ENVIRONMENTAL PROTECTION AGENCY

ROCKY MOUNTAIN-PRAIRIE REGION

FY 74 SEGMENT PLAN UPPER SOUTH PLATTE RIVER BASIN (COLORADO) (Water Quality Limited Segment) 17=354

R8 0118

FY 74 Segment Plan for the Upper South Platte River Basin in Colorado (Water Quality Limited)

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John A. Green

Regional Administrator Environmental Protection Agency Region VIII, Denver, Colorado

September, 1973

SUMMARY

In summary, to ensure the protection of water quality in the Upper South Platte Basin and that water quality standards are not violated, permits in the segment should be written as follows:

Facility	Permit Conditions								
	Immediate	By 1975	By 1977						
Fairplay	Present quality but to meet state disinfection standards of 5000 fecal coliform/100ml	BOD ₅ - 25mg/1 SS - 25mg/1	BOD ₅ - 20mg/1 SS - 20mg/1 Fecal coliform 200/100ml						
G & C Camp	II	u	11						
Geneva Ski Basin	It	11	n						
Santa Maria	n	u	н						
Bailey San. Dist.	n	н	и						
Perry Park San. Dist.	и	н	и						
Castle Rock San. Dist.	н	н	u						
Silver Hts. San. Dist.	п	n	"						
Louviers, 3.D.	u	n	п						
Dupont Co.		By Jan. 1975	By June 1977						
(1) Cooling water discharge - 001	BOD ₅ = 10mg/1 NH ₃ -N = 1.0mg/1 NO ₂ -N + NO ₃ -N - 5 mg/1 SS - 30mg/1	BOD ₅ = 10mg/1 NH ₃ -N - 1.0mg/1 NO ₂ -N + NO ₃ -N - 5.0 mg/1	BOD ₅ = 10mg/1 NH ₃ -N - 1.0mg/1 NO ₂ -N + NO ₃ -N - 5.0 mg/1 S S - 5.0 mg/1						
		TSS - 20 mg/1 by Jan. 1974	by June 1977						
Martin Marrietta Co.	BOD ₅ - 30 mg/1	BOD ₅ - 25 mg/l TSS - 5 mg/l by PO ₄ -P - 5 mg/l by June 1974	BOD ₅ - 20 mg/1 TSS - 20 mg/1 PO ₄ -P - _{See} Page by June 1977						
Denver Water Board, Kassler Plant	Present Quality	BPT	BPT						

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STATE: Colorado

BASIN: S. Platte River

SEGMENT: . S. Platte-Source to Chatfield Dam Outlet & Tributaries

INDUSTRIAL

Major

- E. I. Dupont #270
 Martin Marietta #460

Minor

- Denver WTP (Kassler) #724
 Peter Kiewit & Sons #687

MUNICIPAL.

Major

None

Minor

- 1. Bailey
- 2. Castle Rock
- 3. Fairplay
- 4. Louviers
- 5. Perry Park
- 6. Silver Heights
- 7. G & C Camp
- 8. Geneva Ski Basin
- 9. Santa Maria



- I. Introduction The State of Colorado has designated the South Platte River and all tributaries above the outlet of Chatfield Dam as water quality limited. The State has applied this water quality limited designation because of the present generally high water quality and because of projected increasing recreational uses of these water. This segment plan has found that this is true for the segment.
- II. <u>Basin Description</u> The segment can be physically divided into three reaches because of the differences in problems and topography. The reaches used in this water quality limited segment plan are:
 - a. The S. Platte and Tributaries above Waterton.
 - b. The S. Platte below Waterton (from Waterton to the Chatfield Dam Outlet).
 - c. Plum Creek.

a. <u>The South Platte and Tributaries above Waterton</u> - The sources of the South Platte and tributaries are on the eastern side of the Continental Divide and flow through South Park before reaching the Front Range. This headwater area is sparsely settled with nearly all of the land in the San Isabel and Pike National Forests.

The South Platte and tributaries after leaving the Divide, except for the North Fork, flow through South Park, which is a high semi-arid plain. This area has a small population increase during the summer tourist season. South Park is privately owned land with grazing on irrigated land its major economic activity.

At the present time there are few second home subdivisions in this area but at the current rate of growth in other Colorado areas, the State feels this area could also experience such developmental pressures with the resultant required services. The 1972 census for Park County which covers most of this area showed a population of 1,849, with the largest community being Fairplay, with a population of 400. From the South Park area, the South Platte and tributaries pass through the Front Range where the streams are typical fast flowing mountain streams. The North Fork of the South Platte flows southeast from the Divide and joins the South Platte at the town of South Platte at R.M. 352. The entire drainage area of the South Platte above Waterton, with the exception of the South Park area, lies within the Pike National Forest which has very limited amounts of private land holdings. Most of this privately owned land is in the valleys and is used primarily for summer homes and recreational activities. According to the 1970 census, the population of this area, which includes parts of Park, Teller, Douglas and Jefferson Counties, is less than 15,000 persons. The major communities in this area are Bailey, Deckers and South Platte.

The City of Denver Water Board uses the waters originating in these streams as a major source of water for the City and at present, the Denver Water Board has four major water storage reservoirs on the South Platte: Eleven Mile Reservoir, Tarryall Reservoir, Antero Reservoir and Cheesman Reservoir. The City of Aurora also draws some of its municipal water supply from this segment of the South Platte. The Denver Water Board and Aurora divert above Waterton at R.M. 349.2 and R.M. 343.0.

The Northern Colorado Highline Canal also diverts water for irrigation use from this reach with its diversion at R.M. 341.3.

The North Fork of the South Platte is used as an open conduit to carry Denver Water Board transmountain diversion water from the Dillon Reservoir in the Colorado River Basin to the intake at Waterton.

b. <u>The South Platte below Waterton</u> - The South Platte abruptly leaves the foothills at Waterton emerging from South Platte Canyon onto the plains. At Waterton and below there are diversions for muncipal and irrigation use, the largest being for the City of Denver Water Board at R.M. 339.3.

.- 2.--

The City of Englewood uses South Platte water for part of their water supply with the City's diversion in Littleton at R.M. 328.7, some 7 miles below Chatfield Dam.

The character of the River here becomes typical of East Slope streams entering the Plains, that is shallow with a sandy bottom flowing through land that in the past was used for cattle grazing.

The Corps of Engineers is completing construction of the Chatfield Dam and Reservoir, a flood control and recreation project on the South Platte River. The Dam itself is located at river mile 335.2, 4.3 miles below Waterton. This Dam and Reservoir were designed primarily to provide flood protection for the Denver area but storage volume will be available for municipal and industrial water supply storage at a future date through utilization of a higher operating pool elevation.

The Corps has made recreational activities in the reservoir area a significant part of the project. A total of 6,500 acres have been purchased for inclusion in the Chatfield Dam Recreation area. State and Local officials believe that this area will become another major recreational site for the Metro Denver area such as Cherry Creek Reservoir is now. The Jefferson County area to the north of the dam and reservoir has had rapid development in the past five years as developers and builders take advantage of the close proximity of this recreational area and undeveloped land. The 1970 population of this area was 540. The DRCOG estimate for 1985 for the Chatfield area is 9,500 persons, with an estimated year 2000 population of 27,400. At the present time a 3,000 acre planned community called Roxborough Park with a projected 1990 population of 5,000 to 10,000 persons is developing immediately south of Waterton in Douglas County. Presently, the Martin Marietta Company facility near Waterton is the only significantly developed area nearby with a -daily work force of 5,000 persons.

