STATEMENT

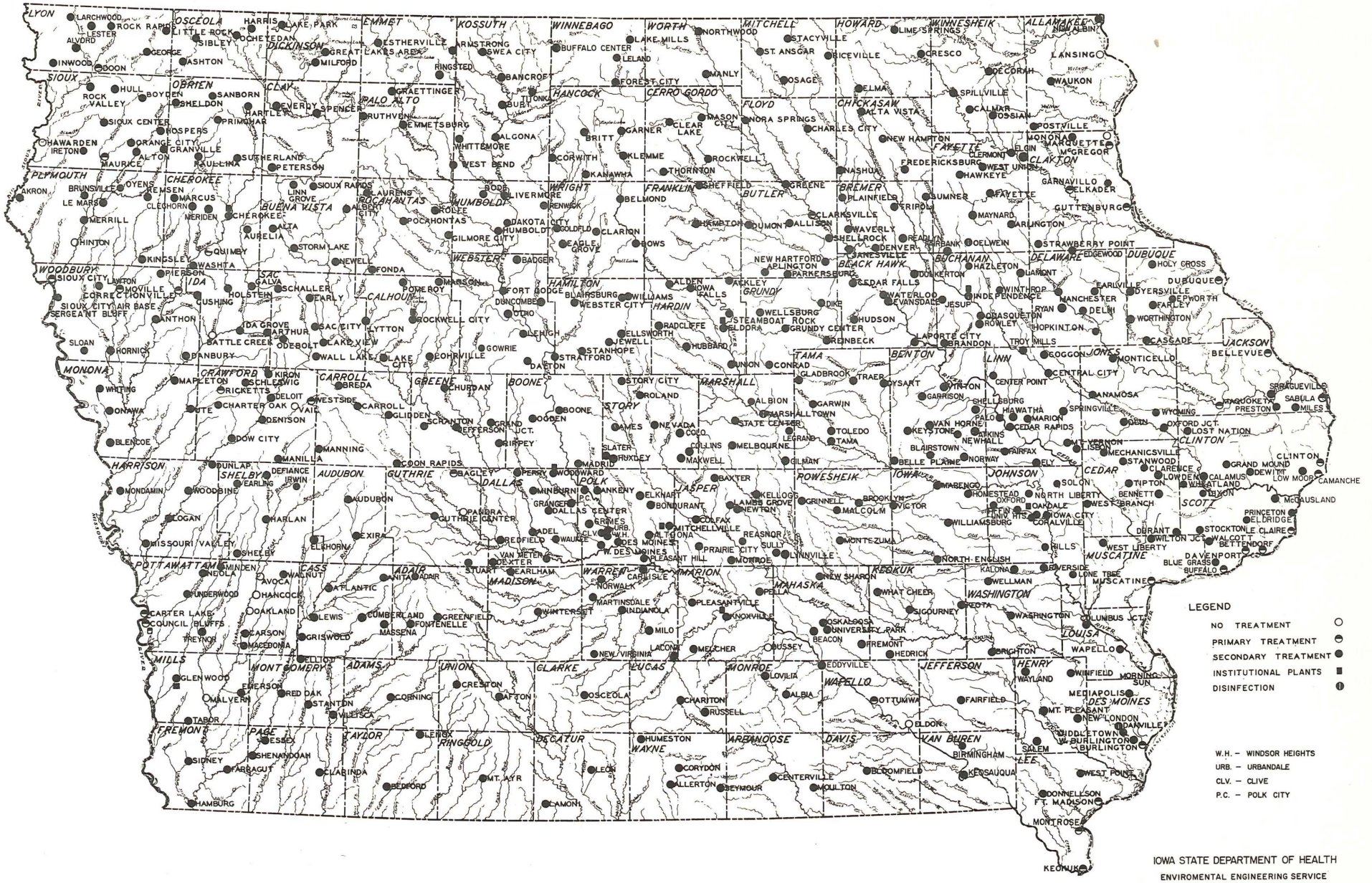
IN SUPPORT OF THE IOWA WATER QUALITY STANDARDS AND PLAN FOR IMPLEMENTATION AND ENFORCEMENT

MISSOURI RIVER BASIN

IOWA WATER POLLUTION CONTROL COMMISSION

APRIL 1969

IOWA WASTEWATER TREATMENT



IOWA STATE DEPARTMENT OF HEALTH
ENVIROMENTAL ENGINEERING SERVICE
AS OF DECEMBER 31, 1968

A. INTRODUCTION

By notice of March 5, 1969, the Secretary of Interior called a conference to consider water quality standards for the interstate waters of Iowa. This is a statement of the Iowa Water Pollution Control Commission's position on the matters to be considered at the April 15, 1969 Council Bluffs, Iowa session of the conference. A similar statement, with emphasis on Iowa waters of the Mississippi River basin, was presented at the Davenport, Iowa session of the conference which convened on April 8, 1969. The Iowa Standards apply to all waters of the state and much of the Mississippi statement is repeated herein. However, this statement will discuss matters more specifically pertaining to waters of the Missouri River basin.

The Iowa Water Pollution Control Law, enacted in 1965, created the Iowa Water Pollution Control Commission and charged the Commission, through the administrative and technical staff of the State Health Department, with the general supervision, administration, and enforcement of all laws relating to pollution of the waters of the state. Among the powers and duties of the Commission are those of prescribing rules and regulations, adopting reasonable water quality standards, and developing comprehensive plans and programs for the prevention, control, and abatement of pollution.

The Water Quality Act of 1965, amending the Federal Water Pollution Control Act, provided for establishment of water quality standards for interstate waters. The Act requires the states to adopt such standards which ultimately become Federal standards, after approval by the Secretary of the Interior. With that authority, the State of Iowa ahead of the schedule specified by the Federal Act, filed a letter of intent to adopt standards, held public hearings on the proposed criteria, and adopted the standards which include the water quality criteria and a plan for implementation. The standards were submitted to the Secretary, and after close liason between state and Federal representatives and after numerous conferences and correspondence attempting to agree on a mutually acceptable document, the Secretary determined that certain of the provisions were not approvable as Federal standards, and called a standards setting conference.

The purpose of this statement is to set out the State of Iowa's position on the matters of disagreement. The Federal position is outlined in a report prepared by the Missouri Basin Region of the Federal Water Pollution Control Administration, for the Water Quality Standards Conference convening April 15, 1969. The report is comprehensive and contains a wealth of detailed background information and technical discussion, so no attempt will be made to duplicate or enlarge on that aspect. However, as with the Federal Water Pollution Control Administration report on the Mississippi River basin, there is considerable discussion of such aspects as turbidity and bacterial and nutrient loading from agricultural land runoff, and also of conditions resulting in large part from waste discharges from Nebraska. Such aspects, while appearing to discredit the water quality and the state's pollution control efforts, but being actually outside the scope of Iowa Water Pollution Control Commission control, are not at all at iasue in the matters being considered by the conference. To the casual reader, such discussion tends to create false impressions of wide spread pollution and ineffective control. This statement therefore, is an attempt to put the issues in context, to clarify the Iowa position on matters actually in controversy, and to present the positive aspects of the Iowa program.

Part B will outline the Iowa policy and review past and present pollution control in the state. Parts C and D will comment on the background information and summary and conclusions and recommendations presented in the Federal report. Finally, the Iowa Water Pollution Control Commission has during past months of negotiation agreed on certain revisions of the standards and implementation plan, and these are summarized in Section E.

B. STATEMENT OF POLICY AND THE PAST AND PRESENT IOWA WATER POLLUTION CONTROL PROGRAM

The present authority for stream pollution control in the State of Iowa is embodied in Chapter 455B of the state code, the "Iowa Water Pollution Control Law". Enacted in 1965, it created the Iowa Water Pollution Control Commission.

The conduct of the program, as intended by the legislature and as actually being implemented by the Commission and the State Health Department, can best be expressed by the statement of policy as written into the law;

> "455B.1 Statement of Policy. Whereas the pollution of the waters of this state constitutes a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish and aquatic life, and impairs domestic, agricultural, industrial, recreational and other legitimate beneficial uses of water, and whereas the problem of water pollution in this state is closely related to the problem of water pollution in adjoining states, it is hereby declared to be the public policy of this state to conserve the waters of the state and to protect, maintain and improve the quality thereof for public water supplies, for the propogation of wildlife, fish and aquatic life, and for domestic agricultural, industrial, recreational and other legitimate (beneficial) uses; to provide that no waste be discharged into any waters of the state without first being given the degree of treatment necessary to protect the legitimate (beneficial) uses of such waters; to provide for the prevention, abatement and control of new, increasing, potential, or existing water pollution; and to co-operate with other agencies of the state, agencies of other states and the federal government in carrying out these objectives. (61GA, ch 375, §1)"

This policy, not in the least inconsistent with the present Federal Act, was enacted prior to approval of the amendments in the Water Quality Act of 1965.

As present policy, it evolves from and reflects long and continued progress of stream pollution control in Iowa. The progress can be seen in a brief history of stream pollution control accomplishments.

