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Region V
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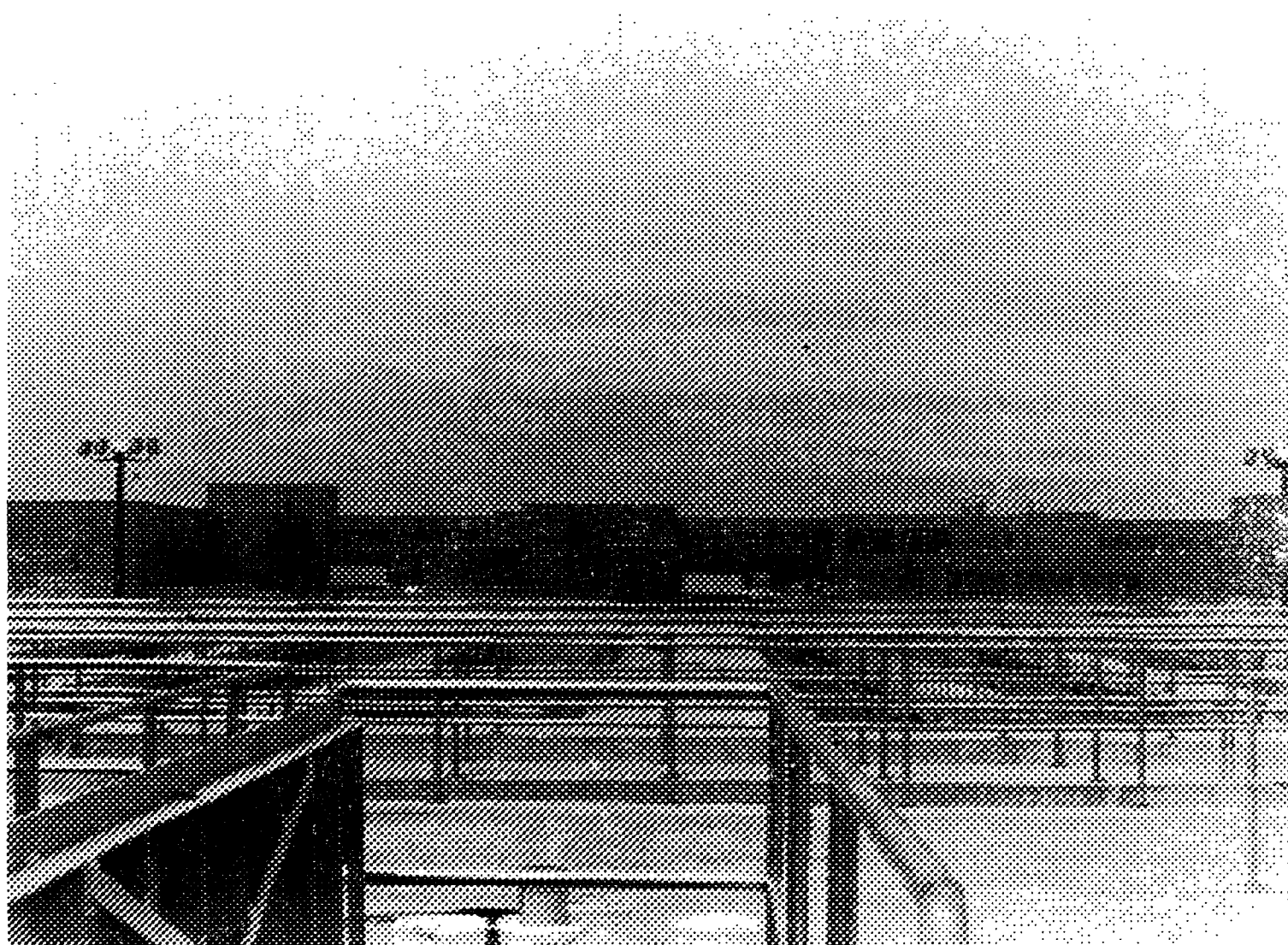


Environmental Impact Statement

Final

Supplemental EIS

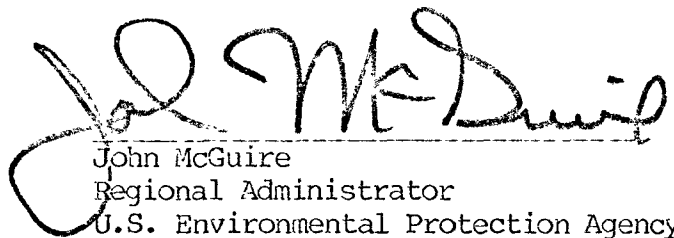
Metropolitan Sanitary
District of
Greater Chicago
O'Hare Water
Reclamation Plant



FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE
METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
DES PLAINES - O'HARE WATER RECLAMATION PLANT

Prepared by the
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
CHICAGO, ILLINOIS

Approved by:


John McGuire
Regional Administrator
U.S. Environmental Protection Agency

January, 1980

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
O'HARE WATER RECLAMATION PLANT
DES PLAINES, ILLINOIS

Prepared by
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION V

Abstract

On January 13, 1975, a Notice of Intent to file an Environmental Impact Statement (EIS) was issued on the Metropolitan Sanitary District of Greater Chicago's (MSDGC) Des Plaines-O'Hare facilities plan. Two EIS's were prepared on this facilities plan, one on the proposed O'Hare Water Reclamation Plant (WRP) and Solids Pipeline, to be constructed in the City of Des Plaines, Cook County, Illinois, and the other on the proposed wastewater conveyance system for the Des Plaines-O'Hare service area. The final EIS's were published in May of 1975.

A primary issue addressed in the WRP EIS was the potential health effects resulting from respiration of aerosols generated from the WRP's aeration tanks.

The WRP EIS concluded that funding the project was acceptable to USEPA, provided the recommended measures were implemented. Since knowledge on the potential health hazards from aerosol generation at treatment plants was sparse and inconclusive at that time, the EIS recommended inclusion of a condition in the grant agreement which required aerosol suppression at the WRP. To ascertain the effectiveness of potential aerosol suppression facilities, the EIS recommended that MSDGC demonstrate the level of aerosol reduction that could be achieved by the suppression facilities.

USEPA's original decision to require aerosol suppression facilities at the O'Hare WRP was based on the lack of scientific evidence regarding the relationship of wastewater aerosols and human health as well as our responsibility under NEPA to avoid health risks. Since that time, however, considerable research has been conducted to evaluate the potential discernible effect on human health from exposure to wastewater aerosols. The USEPA prepared this document to examine the quality of the recent research, and to decide whether the grant condition should be retained, rescinded, or modified.

The recommendation of this final supplemental EIS is to rescind the grant condition to allow operation of the O'Hare WRP without suppression facilities, and continue to monitor the research on health effects and wastewater aerosols.

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I. SUMMARY

A. BACKGROUND

On January 13, 1975, a Notice of Intent to file an Environmental Impact Statement (EIS) was issued on the Metropolitan Sanitary District of Greater Chicago's (MSDGC) Des Plaines-O'Hare facilities plan. Two EIS's were prepared on this facilities plan, one on the proposed O'Hare Water Reclamation Plant (WRP) and Solids Pipeline, to be constructed in the City of Des Plaines, Cook County, Illinois, and the other on the proposed wastewater conveyance system for the Des Plaines-O'Hare service area. The Final EIS's were published in May of 1975.

The O'Hare WRP is an activated sludge plant with a design capacity of 72 million gallons of sewage daily (MGD), and is to serve 277,000 residents located in a 52.8 square mile area of northwestern Cook County.

A primary issue addressed in the WRP EIS was the potential health effects resulting from respiration of aerosols generated from the WRP's aeration tanks.

The WRP EIS concluded that funding the project was acceptable to USEPA, provided the recommended measures were implemented. Since knowledge of the potential health hazard from aerosol generation at treatment plants was sparse and inconclusive at that time, the EIS recommended inclusion of a condition in the grant agreement which required appropriate aerosol suppression at the WRP. To ascertain the effectiveness of potential aerosol suppression facilities, the EIS recommended that MSDGC demonstrate the level of aerosol reduction that could be achieved by the suppression facilities.

After the Final EIS was published, the City of Des Plaines filed a suit against the MSDGC and USEPA, alleging that the two Final EIS's issued by EPA failed to comply with the requirements of the National Environmental Policy Act (NEPA). The U.S. District Court entered judgment against the City. The City appealed this judgment, but the U.S. Court of Appeals upheld the District Court's judgment and ruled, in City of Des Plaines v. Metropolitan Sanitary District of Greater Chicago, 552 F.2d 736 (7th Cir. 1977), that:

- 1) "Our review of the adequacy of an EIS and of the merits of a decision reflected therein, while careful, has real limits. On the merits, the review should be limited to determining whether the agency's decision is arbitrary or capricious." (552 F.2d 737.)
- 2) "We believe the EIS unquestionably contains a fair statement of the problem and the solutions intended, insofar as was possible, and we do not believe more was required in this case." (552 F.2d 739.)
"As to the procedure followed, we believe it is clear from the material of record that EPA took the requisite hard look at this problem and reacted sensitively to it." (552 F.2d 738.) Because no definitive answer could be made, ". . . EPA took a conservative approach and required MSD to design, construct, and install devices to suppress aerosol emissions." (552 F.2d 739.)

- 3) "The uncertainty regarding the very existence and scope of the potential health hazard is ignored by the City in its argument that the failure to specify standards and specific devices renders the pertinent EIS inadequate and in its insistence that the entire project be held in abeyance until definitive answers and solutions can be obtained." (552 F.2d 739.)

B. EVENTS SINCE MAY 1975

Since the court ruling, MSDGC has undertaken studies sponsored by the USEPA to evaluate the performance and costs of alternatives for suppression of aerosols.

In addition, other research listed below has been sponsored by the USEPA to evaluate aerosol emissions and the potential health effects from exposure to wastewater aerosols emanating from activated sludge treatment processes.

- 1) Report entitled "Health Effects of Aerosols Emitted from an Activated Sludge Plant," available as EPA-600/1-79-019.
- 2) Report entitled "Health Implications of Sewage Treatment Facilities," available as EPA-600/1-78-032.
- 3) Report entitled "Health Effects of a Wastewater Treatment System," available as EPA-600/1-78-062.
- 4) Report entitled "Assessment of Disease Rates among Sewer Workers in Copenhagen, Denmark," available as EPA-600/1-78-007.
- 5) Draft report entitled "Environmental Monitoring of a Wastewater Treatment Plant," in prepublication review by USEPA.
- 6) Final Report entitled "The Evaluation of Microbiological Aerosols Associated With the Application of Wastewater to Land: Pleasonton, CA.," available from the Department of the Army.
- 7) Draft Report entitled "Health Risk of Human Exposure to Wastewater," in prepublication review by USEPA.

Also, other research on the potential health effects from aerosol exposure has been conducted.

Since May 1975, the construction of the interceptors leading to the O'Hare WRP, and construction of the plant itself, have been virtually completed. The plant was available for operation as of November 1, 1979.

II. PURPOSE AND NEED FOR FURTHER EPA ACTION:

USEPA's original decision to require aerosol suppression facilities at the O'Hare WRP was based on the lack of scientific evidence regarding the relationship of wastewater aerosols and human health, as well as our responsibility under NEPA to avoid health risks. Since that time, however, considerable research has been conducted to evaluate the potential discernible effect on human health from exposure to wastewater aerosols. The USEPA prepared this document to examine the results of the recent research, and to decide whether the grant condition should be retained, rescinded, or modified.

III. ALTERNATIVES CONSIDERED AND THEIR COMPARATIVE ENVIRONMENTAL IMPACTS:

A. Alternatives Considered:

1. Action.

- a) Remove the grant condition requiring MSDGC to construct aerosol suppression facilities at the O'Hare WRP.
- b) Modify the grant condition and allow operation of the O'Hare WRP without aerosol suppression facilities, and continue ongoing analyses to demonstrate whether or not the potential transmission of wastewater aerosols is a significant health concern.

2. No Action. Retain the grant condition requiring MSDGC to construct appropriate aerosol suppression facilities at the O'Hare WRP prior to operation of the plant. This would necessitate the installation of temporary suppression facilities until permanent facilities could be designed and constructed.

B. Comparison of the Environmental Impacts:

There is no indication that a direct or indirect health hazard will result from operation of the O'Hare WRP without aerosol suppression facilities.

If aerosol suppression facilities are constructed, there will be a significant expenditure of monetary, natural, and depletable resources in their construction and operation. Other adverse impacts include noise and dust associated with construction.

Based on our analysis of the studies, it is our conclusion that the grant condition can be rescinded without a health hazard.

IV. AFFECTED ENVIRONMENT:

The environment potentially affected by this action is that nearby the O'Hare WRP, including the area's residents. For a thorough description of the area's land use, population, and environment, see Section III of the May 1975 O'Hare EIS (Reference 8).

V. ENVIRONMENTAL CONSEQUENCES:

A. Basis of Evaluation:

The research projects referenced in this document are used in the evaluation of the environmental consequences of alternatives.

B. Evaluation of Alternatives:

1. Action:

- a) Rescind the grant condition requiring MSDGC to construct aerosol suppression facilities at the O'Hare WRP:

Testing of a thorough, critical, and sensitive nature, representing the feasible limit of scientific and economic capability, have shown that no direct and indirect health hazards result from exposure to aerosols.

- b) Modify the grant condition and allow operation of the O'Hare WRP without aerosol suppression facilities, and continue ongoing analysis of potential health effects:

- i) If further study shows need for aerosol suppression:

Monetary, natural and depletable resources would be expended on further study and in the construction and operation of aerosol suppression facilities. Other adverse impacts include noise and dust associated with construction.

- ii) If further study shows no need for aerosol suppression:

Beyond the expenditure of monetary resources to further study the potential effects of aerosol exposure, no direct or indirect impacts will result from this action. Thorough research has shown that no health hazards result from exposure to aerosols emanating from activated sludge wastewater treatment processes within the envelope of accepted U.S. design and operational practice.

2. No Action:

Retain the grant condition requiring MSDGC to complete construction of aerosol suppression facilities prior to or concurrently with commencement of operation:

Monetary, natural, and depletable resources would be expended on the construction and operation of aerosol suppression facilities. Other adverse impacts include noise and dust associated with construction. These impacts would be incurred a second time if the temporary facilities are replaced by permanent suppression facilities.

If operation of the O'Hare WRP would be delayed to construct temporary aerosol suppression facilities, the overloaded system presently used would cause continued combined sewer overflows and flooding of basements with combined sanitary and stormwater, thereby threatening public health.

VI. PUBLIC PARTICIPATION:

A Notice of Intent to prepare a Supplemental WRP EIS was issued on July 18, 1979. A public hearing was held on October 29, 1979. The comment period was extended through November 30, 1979 to allow further comments on matters brought up at the public hearing. The comments have been addressed in this final EIS.

VII. LIST OF PREPARERS

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Stephen Poloncsik, Chief, Technology Section, USEPA, Region V.
James Novak, Environmental Engineer, USEPA, Region V.

VIII. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THIS STATEMENT WERE SENT:

The following Federal, State, and local agencies were requested to comment on the Draft Supplemental Environmental Impact Statement:

Council on Environmental Quality
Department of Agriculture
Soil Conservation Service
U.S. Army Corps of Engineers
Chicago District
North Central Division
Department of Energy
Argonne National Laboratory
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Fish and Wildlife Service
Geological Survey
Heritage Conservation and Recreation Service
Department of Transportation
Federal Aviation Administration

Governor of Illinois
Illinois Sanitary District Observer
Illinois Environmental Protection Agency
Illinois Institute for Environmental Quality

Illinois Division of Waterways
Illinois Department of Conservation
Illinois Department of Public Health

Northeastern Illinois Planning Commission
Cook County Department of Environmental Control
Metropolitan Sanitary District of Greater Chicago

City of Des Plaines
Village of Elk Grove
Village of Arlington Heights
Village of Mount Prospect
Village of Palatine
Village of Wheeling

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

FOR THE

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

DES PLAINES-O'HARE WATER RECLAMATION PLANT

I. PURPOSE AND NEED FOR FURTHER EPA ACTION

USEPA's original decision in May, 1975 to require aerosol suppression facilities at the O'Hare WRP was based on two considerations. The first involved the state of scientific knowledge at the time with respect to the health impacts associated with the respiration of wastewater aerosols. Our review of the literature at that time revealed that no conclusive evidence could substantiate either a health effect existed or that it did not exist. We did find that aerosols were generated and could be transmitted by winds to the areas in the vicinity of the O'Hare WRP. There was also some evidence relating to the viability of bacterial and viral organisms under differing atmospheric conditions. While this evidence indicated that organisms were adversely affected by transport on aerosol particles, we felt there was still a possibility that viable organisms could reach some residents near the O'Hare WRP.

The second consideration came directly from the National Environmental Policy Act of 1969 (NEPA), which declares that it be National policy that the Federal Government use all practicable means to assure a healthful environment and to attain the widest beneficial uses of the environment without undue risk to health or safety. Therefore, given the state of scientific knowledge, the possibility of exposure to residents, and our responsibility to avoid health risks, we chose to require the appropriate suppression of aerosols generated at the O'Hare WRP.

In the past four years, considerable research has been undertaken to explore the relationship between health and the respiration of wastewater aerosols. The purpose of this document is to examine this new information regarding the health risks of human exposure to aerosols and to decide whether the grant conditions should be retained, rescinded, or modified.

II. ALTERNATIVES CONSIDERED AND THEIR COMPARATIVE ENVIRONMENTAL IMPACTS

A. Alternatives Considered:

1. Action:

- a) Rescind the grant condition requiring MSDGC to construct aerosol suppression facilities at the O'Hare WRP, since the conclusions of the studies to date indicate that no health hazards result from exposure to aerosols emanating from activated sludge wastewater treatment processes within the envelope of accepted U.S. design and operational practice, either to proximate residents or to plant workers, and by inference to the general public apart from these categories.
- b) Modify the grant condition and allow commencement of functional operation of the O'Hare WRP without aerosol suppression facilities, and continue ongoing analysis to demonstrate

whether the potential emission of wastewater aerosols at the O'Hare WRP is a significant health concern.

2) No Action:

Retain the grant condition requiring MSDGC to complete construction of appropriate aerosol suppression facilities at the O'Hare WRP prior to or concurrently with the commencement of functional operation. In order to allow operation of the WRP as soon as possible, temporary suppression facilities would be necessary.

B. Comparison of the Environmental Impacts of the Alternatives

There is no indication that health hazards will result from operation of the O'Hare WRP without aerosol suppression facilities.