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c. <u>Plum Creek</u> - Plum Creek lies entirely within Douglas County bounded on the south by Monument Hill with the Rampart Range on the west providing drainage for the western half of Douglas County. Douglas County is presently experiencing development pressures as the Denver Metropolitan area urban sprawl spills over into Douglas County. The County had a 1970 population of 8,315 with the primary land usage being cattle grazing. The largest community at present is Castle Rock, the County Seat, with a population of 1,600. Other unincorporated areas of the County are growing at a faster rate and will probably exceed Castle Rock's population by 1980, unless Castle Rock annexes and develops presently open lands adjacent to the City. At present the County does not have a land use plan but is in the process of developing one. From conversations with the County Planner there were, as of 1972, platted lots sufficient to sustain a population of 1,75,000. In the Plum Creek Drainage Basin there are two large developments now underway or planned.

Perry Park is a 45,000 acre development in the southwest corner of Douglas County being developed as a rural upper middle class community featuring central water and sewer systems. At present, the population is less than 1,500 persons.

The other planned community is Castle Pines which is located 2-5 miles north of Castle Rock. Development of its approximately 5,000 acres has not yet begun.

The County hopes to preserve its rural character by limiting development to planned communities such as Roxborough Park, Perry Park and Castle Pines which will be kept isolated from one another with land between these communities being limited to 10-40 acre minimum lot sizes.

Plum Creek is typical of many Eastern Colorado High Plains streams in that after the spring runoff the surface water flow in the stream is minimal, reaching zero flow at times during July, August and September nearly every year. The alluvium of the Creek is very closely tied into the surface stream flow. Plum Creek

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joins the South Platte at River Mile 335.5 in the new Chatfield Dam Reservoir. The reservoir recreation land extends up Plum Creek for approximately two miles and will be developed in the future for various recreational uses.

III. <u>Stream Standards and Water Uses</u> - The South Platte and tributaries from the headwaters to Bowles Avenue in Littleton are presently classified as A, B₁, C, D₁ except for Plum Creek which is not classified. The current Colorado Stream Standards Criteria and the proposed Colorado Stream Standards are attached in Appendix A. The A, B₁, C, D₁ standard provides for protection of the water for drinking water, cold water fisheries, irrigation and industrial use. The unclassified status of Plum Creek only requires that wastewater dischargers to the stream meet the basic discharge standards.

The South Platte and tributaries above Chatfield Dam, except for Plum Creek, are well known trout fishing streams and receive a considerable amount of fishing pressure. However, the primary usage of the streams is "for the storage and supply of public water supplies for the Denver Metropolitan Area with almost all surface water rights in the basin owned by municipalities."¹

The construction of Chatfield Dam and Reservoir will greatly increase the recreational aspects of water use in the South Platte in the recreation area.

The EPA has recommended that the South Platte and tributaries above Littleton be reclassified to include body contact recreation, B_3 . The Colorado Water Quality Control Commission has scheduled public hearings in November on proposed reclassification of streams in Colorado and changes in the stream classification standards. The State has proposed that the mainstem and all tributaries of the South Platte above Exposition Avenue in Denver (which would include Plum Creek) be classified as B_1 . This new classification classifies these waters as suitable for all purposes except primary contact recreation such as swimming and water skiing, and also provides for protection of the streams as cold water fisheries.

¹ Page 2 Interim Basin Plan for Upper S. Platte Basin in Colorado, Colo. Water Quality Control Division, July, 1971.

