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REPORT
ON THE
WATER POLLUTION INVESTIGATION
OF
WALNUT CREEK
BELOW
URBANDALE, IOWA

Division of Public Health Engineering
Iowa State Department of Health
Des Moines, Iowa
September, 1963

Iowa

State Department of Health

EDMUND G. ZIMMERER, M.D., M.P.H., COMMISSIONER

Des Moines, IA

DIVISION OF

Public Health Engineering

Paul J. Houser, M.S.

DIRECTOR

September 3, 1963

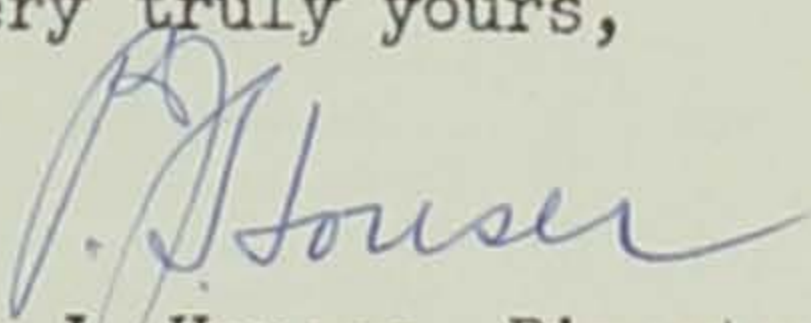
Ralph H. Heeren, M.D.
Acting Commissioner
State Department of Health
Des Moines, Iowa

Dear Dr. Heeren:

I am transmitting a report of your Division of Public Health Engineering relative to an investigation of the pollution of Walnut Creek below Urbandale, Iowa.

This investigation was initiated in accordance with provisions of the Iowa Stream and Lake Pollution Law.

Very truly yours,


P. J. Houser, Director

JRS/mcc

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WATER POLLUTION INVESTIGATION
OF
WALNUT CREEK
BELOW
URBANDALE, IOWA

I. INTRODUCTION

This report concerns maintenance and operation of a sewage treatment plant serving a portion of the City of Urbandale, Iowa. It was designed for a total of 500 homes with contributing population of 2000 persons. A permit for the project was issued under provisions of the Stream Pollution Law, to the Benton Development Company, a copy of which was also filed with the City of Urbandale. One of the conditions of this permit was that, "It is understood that it may be required to abandon these facilities at some future date if a comprehensive sewer system is extended into the area providing another source of treatment and disposal and that if no other source of collection becomes available, it may be necessary to pump the treatment plant effluent to the Beaver Creek watershed rather than dispose it in the Walnut Creek watershed."

The plant consists of a spiragester, trickling filter, final clarifier, chlorinator and sludge drying beds. Although a raw sewage bypass was originally designed into this plant, it was subsequently recommended by this Department that a shear gate be installed and kept closed at all times to prevent the discharge of untreated sewage into Walnut Creek. This gate was installed during the spring of 1956 in accordance with the aforementioned recommendations.

Raw sewage flows by gravity to the plant and through a basket screen into the plant manhole.

Pumps of approximately 200 gpm capacity each lift the sewage from the plant manhole to the spiragester, from where the sewage flows by gravity through the rest of the treatment plant. A float-control butterfly valve is provided to control the amount of filter effluent recirculated for additional treatment. Chlorine is introduced into the sewage between the trickling filter and final clarifier at a sufficient rate to maintain a minimum chlorine residual of 0.5 ppm in the plant effluent.

The exact number of homes connected and discharging wastes to this plant at the present time is not known; however, it is believed to be greater than 400 and that commercial establishments such as beauty parlors, service stations, and pet shops are connected to the sewer system in addition to several churches and a grade school.

II. DESCRIPTION AND USES OF THE RECEIVING STREAM

The receiving stream for this plant is a small tributary to the North Branch of Walnut Creek which flows through residential areas in Windsor Heights and Clive. The North Branch joins Walnut Creek south of University Avenue from where it follows a course through residential areas of Des Moines and West Des Moines and enters the Raccoon River approximately $2\frac{1}{2}$ river miles above the intake to the Des Moines Water Works.

The receiving stream receives storm water runoff from the Karen Acres Housing Development and from storm water intakes along Douglas Avenue, north of Karen Acres. In dry weather, very little flow is encountered and the treatment plant effluent comprises the greater portion of the water within this stream. The receiving stream and Walnut Creek below this plant have a sand bottom and are easily accessible to children living in the populated areas south of Hickman in the municipalities of Clive and Windsor Heights.

