Appendix E. Mass Balances for Instantaneous Streamflows, Total Nitrogen Loads, Total Phosphorus Loads, and Suspended Sediment Loads in the Main Stem, Selected Major Tributaries, and Canals, Yakima River Basin, Washington, July 26–29, 2004

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Streamflow (cubic feet per second)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12487000	**Yakima River at Selah Gap near N. Yakima**	117.0	ms		1,970		na	na		
12499000	Naches River near Yakima	115.9	in						399	
12485002	Roza Power Plant Return	113.3	in						870	
463447120275200	**Yakima WWTP**	111.0	in						21	
12500445	Wide Hollow Creek near mouth at Union Gap	107.4	in						33	
12500420	Moxee Drain at Birchfield Road near Union Gap	107.3	in						32	
12500450	**Yakima River above Ahtanum Creek at Union Gap**	107.3	ms		3,280	3,325	-45	99		
12502500	Ahtanum Creek at Union Gap	106.9	in						11	
12503599	Wapato Main Canal near Parker	106.7	out	Used water-quality results from station 12500450						1,635
12504490	Sunnyside Canal at Diversion near Parker	103.8	out	Used water-quality results from station 12503950						1,249
12503950	**Yakima River at Parker**	103.8	ms		385	407	-22	95		
12505320	**Yakima River at RM 91 at Zillah**	91.2	ms		330	385	-55	86		
462357120153200	Zillah WWTP	89.2	in						0.3	
12505330	**Yakima River above East Toppenish Drain near Granger**	86.2	ms		330	330	-0.3	100		
12505350	East Toppenish Drain at Wilson Road near Toppenish	86.0	in						15	
12505410	Sub-Drain No. 35 at Parton Road near Granger	83.2	in						35	
12505440	**Yakima River at Bridge Avenue at Granger**	83.0	ms		442	380	62	116		
462013120113700	Granger WWTP	82.8	in						0.3	
12505460	Granger Drain at mouth near Granger	82.8	in						52	
12505510	Marion Drain at Indian Church Road at Granger	82.6	in						3	
12507508	Toppenish Creek at Indian Church Road near Granger	80.4	in						20	
12507560	Coulee Drain at North Satus Road near Status	77.0	in						28	
12507580	**Yakima River above Satus Creek at RM 73 near Satus**	73.0	ms		649.0	546.3	102.7	118.8		
12508620	Satus Creek at gaging station at Satus	69.6	in						77.1	
12508630	South Drain near Satus	69.3	in						41.2	

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Streamflow (cubic feet per second)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12508680	**Yakima River above Sulphur Creek at RM 61.3 near Mabton**	61.3	ms		742	767	-25	97		
12508850	Sulphur Creek Wasteway near Sunnyside	61.0	in						205	
12508690	Satus Drain 303	60.2	in						4	
46140411959180	Mabton WWTP	59.5	in						0.2	
12509052	Grandview WWTP	59.0	in						2	
12509050	**Yakima River at Euclid Bridge at RM 55 near Grandview**	55.0	ms		894	954	-60	94		
12509499	Chandler Canal at Bunn Road at Prosser	47.1	out							656
461246119454700	Prosser WWTP	46.4	ms						1	
12509686	**Yakima River at Prosser /downstream bedrock**	43.9	ms		403	239	164	168		
12509690	**Yakima River above Snipes Creek and Spring Creek near Whitstran**	43.0	ms	Used streamflow from station 12509686	403	403	0	100		
12509710	Spring Creek at mouth near Whitstran	41.8	in						21	
12509829	Snipes Creek at mouth near Whitstran	41.8	in						21	
12509900	**Yakima River above Chandler Pump at RM 35.9 near Whitstran**	37.0	ms		na	444	na	na		
1250949990	Chandler Canal at Power Return near Benton City	35.8	in	Used water-quality results from station 12509499					349	
12510200	Corral Canyon Creek at mouth near Benton City	33.5	in						6	
12510500	**Yakima River at Kiona**	29.9	ms		1,220	799	421	153		
12511000	Cid Canal at Horn Rapids Dam near West Richland	18.0	out							172
12511210	Horn Rapids Ditch below Horn Rapids Dam near West Richland	18.0	out							30
12511800	**Yakima River at Van Geisan Bridge near Richland**	8.4	ms		627	1,018	-391	62		