While it is always desirable to study an issue in more detail, it is our conclusion that further study would only have the direct impact of expending monetary resources, and would not alter the conclusions that the health risk associated with close proximity to wastewater aerosols, and hence the O'Hare WRP, is not any greater than that presented by routine environmental exposure to bacterial and viral organisms.

If aerosol suppression facilities are constructed, there will be a significant expenditure of monetary, natural, and depletable resources in their construction and operation. Other adverse impacts include noise and dust associated with construction.

If operation of the O'Hare WRP would be delayed to construct the temporary aerosol suppression facilities, the overloaded system presently used would cause continued combined sewer overflows and flooding of basements with combined sanitary and stormwater, thereby threatening public health.

Based on our analysis of the studies, it is our conclusion that the grant condition can be rescinded with no significant impacts.

III. AFFECTED ENVIRONMENT

The environment potentially affected by this action is that close to the O'Hare WRP, particularly the 1200 residents within 2000 feet of the plant boundaries, and is shown in Figure 2. Figure 1 delineates the O'Hare WRP and adjacent service areas. The northern and southern boundaries of the O'Hare Service Area follow the Cook County boundary lines. The eastern boundary extends from Lake County south along the Des Plaines River to the intersection of Rand and River Roads, thence in a southwesterly direction along the Chicago and Northwestern Railway to the DuPage County line. The western boundary separates the O'Hare and Salt Creek Service Areas, and generally follows the ridge line dividing the Salt Creek and Des Plaines River drainage areas.

The O'Hare Service Area lies in the northwest portion of Cook County. It encompasses an area of 37,250 acres of which 26,400 acres are residential, 5,000 acres are industrial and 5,850 acres are rural or otherwise unsewered. The 1970 census population for the O'Hare Area was 223,000 people.

The area includes the older (but growing) communities of Arlington Heights, Mount Prospect, Wheeling, and a part of the City of Des Plaines, as well as newer urban developments such as Elk Grove Village, Rolling Meadows and Buffalo Grove.

IV. ENVIRONMENTAL CONSEQUENCES

A. Basis of Evaluation:

Since May, 1975, MSDGC has undertaken studies sponsored by the USEPA, to evaluate the performance and costs of alternatives for suppression of aerosols. Phase I of the study which is projected to be completed by March of 1980, is to measure the physical, chemical, and biological properties of aerosols emanating from the aeration tanks of the J. E. Egan WRP and relate these to measurements of the wastewater aeration process parameters of the plant and environmental parameters which may have an influence on aerosol properties. Using these data, MSDGC would prepare engineering estimates of the potential efficiency of alternative aerosol suppression methods identified for consideration, and select up to five (other than covering or vegetative barrier) alternates for detailed testing by pilot plant performance trials. The performance characteristics of the Egan WRP are presumed to be representative of the planned operation of the O'Hare WRP.

The proposed Phase II and III portions of the study were designed to construct a pilot plant, representing a segment of the O'Hare WRP aeration tanks, emitting aerosols comparable to a demonstrated degree, in physical, chemical, and biological properties, to those of the entire Egan WRP, and to construct full-scale short segment prototype equipment for up to five selected alternative aerosol suppression systems to be tested on the pilot plant. Aerosol suppression efficiency of each alternative would then be measured, and the most appropriate alternative would be recommended, and detailed design criteria presented.

Since virtually nothing was known about the possible health effects of wastewater aerosols on populations living near activated sludge wastewater treatment plants, the USEPA sponsored several research efforts to investigate potentially related health effects. The first study funded by USEPA was an investigative study conducted at MSDGC's Egan WRP to determine if a potential problem existed for residents which would warrant further investigation. Since this study revealed a possible association of certain symptoms with nearby operation of a wastewater treatment plant, further investigation was initiated.

The USEPA also sponsored a study at Pleasanton, California which obtained detailed information on the types and concentration of microorganisms

in aerosols, and the factors affecting their viability after aerosolization in order to estimate exposure of those nearby.

To further evaluate potential health effects from exposure to wastewater aerosols, the USEPA sponsored studies conducted by the University of Michigan and the University of Illinois to investigate potential health effects of those residents near a wastewater treatment plant.

Meanwhile, a study conducted by Hebrew University was investigating the incidence of disease on Kibbutzim utilizing wastewater irrigation and those not using wastewater. This study showed some evidence of increased incidence of disease associated with wastewater use. However, there was doubt indicating the possible pathway of infection, so USEPA is sponsoring further study to clarify this issue.

Another study sponsored by the USEPA to evaluate potential health effects from aerosol exposure involved the health experience of students attending schools adjacent to the wastewater treatment plant in Tigard, Oregon.

Health reports of sewer maintenance workers in Copenhagen, Denmark were also reviewed by the USEPA.

To evaluate potential health effects from close occupational exposure to wastewater and their aerosols, the USEPA then sponsored a study of sewage treatment plant workers and sewage maintenance workers, to be conducted by the University of Cincinnati.

The research studies are discussed in the following pages.

This study was conducted by the Southwest Research Institute to identify the health implications of operating a recently constructed activated sludge sewage treatment plant. The general study design was to make baseline (pre-operational) period versus operational period comparisons at the Egan Water Reclamation Plant (WRP) in each of two seasons on the same participants and sampling areas.

The Egan WRP was chosen since the design of this epidemiological study required that the sewage treatment plant had to be a new plant being built on a new site and could neither be an expansion of an existing plant nor built on the site of an old plant. The design capacity of the plant had to be one millions gallons per day (MGD) or larger and use the activated sludge method of treatment. Other constraints also limited the choice of plant. The plant had to serve a residential area with no heavy industry contributing to the waste influent, and there could not be another sewage treatment plant within a six-mile (approximately 10 Km) radius.

The other major factor which influenced the selection or rejection of a plant was the population living around the plant site. Within a 5.0 kilometer (Km) (3-mile) radius of the plant, a minimum of 1,000 households had to be present. Ideally, a uniform population density was needed throughout the study area.

The Egan WRP was placed in service December 16, 1975, serving a design population of 160,000 people in an area of 49 square miles. A generalized flow diagram is presented in Figure 3. The wastewater treated at the STP is primarily normal to low strength domestic-commercial waste. The area served has limited light industry. The influent biochemical oxygen demand (BOD) concentration averages approximately 100 to 150 milligrams per liter (mg/l). The total suspended solids (TSS) concentration is in the same range (100 to 150 mg/l). The waste flow at plant start-up was in the range of 10-15 MGD.

The daily waste flow presently is in the range of 15 to 20 MGD. The monthly average daily flow is approximately 17 MGD. The flow into the plant is somewhat equalized by a wet well and by allowing the collection system (sewer lines) to act as a holding device. This is done in an attempt to distribute the daily flow variations in a more uniform fashion. The design dry weather daily average flow capacity is 30 MGD.

The plant is presently operated in the conventional mode; that is, the raw sewage is discharged into the head end of a series of long tanks and aerated. The flow process of the plant is given in Figure 3.

A map of the study site is provided in Figure 4. The Egan Sewage Treatment Plant is located at the center of the map, on Salt Creek, a tributary of the Des Plaines River. The area is located in the northwest portion of the Chicago Metropolitan area, approximately 35 miles from the downtown business district. A number of suburban communities and villages surround the Egan Plant. These are the villages of Rolling Meadows, Arlington Heights, Elk Grove Village, Itasca,

Schaumburg, and Hoffman Estates.

The area occupies a plain, which for the most part, is only some tens of feet above Lake Michigan (579 feet above mean sea level). Topography does not significantly alter air flow, except that lesser frictional drag over Lake Michigan causes winds to frequently be stronger along the lakeshore. The quadrant from the east to about due north of the Egan treatment plant is a designated forest preserve. Two four-lane highways (Higgins and Arlington Heights Roads) pass through portions of this preserve. Estimated traffic patterns for each of these roads would be between 20,000 and 30,000 cars/day.

The remaining three quadrants of the study area can be described as a mixture of residential, agricultural, and small business tracts. Residential areas are estimated to comprise about 30-40 percent of these quadrants. However, rapid growth in the area is taking over the available farmland and would appear to substantially increase the residential percentage within the next few years. The agriculture usage is predominately for grain crops such as corn, wheat, and oats. An estimated 10 percent of the study area is presently commercial enterprise such as shopping malls and business zones along the major thoroughfares.

The study design provided for a self-paired comparison of individual health observations from the operational period against those from the corresponding baseline period is a very sensitive procedure for detecting changes because it eliminates the substantial inherent variability between human subjects and between locations. For an epidemiological investigation of microbiological hazards to have the power to identify any health hazards that are present, newly exposed human subjects were necessary, because sporadic inhalation of low concentrations of pathogens may confer a degree of immunity. With a new sewage treatment site, all the potential participants are newly exposed.

The original human subjects selected as participants were not to be replaced if they dropped out of the study. Each participant was to be his own control, so very sensitive self-paired comparisons of the corresponding operational and baseline results could be performed. In the health surveys and for the soil and water environmental samples, the same locations were to be used in each sampling period, again to improve the sensitivity of the comparisons.

Pathogens might come from various sources both within and adjacent to the study area. Local farmers use a combination of chemical and biological fertilizers for their grain crops. As manure is spread by machine over the fields some form of particulate matter would be emitted to the atmosphere. No feedlots were observed within the study area.

Environmental monitoring was conducted to characterize the ambient air, surface soil, and surface water in the vicinity of the WRP aeration basin, outward to residential distances of 0.3 to 5.0 Km in all four sampling periods. The researchers' concurrent extensive aerosol and wastewater monitoring study of spray irrigation at Pleasanton, California helped develop a superior microbiological aerosol sampling and analytical protocol. Six high volume

air samplers operating simultaneously were used to perform ten aerosol sampling runs over a seven-day period, with one upwind and five downwind. The upwind station was intended to describe the background levels of airborne microorganisms and trace metals.

For sampling off the plant grounds, 24 sampling sites were preselected to describe the windrose pattern at 1.6 and 5.0 Km distances from the plant. Twelve additional sites were preselected in case the wind direction was different than that predicted by the windrose pattern charts for the area. The sampling sites were changed each day to follow the wind direction. If the wind direction changed drastically during any one sampling period attempts were made to move the samplers. Sampler location distances in meters (m) from the edge of the aeration basin fell into the following distance ranges: 15-30; 50-75; 100-150; 200-400; 600-1200. An upwind station was located directly upwind at a distance of 500-1600 m for each run. In the event wind direction and physical obstructions prevented placement of samplers at one of the distance ranges, the sampler in question was placed at the nearest unobstructed point.

Sampling occurred only if the mean wind direction remained fairly constant and if no marked changes in meteorological conditions were expected over the next 30 minutes. The run was continued as long as there was no marked change in mean wind direction prior to the completion of 15 minutes of sampling.

Each of the 60 aerosol samples was analyzed for total viable particles (TVP), total and fecal coliform, coliphage, pathogenic bacteria-salmonella, Shigella, Pseudomonas, streptococcus, proteus, and viruses: polio, adeno, coxsackie, and echo. Air samples were also analyzed for concentrations of lead, zinc, copper, cadmium, and mercury. In the operational periods, the mixed liquor being aerated in the aeration basins was also sampled for trace metals, viruses, parasitic worms, protozoa, and enteric and respiratory human pathogenic bacteria.

A health survey was conducted to obtain personal information on households and detailed background information on volunteer participants. The household health survey was also used to obtain disease and symptom incidence on the household members through a door-to-door interview. Half of the households were within 3.5 Km in all directions from the plant site, with the other half residing between 3.5 and 5 Km in all directions from the plant. Clinical specimens were obtained from the participating subjects for microbiological and trace metal analyses. The clinical specimens selected were blood, feces, hair, throat swabs, sputum, and urine. One hundred of the participants' baseline and operational blood samples were analyzed using 23 additional viral serology tests.

The household health survey was conducted only in the baseline and operational sampling periods, with health information being collected on the members of 1000 households in each survey, but there were no residents within one-third mile of the plant. From 200 to 240 participants were selected from the baseline household volunteers residing within the 3.5 kilometer radius, so at least 140 to 160 would remain to provide clinical specimens through all four sampling periods. The participants were equally distributed to 45 years; 60 years or older. The months during which the samples

for each sampling period were actually obtained were: September-October 1974, February 1975, September 1975, February 1976, September-October 1976.

The data from the household health survey was in the form of frequency counts for occurrence of a particular chronic illness, symptom, or disease. The statistical methodology used was designed to determine if any significant changes in the frequency of occurrence were detectable between the baseline (pre-operational) period and the operational (post-operational) period. In addition, any increase in incidence should be related to the distance of the household to the Egan plant, if the sewage treatment plant was to be implicated as a potential health hazard.

In order to determine whether the occurrence of pathogens in the clinical specimens had increased after the plant began operating, the analytical results of the samples taken from each participant were matched according to season (February or October) and compared for each of the bacteria, parasites, and viruses analyzed in the four sample media (feces, throat swabs, sputum, and blood).

The study concluded that the Egan plant appears to be a source of indicator bacteria, coliphage, pathogenic bacteria, enteroviruses, and mercury in the aerosols emanating from its aeration basins.

However, the levels of microbiological or chemical agents of the air, soil, and water samples in the neighboring residential areas were not distinguishable from the background levels monitored before plant operation.

From the patterns observed in the household health survey, the reported incidence of skin disease, and the symptoms of nausea, vomiting, general weakness, diarrhea, and pain in chest on deep breathing may have been associated with the nearby operation of the wastewater treatment plant. However, a more sensitive testing procedure, checking 31 viral antibodies and attempted isolations of many pathogenic bacteria, parasites, and viruses yielded no evidence of an adverse wastewater treatment plant effect.

Results for alpha- and gamma-hemolytic streptococci isolations in the throat swabs for the subjects from the Lexington Green Apartments provide some evidence that the pattern may relate to exposure to the wastewater treatment plant aerosols. However, alpha- and gamma-hemolytic streptococcus species are part of man's normal flora in the intestinal tract, upper respiratory tract and skin, and of his environment (e.g., vegetation, insects, and animal feces) and do not normally produce disease. Therefore, their presence in the vicinity of the wastewater treatment plant or in the throat swabs is of little practical health concern. Thirty-one viral antibody tests and attempted isolations of many pathogenic bacteria, parasites, and viruses yielded no evidence of an adverse wastewater treatment plant effect.

The combined baseline-operational and distance experimental design used in this study is very sensitive for identifying potential health hazards and inferring whether or not the wastewater treatment plant may be their source. However, the findings obtained in this study, when considered overall, did not detect a public health hazard for persons living beyond 400 m from a well-operated wastewater treatment plant.

The Evaluation of Microbiological Aerosols Associated with the Application
of Wastewater to Land: Pleasanton, California 2/

This research project was conducted by the Southwest Research Institute to determine to what extent individuals living near sites practicing spray irrigation are exposed to microorganisms.

A water reclamation plant in the City of Pleasanton, California was selected as the study site: the City of Pleasanton Sunol Sewage Treatment Plant (STP). The plant was modified just prior to the study by the addition of an activated biofilter process following the trickling filter to enhance the treatment system's biochemical oxygen demand (BOD) removal efficiency. The City of Pleasanton STP utilized physical and biological processes in the treatment of its sewage flow. This STP is unique in that it combines two biological waste treatment systems, fixed film and fluidized culture. The fixed film is conveniently termed "trickling filter" and the fluidized culture is termed "activated sludge". Additionally, the STP has aerated ponds which serve as polishing and equalization for the land application phase. Provisions have been made for odor control, such as lime addition, partial chlorination, and off-gas ozonation. Figure 5 presents the general plant layout flow scheme for liquid wastes.

A schematic of the study area is shown in Figure 6. A population with middle-class socioeconomic characteristics is located within one mile to the east/southeast of the plant. The prevailing winds in this area are from the southwest to northwest quadrant; thus, this inhabited area would be downwind of the spray fields. There is a population in this subdivision to conduct an epidemiological study, and there are also suitable control populations in Pleasanton with middle-class socioeconomic characteristics located more than 2000 m from the spray fields.

The principal objectives of the first phase of the study were to establish the relationship in wastewater between pathogen levels and levels of the traditional indicator organisms (total and fecal coliform and standard bacterial plate count), to determine microorganism levels in air within 100 m of the spray source, and to begin the assessment of factors thought to affect the levels of pathogenic organisms collected in aerosol samples, including aerosolization efficiency, pathogen survival upon becoming airborne (impact), and microbiological die off with time (viability decay).

Routine monitoring of the wastewater was accomplished by taking a 20 liter composite sample from the aeration basin during the hours of spraying. Analyses included total and free chlorine, pH, total organic carbon, total solids, and total suspended solids. In addition, one-half of the composite samples were tested for biochemical oxygen demand, chemical oxygen demand, total phosphorus, hardness, and the nitrogen series (nitrite, nitrate, ammonia, and organic nitrogen). Microbiological analyses run on all wastewater samples included total and fecal coliform, total viable particles (TVP), coliphage, and assays for selected pathogens (Klebsiella, Pseudomonas, fecal streptococci, Clostridium perfringens, and enteroviruses).

The objectives of the second phase of the study were toward the development and validation of a predictive model of aerosol dispersion and pathogen survival. To accomplish this goal, 50 successful aerosol runs (each utilizing a minimum of 8 samplers) were made using large volume electrostatic precipitator samplers. These samplers were selected because the large volume of air sampled over a 30-minute period increases the sensitivity for the microbiological assay. Air sampling was conducted upwind and up to 600 m downwind in configurations to obtain the information necessary to perform the mathematical modeling. The samples were analyzed for the same microbiological parameters as the wastewater, with the exception of one run for which the collecting fluids from all samples were pooled for conduct of a pathogen screen.

Two special virus aerosol runs were conducted with all available samplers operating close to the spray line under meteorological conditions expected to result in high virus aerosol concentrations. The sampler collection medium was changed every 30 minutes and the samplers ran for a total of about three hours, therefore the results were based upon a total of over 5000 cubic meters (m³) of air. Additionally, 17 aerosol runs were made after the injection of dye into the wastewater to allow estimation of the proportion of the sprayed effluent that became aerosolized. All glass impingers were used to collect the aerosols from the dye runs, to determine the aerosolization efficiency of the sprinklers.

An explicit model for predicting downwind concentrations of pathogens was developed by expanding more general mathematical dispersion models. The model adds factors for microorganism impact, viability decay, and aerosolization efficiency, to the standard diffusion model estimate of pathogen concentration based on source strength. The distributions of aerosolization efficiency and the impact and decay values for each organism were determined and these were used to allow evaluation of the model using monitoring data from the Egan WRP study and the Tigard, Oregon study.

