

CITY OF SACRAMENTO

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

CITY MANAGER'S OFFICE
RECEIVED
MAR 10 1981

HARRY G. BEHRENS
MANAGER
ROBERT W. JOHNSTON
ASSISTANT MANAGER

March 9, 1981

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 3, 1981. 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,

Robert W. Johnston
for Harry G. Behrens
Manager

Approval recommended:

J. F. Carozza
R. H. Parker
City Engineer

Walter J. Slupe
Walter J. Slupe
City Manager

Enclosure

APPROVED
BY THE CITY COUNCIL

MAR 17 1981

OFFICE OF THE
CITY CLERK

March 17, 1981
District #1



CITY OF SACRAMENTO

DIVISION OF WATER AND SEWERS

927 - 10TH ST.
SUITE #201

SACRAMENTO, CALIFORNIA 95814
TELEPHONE (916) 448-5271

HARRY G. BEHRENS
MANAGER

ROBERT W. JOHNSTON
ASSISTANT MANAGER

February 24, 1981

Budget and Finance Committee
Sacramento, California

Honorable Members in Session:

SUBJECT: Chlorination at Sacramento River Water Treatment Plant

SUMMARY

Staff presented a report to the Committee on February 20, 1980 recommending modification and expansion of chlorination facilities at the Sacramento River Plant. In that report, staff recommended that the new facilities be capable of receiving chlorine by three alternative methods: 55-ton railroad tank car, 12- to 20-ton tank trucks, or 1-ton cylinders. Intent was to design the facilities to utilize the 55-ton rail car option under normal conditions.

Staff is now recommending that we design to utilize 12- to 20-ton tank truck delivery under normal conditions.

BACKGROUND

A copy of the February 20, 1980 report is attached. In that report, staff's recommendation (P. 4, recommendation No. 3) was to design primarily for rail car delivery, with truck delivery as an alternative. Safety aspects appeared to be equal, and economics seemed to favor rail car by a slight margin. Further investigation has changed both considerations. Railroad representatives have informed us that 55-ton tank cars are being phased out in favor of 90-ton tank cars for rail delivery. First, at our present and projected rates of chlorine use, demurrage costs on such large tank cars will be significant. Also, the consultant has recommended that we install a storage tank to receive the contents of the rail car in an emergency. Use of 90-ton tank cars increases the required size and cost of such storage tank significantly. Finally, the presence of 90-tons of chlorine on site increases the potential hazard if a serious accident should ever occur. While the probability of such an accident is remote, judging from industry history, there is no question that the potential for damage increases with the quantity of chlorine present.

By using truck delivery, we can install two smaller tanks, each of about 25-tons capacity. One would be used to receive delivery from the truck, thereby eliminating any demurrage, or holding costs. The other tank would be kept empty for safety purposes. If an accident should ever occur to the storage tank, its contents could be transferred to the standby tank.

February 24, 1981

The existing rail spur would be retained so that delivery by rail car could be used for delivery of chlorine in an emergency, or in the event that unforeseen changes should favor rail delivery at some future date.

The economics of rail car vs. tank car delivery appear to be too close to call. The consensus of staff engineers, plant operation and maintenance supervisors, and operating personnel favors truck delivery. Truck delivery of both chlorine and sulfur dioxide at Sacramento Main Wastewater Treatment Plant has been satisfactory.

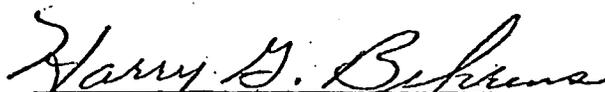
FINANCIAL

Staff estimates that the annual cost by either method of delivery would be about the same.

RECOMMENDATIONS

Staff recommends that the facilities be designed to accept delivery from tank trucks under normal conditions, retaining capability for rail delivery or 1-ton cylinders should availability problems or economics make these alternatives advisable.

Respectfully submitted,


Harry G. Behrens
Manager

R. H. Parker
City Engineer

Recommendation approved,

Jack R. Crist
Director of Finance

attachment



CITY OF SACRAMENTO

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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

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:

	<u>Annual cost</u>
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.

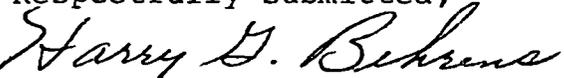


2. The existing inadequate and unsafe pre- and post-chlorination facilities be replaced with a new combined pre- and post-chlorination facility.
3. The new facilities be designed to use chlorine from rail tank cars supplemented by an on-site storage tank. By designing the facilities for rail car deliveries, 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.

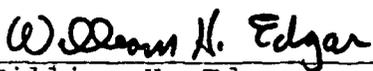
Respectfully submitted,

Harry G. Behrens, Manager

Approval recommended,



Ronald H. Parker
City Engineer

Approval recommended,



William H. Edgar
Assistant City Manager

