Filiberto (Bert) Cortez, a native of El Paso, Texas, attended Bel Air High school and served in the U.S. Air Force during the Vietnam War era. While completing a B.S. in civil engineering at the University of Texas at El Paso, he began working for the Rio Grande Project, Bureau of Reclamation, and upon graduation worked as a staff engineer with the Project. Over the course of his career he has held various positions in the El Paso office, which include design engineer, hydraulic engineer, safety engineer, information resources coordinator, and planning engineer. Bert is now the manager of the El Paso office, which manages the water supplies for the Rio Grande Project. He is the principal Reclamation representative in various negotiations on water operations procedures, water rights adjudications, negotiation conversions of irrigation water to municipal and industrial water use, and resolution of environmental issues.

Lower Rio Grande Project Operating Agreement: Settlement of Litigation

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I want to start off by thanking WRRI for inviting me to speak at this conference. The people here are at the top of the water industry and I appreciate being included with them. I was looking forward to the conference because I was going to be last on the agenda and I was assured there wasn't going to be time for rebuttal. But then I found out that Gary and Chuy were conspiring against me for me to go first, so I almost lost my train of thought but I will go on with my presentation. A lot of it will be repetitive but I find you have to hear something at least three times before you really understand it.

I want to start out by giving a little bit of the history of the Project. We had a very good introduction to that yesterday during lunch when we heard about how we got where we are. We have droughts, floods, and not just in the Rio Grande Project. These are common in the western United States, which was the reason Theodore Roosevelt recognized the flood/drought reality and supported the establishment of the U.S. Reclamation Services. As somebody mentioned earlier, we were originally part of the Geological Services, so we come from the same agency but were separated out. Our initial mission was to capture the springtime floods from snowmelt runoff and store for the benefit of settlers, ranchers, and farmers in the arid West. The sign in Figure 1 says something like "thank God and U.S. Reclamation."

The Upper Rio Grande/Rio Bravo Basin experienced early agricultural development under Native American Pueblos that to this day exercise their water rights in northern New Mexico. The basin underwent a rapid period of development during the Spanish Colonial period, but for the most part, rapid development and diversion of the Rio Grande for agricultural purposes occurred after the construction of railroads into

Figure 1. Western farmers and ranchers benefitted by the establishment of the U.S. Reclamation Services.

the San Luis Valley of Southern Colorado between 1860 and 1890, when about 400,000 acres of land were converted into agricultural development. This agricultural development had an adverse impact on the flow of the river in the El Paso Valley. One of the first indications of water supply problems was recorded in an official report from Major O.H. Ernst, U.S. Army Corps of Engineers, to the Chief of Engineers in 1889, basically saying that "At El Paso, ... the water ceases to flow and except at detached pools the bed becomes entirely dry. The diminished flow is probably due to evaporation and to the abstraction of portions of [the river] for irrigation purposes. In my judgment, the stream is not worthy of improvement by the General Government." I think that thought permeates throughout the hundred-year history of the Project.

Comparatively, when we look at the flows of other major western rivers, we see 150 million acre-feet on the Columbia River, which is 10 times the Colorado River at 15 million acre-feet, which is 15 times the Rio Grande at 1 million acre-feet. The United States Congress passed a resolution on April 29, 1890 calling on the President of the United States to negotiate with Mexico to settle the international aspects of the Rio Grande. In 1894, Mexico formally complained to the Secretary of Agriculture that increased diversions in the state of Colorado were causing damages to the farms in the Juarez Valley. So in 1896, Mexico and the United States agreed to a joint commission to investigate the water resources of the Upper Rio Grande/ Rio Bravo and report on the "best and most feasible mode...of regulating the use of the waters of said river as to assure to each country concerned and to its inhabitants their legal and equitable rights and interests in said waters." I might mention that we don't even call the river by the same name; depending on where you are located, we refer to it as the Rio Grande on the U.S. side and Rio Bravo on the Mexican side. It is the Upper Rio Grande in Texas, Lower Rio Grande if we are in New Mexico.
The Joint Commission on November 25, 1896 found that development of irrigated acreage in the San Luis Valley of Colorado had depleted the flow. Construction of a reservoir to capture the flood waters of the Rio Grande would provide the best and most feasible mode of affecting an equitable distribution. It further recommended that the United States prevent the construction of any large reservoirs on the Rio Grande in New Mexico or restrain any such reservoir hereafter constructed from the use of waters to which the citizens of the El Paso and Juarez Valleys had right. Basically, this established the senior right on the river at El Paso and Juarez.