The first law, passed in 1923, gave the State Department of Health regulatory and enforcement authority. Even before that, Iowa was "ahead of the program". The Department of Health working under legislative authority for supervision over the installation and operation of sewerage works and control of nuisances, and towns recognizing the public health and clean streams need for sewage treatment, had already begun stream pollution control. At the time the 1923 law was passed, nearly 200 municipal sewage treatment plants were already in operation. These being in the smaller towns, only 350,000 some persons were being served by the plants, and this represented only 30% of the population being served by municipal sewer systems. However, this was a good start.

The program operated under the same authority for many years. Then in 1949, the law was changed, among other things, adding a sewage disposal permit feature. By reviewing treatment plant construction plans and specifications required to obtain a permit, the State Health Department could insure that any proposed plant was capable of producing an effluent of sufficiently high

quality to protect the receiving stream. Essentially no sanitary sewer permits have been granted unless served by a treatment plant, and in particular, a treatment plant operating satisfactorily. Although this philosophy had been in effect as a matter of policy for many years, the permit feature formalized the policy.

No combined sewers have been approved in Iowa for the last 40 years.

At the time of the 1949 legislation, some 280 municipal treatment plants were in operation. Some of the new plants were constructed by the larger municipalities, so the capacity of the 280 plants was almost three times that of 1923, and the plants were serving approximately 70% of the sewered population.

In recognition of the fact that treatment plant construction is effective only if operation is efficient and competent, an operator training and voluntary certification program was implemented in 1952. In 1965, legislation was passed and implemented, and Iowa is now one of only 17 states with a mandatory operator certification law. The operator training program has expanded and thrived. Under the cooperative effort of the State Health Department, the Iowa Water Pollution Control Association, and the State Universities, laboratory courses are conducted at the Universities and regional basic and advanced operation courses are conducted throughout the state.

From 1949, plant construction steadily and dramatically progressed, and in 1965 some 400 plants were in operation. This represented an increase in population served by treatment to approximately 97.5% of the sewered population.

The 1949 law lifted a previous restriction, so that effective in 1951, Mississippi and Missouri River cities and towns were subject to all provisions of the stream pollution control law. In recognition of common interests in water quality, Iowa in 1952 entered into a tri-state agreement with Illinois and Wisconsin, resolving to require any such corrections of pollution conditions needed to render Mississippi River waters suitable for all purposes.

On the Missouri River also, Iowa as a member of the Missouri Basin Health Council, agreed to and participated in adoption of a similar "Guide for Water Pollution Control Activities." The several states of the Council in 1952 agreed to a program for elimination of toxic substances and settleable and floatable solids, and treatment of industrial wastes as necessary to prevent deterioration of water quality, and to provide treatment over and above removal of settleable and floatable solids as necessary to protect downstream water uses. The Guide also provided for future programs for legislation, construction of treatment plants, improvement of plant operation and maintenance and stream surveillance.

1965 was the year of enactment of the present pollution control law and formation of the Commission. In addition to retention of the permit feature, the new law provided improved enforcement provisions, and authorization for rules and regulations and water quality standards. It should be noted that this Iowa requirement for water quality standards, proven to be consistent with the Federal act, was imposed prior to the water quality amendments of the Federal act.

Since the current law was passed, the Commission has adopted three regulations to aid in surveillance and enforcement. The first is a regulation relating to the General Criteria of the water quality standards, which makes mandatory the effective removal of settleable and floatable solids from municipal waste water discharges. The water quality criteria which apply to all surface waters at all times and places, require that the surface waters be free from floatable and settleable solids which could form putrescent and objectionable sludge deposits and be otherwise unsightly and deleterious. This general criteria has been effective in demonstrating conditions of pollution and has been used as the basis for ordering corrections. However, removal of settleable and floatable solids in most cases does not satisfactorily meet the standards, and the public water supply, aquatic life and recreation criteria have necessitated secondary treatment on virtually all interior streams.

Rules and regulations also require submission of monthly treatment plant operation reports. By specifying format and content, the Department can require reporting of sufficient flow and laboratory testing data to evaluate plant effectiveness, and thereby obtain an indication of the plant's affect on receiving stream water quality. To aid in more efficient and effective use of the reports, a program for computer scanning of the reports is in the final stage of development.

The Iowa "Mail Order BOD" program has also proven effective in surveillance of treatment plants. This program, which utilizes a technique for fixing samples in the field in preparation for BOD determination in the State Laboratory, eliminates the need for refrigeration and enables transportation to the laboratory by ordinary mail. It is a unique procedure and was developed in the State Hygienic Laboratory.

Although not yet having legislative approval, a third regulation has been adopted by the Commission requiring control of feedlot runoff. Feedlot pollution is being effectively controlled through the present enforcement provisions of the Law, utilizing the water quality standards and definition of stream pollution, but approval of the regulation will hopefully reduce staff time required and prove to be a more efficient and effective means of control.

Using the various regulations and enforcement provisions, the Commission since its inception in 1965 has issued 114 orders for correction of pollution conditions. The point is that the orders, along with more informal education and persuasion efforts during routine plant inspections and contacts with municipal and industrial officials, and more importantly with the understanding and cooperation of local officials, are getting waste treatment facilities built and efficiently operated. As of January 1, 1969 there were 510 municipal plants in operation or under construction, and the population served by treatment has increased to 99.3% of the sewered population. The 13,000 population in municipalities not yet treating, represent plants in the engineering planning stage or actually under orders to be under construction in 1970 or before. Municipalities not presently treating are smaller communities, and 100% of the medium size and large communities do have sewage treatment. This record ranks with the highest in the nation.

Of the industries, the Iowa Meat Packing Plants are the largest potential sources of pollution. Every meat packing plant in the state has a treatment plant in operation or under construction, and this represents some 3.5 million population equivalent being treated. Some of the plants are realizing as much as 98 or 99% BOD removal, due in significant part to pioneering and development of anaerobic/aerobic lagoon treatment in Iowa. With the exception of those on border streams, all packing plant wastes receive at least secondary treatment.

Other wet process industries, though not producing the magnitude of waste produced in meat packing, are subject to and complying with treatment requirements (or if more appropriate, some type of inplant control), to meet Iowa water quality standards. Iowa has no provision for untreated waste discharge permits.

It is significant that Iowa does not have stream classification. Although the standards do specify recreation, fishing, and public water supply uses, and areas of applicability have been defined, minimum defined standards of high quality apply to all waters of the state.

In summary, Iowa has through the years recognized the need for clean streams and continued and expanded its programs to meet the need. The regulatory agency has exercised it's authority to abate pollution and maintain and improve water quality, and municipalities and industries have complied with the requirements. The accomplishments shown by the record can be compared with the best in the nation. Despite the adverse impressions created by the Federal reports and the Secretary's decision to except certain provisions of the Standards, Iowa has in the past and will in the future exercise it's regulatory authority to the fullest legal extent.

IOWA LEADS NATION IN SEWAGE TREATMENT

No Urban Population Without Treatment

TABLE 3. URBAN POPULATION SERVED BY ADEQUATE AND LESS THAN ADEQUATE MUNICIPAL WASTE TREATMENT FACILITIES AND URBAN POPULATION NOT SERVED, BY STATE: FY 1968

(In thousands, except percent)

State	Total Urban Population	Population Served By (Facilities): Adequate	Less than Adequate	None	% of Pop. with less than Adequate or None
U.S [1]	145,602	81,703	31,865	32,293	44.1
Ala.	2,140	819	678	643	61.7
Alaska [2]	121	19		102	84.2
Ariz.	1,411	711	34	666	49.6
Ark.	937	684	156	97	27.0
Calif [2]	17,651	12,766	36	4,849	27.7
Colo.	1,602	854	593	155	46.7
Conn.	2,342	312	1,286	744	86.7
Del.	356	9	267	80	97.5
D. C.	832	832			
Fla [2]	4,860	1,741	864	2,255	64.2
Ga.	2,727	1,081	1,003	643	60.4
Hawaii [2]	591	162		429	72.6
Idaho.	349	160	134	55	54.2
Ill.	8,923	7,410	586	927	17.0
Ind.	3,182	2,286	529	367	28.2
Iowa [1] [2]	1,526 [1]	1,590		[1]	
Kans [2]	1,475	1,267	192	16	14.1
Ky.	1,539	536	792	211	65.2
La.	2,479	818	515	1,146	67.0
Maine.	509	37	60	412	92.7
Md.	2,785	2,119	162	504	23.9
Mass [2]	4,563	1,729	1,173	1,661	62.1
Mich.	6,377	1,340	4,223	814	79.0
Minn.	2,370	769	1,324	277	67.6
Miss.	988	460	23	505	53.4
Mo [2]	3,141	2,522	183	436	19.7
Mont [1]	379 [1]	123	263	[1]	69.4
Nebr [1] [2]	846	833	100	[1]	11.8
Nev.	376	366	6	4	2.7
N. H.	414	43	102	269	89.6
N. J.	6,444	1,629	3,179	1,636	74.7
N. Mex.	764	671	5	88	12.2
N. Y.	16,003	8,017	3,733	4,253	49.9
N. C.	2,138	1,447	125	566	32.3
N. Dak [1]	254 [1]	278	15	[1]	5.9
Ohio.	7,870	4,591	2,071	1,208	41.7
Okla.	1,694	1,332	199	163	21.4
Oreg.	1,320	552	504	264	58.2
Pa.	8,428	5,325	2,916	187	36.8
R. I.	793	395	190	208	50.2
S. C.	1,134	540	178	416	52.4
S. Dak [1]	287 [1]	290	39	[1]	13.6
Tenn.	2,214	750	319	1,145	66.1
Tex.	8,874	6,819	130	1,925	23.2
Utah.	825	500	19	306	39.4
Vt.	162	9	121	32	94.4
Va.	2,756	1,092	1,328	336	60.4
Wash [2]	2,139	681	444	1,014	68.2
W. Va.	710	149	348	213	79.0
Wis.	2,804	2,049	689	66	26.9
Wyo [1] [2]	198 [1]	189	29	[1]	14.6

