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WASHINGTON (STATE) POLLUTION CONTROL  
COMMISSION

SEATTLE SEWAGE TREATMENT PROBLEM

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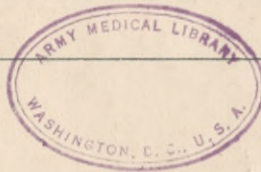
# THE SEATTLE SEWAGE TREATMENT PROBLEM

WITH COMMENTS ON THE WOLMAN REPORT



MON C. WALLGREN, Governor

JACK TAYLOR, Director



1948



STATE OF WASHINGTON  
POLLUTION CONTROL COMMISSION

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*The* SEATTLE  
SEWAGE TREATMENT PROBLEM

With Comments on the Wolman Report

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## PREAMBLE: 1945 POLLUTION CONTROL LAW

Section 1. It is declared to be the public policy of the State of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the State of Washington.

To achieve this goal the Commission has adopted the policy that the proper treatment of sanitary sewage is one of the civic responsibilities of all municipalities whether they be large or small. The practice of pouring millions of gallons of raw sewage into the nearest water course without adequate treatment is a violation of the standards of modern sanitation as well as the Pollution Control Law. The multiple use system for sharing our natural water resources makes it mandatory that fair and just consideration be given to every person who wishes to enjoy the use of these waters. Before such a program achieves success it will be necessary for all city authorities to join in the rapidly expanding program of sewage treatment for municipal waste waters.

## HISTORY

The rapid growth of the Seattle metropolitan area has resulted in numerous complex municipal problems. Constant attention has been given to providing food and shelter, improved transportation, and better education. The spectacular advancement in these problems has been accomplished at the expense of the sanitary problem of sewage disposal which in the past has received a minimum of attention. In dense settlements such as this metropolitan area there arises many conflicting demands on the land and water uses, and in order to protect the public health and welfare State agencies have been established to determine how these rights and uses may best be shared.

Many of the public health and sanitary problems have been solved by the establishment of high standards. The well established policy of chlorinating all municipal water supplies and the proper handling of milk and other foods has been so effective that former disease epidemics from these sources have been reduced to only scattered cases of sickness. The ever increasing problem of handling and treating sanitary sewage in this area has not been satisfactorily solved by the responsible civic authorities.

Most sanitary authorities agree that the dumping of untreated sewage into natural bodies of water has many harmful results. The accumulation of sludge beds on private and public shore lines and beaches tends to create a muddy foul area unfit for most types of human use. The presence of B. Coli organisms (sewage indicators) in the water in the vicinity of swimming beaches indicates that this water is contaminated. Waters containing large quantities of sewage also tend to render the various sea foods found therein such as fish, shrimp, clams and oysters unfit for human consumption. The Pollution Control Commission believes that cases of improper disposal of municipal sewage as well as the harmful results thereof should be forcefully brought to the attention of the general public.

Inland cities such as Ellensburg, Grandview, Sunnyside, Omak, Selah, Walla Walla as well as many others have long ago constructed plants for the treatment of sewage. Nominal utility charges have been established to maintain and improve many of these facilities. Cities such as Morton, Renton, Kirkland, and Burlington as well as many others in the coastal region have constructed treatment plants. In all there are about 40 treatment plants scattered throughout the State at the present time. Numerous cities are either building or actively planning treatment facilities. A considerable number of industries throughout the State are treating their waste waters either by chemical treatment or by settling and screening the solids from their plant effluent.

This problem of sewage treatment exists in most localities throughout the United States and in the past half century over 6,000 treatment plants have been erected. Many more municipal plants are being planned. Private industry has also been very active in an industrial waste treatment program. The expenditure of over \$160,000,000 will be necessary before the industrial waste problem in the United States will near completion.

Prior to 1938 nearly all pollution control activities in this State were carried out under authority of public health statutes. In 1938 a technical commission was established to work on pollution problems under the State Department of Health. An active survey and research program was conducted on the problems relating to municipal and industrial pollution and numerous technical bulletins were published by this Commission.

The present Pollution Control Commission was established under Chapter 216 of the Laws of 1945. The Commission was delegated the authority to establish regulations and standards, to conduct surveys, as well as to *enforce* the law in cases where violations are noted.

As a result of the overall program of the Commission treatment plants will be erected at Tacoma, Bellingham, Vancouver, Puyallup and many other cities in the near future. At the present time the first of two plants is under construction in the City of Bremerton and should be completed during the year 1949. It is expected that the second plant will be erected soon after the completion of the first.

For several years the Pollution Control Commission has investigated many instances of gross pollution of the waters adjacent to the City of Seattle. Water samples have been collected by members of the Commission staff and analyzed in the laboratory of the State Department of Health. These samples have shown that under tide and wind conditions all of the salt water bathing beaches of the City show varying degrees of pollution. B. Coli counts (sewage indicators) have ranged to as high as 2,400,000 which is definite proof that bathers are often in contact with waters containing various dilutions of sewage. A further and more detailed discussion of the bacteriological phase will be taken up later in this report.

During the year 1947 Dr. Abel Wolman of Johns Hopkins University was retained by the City of Seattle to survey the entire sewage problem. At the initial joint meeting of the three agencies concerned it was decided that the City, the State Health Department and the State Pollution Control Commission would all take part in the collection and interpretation of the data pertinent to this investigation. Everything proceeded according to plan up to the final step—the drawing of the conclusions and recommendations. The regulations and opinions of the Pollution Control Commission were not taken into account in the preparation of these conclusions and recommendations. For this reason the Commission has found it necessary to publish the report which follows:

### COMMENTS ON WOLMAN REPORT

It was the understanding of the Pollution Control Commission that the purpose of the Wolman Report was to provide the City of Seattle with a basis for *future planning* for sewage and industrial waste collection, treatment, and disposal and to furnish detailed information as to the methods of accomplishment. The report does not give any of the expected details. The basis for future planning seems to hinge on the interpretation of the recommendations. Some first interpretations have appeared in the newspapers to the effect that Seattle will never need to provide sewage treatment facilities. Since this is a far reaching conclusion and effects not only Seattle but all of the salt water areas in the State, it appears advisable to consider all of Wolman's recommendations and conclusions and not only those which appear to recommend no treatment. Each and every conclusion and recommendation contained in the report is therefore quoted below with comments for the purpose of bringing out all pertinent factors.

