

ANNUAL REPORT

by

Chief Engineer
S. A. LUBETKIN

to the

PASSAIC VALLEY
SEWERAGE COMMISSIONERS

FOR THE YEAR

1973

847920002

Violation and Elimination - Fair Lawn Water Pollution
Control Facilities, 2-01 Saddle River Road, Fair Lawn, N.J.
Intermittent
(M. Tomaro)

This activated sludge plant treats an average daily flow of 2.7 million gallons per day and discharges its chlorinated effluent to Saddle River, a tributary of the Passaic River. The sludge is digested and dried in lagoons. The licensed operator is Donald Eelman. The Commissioners monitor the discharge from this plant routinely.

In 1973 of 47 samples taken 6 were unsatisfactory as follows:

May 17, 1973: Sample had a slightly high C.O.D., turbidity and suspended solids. Upon reporting this to the Chief Operator, the inspector was informed that on the morning of May 17, two aeration tanks were being cleaned, and therefore some activated sludge was carried over to the effluent from the temporarily overloaded remaining units. Things were back to normal the following day.

September 12, 26, October 24, 31 and November 8, 1973: These samples, generally speaking had a slightly high turbidity, suspended solids & B.O.D. and was explained by a plant "upset". It is to be noted that the samples for the remainder of the year were satisfactory.

Violation and Elimination - Fiske Bros. Refining Co.
129 Lockwood Street, Newark, N.J.
February 7, 1973
(J. McLaughlin)

While making routine inspections of his district, Inspector J. McLaughlin saw the hose coupling strap from a Tank Truck break, releasing approximately 60-75 gallons of bright stock oil into Esther St. The tank truck was owned by Tank Truck Rentals of Croydon, Pa. and was on lease to Chemical Leaman Tank Lines, Inc. of Downingtown, Pa. making a delivery to Fiske Bros.

The driver notified his terminal manager in Pennsylvania while Inspector Mc Laughlin contacted Mr. Louis De Nicola the terminal manager for Chemical Leaman in Newark. Mr. Di Nicola contacted Sampson Tank Cleaning Co., Bayonne, to clean up the oil.

Meanwhile Mr. Clifford Wolf, Supt. of Fiske Bros., directed two Fiske employees and the driver in preventing the oil from flowing into the catch basin at Lister and Esther Streets by spreading oil-dry over the area.

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Violation and Elimination - Fiske Bros. (con't.)

Sampson Tank Cleaning Co., crew and equipment arrived at approximately 4:30 P.M. and completed the clean-up and removal at 5:30 P.M.

Violation and Elimination - Glamorene Products Corp.
175 Entin Rd., Clifton, N.J.

March 26, 1973

(F. Wendt)

At 11:30 A.M. on March 26, 1973, Mrs. Molnar of Rutherford, N.J. called P.V.S.C. and reported that a white discharge was coming from the Entin Storm Sewer.

Inspector Wendt was assigned and found that the Glamorene Products Corp., was the source of the pollution. Two cases of liquid detergent fell and broke during a delivery to this company. Company employees then hosed down the material into the storm sewer thence the Passaic River.

Mr. Noll, the Plant Manager, was warned that if there was a repetition of this type of accident, he should not wash it into the storm sewer but should apply an absorbent material or vacuum it up and wash it into the sanitary sewer.

Violation and Elimination - City of Hackensack, So. Summit Avenue Storm Sewer

May 17 - December 14, 1973

(J. Perrapato)

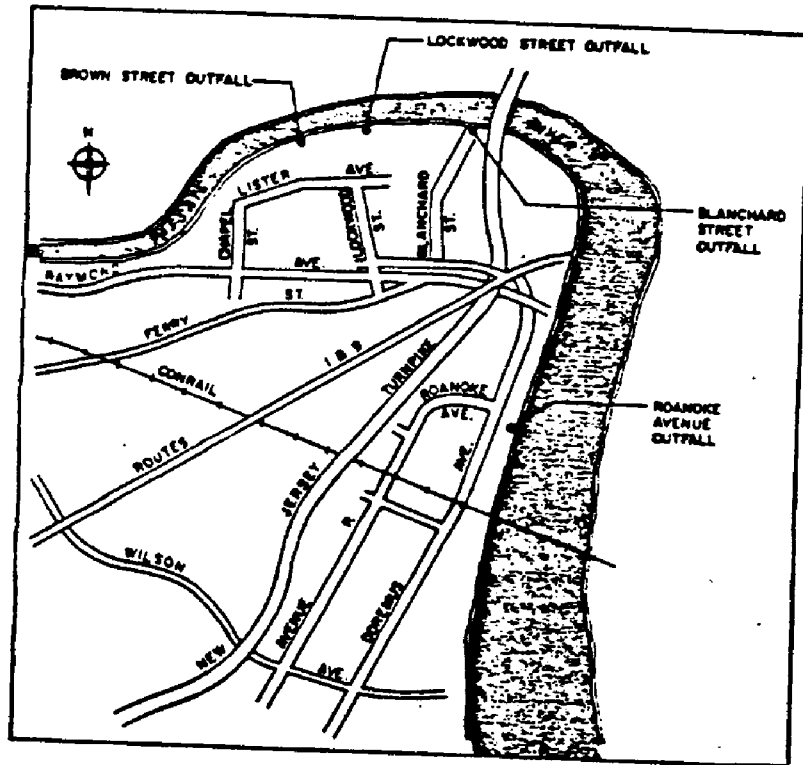
While tracing the oil in Millbank Brook back to its source, Mr. Lubetkin noticed a small flow from a storm drain on the Raywin Realty property, which appeared to come from South Summit Avenue, Hackensack. On May 17, 1973, a sample was taken and found to be polluting (very high fecal coliform count, high turbidity, suspended solids, and C.O.D.).

