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CITY OF SACRAMENTO

CITY MANAGER'S OFFICE
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DIVISION OF WATER AND SEWERS
927 - 10TH ST.
SUITE #201
SACRAMENTO, CALIFORNIA 95814
TELEPHONE (916) 449-5271

HARRY G. BEHRENS
MANAGER
ROBERT W. JOHNSTON
ASSISTANT MANAGER

March 10, 1980

City Council
Sacramento, California

Honorable Members in Session:

SUBJECT: Chlorination at Sacramento River Water Treatment Plant

Enclosed is a report submitted to the Budget and Finance Committee on March 4, 1980. Since a great deal of attention has been focused on chlorine safety in recent months, staff believes the Council should be aware of our intentions on expanding chlorination facilities at Sacramento River Water Treatment Plant.

The Budget and Finance Committee approved recommendations contained in the report. Approval by the City Council is recommended.

Respectfully submitted,

Harry G. Behrens

H. G. Behrens, Manager

Approval recommended:

R. H. Parker

R. H. Parker, City Engineer

Walter J. Slipe

Walter J. Slipe, City Manager

APPROVED
BY THE CITY COUNCIL
MAR 18 1980
OFFICE OF THE
CITY CLERK

Enclosure

March 18, 1980
District #1

CITY OF SACRAMENTO

DIVISION OF WATER AND SEWERS
827 - 10TH ST.
SUITE #201
SACRAMENTO, CALIFORNIA 95814
TELEPHONE (916) 449-5271

HARRY G. BEHRENS
MANAGER
ROBERT W. JOHNSTON
ASSISTANT MANAGER

February 20, 1980

Budget & Finance Committee
Sacramento, California

Honorable Members in Session:

SUBJECT: Chlorination at Sacramento River Water Treatment Plant

SUMMARY

Expansion of Sacramento River Treatment Plant capacity has led staff to review the disinfection facilities at that plant. A consultant was engaged to prepare a report on the plant facilities, addressing both economics and safety. This report presents the recommendations of the consultant and staff.

BACKGROUND

Chlorination has been the sole method of water disinfection at the Sacramento River Plant since its commissioning in 1924. For a short time, the plant generated chlorine on site. However, the maintenance difficulties experienced with the generating equipment, and availability of commercial chlorine caused the City to abandon on-site generation in favor of purchasing commercial chlorine. Until 1959, only post-chlorination was practiced, that is, chlorine application as the last step in the treatment process. In 1959, the City began pre-chlorination, application at the beginning of treatment, as well. This provides an additional safety factor, plus added taste and odor control. The pre-chlorination facilities were added at a different location from the post-chlorination. This involves two points of control, separated by about 300 feet, in different buildings.

The existing facilities have served reasonably well, but as plant production has increased, it has been necessary to store more and more one-ton chlorine cylinders, requiring more frequent disconnection and reconnection as cylinders are emptied, and moving cylinders from one storage rack to another. While we have never experienced an accident involving loss of significant chlorine, such frequent changing increases the potential for accidents involving loss of chlorine.

Since chlorine can be obtained in one-ton cylinders, 12 - 20 ton tank trucks, and 55-ton railroad tank cars, we felt that the possibility of

modifying the facilities to accommodate the safest and most economical method should be considered. Combining pre- and post-chlorination facilities at one location would make control and operation and maintenance more efficient. The consulting firm of Culp, Wesner, and Culp was engaged to study the facilities and to prepare a report, emphasizing safety as well as economics. This report was prepared in 1978; however, we delayed our decision on recommendations for two reasons:

1. The Environmental Protection Agency has been holding hearings in the process of adopting new regulations on organics in drinking water. Some of the organics concerned, especially chloroform, are formed or increased by the reaction of chlorine on organics in water. Therefore, there was speculation that chlorination as the primary method of disinfection of drinking water could fall into disfavor. It now appears that levels adopted by EPA for these organics will not change the almost-universal use of chlorination as the primary disinfection process used in this country.

