHERWOOD	<Null>	Pumped	131--139	27741	0.842647	0.58146	27.72773	29.151834	0.842647	0.102461	26.41571	27.36082	0.842647	22.86774	23.71039	25.535603	Adopted CP is greater		
100149	893	GREENLEA PINNACLE	GREENLEAI	<Null>	Pumped	154--66	33948	4.330753	15.39119	23.46708	43.189018	4.330753	1.70876	35.68714	41.72665	4.330753	7.767303	12.09806	26.912355	Adopted CP is greater		
100115	733	PORTLAND VISTA	PORTLAND	UPDATED	Pumped	111--146	22458	4.920091	11.96492	0	16.885013	4.920091	7.252722	0	12.17281	4.920091	2.729542	7.649633	9.911223	Adopted CP is greater		
100116	615	PORTLAND RIVINGTON	PORTLAND	<Null>	Pumped	115--146	23536	4.567598	23.47734	7.248878	35.293812	4.567598	11.80471	10.91136	27.28367	4.567598	6.560929	11.12853	19.206096	Adopted CP is greater		
100195	552	RAYMOND PUMP	PREVIOUS	RAYMOND	<Null>	Pumped	73--323	12388	6.036756	37.74714	0	43.783892	6.036756	21.04202	0	27.07878	6.036756	4.256366	10.29312	18.685951	Adopted CP is greater	
100194	435	RAYMOND TANK	PREVIOUS	RAYMOND	<Null>	Pumped	53--309	7069	37.69594	984.9614	306.572	1329.229284	37.69594	830.5207	313.5086	1181.725	37.69594	646.2175	683.9134	932.819321	Adopted CP is greater	
100018	338	KELLY BUT CULLY	KELLY BUT	ROSE CITY	Gravity	180--232	41833	49.06667	300.2264	325.3878	674.680896	49.06667	633.4677	342.3353	1024.87	49.06667	782.8298	831.8964	928.383077	RIP is greater		
100136	600	ARLINGTON CUMBERLAND	<Null>	ARLINGTON	<Null>	Pumped	132--130	28006	14.9804	24.10758	3.033846	42.121823	14.9804	13.61406	4.155791	32.75024	14.9804	9.683467	24.66387	28.707054	Adopted CP is greater	
100171	864	ARLINGTON TANK	Tank 2: 864	ARLINGTON	<Null>	Pumped	112--123	22705	13.27115	28.34194	0	41.613094	13.27115	17.69173	0	30.96289	13.27115	6.683061	19.95421	25.45855	Adopted CP is greater	
100137	743	ARLINGTON WARRENTON	ARLINGTON	<Null>	Pumped	136--122	29093	11.70344	17.63922	0	29.342657	11.70344	11.01906	0	22.7225	11.70344	3.981788	15.68522	19.203862	Adopted CP is greater		
100015	590	TABOR TANK	TABOR 59C	<Null>	Pumped	110--247	22291	20.33592	79.0609	33.46284	132.859652	20.33592	32.61199	47.30697	100.2549	20.33592	57.18526	77.52117	88.888026	Adopted CP is greater		
100027	503	TABOR MOUNTAIN VIEW	TABOR 503	<Null>	Pumped	112--249	22831	0.283307	0	0	0.283307	0.283307	0	0	0.283307	0.283307	0	0.283307	0.283307	both are equal		
100043	261	PARKROSE TANK	<Null>	PARKROSE	<Null>	Gravity	157--332	35073	21.11703	396.4414	659.9029	1077.461305	21.11703	168.9108	651.6551	841.683	21.11703	940.8524	961.9694	901.826206	Adopted CP is greater	
100385	261	GRESHAM MARINE	WHEELED	GRESHAM	GRESHAM	Gravity	178--370	41328	0	0	0	0	0.042817	0	0.042817	0	0.007872	0.007872	0.025344	RIP is greater		
100111	1043	CALVARY TANK	CALVARY 1	<Null>	Pumped	103--107	20267	3.320527	219.0068	59.90784	282.23512	3.320527	96.16831	90.2642	189.753	3.320527	55.17611	58.49663	124.124832	Adopted CP is greater		
100029	813	CLATSOP TANK	CLATSOP 8	<Null>	Pumped	30--338	2481	0	90.06993	0	90.069932	0	36.56037	0	36.56037	0	9.965665	9.965665	23.263018	Adopted CP is greater		
100035	701	CLATSOP BARBARA WELCH	CLATSOP 7	<Null>	Pumped	44--335	4729	0	44.80532	0	44.805322	0	29.40906	0	29.40906	0	8.016638	8.016638	18.712848	Adopted CP is greater		
100215	426	TVWD GARDEN H WHEELED	TVWD 426	TVWD (ME	Unknown	52--80	6572	0	74.64436	112.0555	186.699813	0	9.687136	148.1617	157.8488	0	146.5476	146.5476	152.198188	Adopted CP is greater		
