



# CITY OF SACRAMENTO

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M. H. JOHNSON  
Director

February 19, 1985

Transportation and Community  
Development Committee  
Sacramento, California

Honorable Members in Session:

SUBJECT: Water Quality Issues Associated with Landfill Expansion

## SUMMARY

This is the first of two (2) associated reports that address water quality issues at the Sacramento City landfill and its expansion. The report which follows this one was prepared by City Staff and analyzes water quality at the current city landfill. This report transmits an evaluation of the water quality protection measures in the landfill expansion. The evaluation was performed by Dr. Alvin Franks.

## BACKGROUND INFORMATION

Dr. Franks, who prepared the attached report, has over 30 years of geologic, hydro-geologic, and geotechnical experience with the State of California and private industry. He also has been involved in numerous university research projects, teaching at both the University of Southern California and at the University of California at Davis. As Chief Geologist for the state agency regulating water quality and water rights, he developed the guidelines for land disposal of hazardous and nonhazardous waste, closure, and long-term maintenance of all disposal sites. He was also involved in coordination of state and federal regulations such as the Resource Conservation and Recovery Act. He directed and reviewed all groundwater investigations, design criteria, and operation and monitoring procedures for major landfills statewide.

Dr. Franks was a water quality consultant to the designers of the landfill expansion.

Dr. Franks' evaluation is attached hereto as Enclosure A.

## FINANCIAL DATA

This report contains no financial data.

February 19, 1985

RECOMMENDATION

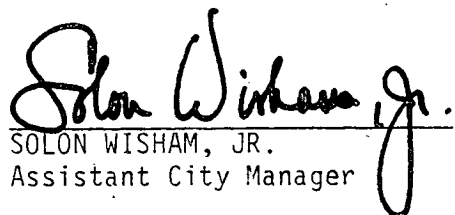
It is recommended that this report be received by the Committee for information and filed.

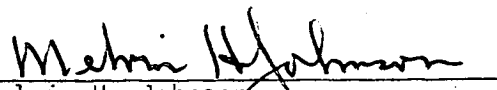
Respectfully submitted,

  
Reginald Young  
Deputy Director of Public Works,  
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FOR COMMITTEE INFORMATION:

APPROVED:

  
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ENCLOSURE A

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GROUND WATER AND SURFACE WATER PROTECTION  
CITY OF SACRAMENTO LANDFILL EXPANSION

By Alvin L. Franks, Ph.D  
February, 1985

GROUND WATER AND SURFACE WATER PROTECTION  
CITY OF SACRAMENTO LANDFILL EXPANSION

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Introduction

A few residents living near the existing Sacramento City Landfill are disturbed by the expansion of the landfill to the Interstate 80 Business right-of-way. They indicated that there could be a water quality problem with the leachate that may be generated in the new area causing degradation of the ground water under the site and thus the American River. The following portion of this report shows that the expanded landfill area will not result in any degradation of either surface or ground water.

Hydrogeology

The area between the existing landfill and the Interstate 80 Business right-of-way has a layer of silty clay, silt, and/or clay extending from the ground surface to depths of five to nineteen feet. This layer is underlain by a sandy to gravelly aquifer system extending to depths in excess of 100 feet. Ground water flow through the aquifer system is dependent on the American River stage. Water flows from the River when it is at high stages and flows from the ground water system when the River is at low stages.

Ground Water Protection

The State of California has adopted and enforces the most stringent regulations for the disposal of any material to land. These regulations are contained in Subchapter 15 of the Cali-

ifornia Administrative Code. The Central Valley Regional Water Quality Control Board is the local agency that must enforce these regulations for the protection of surface water and ground water and to prevent nuisance.

Draft requirements were published by the Regional Board, a public hearing was held, and Waste Discharge Requirements were given to the City of Sacramento with specific conditions that conform to the Subchapter 15 regulations. The following discussion outlines some of these requirements and compares them with what is being constructed by the City of Sacramento.