III. OBSERVATIONS

On June 13, 1963, the writer conducted a routine sanitary survey of the sewage treatment plant serving the housing development known as Karen Acres in Urbandale, and the receiving stream below the plant outlet. This plant is designated by the City as Water Pollution Control Plant No. 1. During the course of this survey, the following observations were noted:

1. The bypass gate in the inlet manhole was found to be open at this time, and failure in raw sewage pump operation or peak daytime sewage flows resulted in the bypass of a portion of the raw sewage to the receiving stream without treatment.

2. The raw sewage flow to this plant was approximately 200 gpm at the time of this survey. This flow estimate was made from observation of the V-notch weir located in the effluent channel just prior to discharge of the effluent to the receiving stream.

The approximate 200 gpm raw sewage flow indicates a substantial quantity of infiltration water present in the raw sewage. At the time of the last complete survey and 24-hour composite of the plant flow on September 15, 1959, it was estimated that 333 homes were occupied and that a population of approximately 1,170 was contributing to this plant. The peak flow during this 24-hour survey occurred at 8 a.m. when a rate of 90 gpm was recorded. Low flows of less than 30 gpm occurred during early morning hours from midnight to 6 a.m. The present flow of 200 gpm was noted at 1 p.m., at which time of the day, the rate of flow could be slightly elevated; however, it is not the peak flow. In comparison, the flow recorded on September 15, 1959, at 1 p.m. was 60 gpm. The connection of the additional homes since 1959 to the sewer system should not result in a three-fold increase in sewage flow, and on this basis, it appears that infiltration is excessive and the cause for the high flow.

3. The float-control mechanism that actuates the sewage pumps appears to be set too high which results in back-up of sewage into the outfall sewer before the pumps start. This has resulted in partial bypass of sewage to the stream when the bypass gate was left open.

4. The rotary distributor on the trickling filter was not functioning properly, and the sewage was not being distributed onto the rock surface on a continuous basis. The distributor should operate satisfactorily with one pump in operation. In addition, approximately ten nozzle guards were missing on the distributor arms which resulted in poor distribution of the sewage; however, this should not prevent the rotation of the distributor.
5. A new butterfly valve has been provided for the recirculation line; however, it is not functioning as designed to recirculate a portion of the flow.
6. The chlorine pressure gauge on the chlorinator is not operating and is in need of repair or replacement.
7. Sludge has recently been withdrawn from the spiragester and discharged to the small retention lagoon located just west of this unit. Sludge was removed from this lagoon by pumping to a tank, mounted on a truck, and disposed on farm land. Some sludge, however, was allowed to remain in the retention lagoon and is digesting rapidly with resultant objectionable odor conditions. It has been the practice at this plant to remove the sludge from the spiragester in liquid form through the use of the tank truck and dispose of it on farm land. This method of sludge disposal results in less objectionable odor conditions around the plant.
8. The final effluent discharged from this plant was quite cloudy due to the improper operation of the trickling filter; however, a total chlorine residual of 2.5 ppm was noted in the effluent at the time of the survey. The receiving stream below the plant outlet indicated the previous bypass of raw sewage by the presence of paper and other objectionable solids clinging to tree twigs in the water. Except for the objectionable visible solids noted, the receiving stream below the plant outlet showed clean bottom conditions, and no sludge or slime deposits were visible. The objectionable solids were removed from the stream and disposed of with the screenings at the plant at the time of this survey.
9. Previous surveys of the sewage treatment plant during the past seven years have revealed difficulty in operation in some of the plant units especially during several months each winter when the trickling filter cannot be operated because of freezing conditions, thus necessitating the discharge of a deteriorated effluent to the receiving stream.
10. Experience has shown that during extreme rainfall conditions, sewage either backs up into basements in low areas within the housing development or overflows the manhole at the plant where a portion of the waste could be discharged to the stream without treatment.

IV. SIGNIFICANCE OF WATER POLLUTION

In accordance with the Iowa Stream and Lake Pollution Law, pollution is defined as follows:

" . . . pollution means such contamination, or other alteration to the physical, chemical or biological properties, of such waters of the state, or such discharge of such liquid, gaseous or solid substances into such waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety or welfare or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life."

