**Water Acquisition and Management Subcommittee Position Paper:**
**Municipal Conjunctive Use and Conservation Strategies**
**August 13, 2003 First Working Draft**

## Background

Groundwater and surface water in the middle Rio Grande are in hydrologic connection, but the precise nature this connection is uncertain. Data collection and research into the groundwater-surface water interaction should be continued into the future. If Albuquerque were to stop pumping today, the delayed, residual effects of historic pumping on the flow of the Rio Grande would be about 10,000 ac-ft per year sixty years from now. Impacts of future pumping by the City and other municipal and industrial water users will also directly affect the flow of the Rio Grande. All entities are required to offset their effects. Albuquerque's effects on the Rio Grande are fully offset by its return flow and water rights. So, expected future increases in demand resulting in increased pumping will likely result in little or no change to flow in the Rio Grande.

Aquifers must be managed on a sustainable yield basis, with artificial recharge projects supplementing the natural recharge. This is the basis for Albuquerque's Water Resource Management Strategy, which includes the Drinking Water Project (DWP).

## City of Albuquerque Drinking Water Project

The City of Albuquerque is in the process of obtaining approvals for implementation of its DWP, which will include surface diversion, treatment and consumption of its San Juan-Chama water. Through implementation of the DWP as well as other projects identified in the City's Water Resource Management Strategy, such as re-use and aggressive water conservation, the City intends to:

- Reduce its pumping and allow the aquifer to recover;
- Curtail surface diversions during low-flow periods to minimize effects on the river;
- During low flow periods, increase pumping, thereby supplementing the river with increased return flows below Albuquerque;
- Preserve a drought reserve in the Albuquerque basin aquifer for use in times of severe and prolonged drought; and
- After development of ASR capability (aquifer storage and recovery), periodically recharge the Albuquerque basin aquifer during times when there is a surplus of treated surface water.

## River Management

Under the DWP, the City will continue to work closely with those agencies having responsibility in managing the flows of the Rio Grande and Rio Chama. These include the BOR, the U. S. Army Corps of Engineers (COE), the Office of the State Engineer (OSE), and the Middle Rio Grande Conservancy District (MRGCD). More recently, because of the critical habitat designation for the Rio Grande silvery minnow, the U. S. Fish and Wildlife Service has become a more active player in flow management on the river.

With the evolution of the multi-agency Upper Rio Grande Water Operations Model (URGWOM), and continued conference calls and meetings during critical times of year, the management of the SJC project and river flows and reservoirs on the Rio Chama and Rio Grande will become more efficient. The City, in concert with the above agencies, will monitor snowpack, reservoir storage, seasonal weather forecasts, and other factors particularly in the late-winter and early-spring periods leading up to the irrigation season (which begins in March). Preliminary decisions and action plans will be formulated as to how the City's SJC water will be managed, particularly in the case of likely low-flow or drought conditions, as to whether or not surface diversions under the DWP will be curtailed or shut down entirely for several months in the coming year. As the critical warm weather irrigation season approaches (usually beginning in late May or early June), flow forecasts and river management decisions will be updated and specific plans formulated relative to the City's DWP release and diversion program for the coming year.

**Past Pumping Effects**

When the DWP begins operation in 2006, there will still be a lingering effect of historical City pumping on the river. In other words, the City's past pumping has lowered the water table in the aquifer inducing continued seepage of native Rio Grande water into the adjacent aquifer. The effects of this additional seepage will continue for about a decade. In accordance with the conditions on the City's existing ground-water permits under RG-960 and the Guidelines for Review of Water Right Applications in the Middle Rio Grande Administrative Area, the City must offset both current and historical pumping effects. The City will meet these conditions by releasing City SJC water stored in Abiquiu.

The estimated total water needed to offset the residual pumping effects, as calculated using the OSE interim model, for the period from 2006 to 2016 is about 91,000 ac-ft. This quantity is obtained by summing the annual amounts and does not account for evaporative losses for storage in Abiquiu. Accounting for seepage and evaporative losses, the estimated quantity of City SJC water needed in storage to offset the residual pumping effects and fully implement the DWP, including up to 3,000 ac-ft/yr of SJC for the Nonpotable Surface Water Reclamation Project, is on the order of 150,000 ac-ft. The estimated end of year 2002 storage of the City's SJC water in Abiquiu is only about 20,000 ac-ft. Thus, the entire 48,200 ac-ft/yr allotment of City SJC water for 2003-2005 will be needed to fully implement the AWRMS project beginning in 2006.