· · · · · · · · · · · · · ·	<u></u>	Tab]	08 	00025 3 25 00.0 00th PLATI 3 COLORADO (SSOURI R)	105 13 00 16 AT SOU 1 1 VER	0.0 4 TH PLATTE						
					SC 2]	DUTH PLATI	E	77777777				
1.1.7.4 1001600					C	0000						
1 VUEX 1021000 (1/701100/00			••	· ·								
PAR NHETER	• •	•	NUMBER	ME AN	VARIANCE.	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
GOCIL WATER	TE.MP	FAHN	27	43.9629	123.038	11.0923	.252309	2.13471	63.0000	32.0000	68/10/29	72/09/28
- 60170 TUPB	JKSN	JTU	20.	11.5650	. 82.7213	9.09513	.786436	2.03373	36.5000	2.10000	63/10/29	72/05/10
OFLES CNOUCTVY	AT 25C	MICROMH O	22	214.955	9321.51	96.5480	•449155	20.5841	470.000	75.0000	68/10/29	72/09/23
53296 05		MG/L .	10	8.85999	2.13832	1.46230	.165045	.462420	11.5000	. 7.50000	70/10/20	72/09/28
00310 B0D	5 DAY	MGZL	7	1.44286	.429522	.655379	.454223	.247710	2.20000	•500000	69/02/26	72/08/29
	TOT 101	SU	2(20163	115488_		- •044498. 1 00500	20 5014	102 000		60/02/26	72/09/28
COSUS RESIDUE			22	39.3333	3313.00	57 5500	1.90509	12 2607	290 000	54.0000	69/10/20	72/09/28
	UISS-105 _		CC	20-2333	241.457	15,5392	.766223	6.34385	46-0000	3,00000	69/02/26	72/09/28
00545 BESTOUE	SETTIRIE	MLZ	6	.116667	.001667	040825	A349927	.016667	.200000	.100000	69/02/26	72/08/29
- 00510 - NH3-N	TOTAL	MGZI	19	.068947	.005310	072869	1.05688	.016717	.250000	.000000	68/10/29	72/05/10
(21.15 NO2-N	TOTAL	MG/L		001053	.000004	.001929	1.83212		006000	000000	69/11/27	72/05/10
00020 N03-N	TOTAL	MG/L	51	.190952	.086469	.294056	1.53995	.064168	1.00000	•000000	68/10/29	72/05/10
10650 T P04	P04	MG/L	20 .	.167500	.067440	. 259693	1.55041	•058069	1.10000	.000000	68/10/29	72/05/10
00720 CYANIDE	CN	HG/L	9	.000000	.000000	.000000		.000000	.000000	.000000	69/05/26	72/09/28
00000 TOT HARD	CACO3	MG/L	21_	. 84.7619	1103.69	. 33.2219	•391943	7.24961	162.000	.38.0000	68/10/29	72/06/23
60710 CALCIUM	CACOB	MG/L	21	54.5238	639.763	25,2935	•463899	5.51950	115.000	.19.0000	63/10/29	72/06/23
GISSU MGNSIUM _	CAC03	MG/L			10.7572	3.2/981		•/15/14	16.0000		69/10/29	12/00/23
	NAIUISS		21	13.9048	1 20057	9.10443	+034/71	248765	5 60000	1.00000	68/10/29	72/06/23
60940 CHLORIDE			21	15.4286	148.957	12,2048	.791053	2.66331	58.0000	2-00000	68/10/29	72/06/23
00945 SULFATE	504	MGZI	21	30.6190	170.949	13.0747	.427013	2.85314	60.0000	10.0000	68/10/29	72/06/23
00950 FLUORIDE	FIDISS	MG/L	10	.850000	.373889	.611464	.719370	.193362	2.40000	.200000	69/05/26	72/09/28
01400 ARSENIC	AS.DISS	UG/L			.000000	.000000			.000000	.000000	64/10/29	55/60/52
01020 80PON	BODISS	UG/L	18	24.4444	1579.09	39.7371	1.62563	9.36627	120.000	.000000	64/12/11	72/09/28
01025 CADMIUM	CO+DISS	UG/L	18.	000000	.000000	.000000		•000000	•00000	•000000	68/10/29	72/09/28
61935 CHROMIUM	HEX-VAL	UG/L	10	.000000	.000000	.000000		.000000	.000000	.000000	69/05/26	72/09/28
01040 COPPER _	CU-DISS	UG/L			.000000	.000000	···· ·	000000	000000	•000000	69/05/26	72/09/28
61045 IRON	LATOI	UG/L	21	266.666	31083.4	176.305	•661144	38.4729	650.000	.000000	68/10/29	72/09/28
DINAY, LEAD	PE;0155			0000000.		16 3907	3 07702			•000000	69/05/25	72/09/28
D1062 MOLY	MO.TOT		∠∪ ว	-000000	.000000	1000000	3001173	-000000	-000000	-000000	71/02/25	72/09/28
51075 STIVER	LG.DISS		<u></u>	.000000	000000	.000000		.000000	.000000	.000000	69/02/26	71/02/25
01050 ZINC	ZN, DISS	UGZL	21	68.0952	36816.2	191.875	2.81775	41.8706	720.000	.000000	68/10/29	72/09/28
01145 SELENIUM	SE.DISS	UG/L	11	.000000	.000000	.000000		.000000	.000000	.000000	68/11/27	72/09/28
01501 ALPHA	TOTAL	PC/L	6	_13.9000_	186.912	13.6716		5.58140	. 41.0000	5.60000	69/06/20	72/01/24
01502 ALPHA-T	ERROR	PC/L	6	6.06666	2.37873	1.54231	•254227	•62964 6	8.70000	4.00000	69/06/20	72/01/24
03501 BETA	TOTAL	PC/L	3_	_3.12000.	23.3532	4.83251	1.54888	2.79005	. 8.70000	.300000	69/04/21	69/10/30
03502 BETA-T	ERROR	PC/L	3	2.95333	21.4405	4.63039	1.56785	2.67336	8.30000	•260000	69/04/21	69/10/30
• • • • • • • • • • • • • • • • • • • •												
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	Table 1		000025 38 25 00.0 SOUTH PLATT	000025 38 25 00.0 105 13 00.0 4 South Platte at south platte							
	·		MISSOURI RI SOUTH PLATT 21COL001 0000	VER	. זרדדדרד						
INDEX 1021500 MILES 1149.40 FAMANETER 31505 TOT COLI - MPN CONF 31615 FEC COLIMPNECMED 38260 MBAS _71900 MERCURYHG+TOTAL	NUMB /100ML /100ML MG/L UG/L	ERMEANVAR 23 808.956 150 19107.768 230 10 .000000 .00 2000000 .00	IANCE_STAN_DEV_ 60064 1249.03 628.8_ 153.717_ 00000 .000000 00000000000_	COEF VAR 1.54399 1.42636	STAND ER 1 260.440 35.2650 .000000	4AXIMUM] 4600.00 490.000 .000000 .000000 _	11NIMUM _ BE 15.0000 68 .200000 68 .000000 68 .000000 70	G DATE_ENI /12/11 72. /12/11 72. /12/29 72. /12/29 71.	D DATE /08/29 /03/29 /05/10 /02/25		
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		Table	e 2				
Phosphate	Concentration	Loads	and	Stream	Flow	in	the
Sou	th Platte at	South F	Plati	te, Colo	orado		

Date Sampled	Time of Day	T-PO ₄ -P mg/1	T-P0 ₄ -P 1bs	DWB ² Diver- sion CFS	Total Flow CFS
68/10/29	11:30	0.00	0	7	560
68/11/27	15:30	0.00	0	105	250
68/12/11	11:00	0.03	35	53	217
69/02/26	11:40	0.13	111	53	159
69/04/21	11:45	0.03	117	112	726
69/05/26	11:15	0.00	0	0	2,290
69/06/20	11:55	.37	3,065	0	1,540
69/07/18	11:00	.03	195	135	1,210
69/10/30	11:35	.03	53	7	329
69/11/20	10:45	0.00	0	7	217
69/12/11	10:55	.07	58	7	156
70/01/29		.017	17	0	182
70/02/26		0.00	0	0	122
70/04/23		.017	33	0	360
70/06/23	11:30	.13	681	0	974
70/07/21	11:00	.03	159	0	985
70/10/20	10:55	.15	273	0	346
70/02/25	12:05	.017	11	0	122

