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WATER DEVELOPMENT AND
ACQUISITION FOR A MUNICIPAL SUPPLY

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I. MUNICIPAL GROWTH

The present population of the City of Aurora is 226,000. In 1950 the City's population was 11,000 and in 1970 the population was 74,000. In the early 1980's growth averaged 12,000 people per year and Aurora was the fastest growing city in the county with a population exceeding 100,000.

After a 10 year moratorium on external annexations, the City Council decided in 1985 to identify a planning and development area east and south of its present boundaries and accept annexation petitions from the area. The area encompasses a land base in excess of 100 square miles. Large blocks of land have already been annexed and it is highly likely that the majority of the remaining land will be annexed into Aurora within 3 years. With the added area current projections show the city population approaching 600,000 by the year 2035.

II. HISTORY OF WATER DEVELOPMENT

A. Service from Denver

Aurora was entirely supplied by the Denver Water Board until the early 1950's. In 1951, due to a combination of factors causing a shortage in its supply system, including a drought and growth in the metropolitan area, the Denver Water Board established a "blue line" beyond which water service would not be provided.

B. Early Aurora Water Projects

Because Denver would no longer supply water beyond the blue line and because of strong growth pressures within Aurora, the City decided to seek its own water supply. Modest initial supplies were obtained from a well field and the purchase of South Platte direct flow rights.

C. Homestake Project

Studies by water consultants which were made for Aurora in the late 1950's and early 1960's indicated that additional sources of water supply would be required if the expanding demands of the City were to be met. In June, 1962, an agreement for the joint construction and development of a system of collection, diversion, storage, pumping and delivery facilities for the diversion of water from the western to the eastern slope of the Continental Divide, known as the Homestake Project, was signed by the cities of Aurora and Colorado Springs. Following completion of this extensive project in 1967, Aurora ceased purchasing water from Denver.

D. Development and Acquisition in the 70's and 80's

1. Agricultural Conversions

Beginning in the early 1970's, the City has purchased and transferred from agricultural to municipal use numerous water rights in the upper reaches of the South Platte in an area known as South Park. The transfer of these rights has necessitated the "dryup" of thousands of acres of previously irrigated high altitude meadows. In total the City has transferred approximately 20,000 acre-feet from the South Park area.

2. Recent Major Projects

In the last 5 years the City has completed several major projects which have significantly increased system capacity and reliability.

a. Rampart Parallel Pipeline

This facility consists of approximately 25 miles of 54 inch diameter raw water pipeline. The pipeline delivers raw water from Rampart Reservoir to Aurora. It parallels a previously existing 40 inch diameter raw water line. Completion of the parallel pipeline increased Aurora's raw water influent capacity from 33 million gallons per day to 93 million gallons per day. The project was completed in early 1981 at a cost of approximately \$19,500,000.

b. Spinney Mountain Reservoir

Aurora has long recognized the need for additional east slope storage to provide both carryover and operating storage. To meet these requirements, Spinney Mountain Reservoir was completed in early 1982 at a cost slightly in excess of \$26,600,000. The reservoir has a total storage capacity of 54,000 acre-feet and is located on the middle fork of the South Platte River in Park County, Colorado. The project more than doubled Aurora's raw water storage capacity. The reservoir provides east slope storage for Aurora's Homestake water and a point of collection and storage for water rights owned by Aurora in South Park, Colorado.

c. Strontia Springs Dam and Appurtenances

In conjunction with the Denver Water Board's Foothills Project, Aurora paid approximately 15.73% of the cost of constructing Strontia Springs Dam and Reservoir. This facility provides terminal storage and a diversion point on the South Platte River for both Aurora and the Denver Water Board. It replaces Aurora's previous point of diversion. In addition to participation in the Dam, Aurora independently constructed a new intake tower within the reservoir, placed concrete lining in Rampart Tunnel #1, and constructed a

pressure reducing and flow control facility immediately downstream from Rampart Tunnel #1. Aurora's total costs for these improvements were approximately \$11,393,000. The new intake facilities were placed in operation in January, 1983. Aurora significantly increased its diversion capacity and system reliability by participating in this project.

d. Wemlinger Water Treatment Plant

The Wemlinger water treatment plant was placed in functional operation in April, 1983. The new plant increases Aurora's water treatment capacity by approximately 40 million gallons per day. The new water treatment capacity is approximately 110 million gallons per day. Final costs for the Wemlinger Water Treatment Plant were approximately \$12,800,000.

e. Otero Pipeline Extension

In April, 1984, the Aurora-Colorado Springs Joint Water Authority (an entity previously created to facilitate the possible financing of joint water projects) issued revenue bonds in the amount of \$10,620,000 to finance the construction of a pipeline from Twin Lakes Dam to the existing Otero Pumping Station. This section of the transmission system

used to transport Homestake water is currently not served by pipeline. Rather, the Arkansas River is used to transport City water. A construction contract was let in 1984 for the construction of the 5½ mile pipeline. Construction is expected to be completed in May, 1986. Pumping costs should be substantially reduced with the completion of the pipeline (at the Otero Pumping Station) and water delivery reliability will be increased.