On December 5, 1896, the Secretary of Interior suspended all applications for right of way for irrigation in New Mexico and Colorado. It remained that way until 1925. While it was in effect, the development of storage facilities was prohibited. The objections by upstream states were the impetus that led to the negotiation of the Rio Grande Compact.

The 1904 Compromise of the 12th International Irrigation Congress was to find a solution and suggested the Reclamation Act of 1902, from which the Reclamation Services was created, be enacted or authorized. It was to provide an interstate and international solution. In November 1904, the Reclamation Service presented a compromise at the 12th International Irrigation Congress held in El Paso, Texas. Reclamation presented plans for the Rio Grande Project, which stored waters at Elephant Butte Reservoir and supplied southern New Mexico, West Texas, and the Juarez Valley.

So what is the Rio Grande Project? It was constructed by the U. S. Bureau of Reclamation, an agency under the Department of Interior. It was authorized by the passing of the Reclamation Act of 1902 by Congress. It was the first civil engineering work to affect international allocation of water between the United States and Mexico. In 1907, Congress appropriated $1million to start project construction which would provide 60,000 acre-feet of water annually to Mexico.

Figure 2 is a map showing the project; Truth or Consequences is where Elephant Butte Reservoir is located, and right below is Caballo Reservoir, constructed in the mid 1930s. Percha Dam is our first diversion point

that irrigates the Rincon Valley. Leasburg Diversion Dam is our next diversion point that irrigates the upper portion of the Mesilla Valley; the Mesilla Diversion Dam irrigates the lower portion of the Mesilla Valley. Then we have the American Diversion Dam that irrigates the upper portion of the El Paso Valley and Riverside Diversion Dam that actually no longer exists but was built to irrigate the lower portion of the El Paso Valley. The water is diverted to Mexico at the International Diversion Dam. That is where they get their 60,000 acre-ft under a full allocation.

Figure 2. Rio Grande Project area.

As stated before, we irrigate about 178,000 acres of land and supplemental hydroelectric power to south-central New Mexico. The Project features are Elephant Butte and Caballo storage dams, four diversion dams, 586 miles of canals and laterals, 484 miles of open drainage ditches, and a hydro-electric plant. Water provided by the Rio Grande, along with improved irrigation methods, has transformed the desert land in the valley into a productive region.

When we first sent astronauts up to circle the earth, one of the man-made features they could readily discern was the Rio Grande Valley, the Rio Grande Project, and its irrigated acreage. The Rio Grande Project has helped stabilize the water supply by minimizing flooding and providing water storage. Water from the Rio Grande Project is allocated by Reclamation to Elephant Butte Irrigation District in New Mexico, El Paso County Water Improvement District #1 in Texas, and delivered to each respective irrigation river head works. Water is allocated to Mexico under the Convention of 1906 and delivered at the "Acequia Madre" in El Paso.

Water is used to grow cotton, chile, pecans, and other valuable crops that flourish where once only sagebrush and cactus would grow - I took that off of a travel brochure. The project extends from 165 miles north to 80 miles southeast of El Paso. The Rio Grande meanders these approximately 200 plus miles providing water for the primary purpose of irrigation and additional purposes of municipal and industrial water supplies, and hydroelectric power generation. I think I need to interject at this point that when the Project was authorized in 1905, it was strictly for irrigation. There were no other uses of the Rio Grande Project water supply until 1925 with the Municipal Water Users Act that enabled us to go and provide the City of El Paso with water and then for other uses that were authorized under that Act.

The Project provides for flood control, fish and wildlife enhancement, outdoor recreation, research on water-related issues, construction, materials, atmospheric management, and wind and solar power. Figure 2 is a photo of Elephant Butte Dam just after it was completed. The dam provides agricultural and municipal uses in New Mexico, Texas, and Mexico. Reclamation has a good history of dam construction. In 1915 we went into a relatively wet period and filled the dam pretty quickly - Reclamation knows what it is doing.