On May 24, 1973, Mr. Richard Galofaro, Sanitarian of the Borough of Lodi, wrote to the PVSC, stating that a joint inspection was conducted by the Lodi and Hackensack Health Departments concerning the sewage discharge into Lodi waterways. A dye test had proved negative, and further testing was to be done by the Hackensack Health Department. Mr. Galofaro requested a copy of the analysis, which was sent to him on June 5, 1973.

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City of Newark, New Jersey
Feasibility Study

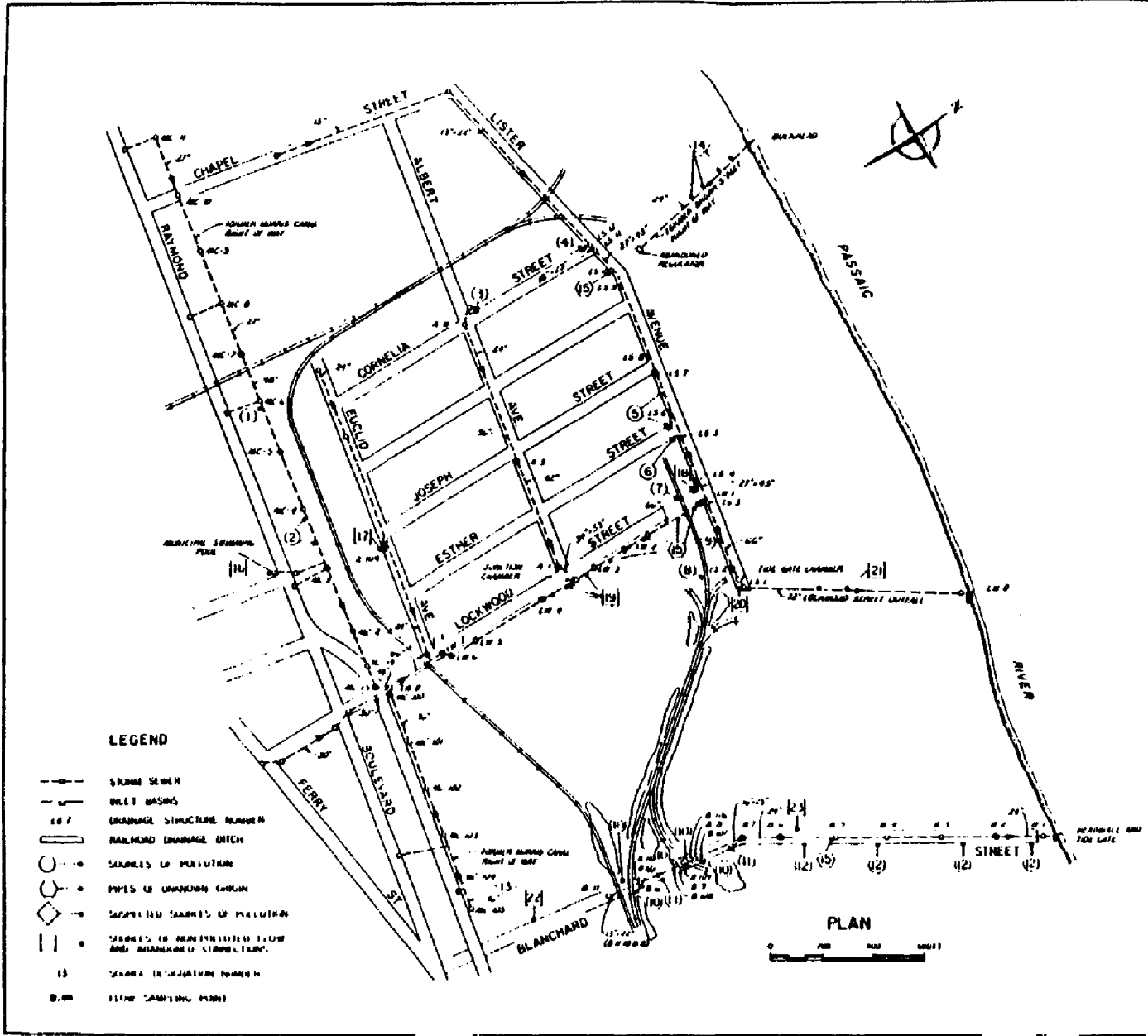
POLLUTION ABATEMENT PROGRAM



Clinton Bogert Associates
Consulting Engineers
September, 1978
Revised January, 1979

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SOURCES

SEWER

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SOURCE

DESCRIPTION

INTERMITTENT DUMPING OF PAINT INTO SEWER AT ASSOCIATED AUTO BODY AND TRUCKS INC.

CAR WASH DRAINS AT SERVICE STATION CONNECTED TO STORM SEWER

INTERMITTENT LOW VOLUME DISCHARGE OF OIL AND WATER ENTERING INLET FROM COLLIERIES CORP.

CONTINUOUS FLOW OF THICK VISCOUS CHEMICALS ENTERING INLET FROM COLLIERIES CORP.

CONTINUOUS FLOW OF BLACK OILY CHEMICALS ENTERING INLETS FROM S-LINE TRUCKING COMPANY.

INTERMITTENT LOW VOLUME DISCHARGE OF OIL AND WATER ENTERING INLET FROM FINE'S SHOPPING CENTER COMPANY.