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Total nitrogen (pounds per day)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12487000	**Yakima River at Selah Gap near N. Yakima**	117.0	ms		4,881		na	na		
12499000	Naches River near Yakima	115.9	in						537	
12485002	Roza Power Plant Return	113.3	in						1,499	
463447120275200	**Yakima WWTP**	111.0	in						1585	
12500445	Wide Hollow Creek near mouth at Union Gap	107.4	in						331	
12500420	Moxee Drain at Birchfield Road near Union Gap	107.3	in						190	
12500450	**Yakima River above Ahtanum Creek at Union Gap**	107.3	ms		7,420	9,023	-1603	82		
12502500	Ahtanum Creek at Union Gap	106.9	in						38	
12503599	Wapato Main Canal near Parker	106.7	out	Used water-quality results from station 12500450						3,699
12504490	Sunnyside Canal at Diversion near Parker	103.8	out	Used water-quality results from station 12503950						2,691
12503950	**Yakima River at Parker**	103.8	ms		829	1,068	-237	78		
12505320	**Yakima River at RM 91 at Zillah**	91.2	ms		498	829	-332	60		
462357120153200	Zillah WWTP	89.2	in						22	
12505330	**Yakima River above East Toppenish Drain near Granger**	86.2	ms		587	520	67	113		
12505350	East Toppenish Drain at Wilson Road near Toppenish	86.0	in						173	
12505410	Sub-Drain No. 35 at Parton Road near Granger	83.2	in						535	
12505440	**Yakima River at Bridge Avenue at Granger**	83.0	ms		1,738	1,294	444	134		
462013120113700	Granger WWTP	82.8	in						55	
12505460	Granger Drain at mouth near Granger	82.8	in						884	
12505510	Marion Drain at Indian Church Road at Granger	82.6	in						67	
12507508	Toppenish Creek at Indian Church Road near Granger	80.4	in						228	
12507560	Coulee Drain at North Satus Road near Status	77.0	in						323	
12507580	**Yakima River above Satus Creek at RM 73 near Satus**	73.0	ms		3,251	3,296	-45	99		
12508620	Satus Creek at gage at Satus	69.6	in						831	
12508630	South Drain near Satus	69.3	in						533	

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Total nitrogen (pounds per day)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12508680	**Yakima River above Sulphur Creek at RM 61.3 near Mabton**	61.3	ms		5,235	4,613.9	621.4	113.5		
12508850	Sulphur Creek Wasteway near Sunnyside	61.0	in						3,147	
12508690	Satus Drain 303	60.2	in						32	
46140411959180	Mabton WWTP	59.5	in						18	
12509052	Grandview WWTP	59.0	in						133	
12509050	**Yakima River at Euclid Bridge at RM 55 near Grandview**	55.0	ms		7,126	8,564.7	-1,438.4	83.2		
12509499	Chandler Canal at Bunn Road at Prosser	47.1	out							5,016
4612461119454700	Prosser WWTP	46.4	ms						13	
12509686	**Yakima River at Prosser /downstream bedrock**	43.9	ms		3,233	2,123.0	1,109.5	152.3		
12509690	**Yakima River above Snipes Creek and Spring Creek near Whitstran**	43.0	ms	Used streamflow from station 12509686	3,037	3,232.5	-195.3	94.0		
12509710	Spring Creek at mouth near Whitstran	41.8	in						142	
12509829	Snipes Creek at mouth near Whitstran	41.8	in						56	
12509900	**Yakima River above Chandler Pump at RM 35.9 near Whitstran**	37.0	ms		2,801	3,235.8	na	na		
1250949990	Chandler Canal at Power Return near Benton City	35.8	in	Used water-quality results from station 12509499					2,667	
12510200	Corral Canyon Creek at mouth near Benton City	33.5	in						70	
12510500	**Yakima River at Kiona**	29.9	ms		7,819	5,973.2	1,846.2	130.9		
12511000	Cid Canal at Horn Rapids Dam near West Richland	18.0	out							908
12511210	Horn Rapids Ditch below Horn Rapids Dam near West Richland	18.0	out							160
12511800	**Yakima River at Van Geisan Bridge near Richland**	8.4	ms		2,938	6,751.6	-3,813.6	43.5		

