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**To:** Peter Ampe – Hill & Robbins, P.C – Counsel for the Republican River Water Conservation District

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**Date:** April 9, 2018

**Subject:** April 2018 Projected Delivery for the Colorado Compact Compliance Pipeline

The RRCA approved the “Resolution by the Republican River Compact Administration Approving Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado’s Compliance Efforts in the South Fork Republican River Basin” August 24, 2016. Colorado is operating the Compact Compliance Pipeline (CCP) in 2018 under the provisions described in that resolution.

The projected CCP delivery requirement to meet Colorado’s obligation under the Compact in 2018 is approximately 13,000 ac-ft after accounting for under and over deliveries for the previous 4-year period of 2014-2017. Colorado estimates that it will run the Compact Compliance Pipeline this spring from January 1 to April 30. From January 1 through April 2 of this year, Colorado delivered approximately 5,600 ac-ft through the CCP. The current delivery capacity of the CCP is approximately 31 to 32 cfs. The following table summarizes the projected delivery schedule for 2018:

Time Period	Amount of CCP Delivery (ac-ft)
January 1 – April 30	7,400
October 1 (preliminary projection) – December 31	5,600
Total	13,000

## Data Utilized to Determine Delivery Amount

The attached Table 1 summarizes the calculations used to derive the delivery amount. The RRCA Groundwater Model was run to obtain an estimate of the Groundwater CBCU. For all States’ groundwater pumping, the 2017 data was repeated for 2018. Precipitation recharge was estimated using the long-term average monthly data at each station when historical data was not available. Reservoir stages and potential evapotranspiration values were estimated to

be the same as the 2017 values. Streamflow records for 2018 were estimated using engineering judgement and historical streamflow records.

The projections were made assuming water short year administration on Harlan County Reservoir. The 5-run model approach was utilized in these projections. Bonny Reservoir was modeled as an accounting point for all years.

**Table 1** (page 1 of 3)  
**Operation of the Colorado Compact Compliance Pipeline**  
(units of ac-ft)

Jan - Dec Calendar Year	North Fork Basin Accounting									Arikaree Basin Accounting					
	Consumptive Use									Consumptive Use					
	North Fork Gaged Flow	CCP Deliveries	Net North Fork Gaged Flows for Virgin Flow Calculations	0.40 x Haigler Canal Divs Measured at Stateline	CO SW and Small Res Evap	CO GW Con Use	KS GW Con Use	NE GW and SW Con Use	Virgin Flow	Gaged Flow	CO SW	CO GW	KS GW and Non- Fed Res Evap	NE GW	Virgin Flow
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
2000	19,435	0	19,435	2,368	3,122	13,173	15	4,709	42,822	3,631	0	1,918	128	196	5,873
2001	19,752	0	19,752	2,004	2,809	13,534	18	4,683	42,800	553	0	1,288	190	341	2,372
2002	15,904	0	15,904	2,258	3,172	13,562	14	5,324	40,234	231	0	401	114	351	1,097
2003	17,700	0	17,700	1,986	2,615	14,023	17	4,381	40,722	1,060	0	242	100	507	1,909
2004	19,759	0	19,759	1,493	3,022	14,373	16	3,685	42,348	341	0	353	157	431	1,282
2005	21,060	0	21,060	1,898	3,171	14,359	17	4,290	44,795	1,151	0	811	163	250	2,375
2006	17,608	0	17,608	1,767	3,140	14,301	12	4,017	40,845	404	0	1,116	130	125	1,775
2007	20,333	0	20,333	1,809	3,014	14,790	0	3,612	43,559	1,308	0	1,143	117	112	2,680
2008	21,638	0	21,638	1,998	671	15,004	0	3,925	43,235	1,567	0	1,536	106	124	3,333
2009	24,405	0	24,405	1,677	265	15,783	0	3,468	45,598	779	0	4,011	162	153	5,106
2010	20,418	0	20,418	2,016	325	15,479	0	3,999	42,238	2,358	49	1,446	109	73	4,035
2011	19,722	0	19,722	1,930	354	15,689	0	3,899	41,594	1,074	33	1,830	170	93	3,200
2012	14,376	0	14,376	2,452	583	15,309	0	4,698	37,418	494	63	1,558	116	78	2,309
2013	18,433	0	18,433	1,536	377	15,649	0	3,362	39,357	91	45	458	214	126	934
2014	26,707	7,448	19,259	1,244	285	16,283	0	2,962	40,034	0	21	1,141	236	128	1,526
2015	27,895	10,760	17,135	1,467	512	16,424	0	3,324	38,862	142	23	2,829	192	108	3,294
2016	28,091	10,130	17,961	1,596	419	16,820	0	3,550	40,346	397	37	2,638	197	147	3,416
2017	26,046	11,330	14,716	1,596	419	16,906	0	3,569	37,206	646	0	2,100	173	77	2,996
2018	28,000	13,000	15,000	1,596	419	17,199	0	3,597	37,811	300	0	2,065	166	48	2,579
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Table 1** (page 2 of 3)  
**Operation of the Colorado Compact Compliance Pipeline**  
(units of ac-ft)