## CONCLUSIONS

1. PUGET SOUND, BY VIRTUE OF ITS UNUSUAL DEPTHS AND GREAT TIDAL VARIATIONS, HAS A HIGH CAPACITY FOR CONTINUING ASSIMILATION AND CONVERSION OF SEWAGE INTO NON-OBJECTIONABLE INORGANIC CONSTITUENTS.

The above statement is correct as written. However, in his calculations, Wolman assumes that all of this vast quantity of water is available for mixing with Seattle sewage. By the use of this assumption with an 11-foot tidal range he arrives at a sewage assimilation value of 23,000,000. For that reason the discussion can only be viewed as an academic presentation since it is a physical impossibility to mix so much sewage with so much Sound water spread over so vast an area. Wolman admits this when he states that only a portion of this water is available, but presents no data to show what amount is available. Similar calculations were made for San Francisco Bay, Boston Harbor and other places. For instance, on the basis of the same calculations San Francisco Bay was shown to have an assimilation value of 35,000,000 to 50,000,000. These other coastal cities in the past extended their outfalls only to find that the improvements were not sufficient to correct their problem. Sewage treatment became a necessity for them just as it is for the City of Seattle.

2. PUGET SOUND, EXCEPT IMMEDIATELY ADJACENT TO THE CITY OF SEATTLE, IS IN EXCELLENT BIOCHEMICAL CONDITION AND SAFE FROM A PUBLIC HEALTH STANDPOINT.

This statement obviously includes more territory than comes within the scope of the report. However, it is assumed that it refers only to that portion of the Sound within the zone of influence of the City of Seattle. Attention is directed to that portion of the statement "except immediately adjacent to the City of Seattle." The entire statement by exception indicates that this area immediately adjacent to Seattle is not in excellent biochemical condition and is not safe from a public health standpoint.

This area "immediately adjacent to the City of Seattle" includes the popular salt water bathing beaches for which the City is so well known. The attached map (No. 1) shows the numerous sewer outfalls and their respective proximity to the various beaches as well as to private shore lands.

The red colored symbol of a float and flag indicates the approximate location of sampling stations used for the collection of data for studies by the Pollution Control Commission, and also for data collected for the Wolman Report. The numbers on the flags indicate the range of the number (M.P.N.) of B. Coli organism (sewage indicators) found in each 100 ml of water. Considering that the Pollution Control Commission and State Health Department standard is 50 B. Coli per 100 ml. (M.P.N.) it is difficult to understand how anyone could possibly justify counts of 24,000, 70,000 and 240,000 or higher as often occur.

These high B. Coli counts may be found not only at sewer outfalls but two miles or more away as shown on map (No. 2). B. Coli counts of 70,000 or more were found as far as two miles from some of the outfalls. From the map it is evident that under certain tide and wind conditions these various sewage fields will drift ashore in the vicinity of swimming areas.

The unsatisfactory condition of the swimming beaches in the area "immediately adjacent to the City" was noted by the State Health Department over seven years ago. A letter from the Division of Public Health Engineering, State of Washington Department of Health dated July 12, 1945, reads as follows:

"In the spring of 1941 and again in 1944 extensive bacteriological investigations were made of the waters at Alki and Golden Gardens bathing beaches. These studies were made by the State and City of Seattle Health Departments. Conclusions of both investigations were that the beaches were seriously polluted. The outfall sewers mainly responsible for these conditions were the Ballard and North Trunk at Golden Gardens; and Jersey Street, Arkansas Street, and 53rd Avenue, S. W., at Alki.

"These bacteriological studies revealed coliform bacteria concentrations as high as 10,000 per 100 c.c. and average values of over 1,000 per 100 c.c. Al-

though no national standard has been adopted establishing the maximum limit of quality of water in which it is safe to swim, it is generally indicated by the several standards in use that 50 coliform organisms per 100 c.c. is desirable but in a few instances upper limits of 1,000 per 100 c.c. have been set to permit swimming when no other quality of water was available. Therefore it is indicated that the public bathing at Alki and Golden Gardens bathing beaches have been made unsatisfactory by the discharge of City of Seattle sewage.

"While only two established city bathing beaches have been discussed, all the salt water bathing beaches within the city limits of Seattle must also be considered, on the basis of their location with reference to city sewer outfalls, as unsatisfactory for bathing purposes.

"Other factors of concern are: There are continual complaints arising from floating solids, scum and slick throughout all of Elliott Bay and extensive stretches of the Sound, depending on tide conditions. Also, preliminary studies of the Duwamish Waterway reveal that at times the dissolved oxygen is depleted to such an extent that fish life cannot exist. This situation is attributable in part to the City of Seattle sewer outfalls into these waters."

### 3. THE CITY OF SEATTLE HAS NOT MADE LOGICAL AND EFFECTIVE USE OF PUGET SOUND FOR THE ADEQUATE DISPOSAL OF ITS MUNICIPAL SEWAGE, THROUGH THE FAILURE

(a) TO EXTEND ITS DISCHARGES INTO SUFFICIENTLY DEEP WATER AT MANY LOCATIONS.

