Report on Diversion Facilities on the Rio Grande That Deliver Water For Domestic, Municipal and Industrial Uses

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March 1999

Lower Rio Grande Valley Development Council
311 N. 15th St.
McAllen, Texas 78501-4705
Report on Diversion Facilities on the Rio Grande That Deliver Water For Domestic, Municipal and Industrial Uses

The Lower Rio Grande Valley Development Council entered into a Research and Planning Fund Research Grant Contract with the Texas Water Development Board to assemble data on each irrigation district diversion facility on the Rio Grande that delivers water for domestic, municipal and industrial uses. The objective on the study was an analysis of the irrigation district diversion facilities on the Rio Grande to develop an opinion on whether municipal water supplies could be delivered when little or no irrigation water is being used.

The specific items in the Scope of Services were:

• Assemble available construction drawings showing the general plan and capacity of each diversion facility including existing weirs.
• Establish a committee of three irrigation district representatives and three municipal representatives to review the assembled drawings.
• Visit each critical diversion facility to observe the actual physical condition and take photographs.
• Prepared a written summary on each diversion facility.

The appointed committee consisted of the following individuals:

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<tr>
<th>Irrigation Districts</th>
<th>Municipal</th>
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<tr>
<td>Jo Jo White</td>
<td>Bart Hines</td>
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<td>Wayne Halbert</td>
<td>Cloice Whitley</td>
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Charles Greenwood, with the consulting engineering firm of Sigler, Winston, Greenwood and Associates, Inc., was responsible for assembling the available construction drawing. The available construction drawings to show the general plan and capacity of each diversion facility, including existing weirs, are presented in the attached Appendix A.

Committee Action

The committee met on January 11, 1999 at 2:00 P.M., in the offices of Sigler, Winston, Greenwood and Associates. The committee members present agreed that they did not believe it was necessary to visit each of the critical diversion facilities to observe the actual physical condition and to take photographs. After extensive discussion, the committee members present agreed to state in writing their opinions on the capability of the diversion facilities to deliver the domestic, municipal, and
industrial demands when there is little or no agricultural water in the Rio Grande. The written statements are included in Appendix B and a summary of the comments is presented below.

Summary of Comments

The main purpose of the report is in support of the investigation to determine the answer to two questions:

If there is no agricultural water being discharged from Falcon Reservoir (only M&I water is being discharged), will the Rio Grande be capable of delivering water to each diversion structure?

Is each irrigation district capable of diverting water from their diversion point to the cities?

From past history, the irrigation districts can and do divert water from the Rio Grande when there is no irrigation water being released. Obviously, the pumping efficiencies are negatively affected and the overall volumes to be pumped are limited. There are documented data (Rio Grande Watermaster and I.B.W.C.) that indicate the historical periods of time when little or no irrigation water was being released from Falcon Lake. The water being diverted from the river during these times was only municipal water. The assumption can be made from this documented history that irrigation districts will be able to physically pump water from the river even if the only remaining water in the Rio Grande is municipal water.

The diversion of water for city water supplies by the respective irrigation district is fairly well established due to the long term operation and the development that has grown up around most systems. These restrictions are going to make any changes impossible that would help in diverting more water or to provide any type of storage during drought periods.

The major water diverters (irrigation districts) along the Rio Grande, below Anzalduas Dam, have weirs downstream of their diversion points that maintain a minimum river elevation and create a pool of water that facilitates the diversion of water during low flow conditions.

Raising of the diversion weirs should be further evaluated, but such action may not be advisable. The increase in the weir height will affect the flood hydrology of the Rio Grande. The greater weir height will also cause a greater amount of backwater on land that may flood both the United States and Mexican shorelines. The additional height may also cause greater impoundment of water, with the related higher seepage and evapotranspiration losses.

The irrigation districts upstream of Anzalduas Dam utilize the pool created by the Dam, therefore, their ability to divert water for M&I purposes only should not change.

One solution for assuring a diversion structure is capable of pumping water to the canals for only M&I purposes would be dredging the Rio Grande diversion points.
Although the depletion of irrigation water in the reservoirs is unlikely, there will be individual irrigation districts that may exhaust their water right account. The problems encountered by these irrigation districts in 1998 was maintaining a charged canal system for a city that has no raw water storage reservoir.

**Recommendations**

All cities and/or water purveyors must be required to have control of, or contract to an irrigation district for, raw water storage for at least 20 to 30 days of supply. Raw water storage requirements should meet the maximum daily demand from the water treatment facility. The 20 to 30-day storage requirement should be a firm storage requirement and not be based on total volume of storage. If cities had a requirement to have 20 to 30 days of water supply in storage, it would greatly increase the efficiency in how the irrigation districts divert water. This would be the responsibility of the city and not the district since it would only benefit the city.

