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CITY OF SACRAMENTO

DEPARTMENT OF PUBLIC WORKS

915 I STREET SACRAMENTO, CALIFORNIA 95814
CITY HALL ROOM 207 TELEPHONE (916) 449-5281

CITY MANAGER'S OFFICE
RECEIVED
OCT 5 1983

J.F. VAROZZA
Director
M.H. JOHNSON
Asst. Director

October 5, 1983

City Council
Sacramento, California

APPROVED
BY THE CITY COUNCIL
OCT 11 1983
OFFICE OF THE
CITY CLERK

Honorable Members in Session:

SUBJECT: Water Quality Laboratory

SUMMARY:

The Budget and Finance Committee unanimously approved the attached report at their meeting October 4, 1983.

RECOMMENDATION:

It is recommended that the City Council approve the subject report.

Respectfully submitted,

M. H. Johnson

J. F. Varozza
Director of Public Works

Recommendation Approved:

Walter J. Slipe

Walter J. Slipe, City Manager

October 11, 1983
All Districts

9-20-83

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CITY OF SACRAMENTO

DEPARTMENT OF ENGINEERING
915 I STREET SACRAMENTO, CALIFORNIA 95814
CITY HALL ROOM 207 TELEPHONE (916) 449-5281

J. F. VAROZZA
CITY ENGINEER
M. H. JOHNSON
ASSISTANT CITY ENGINEER

September 13, 1983

City Council
Sacramento, California

Honorable Members in Session:

SUBJECT: Water Quality Laboratory

SUMMARY

The purpose of this report is to provide Council with information on the scope and responsibility of the Water Quality Laboratory located at the American River Water Treatment Plant. Greatly increased responsibilities have recently been assumed by this unit as a result of the presence of pollutant's in the City's water supply.

DISCUSSION

The American River Water Quality Laboratory has the responsibility for the physical chemical and microbiological analysis of the drinking water for the City. Duties include:

1. Quality control of the water treatment process.

2. Quality control testing of the water distribution system.

3. Comprehensive monitoring of common mineral constituents present in the water supply and the treated water.

4. Comprehensive monitoring for the presence of microbiological, organic, inorganic, and radiological pollutants in the water supply and in the treated water.

5. Inter-city testing for analytical needs of such City entities as Community Services and Solid Waste Disposal.

The laboratory is staffed 7 days per week. The staff consists of 1 supervising chemist, 2 chemist's, 1 part time student aide, and 1 sanitary inspector. The laboratory is under the direct supervision of the Deputy Superintendent of Water Production Facilities.

Regulatory requirements for testing are controlled by the State of California, Department of Health Services. Because of recent discoveries of such pollutants as TCE, Ordram, and Bolero in the water supply, the laboratory has had to greatly

increase the scope of its analysis. The laboratory is currently at the peak level of performance. It is anticipated that more requests for services will come as attempts to clarify existing problems and anticipate future water quality problems become necessary.

The present responsibilities of the laboratory include:

1. Quality Control at the Water Treatment Plants - The laboratory has the responsibility to insure that the treatment processes are operating at optimum conditions. Specific duties include the supervision of all process testing done by shift operators and interpretation of results. The laboratory also implements necessary changes in operational conditions as necessary.

2. Quality Control in Distribution System - The laboratory is responsible for the analysis required in the distribution system. Specific duties include verifying new mains are not contaminated prior to placing in service, inspecting and testing various backflow devices throughout the City, and investigating customer complaints caused by deterioration in water quality in pipelines.

3. Water Quality Monitoring - The laboratory currently tests for all major dissolved minerals present in the water supply and treated water. Specific analyses include sodium, calcium, magnesium, hardness, total dissolved solids, chlorides, sulfates, alkalinity, and pH. Results of these analyses are required by the regulating authority. The laboratory has an extensive microbiologcal analytical program. The bacteriological section performs all necessary tests to insure that the water is protected from disease organisms. This program is also required by the regulatory authority. The laboratory also tests for the inorganic pollutants of interest in water quality. Examples are mercury, lead, fluoride, barium, chromium, arsenic, selenium, nitrate, silver, and cadmium. These test are also required by the regulatory authority. The laboratory monitors for radiological contamination as required by current regulations. In-house capabilities include testing for gross alpha, and beta activity, as well as strontium 89 and 90. Tritium analyses are sent to a laboratory with the capabilities to test for that compound.