INTERMITTENT DISCHARGE OF BLACK OILY CHEMICALS ENTERING INLET FROM FINE'S SHOPPING CENTER COMPANY BAYLOR ST. SIDE.

CHEMICAL SPILLAGE AT ATLAS REFINERY INC. BAYLOR ST. SIDE CONTAINING "A" GRADE AND ENTERING BAYLOR ST. DRAINAGE DITCHES DURING HOT WEATHER

RAILROAD DRAINS AND OIL SEPARATOR AT ATLAS REFINERY INC. CONNECTED TO STORM SEWER

INTERMITTENT FLOW OF WATER AND CHEMICALS ENTERING INLETS FROM BAYLOR ST. DRAINAGE DITCHES

FALL-OFF OVERFLOW OF SEWAGE FROM SANITARY MANHOLE ENTERING INLETS

OCCASIONAL OVERFLOW OF SEWAGE FROM SANITARY MANHOLE ENTERING INLETS

CONTINUOUS DISCHARGE FROM URBAN DOMESTIC COMPANY

INLETS AND DRAINS AT SHERWIN WILLIAMS COMPANY CONNECTED TO STORM SEWER

PIPES OF UNKNOWN ORIGIN

CONTINUOUS FLOW FROM MUNICIPAL ENTERING SOC. (OCCASIONAL)

CONTINUOUS FLOW OF COOLING WATER ENTERING INLET FROM HODGSON MANUFACTURING COMPANY

INTERMITTENT DISCHARGE OF COOLING WATER ENTERING INLET FROM FINE'S SHOPPING CENTER COMPANY

SEWER DRAIN CONNECTIONS FROM THE RESINER'S MANHOLE AND TRUCKING COMPANY ARE ABANDONED INLET CONNECTION

ABANDONED BAYLOR ST. DRAIN CONNECTED TO MANHOLE 14-1

SEWER DRAIN CONNECTIONS FROM THE RESINER'S SEWER COMPANY

CONTINUOUS LOW VOLUME DISCHARGE OF COOLING WATER ENTERING DITCHES FROM HODGSON MANHOLE COMPANY

INTERMITTENT DISCHARGE OF SOLIDIFIED ENTERING DITCHES FROM SAND PUMP AT FARMINGTON CHEMICAL COMPANY

REAR END AND
NO. 6171

**NEWARK POLLUTION ABATEMENT
FEASIBILITY STUDY**

**SOURCES OF POLLUTION IN STORM
SEWER SYSTEMS ON BLANCHARD,
LOCKWOOD AND BROWN STREETS**

CLIFTON SOCIETY ASSOCIATES
CONSULTING ENGINEERS

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IV. Blanchard Street

A. Physical Inspection Findings

Blanchard Street is served by separate storm and sanitary sewers. The 24-inch storm sewer (see Plate 2), constructed in 1917, discharges to the Passaic River. In 1970, the storm sewer was extended and the sanitary sewer was rebuilt. The sanitary sewer connects to a trunk sewer in Raymond Boulevard. The sanitary sewer is clogged by grease, tallow, paper and black oily waste. Several sanitary manholes were observed to surcharge and overflow into the street. These overflows usually occurred between 11:00 a.m. and 3:00 p.m. on weekdays. The frequency of overflow varies depending on industrial discharge rates. It does not appear to be related to rainfall events. Overflows were observed at least once a week and were noted on ten consecutive weekdays in April 1978. Intermittent overflows may have occurred during the last few years. These sanitary overflows are a major source of pollutants in the Blanchard Street storm sewer. City forces had been cleaning the Blanchard Street sanitary sewer when backups and overflows were reported. Equipment breakdowns and manpower shortages caused a suspension of cleaning operations in 1978.

Prior to cleaning, the storm sewer contained between 1.0 and 1.5 feet of primarily granular sediment mixed with black oil. The oil, which comes from the overflowing sanitary sewer, coats the inside of the pipes and manholes. Several inlets were filled with debris and sediment. The tide gate is mounted on a headwall on the river bank. The gate was being held open by sediment and debris during the first field inspection. The gate appeared to be fully operational after City personnel removed the sediment in April 1978. In subsequent inspections floating debris had lodged again under the gate indicating the need for frequent maintenance. A continuous waste

discharge was noted. Dry weather flow rates, varying between 10,000 gpd and 100,000 gpd were estimated using depth measurements. The source of this flow appears to be groundwater. Dry weather flow was observed above manhole B-7 only when the sanitary sewer was overflowing or the drainage ditches along the Conrail industrial spurs were flooded.

Inlets B-106, B-107, B-108, B-109, B-110 and B-111 receive flow from the railroad spurs and sidings. The ditches along these tracks drain wet lands which were observed to contribute continuous flow for up to two weeks during wet periods. Chemical spillage was observed on the tracks and in the adjacent ditches. The source of the chemicals appears to be leakage from railroad tank cars. No leaking cars were observed, however. Major spills were noted from the Atlas Refinery Inc. railroad siding. Rain washes some of this spillage through the drainage ditches and railroad ballast into the Blanchard Street storm inlets. Since no leaking cars were found on the Conrail spurs, it is not possible to link other specific industries to the spillage. Valves may not always be closed when the cars are unloaded and chemicals may drip out while the cars are standing on the spurs in a totally random pattern. The Fairmount Chemical Company, the Benjamin Moore Company, Atlas Refinery Inc, and the Fiske Brothers Refining Company all receive tank cars through this railroad spur.