No population without treatment

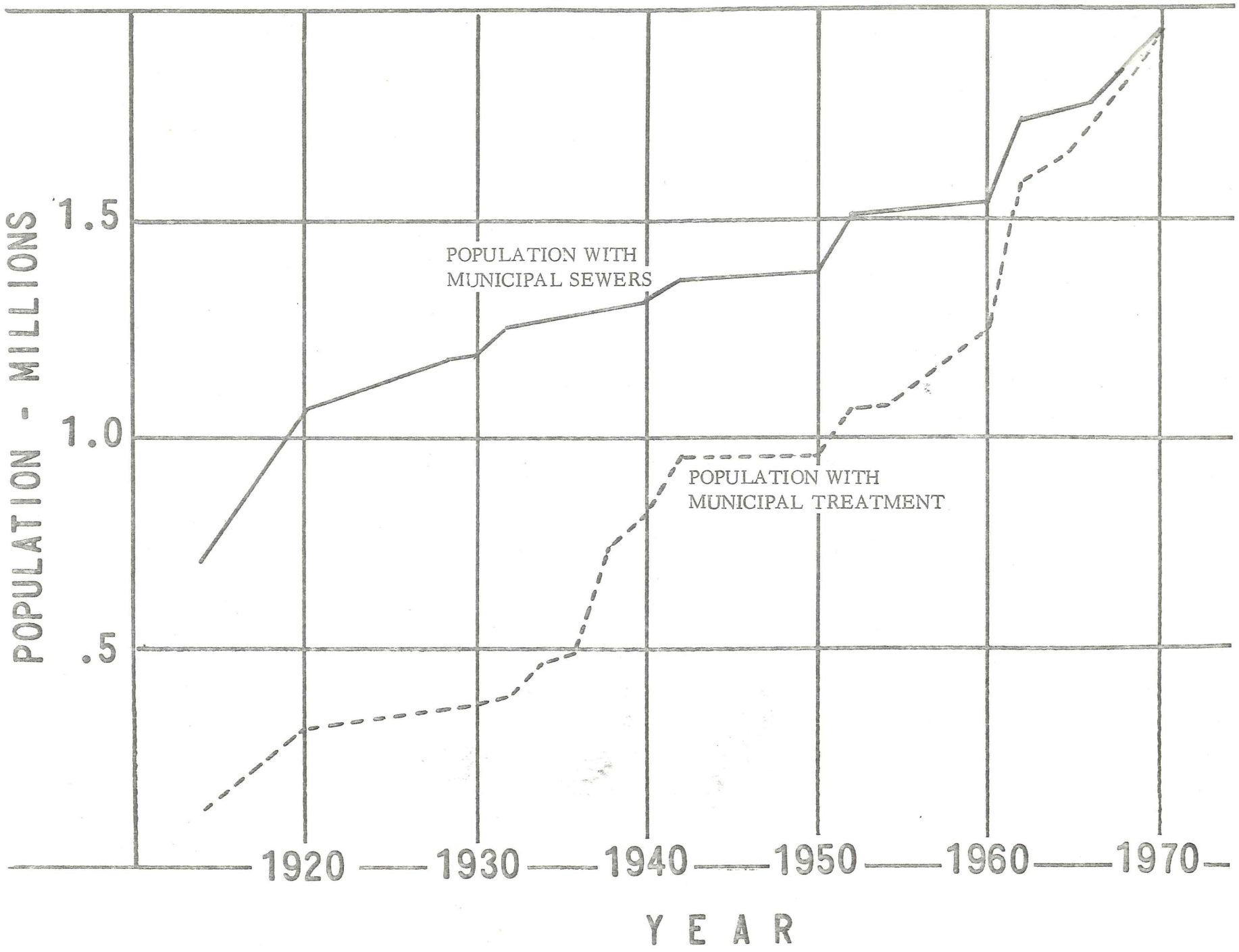
1/ Population served by treatment facilities exceeds total urban population of these States by 259,000 persons. Thus the detail adds to 259,000 more than the total U. S. urban population.

2/ Water quality standards adopted call for primary waste treatment in some urban areas of this State. Standards adopted for other States call for at least secondary waste treatment.

Source: 1962 Inventory, Municipal Waste Facilities in the United States, updated by FWPCA Construction Grants Awards; urban population estimates based on U. S. Census of Population, 1960; Bureau of Census Population Estimates, Series P-25.

From: THE COST OF CLEAR WATER - Volume I Summary Report,
U S Department of Interior, Federal Water Pollution Control Administration
January 10, 1969

MUNICIPAL SEWAGE TREATMENT IN IOWA



MUNICIPAL SEWERAGE SYSTEMS
(Based on 1960 population and special census)
December 31, 1968

	Total Number of Municipalities		Municipalities with Sanitary Sewers		Municipalities -- Treating Sewage		Total Population Treated to Total Sewered Population
Population	No.	Population	No.	Population	No.	Population	Percent
Over 15,000	22	1,083,398	22	1,083,398	22	1,083,398	100.00
2,000-15,000	113	526,269	113	526,269	112	523,725	99.5
1,000-2,000	113	151,515	112	150,391	106	142,588	94.8
500-1,000	207	144,457	176	125,133	173	123,218	98.5
Under 500	495	120,367	101	34,888	97	33,362	95.6
TOTALS	950	2,026,006	524	1,920,079	510	1,906,291	99.3

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Compiled by
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C. COMMENTS ON SUMMARY AND CONCLUSIONS OF THE FEDERAL REPORT

The extensive text is summarized in Section II of the Missouri River Basin Water Quality Standards Conference report. Several of the items deserve comment and are discussed below. The parenthesis indicates material quoted or paraphrased from the Federal report.

Agricultural Runoff Effects

Items E, G, and K on pages II-2 and II-3 deal generally with agricultural runoff effects. While of interest, this particular aspect is actually outside the scope of controllable standards, and the manner of the statements could lead the less than totally informed reader to unwarranted conclusions.

E. (It is estimated that at least 3,300,000 cattle and calves and 6,100,000 hogs and pigs were on farms. These animal wastes have a population equivalent of 65,000,000 and can cause several conditions of stream degradation.) There is no particular problem from animal waste until such time as rainfall, snow melt or water passes through the feed lot dissolving material from the manure and carrying it to the stream. Since the load of dissolved and suspended material water carried to the stream is only a fraction of that on the feed lot, the 65,000,000 population equivalent of animal waste on the feed lots should not at all be interpreted as the load on the stream.

(There are approximately 46,000 feeder lots in the state - page IV-23.) This statement is misleading in that a feeder lot could be defined as an area from which one or more grain-fed beef was marketed during the year. This could not be much of a pollution problem, and certainly not one over which control could be exercised. Iowa does however, effectively control large confinement feed lot runoff pollution.

G. (Sediment from uncontrolled runoff is a major pollutant of the Missouri River.). The reference to low turbidity of water discharged from Gavins Point Dam, compared to the turbid condition through Iowa is understandable. The effect of settling of sediment in the pool above the dam is not available in the lower reaches. Again, this aspect is outside the scope of controllable standards and is not an issue of the Standards conference.

K. (High densities of bacteria and high concentrations of nitrogen and phosphorus are found in Iowa tributaries to the Missouri River, especially during periods of stormwater runoff.) This statement could be expanded to include the agricultural land and streams in all states. Furthermore, while some control may be imposed, the bacteria, nitrogen and phosphorus in stormwater runoff can never be fully abated. Stormwater runoff effects negate at least in part, the desirable effect of continuous disinfection of treatment plant effluents.

Recreational Uses

Items P, Q, and S deal generally with recreational uses and give emphasis to impairment of use by grease.

P. (Recreational activities on the main stem include boating, water skiing, swimming and wading. These activities are directly affected by presence of floating material and grease balls, high bacterial densities, dissolved organics and turbidity. Samples of water taken in the survey had as high as 2000 bacteria per drop.)

Q. (Esthetic values of the waters in this area are reduced due to turbidity, floating materials, and other effects which reduce or eliminate the opportunity for development of spectator oriented activities, e.g., boat or canoe races, etc.)

S. (Fouling of fishnets and lines with grease is common below major municipal and industrial waste outlets. Similarly, boat hulls of recreational watercraft are fouled with grease and scum.)

The Iowa Water Pollution Control Commission has not designated the main stem of the Missouri as a recreation stream involving whole body contact sports (swimming and water skiing). The Iowa Health Department has for many years recommended that Iowa streams not be used for this purpose because of the injury and drowning hazards involved. Section IV of the Federal report contains the following statements which would appear to bear out this position.