Figure 3 is a graph of the historical end-of-month elevations on the Project starting in 1915. At the top it shows that the Bureau of Reclamation delivered water to farms from the inception of the Project in 1915 all the way to 1978. The period between 1951 and 1978 will be called D1 and D2 years, and those are the dates used to develop the curves for delivery to the irrigation districts and to Mexico. Why D1 and D2? They don't stand for delivery curves. I was actually on the Project when we started working on these curves and started analyzing all the data we had gathered from

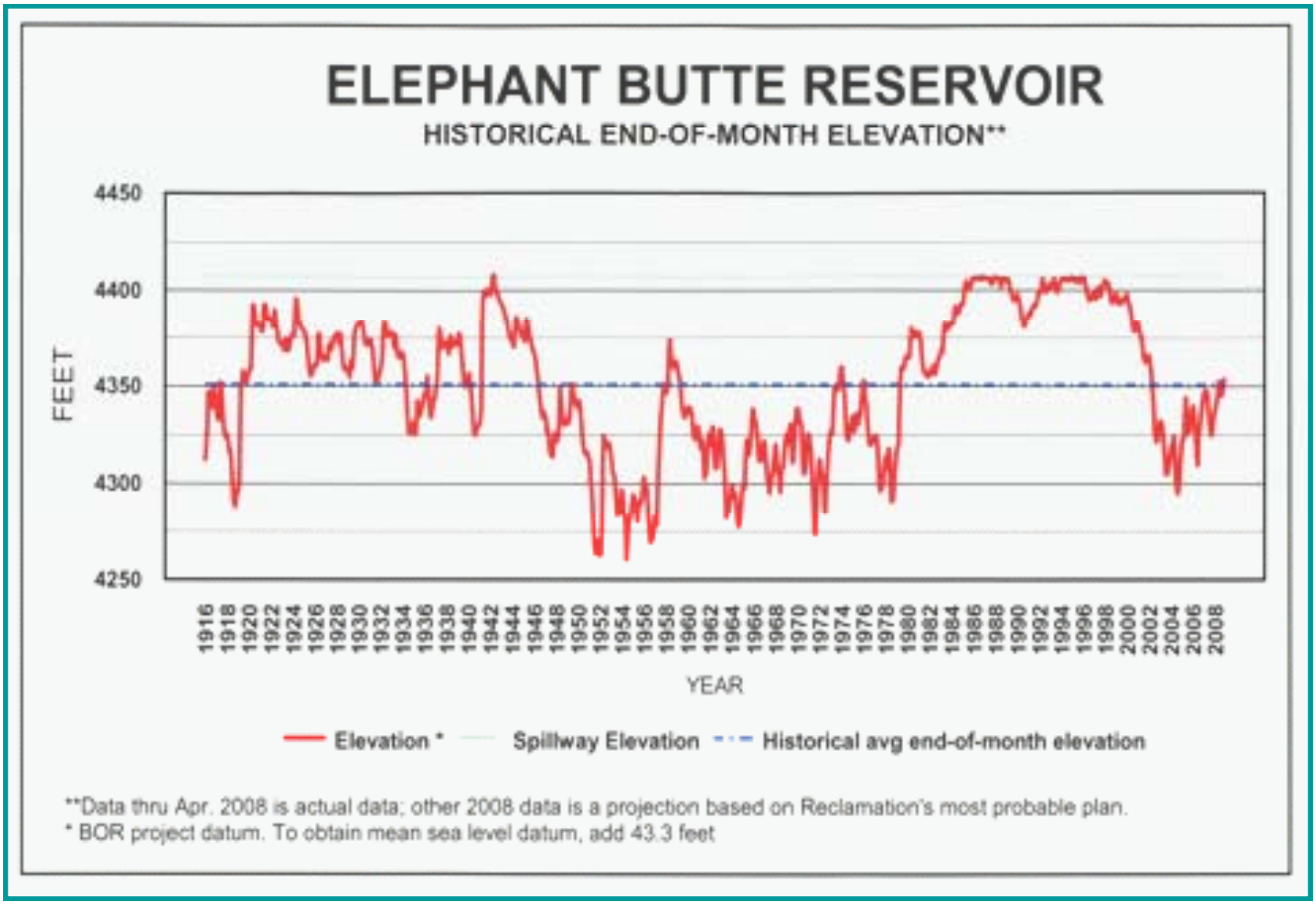

Figure 3. Elephant Butte Reservoir historical end-of-month elevation from 1915 to 2008.

1950 to 1951. We looked at evaporation curves, that was probably A1; we looked at bank storage, that was probably B1; we looked at differences in evaporation from month to month, so we just had a series of lettered curves. When we finally started looking at the release and delivery ratios and efficiencies, that's when we got to the Ds and thus why we have D1 and D2. I know because I was there. It was interesting because this was before calculators and every time that we ran a regression analysis, we had to punch every number in one at a time, over and over again. There was no storage on calculators. Or we used a tablet. That was the way it was done and this was done in coordination with the irrigation districts at the time and also with the International Boundary and Water Commission. The IBWC had a large interest in how we were going to re-manage the Project after we turned it over to the districts.