Four pipes were observed along the railroad tracks west of Blanchard Street. Two of the pipes drain the Delissa Pallet storage area and are not sources of pollution. The other two are filled with earth and appear to be old railroad culverts. Railroad drainage ditches are connected to inlets B-106 and B-108 by pipes. The pipe at B-108 is clogged with earth; this causes partial flooding of the siding during rainfall events. Leaks were found in the walls and under the frames of inlet B-106 and B-107 when the ground was saturated. The sanitary sewer is adjacent to inlet B-107 at an elevation lower than the leaks observed. The inlet was inspected in dry

weather when the sanitary sewer was surcharged and no leakage was observed. During another inspection made during a rainfall event, the sanitary sewer was not surcharged but the inlet walls were leaking, implying that the leakage in inlet B-107 is not caused by sanitary sewer exfiltration. Inlet B-106 is on the opposite side of the street and has the same type of leakage, implying that the leakage is groundwater.

Two minor sources of flow were observed. Neither is believed to be a significant source of pollution. Newark Boxboard Company discharges a small volume of cooling water into the gutter adjacent to their loading dock area. A sump pump at Fairmont Chemical Company intermittently discharges groundwater into the gutter near manhole B-6. The City of Newark is aware of this discharge and had previously inspected the facility. No discharging was observed during the field inspections but water was noted along the curb. The water was clear and there was no evidence of chemical contamination. Algal growth was noted in the water along the curb.

B. Dry Weather Sampling and Flow Rates.

Samples were obtained at the following locations:

- B-2 300 feet south of the Passaic River
- B-6 1100 feet south of the Passaic River
- B-7 1300 feet south of the Passaic River

Samples were obtained at B-2 and B-6 on May 2, 1978 and at B-2, B-6 and B-7 on June 14, 1978. The May samples were taken two hours before low tide with tide water in B-2. The June samples were obtained at low tide while the Passaic River level was below the invert of the discharge pipe. Appendix A shows the results of laboratory analysis of the samples. The May samples show higher levels of pollution at B-6 than at B-2 downstream. This difference can be attributed to dilution of the pollutants by tide water at B-2. (note chloride concentrations) There was no tidal flow in the line when the June samples were taken. The pollutant concentrations at B-6 and B-7 were similar. There was a substantial increase in pollutants at B-2. This increase may result from leaching from abandoned septic tanks in the area. The sanitary sewer was not overflowing and the storm sewer was not receiving flow from the railroad drainage ditches when the samples were obtained. The flow rate during both sampling operations was estimated at 50,000 gpd.

C. Smoke Testing

Smoke testing of the entire storm and sanitary sewer system was planned. However, the sanitary sewer was surcharged and badly clogged with grease so that smoke could not be pumped through it. The sanitary sewer could not be dye tested to observe exfiltration due to the oil and hardened grease sealing the manholes above the top of the pipe. The entire storm sewer was smoke tested at low tide. Smoke did not pass between manholes and was observed only at inlets connected to points where smoke was blown in. It appeared that there were blockages or severe misalignments in the storm sewer. No smoke entered industrial facilities and no smoke was observed at roof drains. The absence of smoke in adjacent buildings does not preclude the existence of illegal connections with water traps.

D. Television Inspection

Illegal connections were suspected downstream of manhole B-7. Television inspection was planned for 1250 feet of 24-inch storm sewer between manholes B-1 and B-7. The line required cleaning with bucket machines prior to the television inspection. The bucket machine operation encountered obstructions in the pipe which caused the buckets to become lodged frequently. In no single section could a 24-inch tool be passed. Openings varying between 12-inch and 18-inch were cleared. Most of the sediment was removed, but pieces of the 24-inch pipe were also brought out in the buckets which caused suspension of this operation. The obstructions encountered could be the result of joint misalignments, partial cave-ins and pipe fragments lodged in the line. Further cleaning operations could have caused collapse of the street.

Television inspection was attempted without further cleaning. Several attempts were made to pull the camera through various portions of the line. In every case but one, the camera went under water within 10 feet of the manhole and the skids lodged on obstructions. The first 45 feet of line downstream of manhole B-2 were visible. The pipe was cracked and a partial collapse was observed approximately 45 feet downstream of the manhole. Pieces of pipe had fallen into the line and the camera could not pass over them. An 8-inch connection was found in manhole B-5 below the sediment level during the cleaning operations. This connection was filled with sediment and was inactive. The problems encountered during cleaning and television inspections operations are described in greater detail in Appendix B. The 24-inch storm sewer is not structurally sound. This sewer was constructed in 1917 and has been subjected to very heavy truck traffic for the last several decades. A partial collapse of the street could occur as this pipe continues to deteriorate.

E. Conclusions and Recommendations

1. The frequent overflow of sanitary sewage may be considered the most serious source of pollutants found in the storm sewer. The 2500 linear feet of sanitary sewer should be cleaned to prevent future surcharging and overflows. Contracting this work would cost approximately \$10,000. Area industries should be required to conform to discharge quality standards and cease discharging grease, tallow, paper and oil into the sanitary sewer. After cleaning, the sanitary sewer should be dye tested to determine if sewage is exfiltrating into the storm drainage system.
2. Industries that receive and ship chemicals in railroad tank cards should be required to control spillage and leakage. All tank car valves should be closed prior to moving the unloaded cars back onto the Conrail spurs. Atlas Refinery should be required to clean up the spillage at its siding and prevent future spills.
3. The 24-inch storm sewer, downstream of manhole B-7, should be replaced. The problems encountered during the cleaning and television work indicate that the sewer is cracked, misaligned, and partially collapsed in places. Sizing a new sewer is beyond the scope of this study, however, a 30-inch replacement was assumed for estimating purposes. The 1978 construction cost of 1300 linear feet of 30-inch storm sewer, manholes, tide gate chamber, and headwall would be approximately \$450,000. Replacing this sewer will prevent the collapse of the roadway, locate any illegal connections, and eliminate the infiltration of contaminated groundwater.