Second paragraph, page IV-7 (Present recreation use along the Missouri River in Iowa has not met its potential for the amount of land and water acreage involved. While being light, however, it appears that most recreation activities are participated in with sightseeing, boating, picnicking and fishing as the most popular.) Last paragraph, page IV-7(Water skiing, surprisingly is enjoyed even though the river contains a high silt load. Swimming is not considered a common activity due in large measure to the dangerous water conditions and high turbidity.) Third paragraph, page IV-11-(It can be expected that use on the waters of the Missouri will principally be in the form of fishing, and boating, and on the adjoining lands in the form of sightseeing, picnicking, hiking, driving and walking for pleasure, and in historical interpretation.)

From this, it would appear that there is general agreement that the value of the Missouri River for whole body sports is dictated principally by factors other than controllable water quality criteria, and that maintenance of the general criteria and the criteria for public water supply and aquatic life should adequately protect recreational uses.

The grease ball, grease and scum problems mentioned in items P and S have not been shown to be attributable to the Sioux City or Council Bluffs municipal sewage plant discharges. The discharges which would be most suspected of containing large amounts of grease would be the Iowa Beef Packers discharge at Dakota City, Nebraska, the municipal sewage treatment plant effluent at Sioux City, Iowa, and the City of Omaha discharges. Grease is discussed on page A-26 of the Federal report and this discussion is quoted in its entirety as follows:

(The concentration of grease from the daily composite from the Monroe Street and South Omaha sewers averaged 299 mg/l during the October 1968 survey. The actual amount of grease reaching the Missouri River following a privately operated recovery operation at the Monroe Street sewer was not determined.)

(The grease concentration in the effluent from the Sioux City, Iowa, sewage treatment plant during the October 1968 survey averaged 17 mg/l. The amount of grease removed through the sewage treatment plant was not determined.)

(Grease results from the January 1969 survey were not available for inclusion in this report.)

The amount of grease being discharged (in the Monroe Street sewer) to the private recovery operation, using a total daily flow of 40 million gallons per day as shown in Table A-1, is fifty (50) tons per day. In comparison, the 17 mg/l of grease found in the Sioux City effluent is not significant. The Iowa State Department of Health has found that this amount of grease is not visible in effluents or in the receiving stream. The 17 mg/l of grease amounts to a little over one (1) ton in the Sioux City effluent, as compared to fifty (50) tons being discharged in the Omaha Monroe Street sewer.

The Federal report speaks of grease balls as big as oranges, but does not say where these were observed. Nor does it contain information concerning the grease content of the Iowa Beef Packers effluent at Dakota City, Nebraska. The waste being discharged from Iowa Beef Packers is not treated in a municipal plant and can be expected to contain appreciable amounts of grease. The waste treatment facility consists of an air flotation grease removal unit, the type of which past Health Department observations have shown, present operator problems and is subject to operational outages.

The Iowa State Department of Health has information that the State of Nebraska permitted Iowa Beef Packers at Dakota City to discharge wastes which may be over 200,000 population equivalent, compared to 195,000 population equivalent listed in the Federal report for the Sioux City sewage treatment plant effluent. Grease removals in the Sioux City plant would be much more effective than the IBP industrial unit, so that the grease observation should not be attributed to Sioux City.

Water Quality Effects.

Items L, O, and R on pages II-3, and II-4, discuss certain other water quality effects.

L. (Survey results from the main stream of the Missouri River in Iowa identified adverse changes in water quality. Turbidity increased four-fold in the length of reach surveyed and cyanide and phenols were found) It is true that phenols were found in the Missouri River, however, the Federal report failed to mention in the summary that the maximum observed phenol concentrations (Table No. A-5) did not change from station M-52, which is located above Sioux City, to station M-38, which is located below the Omaha-Council Bluffs area. These maximum levels, which showed no relation to waste discharges, were 2 parts per billion (ppb), which is twice as high as the suggested FWPCA standard of 1 PPb. These data further substantiate Iowa's position that phenol concentrations resulting from natural degradation products often exceed the FWPCA standard of 1 ppb, and that this standard is therefore unreasonable.

During the January, 1969 FWPCA survey, turbidity values were shown to decrease from 19 units above Sioux City to 8 units below Omaha-Council Bluffs. During this period storm water runoff was minimal and these data show that sewage treatment plant discharges had no effect on the turbidity of the Missouri River. High turbidity in the Missouri is caused exclusively by land drainage and that subject is not relevant to the conference.

Cyanide concentrations up to 15.2 ppb were measured in the Missouri River. These concentrations given in Table A-5 bear no apparent relationship to municipal or industrial discharges. 12.2 ppb of cyanide were found above Sioux City while less than 1 ppb was found below the Omaha-Council Bluffs area. In no case was the Iowa aquatic life standard of 25 ppb of cyanide violated.

O. Public water uses relying on the Missouri River as a source of supply report problems associated with turbidity,ammonia, coagulation, taste and odors.) These are common problems of most surface water treatment plants, whether or not being affected by upstream waste discharges. We have already established that turbidity problems in the Missouri are not caused by waste discharges but by land runoff over which we have no control.

Sewage treatment plants are designed to eliminate settleable materials and organic carbon, not ammonia. Waste effluents from secondary treatment plants contain concentrations of ammonia that are many times greater than concentrations in the average receiving waters. Nevertheless, increased ammonia concentrations in the Missouri and other Iowa streams are generally the result of agricultural land drainage and not sewage treatment plant discharges. This is substantiated by the fact that 85% of the Missouri River stations had greater ammonia concentrations during the runoff period than during the normal period of flow (see Table A-3, Federal report).

It has been widely recognized by Iowa that taste and odor problems frequently are encountered during periods of surface runoff, particularly in the late winter and spring. However, this is not related to sewage treatment plant discharges.

R. (Tainting of fish flesh has been reported by commercial and sport fishermen in many areas of the main stem of the Missouri river.) The State Conservation Commission reports no such complaints in the Iowa reach of the River. Again, it should be pointed out that industrial and municipal contributions on the Iowa side of the river are much less than those of adjacent or downstream states.

Treatment Requirements in Other States

Item T states that (Every state which borders the Missouri River, except for Iowa, has adopted as part of its Standards, a minimum requirement for secondary treatment or its equivalent for wastes discharged into the Missouri River.) This Department has been informed by the State of Kansas that Kansas, which borders the Missouri River, has not agreed to a blanket requirement for secondary treatment without such need being demonstrated. The Kansas standards have not yet been approved by the Secretary of the Interior.

The Conference in the matter of pollution of the Missouri River-Omaha area, held in June 1957 by the Public Health Service, recommended that Omaha area cities and towns provide adequate waste treatment. Municipal waste treatment plants were placed in operation by Council Bluffs, Iowa in February 1963 and by Omaha in February 1964.

Failure of the Omaha meat packing plants to remove paunch manure and other solids in pre-treatment produced such severe plant operation problems that the packing plant wastes and the south half of the City of Omaha still remain untreated. Four additional conference sessions ending March 1966 produced an agreement between the packers and the City of Omaha for construction of packing plant waste pre-treatment facilities, scheduled for completion in 1969.

FWPCA Biological Study

The manner in which the biological data was presented did not deviate from the rest of the Federal report. Conclusions were "not objective" and pertinent facts were buried which tended to create the illusion that Iowa is a major polluter of the Missouri River.

The FWPCA summary (part M, page II-3) regarding the biological study states the following. (Biological investigations revealed predominately clean water organisms and associated aquatic life above Sioux City. However a consistent increase in pollution tolerant organisms and biota were observed in many stretches of the river between Sioux City and St. Joseph.) This statement leads one to believe that all is well above Sioux City, whereas the Missouri downstream from Sioux City is polluted. If the data (Table B2-Federal Report) is examined objectively, it is obvious that this statement is misleading.

The fact is that the study showed little difference in the biological quality between station 736 and 730 above the Sioux City sewage treatment plant discharge, whereas every sample taken in the first 74 miles below the Sioux City discharge definitely demonstrated a biological fauna which was superior in quality to that observed upstream from Sioux City. Stoneflies, which are noted for being extremely pollution intolerant, were found at three stations downstream from Sioux City, while the data indicate that no stoneflies were found above Sioux City. Likewise there was a greater diversity of mayflies in the first 74 miles below the Sioux City discharge than there was above Sioux City. Mayflies are also pollution intolerant organisms which require high water quality. The FWPCA data (Table B-2) demonstrate that pollution intolerant forms were present in greater diversity in the first 74 miles below the Sioux City discharge than above it. This not a claim that the treated waste discharge from Sioux City enhances biological quality in the Missouri River, but merely points out that the biological quality was not deteriorated at these stations by the Sioux City discharge.

It is stated in the Federal report (page B-1) that severe degradation of the bottom associated organisms occurred for 54 miles downstream from the Omaha-Council Bluffs area, and that floating solids (grease and chunks of animal fat) were observed for 166 miles downstream.

It is interesting to compare the waste contribution of Omaha, Nebraska and Council Bluffs, Iowa. This can be readily done by a few simple calculations using the data given on page IV-24 of the Federal report. Omaha, Nebraska discharges 1,801,640 P.E. to the river, or 46 times as much as the Council Bluffs 39,000 P.E. discharge. Omaha's waste load to the river thus exceeds the sum total waste load discharged by the 20 Iowa municipalities (including industries) which are located on the Mississippi River.