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Total phosphorus (pounds per day)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12487000	**Yakima River at Selah Gap near N. Yakima**	117.0	ms		488		na	na		
12499000	Naches River near Yakima	115.9	in						49	
12485002	Roza Power Plant Return	113.3	in						197	
463447120275200	**Yakima WWTP**	111.0	in						326	
12500445	Wide Hollow Creek near mouth at Union Gap	107.4	in						19	
12500420	Moxee Drain at Birchfield Road near Union Gap	107.3	in						27	
12500450	**Yakima River above Ahtanum Creek at Union Gap**	107.3	ms		1,184	1,106	77	107		
12502500	Ahtanum Creek at Union Gap	106.9	in						8	
12503599	Wapato Main Canal near Parker	106.7	out	Used water-quality results from station 12500450						590
12504490	Sunnyside Canal at Diversion near Parker	103.8	out	Used water-quality results from station 12503950						417
12503950	**Yakima River at Parker**	103.8	ms		129	185	-56	70		
12505320	**Yakima River at RM 91 at Zillah**	91.2	ms		91	129	-38	70		
462357120153200	Zillah WWTP	89.2	in						22	
12505330	**Yakima River above East Toppenish Drain near Granger**	86.2	ms		89	113	-24	79		
12505350	East Toppenish Drain at Wilson Road near Toppenish	86.0	in						12	
12505410	Sub-Drain No. 35 at Parton Road near Granger	83.2	in						35	
12505440	**Yakima River at Bridge Avenue at Granger**	83.0	ms		164	135	29	121		
462013120113700	Granger WWTP	82.8	in						8	
12505460	Granger Drain at mouth near Granger	82.8	in						64	
12505510	Marion Drain at Indian Church Road at Granger	82.6	in						2	
12507508	Toppenish Creek at Indian Church Road near Granger	80.4	in						10	
12507560	Coulee Drain at North Satus Road near Status	77.0	in						15	
12507580	**Yakima River above Satus Creek at RM 73 near Satus**	73.0	ms		273	263	10	104		
12508620	Satus Creek at gage at Satus	69.6	in						56	
12508630	South Drain near Satus	69.3	in						47	

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Total phosphorus (pounds per day)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12508680	**Yakima River above Sulphur Creek at RM 61.3 near Mabton**	61.3	ms		639	376	264	170		
12508850	Sulphur Creek Wasteway near Sunnyside	61.0	in						152	
12508690	Satus Drain 303	60.2	in						4	
46140411959180	Mabton WWTP	59.5	in						1	
12509052	Grandview WWTP	59.0	in						54	
12509050	**Yakima River at Euclid Bridge at RM 55 near Grandview**	55.0	ms		650	850	-200	76		
12509499	Chandler Canal at Bunn Road at Prosser	47.1	out							721
4612461119454700	Prosser WWTP	46.4	ms						25	
12509686	**Yakima River at Prosser /downstream bedrock**	43.9	ms		377	-46	423	-821		
12509690	**Yakima River above Snipes Creek and Spring Creek near Whitstran**	43.0	ms	Used streamflow from station 12509686	360	378	-17	95		
12509710	Spring Creek at mouth near Whitstran	41.8	in						11	
12509829	Snipes Creek at mouth near Whitstran (RSBJOC)	41.8	in						8	
12509900	**Yakima River above Chandler Pump at RM 35.9 near Whitstran**	37.0	ms		359	378	na	na		
1250949990	Chandler Canal at Power Return near Benton City	35.8	in	Used water-quality results from station 12509499					383	
12510200	Corral Canyon Creek at mouth near Benton City	33.5	in						2	
12510500	**Yakima River at Kiona**	29.9	ms		946	763	183	124		
12511000	Cid Canal at Horn Rapids Dam near West Richland	18.0	out							130
12511210	Horn Rapids Ditch below Horn Rapids Dam near West Richland	18.0	out							23
12511800	**Yakima River at Van Geisan Bridge near Richland**	8.4	ms		483	794	-311	61		

