



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE

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MEMORANDUM

Date: April 13, 1992

TO: J. KILLINGSTAD, OPERATIONS MANAGER

FROM: *DWL*
DAVID W. LUNN, WATER RESOURCES ENGINEER III

SUBJECT: MAIN GROUNDWATER BASIN NATURAL SAFE YIELD

INTRODUCTION

The main groundwater basin in the Livermore-Amador Valley is an important resource because of its large storage capacity and its natural yield. The main groundwater basin encompasses an area of over 17,000 acres and has a storage capacity exceeding a quarter million acre feet. The annual natural safe yield of the main groundwater basin is 13,400 acre feet or about 5% of the basin's storage capacity. Annual natural safe yield is the net quantity of groundwater naturally added to the groundwater basin by stream recharge, rainfall recharge, applied water recharge, and net subsurface inflow. This memorandum discusses the long term average annual safe yield of the main basin based upon hydrologic data from the 1974-1991 water year period and current land use and stream channel conditions.

The natural safe yield is the quantity of water which can be successfully removed on an annual basis over a sustained number of years without overdrafting the basin. Withdrawals in excess of the natural safe yield over time will require the replenishment of the groundwater basin with artificial sources of water such as imported water from the South Bay Aqueduct. Zone 7 operates the groundwater basin on a Safe Yield basis and plans for additional artificial recharge when annual basin withdrawals are scheduled to exceed the natural safe yield.

DISCUSSION

The long term average annual safe yield of the main groundwater basin in the Livermore-Amador Valley is calculated by estimating the average annual supply of water to the groundwater basin and subtracting any natural outflows of groundwater. Table 1 shows the basin yield components under 1991 water year conditions. The contributions from stream recharge, rainfall recharge, applied water recharge and net subsurface flow shown in the table are discussed below.

NATURAL STREAM RECHARGE

The stream recharge contribution to the long term average annual safe yield is determined by calculating the individual contribution to safe yield from stream recharge on the Arroyo Valle, Arroyo Mocho and Arroyo las Positas.

The Arroyo Valle stream recharge components that contribute to the main basin's safe yield include the recharge of gaged and ungaged natural streamflow, flood control releases, and an estimate of the stream recharge from releases of conserved Lake del Valle inflow necessary to meet unregulated recharge conditions (water rights releases). The 1974-1991 average annual recharge is 2,700 acre-feet. The safe yield component from stream recharge on the Arroyo Mocho was calculated by averaging the annual natural stream recharge amounts from the hydrologic inventory. No adjustments are made to the average. The long term average annual Arroyo Mocho recharge is 2,600 acre-feet.

The safe yield component from stream recharge on the Arroyo las Positas is the natural recharge determined in 1991. This recent year reflects the current recharge conditions on the Arroyo las Positas. The Arroyo Las Positas contribution is 1,300 acre-feet.

RAINFALL RECHARGE

The contribution of rainfall recharge to the main basin's long term safe yield is calculated by determining the annual average rainfall recharge under current land use conditions and hydrologic conditions for the 1974-1991 hydrologic inventory period. The average annual rainfall recharge under current land use conditions is 3,500 acre-feet.

APPLIED WATER RECHARGE

Applied water recharge is the groundwater recharge that comes from the irrigation of golf courses, urban areas, and agricultural land. The contribution of applied water recharge to the main basin's long term safe yield is calculated by determining the annual average of applied water recharge under current land use conditions and hydrologic conditions for the 1974-1991 period. The average annual applied water recharge is 1,600 acre-feet.

NET SUBSURFACE FLOW

Under present groundwater level conditions, the net subsurface inflow into the main basin is about 1,700 acre-feet. Groundwater basin outflow from rising water along the Arroyo de la Laguna has essentially ended under these groundwater conditions and the net subsurface flow is 1,700 acre-feet.

SUMMARY

The total long term average annual safe yield of the main groundwater basin in the Livermore-Amador Valley is about 13,400 acre-feet. This is based on hydrologic data collected from 1974-1991 and 1991 land use and stream channel conditions. Stream recharge contributes 6,600 acre-feet or 49 percent. Rainfall recharge contributes 3,500 acre-feet or 26%. Applied water recharge contributes 1,600 acre-feet or 12% and subsurface inflow contributes 1,700 acre-feet or 13%.

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Zone 7
Water Resources Engineering
Livermore-Amador Valley Main Groundwater Basin

Safe Yield
in Acre-feet

Natural Stream Recharge		
Arroyo del Valle	2,700	
Arroyo Mocho	2,600	
Arroyo las Positas	1,300	
Total Stream Recharge	6,600	49%
Rainfall Recharge	3,500	26%
Applied Water Recharge	1,600	12%
Net Subsurface Flow	1,700	13%
Total Main Groundwater Basin Safe Yield	13,400	