100040	657	LEXINGTON TANK	LEXINGTON	<Null>	Pumped	35--301	3030	8.477252	68.98408	0	77.46133	8.477252	45.04445	0	53.5217	8.477252	11.80034	20.27759	36.899647	Adopted CP is greater		
100077	585	VERMONT TANK	VERMONT	<Null>	Pumped	63--116	9504	15.58923	20.33	0	35.919226	15.58923	18.38209	0.000035	33.97136	15.58923	6.824025	22.41326	28.192305	Adopted CP is greater		
100069	562	VERMONT GARDEN HOME	VERMONT 562	GARDEN	Pumped	48--94	5532	17.57285	116.6846	33.54387	167.801292	17.57285	79.60957	52.31016	149.4926	17.57285	52.86683	70.43968	109.966127	Adopted CP is greater		
100135	534	SHERWOOD TANK	SHERWOOD	<Null>	Pumped	131--130	27732	11.89238	15.28324	181.0508	208.226376	11.89238	6.283386	177.1291	195.3048	11.89238	157.4276	169.32	182.312402	Adopted CP is greater		
100114	727	PORTLAND BROADWAY	PORTLAND	<Null>	Pumped	110--140	22184	0.685386	2.603275	0	3.288661	0.685386	1.732525	0	2.417911	0.685386	0.670214	1.355599	1.886755	Adopted CP is greater		
100106	866	PORTLAND TANK	PORTLAND	<Null>	Pumped	97--142	18692	28.01602	75.00184	28.05659	131.074452	28.01602	36.18935	44.06436	108.2697	28.01602	22.77398	50.78999	79.529861	Adopted CP is greater		
100104	1017	COUNCIL C MT ADAMS	COUNCIL C	<Null>	Pumped	99--132	19220	0.614889	4.797173	0	5.412062	0.614889	3.371578	0	3.986467	0.614889	1.143403	1.758292	2.872379	Adopted CP is greater		
100093	299	WASHINGTON	WASHINGTON	<Null>	Gravity	80--157	14109	14.73112	188.6498	5789.737	5993.117978	14.73112	11.60893	5817.06	5843.4	14.73112	6410.229	6424.96	6134.180026	RIP is greater		
100056	229	WASHINGTON	WASHINGTON	<Null>	Gravity	10--184	539	34.0365	113.5284	13222.66	13370.22465	34.0365	96.87868	13441.25	13572.17	34.0365	14993.69	15027.72	14299.94442	RIP is greater		
100049	773	STEPHENS VACUNA	PREVIOUS	STEPHENS	<Null>	Pumped	16--115	1017	0.614477	0	0	0.614477	0.614477	0.112314	0	0.726791	0.614477	0.043448	0.657924	0.692358	RIP is greater	
100048	685	ARNOLD TANK	ARNOLD 6	<Null>	Pumped	4--135	64	27.33564	203.7764	303.5126	534.624675	27.33564	148.3602	280.4502	456.146	27.33564	450.1341	477.4697	466.807855	Adopted CP is greater		
100168	305	KELLY BUT	KELLY BUT	<Null>	Gravity	40--210	3720	735.7162	1655.226	13801.51	16192.45332	735.7162	960.8222	13325.14	15021.68	735.7162	16595.19	17330.9	16176.28961	Adopted CP is greater		
100037	427	KELLY BUT	KELLY BUT	PWB WHO	Gravity	38--267	3418	1046.592	8201.911	17869.67	27118.17218	1046.592	11477.01	17881.94	30405.54	1046.592	26989.8	28036.39	29220.96471	RIP is greater		
100044	270	VERNON	<Null>	<Null>	VERNON 2	<Null>	Gravity	189--278	44754	322.1949	1332.615	3183.913	4838.722332	322.1949	2110.932	3291.73	5724.857	322.1949	4786.944	5109.139	5416.998206	RIP is greater
100042	362	VERNON TANK	VERNON 3	<Null>	Gravity	161--177	36067	607.696	1422.142	7938.653	9968.491215	607.696	1251.618	7605.18	9464.494	607.696	9905.474	10513.17	9988.832028	RIP is greater		
100046	643	BURLINGAI TANK	BURLINGAI	<Null>	Pumped	6--91	164	155.5175	804.8045	1044.353	2004.675379	155.5175	518.2929	1155.334	1829.145	155.5175	1583.969	1739.487	1784.315966	Adopted CP is greater		
100072	750	BERTHA SUNSET	BERTHA 75	<Null>	Pumped	57--129	7947	23.12551	97.1049	97.62235	217.852758	23.12551	118.6976	91.23566	233.0588	23.12551	215.7826	238.9081	235.98346	RIP is greater		