2. The City was forced to go to tank truck delivery at the Main Wastewater Treatment Plant in 1978 by the closure of Southern Pacific tracks to the plant. Previously, delivery had been by railroad tank car. This would enable us to gain experience with both the economics and reliability of tank truck delivery. This experience has been satisfactory from both standpoints. Therefore, while the consultant questioned the cost and reliability in 1978, our experience since then establishes tank truck delivery as a satisfactory alternative along with railroad tank cars and one-ton cylinders.

The consultant's conclusions were:

1. Chlorine is the most effective means of disinfection when considering germicidal effectiveness, flexibility of application, dependability of supplies, ease of operation, maintenance, and safety.

2. The existing chlorination facilities are not adequate to meet reliably present and future anticipated treatment requirements.

3. Of the three methods for receiving chlorine - one-ton cylinders, tank trucks, and rail tank cars, the latter, rail tank cars appear to be the safest, followed by one-ton cylinders, and last by tank trucks.

   (Staff does not feel that the conclusion regarding tank trucks is supported by the data. While rail transportation may be safer than by truck, the larger quantity in rail cars (55 tons) vs that in tank trucks (10-18 tons) presents a more serious potential hazard. There has been so little experience nationwide with chlorine transport accidents that evaluation is to a great extent a matter of judgment. The water and wastewater industry

as a whole does not seem to place one method above others from the standpoint of safety.)

4. Chlorine from railroad tank cars is the most economical of the three methods. At the time of the report, we had no experience with costs by tank truck, so the consultant had little basis for estimating costs by this delivery methods. Also, the consultant assumed construction of a new building for centralized chlorine facilities and controls. We have made studies since then that lead us to conclude that there is room for such facilities in the existing administration building, utilizing space formerly occupied by the laboratory and office. Modification of this space should cost much less than a new building, and will be more acceptable aesthetically.

   Our estimate of relative annual costs by the three methods is as follows:

	Annual cost
1-ton cylinders	$ 140,000
Bulk tank truck	113,000
Rail tank car	104,000

5. Disinfection by ozone, chlorine dioxide, and on-site generation of sodium hypochlorite were considered. However, costs were so much higher than by chlorine that there would appear to be no reason to consider them. Costs for these methods were estimated to be as follows:

On-site generation of hypochlorite	$ 335,000
Ozone with supplemental chlorination	604,000
Chlorine dioxide	3,181,000

FINANCIAL

The lowest cost alternative appears to be delivery by rail car at $104,000 annual cost. The second, delivery by tank truck is so close at $113,000, that it can be considered essentially a standoff. The third, one-ton cylinder delivery, is clearly more expensive. The first two alternatives will reduce costs below our current costs; the third costs slightly more than current costs, but would represent an improvement in safety.

RECOMMENDATIONS

The consultant's recommendations were:

1. Chlorination be retained as the principal method of disinfection at the Sacramento River Plant.

2. The existing inadequate and unsafe pre- and post-chlorination facilities be replaced with a new combined pre- and post-chlorination facility.

3. The new facilities be designed to use chlorine from rail tank cars supplemented by an on-site storage tank. By designing the facilities for rail car deliveries, it will be possible to accommodate truck delivery also. Thus, we will be able to accept bids by either method, thereby obtaining the best possible price.

4. The new facility should be built adjacent to the existing coagulation building to minimize costs, reduce safety hazards, and for aesthetic reasons. Tank cars would be accommodated on an extended siding track.

Staff concurs with all recommendations except No. 4. as it pertains to the location. We feel that existing space in the administration building will accommodate the chlorination equipment. This location has three advantages over a new building:

1. Costs of modifying this space should be much less than a new building.

2. The location would be very close to the chief operator's normal working location in the filter building.

3. Aesthetically, adding another building would not be desirable, and would add maintenance costs.

Staff recommends that the consultant's recommendations be adopted, with our modification to No. 4.

Respectfully submitted,

Harry G. Behrens

Harry G. Behrens, Manager

Approval recommended,

Ronald H. Parker
City Engineer

Approval recommended,

William H. Edgar

William H. Edgar
Assistant City Manager