The dispersion model developed in this study was then validated. It was shown to produce satisfactory results when used to predict aerosol concentrations at three sites. Most of the predicted results fell within a factor of five of the measured concentrations when non-chlorinated effluent was being sprayed.

Through wastewater monitoring it was found the wastewater effluent applied was of relatively consistent day-to-day quality (BOD, 18.7 mg/l; Chemical Oxygen Demand (COD), 99.5 mg/l; Total Organic Carbon (TOC), 33.0 mg/l; pH, 8.4; hardness, 235.2 mg/l; TSS-33.0 mg/l; total phosphorus—5.6 mg/l; and nitrite, nitrate, ammonia, and organic nitrogen: 0.15 mg/l, .06 mg/l, 23.9 mg/l, and 5.6 mg/l, respectively).

Pathogenic bacteria and viruses were found consistently in the pre-application effluent samples, and coliphage was found in all pre-application effluent samples. A wide range of levels of these microbial components was found. Concentration levels routinely varied by one order of magnitude, and variation often approached two orders of magnitude.

A special study of respiratory viruses in wastewater found confirmed viruses in five of forty cultures. Typing disclosed that four of the five tubes contained echovirus 6, while the other viral isolate could not be identified. Echovirus 6 may occur as either a respiratory-tract virus or as an enteric virus. The failure to isolate respiratory viruses in the Pleasanton wastewater confirmed the researchers' suspicion that the likelihood of finding respiratory viruses in wastewater is very small.

There was no significant difference in the coliform or coliphage concentration in corresponding effluent samples taken from a spray-head during the aerosol runs and from the effluent composite samples at the pond pump. The standard bacterial plate count, however, was significantly higher in the spray-head wastewater samples. The correlations of the spray-head and pond composite microorganism concentrations were generally significant, but not adequate for prediction.

The median aerosolization efficiency obtained for the sprayers over 17 dye runs at Pleasanton was 0.33 percent. There was over an order of magnitude of variation in aerosolization efficiency estimates. Eighty percent of this variation in aerosolization efficiency at Pleasanton appears to have resulted from changes in meteorological conditions (air temperature, wind velocity, and solar radiation) that affect the evaporate capability of the air.

The median impact factor estimates for the microorganism groups studied were 0.13 for fecal coliform (13% survive aerosol impact), 0.16 for total coliform, 0.21 for standard bacterial plate count, 0.34 for coliphage, 0.89 for mycobacteria, 1.2 for Clostridium perfringens, 1.7 for fecal streptococci, 14 for Pseudomonas, about 10 for three-day enteroviruses (mostly polioviruses), and about 40 for all (3-day and 5-day) enteroviruses. Most individual impact factor estimates were quite imprecise, reflecting the imprecision of the microbiological aerosol concentration measurements. Since the middle range of impact factor values (fortieth to sixtieth percentiles) for each microorganism group were quite consistent, they were considered to be characteristic of the microorganism groups' typical survival through aerosol impact.

As indicated by impact factors exceeding 1.0, the enteroviruses and some hardy bacterial pathogens were frequently found in wastewater aerosols at higher concentrations than could be expected based on their wastewater concentrations. Mechanical splitting of colony forming units (CFU) may account for this phenomenon.

The range of impact factor estimates for each microorganism group was broad, generally covering two orders of magnitude from the tenth percentile to the ninetieth percentile. The detectable viability decay rates of each microorganism group also covered a wide range. Limited data suggest ambient conditions such as low relative humidity, high wind velocity, and a large temperature differential between wastewater and air all may reduce the initial survival. Viability decay may be more rapid with high solar radiation, high temperatures, and middle or low relative humidity.

The viability decay rates for total coliform and fecal coliform were more rapid, more reliable, and more frequently detectable than those of the other microorganism groups. Viability decay was less rapid for coliphage, Clostridium perfringens, and standard bacterial plate count and its effect could only be ascertained within 100 m on about half the runs. Viability decay could seldom be ascertained for fecal streptococci, mycobacteria, and Pseudomonas. No attempt was made to determine the viability decay of enteroviruses due to insufficient data.

The geometric mean aerosol concentrations obtained at 50 m downwind of the wetted spray area were:

1) standard bacterial plate count	460.0 /m3
2) total coliform	2.4 MFC/m3
3) fecal coliform	0.37 MFC/m3

4) coliphage	0.38 PFU/m ³
5) fecal streptococci	0.61 CFU/m ³
6) <u>Pseudomonas</u>	34.0 CFU/m ³
7) <u>Klebsiella</u>	5.0 CFU/m ³
8) <u>Clostridium perfringens</u>	0.9 CFU/m ³
9) mycobacteria	0.8 CFU/m ³
10) enteroviruses (3 and 5 day)	0.014 PFU/m ³

PFU = Plaque Forming Units
 CFU = Colony Forming Units
 MFC = membrane filter count
 m³ = cubic meters

Individual aerosol measurements frequently differed by more than an order of magnitude from these mean values.

Limited particle size data obtained with two-stage Andersen samplers showed a substantial portion in the respirable range. The median percent respirable particle values downwind of the spray line were 44 percent for total count and 74 percent for total coliform. In general, there was a higher percentage of respirable particles at close downwind distances (5 to 25 m), than at background and farther downwind distances. This meager data is in general agreement with more thorough particle size studies performed at the Egan WRP. Particle size was not considered in the mathematical modeling.

Wastewater quality as measured by chemical and physical parameters was unrelated to the generation or transport of microbiological aerosols from spray irrigation. In addition, little correlation was found in the wastewater between levels of the traditional indicator organisms; total coliform, fecal coliform, standard bacterial plate count, and coliphage, with the levels of the pathogens which they are intended to indicate.

Aerosol studies indicated that use of the traditional indicator organisms to predict human population exposure results in extreme underestimation of pathogen levels. The pathogens studied survived the wastewater aerosolization process much better than did the indicator organisms. Based upon the results of this study, fecal streptococci may be an appropriate indicator due to ease of assay, levels routinely seen in wastewater, and the similarity of their hardiness upon impact and viability decay rate to those of the pathogenic organisms of interest. However, an apparent problem was the occasional presence of fecal streptococci in aerosols due to non-wastewater sources.

Although Klebsiella was relatively prevalent in the wastewater, it was far less prevalent in the wastewater aerosol. It appears that Klebsiella die off rapidly during the aerosolization process. This finding was in contrast to data seen in the literature which consistently report Klebsiella as the predominant pathogen found in the air near spray irrigation sites and near sewage plants. More analytical confirmation steps were used in this study than in earlier studies. If the confirmation steps had been stopped at the point used by other investigators more values would have been reported as Klebsiella when, in fact, they were primarily other organisms of the mucoid type.

The study was supported by an extensive quality assurance program. Chemical, physical, and microbiological methods used were subjected to accuracy and precision studies, and alternative laboratories were used, where feasible, to verify the results.

Studies conducted on the aerosol collection media, the temperature at which the samples are shipped, and the total time from collection to analysis were examined in detail in the laboratory. The results led to the design of adequate methods for sampling and analysis so that pathogenic organisms were found consistently.

Some difficulties were encountered in contamination of the high-volume aerosol samplers between aerosol runs. This problem appeared primarily in the standard bacterial plate count and Pseudomonas assays. Special care must be taken to adequately decontaminate high-volume aerosol samplers between aerosol runs.

The microbiological aerosol data varied substantially in quality and statistically usable information content. Accordingly, a suitable aerosol data weighting procedure was employed, according to consistent rules, in conducting the aerosol factor analyses. In the quality assurance aerosol runs for systematic sampler differences, it was concluded that after correcting for the air flow rates, there was no systematic bias in microbiological collection efficiency among the high-volume samplers evaluated.

There was substantial imprecision using the methods employed in this study for measuring microbiological concentrations in aerosol samples. The aerosol measurement coefficients of variation were 17 percent for dye, 50 percent for total coliform and standard bacterial plate count, 58 percent for fecal coliform and Pseudomonas, 60 percent for Clostridium perfringens, 73 percent for coliphage, 74 percent for Klebsiella, 77 percent for fecal streptococci, and 81 percent for mycobacteria. While the microbiological aerosol variation due to field sampling sources was considerable, even more variation was caused by analytical sources such as sample processing, shipping, and laboratory procedures. Relatively little of the analytical variability was reflected in replicated analyses, which is the usual manner of reporting analytical variation.

The accuracy and precision of microbiological dispersion model predictions have, in general, been validated to 100 m downwind of spray sources of unchlorinated wastewater aerosols. Most model predictions (e.g., 77 percent for standard bacterial plate count, 71 percent for total coliform, and 80 percent for coliphage) were within a factor of five of the net measured aerosol concentrations evaluated. Considering the imprecision and cost of measuring microorganism aerosol concentrations from spray irrigation by field sampling, using predictions of the microbiological dispersion model supplemented with minimal field sampling does appear to be a preferable alternative to extensive field sampling when the sprayed wastewater does not contain residual chlorine.

The University of Michigan and the IIT Research Institute utilized data obtained as part of a comprehensive community health study conducted during 1965-71 to examine the incidence of acute illness in a population surrounding an activated sludge wastewater treatment plant and a control location in Tecumseh, Michigan.

The Tecumseh wastewater treatment plant (WWTP) is located in the southeast quadrant of the city (Figure 7). The plant is at a lower elevation than most of the populated study area and is surrounded by deciduous trees on the east, west, and south. This plant processes approximately 1 million gallons of wastewater per day (MGD) by activated sludge secondary treatment. Activated sludge has been in use since 1956, when the plant was redesigned from a trickling filtration facility. Data that might be used to estimate the fecal contribution to the wastewater, such as total or fecal coliform concentrations, are not available for the study period. Wastewater flow rates for the study period were not available from the Tecumseh WWTP, but available data were obtained from the Michigan Department of Natural Resources.

Average monthly flow rates at the Tecumseh wastewater treatment plant ranged between 0.64 and 1.18 MGD from 1965 to 1971. Data, however, were not available for 1966, and some data for 1965, 1968, and 1969 are missing.

The study population was defined as those participants in the University of Michigan Tecumseh Community Health Study from 1965 to 1972 who resided in dwelling units at specific distance ranges from the Tecumseh wastewater treatment plant (Figure 7). Dwelling units located within each of five concentric rings and beyond, radiating from the plant in approximate multiples of 600 m, were identified. Dwelling units were likewise identified with a second set of concentric rings constructed around a nonemitting location. This site was located in the northwest quadrant of the city in an undeveloped area approximately 180 m west of Seminole and 275 m south of Brown Roads. This control location was selected because it is upwind from the wastewater treatment plant and had a surrounding population density comparable to that of the study groups. The dwelling units within the study area were primarily single family houses, although multiple family units occurred at various locations within the area. Confirmation of dwelling unit locations near concentric ring boundaries was made by site visitation. All dwelling units studied were assigned to concentric rings surrounding both the wastewater treatment plant and control location. Data with reference to each index point were analyzed separately.

The population used in nonseasonal-related analyses included those individuals who were contacted at least 50 weeks in a row with no absences during four or more weeks. The illnesses included are those whose onset occurred within this 50-week period. The entire population on report from 1965 to 1971 was used for determination of true illness incidence rates.

As used in this study, colder months included November through April whereas warmer months included May through October. In each case, the study population was defined as those persons on report for the entire

26-week period, with no long periods (two weeks or more) off report. The illnesses included are those whose onset occurred during the 26-week period.

Data were obtained from the participating families regarding health history, socioeconomic factors, employment locations, and schools attended by all children. After recruitment, each family was contacted weekly by telephone or personally, and a single respondent was questioned regarding the occurrence of short term illness within the family during the past week. When illness was reported, the details of the specific event were recorded using a questionnaire. The respondent was contacted during the weeks following the initial report and asked whether the illness persisted and to describe the symptoms. The date of illness termination was obtained, and the respondent was questioned regarding other illness development within the family. An illness occurring at least two days after a termination date was regarded as a new event.

Acute illnesses were grouped into three general categories: total, respiratory, and gastrointestinal. Data are reported as incidence rates and as individual illness rates. Age-sex-distance-specific true incidence rates were determined by dividing the number of each kind of illness by the number of person-years observed within each group. Age-sex-distance-specific individual illness rates were calculated by number of illnesses during report period/number of weeks on report.

Study participants were classified into concentric rings of approximately 600m each by dwelling unit distance from both the study and control site. School children were classified by school attended in a similar manner.

The objective of the statistical analyses was to determine whether the incidence of illness varied with distance of the dwelling unit from the wastewater treatment plant, and, in children, also whether incidence depended upon distance of the school attended from the wastewater treatment plant. Dwelling units and schools were also classified with respect to distance from a control location.

Differences in illness incidence occurred during the May through October season at varying distances from the wastewater treatment plant, but persons within 600m appeared to have a greater risk of respiratory and gastrointestinal illness than the control group. The data do not, however, demonstrate a causal effect and factors other than the wastewater treatment plant, such as higher rates of illness transmission in areas of higher densities of lower socioeconomic families, could have contributed to these findings. Persons dwelling within 600m of the plant had respiratory illnesses that exceeded those of the control group by 20% and 27%, and gastrointestinal illnesses that exceeded those of the control group by 78% and 50% when specified for income and education, respectively. When specifying socioeconomic factors, education and income exerted an unequal influence on the significance of illness incidence variation and, in general, such variations between geographic locations were found to be greatest in groups having the lowest income and education. Therefore, the data suggest the higher illness rates are related to higher densities of lower socioeconomic families rather than the wastewater treatment plant.

The group within the 1800 to 2400m concentric rings from the wastewater treatment plant had a greater than expected incidence of respiratory illnesses during both warm and cold seasons. Significant differences were not found in the control location related groups at this distance. However, the higher than expected illness cannot be related to the wastewater treatment plant itself, since they appear to be related to socioeconomic status.

Differences in total illness were observed in the school children with regard to distance of school attended from both the wastewater treatment plant and control location. But these results are inconclusive since the schools were very unevenly distributed with reference to distance from these locations.

These observations should be tempered with the recognition that the Tecumseh wastewater treatment plant is located at a lower elevation than most of the populated study area and is surrounded by deciduous trees on the east, west, and south. Depending upon wind direction, velocity, and atmospheric stability, surrounding trees may act as a partial barrier for persons dwelling nearest the plant while lofting the airflow, resulting in further downwind dispersion.

This research project investigated the potential health effects of aerosols emitted from an activated sludge plant. The University of Illinois Medical Center conducted an 8-month environmental health study using a stratified sample of persons residing near the North Side sewage treatment plant (NSSTP) in Chicago.

- The NSSTP was chosen for the study since the plant is nearly surrounded by a substantial number of residences. Census information (1970) indicated the population to be of homogeneous socio-economic status and to consist of appropriate numbers of individuals in the desired high-risk age groups. The sewage is not heavily industrial, and the prevailing wind patterns and topography appeared to be conducive to exposure of population groups.

Built in 1929, the NSSTP is one of the three main plants of the Metropolitan Sanitary District of Greater Chicago (MSDGC). The plant is located on Howard Street between Hamlin Avenue and McCormick Boulevard in Skokie, Illinois (Figure 8), which is a northwest suburb of Chicago.

The NSSTP is an activated sludge plant employing diffused aeration with tapered aeration. Chlorination occurs after the final settling process. No sludge processing occurs at the plant. A schematic of the plant is shown in Figure 9. The maximum capacity of the plant is 399 million gallons of raw sewage per day. During the study period (April-November, 1977) the plant had an average daily flow rate of 292 million gallons of sewage and a median air rate of 4.6×10^3 m³/day. The estimated surface area of sewage in the aeration tanks is about 55,000 m² in settling tanks, concentration tanks, etc., exposed to the atmosphere. The total retention volume of one battery of aeration tanks is 7.45×10^3 m³. The tank levels are maintained at approximately 4.6 m. Residence time of sewage in the aeration tanks is generally 5-1/2 hours.

The area within a 1.6 Km radius of the treatment plant as shown in Figure 8 was designated as the study area. Previous studies at other locations have found that the dispersion of viable particles does not exceed 0.8 Km from the source. Therefore, the 1.6 Km radius study area permitted analysis of exposed and unexposed populations. The study area included portions of four communities: Skokie, Lincolnwood, Evanston, and Chicago. As can be seen in Figure 8, the plant is located in a small industrial area. Light industries are situated north, east, and south of the plant, occupying most of the land within the first 0.4 Km (1/4 mile) radius of the plant. Residences are located about 152 m west of the aeration basins, and about 0.8 Km (1/2 mile) directly east of the tanks. Housing also exists within 0.8 Km north and south of the plant. The major residential section begins at the 0.4 Km radius line and extends uniformly through the 1.6 Km radius area.

The population of the study area was estimated to be 15,850 persons, or 5,600 households, based on the 1970 census. Considering property value, age, and race, the population appeared to be relatively homogeneous.

Although there were differences in several characteristics between some of the tracts, these 1970 figures were used for preliminary evaluation of the population and not for subsequent demographic analysis.

In order to characterize the nature and degree of exposure of the study population to pollutants emitted during treatment plant operation, environmental air quality, measurements of total viable particles (bacteria containing particles), total coliform bacteria, total suspended particulates (TSP), and 19 metals and gases were made at regular intervals at different distances from the plant in ambient air. Concentrations of total viable particles (TVP) were measured on a regular basis (approximately every other day) at the plant and in the community for eight months (April-November, 1977) using Anderson 2000 six-stage (A6S) viable samplers. Initial attempts to monitor for total and fecal coliform were made using an All-Glass-Impinger on six days during April and May. These samplers were found to be below the sensitivity required for detection of the concentrations present. Beginning in September, airborne total coliform samples were taken with Andersen samplers on days of total viable particle sampling and with a Litton Large Volume Air Sampler (LVAS) one day per week. Airborne coliphage measurements were originally scheduled to be taken once every other week. However, many equipment problems were encountered with the LVAS, and only eight coliphage in air measurements were obtained. Animal virus in air samples were obtained for two days using LVAS's (one upwind and one downwind each day). Monitoring of nonviable constituents was conducted every five days from April through November on the plant and in the community.

The Andersen 2000 six-stage (A6S) viable samplers used are a multi-orifice cascade impactor consisting of six aluminum stages accompanied by six glass petri dishes and a pump. Each stage collects particles of pre-determined size range with stage six collecting particles of 0.65 to 1.1 μ m diameter and stage one collecting particles of 7.7 μ m and above. These samplers were calibrated to sample air at 28.3 liters/minute.