4. The existence of illegal connections could not be verified because the condition of the storm sewer prevented internal inspection. Illegal connections may exist downstream of manhole B-7. However, because of the age and condition of the 24-inch storm sewer, its proximity to abandoned septic fields and high groundwater in the area, contaminated groundwater is also a probable source of pollutants in the storm sewer. Pollutants may also be leaching directly into the river. Further studies should be made of groundwater pollution in the entire study area.
5. The Fairmount Chemical Company should be required to redirect its sump pump discharge into an inlet.
6. The connection found in manhole B-5 should be sealed.

V. Lockwood Street Outfall

A. Physical Inspection Findings

The storm sewers in Lockwood Street, Lister Avenue, Chapel Street, Albert Avenue, Euclid Avenue and the Morris Canal Right-of-Way all drain through the Lockwood Street outfall (see Plate 2). Drainage from parts of Raymond Boulevard, Ferry Street, and the Pulaski Skyway ramp are also connected to the Lockwood Street system. Separate sanitary sewers serve the entire area. All storm manholes and inlets in the study area were inspected. The limits of tidal flow were identified and all sources of dry weather flow were isolated. Chemical spills at industrial facilities were noted. The Morris Canal storm sewer west of Lockwood Street (LW-8 to MC-11) was lapped.

(1) Lister Avenue Sewer

The manholes, inlets and pipes on Lister Avenue were coated with a black oily material. Sediment depth varied between 0.5 and 1.5 feet. The source of the oil was spillage at the B-Line Trucking Company. Tank trucks are allowed to drain while parked at this facility. Black oily chemicals flow into inlets on Lister Avenue and Esther Street. The flow into Esther Street is continuous and the curb has been broken out to facilitate it.

A continuous flow of viscous orange chemicals was observed entering an inlet on Cornelia Street. This material came from leaking drums stored on the Cellomer Corporation property. These chemicals were entering the Lister Avenue storm sewer. Intermittent spillage of black oily chemicals was noted at the Fiske Brothers Refining Company railroad siding and a very small volume of water and oil from that industry was being discharged into Esther Street. Both flows

were entering the Lister Avenue storm sewer. A cooling water discharge pipe from Fiske Borthers was found at the inlet on the southwest corner of Lockwood Street and Lister Avenue. A 2-inch + connection was found entering inlet LS-10. Because of its diameter, it is improbable that this line contains wastes. It was not flowing when inspected. The only building near LS-10 is occupied by the State Produce Company. No dry weather flow was observed upstream of manhole LS-12 and no sources of pollution are suspected above that point.

(2) Morris Canal Sewers

Continuous flow was observed in the Morris Canal storm sewers east and west of Lockwood Street. The flow in the easterly line (LW-8 to MC-105) was traced to the Newark Boxboard Company. This flow was estimated at 0.16 mgd using depth measurements. The municipal swimming pool on Waydell Street was discharging an estimated 0.07 mgd into the westerly line upstream of manhole MC3. The car wash drains at the Sunoco Station on Raymond Boulevard were found to be connected to the storm sewer between manholes MC3 and MC-4. Personnel at Associated Auto Body and Trucks Inc. were observed dumping paint into the storm sewer between manholes MC-6 and MC-7. Manhole MC-7 is the limit of tidal influence and no dry weather flow was observed upstream of that point. A partial blockage was found in the invert of manhole MC-2. Sediment varying in depth between 0.5 and 1.0 feet was noted between manholes LW-8 and MC-7.

(3) Euclid Avenue Sewer

The flow in the Euclid Avenue storm sewer, estimated at 0.02 mgd, was traced to the Reddaway Manufacturing Company's cooling water discharge at inlet E-104.

(4) Albert Avenue Sewer

Tidal flow was observed in the Albert Avenue storm sewer up to manhole A-3. A minor, intermittent flow of water and oil from Cellomer enters the Cornelia Street gutter and flows to the Albert Avenue storm sewer. However, no dry weather flow was actually observed upstream of manhole A-3.

(5) Lockwood Street Sewer

No dry weather flow was observed in the Lockwood Street storm sewer upstream of manhole LW-8. There is no indication of pollutant sources above that point. The cross-connections shown on the sewer plans were inspected and found to be sealed. A railroad drain on the south side of the Messinger Trucking and Warehouse Corporation building appeared to be connected to the Lockwood Street sanitary sewer. Major spillage of chemicals was observed at the Atlas Refinery Inc. railroad siding. The eastern portion of this siding drains into railroad drainage ditches that are connected to the Blanchard Street storm sewer system. The discharges from Newark Boxboard, the municipal swimming pool, and Reddaway Manufacturing produce a base discharge of approximately 0.25 mgd.

(6) Lister Avenue Tide Gate

There was no evidence of chemical attack or deterioration of the concrete chamber. Sediment in the invert of the chamber prevents the Lister Avenue tide gate from closing completely. The gate allows inflow during the rising tide. Assuming a five foot tidal range and an open tide gate, approximately 270,000 gallons of river water enters with each incoming tide, mixes with pollutants being discharged into the system and flows back into the river as the tide falls. A typical diurnal flow pattern at the tide gate is shown on Plate 9. If

the tide gates were to close completely, the discharge from the system of any polluted flow would be restricted to a relatively short period around low tide.