2 From Denver Water Board operations data

						00024						
		Ta	ble 3		39	36 00.0	105 02 00	•0 4				
					S(DUTH PLATT	E ABOVE. L	ITTLETON.				
					08	B COLORADO						
					M	ISSOURI RI	VER					
					S	DUTH PLATT	ε					
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					C	0000						
119EX_1021500												
MILES 1147.40 D/D/METED	• •	•	NUMBED	MEAN	A DTANCE	STAN DEV	COFE VAR	STAND FR	MAXTMUM	MINIMUM	BEG DATE	END DATE
	TEMP	EAHN		49,6970	128.033	11, 3152	227683	1.96972	69.0000	34.0000	68/11/27	72/09/28
00070 TURB	JKSN	JTU	24	81.9416	21522.7	146.706	1.79038	29.9463	700.000	5.50000	63/11/27	72/04/07
00095 CNDUCTVY	AT 25C	MICROMHO	28	394.643	6979.00	83.5404	.211686	15.7877	500.000	156.000	69/02/26	72/09/28
00300 DD		MGZL	15	8.34666	1.54412	1.24263	.148877	.320845	11.0000	6.00000	70/11/05	72/09/28
00310 BOD	5 DAY	MG/L	16	1.96875	.452973	.673033	.341859	. 168258	3.50000	1.00000	68/12/11	72/08/29
_00400 PH		SU	33	_7.72727_				050243.	8.80000	_7.30000.	.68/11/27	72/09/28
00505 RESIDUE	TOT VOL	MG/L	12	12.5000	49.5454	7.03885	.563108	2.03194	23.0000	4.00000	68/12/11	721.04/07
00515 RESIDUE	_DISS-105_	C_ MG/L	25 .	232.360	3212.37	56.6778	243922	_11,3356	310.000	114.000	58/11/27	72/05/23
00530 RESIDUE	TOT NELT	MGZL	12	81.3333	6452.07	80.3247	•987599	23,1877	238.000	7.00000	68/12/11	12/04/07
_00545 RESIDUE	SETTLBLE	ML/L			•724102	.850942	. 2.08722	-236009	_ 3,20000	.100000	68/12/11	12/08/29
00610 NH3-N	TOTAL	MG/L	22	.134091	.036111	•1900Z9	1.41/1/	•040514	.800000	•000000	68/11/2/	72/04/07
_ UUDID_ NUZ-N		M5/L	<u> </u>	- 0100010- - 10000	15 122	- 040346 . 3 80004		- + UU7(1)		- 000000	68/11/27	72/04/07
00650 T 804		MGZL	20	332608	385365	620778	1.86639	129441	3.00000	-000000	69/11/27	72/04/07
00720 CYANIDE	F04		12	-000000	•000000	.000000	_ 1100037 _	.000000	-000000	.000000	69/05/29	72/04/07
00900 TOT HARD	CACO3	MGZL	21	138.739	1064.75	32.6305	.235194	6.80394	192.000	55.0000	69/11/27	72/04/07
00910 CALCIUM	CAC03	MGZI	23	94.4348	658.170	25.6548	271667	5.34940	137.000	44.0000	68/11/27	72/04/07
00920 MGNSIUM	CACO3	MG/L	23	10.5217	7.07907	2.66065	.252872	. 554784	16.0000	3,00000	68/11/27.	72/04/07
00930 SODIUM	NA.DISS	MG/L	22	24.6818	67.9421	8.24270	,333959	1.75735	39.0000	7.00000	68/11/27	72/04/07
00931 SODIUM	ADSBTION_	RATIO	22	. 895454	. 053790	.231927		. • 049447	1.30000	•400000	68/11/27	72/04/07
00940 CHLORIDE	CL	MG/L	25	30.5600	100.924	10.0461	. 328733	2.00922	46.0000	6.00000	68/11/27	72/05/16
_00945 SULFATE		MG/L	23	53.8261	225.881	15.0293	. •279220	3.13383	74.0000	22.0000	68/11/27	72/04/07
00950 FLUORIDE	F.DISS	MG/L	13	.976923	.110256	.332048	•339892	.092094	1.60000	.300000	69/05/29	72/04/07
_01000 APSENIC	AS+DISS	UG/L	12	000000					. 000000		69/05/29	72/09/28
01020 BOPON	BOISS	UG/L	20	23.5000	2013.42	44.8/12	1.90941	10.0335	130.000	•000000	63/12/11	72709725
01025 CADMIUM	CD,DISS	UG/L		•173913	.695652		-4•19583	1/3913	. 4.00000	. •000000	60/05/20	72/09/28
01032 CHROMIOM	HEX-VAL		11	•000000	.000000	.000000		.000000	.000000	•000000	69/05/29	72/05/10
_01040 COPPER				397 500	255507	505.477	1.27164	103-180	2400-00	-000000	69/11/27	72/09/28
01049 1540	PR-DISS		11	-000000	.000000	.000000		.000000	-000000	.000000	69/05/29	72/05/10
01055 MANGNESE			23	32.6087	21274.7	145.858	4.47299	30.4136	700.000	.000000	68/11/27	72/09/28
01062 MOLY	MO,TOT	UG/L	1	.000000						.000000	72/09/28	72/09/28
01075 SILVER	AGODISS	UG/L	7	.000000	.000000	.000000		.000000	.000000	.000000	69/02/26	70/12/21
_01090 ZINC	ZN+DISS	UG/L	23	64.3478	_36771.1	_ 191.758.	2.98002.	39.9843	. 760.000		68/11/27	72/09/28
0:145 SELENIUM	SE.DISS	UG/L	23	.434783	2.16601	1.47174	3.38499	.306878	6.00000	•000000	68/11/27	72/09/28
01501 ALPHA	TOTAL	PC/L	6_	_9.55000	5.69902.				12.3000.	5.60000	69/05/29	.72/09/28
01502 ALPHA-T	ERROR	PC/L	6	9.39999	9.86006	3.14007	.334050	1.28193	13.3000	4.80000	69/05/29	72/09/28
.03501 . BETA	TOTAL	PC/L		10.1000			••••		. 10.1000	-10.1000	70/04/28	70704728
03502 BETA-T	FRROR	PC/L	1	9. 20000					∀ •20000	7.20000	10/04/28	10/04/28
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		Table 3			0 39 50 08 MI	00024 0 36 00.0 DUTH PLATT 0 COLORADO SSOURI RI	105 02 00 E ABOVE L	D.0 4 LITTLETON				
		<u></u>			SC 21 0	OUTH PLATT Colnol 1000	Έ	רדדרדדד				
MILES 1149.40 PAFAMETER 09503 PA-226 [09504 RA-226-D 31505 TOT COLI P 31615 FEC COLI P 38260 MBAS 71900 MERCURY	DISOLVED ERROR MPN CONF MPNECMED HG•TOTAL	PC/L PC/L /100ML /100ML MG/L UG/L	NUMBER_ 1 29 27 23 4	MEAN • 160000 • 090000 866•483 199•481 • 000000 • 000000	VARIANCE 1592418 50309.2 .000000 .000000	STAN. DEV _ 1261.91 224.297_ .000000 000000 _	COEF_VAR. 1.45636 _1.12440_	.STAND_ER_ 234.331 _43.1660_ .000000 000000_	MAXIMUM 160000 .090000 5420.00 .000000 000000	MINIMUM • 160000 • 090000 30.0000 - 2.00000 • 000000 • 000000	BEG DATE 72/09/28 72/09/28 68/12/11 68/12/11 68/11/27 70/11/05	END DATE 72/09/28 72/09/28 72/08/29 72/08/29 72/08/29 72/06/23 72/03/20
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The Corps of Engineers, in their recreation plans for Chatfield Reservoir, have included body contact recreation development which the present and proposed State standards do not recognize. The Denver Water Board is also on record that their policy is no body contact recreation in any Denver Water Board water supply, whether a river, lake or reservoir. The State has also said that Colorado policy is that there be no body contact recreation classification above 7,500 ft. elevation.

With the filling of Chatfield Reservoir and with the City of Littleton's proposed park along the South Platte below Chatfield Dam, it can be expected that strong public pressures will be exerted to have the South Platte from Bowles Avenue to Waterton, including Chatfield Reservoir, be classified for body contact recreation.

Presently, Plum Creek's major use is probably that of a drainageway for summer storms and as a conveyor of wastewaters from the few communities on the creek. However, with the transition of Douglas County from a rural county to a Denver bedroom community the use of the creek and flood plain as greenbelt and open space land will be of equal importance to its present uses.

IV. Assessment of Present Water Quality and Waste Dischargers in Segment

a. <u>South Platte above Waterton</u> - Water quality samples in this area show no significant problems. Dissolved oxygen is near saturation with fecal coliform and nutrients generally low and not a problem. Samples taken since 1968 at South Platte, Colorado, R.M. 350 by the Colorado Department of Health are shown in Table 1. (Colo. #201 at South Platte)

Point sources above Waterton are from the few small communities in the area. The Denver Water Board samples these point sources and from their data it appears that the major problem from some of these sources is poor disinfection resulting in high total and fecal coliforms in the discharges.

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The data at South Platte show that there are no violations of the present A or B classifications at South Platte. This is due to the small wastes flows and distance traveled. Table 4 lists point sources and estimated loads.