(b) TO MAINTAIN DISCHARGES ~~CONSISTENTLY~~ AT DEEP WATER, WHERE ORIGINALLY SO PLANNED AND CONSTRUCTED, BY INSUFFICIENT CAPACITY OF DISCHARGE LINES, BY BREAKS IN OUTFALLS CLOSE TO SHORE, BY CONTINUED ADDITIONS OF STORM WATERS, OR BY VARIOUS COMBINATIONS OF THESE DEFICIENCIES.

(c) TO DEVELOP THE MOST DESIRABLE POINTS OF DISCHARGE.

These are only a few of the instances where the City has been lax in its attention to the sewerage problem. There has been a need for a number of years for a re-valuation of the entire program of sewers and outfalls. Most of the construction of recent date has been based on a plan adopted about thirty years ago. While the Commission is thoroughly in accord with planning for a considerable period into the future, it is felt that plans must, of necessity, be adjusted to meet the advances in engineering practice and the changing standards of living. Both the Department of Health and the Pollution Control Commission have, on many occasions, taken exception to the plans proposed and have called attention to the need for a new and modernized overall program.

It is pertinent at this point to call attention to the matter of the type of organization which is considered by many municipal governments as best adapted to finance and administer a sewerage program. Sewage collection, treatment and disposal is a utility function comparable to municipal water utilities and municipal power and light utilities. Both of the latter have, in almost all cases, proven to be more than self-sustaining. There is every reason to expect that the sewage utility will be equally sustained. Funds for construction, repairs, and operation are collected by nominal sewer service charges which are so regulated as to establish a fair and just charge to private and commercial users based on the actual use of the system. Almost all of the smaller communities in this State operate on this basis with service charges undoubtedly often in excess of that which will be necessary to adequately take care of Seattle's system. Construction in these cases is financed by utility bonds against the system and not by funds obtained by general taxation.

As a utility the entire system will come under the control of an organization whose sole purpose is to administer the sewerage system problem. Specific funds are available for this use which normally results in more effective and competent administration. There is a definite need for such an arrangement in the City of Seattle.

4. THE EXISTENCE OF LARGE AMOUNTS OF DILUTING WATER IN PUGET SOUND CAPABLE OF ASSIMILATING WITHOUT RISK ALL OF THE SEWAGE OF SEATTLE IS OF NO VALUE UNLESS IT CAN BE BROUGHT INTO EFFECTIVE ACTION UPON THE SEWAGE AT MULTIPLE POINTS OF DESIRABLE DEPTH AND LOCATION. SUCH A CONCOMITTANCE OF CIRCUMSTANCES IS ENTIRELY PRACTICAL AND A PROGRAM FOR ACCOMPLISHING IT IS HEREIN PROPOSED.

The need for deep water outfalls is recognized; however, to be effective they should be preceded by partial primary treatment. Throughout the report Wolman recognizes that sewage treatment will become a necessity and for this reason the planning for the location of these outfalls will be affected by collection and treatment plant locations. This requires the preparation of an overall plan and a much more detailed study than has been made thus far. Certainly the extension of the present numerous outfalls would not fit into any such plan.

The program proposed is based on theoretical calculations formulated by Rawn and Palmer of California. The following statements are found on Page 36 of the Wolman Report: "Rawn and Palmer of California some years ago presented certain theoretical calculations by means of which the behavior of sewage discharges might be predicted at varying depths and varying distances from shore." This statement and further discussion in the report would lead one to believe that the formulas of Rawn and Palmer can be applied to any situation without regard to time, place, or local conditions. The comment of Rawn and Palmer on the limitations of their formula is as follows: "The writers wish to add that the formulas are useless, or nearly so, unless all the factors influencing the rise and spread of the sewage field are carefully predetermined." The report gives no indication that any special studies were ever made for that purpose. In addition to this, float and dye studies which might have been used as supporting evidence have been eliminated as unreliable, in spite of the fact that Rawn used them in the studies on which his formulas are based. Considering the lack of substantiating evidence it is contended that the calculations do not support the conclusions made on the basis of raw sewage discharge.

Apparently, Wolman was not convinced in his own mind that he had the required evidence to support such calculations since, in the conclusion, he states that a program for accomplishing a practical solution is to be proposed in the report, but no such program has been presented. The only outfall mentioned is the North Trunk for which he indicates in Fig. 3, two 48-inch outlets at an unspecified depth. The calculations made in the body of the report do not include this proposal.

5. THE DISPOSAL OF RAW SEWAGE FROM SEATTLE INTO PUGET SOUND, UNDER APPROPRIATE STRUCTURAL CONDITIONS, WILL PROVIDE PUBLIC HEALTH SAFETY, PROTECTION OF FISH AND AQUATIC LIFE, PREVENTION OF NUISANCE, AND PROTECTION OF RECREATION AND BATHING BEACHES.

From this statement it would appear that Wolman has decided that the City of Seattle will at no time, now or in the future, require any form of sewage treatment. This is the interpretation one could make if other statements in the report referring to sewage treatment were not considered. These other statements will be discussed later as they appear and their contradictory nature will be indicated.

The Pollution Control Commission contends that Dr. Wolman has not offered sufficient proof to substantiate this conclusion.

In the first place he claims that he "established a relatively comprehensive field study of the Sound." It is known that he was not personally involved in the collection of samples, nor was he ever on the boat during the collection period. The number of samples collected was extremely limited. Wolman spent less than one month in Seattle and was without a staff. In comparison, a board of three consulting engineers with a staff of about 28 people of whom 24 were engineers or engineering aids, spent approximately one year in the study and preparation of the East Bay cities, San Francisco report. The conclusions and recommendations of the Seattle study are too far reaching to be based upon such a meager and limited study as was made in this connection.