Several cities rely on the irrigation districts' canal system as their reservoir. This practice places an unnecessary burden on the irrigation districts. Cities should not take into account canals as storage facilities unless there are no taps to the canal prior to the city's diversion point. In other words, they can use that portion of the canal that serves solely their water treatment facility, if and only if, the irrigation district agrees to the concept. The storage could be contained through weirs or gates to meet that storage requirement. If an irrigation district has a storage structure at the present time, the district might explore to determine if the structure can be reworked to provide more storage, or to determine if there is a way that the city can put their own storage facility into operation. If the district has a storage structure presently, the district could work with the city to fund the needed repairs or enlargement of the facility.

To insure the continued pumping ability under low flow conditions, the following recommendations are made:

1. A study should be made on all existing Rio Grande weirs (and future installations) that could determine their positive impact on pumping conditions during low flows. Also, what could be done to increase the positive results of the weirs now in place.

2. Further study should be done on the aquatic weed infestation and its impact on low Rio Grande flows.

3. The water ordering mechanism now being used between the irrigation districts and the Rio Grande Watermaster needs to be investigated to determine what would best enhance the efficient delivery of water from the Falcon Lake if the situation ever arose where only municipal water was remaining in the reserves.

4. Additional measuring or gauging stations along the river could better monitor the river flow and could provide a higher level of operation. Efforts should be made to coordinate the activities
of all the agencies to assist in the funding of such a program.

5. Negative environmental effects resulting from the low flows, such as potential fish or wildlife damage, need to be addresses by those water right holders (Texas Parks & Wildlife, U.S. fish & wildlife, etc.) who have the water reserves that could possibly alleviate these conditions. No other water right allocation holders should use their reserves for this purpose.

6. The cities can help themselves by either studying their water supply system themselves or hiring someone assess their needs and provide an answer for them. Many of the smaller towns have let their treatment and distribution systems and their water supply sources to their system deteriorate for so many years. These cities are in an almost impossible situation money wise to be able to provide any type of fix to these facilities.
Appendix A
Appendix B
Attached please find comments on the above mentioned contract.

Should you need additional information, please advise.
CITY OF McALLEN
DEPARTMENT OF PUBLIC UTILITIES
MEMORANDUM

TO: Tony Reid, P.E., Perez/Freese & Nichols LLC
FROM: Wm. Bart Hines, Utility Manager
SUBJECT: Comments regarding TWDB Contract
Diversion Facilities on the Rio Grande River
DATE: January 14, 1999

Please accept the following comments as requested in our meeting Monday January 11, 1999 at Sigler, Winston, Greenwood and Associates, Inc. offices where we discussed the recommendations which should be made to accomplish the above referenced contract.

It is my understanding that Mr. Greenwood has accomplished Subtask 2.1 and provided drawings to you for further evaluation and for reporting. I see no useful purpose for Subtask 2.3 (to visit each diversion point) if the assembled drawings are truly accurate. I believe the TNRCC Rio Grande Watermaster should be contacted and shown the drawings to verify their accuracy, if this could be at all possible.

The main purpose of Task 2.0, is in support of the investigation to determine the answer to two questions:

➢ If there is no agriculture water being discharged from Lake Falcon (only M & I water is being discharged from Lake Falcon), will the Rio Grande River be capable of delivering water to each diversion structure?

➢ Is each irrigation district capable of diverting water from their diversion point to the cities?

• Raising of the diversion weirs should be evaluated further, but may not be advisable. The increase of weir height will affect the flood hydrology of the Rio Grande River and may cause greater impoundment of waters, thus greater seepage and evapotranspiration. Greater weir height will also cause a great amount of backwater on land that may flood both United States and Mexican shorelines. The solution for assuring a diversion structure is able to pump water to the canals for M & I's purposes would be dredging the Rio Grande River diversion points.

• All cities and/or water purveyors must be required to have control of, or contract to, an irrigation district for raw water storage for at least 20 days. Raw water storage requirements should meet the maximum daily demand from the water treatment facility. The 20 day storage requirement should be a firm storage requirement and not be based on total volume of storage. Also, cities should not take into account canals as storage facilities unless there are no taps to the canal prior to the city’s diversion point. In other words, they can use that portion of the canal that serves solely their water treatment facility, if and only if, the irrigation district agrees to that concept and it could be contained through weirs or gates to meet that storage requirement.

If you have any questions or comments feel free to contact me.
Tony Reid, P.E.
Perez, Freese, and Nichols, L.L.C.
3233 N. McCall Road
McAllen, Texas 78501

Re: Low River Flow Pumping Conditions

January 14, 1999

Dear Tony,

From past history, it has been shown that Irrigation Districts River Pumping Plants (those that deliver municipal water) still have the ability to operate during low River flow conditions. Obviously, the pumping efficiencies are negatively affected and the overall volumes to be pumped are limited. The main reason that diversions can still take place is due to the existing River weirs that provide the necessary elevated pools of retained water. There is documented data (Rio Grande Watermaster and I.B.W.C.) that indicate the different past time frames when little or no irrigation water was being released from Falcon Lake. The water being diverted from the River during these times was only municipal water. One can assume from this documented history that Irrigation Districts will still be able to physically pump water from the River even if the only remaining water supply is municipal water.