An analysis was made of the phosphate concentrations and total pounds of phosphates in the South Platte River at South Platte to see if the Denver Water Board diversions from Dillon Reservoir were introducing significant amounts of phosphorous which could affect the water quality in Chatfield Dam Reservoir. Analysis of the available data shows no correlation between phosphorous concentrations or loads in the South Platte and the amount of water that was diverted by the Denver Water Board down the North Fork of the South Platte.

b. <u>South Platte Below Waterton and Plum Creek</u> - Water samples are taken in the South Platte River at River Mile 330 above Littleton.

At present there are no sampling stations on Plum Creek. Water samples taken at R.M. 330 reflect the effects of dischargers in both Plum Creek and the South Platte River below South Platte, Colorado. Samples taken since 1968 at this station by the Colorado Department of Health are indicated in Table 3. There were no stream violations for D.O. or fecal coliform. However, the mean value of total phosphates and ammonia doubled in concentration, while nitrates increased by over a factor of 10; between R.M. 350 and R.M. 334.9.

	<u>R.M. 350</u>	<u>R.M. 334.9</u>
T-PO -P mg/1	0.05	0.11
NH3-N mg/1	0.07	0.13
NO ₃ -N mg/1	0.19	2.18

While these concentrations presently exceed EPA recommended limits for stream to prevent algal problems, no evidence of such problems has been noted by EPA. However, with the filling of Chatfield Reservoir the previous nutrient levels could create problems in the reservoir.

The major point sources in this reach are the Martin Marietta Company on the South Platte and the DuPont Company and the town of Castle Rock on Plum Creek. Table 4 lists the loads discharged by these sources.

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A 1971 EPA investigation of fecal coliform sources in the South Platte below Waterton concluded that if proper disinfection practices are observed at the Martin Marietta Wastewater Treatment Plant, fecal coliform standards for a B₃, (body contact) classification could be met below Waterton except during heavy runoff conditions when non-point sources would probably result in fecal coliform violations. $\frac{4}{}$ With the filling of Chatfield Reservoir it will be essential that good disinfection be practiced by Martin Marietta.

The Roxborough Park area does not appear to be a potential problem since the development will reuse the wastewater treatment plant effluent on a golf course and greenbelt area.

V. Future Water Resource Projects and Dischargers in Segment

a. Water Resource Projects - (1). The Denver Water Board presently imports 40,000 to 80,000 acre-feet of water from Dillon Reservoir in the Blue River Basin to the North Fork of the South Platte. The DWB currently has sufficient water available in the Blue River Basin to divert up to 106,000 acre-feet to the North Fork; by 1985 it will be diverting that much water to the North Fork. If the Eagle-Piney project is developed, it will increase the flow even more.

Presently, the nutrient concentrations in the South Platte are low enough that they are not causing problems. However, if and when the DWB diverts this additional flow, nutrient levels in Dillon Lake may have to be limited to prevent problems in the South Platte Basin, especially with Chatfield Reservoir in operation. To date, there have not been any studies conducted to determine critical nutrient levels for the South Platte river or Chatfield Reservoir. (2). The Bureau of Reclamation has proposed construction of two dams on the South Platte between the communities of South Platte and Waterton in Platte Canyon. The purpose of these dams is for power generation and water storage for the Metropolitan Denver Area. The Two Forks Dam would provide for the

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South Platte Survey of 1971 by DFIC, EPA. Bacteriological Investigations of the Upper South Platte River Basin, Technical Support Branch, Surveillance & Analysis Division, EPA, Region VIII

power pool and water storage while the Turkshead Dam, approximately four miles downstream, will be a re-regulating dam. The Two Forks Dam will provide for 975,000 acre-feet total storage and create a lake of 6,215 surface acres. The Bureau has prepared an environmental assessment for the project, but the assessment does not appear to adequately deal with the possible nutrient problem which could be caused by the additional Dillon Reservoir Diversions since the environmental assessment presumes that the waters of Dillon Reservoir will continue to be of a high quality.

(3). An alternative to constructing the dams in the Platte Canyon identified in the above assessment is the transfer of surplus Blue River Basin water from the Platte Canyon to Plum Creek and the construction of a dam and reservoir on Plum Creek to provide the required water storage. If this alternative should be selected, dischargers in Plum Creek will have to be examined in more detail to determine what effluent quality will be required to meet the stream standards.

b. <u>Projected Load Increases</u> - (1). <u>The South Platte Above Waterton</u> - With the proposed Two Forks Dam and Reservoir, some existing communities in the project area will have to be relocated. At that time new wastewater treatment facilities would be constructed for the communities.

The population in the South Platte Basin below South Park probably will not grow significantly because most of the land is Forest Service land and therefore is not available for development.

The South Park area probably will experience a significant increase in summer homes if the State does not impose stricter land use controls. For the purposes of this study the only point sources projected for the next 2-5 years are the existing ones discharging at full present capacity.

(2). <u>South Platte below Waterton</u> - The area in Jefferson County tributary to Chatfield Reservoir is expected to grow significantly in the next 2-5 years,

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520373444		1.0.0			••••••									
	1	1		1	Plant Description	Pop. Equiv.	Pop. Equ	iv.	Est: P	resent	t Efflu	ient 🗅	uality	
	Stream	River Mile	County	Stream Class		Design Cap	Served	FLOW mad	B0D5 ma	16	P04 mg71	15	Fecal =/100m1	n, Other
Fairplay	Middle Fork of the Sout Platte	443A	Park	А, В1, С, ^D 1	Aerated Lagoon	700	400	0.05	30	12	8	3.2	0	
G & C Camp	u	445A	aPark	u	Extended Aeratic	n 300 .	300	0.05	40	17	8	3.2		_
Goneva Ski Basi	North n Fork at S. Platte	350/46	Park		Extended Aeratic	100 Maiddi	e Fork lota 100	0.10	40	3	⁻ 8	6.4 >1	UK	
Santa Maria	U	350/29	Park	n	Lagoon	200	100	0.01	50	3	8	ול	UK	
Bailey \$.D.	1	350/20	11	u	Extended Aeratic	n 300 Nor	300 th Fork Tota	0.03 1 0.0	40	10	8	2.0	10,000	-
Perry Park	W. Plum Creek	356/25	douglas	Unclass.	Extended Aeratic	n 300	300	.03	20	5	8	20	5,000	
Castle Rock S.D	n -	336/15	Douglas	Unclass.	Aeration Lagoon, 2 polishing Lagoons	2,500	1,800	0.2	35	56	8	12	UK	
Silver Heights S.D.	H	336/12			Lagoon	100	165	0.01	40	3	8	1.0	UK	
Lou viers S.D.		336/7.3		ii	2-lagoons	350	350	0.04	40	13	8	3	UK	(140 ₃ + i 30 mg
Dupont Co.		336/6.3		н	(1) Cooling water discharges			1.0	5					or 12
					(2) Process water Discharge	Pl	um Creek Tot	$\frac{0.5}{a1}$	8	77	 	24		-

lable 4

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Facility	r	Loc	ation	·	Plant Description	Pop. Equiv.	Pop. Equ	iv.	Est: F	resen	t Efflu	ent O	ualitý
	Stream	River Mile	County	Stream Class		Design Cap	Served	FLOW	COD5 mgll	16	P04 mg11	16_	Fecal #/100ml
Martin Marrietta	Main Stem of the S. Platte	341.1	Jefferson	Α, Β ₁ , C, D ₁	Trickling Filters in series with claritiers for sani- tary wastes, dischar after disinfect.	0.5 mgd ge	5,000 max.	0.5mgd	40	170	15	60	5,000
					Batch treatment of indust. wastes with lime, clarification & discharge. For untreatable wastes discharge to evapora tion lagoon.	N/A -	0.5	0	0	0	5	.10	C
Denver W.B.		339.0	H	•	Washing of infili- tration galley sand on a semi-annual basis.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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but will probably not have any wastewater treatment plant which will discharge to the reservoir. The City of Littleton has contracts with sanitary districts in nearby Jefferson County areas which will probably serve this area.