Sections 657.1 and 657.2, Code of Iowa, 1962, define a nuisance as follows:

"Whatever is injurious to health, indecent, or offensive to the senses, or an obstruction to the full use of property, so as essentially to interfere with the comfortable enjoyment of life and property, is a nuisance"

Section 657.2:

" 4. The corrupting or rendering unwholesome or impure the water of any river, stream or pond . . . to the injury or prejudice of others."

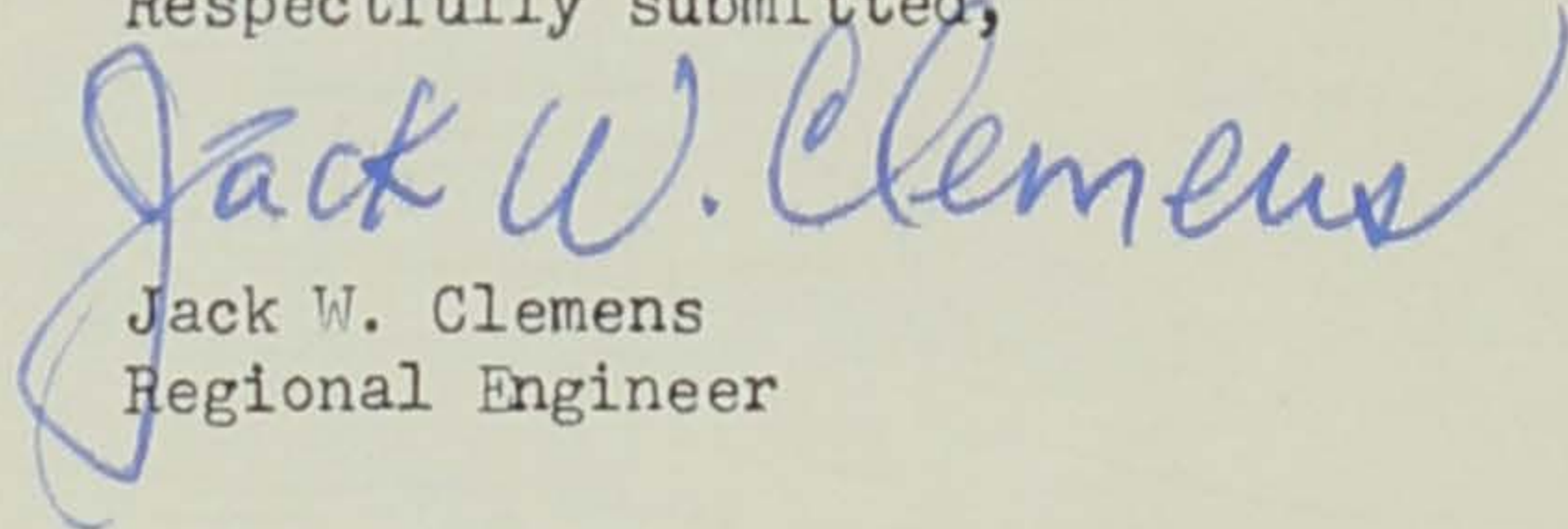
During the course of this investigation, the following conditions pertaining to the aforementioned definitions were found to exist:

1. The discharge of untreated or partially treated sewage to a stream flowing through a populated area creates a nuisance and a potential health hazard to anyone coming in contact with the stream water. In addition, a health hazard is created by the backup of sewage into basements from sewers overloaded at times of excessive rainfall. Due to the continued buildup of residential areas near and below the receiving stream, the discharge of wastes from this plant becomes more objectionable and results in a greater potential health hazard.
2. The discharge of raw or insufficiently treated sewage is not conducive to the use of the river as a source of a public water supply.
3. Bypass of raw or partially treated sewage can be expected in the future unless extensive measures are taken to control all sources of extraneous water such as surface water, roof connections, foundation drains, infiltration, and sewer breaks which result in overloading the hydraulic capacity of the system and plant during wet weather conditions. Likewise, bypassing has occurred in the past as a result of necessary repair work on the spiragester which was partially the result of unsatisfactory operation and maintenance practices.