Eighty-eight percent of Omaha's raw waste load receives no treatment or, in other words, is discharged directly to the Missouri River. All of the Council Bluffs waste receives primary treatment.

It is therefore not all surprising that the Missouri is biologically degraded for 54 miles below Omaha, nor is it surprising that grease balls are found as far as 166 miles downstream. However, these conditions can hardly be attributed to Council Bluffs, Iowa.

Water Quality Monitoring

(Pages IV-41, IV-42 and IV-43 of the Federal report contain discussion of the need for water quality monitoring and recommendations that Iowa establish additional monitoring stations and increase sampling frequency.)

The Iowa Water Pollution Control Commission agrees that an adequate water quality monitoring program is necessary and that this program should fit the needs of all the agencies involved in water pollution control. This is further emphasized by sections of this statement recommending additional study of parameters at issue in the Standards Conference. However, the extent of monitoring is directly dictated by staff manpower capability. This, being an extremely small staff agency, priorities must be established.

Iowa has recently expanded its limnology program, which is a direct increase in monitoring effort. Iowa has also moved forward by development of the mandatory treatment plant operation report program. This, together with automatic data processing, mandatory operator certification, and mail order BOD, is a form of monitoring, but monitoring of sources of waste discharge rather than stream water quality. However, priority must be given to correction of poor effluent discharges rather than stream sampling, and this effort is a more efficient utilization of staff resources. Such sampling as is now possible is being carried out, and every effort will be made to expand the monitoring station network and increase sampling frequency as manpower increases permit.

D. COMMENTS ON FEDERAL RECOMMENDATIONS

The recommendations of the Department of the Interior are set out, starting on page VI-1 of the Water Quality Standards Conference Report-Missouri River Basin. The Iowa position on each of the recommendations is outlined below, in the same order as it appears in the Federal Report.

Secondary Treatment

The Department of Interior blanket requirement for secondary treatment of all municipal and biodegradable wastes cannot be justified on the basis of Congressional intent, nor can such a requirement be adopted by the Commission under present Iowa statutory authority. An effluent standards provision, such as this secondary treatment requirement, was rejected during early Congressional hearings, and the standards provision reported out of Committee contemplated the setting of water quality standards for receiving waters only. However, on the basis of Guideline 8, the Department of Interior has attempted to impose a uniform requirement of secondary treatment or the equivalent, in all State water quality standards.

The Commission, under Iowa law, has no direct statutory authority to establish or enforce effluent standards. There is no authority to specify a type of treatment, except that based on the water quality criteria of the receiving stream. Treatment can be regulated only to the extent that it will produce an effluent that will protect the stream and meet the water quality criteria.

On the basis of stream water quality requirements, secondary treatment will be needed, and therefore has or will be required for all but 4 or 5 of the 490 municipal sewage treatment plants located on interior streams. However, the Mississippi and Missouri rivers have very high stream flows furnishing very high assimilative capacity, and the need for a degree of treatment higher than primary is difficult and in most places impossible to demonstrate. Extensive Mississippi River water quality studies during the middle 1950's and a 1950 pollution investigation on the Missouri River, demonstrated relatively little effect of even untreated wastes on these border streams. But as the result of water pollution hearings and voluntary compliance, all cities and towns, with the exception of the small Mississippi River towns of Marquette and Lansing, completed primary or secondary treatment during the 1950 to 1966 period.

The dissolved oxygen values presented in Figure A-2 of the Federal report indicate no significant decrease in dissolved oxygen during the October 1968 survey period, and an actual increase progressing downstream to the Omaha area during the January 1969 period.

The principal oxygen demanding sources now existing in the Sioux City area are the primary treated effluent of the City of Sioux City and the relatively untreated waste from the Iowa Beef Packers plant at Dakota City, Nebraska, approximately 4 miles downstream from the Sioux City municipal sewage treatment outfall. As determined from samples collected by FWPCA and from composite plant operation reports submitted to the State Department of Health, the Sioux City plant effluent has a population equivalent waste loading in the range of 200,000. No similar composite samples were collected by the FWPCA from the effluent of the Iowa Beef Packers plant at Dakota City, but information available to this Department indicates that the State

of Nebraska has permitted the Iowa Beef Packers plant to discharge an organic load of over 200,000 population equivalent to the Missouri river. It can be seen that this oxygen demanding waste load figure may be equal to that contributed by the entire domestic population of Sioux City and its packing plant waste load combined.

The table of municipal discharges to the Missouri river on page IV-24 of the Federal report lists a plant discharge population of 39,000 for Council Bluffs, Iowa and over 1,801,000 for Omaha, Nebraska. The oxygen demanding wastes for Omaha are thus 46 times that of Council Bluffs. Some oxygen depression was created by the discharge of primarily untreated wastes in this area but could not be declared to have a serious detrimental effect.

These water quality studies have shown no significant reduction in dissolved oxygen levels below sources of oxygen demanding wastes, even prior to primary treatment. This is a fortunate condition, and fares well compared to others of the nation's major streams where secondary treatment is needed. For instance, the 1968 report of the Ohio River Valley Water Sanitation Commission showed that dissolved oxygen levels of below 4 ppm occurred 33% of the time in the lower reaches of the Ohio River. Likewise, the lower reaches of the Delaware River now have very low oxygen levels, and hundreds of millions of dollars must be expended for secondary treatment, simply to maintain 3.5 ppm dissolved oxygen.

It also deserves comment that most of the larger border cities proceeded with primary treatment in the early years of the Federal construction grant program, and did not enjoy the degree of financial assistance that will be available to cities in other States that have delayed any plant construction to this point.

Using cost figures compiled by Smith and published in the JWPCF, it has been estimated that construction of secondary treatment facilities for all waste discharges to the Mississippi and Missouri Rivers would cost over $25 million. Furthermore, according to figures published in a 1969 FWPCA report, the cost of operation and maintenance of these secondary plants would be approximately $1.7 million per year more than for primary treatment.

The Iowa Water Pollution Control Commission has no hesitancy to require secondary treatment of any waste discharge to either the Mississippi or Missouri Rivers, when the need to satisfy water quality requirements is shown. However, it is the Iowa position that a need for uniform secondary treatment of all waste discharges has not been shown, and there is no scientific reason to believe that secondary treatment of every waste discharge on the border streams will enhance the water quality.

Some degradation of water quality was evident below the Omaha-Council Bluffs area due to the low percentage of wastes receiving treatment. It is suggested additional water quality studies be conducted following completion of meat packing plant pretreatment facilities to permit evaluation of Missouri river water quality when receiving full primary treated effluents from the City of Omaha.

Disinfection

At a meeting on February 9, 1968 with Robert S. Burd, Director of the FWPCA Water Quality Standards Staff, Iowa agreed to adopt definite numerical bacteriological limits compatible with National Technical Advisory Committee recommendations for waters used for public water supplies and primary contact recreation (swimming and water skiing). Interior further agreed that the standards would recognize these values as applying during dry weather, but will state that all reasonable efforts will be made to reduce bacteria concentration increases during periods of storm water runoff.

The Iowa Water Pollution Control Commission at its April 4, 1968 meeting approved a motion accepting these provisions, and the Iowa water quality standards have been revised to include the following numerical bacteriological limits:

Public water supply

Numerical bacteriological limits of 2000 fecal coliforms per 100 ml for public water supply raw water sources will be applicable during low flow periods when such bacteria can be demonstrated to be attributed to pollution by sewage.

Recreation

Numerical bacteriological limits of 200 fecal coliforms per 100 ml for primary contact recreational waters will be applicable during low flow periods when such bacteria can be demonstrated to be attributable to pollution by sewage.

The water quality criteria and plan for implementation and enforcement for the surface waters of Iowa, adopted by the Iowa Water Pollution Control Commission in May 1967, designated the surface waters to be protected for public water supply use as well as the recreation use areas on lakes, impoundments and rivers. The treatment needs in the plan have specified coliform reduction or effluent disinfection by the municipalities to protect this use during the recreational season. Information provided by other state agencies and presentations at the public water quality hearings were used to designate interior stream recreation areas, and coliform reduction has been specified for interior municipalities where necessary to protect recreational uses.

The State of Iowa therefore feels that acceptable bacterial criteria have been established for interstate streams in Iowa. These criteria are compatible with criteria of adjoining states established for public water supply and for recreation. Other state bacterial criteria generally take into consideration the effect of land runoff, and are applied when necessary to protect specified uses. Disinfection of treatment plant effluents is required by states adjoining Iowa, generally where public water supplies are involved and where necessary to protect public health for recreational waters during the recreational season. The State of Iowa had previously gone on record in its implementation plan as requiring effluent disinfection where necessary to protect downstream water uses.

Land runoff contributes high bacterial densities and bacterial studies in the State of Iowa and elsewhere have shown that commonly acceptable coliform levels have been greatly exceeded even in the absence of wastes attributable to human sources. The following is quoted from a long term study (1) of total coliforms in the Iowa River at Iowa City.

"If a stream contains coliform organisms that are of domestic sewage origin, one might expect the MPN to vary inversely with the dilution capacity of the stream. High MPN values would be expected during the dry seasons. On the other hand, high turbidities would be expected with high water conditions due to increased erosion and scour.