The Martin Marietta plant has industrial wastes which include hexavalent chrome, but no significant amounts of this material or other heavy metals have been found at the R.M. 330 sampling location. This may be due to the fact that, at present, Martin discharges its "potent" industrial wastes in an evaporation pond on Company property.

(3). <u>Plum Creek</u> - This drainage area is the area which will probably experience the most growth in the next 2-5 years with increases in most existing discharges and the introduction of new dischargers such as Castle Pines if the development is approved. The Perry Park development intends to use its effluent for golf course irrigation within the community. If this course of action is followed it will eliminate one of the largest potential dischargers in Plum Creek. The Roxborough Park development also intends to utilize land disposal.

There are no projected new industrial waste flows in the area. Because of the proposed urban development in the Plum Creek Basin, non-point source pollution could be a significant pollution source in the future although at present its impact in the basin is estimated to be minimal.

VI. Effluent Standards

(a). <u>Federal</u> - The EPA has promulgated secondary treatment standards which must be met by all municipal dischargers by July 1, 1977, These are attached in the Appendix. EPA is developing BPT effluent guidelines for industries; at the present time there are no National BPT effluent guidelines for the Martin Marietta or the Dupont industries. (b). <u>State</u> - The State of Colorado has adopted effluent standards for the State effective on January 15, 1973, with two additional steps effective July 1, 1975, and July 1, 1978. On these

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dates the State standards will be more restrictive than Federal standards with the exception of fecal coliform limitations. The State standards are attached in the Appendix.

At present it is EPA Region VIII's policy to require point sources to meet the most strict legal discharge requirements, be they State or Local. VIII. <u>Maximum Allowable Loads</u> - A water quality model for the South Platte River Basin has been developed for EPA. This basin model of the South Platte extends from the outlet of Eleven Mile Reservoir on the South Platte to Julesburg and includes the North Fork of the South Platte and the Plum Creek tributaries to their headwaters. This model was used in developing the waste load allocations for the Upper South Platte Segment. The South Platte above Eleven Mile Canyon Reservoir was analysed using the "Simplified Mathematical Modeling of Water Quality" developed for EPA. Table 5 has the estimated flows from the point sources that are expected to be discharging in 1978.

(a). <u>Middle Fork Reach</u> - Application of the Colorado 1975 effluent standards and the Federal 1977 secondary treatment effluent standards to the two present dischargers at the estimated 1978 flows showed that the stream standards would be met.

The analysis showed a 0.2 mg/l D.O. deficit with a minimum D.O. concentration of 6.8 mg/l.

The NH₃-N concentration expected in the stream at 1978 estimated flows is 0.28 mg/l and does not appear to be a potential problem. The EPA and the State has not yet adopted a limitation for ammonia concentrations for protection cf fisheries but this concentration should not create toxic conditions for fish.

Expected total phosphate concentrations at 1978 estimated flows are 0.08 mg/l T-PO₄-P which is below EPA and proposed state stream standards for flowing streams and should present no problems.

Table 5 contains the projected waste flows and required effluent quality

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to meet 1977 stream and effluent standards.

To be sure that stream standards will not be violated a safety factor should be applied in determining the maximum allowable loads. For nearly pristine waters such as the South Platte above Waterton it is believed that a high factor of safety should be used, and from the analysis of D.O. sag it is believed that the effluent limits studied would provide a sufficient factor of safety.

Assumptions used in applying the model were:

Treatment Level - High Rate Biological
 Design low flow - 10 cfs
 Depth of stream - 1-2 feet
 Background D.O. deficit - Zero
 Background TPO₄-P and NH₃-N concentration - Zero
 D.O. at saturation at 9,000 feet elevation at low flow conditions at a temperature of 16 C - 7.0 mg/l
 pH of water at low flow - 7.0

(b). <u>North Fork</u> - The analysis of this tributary indicates that if the present dischargers with projected 1978 flows meet the 1975 and 1978 State effluent standards, and 1977 Federal effluent standards then stream standards would be met.

The analysis showed a 0.06 mg/l D.O. Deficit with a minimum D.O. concentration of 6.8 mg/l.

The NH₃-N concentration expected in the stream at estimated 1978 flows is 0.2 mg/l NH₃-N and does not appear to be a potential problem at this concentreation.

Expected T-PO₄-P concentrations at 1978 estimated waste flows are 0.1 mg/l which is at the recommended maximum EPA and proposed state stream standards for flowing streams. If Two Forks Dam and Reservoir is constructed, the existing dischargers may be required to have phosphorous limitations on their effluent. Additional studies should be made in the future to determine what nutrient levels will create water quality problems in this segment. (See Section VIII: Nutrient Analysis of Chatfield Reservoir) Assumptions used in applying the model were:

(1). Design Low Flow - 125 cfs

- (2). (3). Background D.O. Deficit - Zero
- Background T-PO₄-P 0.01 mg/1
- (4). Background NH₃-N - 0.02 mg/1
- (5). D.O. at saturation at 8,000 foot elevation at low flow conditions at a temperature of 16 C - 6.8 mg/1
- (6). pH of water at low flow 7.0

From the expected water quality it appears that a sufficiently high safety factor is present to meet stream standards under all conditions.

(c). Plum Creek Reach - The analysis of this tributary indicates that if the present and expected dischargers for 1978 meet the 1978 State effluent standards and the 1977 Federal effluent standards, then stream standards will be met.

The analysis showed a 2.2 mg/l deficit with a minimum D.O. of 5.3 mg/l at R.M. 6.3. If Plum Creek is classified as a B_2 stream the minimum D.O. allowable would be 5.0 mg/l.

The NH₃-N concentration at 1978 waste flows is approximately 2.0 mg/l. Since the toxic affects of ammonia to fish are dependent on the pH of the water and since there is no data available on the pH level of Plum Creek, a program of monitoring the in-stream pH should be instituted to determine what free ammonia concentrations can be expected with the discharge of NH3-N concentrations expected in 1978.

Expected PO_{4} -P concentrations in the stream are 1.7 mg/l, well above desired maximum phosphorous levels of 0.1 mg/l. As a result of the expected high nutrient levels; 2.0 mg/l NH₃-N, 6.4 mg/l NO₃-N l.7 mg/l PO₄-P, algal problems in Plum Creek and the Plum Creek Arm of Chatfield Reservoir may occur depending on the turbidity levels in the Creek and Reservoir.