The LVAS's use a liquid collection media to filter the air samplers which are initially collected at approximately 1.0 m³/minute. The fluid containing the air sample is then filtered through a membrane filter in a Millipore filtration apparatus.

Grab samples of sewage were collected from the aeration tanks concurrently with the air measurements and were analyzed for total viable particles, total coliform bacteria, trace metals, sulfates, and nitrates. A limited number of measurements were also made of viruses and coliphage in sewage.

The environmental measurements were used to develop study period exposure indices for each household for total viable particles, TSP, and eight metals and gases, a similar 2.5-month exposure index was developed for total coliform bacteria. Virus and coliphage measurements in sewage and air were inadequate in number to determine their concentrations with any confidence.

In an attempt to determine whether or not the sewage treatment plant was hazardous to the health of the community exposed to the plant aerosols, several measurements of health were made.

An important requirement for this study was that the sample of households be equally distributed throughout the study area. Therefore, three concentric sampling zones were designated around the sewage treatment plant as follows: 1) 0-.8 Km; 2) .8-1.2 Km, 3) 1.2-1.6 Km (from center of plant). A random sample was chosen from each zone in order to obtain a more uniform geographic distribution of households throughout the study area. The sample size for each zone was determined by the number of households in the smallest zone (nearest the plant, 394 households). Thus, nearly every family in this zone was included in the sample.

A history of the baseline health status of each participant was tabulated in a health questionnaire developed in collaboration with the Survey Research Laboratory (University of Illinois, Circle Campus). Specific questions were asked regarding any acute illnesses the participant had experienced in the past year. Additional questions concerned such factors as chronic disease, smoking habits, demographic characteristics (i.e., age, sex, race, income, occupation), length of residence in the study area, travel, and vaccination history.

In order to obtain ongoing, prospective information about health in the study population, a subsample of the persons interviewed in the Health Questionnaire Survey was solicited into the Health Watch. Participants, as family units, were asked first to maintain a health diary to self-report any and all illnesses they encountered for an 8-month period. Secondly, they were requested to provide blood samples at the beginning and again at the end of the 8-month period, and finally, families with young children were asked to provide clinical specimens, i.e., throat and/or stool specimens, for biweekly microbiological surveillance.

The cross-sectional demographic and health survey carried out in the area surrounding the activated sludge plant (which processes 292 million gallons of sewage daily) revealed a relatively homogeneous, predominately white, upper middle class group, with no remarkable prevalence of health problems. Seven hundred and twenty four people (246 families) volunteered to record self-reported illnesses at biweekly intervals. Throat and stool specimens were collected from a selected subsample of about 161 persons. In addition, 318 persons submitted paired blood samples at the beginning and at the end of the study period to determine prevalence and incidence of infections to five coxsackievirus and four Echovirus types potentially associated with aerosol exposure.

In relating illness rates to total viable particle exposure, it was necessary to limit the illnesses to those which potentially have a casual association with viable particle exposure--respiratory, gastrointestinal, eye and ear, skin, and total illness.

A dose-response approach was taken in the analysis of exposure and health effects. Conceptually, if the sewage treatment plant was the source of infections, trace metals and gases, or other hazardous materials, then the level of exposure may be directly related to the number of infections and/or diseases occurring in the exposed population. Standard techniques such as regression analyses were performed to determine if health effects increased with exposure, or if the two variables varied independently. Scatter diagrams were prepared to further examine the relationship between exposure and health effects.

Results of the health survey and the specimen and serological analyses of residents as close as 152 meters were compared with the household exposure indices. No significant correlations were found between the exposure indices and the rate of self-reported illnesses or of bacterial or viral infection rates (antibody levels) determined by laboratory analysis. This lack of correlation between 8-month total viable particle exposure and illness rates may be the result of an inadequate sample size (in terms of number of households), an unequal frequency distribution of household exposure indices in terms of not having enough households exposed at "low" or "high" levels of TVP concentrations, the inaccuracies in self-reported illness rates, the existence of more complex functional relationships between health and exposure variables, or no relationship at all.

The relationship between temporal illness and exposure was also evaluated on a 2-week averaging period basis. No linear relationships were found when analyzed separately or together for all types of illnesses evaluated or for respiratory illnesses alone.

In order to examine a possible lag effect between exposure and illness, a 2-week lag period analysis was carried out. Again, no linear relationship was detected. A 2-week period was the smallest lag period possible to analyze, since the health survey was conducted biweekly. In addition to the possible reasons for lack of correlation provided above, it was possible that the 2-week lag period was too long in terms of incubation period for most bacterial and viral agents possibly associated with these illnesses. It was also important to note that the 2-week exposure indices were much less reliable than those based on the total study period.

An attempt was made to examine the relationship between illness and exposure for various sub-populations potentially at high risk to the effects of TVP exposure. Age (0-12, 13-18, 19-59, greater than 59 years), chronic respiratory disease (chronic bronchitis, emphysema, or asthma), chronic gastrointestinal problems, smoking, family composition (families with one or two adult members, youngest children aged 0-5, 5-14, and greater than 13 years), and length of residence (less than 1 yr., 1-5 yrs., 6-10 yrs., 11-20 yrs., and greater than 20 yrs.) in the study area were considered potential risk factors. The analysis did not reveal any linear relationships except for skin illnesses for families with the youngest child between 5 and 14 years, and for skin conditions in the over 20 years of residence sub-population. However it was reported by the researchers that these linear relationships are of questionable importance since the mean illness rates were so low.

No linear relationship was found for respiratory illnesses or for all illnesses combined when compared to total coliform bacteria exposure. Exposure to metals, gases, and TSP did not exhibit a linear relationship when compared with household illness rates for all illnesses combined, as well as for the separate illness categories.

Throat bacterial infection rates were compared to TVP exposure and no dose-response relationship was found. Analysis of virus infections was possible through serosurvey. The differences observed were not statistically significant.

The overall conclusion that this activated sludge sewage treatment plant had no obvious adverse health effects on residents partially exposed to aerosol emissions should be tempered by the recognition that only a very small number of people were exposed to the highest pollution levels.

This draft research report was compiled by the Southwest Research Institute to evaluate aerosol emissions from the Durham activated sludge treatment plant (DASTP, Tigard, Oregon) and their possible health effects.

The DASTP is situated next to Fanno Creek, a tributary of the Tualatin River, in an area which has recently (Fall 1978) been annexed by the City of Tigard. The DASTP services the entire Fanno Creek drainage basin and nearby areas. Figure 10 shows the location of the plant and the area served. The DASTP commenced operation on July 6, 1976, with an initial design capacity of 75,000 cubic meters (m³) per day (20 MGD) that can be expanded to 227,000 m³ per day (60 MGD) by the year 2000 to meet the needs of this rapidly growing area.

Designed as a modern activated sludge plant incorporating some advanced processes for wastewater treatment, the DASTP is comprised of two parallel plants which can be operated separately from primary clarification to the point of effluent discharge. Alternatively, flows can be combined from the separate plants after various stages of treatment. All plant influent first passes through barminutors to screen out and reduce the size of large objects. The flow is then divided to two primary clarifiers in parallel where settleable solids and grit are removed. Secondary treatment begins with the classical activated sludge process in four aeration tanks.

After secondary clarification, the wastewater is subjected to advanced wastewater treatment processes for reduction of phosphorus and solids. Plant effluent is then filtered and chlorinated prior to discharge in the Tualatin River. Organic sludge from the primary and secondary clarifiers is processed in a series of gravity sludge thickeners, cyclone-type grit separators, disc centrifuges and continuous bowl centrifuges. After heat treatment and incineration, the resulting ash is landfilled. A schematic flow diagram of plant processes is shown in Figure 11.

To accommodate plant flow during periods of extensive rainfall, two large surge basins were built adjacent to the plant. The largest surge basin has a capacity of 38,000 m³ (10 million gallons), while the others have capacities of 19,000 m³ (5 million gallons). A small basin of 7,600 m³ (2 million gallons) capacity is situated adjacent to the surge basins and has no surface aeration. Its purpose is to catch backwash from the filters. Flow from any of the plant processes can be diverted to the surge basins, but typically, primary clarifier effluent is diverted to these basins in sufficient quantity to maintain a relatively constant flow through the activated sludge process. Three surface aerators in the second largest surge basin (No. 1 surge basin) prevent the primary treated wastewater from becoming anaerobic. During periods of low influent flow, wastewater from the surge basin can be reintroduced into the secondary treatment process to equalize flow through the secondary and tertiary treatment sections of the plant.

It was determined that there were three potential sources of aerosol formation within the DASTP: the aeration basins, the surge basins, and

the secondary recarbonation basin.

No chemical treatment (including recarbonation) was performed during either of the sample periods. This eliminated the secondary recarbonation basin as a source of aerosol.

Also, plant personnel determined that use of a single aeration basin resulted in optimal operation of the activated sludge process. In this mode of operation, all wastewater is mixed with activated sludge in a 3,800 m³ (1 million gallon) capacity aeration basin with a detention time of 1.5 to 2 hours. Air at a pressure of 0.39 to 0.53 kg/cm (5.5-7.5 psi) is introduced through a 10-cm (four-inch) diameter nozzle located 1.5 m (5 feet) from the bottom of the basin.

Each nozzle is oriented vertically upward underneath a variable speed turbine aerator that agitates the aeration basin liquor and disperses the air stream from the nozzle. There are two nozzle mixer systems in each 21 x 30 x 6 m deep (69 x 100 x 20 feet) aeration basin. Based on the surface area of the aeration basins, perhaps one-fourth of the potential aerosol was being generated, since only one of the four aeration basins was being utilized for secondary treatment during the monitoring period.

The third source of aerosol generation, surface aerators on the No. 1 surge basin, was functional during both sampling periods. When the wastewater characterization samples were collected in November 1977, the No. 1 surge basin was being used to return surge to the aeration basin. A total of 12,200 m³ (3.22 million gallons) were returned to the aeration basins during 19 hours of the 24-hour operating day commencing at midnight November 9. During the aerosol study in May 1978, the depth of the only aerated surge basin (No. 1) remained constant at 4 m (13 feet) since no wastewater was diverted to or removed from it.

One objective of this study was to measure the types and quantities of viable microorganisms present in the ambient air 0-100 m downwind of the DASTP. A second objective was to determine whether the absentee rate at Durham Elementary school (next to the DASTP) was significantly different from the absentee rates at control schools located in the same area but not near a wastewater treatment facility. This would provide some preliminary indication of possible health effects which might be associated with the treatment facility.

To address the first objective, large wastewater samples were collected from each potential source of aerosols, to characterize the type and approximate concentration of viruses and enteric bacteria available for aerosolization. These results were used to select the types of organisms and methods to be used during routine monitoring of wastewater and aerosols.

Six aerosol runs were conducted to simultaneously measure levels of microorganisms in wastewater and air. This was achieved using a sampler array of eight high-volume air samplers (Litton Model M). Two samplers were paired upwind, while the six downwind samplers were deployed as three pairs, at planned distances of 30 m and 100 m downwind of the aeration basin and 50 m downwind of the surge basin. During the six high volume aerosol runs, temperature, relative humidity, wind direction, wind speed, and solar radiation intensity were monitored. The

aerosol runs were taken over a wide range of solar radiation conditions, from darkness during run 3 to noon during run 6.

Based on experience in detecting microorganisms in the aerosols monitored at the Egan WRP and at Pleasanton, California, the following microorganisms groups were selected for routine monitoring: total coliform; fecal streptococci; Pseudomonas, mycobacteria, and coliphage. A special enterovirus aerosol run was also conducted to measure enterovirus levels at the aeration basin.

- The level of microbial aerosols reaching the school were then estimated. Since previous experience had shown aerosol monitoring beyond 400 m downwind of the aerosol source was infeasible, the only means to obtain exposure dose information was by calculation involving a mathematical model, monitoring data, and wind direction data. Since the calculation required data extrapolations and assumptions whose validity is uncertain, the estimated peak exposure doses do contain considerable uncertainty. However, the researchers have verified the predictions of the model from extensive monitoring data at the Egan WRP and at Pleasanton, California.

The frequency with which children at Durham Elementary were exposed to aerosols from the DASTP was investigated. Two exposure locations at the school (classroom and playground area) were considered. Wind direction observations made at Portland International Airport (24 Km northeast of the DASTP) by the Portland Weather Service office at 7 a.m., 10 a.m., 1 p.m., and 4 p.m. on each of the school days were used in estimating the frequency of student exposure.

A daily exposure index was computed for each exposure location-aerosol sources combination, based on the four wind direction observations for the day. Wind direction observations within 30 degrees of the schools direction were considered to represent an occasional exposure, and the exposure index was adjusted using a weighting factor.

Quarterly attendance for Durham Elementary and eight control schools were obtained for the seven school years prior to DASTP operation and for the first two school years of DASTP operation. If the DASTP had an adverse health effect, one would expect higher absenteeism at Durham Elementary (relative to the control schools) in the two operational years. Such absenteeism might take the form of a uniformly higher absence rate throughout the two operational years, or because of acquired immunity, it might only be evident during the first several months of aerosol exposure.

Wastewater monitoring detected the concentration levels for mycobacteria and Klebsiella were fairly high relative to the microbiological indicators at the DASTP. Also Pseudomonas were found at relatively high concentration levels. However, Salmonella and Shigella, generally regarded as the most common bacterial pathogens, were not prevalent in the wastewater samples. Microorganism concentration levels tended to be higher in the aeration basins than in the surge basin, recarbonation basin or effluent pond. Consequently, the aeration basin was selected as the most suitable source for monitoring the aerosols.

The geometric mean aerosol concentration at 30-50 meters downwind of the aeration basin were 5.8 cfu per m³ of total coliforms, 2.0 cfu per m³ of fecal streptococci, 9.1 cfu per m³ of mycobacteria, 7 cfu per m³ of Pseudomonas, and 0.7 pfu per m³ of coliphage.

Enteroviruses were not detected in the air 30 m downwind of the aeration basin. This resulted from their low concentration in the wastewater and from the association of 98 percent of the wastewater enteroviruses with solid matter which is not readily aerosolized. Mycobacteria were observed to be more prevalent at the DASTP than at the Egan WRP and Pleasonton, California wastewater aerosol monitoring sites.

The microorganism aerosol concentration levels tended to decrease with increasing downwind distance from the wastewater aerosol source, and also tended to vary from one aerosol run to another due to variations of microorganism levels in the wastewater. However, high and extremely variable aerosol concentration levels were probably due to contamination of the high-volume aerosol samplers.

Aerosol runs indicated that levels of fecal streptococci, Pseudomonas, and mycobacteria were generally as high or higher at 70-100 m downwind than the levels of such indicator organisms as total coliform and coliphage. Thus, the use of indicator microorganisms such as total coliform or coliphage in wastewater aerosol monitoring appeared to be inadequate to characterize the pathogenicity of the aerosols.

The calculated daily exposure index over the 355 school days the DASTP was operational showed that on the majority of school days the classroom area had no exposure to aerosols. On ten days the classroom area was steadily exposed to aeration basin aerosols and on five days to surge basins aerosols. The playground area had steady exposure to DASTP aerosols more frequently, but the number of days was still low. These calculations were based on four wind direction measurements per day, and since wind direction is variable, exposure was greater than indicated here.

The weather on the days of steady aerosol exposure in the classroom area was reviewed, and revealed conditions conducive to survival of aerosolized microorganisms. However periods of rainfall experienced on the days of steady aerosol exposure would reduce the duration of exposure. The weather on days of steady aerosol exposure in the playground area was similar. Based on precipitation during and preceding the school day, the playground was considered usable for student play on 13 of the 31 school days with steady aerosol exposure.

Assuming a breathing rate of 0.25/m³/hr, the estimated peak microorganism dose received by Durham Elementary students on a single school day was as high as 9 cfu of mycobacteria and 3.5 cfu of fecal streptococci during seven hours while in the classroom area. Substantially lower doses were calculated for one hour of playground exposure. However, since the bacteriological strength of the surge basin wastewater may vary substantially, the peak playground exposure may be considerably underestimated. In making this calculation it was assumed that the wastewater and aerosols sampled during the one-week monitoring period were representative of the levels and variability occurring throughout the two-year DASTP operational period.

From comparison with usual outdoor background exposure, measured upwind of the aerosol source, the peak exposure dose during a school day may exceed the usual seven-hour outdoor background dose by two orders of magnitude for fecal streptococci, and perhaps three or more orders of magnitude

for mycobacteria.

In the two school years after the DASTP began operating, annual school attendance at neighboring Durham Elementary School improved. The improvement at Durham was evident in comparison both to prior school attendance at Durham and to school attendance in the surrounding control schools. Hence, there was no evidence that operation of the DASTP had any sustained adverse effect on school attendance at Durham Elementary. Analysis of the school attendance data on a quarterly basis also yielded no evidence of adverse effects having a shorter duration. However, very occasional transitory effects could not have been identified from the quarterly attendance data available for this study.

The analysis of class attendance data showed some extended periods of elevated absenteeism among first and second grade students at Durham Elementary (compared to the control school class attendance) after operations at the DASTP commenced. However, periods of even higher absenteeism among first and second grade students at Durham Elementary also characterized many of the baseline years. Thus, it was indeterminate whether the absenteeism among the younger students at Durham Elementary had any relationship to DASTP operation.

This study illustrates both the advantages and disadvantages of using elementary school attendance data for an epidemiologic investigation of a localized potential health hazard. The advantages are the uniformity, availability, and copious volumes of school attendance data, which permit the detection of many significant differences. The primary disadvantage is the existence of many potentially confounding factors affecting school attendance which are unrelated to student health and which can obscure the potential hazard being investigated. School attendance is affected by school factors under the principal's and teachers' control (e.g., policies regarding student progress, nature of curricular and extracurricular activities), as well as student factors (e.g., personal stress, sickness in family, work at home, poverty, inclement weather, parental difference, travel distance in rural schools) 6/. While personal illness is one of the leading causes of absence, other factors may also have sizable effect. Hence, school attendance is quite an insensitive measure of adverse health effects. The lack of an effect on school absenteeism does not necessarily imply the absence of any health hazard.

There were three principals at Durham Elementary during the school attendance study period. The third principal served only during the two DASTP operational years, so the effects of his policies on school attendance are confounded with those of the DASTP. This change in principal may have been responsible for much of the improvement in attendance at Durham Elementary in the DASTP operational years.