"In the Iowa River, increases in stream flow are accompanied by increases in both turbidity and coliform organisms. This pattern has been apparent over the entire 1950-64 period and is true whether one examines daily or monthly average data.

"Apparently, large numbers of coliform organisms are carried into the river after each rainfall and snow melt. The increase in turbidity also indicates the agricultural land adjacent to the river as the source of many of these coliform organisms. Storm sewer overflow is not considered a significant factor because the nearest upstream city is 30 mi. above Iowa City, and above the impoundment.

"In view of the apparently high numbers of nonfecal coliform organisims, and the correlation of high coliform densities with high flow, one might question the significance of such MPN data as related to the bacterial safety of the Iowa River Water. Does a high MPN, expecially a high monthly average, which may be caused by runoff from a single rainfall, mean that this water is an undesirable source? Probably not."

Among his conclusions Professor Powell states: "There are considerable seasonal differences in water quality. The impoundment has tended to reduce this variation, for example, by distributing the poor water from spring runoff over a longer period of time.

"Stream flow, turbidity, and bacterial density follow the same seasonal pattern. Increases in flow are accompanied by increases in the other two. During high flows the extremely high coliform densities are due to agricultural land drainage.

"Improved methods of evaluating bacterial quality and recommending treatment are greatly needed. In view of present day treatment capabilities, the worst rivers in the country can probably be purified with relative ease."

(1) Water Quality Changes Due to Impoundment, Marcus P. Powell & P. M. Berthouex, JAWWA July 1967

Figure 1 illustrates the pattern, on a monthly average basis, of the direct relationship of increasing stream flows accompanied by increases in both turbidity and total coliform density. Figure 2 indicates that the monthly coliform MPN average is less than 5000 per 100 m/l about 46% of the months both before and after impoundment above the supply in 1958. Figure 3 illustrates coliform variations with flow and turbidity on the Raccoon River at Des Moines.

Tables 2 and 3 contain total coliform data for the years 1964 & 1965 raw water at the University of Iowa water treatment plant intake at Iowa City, Iowa. This data indicates that commonly accepted total coliform criteria both for public water supply and recreation uses are exceeded due to land runoff a high percentage of the time.

The following are estimates of the costs for continuous disinfection (chlorination) of municipal waste treatment plant effluents, including effluents from industrial wastes which may contain pathogenic agents as recommended by the Department of Interior.

Estimated Chlorination Costs
Iowa Cities and Towns on Interstate Streams

	Raw PE	Eff. PE	Construct. & Equip. costs	Annual Chlorine cost
Major Mississippi River cities	1,029,000	700,000	$ 642,000	$390,000
Major Missouri River cities	447,000	295,000	307,000	176,000
Interior Interstate Streams			1,400,000	291,000
Total Chlorination Costs			$2,394,000	$857,000

The expenditure annually of the large sums of money required for year-round disinfection of municipal and industrial wastes as recommended by FWPCA, will not improve the bacterial quality of interstate waters during periods of run-off, and these are the periods when high bacterial levels have been found. The Iowa Water Pollution Control Commission has agreed to disinfection of waste discharges where these discharges can be expected to affect recreational or public water supply uses. Primary body contact (swimming and water skiing) recreational uses of Iowa streams is limited by nature to summer months. It has not been demonstrated to the Iowa Water Pollution Control Commission that year round chlorination is required to protect secondary contact (boating and fishing) recreational uses.

The Missouri River being unsuitable for whole body contact recreational sports (swimming and water skiing), precludes the need for disinfection to protect this use. The one possible need for disinfection would be at the Sioux City area to protect the downstream water supplies. However, that need, as demonstrated by the FWPCA water quality study, appears to be rather borderline, and the study was relatively brief. Therefore before definitely establishing a compliance requirement and making the large expenditure that will be required, additional study should be undertaken to more accurately determine the coliform densities and sources.

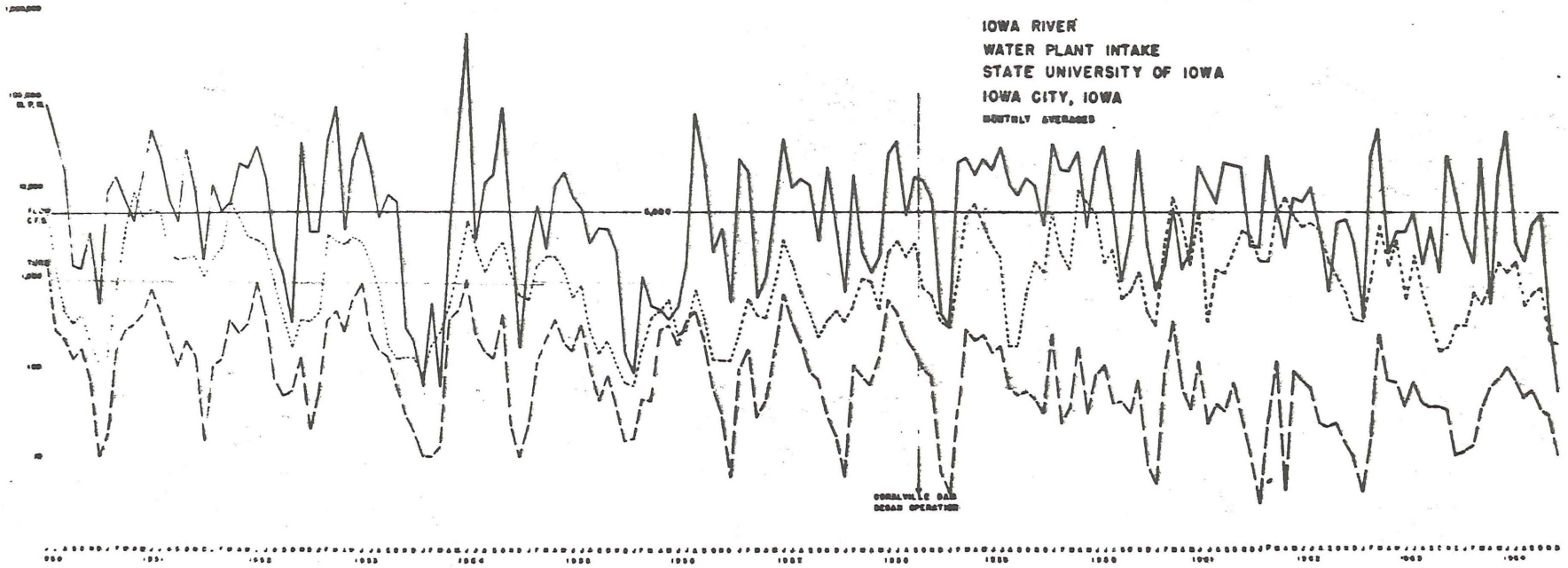
IOWA RIVER
WATER PLANT INTAKE
STATE UNIVERSITY OF IOWA
IOWA CITY, IOWA
MONTHLY AVERAGES
5,000
CORALVILLE DAM
DESIGN OPERATION

FIGURE 1

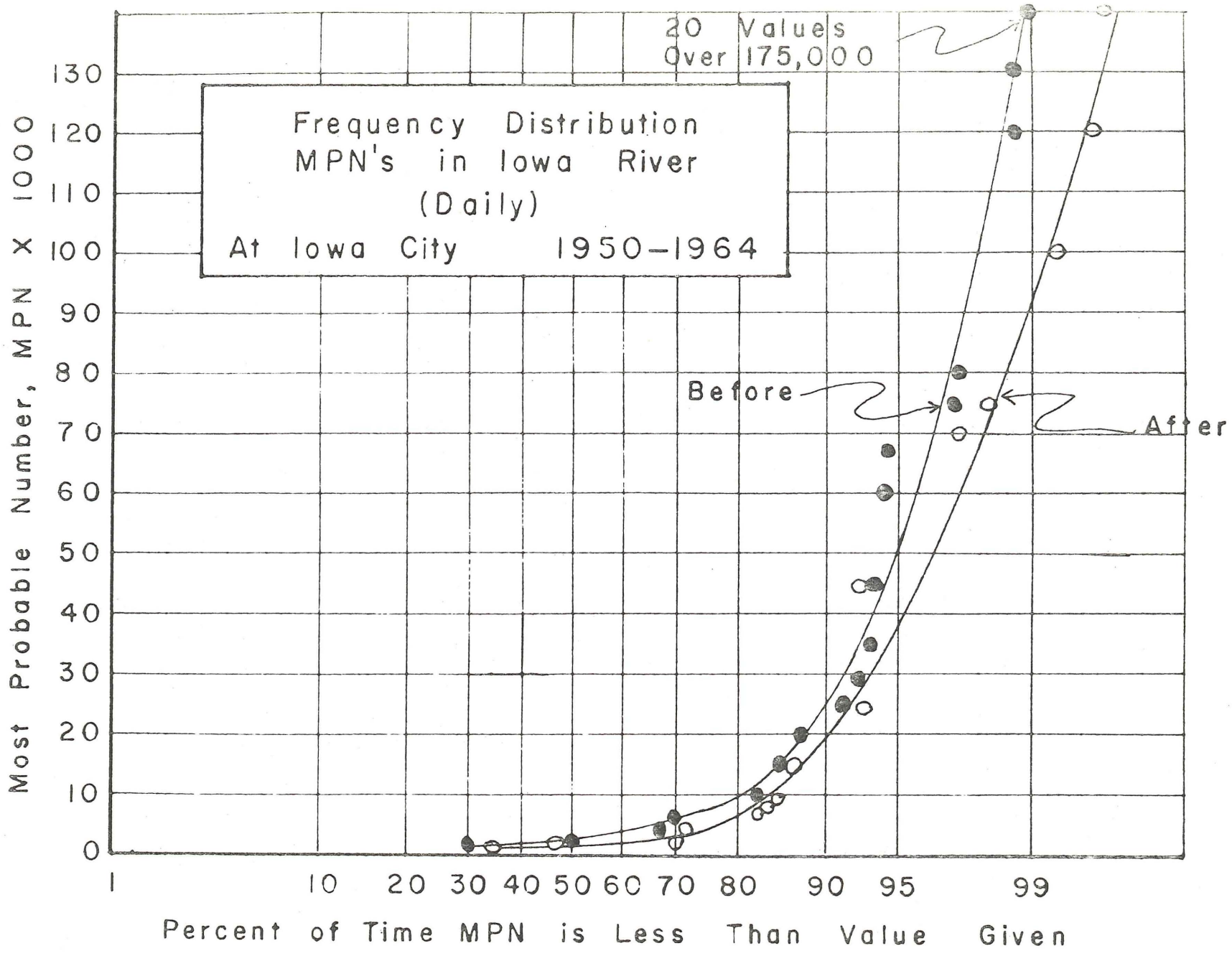
Frequency Distribution
MPN's in Iowa River
(Daily)
At Iowa City 1950–1964
20 Values
Over 175,000
Before
After
Most Probable Number, MPN X 1000
0
10
20
30
40
50
60
70
80
90
100
110
120
130
1
10
20
30
40
50
60
70
80
90
95
99
Percent of Time MPN is Less Than Value Given