To insure the continued pumping ability under low flow conditions, the following recommendations are made:

1. A study should be made on all existing River weirs (and future installations) that could determine their positive impact on pumping conditions during low flows. Also, what could be done to increase the positive results of the weirs now in place.

2. Further study should be done on the aquatic weed infestation and its impact on low River flows.
3. The water ordering mechanism now being used between the Districts and the Watermaster needs to be investigated to determine what would best enhance the efficient delivery of water from the Reservoirs if the situation ever arose where only municipal water was remaining in the reserves.

4. It is strongly recommended that each individual municipality have its own raw water storage reservoir. This would greatly benefit the overall efficiency of delivering water during extreme shortages.

5. Negative environmental affects resulting from low flows, such as potential fish or other wildlife damage, need to be addressed by those water right holders (Texas Parks & Wildlife, U.S. Fish & Wildlife, etc.) who have the water reserves that could possibly alleviate these conditions. No other water right allocation holders should use their reserves for this purpose.

Sincerely,

Jo Jo White
Hidalgo & Cameron Counties
Irrigation District #9
January 15, 1999

Tony Reid, P.E.
Executive Vice President
Perez/Freese and Nichols, L.L.C.
3233 N. McColl Road
McAllen, Texas 78501

RE: Task 2, Diversion Facilities on the Rio Grande below Falcon Dam.

Dear Tony,

As discussed at the January 11, 1999 meeting at the offices of Sigler, Winston, Greenwood, and Assoc., there should be no difficulty in diverting municipal, domestic, and industrial (MDI) water from the Rio Grande, if little or no irrigation water is in the River.

The major water diverters (DISTRICTS) along the Rio Grande, below Anzalduas Dam, have weirs downstream of their diversion points that maintain a minimum river elevation and create a pool of water that facilitates the diversion of water during low flow conditions.

The Districts upstream of Anzalduas Dam utilize the pool created by the Dam; therefore, their ability to divert water for MDI purposes only should not change.

There have been numerous occurrences where only MDI water is in the River. Usually, after periods of widespread rainfall, when there is no irrigation water demand, the MDI demands are still met. This is due to the ability of Districts to divert MDI water only.

Although the depletion of irrigation water in the reservoirs is unlikely, there will be individual Districts that may exhaust their water right account. The problems encountered by these Districts in 1998 was maintaining a charged canal system for a city that has no reservoir.

Several cities rely on the Districts' canal system as their reservoir. This practice places an unnecessary burden on Districts. All cities should be required to have a several day water supply storage facility.
In summary, I would like to emphasize that Districts can and do divert water from the River when there is no irrigation water being released. If cities would have a requirement to have "X" number of days of water supply in storage, it would greatly increase the efficiency in how Districts divert water.

I hope that this information is beneficial to you. If you have any questions or comments, please contact me.

Sincerely,

[Signature]
Sonny Hinojosa
General Manager

SH:aa
January 25, 1999

TO: Tony Reid

FROM: Closie Whitley

RE: River Diversion Water Supply for Municipalities

Integrated Water Resource Plan

Diversion of water for city water supplies by the respective irrigation district is going to be pretty well fixed because of the long term operation and the development that has grown up around most systems. These restrictions are going to make any changes impossible that would help in diverting more water or to provide any type of storage during drought periods. Also, to install weirs in the river to increase the water level at the diversion points will not provide any additional beneficial results. If the districts have a storage structure at the present time, they might see if there is some way they can rework the structure to provide more storage or to see if there is a way that the city can put their own storage facility into operation. I think that each city should have at least a 30 day storage capacity reservoir that will feed their treatment facilities. This would be the responsibility of the city and not the district since it would only benefit the city. If the district has a storage structure presently, they might get the city to fund the needed repairs or enlargement of the facility.

The only way that I see the cities helping themselves is for them to either study their system themselves or to hire someone to assess their needs and to provide an answer for them. One problem that I see is that a lot of the smaller towns have let their treatment and distribution systems and their water supply source to their system deteriorate for so many years, that they are in an almost impossible situation money wise to be able to provide any type of fix to these. Storage reservoirs is the only thing that most can do that would give some relief.

If weirs were to be put in the river at the pump stations, several things that I think would happen would be a minus in my mind. 1. Increased height in the river would impede the flow of the river and although the changes in height would not be much. 2. A raised water level in the river could cause some critical differences in the land that would be required in the new elevations. On the Texas side of the river, this might not be a problem but on Mexico's side, it might create some difficult problems.
If there could be additional measuring or gauging stations along the river and these could be monitored as to river flow, I think that the river could be operated without too much trouble. I think that has been talked about and maybe with HWC, we could get enough money between all of the agencies to fund such a program. Course, the answer to the cities' problem is to put the pipeline in from the lake to the lower Valley and the supply problem is solved for them. Solving the problem for one will create some problems for the other.

I really don't see any thing that can be done that does not require a tremendous amount of funding that will solve the problem during times of drought.