V. RECOMMENDATIONS

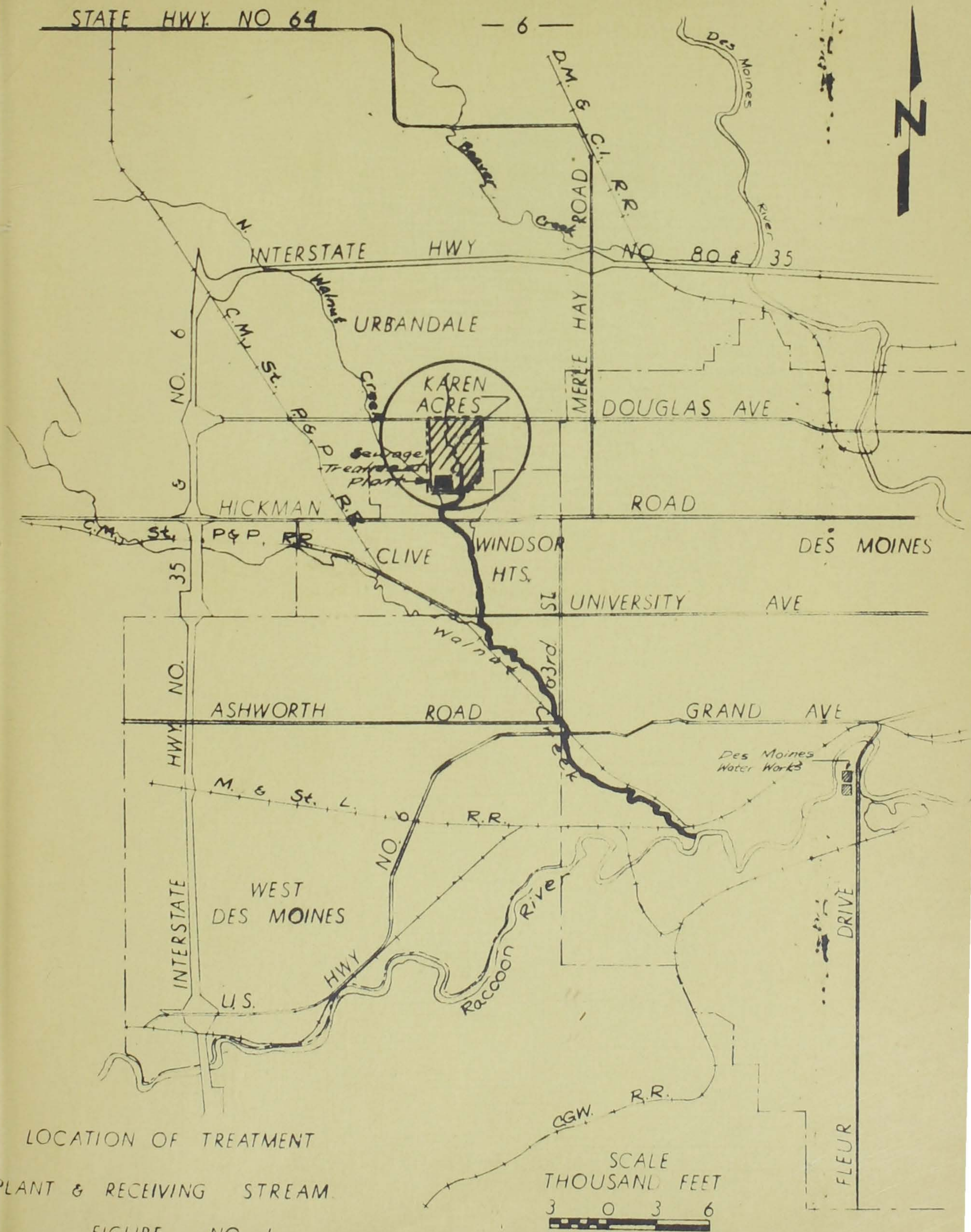
1. It is recommended that efforts be directed toward abandoning this sewage treatment plant and obtaining a connection to the Des Moines sewer system for the treatment and disposal of the wastes at the Des Moines plant. Such a connection to the Des Moines system would eliminate the discharge of treated and untreated wastes to the stream and thereby eliminate this potential health hazard to the populated areas below the point of discharge.
2. Until such time as this plant can be abandoned, the bypass line at the plant must be kept closed at all times, and no sewage must be allowed to bypass this plant at any time. Likewise, the entire plant must be maintained in operable condition, as designed, at all times.
3. Efforts to control the entrance of extraneous water into the sanitary sewer system should be initiated immediately. To reduce the hydraulic loading on the system and treatment plant, an investigation must be made to determine if there are any sewer breaks, and if so, they should be immediately repaired.

Respectfully submitted,



Jack W. Clemens
Regional Engineer

JWC/mcc



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