(7) Lockwood Street Outfall

An abandoned railroad drain was found connected to manhole LS-1. The last 25 feet of the 72-inch outfall was exposed and showed evidence of chemical attack. Portion of the crown had completely deteriorated. The headwall was not deteriorated and there was no evidence of chemical attack below the spring line of the pipe.

B. Dry Weather Flow Sampling and Flow Monitoring

Sources of dry weather flow and limits of tidal influence were noted during the physical survey. Those sewers in which flow was observed were subdivided for sampling. The first set of samples was obtained on May 2, 1978. The second set was taken on June 14, 1978. The laboratory analysis of these samples is shown in Appendix A. Both sets of samples show high levels of pollution on Lockwood Street, Lister Avenue, Albert Avenue, and the easterly portion of the Morris Canal storm sewer. The samples in the Euclid Avenue sewer fell within water quality standards. Because of tidal action, it was not possible to confirm that all high pollutant readings were caused by discharges near the respective sampling points. A discharge of pollutants anywhere in the system within the tidal range could be mixed and carried to distant sampling points. Samples were obtained at the following locations.

LW-0	Lockwood Street Outfall at the Passaic River
LS-2	Lister Avenue upstream of the tide gate chamber
LS-4	Lister Avenue upstream of Lockwood Street
LS-7	Lister Avenue at Joseph Street
LW-1	Lockwood Street upstream of Lister Avenue
LW-4	Lockwood Street upstream of Albert Avenue
LW-7	Lockwood Street downstream of the Morris Canal
A-1	Albert Avenue at Lockwood Street
A-3	Albert Avenue at Joseph Street
E-1	Euclid Avenue at Lockwood Street
E-104	Euclid Avenue (cooling water connection at inlet)
MC-1	Morris Canal at Lockwood Street (west side)
MC-3	Morris Canal 500 ft. west of Lockwood Street
MC-7	Morris Canal 1400 ft. west of Lockwood Street
MC-100	Morris Canal at Lockwood Street (east side)
MC-104	Morris Canal 800 ft. east of Lockwood Street

Euclid Avenue was eliminated from further study because of sampling results. The cooling water discharged at Reddaway Manufacturing was sampled at inlet E-104. The Morris Canal storm sewer west of Lockwood Street (LW-8 to MC-11) was eliminated on the basis of physical inspection, lamping and sampling. The intermittent sources of pollution at the Sunoco Car Wash and Associated Auto Body have been identified. The high levels of pollutants detected at manhole MC-1 in the May 2 sampling is attributed to these sources. Sediment downstream caused flow to pool at manhole MC-7 and remain there as the tide went out. Pollutants from downstream appear to have been carried into that manhole by the tide causing the contamination detected in the MC-7 sample on June 14. The 72-inch Lockwood Street Outfall was not televised because there was no evidence of pollutant sources in the line. The Benjamin Moore Company is the only industry adjacent to the outfall. Maps provided by the City of Newark show the roof drains from one building connected to the outfall. The Benjamin Moore laboratory is located in that building but there are no chemical process facilities. The plant engineer indicates that all other surface and roof drainage is pumped directly into the Passaic River. All other storm sewers in which flow was observed were scheduled for television inspection.

C. Smoke Testing

The storm and sanitary sewers on Lockwood Street, Lister Avenue, Albert Avenue, and the easterly portion of the Morris Canal right-of-way were smoke tested. No problems were observed when the storm sewers were tested. The pipe connecting to manhole LS-1 was found to terminate in an embankment along the nearby railroad spur. This pipe may have functioned as a railroad drain before the track elevation was lowered; it serves no purpose now. The effectiveness of the smoke testing may have been reduced in the larger storm sewers. Blowers were used to force smoke into the pipes under pressure. The volume of the Lockwood Street storm sewer (66-inch) and the number of inlet openings reduced the pressure behind the smoke and may have prevented it from reaching remote connections.

Three inflow sources were detected when the sanitary sewer was smoke tested. All observed roof and area drains at Atlas Refinery Inc. were connected to the sanitary sewer. These drains are a major source of inflow and should be reconnected to the storm sewer. A cross connection was found at the intersection of Joseph Street and Lister Avenue. The storm inlet at the southwest corner of the intersection is connected to the adjacent sanitary manhole. The sanitary sewer elevation is lower than the inlet invert. Sanitary sewage could enter the storm sewer if a blockage occurred. Smoke also escaped from the site of a demolished building at the southwest corner of the Lockwood Street-Albert Avenue intersection. It appears that the building connection was not sealed. No smoke was observed escaping from plumbing vents. It is probable that all connections to the storm and sanitary sewer have line traps which would prevent the passage of smoke.

D. Television Inspection

The following lengths of storm sewer were inspected using closed circuit television.