In order to reconcile the above conclusion, statements from page 18 of the report are quoted as follows: "The shores of the Sound within and immediately adjacent to the city limits are used for three summer months for relatively limited swimming and recre-

ational purposes." "The areas compromise no more than five miles in length." "Incidentally, the number of people using the Coney Island beach on Saturday, August 28, 1948, was 1,500,000." The report also indicates that the water is too cool for swimming and that the air temperatures during the summer average 64° F. Are numbers important? Do not the people of Seattle have the same right to use such facilities as are available, as do those people in New York and other places?

Most of the conclusions and recommendations appearing in this report are apparently based upon the results of the tests shown on Map 2. Page 27 of the report reads as follows: "The findings indicate that, with the elimination of frequent on-shore storm water discharges, with a tight underwater outfall, with a true discharge into deeper water and at a greater distance from shore, the hazards from coliform organisms to on-shore recreation users will be insignificant." The Pollution Control Commission contends that it is extremely difficult and hazardous to attempt to use the limited data presented in attempting to prophesy the condition which will result from underwater discharge.

On Page 32 Wolman entirely eliminates from consideration the studies of currents made by the use of floats and dye stuff and limits his data to the tests for B. Coli. Floats and dyes are employed by most engineering authorities and are the basis for many studies such as those in New York Harbor, Los Angeles and San Francisco Bay. It is difficult to reconcile their elimination from the Seattle study, unless the results obtained have not been favorable to the conclusions drawn.

#### 6. ON ACCOUNT OF THE SALINE CHARACTERISTICS OF PUGET SOUND NO ISSUE INVOLVING THESE WATERS AS SOURCES OF DRINKING WATER CONFRONTS THE CITY.

No comments.

#### 7. FIELD AND LABORATORY STUDIES, REINFORCED BY CALCULATIONS, INDICATE THAT, EXCEPT FOR PURELY LOCAL SITUATIONS, THE SEWAGE OF SEATTLE HAS LITTLE EFFECT ON THE DISSOLVED OXYGEN, THE BIOCHEMICAL OXYGEN DEMAND OR THE COLI COUNT OF PUGET SOUND IN THE GENERAL VICINITY OF THE CITY OF SEATTLE. CONTENT

It has never been contended that all of the waters of Puget Sound are contaminated by Seattle sewage. It is the local situations, bathing beaches, shorelines and Elliott Bay, with which the Pollution Control Commission has always been concerned. It seems apparent that in cases where sewage fields extend for several miles from an outfall, shore pollution in critical areas is sure to result. Proper treatment of sewage would remedy these situations as well as the specific cases mentioned below.

#### 8. LOCALLY, HOWEVER, A NUMBER OF BIOCHEMICAL, BACTERIAL AND PHYSICAL SITUATIONS PREVAIL WHICH SHOULD NOT BE PERMITTED TO CONTINUE. THE MAJOR ONES ARE:

- (a) IN INNER ELLIOTT BAY BIOCHEMICAL, BACTERIAL AND PHYSICAL CONDITIONS ARE POOR.
- (b) IN THE VICINITY OF THE NORTH TRUNK SEWER ONSHORE OVERFLOW AND NEARBY BREAKS IN THE OUTFALL, BACTERIAL CONDITIONS ARE NECESSARILY POOR.
- (c) THE OUTFALLS DRAINING SOUTHWEST SEATTLE IN GENERAL PRODUCE ONSHORE BIOCHEMICAL, BACTERIAL AND PHYSICAL CONDITIONS WHICH SHOULD NOT BE TOLERATED.
- (d) CONDITIONS IN LAKE UNION ARE DETERIORATING FROM A PHYSICAL STANDPOINT.

A condition of pollution exists at each of the city outfalls and the harmful effects in each case tends to extend to the adjacent shorelines and in some cases into the deeper waters of Puget Sound for distances of two miles or more.

(a) The continued discharge of both domestic sewage and industrial waste solids and bacteria will naturally create a poor physical condition in Elliott Bay. The low oxygen concentrations near the mouth of the Duwamish River and the nearby "closed shrimp beds" both attest to this fact. It is entirely possible that if the Wolman program for

waste disposal is followed the famous fishing waters of Elliott Bay may eventually need to be posted "Closed due to Pollution."

(b) It does not take an expert to point out that conditions are poor in the vicinity of the North Trunk sewer. However, even the most naive person does not pass on this matter so lightly as to say this is "necessarily so."

The back pressures in submerged sewers as well as the head created by excessive flows and the action of the tides all tend to cause breaks in these lines. Such a condition exists in the sewer near the Alki swimming beach in West Seattle as well as in the North Trunk. As previously pointed out, the Pollution Control Commission feels that these breaks would be more promptly repaired if the system were under the control of a sewage utility organization.

(c) It is agreed the outfalls draining southwest Seattle have onshore overflows and breaks which create conditions which should not be tolerated.

(d) That conditions in Lake Union are deteriorating from a physical standpoint is certainly true. This condition will continue and increase until the sewer outfalls are removed from the Lake. Rules and regulations governing industrial wastes will also have to be enforced before there will be any improvement in the condition of this Lake.

9. ACCEPTABLE CRITERIA FOR OUTDOOR SALINE WATERS, SUCH AS THOSE OF PUGET SOUND, FOR THE VARIOUS PURPOSES TO WHICH PUGET SOUND AND ITS SHORES MAY BE PUT, MAY BE ECONOMICALLY AND SAFELY MET WITHOUT RECOURSE FOR MANY YEARS TO COME TO ELABORATE ARTIFICIAL TREATMENT OF THE SEATTLE SEWAGE. TO ACCOMPLISH THESE PURPOSES, WITH COMPLETE SATISFACTION TO THE PUBLIC, HOWEVER, WILL REQUIRE CONTINUING RIGID ADHERENCE TO THE PRINCIPLES AND THE PROCEDURES LISTED IN THE RECOMMENDATIONS WHICH FOLLOW.