The turbidity in Chatfield Reservoir in the Plum Creek vicinity is expected to be quite high and the Corps of Engineers is going to relocate their sailboat harbor from the Plum Creek area because of this anticipated sediment. The pre-

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sence of thismuch turbidity may make algal problems in this area minimal, and indicate again the need for more study to determine if there will be an algal problem in the area.

Assumptions used in applying the model:

- Design low flow 0.5 cfs above Dupont, R.M. 6.3, and 2.6 cfs below (1). R.M. 6.3
- (2). (3). Background D.O. Deficit above R.M. 28 - Zero
- Background TPO₄-P above R.M. 28 0.10 mg/1
- Background TNH3-N above R.M. 28 0.20 (4).
- D.O. saturation @ 5,500 feet elev. at low flow conditions at (5). a water temperature of 22.4 C - 7.5 mg/l
- (6). pH of water at low flow - 7.0

(d). Below Waterton Reach - Analysis of the South Platte below Waterton which also includes the Plum Creek discharge reveals that at low flow conditions (35 cfs) in the South Platte just upstream of Bear Creek the minimum D.O. will be 7.3 mg/l at R.M. 325, using 1978 State effluent standards. This analysis did not consider the operation of Chatfield Dam but with the BOD concentration of 1.3 mg/l there should not be an appreciable D.O. depletion in the reservoir from the BOD loading.

VIII. Chatfield Dam Reservoir Nutrient Analysis

Chatfield Dam will be operated with a sediment and recreation pool of some 1150 surface acres and a pool volume of some 20,000 to 25,000 acre-feet. Operation of the Reservoir will be to discharge the same volume of water that flows into the reservoir except during periods when flood conditions prevail downstream or when flooding conditions are expected downstream. During these periods releases of water from the Reservoir will be held to a minimum, with release of the stored floodwaters after the downstream waters have fallen below flood stage.

The average yearly flow past the USGS gaging station at Littleton below Chatfield Dam is 229 cfs, or 165,900 acre-feet/year. The combined total flow into Chatfield Reservoir as measured at the USGS gaging stations at Waterton, Colorado and on Plum Creek 7.5 miles above the mouth are 201 cfs or 145,800 acre-feet/year. The expected average year flow through the Reservoir then is approximately 150,000 acre-feet/year. With a normal recreational pool volume of 20,000 acre-feet, the reservoir will have an average flow-through time of $\frac{20,000}{150,000}$ x 12 = 1.6 months. Flow through the Reservoir will not be uniform how-150,000

ever, since the Reservoir will be operated in such a manner to maintain a nearly constant recreational pool elevation and to let outflows equal inflows. The pattern of flow in the South Platte at Waterton is such that the discharges during the months of April, May, and June and July are probably 50% of the yearly discharge.

These months also correspond with the periods of greatest potential algal problems. During these high flow months, the monthly discharge will be approximately 20,000 acre-feet which would be a turnover time of approximately one month. However, the flow through time in the Reservoir will also be affected by the configuration of the lake, differences in water temperature between the lake water and the inflowing water and any stratification that is present in the lake. Because of these factors the residence time in some of the shallower bays and backwaters in the reservoir could be significantly greater than the average lake residence time. For evaluation of possible eutrophication problems nutrient concentrations in the lake are predicted to be nearly the same as if the flow through times were based on plug flow throw through the Reservoir and complete mixing of the lake waters. Based on this, the following nutrient concentrations are possible depending on the level of control placed on the dischargers.

(1). Background concentration of PO_4 -P, NH_3 -N, and NO_3 -N above the Martin Marietta Discharge at design low flow conditions of 42.0 cfs and application of 1978 State effluent standards for dischargers are:

<u>Conc.</u>	Total_Load/Day
PO ₄ -P = 0.08 mg/1	18 1bs
NH ₃ -N = 0.16 mg/1	37. 1bs
NO ₃ -N = 0.14 mg/1	32 1bs
T-N = 0.30 mg/1	69 lbs

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EPA guidelines for nutrient limitations on reservoirs to prevent nutrient problems are:

It can be seen that even at background conditions this concentration is exceeded and eutrophication problems could develop, especially in shallow areas on the reservoir. However, these concentrations are guidelines only and do not guarantee what the algal response will be at higher or lower phosphorous concentrations.

(2). Estimated 1978 total PO_4 -P point source daily loadings to Chatfield Reservoir using 1978 state effluent standards at design low flow conditions and a 5 mg/l PO_4 limit on Martin Marrietta discharge are estimated to be:

	<u>lb/day</u>	
North Fork	4	
Middle Fork	6	
Plum Creek	28 (Perry Park also included)
Martin Marietta	40	
	78	

The total PO_4 -P load in the stream below the Plum Creek confluence at design low flow of 36.2 cfs with out PO_4 -P removal requirement is 71.5 lbs/day which corresponds quite well with the estimated loading of 78 lbs/day. (See Table 6 for nutrient concentrations at this point)

From an examination of the known point source loads above Chatfield Reservoir it can be seen that elimination of Martin Marietta's phosphorous loading would eliminate nearly half of the phosphorous to the reservoir. a. No Phosphorous limitations on dischargers.

Nutrie below	nt conc Martin I	entration in South Platte Marietta at design low flow
07 43. P04-P	NH3-N	N03-N
mg/l	mg/l	mg/1
0.25	0.25	0.32
South flow o	Platte f 36.2	below Plum Creek at design low cfs
<u>P04-P</u>	NH3-N	NO ₃ -N
mg/l	mg/l	mg/1
0.36	0.38	0.83
<u>South</u> low fl	Platte ow of 4	<u>below Martin Marietta at design</u> 3.5 cfs
<u>P04-P</u>	NH3-N	NO3-N
mg/l	mg/l	mg/1
0.11	0.25	0.32
<u>South</u> flow o	Platte f 36.2	<u>below Plum Creek at design low</u> cfs
P04-P	NH3-N	NO _{3-N}
mg/l	ma/l	mq/]
		57
0.11	0.38	0.83

*These limitations are 1 mg/l PO₄-P on all point sources on Plum Creek and on the South Platte below Waterton.

- b. With phosphorous limitations
 on effluent.*

With a reduction of the phosphorous from 5 to 1 mg/l, the expected Martin Marietta discharge would be reduced to 8 lbs, for a total point source loading to the South Platte of 90 - 32 = 58 lbs/day.

If the Castle Pines development does not materialize, that will eliminate 7 lbs, leaving a total of 28 - 7 = 21 lbs/day from point sources.