**Hydrologic Effects and Operation of the Diversion**

To provide for an objective evaluation of hydrologic effects on the Rio Chama and Rio Grande through Albuquerque and downriver, it is necessary to specify specific values of flow, release, and diversion under a hypothetical operation of the DWP. The release-diversion scenarios described below are intended for that purpose, and represent a worst-case condition for evaluation under Permit No. 4830. Deviations from the simplified release-diversion plan (which are fully anticipated under active management on the Rio Grande) will result in hydrologic effects less than those estimated in this document and the Hydrologic Effects Report.

In most years, assuming a diversion point in the vicinity of Paseo del Norte, the project will be operated with a constant release of about 66 cubic feet per second (cfs) of City SJC water from

Abiquiu Reservoir. After incurring conveyance losses between Abiquiu and Albuquerque, approximately 65 cfs of SJC water will reach the diversion facilities. There a constant diversion of 130 cfs will occur throughout the year provided flows are more than or equal to the 'threshold flow' of 200 cfs just above the diversion point. The 130-cfs DWP diversion will include 65 cfs of SJC water and 65 cfs of native water. The 65 cfs of SJC water will be consumptively used within the City's Water Service Area. The 65 cfs of native water will, in effect, be returned to the river at the City's Southside Wastewater Reclamation Plant (SWRP) outfall below Rio Bravo.

Under the above plan, and assuming a diversion near Paseo del Norte (either surface or subsurface), there will be a reach of the Rio Grande between the point of diversion and point of return flow (about 14 miles) that will be depleted relative to native flows. Without the DWP and if the City's pumping under RG-960 (its master well permit) were to continue and to expand to meet projected demand, pumping induced depletions would be similar, on the order of 132 cfs by the year 2030. This depletion is offset by return flows in the amount of approximately 107 cfs and the net effects (25 cfs) are covered by the City's Rio Grande depletion rights.

To ensure that DWP diversions do not dry up or otherwise adversely affect the riverine ecology between the diversion and return flow points, the City proposes to implement a curtailment strategy as described below.

- For the full operation of the DWP under a constant release-diversion scenario, the flow at the Paseo del Norte diversion point must be at least 200 cfs based on the following:
- A diversion rate of 130 cfs comprised of 65 cfs of SJC water and 65 cfs of native water;
- A fishway bypass flow of 50 cfs on the west side of the river and 20 cfs at the outlet of the sluiceway on the east side of the river to provide for downstream movement of sediment and fish past the intake screens (for the surface diversion option)

Thus, the total flow required to fully operate the DWP at 130 cfs is (130 + 50 + 20) = 200 cfs. If the river flow above the diversion point is less than 200 cfs, the flow to the intake will be curtailed to ensure proper operation of the sluiceway and fishway facilities, and to minimize depletion effects in the 14-mile reach between the diversion and the SWRP.

When native flows at the diversion point fall below 135 cfs (total flow of 200 cfs with 65 cfs SJC in the river), the City will begin curtailing the quantity of the diversion by 1 cfs for each 1 cfs drop in native flow. However, the City would continue to release from upstream and divert at Albuquerque the full 65 cfs of SJC water. As native flow continues to drop, DWP diversions would be reduced accordingly. When native flow reaches 70 cfs above the diversion (assumed equivalent to about 105 cfs at the Albuquerque gage), DWP diversions and SJC releases will be cut off entirely. From the gage to the SWRP return flow point, minimum flows will be about 105 cfs, minus seepage and evapotranspiration losses plus any gains due to returns, thereupon increased by the amount of the return flow at the SWRP.

During periods of curtailment, the City will provide increasing amounts of water to the WSA from wells. During periods of complete shut down of river diversion, the WSA will be supplied entirely from wells.

**Aquifer Storage and Recovery**

Details of the City's aquifer storage and recovery (ASR) operation, including pilot testing and an operating permit from OSE, have yet to be developed. However, a general ASR plan of operation is known. The new water treatment plant for the DWP will operate at an essentially constant rate of 84 mgd or 130 cfs. Peak summer demands, which are considerably higher than the plant's capacity, would be met with City well pumpage. During low-demand periods, typically October through March, the Plant would be producing sufficient water (more than demand) to allow the wells to be turned off. During this period, recharge would be accomplished by injection into City wells. The amounts of water involved, number of recharge wells, and other aspects of the ASR program await development over the next few years.

**Conservation**

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**Conclusions:**

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