"Acceptable criteria" as applied to Puget Sound must necessarily be the standards adopted by the Washington Department of Health and the Pollution Control Commission since these organizations are responsible under the law to establish such standards. Wolman has reached his conclusion that these criteria can be forever met by adopting the results of calculations using a B. Coli count of 2400 in place of the Washington standard of a count of 50. For this reason his calculations as given in the report cannot apply.

Conclusion 5 leads one to believe that sewage treatment would never be required for the City of Seattle. Now in Conclusion 9 (his final conclusion), Wolman indicates that *treatment will be needed* at some future date. The term "many years to come" may have different interpretations. The conclusion refers to "elaborate artificial treatment." This is not the usual engineering terminology, but it could be assumed that he had in mind *complete treatment* since the *primary treatment* required in this case is not considered elaborate by engineering authorities.

## RECOMMENDATIONS

1. THE NORTH TRUNK SEWER, PROVIDING FOR MORE THAN HALF OF THE TOTAL POPULATION OF SEATTLE, SHOULD BE

- (a) EXTENDED INTO A DEPTH OF NOT LESS THAN 75 FEET BELOW MEAN LOW WATER, WITH TWO OUTLETS.
- (b) REDESIGNED SO AS TO PROVIDE SUFFICIENT CAPACITY TO DISCHARGE AT THAT DEPTH, EITHER BY GRAVITY OR WITH AUXILIARY PUMPING, THREE TIMES THE DRY WEATHER FLOW OF THE AREA WHICH IT DRAINS, WITHOUT INTERMEDIATE OVERFLOWS ONSHORE OF COMBINED STORM WATER AND DOMESTIC SEWAGE AT FLOWS LESS THAN THE SUGGESTED VOLUMES NOTED ABOVE.
- (c) PROVISION SHOULD BE MADE FOR THE EARLY INSTALLATION OF UNITS FOR FINE COMMUNITION OF ALL THE SEWAGE BEFORE DISCHARGE INTO THE SOUND. WHETHER GREASE OR FLOATING SOLIDS SHOULD BE REMOVED SHOULD WAIT UPON FURTHER FIELD RESULTS WITH COMMUNITION.
- (d) SUFFICIENT LAND SHOULD BE PURCHASED ON OR ADJACENT TO THE NORTH TRUNK SEWER FOR THE PRESENT INSTALLATION OF COMMUNITION FACILITIES AND ULTIMATE INSTALLATION OF FACILITIES FOR PLAIN SETTLING. THESE LATTER FACILITIES WILL PROBABLY NOT BE REQUIRED FOR MANY YEARS, DEPENDING UPON POPULATION GROWTH AND CONTINUING OBSERVATIONS, BUT VACANT LAND APPROPRIATELY LOCATED WILL BE LESS AND LESS AVAILABLE FOR SUCH FUTURE PURPOSES AS THE SURROUNDING AREAS DEVELOP. INTELLIGENT PLANNING CALLS FOR MUNICIPAL OWNERSHIP OF SUCH SPACE, EVEN IF IT IS RENTED FOR OTHER PURPOSES IN THE INTERVENING TIME.

With reference to Item (a)—as pointed out in Conclusion 4, Wolman apparently has not sufficient faith in the formulas he is using to make a prediction of results on the system he is proposing. His predictions are based on conditions which he has not proposed to apply in this case.

In Item (b) the matter of redesign of the North Trunk outfall has been discussed in terms of a complete re-valuation; while in Figure 3, two 48-inch extensions are proposed. After extension is recommended, then he speaks about re-valuation. If this is intended as an engineering report, a detailed re-evaluation should have preceded the recommendation.

It is apparent from Item (c) referring to whether grease or floating solids should be removed, that Wolman is very close to recommending primary treatment. Mr. A. M. Rawn in the November issue of the "Proceedings of the American Society of Civil Engineers," page 1,478, states, "In the disposal of sewage into the ocean an important reason for primary treatment is to eliminate floating material. Skimming alone will not accomplish this satisfactorily. . . ."

Item (d) requires little or no comment since he has pointed out that *sewage treatment will be required*. The only point in question is the matter of time.

2. MINOR SEWERS BETWEEN WEST HALLADAY STREET AND WEST DENNY WAY SHOULD BE EXTENDED INTO DEEPER WATER AS OCCASION MAY REQUIRE. THEY PROVIDE FOR LIMITED POPULATIONS AND DO LITTLE OR NO DAMAGE TO SURROUNDING WATERS.

These sewers would be picked up in a program for interception and should be considered in the overall plan for collection and treatment.

3. ALL OF THE SEWERS DISCHARGING INTO ELLIOTT BAY SHOULD BE EXTENDED INTO DEEPER WATER. DETAILED STUDIES SHOULD BE MADE AS TO THE ECONOMIES OF INTERCEPTING SEVERAL OF THESE LINES INTO SINGLE OUTFALLS CARRIED TO APPROPRIATE POINTS OF DISCHARGE. THE OBJECTIONS TO THE PRESENT LOCATIONS ARE PRIMARILY ESTHETIC AND NOT OF PUBLIC HEALTH SIGNIFICANCE, SO THAT MAJOR EXPENDITURES FOR CORRECTION SHOULD BE CAREFULLY SCRUTINIZED.

The first two sentences of this recommendation are contradictory since it would be impossible to extend the outfalls and at the same time connect them for discharge at an appropriate point. The intercepting of outfalls follows the same plan as is followed when treatment is to be provided. There again, if this was to be an engineering report for long range planning, detailed studies should have been made.

Wolman passes lightly over the matter of esthetic conditions. Does he recommend in this case that conditions of gross pollution and a nuisance in Elliott Bay should be tolerated? This statement probably demonstrates better than any other item the general level of the standard he is applying to the entire Seattle problem.