The laboratory has near "STATE OF THE ART" capabilities in physical, microbiological, inorganic, and radiological parameters. "STATE OF THE ART" refers to the ability to perform on a level equal to the latest advances within a given area of science (see Table 1). The area of concern is in the analysis of organic pollutants. Current regulatory requirements have simply not kept current with analytical needs. We are currently only legally required to analyze for a few pesticides and herbicides, most of which have not been used for years, and four chloroform type compounds which are produced as a result of chlorination of the water supply. The National Academy of Science list over 700 possible organic chemicals which could enter the water supply. We currently routinely test for 30, and have the capabilities to test for possibly another 40 compounds. This means we presently have 10 percent "STATE OF THE ART" capabilities in organic chemistry. Appendix A of this report shows the current organic compounds we are capable of detecting. Fortunately, we have developed methods to test for the compounds currently threatening our water supplies. The question in need of an answer is what level of analytical capability is needed for the present and should we significantly upgrade our laboratory in anticipation of future needs.

Staff analysis concludes that there are four selected options to be considered:

1. To maintain the current capabilities of the laboratory with no additional manpower or equipment.

2. To moderately increase analytical services. This option would require the purchase of an additional gas chromatograph with the detection system capable of analyzing for some organic compounds we can not presently monitor. It would also allow the capability to run more tests simultaneously rather than our current practice of having to convert one machine to analyze different compounds. Further requirements would be a recorder integrater and a microprocessor. Selection of Option 2 would increase our analytical capabilities to approximately 20 percent "STATE OF THE ART."

3. To significantly increase the analytical services. The addition of certain sophisticated analytical instruments would extend the laboratory's capability to detect a more complete list of organic chemicals. The laboratory would be able to monitor for such materials as the breakdown products of the rice herbicides Bolero and Ordram. We would also be able to provide for legally accepted confirmation of most organic compounds. This level of service would also require an expansion of current laboratory facilities. It is estimated that approximately 500 square feet of additional laboratory space would be required. Selection of Option 3 would give the laboratory approximately 70 percent "STATE OF THE ART" capabilities. It would also be necessary to add one (1) full-time analyst to the laboratory staff.

4. To achieve "STATE OF THE ART" status. This option would elevate the laboratory to "STATE OF THE ART" capabilities. It would require the purchase of extremely sophisticated instruments such as the mass-spectroscopy equipment used by large federal, state, and commerical laboratories. It would enable the laboratory to monitor all compounds of interest. In addition to the analyst required under Option 3, selection of Option 4 would require the hiring of an additional analytical chemist. It would also be necessary to add an additional 500 square feet of laboratory space.

FINANCIAL

The required resources are dependent upon the option selected. Table 1 presents the initial capital expenditures and on-going annual cost increase of the four options plotted against percent "STATE OF THE ART" organic capability. As indicated by the graphs, selection of Option 1 would require no additional cost. The laboratory would retain approximately 10 percent "STATE OF THE ART" capability. Selection of Option 2 would require an initial expenditure of $40,000 with no resultant increase in annual cost. The laboratory would attain about 20 percent "STATE OF THE ART" capability. Option 3 would require an initial expenditure of $275,000. Annual costs for the laboratory would increase $25,000. The laboratory would achieve roughly 70% percent "STATE OF THE ART" capability. Selection of Option 4 would require an initial expenditure of $450,000. The annual increase in cost would be $70,000. The laboratory would attain 100 percent "STATE OF THE ART" capability.