III. FUTURE PROJECTS

A. Homestake Phase II

Phase II of the construction of the Homestake Project, which the Cities of Aurora and Colorado Springs are jointly proposing, consists of an extension of the collection system to intercept the flows of Cross, East Cross, West Cross and Fall Creeks. The development plan calls for the construction of a gravity tunnel system from the proposed Phase II collection system to the existing Homestake collection system. The final environmental impact statement for the Homestake Phase II project was issued by the U.S. Forest Service in 1983. In spite of administrative appeals by various groups, the U.S. Forest Service's granting of the permit was upheld by the Chief Forester in January 1984. Additionally, the U.S. Army Corps of Engineers has awarded

a dredge and fill permit under Section 404 of the Federal Clean Water Act. The permit requires that mitigation measures to ensure that wetlands near the project construction area not be damaged be instituted. Consultant studies have been initiated to study existing wetlands and their preservation. Additionally, the Cities have also applied for an Eagle County 1041 permit (a type of County land use permit issued under Colorado law with respect to certain matters involving State interest). Additionally, the Holy Cross Defense fund, an environmental group organized to oppose the Homestake II project, has filed lawsuit in the U.S. District Court against the Secretary of Agriculture and others asking that the dredge and fill permit awarded under Section 404 of the Federal Clean Water Act be revoked. The Cities have intervened in the case on behalf of the Secretary of Agriculture. Upon receipt of all necessary permits and approvals, the construction project will commence. Construction is expected to take from five to ten years. The yield of the project to Aurora will be 11,000 acre-feet/annually. Aurora's share of the project is estimated to cost \$45 million.

B. Two Forks

Aurora is the largest suburban participant in the Two Forks project. The Denver Water Board and 44 cities and districts are funding a massive E.I.S. to document the impacts of

Two Forks and receive the necessary federal, state, and local permits for the project. Aurora's share of the Two Forks yield is projected at approximately 15,000 acre-feet. Ideally located to serve the metro area, Two Forks will complete the development of the South Platte above metro Denver and the Blue above Dillon.

C. Rocky Ford

In February, 1983 the City entered into a purchase agreement with Resource Investment Group for a 52% interest in the Rocky Ford Ditch. This very senior water right diverts from the main stem of the Arkansas at the town of Rocky Ford. Terms of the purchase agreement require the seller to bear the risk of transfer. Being the first major transfer out of the Arkansas basin, the case has attracted considerable interest. The transfer trial is scheduled in May and June of this year. The projected transfer amount is 9,000 acre-feet.

D. Senac Reservoir

The City's consultants are presently in the design phase on the Senac Reservoir project. This facility will function as terminal storage providing seasonal peaking for the City's raw water transmission system. Sized at 31,000 acre-feet, the reservoir will also serve as a major metropolitan recreational resource. With Senac in place, Aurora's raw

water transmission system will be capable of supplying a population in excess of 500,000.

E. Collegiate Range Project

On April 29th of this year, Aurora filed a conditional water right application for unappropriated waters in the upper reaches of the Gunnison River Basin. The application claims water on the upper Taylor and the East River above Almont under a storage and delivery configuration known as the Collegiate Range Project. The project features would include 2 reservoirs and 42 miles of pipeline and tunnel conveyance facilities to deliver water to the upper South Platte. The City views this project as an after the year 2000 development to supply long-term growth. Yield projections for the project average 73,000 acre-feet annually.

IV. MANAGEMENT PRACTICES

A. Yield Criteria

Like all major water purveyors, Aurora utilized computer modeling and system simulation to predict overall system yield. The City's raw water model is loaded with historical hydrology for the years 1950 through 1980. However, the City's

raw water planning and yield criteria is not designed to supply unrestricted demand through an extended drought cycle. A repeat of the 30's drought or the early 50's drought will require mandatory reduction of demand through restrictive measures.