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Suspended sediment (tons per day)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12487000	**Yakima River at Selah Gap near N. Yakima**	117.0	ms		58.4		na	na		
12499000	Naches River near Yakima	115.9	in						3.2	
12485002	Roza Power Plant Return	113.3	in						25.8	
463447120275200	**Yakima WWTP**	111.0	in						0.0	
12500445	Wide Hollow Creek near mouth at Union Gap	107.4	in						0.4	
12500420	Moxee Drain at Birchfield Road near Union Gap	107.3	in						3.3	
12500450	**Yakima River above Ahtanum Creek at Union Gap**	107.3	ms		97.2	91.0	6.1	106.8		
12502500	Ahtanum Creek at Union Gap	106.9	in		0.1				0.1	
12503599	Wapato Main Canal near Parker	106.7	out	Used water-quality results from station 12500450						48.4
12504490	Sunnyside Canal at Diversion near Parker	103.8	out	Used water-quality results from station 12503950						33.6
12503950	**Yakima River at Parker**	103.8	ms		33.6	15.2	18.4	220.9		
12505320	**Yakima River at RM 91 at Zillah**	91.2	ms		8.0	33.6	-25.6	23.8		
462357120153200	Zillah WWTP	89.2	in						0.0	
12505330	**Yakima River above East Toppenish Drain near Granger**	86.2	ms		4.4	8.0	-3.6	55.6		
12505350	East Toppenish Drain at Wilson Road near Toppenish	86.0	in						0.4	
12505410	Sub-Drain No. 35 at Parton Road near Granger	83.2	in						1.8	
12505440	**Yakima River at Bridge Avenue at Granger**	83.0	ms		7.1	6.6	0.5	107.4		
462013120113700	Granger WWTP	82.8	in						6.0	
12505460	Granger Drain at mouth near Granger	82.8	in						nd	
12505510	Marion Drain at Indian Church Road at Granger	82.6	in						6.3	
12507508	Toppenish Creek at Indian Church Road near Granger	80.4	in						0.2	
12507560	Coulee Drain at North Satus Road near Status	77.0	in						0.2	
12507580	**Yakima River above Satus Creek at RM 73 near Satus**	73.0	ms		10.5	19.8	-9.4	52.8		
12508620	Satus Creek at gage at Satus	69.6	in						1.5	
12508630	South Drain near Satus	69.3	in						3.3	

Table E1. Mass balance for instantaneous streamflows, total nitrogen loads, total phosphorus loads, and suspended sediment loads in the main stem, selected major tributaries, and canals, Yakima River Basin, Washington, July 26–29, 2004.—Continued

[**Difference:** Calculated–subtracted from measured. Bold site name indicates main stem site. **Abbreviations:** USGS, U.S. Geological Survey; RM, river mile; WWTP, wastewater treatment plant; na, not applicable; ms, main stem; in, inflow; out, outflow]

USGS site identification No.	USGS site name	RM	Type	Comment	Suspended sediment (tons per day)					
					Measured main stem streamflow	Calculated	Difference	Measured value as a percentage of calculated value for mainstem sites	Inflowing	Outflowing
12508680	**Yakima River above Sulphur Creek at RM 61.3 near Mabton**	61.3	ms		105.9	15.3	90.6	693.6		
12508850	Sulphur Creek Wasteway near Sunnyside	61.0	in						13.2	
12508690	Satus Drain 303	60.2	in						0.1	
46140411959180	Mabton WWTP	59.5	in						0.0	
12509052	Grandview WWTP	59.0	in						0.0	
12509050	**Yakima River at Euclid Bridge at RM 55 near Grandview**	55.0	ms		31.3	119.2	-87.9	26.3		
12509499	Chandler Canal at Bunn Road at Prosser	47.1	out							21.2
4612461119454700	Prosser WWTP	46.4	ms						0.0	
12509686	**Yakima River at Prosser /downstream bedrock**	43.9	ms		8.7	10.1	-1.4	85.9		
12509690	**Yakima River above Snipes Creek and Spring Creek near Whitstran**	43.0	ms	Used streamflow from station 12509686	8.7	8.7	0.0	100.0		
12509710	Spring Creek at mouth near Whitstran	41.8	in						1.3	
12509829	Snipes Creek at mouth near Whitstran	41.8	in						1.1	
12509900	**Yakima River above Chandler Pump at RM 35.9 near Whitstran**	37.0	ms		3.6	11.1	na	na		
1250949990	Chandler Canal at Power Return near Benton City	35.8	in	Used water-quality results from station 12509499					10.3	
12510200	Corral Canyon Creek at mouth near Benton City	33.5	in						0.3	
12510500	**Yakima River at Kiona**	29.9	ms		29.6	21.7	7.8	136.1		
12511000	Cid Canal at Horn Rapids Dam near West Richland	18.0	out							1.9
12511210	Horn Rapids Ditch below Horn Rapids Dam near West Richland	18.0	out							0.4
12511800	**Yakima River at Van Geisan Bridge near Richland**	8.4	ms		5.1	27.3	-22.2	18.5		