RECOMMENDATION

Staff recommends the selection of Option 2. Conclusion of staff is based upon the following analysis. The laboratory is currently having a difficult time simultaneously testing for all organic chemicals presently a problem in the City's water supply. Initial expenditure of $40,000 with no increase in on-going cost will allow the laboratory to solve this problem. The purchase of an additional gas chromatograph and recording integrater will give the laboratory flexibility to simultaneously analyze all chemicals currently threatening our water supply, rather than the present system of mounting new detector systems for different test requirements. This option will also increase the number of organic compounds we can detect.

Staff concludes that consideration of Options 3 or 4 represents a quantum leap in the scope and responsibility of the water quality laboratory. The sophisticated instruments required under either of these options can only be justified by the need to analyze a large number of different water supplies. This is why these instruments are usually only in the possession of large governmental and private laboratories. The City currently does not have the diversification of water sources to justify the purchase of this sophisticated equipment or the resultant increase on-going annual cost.

Staff concludes that the water quality laboratory with the selection of Option 2 will be capable of detecting all organic chemicals currently a problem to the City. It is not deemed fiscally prudent to invest vast sums necessary under Option 3 or 4. It will be far more cost-effective to contract for the services of a large laboratory as needed to expand our capabilities beyond a 20 percent "STATE OF THE ART" status.

Respectfully submitted,

John F. Varozza
Director of Public Works

Recommendation approved:

Walter J. Slipe
City Manager

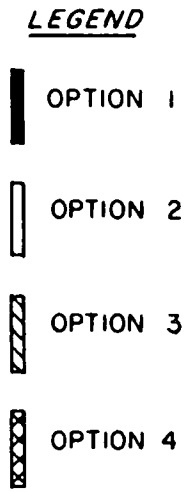
LH:vz
attachments (2)