This report attempts to provide an assessment and discussion of pertinent data as it applies to the health of sewer workers from a series of documents published over the period of 1975-1977. The report was based on four separate sources: 1) responses to a questionnaire to sewer workers about health and working conditions; 2) a study of sick leave records from January 1957-December 1973 for sewer workers and a control group of all city office workers; 3) a study of death records compared with national mortality statistics; and 4) assessment of reports of analyses of sewer atmospheres for toxic substances.

The municipality of Copenhagen serves 600,000 permanent residents, approximately 200,000 transients and commuters and has an industrial load equivalent, on a BOD5 basis, to 1,600,000 additional persons for a total equivalent load of 2.4 million. The sewage is strong with a BOD5 concentration of 750 mg/l. Over the entire period covered by the reports, sewer work involved primarily cleaning and maintenance of sewers, manholes, screens, and pump stations. About eighty permanently employed workers were classified as sewer workers in 1976.

Mortality statistics show that sewer workers die earlier than Copenhagen males of comparable age, many of them within the year that employment terminates. Workers who have spent 1 to 8 years in sewer work in the 15-year study period have a death rate indistinguishable from the city rate. For the next 8 years of employment, the rate is more than twice that expected for all Copenhagen males.

Attempts to correlate the statistics with sick leave records or chemicals in the environment were not successful. Sewer workers experience a high rate of gastrointestinal tract disorders which the workers associate with chemical odors and infectious agents. Workers have elevated levels of gamma globulins. Analytical work has not identified any agents that might be responsible for the observed death rates or gastrointestinal problems.

This draft research report was compiled by the Department of Environmental Health and Medicine at the University of Cincinnati (U of C) Medical Center to determine the health effects, if any, associated with occupational exposure to biological agents present in municipal wastewater. An additional objective was to determine the sensitivity of the methodology used for detecting potential health impacts of other wastewater exposures, such as recreational contact with surface water receiving wastewater effluents.

About one year after this research began, its goals were expanded to include a determination of the health effects, if any, associated with the dispersion of airborne bacteria and viruses generated by the activated sludge wastewater treatment process.

In order to evaluate potential health effects, a sero-epidemiologic study was conducted with municipal wastewater workers and controls in three metropolitan areas: Cincinnati, Ohio; Chicago, Illinois; and Memphis, Tennessee. The study consisted of four aspects: epidemiological, environmental monitoring, clinical aspects, and a serological survey. The epidemiological phase involved selection of study population, recruitment of volunteers, collection of biological specimens for the serological and clinical survey, collection of illness information, collection of demographic and medical history information, and worker activity observations.

The environmental monitoring portion of the study consisted of determination of airborne bacterial levels at worksite locations, and assay of wastewater for viruses and bacteria.

The clinical aspects consisted of yearly multiphasic and physical examination of study volunteers, and analyses of throat and fecal specimens for bacteria, viruses, and parasites. Parasitic examinations were performed only during the early period of the study in Cincinnati. The multiphasic and physical examinations served three purposes: (1) to evaluate whether wastewater exposure affected certain tests of liver function; (2) to assess the overall comparability of study populations; and (3) to provide motivation for volunteers to participate in the study.

The core of the study involved an extensive serological survey to determine levels of antibodies to a group of viruses and bacteria and to assess overall immunoglobulin levels. Of concern in the serologic survey was whether overall concentration of antibody concentration was different among the various study groups.

Possible correlations among results from the epidemiological, environmental, clinical, and serological phases of the study were investigated to evaluate potential health effects.

As initially conceived, the study was to include four groups of workers in Cincinnati, Ohio. Each group was to be a minimum of 30 in number. Two of the groups were to be routinely exposed to municipal wastewater: one group for a minimum of two years, and the other just beginning such exposure. The other two groups were to be engaged in an occupation not involving wastewater

contact, and, again, one was to have been on the job for at least two years and the other just employed. In Cincinnati, the occupational group thought to be most exposed to wastewater was sewer maintenance workers, who were thus chosen as the exposed population. These workers maintained the combined sanitary and storm sewer system. Highway maintenance workers of the Cincinnati Public Works Department were selected as the control group, since they were similar in age and race to the sewer maintenance workers, and the types of jobs they had were similar.

Because of a moratorium on hiring new employees in the Cincinnati Public Works Department, prospects for establishing a newly employed highway maintenance study group could not be obtained, and the group of 30 inexperienced sewage-exposed workers was expanded to include newly-hired wastewater treatment plant workers as well as the newly-hired sewer maintenance workers. The study design was then expanded to include two additional exposed population groups: fifty (50) men at the Cincinnati Mill Creek Sewage Treatment Plant, which was in the process of being expanded from primary wastewater treatment to include the activated sludge process; and a total of one hundred (100) men employed at activated sludge treatment plants. The purpose of including this group was to differentiate between aerosol exposure and exposure to wastewater and sludge through those operations associated with primary wastewater treatment.

In all cities the wastewater-exposed workers recruited were generally outdoor workers engaged in various operational aspects of wastewater treatment. In Chicago the inexperienced wastewater treatment plant worker groups that were recruited were laborers and security guards. Laborers and selected operating personnel at the two Chicago water filtration plants were chosen for control groups because they were more similar in age and race than Chicago street maintenance workers. (The choice of a control group in Chicago was also based in part on an interest in using a different occupational group than in Cincinnati, where during the first year of the study the highway maintenance group repeatedly had higher immunoglobulin levels than the sewer maintenance group.) In Memphis neither highway maintenance nor water treatment plant workers were similar in age and race to the newly hired wastewater treatment plant workers. A suitable control group were located at the Gas Service Center of the Memphis Light Gas and Water Division (MLG&W).

In each city, meetings were held with appropriate management and employee representatives to explain the study and what was expected of participants. The study was identified as the Public Works Employees Health Study. It was stated that participation was voluntary and that all results would be treated in a confidential manner.

At the time of joining the study, a family history questionnaire was administered by a member of the research team. Questions included ones relating to chronic health conditions and previous major health problems of household members. In addition, at the time of the annual health evaluation, a more detailed medical history questionnaire was given. Permission to share study results with the participant's personal physician was obtained at the time of recruitment.

Demographic information collected on each worker included age, race, years of school, job classification, salary, total household income, number of persons dependent on family income, household size, and household composition

broken down as to adults, school-age children, and other children. The breakdown of household composition was primarily for the purpose of examining the number of school-age children, as they are likely to be a source of infection.

Each worker was generally visited on his job several times during the study to determine type of job, frequency of wastewater contact and aerosol exposure contact, and other related work conditions. Results of these observations were used to categorize the worker on a relative exposure scale for direct wastewater contact and one for aerosol exposure.

The environmental monitoring program consisted of viral and bacterial analyses of wastewater samples and bacterial analyses of aerosols. The purpose of the aerosol sampling procedure was to provide data for the estimation of the worker exposure to airborne microorganisms. The viral analyses of wastewater were used in deciding what viruses to test for in the household member serologic survey.

Six stage Andersen samplers were used to collect the aerosols at about ten sites at each treatment plant studied. The Andersen samplers were fastened to tripods about 4 feet high. For all aerosol samples, calibrated pumps pulling 1 cfm were utilized. Each sampler was specially equipped with six molded Andersen glass petri dishes containing 27 ml of plate count agar.

In order to process the aerosol samples as soon as possible, preparation and analyses of the plates for bacterial aerosol sampling was performed in Chicago by the MSDGC, in Memphis by the Memphis State University, and by the bacteriologist on the study staff in Cincinnati. At least once during the study, duplicate samples were collected in Memphis and Chicago for analyses by University of Cincinnati personnel.

A portable weather station was used during periods of airborne bacterial sampling. This station consisted of instruments for wind directions and speed, temperature, relative humidity, and barometric pressure readings.

During the quarterly specimen collection periods, 45 ml of blood were collected from each worker, in three 15 ml portions. After clotting at room temperature, the tubes were centrifuged, and the serum placed in labeled vials.

Viral isolation specimens were obtained from a throat swab collected by a medical technician or nurse, and a rectal swab collected by the participant. Bacterial isolation specimens were obtained by a second rectal swab, collected by the participant at the same time as the first.

During the early portion of the study, before the aerosol-exposed worker expansion, stool samples rather than rectal swabs were collected and were analyzed for parasites in addition to viruses and bacteria. At the same time rectal swabs were substituted for stool specimens for virus isolation, stool specimen collection was continued for new sewage-exposed workers in Cincinnati. Urine specimens were also collected during the early portion of the study and were used for isolation of cytomegalovirus. These collections were discontinued because no such virus was isolated during the first

study year, probably because this virus does not survive long in the environment.

Single blood specimens were obtained from the household members of study volunteers during late summer of 1978. These specimens were obtained at various locations in the study cities, including in homes of the volunteers. These specimens were collected for use in a limited serologic survey to look for differences among study groups in household-member antibody levels.

Illness information was obtained through monthly family health diaries, telephone contacts, and on-the-job contacts. The objective was to contact each worker at least once a month. At the time of worker absence, telephone contact was made by a study nurse to determine if an infectious disease existed. If appropriate, a home visit was attempted for specimen collection. In order to facilitate a worker in contacting a member of the research staff in the event of illness, or to ask a question about the study, telephone answering systems consisting of tapes with remote retrieval capabilities were installed in all three cities. Illness symptom information from all sources was categorized as "respiratory," "gastro-intestinal," "other," and combinations of these.

During periods of illness, attempts were made to collect a throat or rectal swab from the study volunteer. These specimens were generally obtained in the worker's home, but on occasion were obtained at the office of his physician or at work.

Annual health evaluations of study participants and viral and bacterial isolations from biological specimens were the primary sources of clinical data. Stool samples from some Cincinnati workers were examined in the early portion of the study for the presence of ova and cysts of parasites.

Results of the serological survey of sera collected quarterly provides the basic core of data for the study. The sera were analyzed for antibodies to 33 viruses or groups of viruses, 10 bacteria, and 3 classes of immunoglobulins. Their purpose was to determine: (a) whether there were differences in antibody levels between groups, and (b) whether there were significant increases in antibody levels within a group of workers over a period of time, indicating infection. The researchers also investigated the relationships between an increased antibody level in a volunteer and the presence of illness symptoms.

In an effort to determine if there were any relationships among various types of data, several comparisons have been made among the many possible ones:

I. Worker Exposure - Virus Serology Comparisons

Every study participant was ranked into one of two categories for wastewater/sludge and airborne bacteria exposure: (1) above average, or (2) average or below average. These rankings are in all cases relative to fellow workers in the same worker group (i.e., experienced sewer maintenance). Job observations and environmental monitoring

data even made it possible to separate the control group into "clean" and "less clean" working environmental groups. None of the comparisons had a significant correlation.

1. Control Group Comparisons--

Using data from January 1978 and October 1978 from the final virus serology survey, the control group in all three cities were compared by exposure. One exposure category referred to airborne exposure and the others to solids and dirty water.

2. Exposed Group Comparisons--

The inexperienced sewage-exposed group in each city was ranked according to their direct contact with wastewater and sludge regarding the airborne bacterial levels of their workplace air. Prevalence levels and seroconversion rates were compared between combined-city groups with above average exposure to these conditions with those having average or below average exposure.

Results indicate that for only one comparison is the correlation significant. For sera collected in January 1978, the workers with average or below average wastewater/sludge contact had more titre levels less than the detection limit for the test than above average exposure workers.

3. Comparison of Above Average Sewage Exposed Group with Control Workers in Cleaner-Than-Average Working Environments

The inexperienced sewage-exposed workers ranked above average in wastewater/sludge or airborne bacteria exposure were compared with control workers ranked average or below average in either liquid/solids or contaminated air exposure. January 1978 and October 1978 virus serology data were used in making the comparisons. No statistically significant differences were detected.

II. Illness Rate - Antibody Level Change Comparison--

Four-fold or greater increases in titer level to a virus antibody is generally regarded as a medically significant increase. Such occurrences signify an infection which may be either clinical or subclinical. The study did not reveal statistically significant increases in viral infections that might be related to occupational exposure to wastewater, as indicated by virus isolations, distribution of antibody titers (comparative antibody levels), or increases in antibody titer levels, either in individuals or among work groups in Chicago, Illinois, or Memphis, Tennessee. In Cincinnati, Ohio, experienced sewer maintenance workers had higher antibody levels to Poliovirus Type 2 in January 1977. This same group had statistically significant increases in Echovirus Type 6 antibody levels from January-September 1977.

Based on the testing to date, there is no indication that occupational exposure to sewage increased the risk of Hepatitis A or B infection in study participants.

Analyses of single blood specimens from family members of study participants for antibody to six viruses did not reveal higher infection rates among families of exposed workers than controls.

No evidence was found to suggest that occupational exposure to wastewater by the study participants produced any increase in bacterial infection by Salmonella, Leptospira, and Legionella pneumophila.

Examination of biological specimens from workers for bacteria and parasites did not reveal any increase in isolation rates among sewage-exposed workers.

Immunoglobulin (IgA, IgG, IgM) levels were not found to be consistently higher in the sewage-exposed workers in any of the cities studied.

Testing of liver function did not reveal any consistent abnormalities in either the sewage-exposed groups or control groups.

Airborne bacterial levels, TVP's, inside buildings where wastewater sludge was being processed, were higher than those at aeration basins. TVP levels at some highway maintenance work areas are on occasion as high as those at aeration basins of activated sludge sewage treatment plants.

From preliminary analyses of illness rates, inexperienced workers exposed to sewage had a higher rate of gastro-intestinal illnesses than that of experienced sewage treatment plant workers.

B. Evaluation of Alternatives:

The aerosol monitoring procedure, used in 4 of the other 5 studies, represents the state of the art, since the LVAS's used offer increased sensitivity over other available methods. These instruments sample at 1000 liters/min

and to increase sensitivity for the viral runs, the Tigard, Oregon, and Pleasanton, California, studies pooled samples from LVAS's running simultaneously, resulting in sample volumes of 1,980,000 liters and 5,000,000 liters, respectively. The less sensitive Andersen samplers used in the University of Cincinnati study were considered adequate, since the microorganism aerosol concentrations at the treatment plant site itself are of the magnitude where these samplers' sensitivity are adequate to characterize the exposure levels present.

Since experience in monitoring wastewater aerosols at Pleasanton, California, showed that statistically usable biological analysis results could be obtained only up to 200 m away from the aerosol source during the day, and 400 m during the night, models were used to predict concentration levels beyond these distances in Pleasanton, California; Tigard, Oregon; and at the Egan WRP. Although the model used required assumptions whose validity is uncertain, the predictions of the model have been verified to 100 m for all three sites and were considered satisfactory by the researchers. This model represents the feasible limit of scientific capability for estimation of microorganism aerosol concentration levels.

To detect possible health effects, all but the Tigard, Oregon study utilized health surveys to record infectious diseases, symptoms, and frequency. In addition to using clinical samples (collectively: blood, feces, urine, sputum, throat swabs) analyzed for bacteria, viruses, and parasites, the Egan WRP, the University of Illinois, and the University of Cincinnati studies utilized a sensitive measure of antibody titer to detect infection. Antibody titer can detect subclinical infection which might not be detected through a health survey or other clinical specimens.

The Egan WRP and University of Cincinnati studies were designed to make pre- and post-exposure measures of health on the same participants and sampling area. This self-paired comparison of the results is a very sensitive procedure for detecting changes because it eliminates the inherent variability between human subjects and between locations. This study design also eliminates the possibility of acquired immunity masking potential health effects, since some participants are newly exposed.

The Tigard, Oregon study utilized a variation of the very sensitive pre- and post-exposure study design to evaluate health effects of a potential high risk group with exposure as close as 40 m from the aerated surge basin. Even though not all of the same students were investigated in the pre/post-exposure phases of the study, the potential variability created by this should be minimized through comparisons with data from the control schools.

To evaluate possible relationships between wastewater aerosol exposure and health effects, rigid statistical procedures were used to analyze the data. The epidemiologic study design used in the Egan WRP, University of Illinois, and the University of Cincinnati studies was the most sensitive that could be devised at the time for determining if any relationship between wastewater aerosol exposure and health effects exists.

The Tigard, Oregon and the University of Michigan studies also utilized health related data; however, these studies' measure of health and exposure, respectively, were not as sensitive as those mentioned above. Nonetheless, these studies should have detected any statistically significant relationship between exposure to wastewater aerosols and significant adverse health effects, if present.

The researchers concluded that several pathogens (Klebsiella, Mycobacteria, and Staphylococcus) in wastewater are usually higher in concentration than, and appear to have no relationship to, the concentration of indicator organisms such as T.C. and F.C. Viable enterovirus were found in low concentration in the primary effluent because they are primarily associated with the solids fraction of the wastewater.

The University of Illinois study concluded that activated sludge wastewater treatment plants are a source of low concentrations of bacteria, coliphage, pathogenic bacteria, and enteroviruses, but are not a source of trace metals, particulates and gasses.

The study conducted in Tigard, Oregon concluded aerosol concentration levels tended to vary from one run to another due to variations of microorganisms levels in the wastewater. However, high and extremely variable aerosol concentration levels were probably due to contamination of the LVAS's. The University of Illinois study found no correlation between the concentration of TVP or T.C. in aerosols and sewage characteristics. However, the Tigard, Oregon and Pleasanton, California studies concluded that the use of such indicator organisms as T.C. and coliphage appear to be inadequate to characterize the pathogenicity of aerosols. Microorganism aerosol concentration levels 70-100 m downwind of the aeration basin at Tigard, Oregon were generally as high or higher than levels of such indicator organisms as T.C. or coliphage. The Pleasanton, California, study suggested some microorganisms (Coliphage, Clostridium perfringens, TVP) have a lower decay rate than T.C. and F.C.

The higher concentrations of substances detected close to the aeration basins have been found to rapidly decrease in concentration with distance away from the aeration basins. For example, the very sensitive enterovirus monitoring conducted at Tigard, Oregon (referenced above) detected no enterovirus at 30 m downwind of the aeration basins, indicating a concentration less than 0.0009 pfu per m³. The study conducted at the Egan WRP concluded that the levels of microbiological or chemical agents of the air, soil, and water samples in the neighboring residential areas were not distinguishable from background levels monitored.

It has been suggested that other factors also affect the microorganism concentration levels detected. The Pleasanton, California study suggested ambient conditions, such as low relative humidity, high wind

velocity, and large temperature differentials between wastewater and air, may reduce initial microorganism survival, and die-off may be more rapid with high solar radiation and high temperature. In contrast, the University of Illinois study found no relationship between TVP or T.C. bacteria concentrations and ambient conditions. However, as stated above, the use of such indicator organisms as T.C. appears inadequate to characterize microorganism aerosol concentration, and since the Pleasanton, California study used more sensitive sampling techniques, it appears a relationship does exist between ambient conditions and microorganisms survival in aerosols.