After 1978, when the districts took over the deliveries to the farms from the headings, the Bureau of Reclamation was responsible to get the allocation to the heading at the head gates, whereupon the districts took their block of water and set the allocation to the land. From 1951 through the present, we allocated an acre-foot per acre to the land before we turned it over to the districts. After that we allocated blocks of water to each district; from there they allocate it to the land based on what they thought their efficiencies were and the amount of water they could deliver based on what Reclamation had allotted to them.

Now Mexico's allocation has always been based on the delivery to lands, which is the language in the 1906 Treaty. The full allocation to land on the Project is 3.0412 acre-ft per acre, and the fact that we drew it out that far when you had ditch riders going out and visually judging what the deliveries were, and then using that data to go out to the tenth power doesn't make any sense but 3.0421 acre-feet per acre was determined to be a full allocation.

Whenever we didn't have enough water to make that full delivery, let's say we could only deliver 2 acre-feet per acre based in the short water supply in storage, then Mexico was reduced by percentage to 40,000 acre-feet, if my math is correct. Table 1 shows the relative allocation and then the allocation to Mexico. What we found when we were doing the analysis is our records show that we were very, very consistent in how we de-

Table 1. Allocation of Water Supply

			ALLOCATION OF PROJECT WATER SUPPLY							03/05/2008
YEAR	EO FEB. TOTAL RIO GRANDE PROJECT STORAGE (acre-feet)	SAN MARCIAL SPRING RUNOFF (Mar-Jul) (acre-feet)	INITIAL ALLOTMENT TO PROJECT LANDS (acre-foot/acre)	FINAL ALLOTMENT TO PROJECT LANDS (acre-foot/acre)	INITIAL ALLOTMENT TO PROJECT CANAL HEADINGS (acre-feet)	FINAL ALLOTMENT TO PROJECT CANAL HEADINGS (acre-feet)	EO OCT. TOTAL RIO GRANDE PROJECT STORAGE (acre-feet)	MEXICO DIVERSION AT ACEQUIA MADRE HEADING (acre-feet)	INITIAL RELEASE DATE FROM CABALLO DAM	CABALLO DAM TOTAL YEARLY RELEASE (acre-feet)
1951	452,730	17,677	1.00	1.75			32,900	33,059	03/06	469,450
1952	103,920	832,160	0.21	2.50			370,950	49,890	03/20	543,975
1953	468,600	143,170	1.00	1.90			99,990	37,760	03/10	526,628
1954	184,460	76,720	0.42	0.50			91,480	10,147	03/20	244,165
1955	169,850	68,920	0.21	0.42			129,700	8,185	03/20	219,157
1956	212,180	59,685	0.33	0.39			31,040	7,864	03/18	246,140
1957	77,130	600,680	0.10	1.17			645,760	23,290	03/20	397,103
1958	857,510	988,030	1.75	**4.00**			1,007,170	60,050	03/01	737,125
1959	1,185,120	72,590	3.00	**3.50**			575,670	60,110	03/02	687,414
1960	713,550	410,900	2.25	**3.25**			405,820	60,320	03/02	705,162
1961	492,870	269,550	1.25	2.45			223,080	48,610	03/10	561,697
1962	486,570	448,250	1.75	**3.25**			269,580	60,057	03/05	651,941
1963	513,170	116,765	1.65	2.00			109,440	39,693	03/05	517,172
1964	194,790	67,930	0.25	0.33			58,670	6,653	03/15	206,085
1965	172,340	598,290	0.17	1.85			340,940	36,658	03/20	505,598
1966	627,430	328,380	1.75	2.50			312,910	49,618	03/05	610,341
1967	454,710	74,090	1.25	1.50			223,340	29,829	02/27	456,517
1968	386,860	238,560	1.00	2.00			277,530	39,677	02/27	505,691
1969	466,970	358,710	1.25	**3.00**			387,410	59,884	02/27	667,669
1970	614,620	257,960	2.00	**3.00**			223,870	60,065	02/23	661,125
1971	435,640	112,837	1.50	1.75			75,540	34,847	02/26	498,375
1972	283,380	77,630	0.60	0.80			258,910	16,077	03/01	260,911
1973	457,960	914,090	1.00	**3.00**			707,340	60,000	03/09	617,461
1974	915,650	95,430	3.00	**3.00**			376,650	60,050	03/02	640,843
1975	507,700	617,850	1.00	**3.00**			534,490	60,052	01/24	580,617
1976	762,230	204,260	2.50	**3.00**			353,910	60,172	01/16	679,676
1977	482,460	43,374	1.00	1.25			140,460	24,824	03/03	416,496