4. SEWERS EMPTYING INTO THE ALKI BEACH, LOWMAN BEACH, LINCOLN PARK, AND OTHER SOUTHWEST SEATTLE AREAS ADJACENT TO PUGET SOUND SHOULD BE EXTENDED INTO AT LEAST 35 FEET OF WATER AT MEAN LOW TIDE. CAREFUL STUDY SHOULD BE MADE TO DETERMINE ON THE MOST ECONOMIC INTERCEPTIONS TO BE BALANCED AGAINST MULTIPLE OUTLETS. IF ECONOMICALLY FEASIBLE, MULTIPLE OUTLETS OFFER GREATER OPPORTUNITIES FOR MAXIMUM DISPERSION AND ASSIMILATION. THE SUCCESS OF THE PROCEDURES WILL DEPEND, OF COURSE, ON TRUE DEEP WATER DISPOSAL. FOR THE TIME BEING COMMUNION IS NOT RECOMMENDED IN THESE AREAS, BECAUSE TOTAL POPULATIONS PROVIDED FOR ARE NOT LARGE. IN THE CASE OF THE LOWMAN PARK SEWER PARTICULARLY THE CAPACITY BEFORE ONSHORE OUTFLOW SHOULD BE ADJUSTED UPWARD.

Just what is the meaning of this recommendation? It is impossible to decide as to the meaning since the statements are contradictory and indefinite. First, extension of the present outlets to 35 feet of water is recommended. Then, it is recommended that a study be made to determine the most economical interceptions to be balanced against multiple outlets. It is apparent that these items are given in reverse order of the usual engineering procedure since the study usually precedes the recommendation. Again, Wolman hasn't sufficient information on which to base a definite recommendation and in order to protect himself from any eventuality he states "the success of the procedure will depend, of course, on true deep water disposal." If the system installed works properly it will be considered as true deep water disposal; if not, it will not, and the responsibility rests with the City, not with Wolman.

5. THE POLICY SHOULD BE PROMPTLY ADOPTED BY THE CITY OF SEATTLE PROHIBITING ANY FURTHER EXTENSION WITHIN THE CITY LIMITS, AND REQUESTING THE ESTABLISHMENT BY THE STATE BOARD OF HEALTH OF A SIMILAR POLICY IN AREAS ADJACENT TO THE CITY LIMITS, OF COMBINED SEWERS. THE CONTINUING INSTALLATION OF COMBINED SEWERS WILL AGGRAVATE THE DISPOSAL PROBLEMS IN LAKE WASHINGTON, LAKE UNION, PUGET SOUND AND THE DUWAMISH RIVER BY SURCHARGING EXCESSIVELY PRESENT AND FUTURE FACILITIES WHEN THE REMOTE DAY ARRIVES WHEN ARTIFICIAL TREATMENT BECOMES NECESSARY, AND WHEN EXCESSIVE AMOUNTS OF STORM WATER, SULLIED BY DOMESTIC SEWAGE IN COMBINED SEWERS, WILL CREATE MAJOR FISCAL PROBLEMS. EVEN TODAY SUCH STORM WATER ACCRETIONS AGGRAVATE ONSHORE OVERFLOWS TO THE DETRIMENT OF SMALL BUT IMPORTANT RECREATIONAL AREAS. IT IS NOT TOO SOON TO MOVE PROMPTLY TO A REVIEW AND AN EARLY REQUIREMENT THAT ALL FUTURE SEWER EXTENSIONS BE OF A SEPARATE OR SANITARY SEWAGE CHARACTER.

The Commission is thoroughly in accord with this recommendation and believes it should be carried out in its entirety. The policy of requiring separate sanitary and storm water systems has been adopted by the Department of Health and has been that of this Commission. This policy has met with determined resistance on the part of the City of Seattle. Separation of sewers points toward sewage treatment which Wolman again indicates will be a necessity.

6. SINCE THE DISCHARGE INTO THE SEWERS OF OBJECTIONABLE INDUSTRIAL WASTES, IN AMOUNT OR CHARACTER, MAY VITIATE (RENDER INEFFECTIVE) THE WHOLE SEWAGE DISPOSAL PROGRAM BY CONTROLLED DILUTION, THE CITY MUST PURSUE A CONTINUING AND EFFECTIVE INDUSTRIAL WASTE SURVEY SO AS TO DETECT AND TO PREVENT DISCHARGES WHICH MAY HAVE DELETERIOUS EFFECTS UPON THE CURRENT USES OF THE PUGET SOUND WATERS. A CITY ORDINANCE DILIGENTLY ENFORCED MAY BE REQUIRED TO ACCOMPLISH THESE PURPOSES.

Is this recommendation to be interpreted that the method of disposal proposed by Wolman is close to the top limits of satisfactory performance and the practical capacity for absorption of sewage and waste by the Sound far below the values he has indicated?

Certainly the method of disposal adopted by the City of Seattle must include industrial wastes as well as domestic sewage. The Commission agrees that some control of these wastes will be necessary in many cases. This recommendation could be interpreted that it is not inconceivable that the industrial development which can be reasonably expected in the City of Seattle will upset all of the calculations on sewage disposal by "controlled dilution."