The only other significant point source is Castle Rock which is projected to contribute 11 lbs. If this source is eliminated it would result in a point source loading from Plum Creek of 28 - 18 = 10 lbs/day, which is largely from the Perry Park discharge (7 lbs). If Perry Park goes to land disposal this would reduce the point source loading to 4 lbs. on Plum Creek. The total point source loading to Chatfield Reservoir then would be 78 lbs. (32 + 7 + 11 + 7) = 21lbs/day. Of these 21 lbs., 6 lbs. are from the Middle Fork and probably are beneficial as far as the Upper Reservoirs on the South Platte are concerned since these reservoirs have low nutrient levels and are not very productive as fisheries. As previously noted, Water Quality data taken at South Platte, Colorado does not reflect any correlation between stream flow and phosphorus concentrations. Therefore, it was assumed that the phosphorous concentrations in the South Platte in this stretch are more or less constant and do not very with flow. If this is so, then during low flows to Chatfield Reservoir the effect of point source loadings from Plum Creek and Martin Marietta would not result in a significant increase in phosphorus concentrations in Chatfield Reservoir, if dischargers of phosphorous in Plum Creek and Martin Marietta are controlled. This is shown below:

Est. Ave. Flow at Waterton = 200 cfs
Assumed background =
$$PO_4 - P = 0.08 \text{ mg/l}$$

Load in stream = $0.08 (8.34) (200) = 86 \text{ lb/day}$
1.55

Summary

A waste load discharge of 80 lbs from Plum Creek and Martin Marietta would result in a doubling of stream concentration to approximately 0.16 mg/l. If the Martin Marietta discharge were to be reduced from 40 lbs. to 8 lbs. and the Plum Creek discharges were reduced from 40 lbs. to 4 lbs., the total load of 14 lbs. would produce an increase to $\frac{14}{80} \times 0.08 = 0.094$ mg/l, which is only

0.014 mg/l above expected phosphorous concentrations above the Martin discharge.

Additional study will be required on Chatfield Dam reservoir to attempt to determine what the response of the reservoir water will be to various nutrient concentrations. With this information it should be possible to determine if a problem will arise from projected nutrient concentrations and if so what limitations should be imposed on dischargers to insure that use of the reservoir will not be impaired.

IX. Basin Strategy and Permit Priorities

<u>Basin Strategy</u> - EPA Region VIII strategy in the Upper South Platte Basin Segment was expressed last year in the South Platte Priority Accomplishment Plan which called for the elimination of all point sources in this segment of the South Platte. This is still Region VIII policy and in accordance with this policy EPA strategy is to support adoption of the local Tri-County goals of no discharge to the Souch Platte and tributaries above Littleton. In furtherance of this strategy, dischargers should be encouraged to use land disposal as an alternative which would enhance the value and use of open space and park land in the segment as called for in section 201(f) of the Federal Water Pollution Control Act Amendments of 1972.

From the analysis of the possible impact of phosphorous on the water quality of Chatfield Reservoir, it is Region VIII strategy to study the response of the lake to various nutrient levels to determine if there is a need to limit the discharge of phosphorous from point sources in this segment. In the meantime permits should be issued on a short term basis so that the reissuance of the permit can be made using the data available from nutrient studies

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Permit Priorities

- 1. Require point source dischargers in South Platte above Waterton and on Plum Creek to meet present State secondary treatment effluent standards for disinfection by 6/74.
- 2. Require point source dischargers above Waterton to meet present State effluent standards by 6/74 and to meet 1975 and 1978 State effluent standards on the applicable dates.
- 3. Require E.I. Dupont to go to no discharge of process water waste if possible by Jan. 1975. Limits for discharge of process water if discharged are shown on Table V.
- 4. Require Martin Marietta to meet present State effluent standards by 1/74 with limitation of PO₄-P of 5 mg/l by 7/74. Seek to have Martin Marietta reach no discharge by July 1977, through reuse of wastewater.

<u>Construction Grant Priorities</u> - Presently the municipal point sources in the Upper South Platte have low priority ratings in the 1974 106 State Program Plan. Because of the number of communities with higher priority ratings, the Upper South Platte communities will likely not receive funds in FY 75 or 76 unless funding increases considerably or priorities are reordered.

Facility		Requ	ired	Eff.	-77	****	Needs	L	Compliance Date
	FLOW • mgđ	BOD5 mg/1	15	P04 mg/1	16	Fecal #/100 ml		State municipal Inventory Priori- ty number	
Fairplay	.07	25	14	8	3	200 (5,000 now)	Put in filtration to meet 25 mg/l BOD5	None	6/75 25mg/1 BOD5 6/78 20mg/1 BOD5
G&C Camp	.05	25	10	8	3	200 (5,000 now)	Provide for no discharge, or put in filtration to \mathcal{L}_{1} meet 25 mg/l BOD5	N.A.	6/74 30mg/1 BOD5
Middle Fork Totals	0.10		24		6				
Geneva Ski Basin	.01	25	2	8	1	200 (5,000 now)	Provide adequate disinfection; put in filtration to meet 25 mg/l BOD5	None	6/75 25mg/1 BOD5 6/78 20mg/1 BOD5
Santa Maria	0.01	25	2	8	1	200 (")	Provide filtration or adequate lagoon capacity for no discharge	None	6/75 25mg/1 BOD 6/78 20mg/1 BOD
Bailey S.D.	0.03	25	6	8	2	200 (")	Provide adequate disinfection immediately. Put in polishing pond and/or filtration to remove BOD_5 to 25mg/l	6	6/75 25mg/1 BOD ₅ 6/78 20 mg/1 BOD ₅
N. Fork Totals	0.05		8		4				
Perry Park	.2	20	21			200 (")	Provide filtration of plant effluent to reduce BOD ₅ . or go to land disposal.	24	6/75
Castle Rock, S.D.	.3	20	32		1	200 (")	Provide filtration of lagoon effluent to reduce BOD and SS, or go to land disposal.	24	6/75 25mg/1 BOD ₅ 6/77 20mg/1 BOD ₅
Silver Heights	.02	20	2			200 (")	Provide additional lagoon capacity to provide no dis charge use percolation and evaporation	- 6	6/75 25mg/1 BOD5 6/77 20mg/1 BOD5
Louviers, S.D.	.04	20	4			200 (")	Provide sufficient lagoon volume to have no discharg use evap. and/or percolation	e N.A.	6/75 25mg/1 BOD ₅ 6/77 20mg/1 BOD ₅
	1	1 1	i		-				

Table 5

Facility		Requ	lirea	<u>d Eff</u>	-77		Needs	Compliance Date	
	FLOW mgd	BODg mg/1	15	PO4 mg/1	1b 	Fecal #/100 ml		State municipal Inventory Priori- ty number	
Dupont Co. (cooling water)	0.7	10	58	0	Q	N.A. (")	Institute tight process controls and keep process waters out of cooling water system. To eliminate highest levels of $NO_3 \& NH_3$ in present effluent.	N.A.	Reduce NH ₃ -N to 1 mg/1 and NO ₂ -H, NO ₃ -N to 5 mg/1 immediately.
Dupont Co. (process water)	0	0				N.A. (")	Eliminate high NH_3 and NO_3 loadings.	N.A.	Reduce HH ₃ -N to 1 mg/l immediately. Reduce HO ₂ -N + NO ₃ -N to 5.0 mg/l by 1/75
Castle Pines	0.2	20	33				Provide phosphorous removal, or go to land dis- posal.	N. A.	Upon construction of new facility.
Plum Creek Total	1.46		150		9				
Kartin Narrietta	1.0	20	167	5	40	200	Martin putting in reactor-clarifier for settling of lime treated combined munic. and industrial wastes before discharge to 2 polishing ponds in series.		1/74
Denver W.B.			НА.			N.A.	Meet BAT Guidelines.		6/74

Table 5 (con't)