1978	268,220	248,610	0.25	0.75			112,160	14,903	03/10	356,167
1979	328,690	1,148,880	0.67	**3.00**		**750,000**	855,640	60,055	03/08	568,687
1980	1,080,400	861,894	3.00	**3.00**		**750,000**	1,178,400	60,033	01/17	658,686
1981	1,339,860	54,256	3.00	**3.00**	**750,650**	**750,650**	774,380	60,262	02/04	608,166
1982	878,660	548,573	3.00	**3.00**	**790,000**	**790,000**	866,140	59,257	01/27	635,642
1983	1,070,130	920,545	3.00	**3.00**	**790,000**	**790,000**	1,289,750	60,621	02/03	648,386
1984	1,424,200	831,291	3.00	**3.00**	**902,000**	**902,000**	1,515,500	58,588	02/09	653,150
1985	1,747,700	1,133,599			**902,000**	**902,000**	2,121,600	60,276	02/20	677,396
1986	2,322,200	812,686			**902,000**	**902,000**	2,290,800	66,163	04/01	1,396,165
1987	2,336,900	1,003,319			**902,000**	**902,000**	2,168,400	65,866	02/03	1,376,099
1988	2,383,900	419,098			**902,000**	**902,000**	2,060,100	61,935	01/20	836,006
1989	2,151,900	378,144			**890,900**	**890,900**	1,705,300	58,854	02/13	736,866
1990	1,801,000	159,213			**931,841**	**931,841**	1,319,400	58,353	02/12	680,107
1991	1,509,660	656,638			**931,841**	**931,841**	1,580,080	59,242	02/19	625,956
1992	1,830,380	745,950			**931,841**	**931,841**	1,802,720	58,080	01/09	734,982
1993	1,980,230	742,508			**931,841**	**931,841**	1,978,640	63,763	01/12	823,263
1994	2,155,690	852,845			**931,841**	**931,841**	2,003,860	60,167	01/11	893,384
1995	2,203,730	991,736			**931,841**	**931,841**	2,083,050	63,618	01/17	1,096,146
1996	2,263,420	131,980			**931,841**	**931,841**	1,689,550	60,063	01/12	774,335
1997	1,814,910	600,666			**931,841**	**931,841**	1,814,980	59,442	01/21	796,621
1998	2,036,000	447,172			**931,841**	**931,841**	1,636,860	60,628	01/16	808,661
1999	1,803,410	384,225			**931,841**	**931,841**	1,658,810	58,308	01/27	735,467
2000	1,804,980	159,000			**931,841**	**931,841**	1,243,900	60,611	01/20	751,373
2001	1,359,370	241,000			**931,841**	**931,841**	656,910	61,037	02/02	786,549
2002	974,610	61,095			736,139	**931,841**	323,190	60,324	02/19	801,147
2003	456,140	62,029			74,966	317,495	170,490	26,946	03/17	364,529
2004	288,480	240,387			43,667	353,944	128,010	27,613	03/12	396,612
2005	331,000	738,095			136,549	**931,841**	362,060	58,091	03/09	676,031
2006	517,170	92,521			351,560	472,426	436,950	27,112	03/08	434,226
2007	644,990	316,979			369,466	760,391	346,170	51,245	03/07	636,730
			bold number means full irrigation supply for Rio Grande Project water users.							
			* derived from International Boundary & Water Commission (IBWC) - U. S. Section, Yearly Flow Data Publications.							

livered water to the districts and how we delivered water to Mexico in compliance with the Mexican Treaty.

Water prior to 1951 was released to irrigation lands on an as-needed basis. During the drought in the 1950s, we needed to figure out how to allocate water; we didn't have enough water to meet all the needs. We did an analysis of the deliveries that remained from 1946 to 1950, when farmers were able to call for all the water that they needed and we determined that they were calling for about 3 acre-feet per acre. That was established as a full allocation and was also used to make the delivery or the cut in the delivery to Mexico. This was the case prior to 1951. The Project was operated by Reclamation from 1951 to 1980 with the added responsibility of determining the allocation of water to lands in the United States from Acequia Madre heading for delivery to Mexico. Because of the drought, the allocation was available based on the water in storage at Elephant Butte and Caballo, which doesn't mean any water there - there is Compact water and water that we can't allocate, there is San Juan Chama water we can't allocate, also native Project water available for the Project to use for allocation and release to the Rio Grande Project users.