1. The discharge requirements call for a clay liner one foot thick with a permeability of  $1 \times 10^{-7}$  cm/sec. (about 0.1 foot per year with a 1 foot head of water).
1. The City of Sacramento is constructing a clay liner 1 1/2 foot thick with a permeability of  $1 \times 10^{-7}$  cm/sec which is 50% thicker than the Regional Board requirements. This liner is being constructed in three layers to assure that it will be uniform with no thin spots or areas that could provide a more permeable area where water could penetrate the liner.
2. The discharge requirements state that "Liquid control barriers shall be maintained downgradient from the disposal area to prevent any fluid, including waste and leachate, from entering surface waters."

2. The City of Sacramento is constructing a leachate collection system above the clay liner system to prevent any flow to surface or ground water. It will also prevent any head build up of water on the clay liner. They are also protecting the clay liner with a 1 1/2 foot thick layer of compacted soil so that there will be no ruptures or breaks in the continuity of the liner. There will be two pumps in the leachate collection sump, one for use and the other for standby. As stated before, the flow of fluid through a clay liner with a permeability of  $1 \times 10^{-7}$  cm/sec is 0.1 foot per year with a head of one foot of water. With the leachate collection system, there will be "0" feet of head on the liner and thus "0" feet of penetration or no flow.

#### Other Matters

The use of a clay liner/leachate collection system is not usually required for a typical sanitary landfill, when the ground water level is at least 15 feet below the base of the waste. However, in areas where there could be a threat to a ground water body, the Regional Boards may require this type of protection. A good example is the Bradley Avenue Landfill in the San Fernando Valley of Los Angeles.

This landfill is in an old worked out gravel pit that was dug below the water level in the ground water basin. This area is used by the City of Los Angeles for conjunctive use of natural and imported water. It is also the major water supply

for the cities of Burbank and Glendale. The landfill was constructed with a leachate collection system over a 3 feet thick clay liner with a permeability of  $1 \times 10^{-6}$  cm/sec (three years for the movement through the liner with a 1 foot depth of water). This can be compared to the City of Sacramento expansion area clay liner of 1.5 feet with a permeability of  $1 \times 10^{-7}$  cm/sec (15 years for the movement through the liner with a 1 foot depth of water).

The use of clay liners/leachate collection and detection systems for the protection of water quality has been used for many years for both sanitary landfills and industrial waste disposal sites. Some of the systems in California have been in operation for 15 to 20 years. The only ones that I know of that have had problems are the ones constructed with plastic liners or industrial sites using clay for the retention of organic solvents.

In a well run, normal landfill there is usually no build up of leachate. Both the Regional Board and the California Waste Management Board require the installation of a water proof cover over filled portions of the landfill and a temporary earth cover over the active portions of the landfill. This cover prevents water from saturating the waste and forming leachate. Old landfills that have been drilled into show that the waste at depth is dry and hot (up to 172° f). The small amount of moisture that was in the waste had been used to form methane gas.

The Sacramento City landfill leachate collection system will probably never be used under the conditions that will occur. Under the conditions imposed in the Waste Discharge Requirements, there will never be saturation of the waste with formation of leachate.

The excavations for the construction of the clay liner system were never permitted to fully penetrate the silty clay, silt, and/or clay layer above the sandy and gravelly aquifer system. The base for the clay liner is compacted soil. Grade on this foundation cannot have variations greater than 0.1 foot from that shown on the plan.

A subdrain system is being constructed under the clay liner to prevent inflow from below of any water from the aquifer system. If the water level comes up, water from this subdrain can be discharged either to the American River or to the storm drain system since it will never be in contact with the waste.

Studies have been made by the U.S. Environmental Protection Agency and many states on the content of leachate from municipal refuse (garbage). These studies show that the leachate has a high salt content, a high organic load (Chemical Oxygen Demand), and other undesirable characteristics such as smell, low pH, etc. The only waste streams that had indications of hazardous materials were from industrial developments. The normal household waste was found to contain insignificant quantities of hazardous materials and poses no threat to water quality or public health.