Several studies investigated microbiological aerosol particle size distributions to determine if certain microorganisms contained in the aerosols could be inhaled. The Egan WRP study and University of Illinois study found the majority of the T.C. and TVP were in the respirable range, but no clear trend for change of particle size distribution with sampler distance could be detected. The Pleasanton, California, study of aerosols from spray irrigation equipment did detect a relationship between some microorganisms particle sizes and distance; however, this relationship would not be expected to apply to aerosols generated from aeration tanks.

The studies conclude that residential populations as close as 152 m from the aeration basins at activated sludge wastewater treatment plants have no significant adverse health effects from aerosols emitted during plant operation. In addition, elementary school children—a potential high risk group, appeared to have experienced no health hazard from aerosol exposure as close as 40 m from the aerosol source at an activated sludge wastewater treatment plant.

Some preliminary analysis of illness rates indicates that inexperienced sewage plant workers had a higher rate of gastro-intestinal illness than experienced workers. Since these workers have exposure both from direct contact and aerosols, the appropriateness of extrapolating these findings to a population residing near a sewage treatment plant remains to be determined.

The isolated instances associating wastewater exposure to health effects could be due to chance, or a result of biased responses to health questionnaires, and are not considered significant when weighed against the preponderance of evidence indicating no health hazard from exposure to aerosols emanating from activated sludge wastewater treatment plants. This is especially true if considering nearby populations rather than intensely exposed workers.

Despite the fact it could be argued that weaknesses in individual studies may lower their sensitivity, if any health hazards result from exposure to activated sludge wastewater treatment plant aerosols some substantial indications of health effects should have been discovered.

The O'Hare site and the sites studied are similar in the following ways:

1. All the plants are activated sludge plants and received the following quantities of primarily residential sewage during the study period:

<u>Study Plants</u>	<u>Flow (mgd)</u>	<u>Influent Concentration (mg/l)</u>	
		BOD5	SS
Egan	17	127	196
Northside	292	85	106
W-SW	821	138	196
Calumet	223	168	328
Tigard	11	112-162	187-262
Memphis Maxson	10-20	-	-
Memphis North	10-20	-	-
Cincinnati	120	-	-
O'Hare	45 (initially)	146	180
	72 (design yr 2000)		

2. The aeration tank design parameters are identical for all MSDGC plants and are similar to the other plants studied. Each MSDGC plant is constructed using diffused plate aerators with the air rate adjusted to provide 2 mg/l of oxygen in the tanks. Since the influent for each MSDGC plant is similar to the other plants studied, the aeration rates should be similar. Below are the surface areas of the aeration tanks for selected plants:

Surface Area of Aeration Tanks (acres)

Egan	2.58
Northside	13.6
O'Hare (initially)	3.2
(design flow)	5.16

(other data not available)

3. The various studies monitored the following microbial concentration levels:

Study	Background Concentration (number/m3)		Distance of Closest Population Exposed (meters)	Concentration at That Distance (number/m3)	
	MEAN/PEAK			MEAN/PEAK	
	TVP	TC		TVP	TC
MSDGC					
-Northside	411/804	1.1/ -	152	354/513	12/ -
-Egan	1153/3200	<.3/.3	400	indistinguishable from background	
-W-SW	N/A	N/A	at aeration basins	253/544	13/ -
-Calumet	N/A	N/A	at aeration basins	292/906	4/ -
-O'Hare	400/ -	*20/ -	117	**425/850	*21.2/42.4
Tigard	-	<.07/<.07	30-50	-	5.8/11
Cincinnati	N/A	N/A	at aeration basins	812/2967	8/ -
Memphis					
-Maxson	N/A	N/A	at aeration basins	583/1827	68/ -
-North	N/A	N/A	at aeration basins	735/3258	43/ -

*Based on assumption that TC would be 5% of TVP.

**Estimated by a model, see response to comment 9.

Because of the similarities between the O'Hare plant and those studied, similar increases in microbial concentrations are expected to occur due to the plant. Since health hazards were not detected in the studies of situations similar to O'Hare, no health hazard is expected from operation of the O'Hare facility.

One possible health effect was detected through the household health survey for residents 400 m away from the Egan plant. The illnesses quoted increased from 1.2 percent to 3.5 percent. Not mentioned were the number of illnesses shown to decrease during the same period based on questionnaire results. Examples are colds, fevers, and sore throats for the people living close in. A more sensitive testing procedure, checking 31 viral antibodies and attempted isolations of many pathogenic bacteria, parasites, and viruses yielded no evidence of an adverse wastewater treatment plant effect. Therefore, the questionnaire results, by themselves, cannot be considered evidence of a health hazard.

Another health effect detected was for inexperienced sewage treatment plant works who had reported a higher rate of gastro-intestinal illnesses when compared to experienced sewage treatment plant workers.

This effect was only a short-term effect and, as can be seen, these workers are exposed to a much higher level of aerosols than the residents nearby the study plants or the levels expected to occur nearby the O'Hare plant. Furthermore, STP workers come in direct contact with sewage and therefore have more pathways of infection than the nearby residents.

1. ACTION

- a) Rescind the grant condition requiring MSDGC to construct aerosol suppression facilities at the O'Hare WRP:

Testing of a thorough, critical, and sensitive nature, representing the feasible limit of scientific and economic capability, have shown that no health hazards result from exposure to aerosols.

- b) Modify the grant condition and allow operation of the O'Hare WRP without aerosol suppression facilities, and continue ongoing analysis of potential health effects.

- i) If further study shows need for aerosol suppression:

Monetary, natural and depletable resources would be expended on further study and in the construction and operation of aerosol suppression facilities. Other adverse impacts include noise and dust associated with construction.

- ii) Further study shows no need for aerosol suppression:

Beyond the expenditure of monetary resources to further study the potential effects of aerosol exposure, no direct or indirect impacts will result from this action. Thorough research has shown that no health hazards result from exposure to aerosols emanating from activated sludge wastewater

treatment processes within the envelope of accepted U.S. design and operational practice.

2. NO ACTION

Retain the grant condition requiring MSDGC to complete construction of aerosol suppression facilities at the O'Hare WRP prior to or concurrently with the commencement of functional operation:

Monetary, natural, and depletable resources would be expended on the construction and operation of aerosol suppression facilities. Other adverse impacts include noise and dust associated with construction.

If operation of the O'Hare WRP would be delayed to construct aerosol suppression facilities, the overloaded system presently used would cause continued combined sewer overflows and flooding of basements with combined sanitary and stormwater, thereby threatening public health.

V. PUBLIC PARTICIPATION

A Notice of Intent to prepare a Supplemental WRP EIS was issued on July 18, 1979. Copies of this Draft Supplemental EIS were available to the public approximately 30 days prior to the October 29, 1979 Public Hearing. Because of the response to the public hearing, the record remained open until November 30, 1979 to allow further comment on matters brought up at the public hearing.

A number of comments were received at the public hearing and in letters sent directly to the USEPA. The public hearing comments are reproduced directly from the hearing transcript, and the comment letters are reproduced and presented in chronological order. The numbers in the margins of the transcript or the letters numerically identify the response to those specific comments. These responses are listed and presented on those pages immediately following the comments.

A. COMMENTS AT THE PUBLIC HEARING -- OCTOBER 29, 1979

MR. WARD: It has been a lot of years. There are people in the audience that have been working with us for fourteen years now, and a lot of familiar faces, and we are all getting a little older and grayer. Welcome back.

In 1975, the U.S. EPA was confronted

by five conflicting factors summarized in this transparency. The public was demanding a more remote site to agree with the isolation distance required by HUD and every other state in Region V. The White House was pushing for jobs to stimulate the economy and help in any reelection attempt.

The U.S. EPA's regulations required a decision by June 30, 1975 or the funds reserved for Illinois would be reallocated to the other states. And the scientific community was concerned that there was no proof that the aerosols were safe.

The EIS team selected the more remote site, Option A. But Francis Mayo overruled them because of factors B, C and D. And the rough draft EIS was rewritten selecting the site adjacent to our homes with no provisions to control the aerosols.

Public hearing testimony and further scientific input convinced Francis Mayo that aerosol suppression was a necessary EIS and draft condition because there was no proof that aerosols were safe.

The appeal procedures to the President's Council on Environmental Quality was attempted in June of 1975, and the CEQ staff expressed concern over several serious deficiencies in the U.S. EPA's final EIS at our meeting in Washington. The subsequent follow-up by Congressman Crane's office resulted in four phone calls not being returned in one week during July. The silence by the CEQ has never been explained.

The challenge by Des Plaines in the federal court on the adequacy of the final EIS was successfully defended by a legion of federal and MSD attorneys. It was never explained why there were so many missing and incomplete answers to our several hundred questions in the final EIS.

In 1975 we were concerned that the unspecified "aerosol suppression" draft condition was merely a legal defensive ploy. We possibly were right.

A number of studies were quietly begun without the knowledge of Des Plaines officials to attempt to show that aerosol suppression was

neither "cost effective" or necessary.

In the meantime, the project that was supposed to be done, examining alternative methods of suppressing the aerosols, was somehow delayed. The public, the federal courts, Des Plaines officials and even apparently the Illinois EPA have been misled by these Region V actions.

Let us now review the various studies that have been accomplished since 1975. And we will examine them to determine if they provide the guarantees in the National Environmental Policy Act that "assures for all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings." This includes the several hundred persons living adjacent to the O'Hare sewage plant.

We will examine these studies to find any health data applicable to young children and senior citizens with bedroom windows within a hundred and fifty feet of several acres of aeration tanks. And we will determine if the focus is on the adverse conditions of high humidity, mild wind, low ceilings and cold temperatures.

I will begin with my conclusions that none of the studies meet any of the above requirements. That is a sad status report and so important of a subject after it had supposedly been a high priority of U.S. EPA for eight years.

In 1971, Region V concluded the Highland Park Clavey Road study with this recommendation, and I quote: "The water program office of the U.S. Environmental Protection Agency is advised to initiate a study under controlled conditions to ascertain the possibility of airborne infections from sewage treatment facilities."

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And Region V required the aeration tanks and retention basins to be "covered to protect the local residents from objectionable odors and potential airborne infections." That was eight years ago, in 1971.

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Before we get to a critical examination of each of the studies, let me explain to the audience here this evening that the U.S. Environmental Protection Agency held a three-day symposium on wastewater aerosols and disease in Cincinnati, Ohio

on September 19, 20 and 21st, 1979. If I had been invited to participate in the symposium, my presentation may have been viewed as biased or too conserative.

However, an individual selected by the U.S. EPA to deliver the final assessment at the symposium should be listened to very carefully, especially if that individual had a good objective knowledge of the studies.

The man responsible for coordinating all of the individual studies being discussed here this evening is Mr. Leland McCabe, the Director of the Field Studies Division of the U.S. EPA Health Effects Research Labs. He helped to summarize the recent three-day symposium on wastewater, aerosols and disease.

I think it is important enough to quote his entire presentation that I transcribed from the recording of the meeting. He said, "Henry Longest asked if the challenge was only scientific, and I would have to answer, based on what we have heard in the last two and a half days,

that we do not have the scientific know-how to address this problem of sewage treatment plant aerosols.

18 We have spent somewhat over \$3 million in the last several years, and we have to conclude that we do not know how to measure what has to be measured. Considering the impact to the agency, I think the research money has been constructively spent. The effort has not been excessive, certainly, and it has not been lucrative. But the research in many cases has not produced very helpful answers.

18 Mr. Longest was apparently concerned that our assessment would be made and would increase the cost of sewage treatment. I think if we made an assessment of what we have heard the last two days, we could probably save him quite a bit of money in his construction grant program because, pretty obviously, there is no hazard to sewage, and we could all probably get by with cess-pools in our back yard.

And certainly, as our colleague

from Baylor has indicated, that in this case, the sewage. the kids would be playing in would be from our own family, and obviously that is not hazardous. In order to say that the sewage treatment plants are not a hazard to the neighbors, I think we have to have an instrument that can measure somewhat along the dose response curve where we do have an effect, if there really is one.

Midday addressed the problem when talking about the power of tests to detect a real effect when one existed. We have applied inquiry systems, serological epidemiology and infection rates. These have all been used by some of these studies of sewer workers or sewage treatment plant workers, and we do not have a demonstrated effect, except possibly the one that Scott indicated in new workers.

I think we have to have a method to show we have an effect in a micromized exposed population before we can conclude that the exposure is much lower in the neighborhoods. I think your problem is the sample size. Each one has been too

small and inadequate. I think we are going to have to pool the results from several studies. But this might not be too hopeful because Scott's study in Cincinnati did not even have much of a difference and sometimes not even in the right direction.

To think if you had more data, you would be able to show that a small effect would be significant. I don't know what we are to do! I guess he studied every new worker when he came to work. It is not a question of sampling even the entire universe of workers. What else could he do?

We did have one paper that indicated Dr. Rylander's techniques and demonstrated effects. I think we have to consider what he has been doing compares with what we have been doing and how it might fit together.

Some of us at least took some comfort, Cecil obviously did not from the comments he asked; that we had a worse case situation occur in Israel, and we can extrapolate down from that situation.

But we are told that probably was a fluke also, and we really did not have a worse case situation.

The effect of the environment on enteric diseases has certainly been measured by others. We have just equated a series of studies relating to the bacterial indicators in water quality and gastrointestinal illnesses in swimmers. Even as a child I was able to show the effects of herpes on dysentery rates.

It is possible that it is something than an adult is really not responsive to an infection and may like measurable antibodies. Scott would rather have to study a group of Cub Scouts led by seven-year old den mother and measure something as they go along and clean up the polluted river bank. We just somehow have to do something that we can have a measurable effect we can back off from.

The chemical epidemiologists seem to have solved their problem pretty effectively with just a few studies of infection curves. They can measure them and all that is required is

to keep the neighborhood below the TLB or maybe to keep it below the background level. The concept of getting a viable count below background should also be considered in the microbiological sense, but I'm not sure we know how to measure the viable count in the proper way.

We obviously need to be measuring something that relates to infectious dose. It is possible that what we have referred to as aerosol shock is really the reducing the size of microbiology from clumps and maybe an aerosol made up of only singles of microbiological entities and these could be less than the infected dose. To get at this, we would probably need some kind of an animal model which was done by some of the early work at the VA Hospital on airborne infections in Baltimore. We may have to get at this problem of microbiological measuring of what is in the air by some other means than just straight plates or cultures.

If we have to study real susceptible populations, we obviously have to involve children. We're not going to get those in a sewage treatment

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plant with that type of exposure. The children we studied in the Tigard, Oregon exposure situation received the maximum dose only one day per year with infectious organisms, and that is not reflected in their absentee rates.

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Dan's paper that he gave here was much easier to understand for me than the report that was turned in by the group. Obviously, the time allotted here got it down so that it was a little more understandable. Now, he did not specifically talk about children, but he did indicate that there was an adjustment, that there were children involved in the study.

When he adjusted for all other factors, he did not get an effect at the 600-meter distance. And if you look at the tables in the report, you get some hint that maybe that was a component made up of children.

Now, there probably won't be enough children in there alone to get some significant results." At this point there was a short garbled section of recording. One sentence is missing.

"It would be something that we may want to get more data on especially for the younger ages and probably a separate grant ought to be submitted to study those few people that live at 2400 meters to try to explain how come they are different from the rest of the city.

Don Johnson also reported the effect on neighbors; that some infections were higher after the start-up of the operation at the Egan plant. Here the illness effect, looking at the table in the report, looks like it might be greater on children. I was not able to note any difference on the infection rates as it related to children, but of course that study is done.

But it might be fruitful to follow another start-up of a sewage treatment plant where we would concentrate our concern on the children and not factor the adults against the situation. If we were requested to continue health effect studies, I think it would be well also to do the type of research that was commented on this morning because the challenge we got on

the first morning was that it is terribly costly to do anything about aerosols. And also if you are able to do anything about that, to insist on that type of control, you have to have some unequivocal health effects data.

But, if the suppression can be accomplished, at least costs, then I do not think the health effects would have been so unequivocal. From what we have heard, I think there seems to be a little justification as far as expenditures for aerosol suppression at this time, but I think the planners of sewage treatment plants must continue to be concerned with what can be done in a reasonable way to minimize aerosols.

Here is obviously a case where the answer is more than scientific. I am sure the public must feel that their interests have been considered and that something could be done within reason to minimize the potential or imagined hazard. That is what I want to say."

May I have Slide No. 2, please.

Let us examine the North Side Study.

There are seven studies that we are going to be going through this evening. This is the long presentation; bear with me. There's a lot of meat in it. I am only highlighting the things that the U.S. EPA neglected to highlight.

Let us examine now the North Side Study; it was conducted in Skokie, Illinois by the University of Illinois Medical Center. I will not repeat any of the information contained in the draft Environmental Impact Statement, but I will highlight only the areas critical to the study.

Again, let me thank Dr. Carnow and Dr. Northrop and their associates for advising those who will use their work that, "The overall conclusion that this activated sludge treatment plant had no obvious adverse health effects on residents potentially exposed to aerosol emissions must be tempered by the recognition that only a very small number of people were exposed to the highest pollution levels."

It is also important to note that this plant was not a source of high concentration

of viable particles, gases or metals to the study area." That last sentence requires the further explanation that this plant may not be representative of other plants where the emissions are considerably higher.

Let us further examine the very small number of people exposed to the highest pollution levels by looking at the make-up of the 847 participants living within one-half mile of the center of the plant.

From page 62 of the study we find that 5.1 percent or only 43 participants living within one-half mile were under six years old, and that represents the most susceptible group. And of these 43 children, only 7.1 percent or three have lived in the area for less than one year. And we do not know if these hypothetical three children live in the homes six hundred feet from the tanks or twenty-five hundred feet from the tanks.

And, further, we do not know if immunities are built up in less than one year.

If it only takes four months, then our sample size is down to one child. If this child gets infected by the plant emissions, then the infection rate is one hundred percent of this most susceptible group. But this one hundred percent rate would be lost if mixed with the other 846 participants living less than one-half mile.

This is certainly an illustration of the inadequate sample size that Mr. McCabe was referring to in Cincinnati last month.

The North Side Report included each of the air sampling results, and I attempted to partially reconstruct the data to see if the environmental monitoring had a logical trend from upwind to downwind.

From the transparency, we can see the upwind average of 141 total viable particles per cubic meter is increased to 376 as it moves across the plant and then rapidly dies off until only 181 are left at the one-half mile point and 155 at the one mile point.