Figure 2

FIGURE 3

MPN COLIFORM ORGANISMS
RACCOON RIVER - DES MOINES
JUNE 15 - DECEMBER 31, 1953
(DAILY DETERMINATIONS)

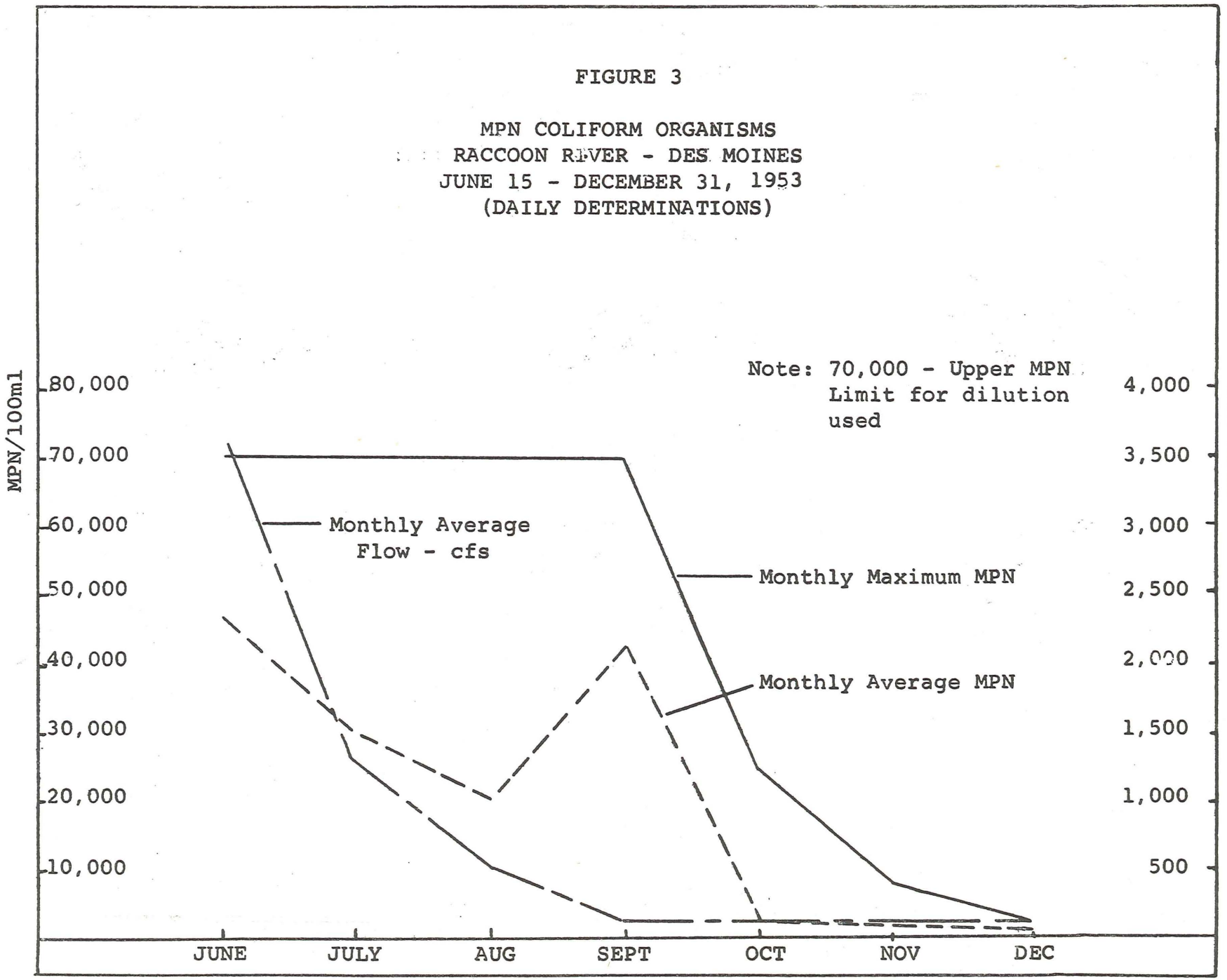

TABLE 2

IOWA RIVER
WATER PLANT INTAKE
UNIVERSITY OF IOWA
TOTAL COLIFORM M.P.N. DATA
1964

Month	Number of Samples	Ave. MPN per 100 ml	Public Water Supply % > MPN 5,000 per 100 ml	Public Water Supply % > MPN 20,000 per 100 ml	Recreation % > MPN 1,000 per 100 ml	Recreation % > MPN 2,000 per 100 ml	Recreation % > MPN 2,400 per 100 ml	Recreation % > MPN 5,000 per 100 ml	Mean Flow cfs
Jan.	17	2,780	11	05	41	41	23	11	187
Feb.	19	1,335	05	0	31	21	15	05	655
March	20	5,890	20	10	55	45	45	20	467
April	22	478	0	0	09	09	09	0	803
May	19	10,240	31	05	78	78	78	31	1,391
June	22	22,980	50	22	81	77	77	50	1,040
July	22	2,240	18	0	63	45	36	18	1,355
Aug.	21	1,450	04	0	14	14	14	04	452
Sept.	21	3,700	14	04	61	52	52	14	637
Oct.	21	4,970	14	09	38	38	33	14	213
Nov.	20	206	0	0	0	05	0	0	294
Dec.	21	51	0	0	0	0	0	0	419

*When averaging MPN values all values less than 30 were considered 30.

TABLE 3

IOWA RIVER
UNIVERSITY OF IOWA
WATER PLANT INTAKE
TOTAL COLIFORM MPN DATA
1965

Month	Number of Samples	Ave. MPN per 100 ml	Public Water Supply % > MPN 5,000 per 100 ml	Public Water Supply % > MPN 20,000 per 100 ml	Recreation % > MPN 1,000 per 100 ml	Recreation % > MPN 2,000 per 100 ml	Recreation % > MPN 2,400 per 100 ml	Recreation % > MPN 5,000 per 100 ml	Mean Flow cfs
Jan.	20	37	0	0	0	0	0	0	1,282
Feb.	20	46,000	30	30	35	35	30	30	2,039
March	23	15,000	48	13	96	87	70	48	3,388
April	27	32,000	52	33	78	74	59	52	6,257
May	20	17,000	65	20	85	85	80	65	4,989
June	22	5,100	18	9	46	41	32	18	5,633
July	21	6,100	29	14	62	57	48	29	2,661
Aug.	22	27,000	41	27	77	77	59	41	513
Sept.	21	38,000	77	53	90	90	86	77	2,651
Oct.	20	2,100	5	0	40	30	15	5	3,593
Nov.	21	670	0	0	14	5	0	0	4,025
Dec.	20	12,000	15	10	30	25	20	15	3,807

*When averaging MPN values all values less than 30 were considered 30 and all values greater than 110,000 were considered 110,000

Temperature

The temperature criteria for interior streams was excepted from approval by Secretary of Interior. During the lengthy negotiations, the temperature criteria has been the subject of wide variation and inconsistency in the Department of Interior's position. In five separate expressions, for instance, Interior has requested different maximum temperature requirements, ranging from 86°F to 93°F.

Agreement was reached on the 93°F maximum on interior streams but not on permitting a differential of 10°F above the natural background. Interior has insisted that this follow the pattern of the larger streams, like the Mississippi and the Missouri, dictating a differential of 5°F above natural background from May 1 through October 1, and then 10°F October 1 through May 1. This issue is unwarranted and would seriously add to the expense of power plant operations where applicable.