7. THE CONTINUING VALIDITY OF DISPOSAL BY DILUTION IN DEEP WATER CAN BE SUSTAINED ONLY BY VIGILANT ADMINISTRATIVE CHECKING OF PERFORMANCE BY THE CITY. THIS MUST BE ANNUALLY PURSUED AND AUTHORITY INTERPRETED BY THE CITY'S FORCES. SUCH SURVEYS ARE INTENDED TO DETECT PROMPTLY ONSHORE BREAKS IN OUTFALLS, LOCAL OVERBALANCING OF ASSIMILATIVE CAPACITIES, NECESSITIES FOR FURTHER EXTENSIONS OR ADDITIONS OF SUPPLEMENTARY TREATMENT, AND OTHER INDICES OF GOOD OR BAD PERFORMANCE. THE ANNUAL COSTS OF SUCH FIELD SURVEYS ARE SMALL, BUT THEY ARE OF THE GREATEST SIGNIFICANCE IN MAINTAINING THE MAXIMUM BENEFICIAL USES OF THE WATERS OF PUGET SOUND, WHEN THE CORRECTIVE MEASURES ALREADY RECOMMENDED HAVE BEEN FULLY CONSUMMATED. THESE CONTINUING DUTIES OF CONTROL SHOULD BE THE JOINT RESPONSIBILITY OF THE ENGINEERING AND HEALTH DEPARTMENTS OF THE CITY.

It is admitted that it is difficult to predict what condition will result from this method of disposal and it is apparent that Wolman is of this same opinion. He starts out in the report with positive statements as to the ability of the Sound to assimilate the City's sewage, but the statement "necessities for further extensions or supplementary treatment" indicates as do many others, that he does not know how or when true deep water disposal will be accomplished.

The Commission agrees that vigilant administration is needed for any type of city enterprise. In the case of sewerage systems, experiences indicated that this can be more effectively accomplished if set up in a separate utility organization rather than spread between two departments such as the city engineer and the city health departments.

8. A MASTER PLAN FOR PROGRESSIVE SEWER EXTENSION AND FOR CONTROLLED SEWAGE DISPOSAL SHOULD BE DEVELOPED FOR SEATTLE AND THOSE ENVIRONS, OUTSIDE THE CITY LIMITS, WHICH WOULD NORMALLY EMPTY INTO THE SAME SURFACE WATERS.

The Commission strongly urges the preparation of an overall plan for the City of Seattle and surrounding areas. Throughout the report Wolman has indicated that sewage treatment will be necessary. It will be a grave and expensive mistake if provision for primary treatment is not included in this plan.