I began to plot the individual runs

of four samples per day, and you see here the first twenty percent of the runs, the second page of five and a half pages. I ran out of time and space on this particular plot, but you can see that the-- you can see the irregular data on this first eleven runs. Most of the upwind values actually decreased after crossing the plant and the frequent irregularities continued to do odd things downwind. Apparently, they just continued to take data until the averages ended up where they wanted them.

The U.S. EPA's staff in Cincinnati should reconstruct this data to see if the implications or conclusions are justified.

Let me depart from my written text and further explain: The green dotted line is -- actually, the purple line is probably what you expect for the aerosols to be. The background is 141; it moves, it does not change, of course, until it hits the plant and then the plant adds considerably to the viable count. So, it gets up to 376, drops off very rapidly. I do not know how rapidly it drops off.

Of course, the only data points we have are at the plant and at the half-mile point, but I presume from other literature that it drops off approximately with that slope. From the upwind point to the plant, all the individual samples should logically increase. The background level, of course, should be one thing, as you move across the plant they should increase.

All the red lines you see between -- all the red lines you see between here and here all go the wrong direction. You can see they all should be going up. Whatever value you have here should remain somewhat consistent. As it hits the plant, it should be added to, but it is not added to; it ends up lower. We have more going the wrong direction than we have going in the right direction, and the same thing continues after they go by the plant; these should all go downhill. They should be going down like the green line goes down. They should be going down, instead, they are going up.

When they get to this point, they should continue to go down, but they are going up.

So, these irregularities, I did not have the time to continue with this plot and continue the four and a half pages. I do not know what I would have found.

44 But it appears to me that at least this first month's effort they looked at it and said, we cannot stay on this; we are going to keep going until we get something we can use. 44

What they finally ended up with was 141, 376, 498 and 155, beautiful, logical. That is what you would expect, but the underlying data that goes into it is extremely irregular, and I think it should be reexamined.

May I have the next slide, please? It is a little premature, but that is fine, Rick. This is still on the North Side Plant.

Robert Dean of Copenhagen commented on the North Side Study. This is at the Cincinnati meeting. "You can get a lot more statistical information if you use the law of normal statistics," he said. "The law of normal statistics would be useful in estimating the power. How big a difference would it have to be before you could see it at all?

Then you could get a little better estimate of the power of your system."

Just last Wednesday in a phone conversation with Dr. Northrop of the University of Illinois, we were talking about environmental monitoring equipment that is available today. And he said:

"The state of the art is so crude that it is embarrassing." Later on in the conversation he said, and I quote, "The newcomers are the guinea pigs." And, unfortunately, all the residents of the Devonshire and Einstein areas will be the newcomers or the guinea pigs when the O'Hare plant begins operation.

I have not met Dr. Northrop personally, but I understand he may be in the audience this evening. We both share the same objection to finding answers to the health questions, and he may desire to share his concerns with us later this evening. Now, Rick.

Let us first -- the Egan Plant Study, let us examine now the Egan Plant Study to find what

answers relate to the O'Hare question. Even before the study was begun, you people in Cincinnati searched the country for the best study site, a new plant being built near an existing population center. The U.S. EPA could not find one candidate throughout the country that fit that description. They couldnot find one candidate of a new sewage treatment plant that was being built next to a populated area.

Therefore, they had to settle on Egan recognizing, and they recognized this in writing in the work plan, that the obvious short-coming, that no one lived within one-third mile from the plant. It was an ill-conceived study and a waste of \$280,000, but, more importantly, time was lost in going through the motions of doing something.

We do appreciate the professional integrity of Dr. Johnson when he wrote into the recommendations on page 11, and I quote: "Primary negative findings were found relative to adverse health effects related to the transport of pathogenic aerosols to exposed populations. These results

should not be accepted as conclusive findings."

46 Another quote from the study reveals that "The Household Health Survey indicated that increased incidents of skin disease and the symptoms of nausea, vomiting, general weaknesses, diarrhea and pain in the chest on deep breathing occurred close to the sewage treatment plant and predominantly in the downwind direction after it was in operation." You won't find that in that blue book you were handed out this evening.

47 One of the study conclusions was "Results for alpha and gamma hemolytic streptococci isolations in the throat swabs for the subjects from the Lexington Green Apartments provide some evidence that the pattern may relate to exposure to the wastewater treatment plant aerosols."

Another quote from the conclusions is that, "The findings obtained in this study, when considered overall, did not detect a public health hazard for persons living beyond 400 meters from a well-operated wastewater treatment plant."

But remember Dr. Johnson's caution

that "These results should be accepted as conclusive findings." The U.S. EPA must have overlooked this advice when writing the draft EIS.

The study states on page 3 that it is important to the general design to select a new sewage plant. This is a quote. Sorber, et al, suggested that treatment plant workers and nearby residents of an older plant might not show health effects from exposure to microbiological aerosols because sporadic inhalation of low concentrations of pathogens may confer a degree of immunity.

For an epidemiological investigation of microbiological hazards to have the power to identify any health hazards that are present, newly exposed human subjects might be necessary. With a new sewage treatment site, all the potential participants are newly exposed. And, of course, that would be the situation here at O'Hare, but we are not willing to volunteer to be newly-exposed participants.

Next slide, please.

Next, let us examine the Durham

School study in Oregon. Page 2 of the study has some critical remarks for the previous two studies, Egan and North Side and I quote, "In general, both studies found little evidence of detectable health effects. This may be because both studies lacked enough participants living very close to the source of the aerosols who would have had substantial exposure from the aerosol. In the study by Johnson, et al., the requirement for evaluating a new plant necessitated examining an area that was sparsely populated.

In the study by Carnow, et al., industries occupied much of the area near the treatment plant, so that few residences were located near the plant. That was the Skokie North Side plant."

In the Durham Study, we solved the problems of not having enough children and of not being close enough to the aerosol source, but this study failed by using the insensitive measure of school attendance to determine any adverse health effects. If the attendance had gotten worse, the

study could have concluded that the plant was the contributing factor. And we all rub our hands here in Des Plaines and say, "We finally have some good hard effort."

If the attendance remained the same, then the MSD would have rubbed their hands and then the plant would have been judged not guilty, but instead the attendance improved, so they had to label that measure insensitive.

The analysis of class attendance data did show some extended periods of elevated absenteeism among first and second grade students after operation of the sewage plant started, but this trend also occurred in many of the base line years. The study reveals that the students received a peak dose only one school day a year.

The study concludes that the improvement in attendance may have been due to a change of principal when the plant began operation.

Next slide, please.

The next study we will examine was conducted in Tecumseh, Michigan by the University

of Michigan and IIT Research Institute.

The conclusions on page 2 indicated that, "During the warmer seasons, some respiratory illnesses within 600 meters, approximately 2000 feet of the wastewater treatment plant, exceeded those expected by twenty percent and twenty-seven percent, and some gastrointestinal illnesses exceeded those expected by seventy-eight percent and fifty percent when specified by income and education, respectively."

The conclusions also revealed that, "Higher rates of illness transmission in areas of higher densities of lower socio-economic families could have contributed to the findings." And I might add that the higher illness rate could be caused by the plant, although there seems to be a reluctance by the research people to accept this concept; and, yet, when pressed for an answer, they will admit that they do not have the dose response information.

Next slide, please.

Now, let us examine the fifth study of the seven studies we will look at this evening.

48 The EIS devotes five pages to a review of this study but carefully forgets to mention the last paragraph of the executive summary which is the same as the last conclusion, which is similar to the first recommendation. If you have not read the basic report which has not been distributed yet, then this will be news to everyone except the Region V people who apparently dread any reference to dose response. 48

"The overall conclusion of Phase II of this program is that microbiological wastewater aerosols are generated by spray irrigation do survive aerosolization and can be transported to nearby populations. The most reliable means of reducing a potential health hazard from pathogenic aerosols is by disinfecting the wastewater before spraying. Until the necessary dose response relationships are developed, neither the level of aerosolized microorganisms that constitute a hazard nor the degree of required disinfection can be specified." 48 41

I agree with that conclusion, and I

detest the apparent cover-up of that important statement. Instead, the EIS is stuffed with useless field material to make it appear very scientific and thorough, but it is nothing more than a pure and simple cover-up of essential information.

59 | Let me give you an example of useless
field material: "This population is located in a
recently completed subdivision of Mission Drive.
Mission Drive runs east and west, and the street
begins on Sunol Boulevard opposite the treatment
plant." So what? Is that really more important
than what was emitted? | 59

Let us shift for a moment to some comments made on this dose response subject by Dr. Sorber who participated in both the Durham School study and the Pleasant Town, California study. These comments were also transcribed by me from the recording of the Cincinnati symposium on Wednesday, September 19, 1979.

Dr. Sorber of the University of Texas shared with us in his introductory remarks: "The potential for health effects of wastewater aerosols

continue to be of some concern. This is based both on the number of pathogens found in wastewater and on still inadequate infections on minimal infectious doses of those pathogens, particularly viruses."

Later on he said, and I quote: "As knowledge of the concentration and extent of the transport of these organisms has increased, greater emphasis must now be placed on the more difficult question, that being the level of risk associated with various concentrations of these aerosols."

49 | The fact is that -- this is another
| quote: "The fact is that considerable questions
| remain as to the level of risk to be associated
| with microbiological aerosol from wastewater
| operations in this country including spray irrigation."
| I thank you.

Next slide, please.

Our sixth study in the draft Environmental Impact Statement is another very poor attempt at hiding information. Region V of the U.S. EPA is supposed to work for the public. If the individual responsible for this emission worked in private

industry and withheld sensitive information from the owner of that company, he or she would be fired, but not in the federal bureaucracy.

Please, you won't find these quotations in the biased EIS. These are found on page 7 of your document.

"In the report of medical consultations with sewer workers, the doctors concluded that the working environment is responsible for a high level of acute disorders of the gastrointestinal tract."

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In the report of clinical laboratory analysis, "The only significant difference was an elevated level of gamma globulins among sewer workers, suggesting that they have had more infections than the other groups."

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Another quotation, "One can conclude that workers who have spent more than eight years in Copenhagen sewers have about twice the death rate of all Copenhagen males." That was withheld from us.

Next slide, please.

The last report this evening was not available to us.

All we have is a six-page explanation in the draft EIS of what Region V was willing to share with the public. This evening we are making our request again at this time under the Freedom of Information Act which requires the federal government to provide a copy within ten days, and I give that to you now before I forget.

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The EIS does give a general hint of a problem in the last sentence of the six pages, in the last sentence of the six pages, "From preliminary analysis of illness rates, inexperienced workers exposed to sewage had a higher rate of gastrointestinal illnesses than experienced sewage treatment plant workers." That is all they say about it.

Please remember, too, that even though these workers are nearer to the aerosols than adjacent residents, they only work there forty hours out of every hundred and sixty-eight hour week. They are also generally working age

males, and there are no young children or senior citizens in their ranks.

The audience is very patient with the review of the seven studies and my presentation leads to considerably different conclusions than the whitewash in the draft EIS. You can turn it off, please.

I have not mentioned the word odors this evening until now because I believe that the MSD can control them with their operational procedures. If the MSD gets lax and/or tries to save too much money by reducing the prechlorination, then I am confident that the many odor cases that have been ruled on by the Illinois Pollution Control Board will provide very effective legal remedy. We can ensure that the Illinois Pollution Control Board will rule favorably in our Complaint by independently -- I ask that each of you to do this, by independently keeping your own records on your own calendar and do not compare with your neighbors. Keep your own records. Also recording your odor complaints with the Des Plaines Environmental

Officer who is here this evening. You want to raise your hand, Bill? This will add to our case.

And the case history has recognized that only we can determine if MSD odors are denying the full enjoyment of our property. The MSD judgment has very little weight in our odor complaints.

Now, what are we looking for? Obviously, you are not capable of moving to a more remote location. We have shown here this evening that we know you did not have the necessary dose response data. We know that.

20 | We know you are anxious to start operating your plant, and we expect some temporary aeration tank covers channeling the air through a simple mechanical filter. | 2

If further studies clearly indicate no health problem, then dismantle the temporary covers and the expense will be minimal.

If further studies reveal a health problem, then replace the temporary covers with permanent covers and install whatever type of air purification equipment that will always keep the

Mr. McCabe's statement, ninety-five percent. Why couldn't Mr. McCabe, the man who is responsible for these studies, communicate these findings to Region V EIS staff that concluded the studies and answered all the questions, and the aerosol suppressor requirements should be eliminated.

The U.S. EPA cannot be construed to be unbiased because they are a very involved participant. They have limited funds to solve poorly defined water pollution problems, and the aerosol question just adds uncertainty to the relatively easy water decisions. They know they must eventually determine the infectious dose, but this O'Hare situation gave them an uncomfortable deadline. So, they chase after some average situations, average situation answers that hopefully would satisfy the O'Hare residents.

Then the U.S. EPA could begin operation of the O'Hare plant and resume the quest for some answers without the O'Hare deadline giving them problems. But we are putting the U.S. EPA on notice this evening that we will not accept

aerosols below the dose response of our most sensitive residents. What we expect need not be costly. Sears sells a heavy-weight fiberglass panel, a corrugated panel ten foot by forty inches for \$21. The MSD has the capability of installing temporary covers of this type in less than five weeks if the U.S. EPA makes this a high priority project.

62 The U.S. EPA has come here this
E evening to explain what their studies have
63 revealed. I listened intently for the rest of the story of what answers they do not have, but there was very few explanations on what they don't know. By this lack of explanation, the U.S. EPA has clearly demonstrated to us their lack of objectivity. It should not be my responsibility to point out the unanswered questions.

The U.S. EPA was formed in 1969 to protect the public from pollution. They are supposed to work for us and not be an advocate for chronic air odors such as sewage plants. In retrospect, I agree a hundred percent with

half answers or volunteer to be the next group of guinea pigs next to a new air pollution generator. We want the air we breathe to be as clean as the water we drink and the food we eat. We feel that the National Environmental Policy Act of 1969 guarantees us no less.

We beg, we warn you not to degrade our air without knowing how many of us will be infected. We cannot tolerate the undefined word "insignificant." Give us an estimate; tell us what your best scientific guess is, but don't hide behind that word "insignificant" and turn a handle on the valve that will degrade the air we breathe.

Your job is hard. Mine is easier to criticize your work effort but, really, the U.S. EPA should be representing the people here this evening. We were asking questions and identifying potential problem areas for several years before the U.S. EPA or the I-EPA existed. When they were founded, we were relieved that now some agency was going to protect our environment. But we

were wrong.

The U.S. EPA and I-EPA have proved to be no match for the MSD. I thank you.

MR. WOJCIK: Roger Spencer. Are you here?
Mr. Spencer?

Myrtle Clamer?

MS. CLAMER: I forgot my question.

MR. WOJCIK: Dorothy Mae Ingram?

MS. INGRAM: I did not say I would make a statement, but I would like to know, we who live just, say, about a block or so away from here on Oakton on Route 83, we are not mentioned. And when you did start that with the dynamite and everything, you ruined wells on Oakton Street.

20 | Now, what are we to do? I mean,
if that is the case that the bacteria will be so
close, what would we do for our health? | 20

MR. WOJCIK: Is that a comment? We can address that; we will address that question in the final -- I do not know.

MS. INGRAM: Somebody approached us from the Environmental to put a black box in my driveway

and monitor, you know, what the pollution count could be there, the aerosols would be in there. What the pollution count could be there, the aerosols would be there. But so far nobody come. But the man have come to the house, and I have got his card at home.

MR. WOJCIK: Okay. I am sure that is part of some study that you know we are involved in. So, I'm sure someone was monitoring that. They won't put it out.

A VOICE: You mean there are questions and no answers?

MR. WOJCIK: All the questions and comments at the hearing will be addressed in the final EIS. They all will be answered.

MR. DEVOREK: My name is Donald Devorek, I live at 1101 Hewitt Drive. I have lived there for the last thirteen years. I am currently and have been president of the Wasserman Park Homeowners Association for the last nine years. However, my remarks tonight are my own view, although I believe they reflect the consensus of the area residents.

What concerns me most is that the bacteria that will be emitting from aeration basins cannot be seen or touched by the average citizens. Therefore, we are at the mercy of those who are operating the plant. Is this situation much different than radiation from a nuclear power plant? Do we have to worry?

From the EPA's draft report which I have for about a month, page 8, the results on the health implications for the John Egan, Salt Creek Water Reclamation Plant says, "The study concluded that the Egan Plant appears to be a source of indicator bacteria."

Of course, the end conclusion of this report states that the overall, the bacteria "is of little practical health concern." If this is true, then why should I worry?

Well, a few years ago, we were advised to spray asbestos on the ceilings of our schools to protect our students. Today we know that this has caused cancer in our children. We used hairsprays for many years, now the FDA has

banned the propellant because of danger to upper atmosphere. Isn't it better to be safe than sorry?

20 This plant has been planned for before 1964. Isn't it better to wait just a few more months and install the aerosol tank covers? We waited over fifteen years already. If the FDA feels it should ban saccharine in soft drinks even though you would have to drink a huge volume every day for years on end to even compare to the amount administered to a test rat to cause cancer, don't we, the citizens who live in a potential dangerous area have similar rights?

2

In conclusion, I doubt very much that any of the information presented tonight will have any effect. The MSD plans to start operating its plant in a few short weeks. This hearing is being held only because it was required by law.

Five years ago I testified before the EPA pertaining to building this plant. I prepared this lengthy report; in it from the MSD's own research from outside services it was shown that it was more economical to have one plant, to

build and to operate it and that plant was the John Egan Plant. But the die had already been cast. The federal government had to release the funds by the end of the year or they would be lost for that year. So, naturally the federal government employees who did not want to lower their spending power in future years chose to spend our taxes rather than making an intelligent decision. The government's credibility is at an all-time low. I hope it does not slip lower tonight.

MR. MIRRIAM: My name is Gerald Mirriam, and I live at 431 Dover Drive in Des Plaines. And I have lived there for the last twelve years. And I come here with no real prepared statement except that of a concerned neighbor.

I have known a lot of you folks for a good many years, and I have seen the draft of this thing drawn with concern against what I figure is our rights for a fair and just environment. All I have to say is, I would like these people to concern themselves with the health and welfare of the community, the people who live in it and the

children that gets it, inherits it. Thank you,
my fellow neighbors.

MR. WOJCIK: Robert Satnaggari.

20 | MR. SATNAGGARI: I support what Mr. Ward
| has said. | 20

MR. WOJCIK: Those are all the people who
indicated they wished to make a statement tonight.
Is there anyone else who cares to?