Since the allocation was to the lands, U.S. and Mexico's river heading the Rio Grande conveyed losses in wells and losses were utilized in making the allocation. In other words, what we are saying is based on contemporary river efficiencies, we would determine on an as needed basis how much water we were able to release and how much water was actually given to the land. Extensive water data were collected by Reclamation during this period because of the need to insure that the U.S. was complying with the 1906 Convention. This data became very important when a need for a revised allocation procedure arose.

From 1979 to 2007, Elephant Butte Irrigation District and El Paso County Water Improvement District #1 paid for their portion of the Project and completed that payment in 2007. The operation and maintenance of irrigation and drainage system was then turned over to the districts. Reclamation changed the allocation delivery point from the lands to each district's respective headings. The delivery and allocation to Mexico

remained the same as before. Respective contracts with each district called for the development of an operating agreement.

Right after the transfer, we started working on the operating agreement. The D1 and D2 curves became the backbone of what ultimately became the signed operating agreement, which was developed as a result of this work. The operations by Reclamation during the years 1951 to 1978 became the baseline for the final Operating Agreement. We talked about many baselines but this was agreed upon by negotiations between the two districts and Reclamation. Because of the need to comply with the 1906 Convention with Mexico, there needed to be consistency in regards to the deliveries to Mexico and the U.S. The final agreement also had to comply with the Rio Grande Compact and the historical releases that were made for irrigation of the Project and in the definition of Project water. So nothing there changes, even though the two districts might have a carryover account, it's all Project water, and it's all counted in relation to the Rio Grande Compact. All releases made are Compact releases, they may be divided up differently to the two districts based on carryover, but it is still a Compact release. There were many interruptions in the work to finalize an operating agreement. Throughout those years though, water was delivered to the farms, the districts, and Reclamation continued to work together in various levels of agreement. So even though we were battling at the negotiation table or suing each other, the main objective was to get water to the farms and that never stopped.

The final 2007 Operating Agreement happened because of the commitment from individuals within Elephant Butte Irrigation District and El Paso County Water Improvement District #1 and all levels of government in the Department of Interior. All levels were involved up to the Secretary. There was a feeling of urgency generated and also an understanding that the personalities that could get it done had come together at the right time. This included the board members, the managers, the management in Albuquerque, Salt Lake, Washington; everybody was committed to getting this done. There were many days of reaching consensus, usually on a Friday, followed by days of no agreement, usually on a Monday, but persistence by the parties kept bringing them back to the negotiation table. The agreement was finally signed February 14, 2007.

To summarize the Operating Agreement: each district may carry over unused water allocation year by year and accumulate up to 60% of a full allocation. When one district reaches their 60% limit on carry- over allocation, the remainder will be placed in the other district's allocation account if that district has not reached its limit. If both districts have reached their limits, then it goes into the project account. Mexico and El Paso County Water Improvement District #1 will be allocated their yearly amounts by using the D1 and D2 regression curves, respectively. Elephant Butte Irrigation District will receive their allocation based on the latest release from Caballo Dam to delivery at the canal headings ratio or the present ability of the Rio Grande to deliver water. If we are in a short water allocation situation, Elephant Butte Irrigation District gets their allocation based on D1 and D2. This delivery ratio reflects the effects of groundwater use in New Mexico on the river. This was an issue finally solved by the Operating Agreement. The Bureau of Reclamation shall perform a review of the Operation of the El Paso Field Division under its Management for Excellence program.

The Rio Grande signed Project Operating and associated documents are a significant achievement not just in this area but also West wide and within the Departments of Interior and Justice. District Board members, managers, and legal and technical staff are to be commended on a significant achievement. The benefits are increased year to year certainty on the allocation for both irrigation and municipal use, increased flexibility in each district's use of their allocation, and well defined areas of responsibility for each agency responsible for the operations of the Project, and more water in storage for recreation.

The task now is to take these documents and make them work for everyone affected by the operations of the Project. We have a year under our belt now and we are working out some of the details and glitches that didn't quite work out how we thought they would work out. What I find is that cooperation between the two districts from the operators on the ground all the way up to management makes it easy to get changes done that need to be done. There is a provision in the agreement that it will reviewed on a yearly basis and if anybody wants to make any changes, their request will be reviewed. Thank you.