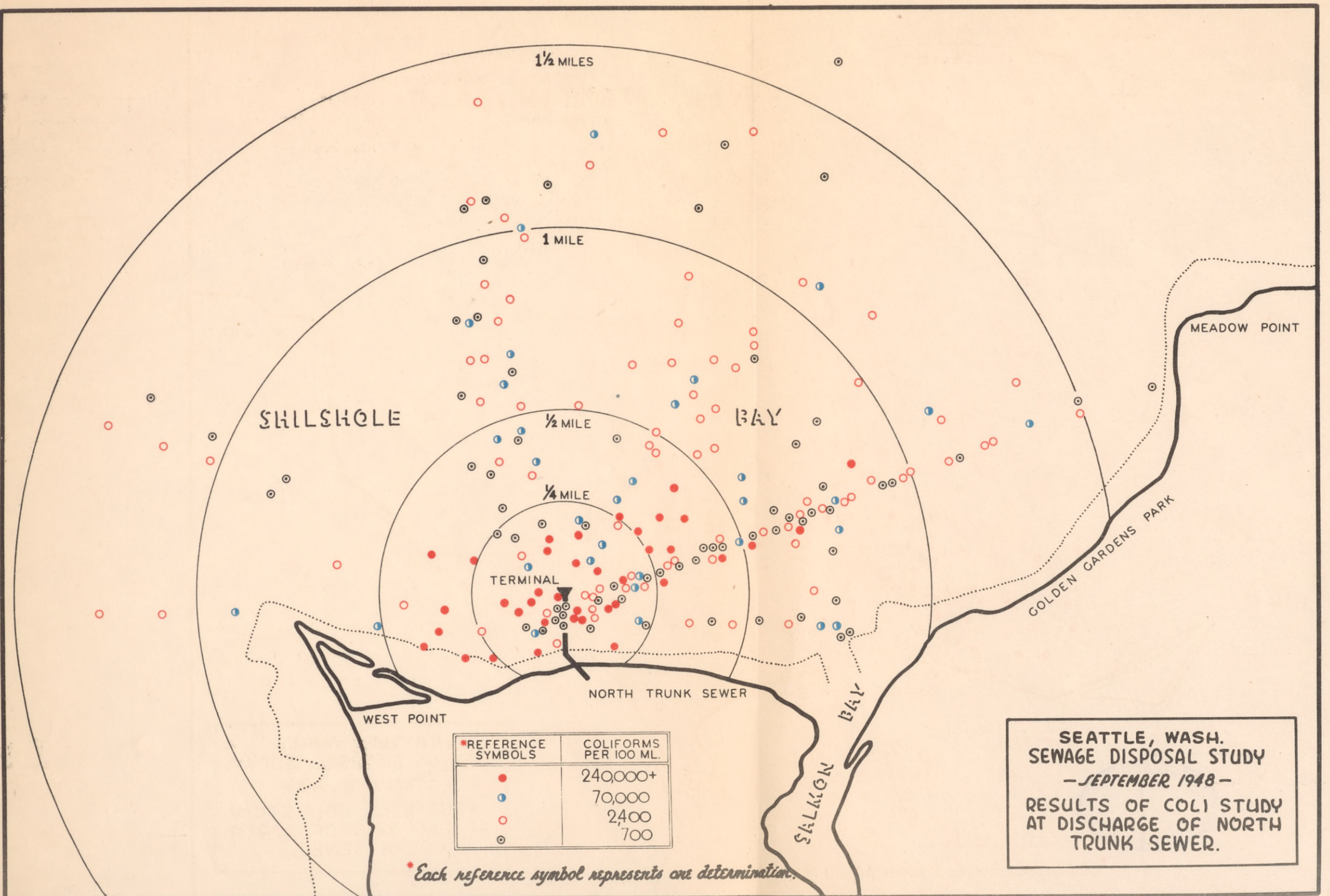


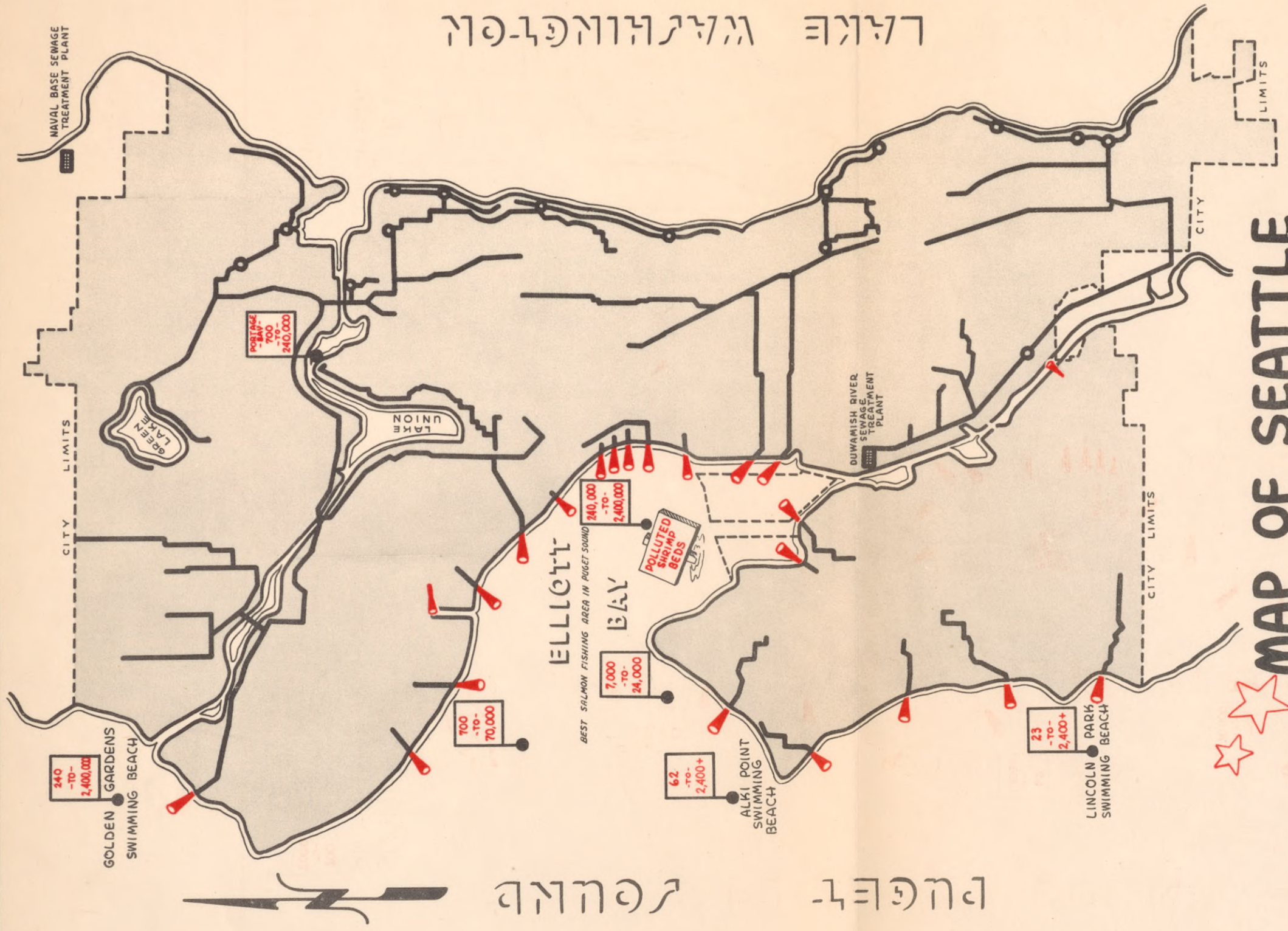
## SUMMARY

The contents of this report, particularly the comments on the Wolman report have, of necessity, been of a somewhat negative nature and while it is not within the province of the Pollution Control Commission staff to act as consultants for the City of Seattle, it is entirely appropriate that this report contain constructive suggestions.

*It will be the requirement of the Pollution Control Commission that the minimum acceptable degree of treatment for the sewage and industrial waste of the City of Seattle will be primary treatment.* The Pollution Control Commission of the State of Washington is not alone in taking a stand for primary treatment as a minimum. A large number of states have established this policy, including the State of California.

There are many engineers, including those of this Commission, who are extremely disappointed in the Wolman report in that there is an entire lack of engineering detail and an indefiniteness which leaves the matter in almost the same position as it was before the report was written. There is an urgent need for the establishment of a competent utility organization within the City of Seattle whose sole purpose is the administration of the sewerage problem. Nominal service charges should be inaugurated for the purpose of providing specific funds for planning and accomplishment. It is expected that this utility organization might later be expanded to include surrounding territory forming a metropolitan sewer area. A board of consulting engineers should be employed, possibly selected from the State of Washington, who will be provided with sufficient funds to conduct a thorough and detailed engineering study of Seattle's sewerage system needs and prepare a preliminary report of an overall plan in sufficient detail to allow the City to proceed with final and construction plans.





# ★ ★ **MAP OF SEATTLE**

SHOWING TRUNK SEWERS AND SEWER OUTFALLS (IN RED) AND THEIR PROXIMITY TO PUBLIC BATHING BEACHES.

700 - TO - 7000

 B. COLI (SEWAGE INDICATOR) COUNTS AS DETERMINED BY VARIOUS POLLUTION CONTROL SURVEYS. WASH. STATE STANDARD IS A COUNT OF 50!









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