The thermal loading in Iowa is primarily from electrical power generation. Other industries using river water for heat exchange work are not believed to be of such magnitude as to exceed the lower limit proposed when operating plants on respective streams at low flow conditions. This leaves then, only those power plants which can properly and economically use this resource when able to stay below the maximum stream temperature set forth by the criteria.

The trend in this area should be noted. Older power plants are being closed rather than expend funds for modernization of air and water pollution control facilities and for other operational reasons. These services are being replaced by transmission of electrical currents from other larger and more modern plants. With the forthcoming of the atomic power plants in this region, increases in the thermal loading at these smaller local points on the interior streams, does not appear to be a problem for the near future.

The several guidelines issued by the National Technical Advisory Committee, describing considerations for setting temperature limits, frequently refer to the need for local study and for specific analysis of each habitat at the zone in question. Iowa believes this to be a most valid consideration and submits to the expert opinions of those professional authorities who have conducted investigations and have knowledge of the aquatic life on the streams where such concern may exist.

The temperature limits in the standards were not finally established until after the seven hearings conducted throughout the state. The final criteria were considered to be a fair representation of values recommended by and acceptable to various biologists who testified at the hearings. The views of the Superintendent of the Biology Section of the State Conservation Commission and the Principal Limnologist of the State Hygienic Laboratory are also firm in the contention that the temperature maximums and the 10°F temperature rise on interior streams are acceptable standards for aquatic life.

The recommendations of the Federal Report on the Missouri Basin water are quite vague in regard to temperature maximums, but a February 21, 1968 letter from Robert S. Burd, director of the FWPCA Water Quality Standards Staff, definitely stated that the maximums then proposed in the Iowa Standards were acceptable, and indicated that the $10^{o}F$ rise on interior streams was the only point at issue.

Iowa believes however, that the first hand knowledge of the problems involved and the subsequent testimonies of the professional authorities who counseled in preparation of the temperature standards, are logical and valid reasons for retaining the 10^{o} tolerance above natural temperatures on interior streams. The 93^{o} maximum temperature should also be retained.

Further, it should be recorded that all industry sharing this thermal pollution problem has cooperated with the Iowa Water Pollution Control Commission and adjusted its agreements to assure compliance within the parameters desired by the Commission. Industry is seriously concerned when reviewing the various thinking, and changes in position expressed in letters coming from the FWPCA, each adding to and further restricting their right for using this resource. Iowa believes the balance it has recommended to be both reasonable and valid for water quality temperature criteria in Iowa.

Protection of High Quality Waters

The October 2, 1968 minutes of the Iowa Water Pollution Control Commission state that the language of the non-degradation clause which was accepted by the state of Colorado and adjacent states is acceptable to the Water Pollution Control Commission. This action is considered firm, and the following non-degradation statement is incorporated as a part of the water quality standards:

> Waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at high quality unless it has been affirmatively demonstrated to the State that a change is justifiable as a result of necessary economic or social development and will not preclude present and anticipated use of such waters. Any industrial, public or private project or development which would constitute a new source of pollution or an increased source of pollution to high quality waters will be required to provide the necessary degree of waste treatment to maintain high water quality. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act, as amended.

Phenols

Phenol concentrations in Iowa streams are highly variable ranging from less than one part per billion to a maximum of 20 ppb. This variation occurs at given sampling points at different times of the year being a function of hydrologic flow, climatic conditions and other factors.

Experience indicates that the highest phenolic compound concentrations occur at the early stages of high flow conditions rather than at low flows. This phenomenon causes us to discount the significance of industrial or municipal input as this type source would tend to produce the highest phenol levels during low flow-low dilution conditions.

Aromatic ring compounds abound in nature and bacterial and fungal organisms are well known producers of hydroxylated ring metabolites. The probability is high that phenolic type compounds reactive to 4-aminaontipyrine could have a potential metabolic pathway resulting from such natural materials as wood tars, plant proteins, tannins, etc. Since Iowa waters at times are loaded with natural soluble organics due to soil surface leaching, the correlation with early stage run-off and elevated phenol concentrations is logical.

Iowa data bears this postulation out and some typical data illustrating phenol levels are delineated in tabular form attached.

The summary data (Table A-5) in the Federal report shows maximum phenol concentrations of 2 ppb did not change from above Sioux City to below the Omaha Council Bluffs area. These maximum levels which showed no relation to waste discharges are twice as high as the suggested FWPCA standard of 1 ppb and again indicate phenol concentrations resulting from natural degredation products often exceed the suggested standard.

> Iowa river cities using surface water showing phenol levels in the 10-20 range have not experienced taste and odor episodes attributable to phenol concentrations subsequent to normal chlorination for disinfection purposes.
>
> In view of the high and variable levels of phenolic compounds found in Iowa surface waters not traceable to industrial or municipal sources, it is the recommendation of the Iowa Water Pollution Commission that the maximum permissible concentration of phenolic type compounds be retained at 0.020 parts per million in all waters.
>
> There is no evidence or logic to suggest the pertinency of an individual standard for aquatic use specifically as most of our streams are multiple use including public water supply. While aquatic life is far less affected by phenols, it is realistic to provide the single standard at 0.020 parts per million on the basis of the most critical potential use.

TABLE 4

PHENOL CONCENTRATION IN
IOWA STREAMS

DATE	RIVER	PHENOL ppb
1-24/25-67	Des Moines-Euclid	2
"	" Ipalco	18
"	" Ottumwa	3
"	Raccoon	2
"	Missouri-Co Bluffs	< 1
"	Cedar- Cedar Rapids	5
"	Iowa River-Iowa City	5
"	Mississippi-Davenport	11
"	" Burlington	11
"	" Keokuk	11
10/9/68	Mississippi-Upstream from Des Moines River	
	" Keokuk	1(Iowa Side)
	" "	2(Channel)
	" "	2(Illinois Side)
"	Des Moines-Keokuk	2
10/24/68	Mississippi-Lansing	1
2/12/69	" Davenport	9(481.3 channel)
"	" "	8(480.1 channel)
2/13/69	" Burlington	8(404.1 channel)
"	" "	12(400.3 channel)
2/8/69	" Keokuk	10(363.6 channel)
"	" "	9(359.1 channel)
"	Des Moines-Keokuk	4

Radioactivity

The original brief criteria on radioactive substances had been acceptable to the Federal Water Pollution Control Administration during earlier discussions. There was no indication of any disagreement on this criteria until the Federal reports were prepared for the conference, and there is no particular disagreement now. The State of Iowa has an adequate radioactivity sampling program and will accept the more detailed radiological limits now suggested by the FWPCA. The following limits on radioactive substances have now been adopted by the Iowa Water Pollution Control Commission:

> Gross beta activity (in the known absence of 90 strontium and alpha emitters) shall not exceed 1000 picocuries per liter.
>
> The concentration of 226 radium and 90 strontium shall not exceed 3 and 10 picocuries per liter respectively.
>
> The annual average concentration of specific radionuclides, other than 226 radium and 90 strontium, should not exceed 1/30 of the appropriate maximum permissible concentration for the 168 hour week as set forth by the International Commission on Radiological Protection and the National Committee on Radiation Protection.
>
> Because any human exposure to unnecessary ionizing radiation is undesirable, the concentrations of radioisotopes in natural waters should be maintained at the lowest practicable level.

E. SUMMARY OF ACCEPTABLE WATER QUALITY STANDARDS REVISIONS AND ADDITIONS.

The following are the various revisions or additions to the surface water quality criteria and plan of implementation which have been adopted by the Iowa Water Pollution Control Commission:

Section 1.2(455B) Surface water quality criteria
1.2(3)

a. Public Water Supply

(1) Bacteria: Numerical bacteriological limits of 2000 fecal coliforms per 100 ml for public water supply raw water sources will be applicable during the low flow periods when such bacteria can be demonstrated to be attributed to pollution by sewage.

(2) Radioactive Substances:

Gross beta activity (in the known absence of 90 strontium and alpha emitters) shall not exceed 1000 picocuries per liter.

The concentration of 226 radium and 90 strontium shall not exceed 3 and 10 picocuries per liter respectively.

The annual average concentration of specific radionuclides, other than 226 radium and 90 strontium, should not exceed 1/30 of the appropriate maximum permissible concentration for the 168 hour week as set forth by the International Commission on Radiological Protection and the National Committee on Radiation Protection.

Because any human exposure to unnecessary ionizing radiation is undesirable, the concentrations of radioisotopes in natural waters should be maintained at the lowest practicable level.

b. Aquatic life

(1) Warm water areas.

Temperature:

Mississippi River-Not to exceed an 89°F maximum temperature from the Minnesota border to the Wisconsin border and a 90°F maximum temperature from the Wisconsin border to the Missouri border nor a 5°F change from background or natural temperature in the Mississippi River.

Missouri River-Not to exceed a 90°F maximum daily temperature nor a 5°F change from background or natural temperature during the months of May through October and a 10°F change during the months of November through April.

Interior streams-Not to exceed a 93°F maximum temperature nor a maximum 10°F increase over background or natural temperature.

Heat should not be added to any water in such a manner that the rate of change exceeds 2°F per hour.