TECHNICAL MEMORANDUM

May 1, 1998

From: R. T. Hanson
U.S. Geological survey, Water Resources division, California District

... springs along the bluffs back in the 1920's may also sugg
... the potential for lateral or vertical flow may exist. But the lack of many current springs al
the base of the bluff may suggest that the water is seeping northward to the Aromas Sand or we
ward to the ocean (Koenig, 1996). Isotopic and chemical analysis of the seeps, irrigation runc
and nearby production wells (to the north and west) and monitoring wells may be needed to ide
tify the source and movement of rainfall and irrigation runoff in the perched system beneath t
1,000 acres of the San Andreas dunes. Both chloride and nitrate concentrations appear to va
increasing together in the shallow well (70-98 ft. depth) at PV-1 (fig. 24) at the north end of Sun
set Beach. Depth-dependent samples from production wells or a monitoring well completed in th
upper parts of the Aromas Sand and the perched aquifer may also be required to get reliabl
geochemical samples from this area, to help delineate the potential flow paths and hydraulic con
nection with the dunes perched system, and to provide a regional baseline for monitoring th
future performance of the proposed ASR.

Reclaimed Water

The source of reclaimed water would represent municipal sources largely from the City of Watsonville. The reported cost of reclaimed water from the City of Watsonville was on the order of $470 per ac-ft. (table 3). The reported yield for reclaimed water from the Watsonville Treatment Plant was 3,000 ac-ft./yr. and could be increased to an estimated 7,000 ac-ft./yr. (PVWMA, 1996). The estimated yield represents from 28 to 65 percent of the average projected pumpage for the Beach Road and Pajaro River Mouth subareas. The cost of reclaimed water from other areas ranges from $15 per ac-ft. for tertiary treated waste water to $480 for drinkable treated wastewater (table 4).

Tertiary treated wastewater could be available for direct use or streamflow conveyance to downstream diversion for agricultural use, surface storage, or aquifer recharge. Higher levels of treatment, such as reverse osmosis could make additional water available for industrial and domestic reuse such as the current project with San Diego County Wastewater Treatment Plant.

Conservation

Conservation can take the form of reduced municipal and agricultural use, in-lieu use with storage recovery from recharge, drought-year storage from natural or artificial recharge, or retirement of coastal agricultural land to eliminate use. The initial estimate of conservation yielded a total of 1,550 ac-ft. that consisting of 1,200 ac-ft. from agriculture and 350 ac-ft. from the City of Watsonville (AMBAG, 1984). The more recent estimate of conservation ranges from 4,000 to 9,000 ac-ft/yr. (PVWMA, 1996). This represents from 6 to 13 percent of projected average pumpage and from 5 to 12 percent of the projected pumpage by the year 2040. About 90 percent (7,013 ac-ft.) of the Watsonville supply was derived from ground-water pumpage and about 10 percent (819 ac-ft.) from streamflow diversions from Corralitos Creek were reported for the City of municipal use in 1988 (JMM, 1990a). On the basis of the 1980 census, rural pumpage for domestic water supply was estimated to be an additional 4,400 ac-ft./yr.(JMM, 1990a). This collectively represents on the order of 12,200 ac-ft./yr. The AMBAG conservation estimate represents about 5 percent conservation of Watsonville pumpage and about 43 percent of the reported streamflow diversions from Corralitos Creek.

The retirement of coastal agricultural land was also an alternative that was suggested (Deitch, 1998). This strategy that has been used in many other areas throughout the Southwestern United States as a means to acquire water rights or transfer pumpage to adjacent basins. The proposed retirement of 3,500 acres in the Springfield Terrace area and 3,500 acres in the Buena Vista area was reported (Dietch, 1998). The reduction in pumpage from 8,200 acres was 24,500 ac-ft./yr. by Dietch (1998) and the total simulated projected pumpage for the Springfield area was about 5,900 ac-ft./yr. The retirement of the Springfield area could represent about 8 percent of the projected pumpage and the cessation of pumpage through land retirement or in-lieu replacement for the Springfield and Pajaro River Mouth subareas (10,796 ac-ft./yr.) would represent about 15 percent of projected average pumpage and about 14 percent of the projected pumpage by the year 2040.

The reported potential storage through conservation needed for drought protection was 3,000 to 9,300 ac-ft. (table 3), which is about 4 to 13 percent of projected average pumpage and about 4 to 12 percent of the projected pumpage by the year 2040. The reported cost of drought-year storage is on the order of $200 to $250 per ac-ft. (table 3). This volume represents the potential increase in pumpage for about two consecutive dry years and would require contributions other supply options to sustain additional use for severe or sustained dry-year periods such as 1976-77 or 1989-92.

A minimum conservation of 4,000 ac-ft./yr. was estimated for the PVWMA summary of proposed plans to meet water needs (PVWMA, 1996). The reduction in pumpage to 50,000 ac-ft./yr. represents a 28-percent reduction from 1992 average pumpage. This reduced rate of pumpage is comparable to the 30-percent conservation estimated to prevent seawater intrusion in the Santa Clara-Calleguas basin, Ventura County, on the basis of ground-water/surface-water simulation-optimization studies (Reichard, 1995). The conservation is more difficult to estimate for Pajaro Valley. Some estimates for selected options were previously reported (JMM, 1990a) but an update of costs and estimation of costs through simulation-optimization modeling could improve the understanding of the spatial distribution and cost of conservation. For example, the amount and spatial distribution of conservation costs can be estimated as trade-off or shadow costs within a simulation-optimization analysis (Reichard, 1995).

Imported Water

Imported water could be available from the entitlement granted to PVWMA from the San Felipe part of the Central Valley Project (CVP) and from water purveyors in adjacent basins in Santa Clara and San Benito Counties. The reported cost for CVP water is on the order of $90 per ac-ft. and the cost of water from other nearby water districts is unknown (table 3). The cost of imported water from other coastal basins is on the order of $240 to $500 per ac-ft. (table 4).

San Felipe (CVP) Water

The reported allotment was about 19,900 ac-ft./yr. (USBR, 1993) but the current agricultural delivery is estimated to be about 13,500 ac-ft./yr. (18.6 $ft.^3/s.$), which is 68 percent of the original allotment (PVWMA, 1996). Three different methods of delivery have been studied (USBR, 1993; figs. 1-3) that include a pipeline from San Felipe Reservoir to the Watsonville area, a pipeline to Pajaro Valley and canal conveyance to Watsonville area, and a combination of pipeline to Bolsa Road and river conveyance the remainder of the way to a diversion structure downstream from Watsonville (USBR, 1993). The initial design proposed by the USBR (1993) was for an average delivery flow of 36 $ft.^3/s.$ (26,100 ac-ft./yr.) and a peak-flow capacity of 75 $ft.^3/s.$ (54,300 ac-ft./yr.) (USBR, 1993). The potential forms of conveyance and delivery were by pipeline, pipeline-canal, and pipeline-river conveyance (USBR, 1993). The river conveyance alternatives proposed the use of a downstream diversion or radial wells to divert the water from the river to the local, coastal distribution system (USBR, 1993).