South Fork Basin Accounting								CO Compact Allocation				
Jan - Dec Calendar Year	Gaged Flow at Benkelman	Consumptive Use						22.37%	78.53%	44.41%	Colorado Allocation of Beaver Creek (See Table 5F in Water Short Year)	All Basins
		CO SW + CO Small Res Evap	CO GW + Bonny Res Seepage	CO Bonny Res Evap	KS GW, Non-Fed Res Evap, SW CU	NE GW	Virgin Flow	North Fork	Arikaree	South Fork		
(1)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
2000	4,855	2,732	10,450	5,557	6,333	982	30,909	9,580	4,612	13,725	1,940	29,857
2001	3,097	980	10,964	3,972	7,515	641	27,170	9,575	1,863	12,065	1,500	25,002
2002	1,579	2,288	10,765	5,750	4,933	1,282	26,598	9,001	861	11,811	0	21,673
2003	905	598	12,115	3,375	5,390	1,347	23,730	9,110	1,499	10,537	0	21,147
2004	0	770	12,874	3,158	6,091	1,202	24,094	9,474	1,006	10,699	0	21,180
2005	0	275	14,952	3,430	7,525	1,372	27,553	10,021	1,865	12,235	0	24,121
2006	0	0	11,757	3,031	4,723	1,040	20,551	9,138	1,394	9,126	0	19,657
2007	674	266	12,511	2,428	5,670	1,055	22,605	9,745	2,104	10,038	1,576	23,463
2008	1,397	52	14,707	1,766	5,933	1,021	24,876	9,672	2,618	11,046	3,080	26,416
2009	8,407	101	14,976	1,020	7,856	1,302	33,661	10,201	4,010	14,948	3,100	32,258
2010	12,756	919	11,938	1,921	3,006	625	31,164	9,449	3,168	13,839	2,890	29,346
2011	9,916	177	13,092	1,965	6,153	941	32,245	9,305	2,513	14,319	2,580	28,716
2012	6,441	107	9,321	67	2,556	810	19,302	8,371	1,813	8,571	1,860	20,615
2013	0	52	12,321	0	5,177	473	18,023	8,805	734	8,003	76	17,618
2014	0	150	13,868	0	8,539	1,027	23,584	8,956	1,199	10,473	22	20,650
2015	4,819	408	13,865	0	5,514	918	25,523	8,694	2,587	11,334	724	23,339
2016	3,898	331	13,883	0	5,820	904	24,836	9,026	2,683	11,029	780	23,517
2017	2,385	331	13,538	0	4,769	701	21,724	8,323	2,353	9,647	2,440	22,763
2018	2,200	331	13,495	0	5,299	711	22,036	8,459	2,025	9,785	428	20,697
2019	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0

**Table 1** (page 3 of 3)  
**Operation of the Colorado Compact Compliance Pipeline**  
(units of ac-ft)

	CO Consumptive Use							Colorado Compact Compliance Accounting			
	Instate			GW Con Use in Nebraska							
Jan - Dec Calendar Year	North Fork	Arikaree	South Fork	Buffalo and Rock Creek	French- man Creek	Rep River Mainstem	Total Colorado Con Use	Annual Amount Colorado Exceeded Compact Entitlement <b>BEFORE CCP Delivery</b>	CCP Deliveries	Annual Amount Colorado Exceeded Compact Entitlement after Accounting for CCP Delivery	5-year Running Average of the Amount Colorado Exceeded Compact Entitlement after Accounting for CCP Delivery
(1)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)
2000	16,295	1,918	18,739	276	599	-4,242	33,585	3,728	0	3,728	
2001	16,343	1,288	15,917	293	569	-4,166	30,244	5,241	0	5,241	
2002	16,734	401	18,804	298	620	-6,155	30,701	9,028	0	9,028	
2003	16,638	242	16,088	324	37	132	33,460	12,314	0	12,314	
2004	17,395	353	16,802	348	39	-1,269	33,668	12,489	0	12,489	8,560
2005	17,530	811	18,656	367	42	-1,954	35,452	11,331	0	11,331	10,081
2006	17,441	1,116	14,788	383	43	-3,009	30,762	11,104	0	11,104	11,253
2007	17,804	1,143	15,205	406	55	-2,062	32,552	9,089	0	9,089	11,265
2008	15,675	1,536	16,525	429	370	-2,487	32,048	5,631	0	5,631	9,929
2009	16,048	4,011	16,097	451	2,917	-1,549	37,975	5,717	0	5,717	8,575
2010	15,804	1,495	14,777	472	3,030	-2,698	32,880	3,534	0	3,534	7,015
2011	16,043	1,863	15,234	492	2,554	-2,305	33,881	5,165	0	5,165	5,827
2012	15,892	1,621	9,495	513	1,485	-6,712	22,294	1,678	0	1,678	4,345
2013	16,026	503	12,373	531	1,125	-1,919	28,639	11,021	0	11,021	5,423
2014	16,568	1,162	14,018	554	951	-1,162	32,092	11,442	7,448	3,994	5,078
2015	16,936	2,852	14,273	584	1,769	-2,649	33,765	10,426	10,760	-334	4,305
2016	17,239	2,675	14,214	608	1,600	-2,436	33,900	10,383	10,130	253	3,322
2017	17,325	2,100	13,869	614	1,236	-3,317	31,827	9,064	11,330	-2,266	2,534
2018	17,618	2,065	13,826	616	866	-2,995	31,996	11,298	13,000	-1,702	-11
2019	0	0	0	0	0	0	0	0	0	0	-810
2020	0	0	0	0	0	0	0	0	0	0	-743
2021	0	0	0	0	0	0	0	0	0	0	-794
2022	0	0	0	0	0	0	0	0	0	0	-340
2023	0	0	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0