Lister Avenue	LS-1 to LS-3
Lister Avenue	LS-4 to LS-11
Lockwood Street	LS-3 to LW-8
Albert Avenue	A-1 to A-3
Morris Canal	LW-8 to MC-104

The inspection of the Lister Avenue line revealed an oil separator at Atlas Refinery Inc. connected to the 66-inch storm sewer approximately 120 ft. upstream of manhole LS-2. This connection is believed to be a major source of pollutants. There is a railroad siding drainage system connected to this oil separator. Tank cars containing chemicals are unloaded at the siding daily and spills are frequent. Much of the spillage is believed to pass through the separator and enter the Lister Avenue storm sewer. No other sources of flow were found during the television inspection of Lister Avenue. Significant settlement was noted between LS-4 and LS-11. The television camera went under water frequently and came out at inlets and manholes. Most lengths of pipe had settled more than 15 inches. Based upon the portions of line that could be seen and the relatively recent date of construction (1970), no illegal connections are suspected. The pollution in the line results from spillage at B-Line Trucking and Cellomer, as well as pollutants washed in by the tide. The flow from the Atlas oil separator, immediately downstream, could cause high pollutant concentrations in the Lister Avenue storm sewer.

Several connections were found in the Lockwood Street storm sewer between manholes LW-4 and LW-3. Pipes were located 34 ft., 92 ft., 104 ft., 133 ft., 143 ft. and 200 ft. downstream of manhole

LW-4. The pipes at 92 ft. and 104 ft. are shown on old plans as connections to inlets at the intersection. These inlets were connected to the new Albert Avenue storm sewer in 1970. The pipes at 34 ft., 143 ft. and 200 ft. appear to be roof or floor drain connections to the Messinger Trucking and Warehouse Corporation building. There are no wastes emanating from this facility. The connection at 143 ft. may also be a concrete spall; the pipe could not be seen clearly. The connection at 133 ft. comes from the west side of the street in the vicinity of the Albert Avenue intersection. This pipe is not shown on the storm sewer plans, but it may be an abandoned inlet connection. These connections were not flowing when the pipe was televised.

A connection of unknown origin was observed in the Lockwood Avenue storm sewer 53 ft. downstream of manhole LW-3. Inlet connections were also observed 170 ft. and 183 ft. downstream of LW-3. The pipe at 53 ft. connected on the east side and may be from Atlas Refinery Inc. A pipe crossing broken into the crown of the 66-inch line and running perpendicular to it was noted at 201 ft. These pipes were not flowing when televised. A 2-inch \pm connection located approximately 10 ft. upstream of manhole LW-2 has been observed by City personnel. This connection comes from the east side of the street and was discharging flow when observed. This connection appeared to originate at Atlas Refinery Inc.

Three connections were noted between manholes LW-2 and LW-1 in the Lockwood street storm sewer. Pipes were observed 149 ft., 159 ft. and 215 ft. downstream of manhole LW-2. The connection at 159 ft. is believed to be from an inlet that was removed during construction of a new building at Atlas Refinery Inc. The connection at 149 ft. appeared to be a large pipe 24-inch \pm surrounded by roots. It could also be a connection crossing the 66-inch line. The connection at 215 ft. was from the westerly side of the street. It

could not be seen clearly and may be a concrete spall. No flow was observed from any of these pipes.

No improper connections were found in the Albert Avenue storm sewer or in the Morris Canal line between manholes LW-8 and MC-104. The pollutants detected in the Albert Avenue line appear to have been carried in by tidal action. Two sources of pollutants are suspected in the Morris Canal sewer east of Lockwood Street. The limit of tidal influence is downstream of manhole MC-104. Yet, pollutants were detected in the sample obtained at that manhole. Newark Boxboard discharges the flow sampled at MC-104 and that flow is polluted. However, the concentration of pollutants downstream, at manhole MC-100, is three times greater than at MC-104. Some pollutants may settle into the sediment during the high tide periods. Flow from Newark Boxboard may flush some of this material and carry it into the Lockwood Street storm sewer.

E. Conclusions and Recommendations

1. Several improvements are required at Atlas Refinery Inc. The firm should be required to connect its oil separator to the sanitary sewer rather than to the storm sewer. The spillage at the railroad siding should be cleaned up and procedures developed to prevent future spills. Roof and area drains should be connected to the storm sewer rather than to the sanitary sewer as at present. The plant has been expanded several times over the years and complete plans of the piping systems are not available. The Lockwood Street storm sewer is located under the sidewalk in front of the Atlas plant. Connections could have been made without excavation in the street. Connections of unknown origin between manholes LW-3 and LW-1 appear to lead to drains in the Atlas plant complex. Fiske Brothers Refining Company, the industry across the street, is a less likely point of origin since they would have had to excavate the street and cross the sanitary sewer to make connections to the storm sewer. Atlas should be required to evaluate its piping and identify connections to the storm sewer. Any sanitary facilities, chemical processes, or drains that accept polluted flow should be reconnected to the sanitary sewer. Authorized discharges to the storm sewer should be made through a manhole or chamber to allow monitoring by the City.

2. Fiske Brothers Refining Company should be required to cease discharging oil and water into Esther Street and to prevent spills at their railroad siding. Fiske Brothers should be required to identify existing connections to the storm sewer. Connections that accept pollutants should be reconnected to the sanitary sewer. Connections that carry

nonpolluted flow should be made through a chamber to facilitate monitoring by the City.