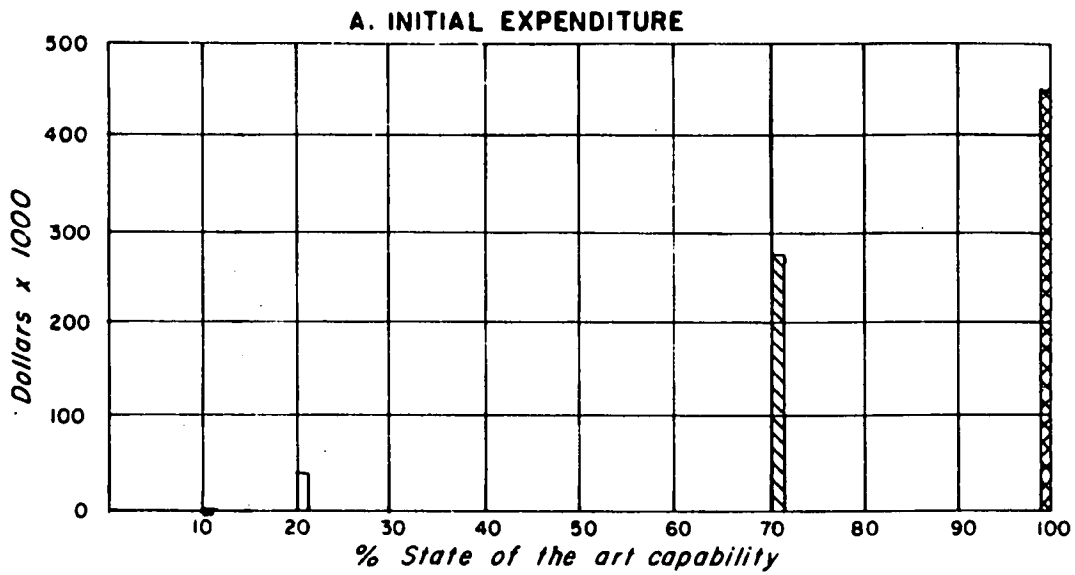
September 20, 1983
All Districts

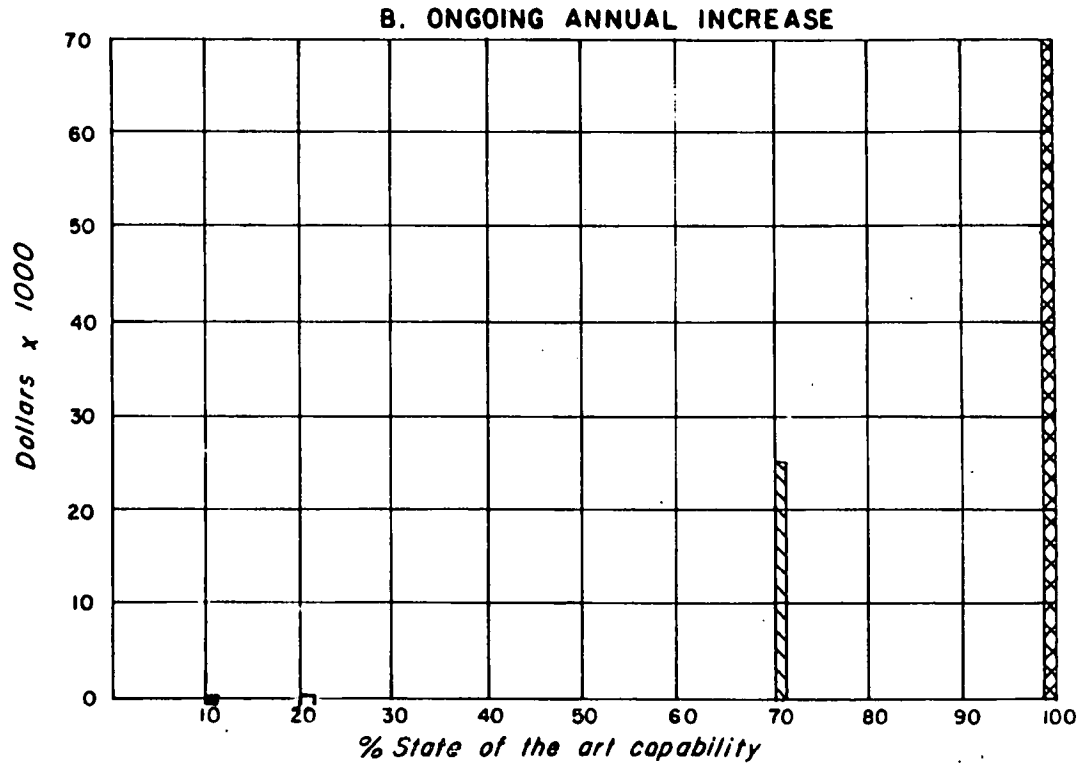
14-R-010-00-0

TABLE I

A COMPARISON OF INITIAL & ONGOING ANNUAL COSTS VS % STATE OF THE ART







APPENDIX A

CURRENT ORGANIC CAPABILITIES - AMERICAN RIVER LABORATORY

VOLATILE ORGANICS

methylene chloride
trichlorofluoromethane
1,1, dichloroethylene
trans - 1,2, dichloroethylene
chloroform
1,1,1, dichloroethane
carbon tetrachloride
1,2, dichloroethane
trichloroethylene
bromodichloromethane
1,2, dichloropropane
trans - 1,3, dichloropropene
CIS - 1,3, dichloropropene
2 - chloro ethyl vinyl ether
1,1,2 trichloroethane
dibromochloromethane
tetrachloroethylene
chlorobenzene
1,1,2,2, - tetrachloroethane
bromoform

PESTICIDES & HERBICIDES

DDT
BHC
DDE
endrin
lindane
toxaphene
chlordane
methoxychlor
heptachlor
strobane
aldrin
dieldin
TDE
endosulfan
chloropicrin
ronnel
ethion
co-ral
guthion
disyston

phosdrin
naled
diazinon
DDVP
metasystox R
cygon
malathion
zolone
monitor
phorate
2,4, D acid
2,4 DB acid
2,4,5 T acid
silvex
2,4D methyl ester
2,4DB methyl ester
2,4,5T methyl ester
silvex methyl ester
2,4,D iso octyl ester
2,4,5T iso octyl ester

CIPC
Ramrod
DEC
silvex PGBE ester
Bolero
Ordram
oftanol
paraquat