B. Planning Alternatives

It is the City's philosophy to include a wide range of planning alternatives for future development and acquisition and to diversify into different basins where practical. An array of planning alternatives allows for the development of "what if" scenarios to deal with circumstances where projects get delayed due to litigation, permitting, or funding. The basin diversification reduces risk exposure associated with localized droughts and conveyance outages.

C. Conservation

Conservation is an important aspect of the City water supply planning. Aurora has adopted a long-term water conservation plan and aggressive ordinances requiring conservation practices in new construction. The City is an active member in Metro Water Conservation, Inc., and has one of the lowest per capita usage rates in the Denver area. Maintenance of a low per capita usage translates into direct dollar benefits in terms of reduced need for new development projects.

D. Reuse

A tertiary sewage treatment plant is presently on line supplying irrigation water to a golf course and 3 parks. Future plans call for the expansion of irrigation reuse and the eventual development of potable reuse where sewage which has been processed through an advanced wastewater treatment plant will be blended with surface rights in Senac Reservoir.

E. Storm Water Detention/Retention

The 3 largest parks in Aurora are combined storm water detention and park facilities. Each park also contains a small storm water retention pond. The entire irrigation requirement for these parks is met by pumping from the retention ponds thereby significantly reducing the demand for treated water and additional water development/acquisition.

F. Alternative Irrigation

Development policies have been adopted for the 81 square mile planning and development area which is expected to be annexed to Aurora. These policies specify that irrigation for large area open space and parks must be accomplished from other than the City's treated water supply. New open space irrigation will be accomplished with either well water, storm retention facilities, or sewage reuse.

G. Deep Wells

The City has a vast reserve of Denver Basin deep well water underlying its boundaries which it is entitled to develop. The capital cost of developing this resource is less than developing traditional surface water supplies. However, due to the non renewable aspect of this supply, the City has taken the position that the Denver Basin water should not be relied upon as a primary supply. Instead, the resource should be sparingly developed for non-essential uses such as park irrigation, and perhaps be developed as a supplemental supply which could be used in drought years when surface water rights are curtailed.

V. FACTORS AFFECTING FUTURE MUNICIPAL SUPPLY

A. Depressed Agricultural Economy

The major factor currently impacting municipal supply decisions is the extensive amount of agricultural water available for purchase. In many many instances, the sale of agricultural water to a municipality or speculator represents the only opportunity for a farmer to clear his debt and have anything left over. From a municipal viewpoint, the purchase of agricultural rights poses less risks than development projects, is often less expensive, and offers better opportunities for incremental development.

B. Environmental Regulations and Constraints

The risks and costs of water development projects have been greatly increased by environmental laws and by how the environmental laws are administered by the federal permitting agencies. Certainly the intent of the environmental laws is admirable, but it would be easy to make a case that the pendulum has swung too far. Case histories are numerous. Colorado can supply its municipal and industrial growth either from the development of new water resources to which it is entitled, or from a re-allocation of resources from agricultural to municipal. Environmental regulations and conflict are driving Colorado rapidly to the re-allocation side of the equation. Smitten by environmental law suits, the federal permitting agencies now function as mediators on permit decisions, rather than administering the environmental laws as written.

C. Financing From Growth

In years past major water projects were financed through long-term bonds. Bond underwriters required a stable source of long-term revenue to retire bonds. This was traditionally accomplished through a water sales rate increase spread across all existing and future customers. Attitudes have changed. Existing customers are no longer willing to fund projects which are needed solely for new growth. New development and acquisition projects must now be funded

from growth revenues. Most of these revenues accrue in the form of tap fees. Although the tap fee revenue source can be quite significant, the flow of revenues is highly variable and subject to rapid downturns in the economy and home building industry. This variable revenue flow does not lend itself to long-term bonding. As a result, smaller more incremental projects which can be cash funded, as development revenues accrue, are more attractive to municipalities. This can also be accomplished with partnership arrangements to build large projects, where the risks, costs, and yield are spread among a number of participants. The Two Forks project agreement is a good example. Large project funding may also be accomplished through a process which could be called "layer financing." Under this concept, the direct financing is done through an Authority, and the Authority contracts with the municipality for repayment. Repayment amounts may be shown by the municipality as an operating expense, and funded from any and all revenues available.

VI. CONCLUSION

If the Denver metropolitan area continues to grow, Aurora will capture a significant portion of the growth. The continued availability of water and the cost of water will be factors in determining the location of growth. Aurora will be a major player in metro area water development. Aurora's water planning

is directed toward basin and source diversification, risk reduction through project sharing and alternative planning, and the development of funding mechanisms which will allow growth to pay its own way.