3. After Atlas and Fiske Brothers have evaluated their piping and reconnected lines as necessary, the remaining connections of unknown origin between LW-3 and LW-1 should be sealed as a precaution. Initially, temporary plugs should be installed. If the lines are active, a backup will be reported. If no problems occur after one month, the connections should be permanently sealed. The connections observed between LW-4 and LW-3 are believed to be roof drains from the Messinger Warehouse and abandoned inlet connections. They should not be sealed.
4. B-Line Trucking Company should be required to cease discharging black oily waste into Lister Avenue and Esther Street. The spillage that has already occurred should be cleaned up. This flow is believed to be the major source of black oil in the system.
5. Newark Boxboard Company should be required to evaluate its internal piping. Only nonpolluted flow should be discharged into the Morris Canal storm sewer. Polluted flow should be discharged into the Blanchard Street sanitary sewer after that line is cleaned. The City should monitor the flow at manhole MC-104 to assure compliance.
6. Associated Auto Body and Trucks, Inc. should be prohibited from dumping paint or other wastes into the Morris Canal storm sewer.
7. The car wash drains at the Sunoco Station should be reconnected to the sanitary sewer. Suitable grit removal and oil separation facilities should be provided.

8. Cellomer Corporation should be required to clean up the spillage on their property and cease discharging oil into Cornelia Street. It should be noted that Cellomer was informed of this problem and cleanup operations were underway.
9. Sources of inflow should be eliminated. The cross connection at the intersection of Joseph Street and Lister Avenue should be sealed. The railroad siding drain on the south side of the Messinger Warehouse should be disconnected from the sanitary sewer. The Atlas roof and area drains have already been discussed.
10. The Lister Avenue storm sewer, west of Lockwood Street should be cleaned of debris, sediment and oily wastes.

APPENDIX A

Analytical Test
Results

847920029

TABLE 1
ANALYSIS OF STORM SEWER FLOW SAMPLES
(POLLUTANT CONCENTRATIONS IN PPM)

SAMPLING POINT	pH	COD	TOC	BOD	Cl	TURB	TSS	F.C. /100ML	PO4	FLAM	EXPLO	TKN	NH4-N
B-2	7.5	148	40	36	447	68	30	-	.09	0	0	24	21
B-6	7.7	228	66	46	286	100	102	-	.12	0	0	47	34
LW-0	7.4	216	165	141	340	100	65	-	.13	0	0	101	93
LW-1	8.4	2456	920	819	232	2700	2404	-	.06	0	0	100	67
LS-2	9.0	3176	1040	696	118	4000	2516	-	.19	0	0	93	63
LS-4	8.8	336	115	133	718	320	67	-	.06	0	0	70	66
A-1	8.7	1000	240	387	110	3200	2876	1800	.19	0	0	40	10
E-1	8.7	24	8	0	180	25	18	1000	.04	0	0	2	0
MC-1	7.6	960	60	36	143	89	423	200	.30	0	0	63	61
MC-100	7.3	232	52	51	23	73	56	38000	1.80	0	0	2	0
MC-7	6.8	460	135	138	255	320	89	100	.40	0	0	9	3

SAMPLES TAKEN ON MAY 2, 1978

847920030

ANALYSIS OF STORM SEWER FLOW SAMPLES
(POLLUTANT CONCENTRATIONS IN PPM)

SAMPLING POINT	pH	COD	TOC	BOD	Cl	TURB	TSS	F.C. /100 Ml	TKN	NH4-N	Grease & Oil
B-2	7.2	412	170	450	307	178	63	1200	19	16	41.6
B-6	7.6	135	56	126	360	344	334	0	20.3	17.1	-
B-7	7.5	150	62	114	331	136	51	200	17	16	0
LS-2	7.2	1119	520	486	335	168	153	0	106	59.4	300.4
LS-4	7.9	408	180	210	517	308	156	0	38	31.5	36.2
LS-7	7.2	1188	520	443	124	3080	2180	500	23.5	7.56	-
LW-1	8.7	6386	560	690	250	344	684	0	217	164	25.6
LW-4	8.2	824	320	455	644	308	204	0	97	71	22.6
LW-7	5.4	5496	1520	1550	1650	142	323	29000	393	184	66.6
A-1	6.9	313	93	169	859	86	152	6800	27	18	-
A-3	7.3	83	19	35	24	45	196	67000	6	.7	14.2
E-1	7.3	44	10	0	13	30	20	0	1.7	0	8.0
E-104	8.6	36	7	0	14	30	1	100	2	.98	.8
MC-1	7.1	48	13	0	141	27	40	1700	.8	.6	4.6
MC-3	6.9	44	14	0	143	18	30	900	0	0	-
MC-7	5.9	622	195	350	14	200	-	250,000	1.96	1.8	-
MC-100	6.7	954	270	480	24	93	103	4700	2.7	0	-
MC-104	7.4	337	96	156	19	86	85	27,000	1.7	0	-

SAMPLES TAKEN ON June 14, 1978

847920031

TABLE 3
 ANALYSIS OF METAL CONCENTRATIONS IN STORM SEWER FLOW SAMPLES
 (METAL CONCENTRATIONS IN PPM)

SAMPLING POINT	Cd	Ca	Cr	Cu	Fe	Pb	Mg	Mn	Ni	Na	Zn
B-2	-	0	-	-	5.6	-	-	-	-	0	-
B-6	-	0	-	-	28.9	-	-	-	-	0	-
B-7	-	0	-	-	5.39	-	-	-	-	0	-
LS-2	.03	-	.01	2.4	2.4	.1	21	3.4	.1	-	6
LS-4	.02	0	.03	-	6.04	.1	21	1.9	.1	-	8
LW-1	.07	-	.10	-	7.46	2.1	25	3.1	.1	-	26
LW-7	.20	-	.11	-	4.58	1.9	21	2.6	.1	-	12
A-1	-	-	-	-	5.88	.1	-	-	-	-	-
MC-1	-	-	-	-	0	0	-	-	-	-	0

SAMPLES TAKEN ON JUNE 14, 1978

847920032