MR. LINDAHL: I am Phil Lindahl. I am the
environmental officer for the City of Des Plaines.

The concerns of the residents from
Des Plaines, Illinois have made it necessary for
the U.S. EPA to enlist the help of experts in the
field of viable microbial aerosols to research
their fields of endeavor to attempt to determine
the health effects of building a sanitary sewage
treatment plant with the edge of the aeration
basin a short distance from the porches of a row
of homes that have been in existence for forty to
fifty years or more.

As a result of these studies, the
U.S. EPA conducted this symposium on water waste

aerosols and disease in Cincinnati, Ohio September 19 through the 21st, 1979. Almost every one of the authors of the various studies that were reported at this symposium said that their conclusions were that more research is needed to arrive at a positive proof that a sanitary sewer treatment plant emitting aerosols would not be harmful to those living in close proximity of such a plant.

H. L. Longest, associate deputy assistant administrator for water program operations for the U.S. EPA in Washington, set the keynote of the symposium by challenging the scientific community to conduct studies to determine the health effects, if any, of water waste aerosols.

Nothing has been said about those times when a massive dose of virus or bacteria might be present rather than the few parts per million or the case in Tigard, Oregon where peak doses of exposure to schoolchildren occur about one school day per year.

If you take the case of two waiting rooms, one a lawyer's office and the other at a

pediatrician's office with the same number of persons in each waiting room and the same age and sex distribution, the lawyer's office waiting room will be the more healthy place to be, for many of the pediatrician's office waiting room are germ carriers or they would not be there.

A sanitary sewer treating plant is just the type of operation where the worst combination of viable microbial aerosols are just waiting to happen to those living in close proximity to the plant.

Conclusions drawn from the papers given at the wastewater aerosol and disease are attached.

These conclusions are one, meaningful data interpretation may require consideration of basic neurological meteorological parameters as well as the limitations of methodologies employed.

Two, sampling procedures suitable for detecting high microbial aerosol concentrations may not be applicable when very low microbial aerosol levels are anticipated.

Three, identification of appropriate organisms and sampling methods needs to be superimposed upon the demographic and socio-economic nature of a community and meteorological conditions to obtain a realistic evaluation.

Four, chronic exposure of wastewater treating plant and sewer workers deserve continuing evaluation.

Five, aerosols may not be a very efficient means of disseminating wastewater-borne pathogens. However, before it can be proven that aerosols do not transmit pathogens, more study than that which has been presented at this symposium must be made.

Six, future studies should incorporate a more precise determination of the exposure situation and additional clinical tests.

Seven, study population sample size availability often is the limiting factor in the design and conduct of epidemiological studies.

Eight, data suggests that the higher illness rates may be related to higher densities of

lower socio-economic families rather than the wastewater treatment plant.

21

Nine, overall findings did not detect a significant health hazard for persons living beyond 400 meters, but what about those persons living 400 feet from the wastewater treatment plant?

Ten, school attendance is a very insensitive measure of health effects from sanitary sewer wastewater treating plants.

Thank you for the opportunity to present these conclusions.

MR. WOJCIK: George Egan?

MR. EGAN: Good evening. Overall findings did not attack the significant health hazards for persons living beyond 400 meters according to the data I received. But what about those persons living 400 feet from the wastewater treatment plant?

Aerosol basins of the treating plant within 385 feet from the front doors of residents living on the north side of Oakton Street in Des Plaines? Identification of appropriate organisms and sample methods need to be imposed to obtain a

realistic evaluation of present conditions.

Future studies should incorporate in more precise determinations of the exposure situation and additional clinical tests need to be taken.

It has been pointed out tonight that the methodologies used have been placed in question which bring about limitations to these studies which questions the validity of the findings. What is needed is meaningful data so that a sound decision can be made which will not jeopardize your health or the thousands of people living around the plant, not only in the 8th Ward.

The City of Des Plaines, Elk Grove, Mount Prospect, or unincorporated Elk Grove. If this plant is going to jeopardize thousands of lives, I think the question should be raised on a Council floor to stop the opening of this plant until the aerosol suppression devices are in place. Thank you.

MR. WOJCIK: Is there anyone else who wished to make a statement?

A VOICE: When I first came in, I asked if

there were going to be questions and answers. It was indicated to me there were. I take it there are not?

MR. WOJCIK: In a sense, we will respond to your questions on the final EIS. And if you have a question to ask, feel free to ask it.

MR. WARD: If you'd like to stay afterwards, I will answer your questions, I will be perfectly willing to do it after the meeting. I will answer your questions.

MR. RATCLIFF: My name is Bill Ratcliff. I live at 136 West Dover Drive. I do not have any prepared statement because I came here primarily because I thought there would be some questions and answers, but since there won't be any questions answered, I would like to make a few comments here.

First of all, I kind of question whether studying sewage workers is a valid step. The reason why I question this is, I work in an industry which used platinum salts, and just about everyone is allergic to platinum salts. It is just

a matter of how allergic is he.

Well, what you have is a situation with sort of self get rid of those individuals that are allergic. The person allergic leaves. So, if you've got an old person in that type of situation, the person who is allergic is not around, and I do not know if that is true in sewage treatment workers or not, but it might be suspect.

Another thing that bothered me on page 4 of this draft, there is a list of seven articles upon which this draft is based, and I was not able to obtain them thus far, not all of them. This bothers me, and I object to the fact that I cannot review the articles upon which a draft is based.

I personally believe that this draft or the final ~~draft~~ should ~~be held until~~ the public has a chance to review every cotton-picking piece of paper upon which a draft is based. Now, also within this draft there is an indication that the EPA is not too confident in their own work and the fact that there is an indication that there is

biases and inconclusive -- I'm trying to look for that right offhand. Somewhere in here it says some of the data should not be considered because the public would be biased on a question. This was going around and questioning that there were field or not.

Well, when you go to a questionnaire, there is three ways of bias, one is how the questionnaire is prepared, and I am not an expert in that. Another one is who analyzes the information then finally is who prepared the report.

I respectfully request that a resume be incorporated into the final draft of the individual who has prepared this report, and it should include his age, his education and previous experience. I thank you.

MR. WOJCIK: Would you give us your address, and we will give you a copy of the report mentioned.

Anyone else would like to make a statement? If not, I would like to remind you we will still be receiving written comments on the draft EIS until November 12th. We will be responding

to all the comments made tonight and all written comments in the final EIS, and if you would like a copy of that, make sure we have your name and address. Yes, sir?

MR. MURPHY: I did not come prepared for a statement, but my name is Pete Murphy, and I am commissioner for the Mount Prospect Park District, and I am newly elected commissioner. And from what I understand, the MSD is also going to donate the land as a park area, and of course, the reason I am here is I am going to be asked to vote and accept this land for the people in the area to lay on.

I would make -- I do not want to sit here and let the question go unanswered. We are thinking of putting a potential park in that area. I would like to have some answers as to the safety and validity of having a park in this area so that I can make a constructive conclusion from your report.

B. WRITTEN COMMENTS RECEIVED



605 WM. G. STRATTON BUILDING • 400 SOUTH SPRING STREET • SPRINGFIELD 62706
CHICAGO OFFICE — ROOM 100, 160 NO. LASALLE 60601

David Kenney, Director • James C. Helfrich, Assistant Director

September 28, 1979

Mr. Gene Wojcik
EPA, Region 5
230 South Dearborn Street
Chicago, IL 60604

RE: DEIS on O'Hare Water
Reclamation Plant at
Elmhurst & Oakton Roads
in Des Plaines, Cook County

Dear Mr. Wojcik:

This letter is to inform you that we have reviewed the specifications of your project mentioned above.

Our review of the records indicates that your project will have no effect on historic, architectural or archaeological sites in the area.

This letter of clearance relates only to cultural considerations and should not be viewed as a blanket write-off which would include natural areas or other concerns of the Department of Conservation.

If you have further questions regarding this, please contact me.

Sincerely,

A handwritten signature in cursive script that reads 'David Kenney'.

David Kenney
State Historic Preservation
Officer

DK/LSA

WATER DIVISION

79 OCT 4 AM 11:46

RECEIVED



United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 678
Champaign, IL
61820

October 16, 1979

Mr. Valdas V. Adamkus
Acting Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn
Chicago, IL 60604

Dear Mr. Adamkus:

We have reviewed the Draft Supplemental Environmental Impact Statement regarding O'Hare Water Reclamation Plant.

We have no comments.

Sincerely,

Warren J. Fitzgerald

Warren J. Fitzgerald
State Conservationist

RECEIVED
79 OCT 22 AM 11:20
WATER DIVISION





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Village Clerk
FAY M. BISHOP

Village Manager
CHARLES A. WILLIS

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JAMES P. PETRI
THEODORE J. STADI
MICHAEL A. TOSTO
NANCY L. VANDERV

October 19, 1979

WATER DIVISION

OCT 25 AM 11.08

RECEIVED

Mr. Gene Wojcik, Chief
EIS Section, Region V
UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

The Village of Elk Grove Village submits the following comments to you for inclusion in the October 29, 1979 Public Hearing record on the Draft Supplemental Environmental Impact Statement prepared on the Metropolitan Sanitary District of Greater Chicago O'Hare Water Reclamation Plant located at Elmhurst and Oakton Roads in Des Plaines, Illinois:

- 1) Based on our review of the 'Draft' Environmental Impact Statement conducted for the O'Hare Water Reclamation Plant, we concur with the conclusion that the aerosol emission levels generated by this type of plant will have no significant health effects on area residents.
- 2) We also agree with the study's finding that the monetary, natural and depletable resources to be expended on the construction and operation of the aerosol suppression facility would result in the creation of adverse impacts and, as such, would not be justifiable based on the available data. Furthermore, to proceed with the construction of this facility might mean delaying the utilization of the new water reclamation plant. This would force the operation of existing facilities, both municipal and those belonging to the Metropolitan Sanitary District, at overloaded levels causing a greater threat to the health of surrounding residents.
- 3) As a result of the above, the Village of Elk Grove supports the action that would allow the O'Hare Water Reclamation Plant to begin operation without aerosol suppression facilities. However, ongoing analysis of the potential health effects on area residents should continue. If this analysis demonstrates the need for aerosol suppression, then the required facilities could be installed at a later date.

next page, please ...

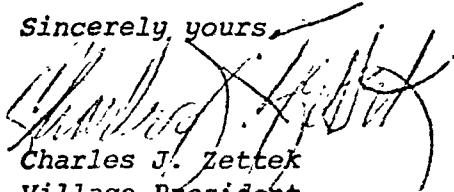
Mr. Wojcik

- 2 -

October 19, 1979

Your consideration of our position on this matter would be appreciated. Thank you for this opportunity to share our thoughts and recommendations with you.

Sincerely, yours,



Charles J. Zettek
Village President

CJZ:ms

c: Board of Trustees

Village Manager

Nicholas J. Melas, President

Metropolitan Sanitary District
of Greater Chicago

NICHOLAS J. MELAS
PRESIDENT



Hugh H. McMillan
General Superintendent
751-5722



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October 23, 1979

Mr. Gene Wojcik
Chief, EIS Section
Environmental Engineering Branch
United States Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Subject: Supplemental Draft Environmental Impact Statement
Metropolitan Sanitary District of Greater Chicago
O'Hare Water Reclamation Plant, September, 1979

Dear Mr. Wojcik:

The Metropolitan Sanitary District of Greater Chicago (District) has received the Supplemental Draft Environmental Impact Statement (EIS) for the O'Hare Water Reclamation Plant dated September, 1979. As noted on pages 37 and 38 of the draft EIS, certain governmental agencies, including the District, were requested to comment. The District through this letter will therefore present its position regarding the draft EIS.

The draft EIS contains a brief but complete literature survey, reviewing the studies which have been concluded since 1975, regarding the health significance of aerosols emitted from sewage treatment operations, including activated sludge aeration tanks. These studies, as pointed out in the draft EIS, were funded by the United States Environmental Protection Agency (EPA) because of its concern about the effect of sewage treatment plant operations on the surrounding community.

Results of studies conducted by Dr. Robert Northrop of the University of Illinois Medical Center (U. of I.) on operations of the District's North Side Sewage Treatment Plant were presented. The eight-month environmental health survey conducted by the U. of I. shows that the District's North Side plant had no effect upon the health of the surrounding community.

WATER DIVISION

79 OCT 26 PM 12:15

RECEIVED

Mr. Gene Wojcik
USEPA - Chicago, Illinois

October 23, 1979

In a study conducted on the effects of the operation of the District's Egan plant, the Southwest Research Institute (SwRI) concluded that the levels of microbiological and chemical agents of the air, soil and water in nearby residential areas were indistinguishable from background levels. Based upon this data, and an environmental health survey of nearby residents, SwRI concluded that there was no health hazard for people living outside the property line of the Egan plant.

Studies conducted by the University of Michigan and the Illinois Institute of Technology Research Institute on the Tecumseh, Michigan Wastewater Treatment Plant led to conclusions similar to those mentioned previously; namely, the wastewater treatment plant operations had no effect on the health of citizens in the surrounding community.

Results of studies conducted by SwRI at a wastewater treatment plant in Durham, North Carolina, involving measuring the microbiological emissions from a treatment plant, and a health survey of a nearby school were also presented. These studies failed to show any connection between the presence of the plant and the health of the students in the school.

The draft EIS also discusses studies of the health of sewage treatment workers. Studies noted were those conducted by the University of Cincinnati Medical Center. These studies, in general, do not indicate any significant adverse effect upon those who work closest to the supposed health risk. They serve to reinforce the conclusions reached by investigators who have studied the health of nearby residents.

From the preparation of the Environmental Assessment for the O'Hare plant, to date, the District has consistently taken the position that there is no demonstrable adverse effect of sewage treatment aerosols upon the health of nearby residents. We recognize, however, that the data collected since 1975 is much more definitive than that gathered previously, and welcome the update presented in the draft EIS.

Mr. Gene Wojcik
USEPA - Chicago, Illinois

October 23, 1979

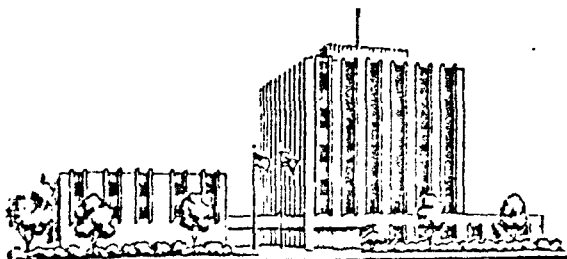
19 | We fully agree with the conclusions of the draft EIS.
| Since the studies conducted show that there is no health hazard
| associated with sewage treatment plant aerosols, we see no
| reason to require the installation of devices to suppress aerosols
| from the O'Hare plant. We, therefore, ask that the draft EIS be
| finalized; and its conclusions be implemented. We have no
| additions or corrections to the draft EIS.

The District appreciates the opportunity to submit comments
on this Supplemental Draft EIS.

Very truly yours,


Hugh H. McMillan
General Superintendent

HHM:CLH:DRZ:RL:r



THE CITY OF DES PLAINES

1420 MINER STREET ■■■ DES PLAINES, ILLINOIS 60016 ■■■ 297-12

October 26, 1979

Mr. John McGuire, Administrator
U. S. EPA Region V
2309 Dearborn St.
Chicago, Illinois 60604

Re: Environmental Impact Statement
O'Hare Water Reclamation Plant
Des Plaines, Illinois

Dear Mr. McGuire:

The repeated concerns from residents of Des Plaines, Illinois made it necessary for the U. S. EPA to enlist the help of the experts in the field of viable microbial aerosols to research their fields of endeavor to attempt to determine the health effects of building a sanitary sewer treating plant with the edge of the aeratio basin a short distance from the front porches of a row of homes that have been in existence for forty to fifty years or more.

63 As a result of these studies the U.S. EPA conducted a symposium on "Wastewater Aerosols and Disease" in Cincinnati, Ohio September 19 - 21, 1979. Almost every one of the authors of the various studies that were reported at this symposium said that their conclusions were that more research is needed to arrive at a proof that a sanitary sewer treating plant emitting aerosols would not be harmful to those living in close proximity of such a plant.

H. L. Longest, Associate Deputy Assistant Administrator for Water Program Operations for the U. S. EPA in Washington set the keynote of the Symposium by challenging the scientific community to conduct studies to determine the health effects, if any, of waste water aerosols.

33 Nothing has been said about those times when a massive dose of virus or bacteria might be present rather than the few parts per million or the case in Tigard, Oregon where peak doses of exposure to school children occur about one school day per school year.

25 If you take the case of two waiting rooms, one a lawyer's office, and the other a pediatrician's office with the same number of persons in each waiting room and same age and sex distribution, the lawyer's office waiting room will be the more healthy place to be, for many in the pediatrician's office waiting room are "germ carriers" or they would not be there.

A sanitary sewer treating plant is just the type of operation where the worst combination of viable microbial aerosols are just waiting to happen to those living in close proximity to the plant.

Conclusions drawn from papers given at the "Wastewater Aerosol and Disease" are attached.

Conclusions:

- 40 | Meaningful data interpretation may require consideration of basic meteorological parameters as well as the limitations of methodologies employed. | 4
- 64 | Sampling procedures suitable for detecting high microbial aerosol concentrations may not be applicable when very low microbial aerosol levels are anticipated.
- 64 | Identification of appropriate organisms and sampling methods needs to be superimposed upon the demographic and socioeconomic nature of a community and metrologic conditions to obtain a realistic evaluation.
- 63 | Chronic exposure of waste water treating plant and sewer workers deserves continuous evaluation. | 65

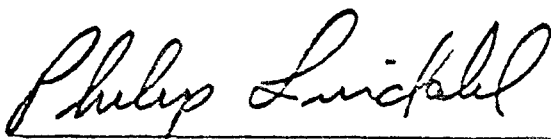
Aerosols may not be a very efficient means for disseminating waste water borne pathogens. However, before it can be proven that aerosols do not transmit pathogens, more study than that which has been presented at this symposium must be made.

Future studies should incorporate a more precise determination of the exposure situation and additional clinical tests.

Study population sample size availability often is the limiting factor in the design and conduct of epidemiological studies.

- 66 | Data suggest that the higher illness rates may be related to higher densities of lower socioeconomic families rather than to the wastewater treatment plant. | 6
- 67 | Overall findings did not detect a significant health hazard for persons living beyond 400 meters, but what about those persons living 400 feet from the waste water treatment plant? | 6'

School attendance is a very insensitive measure of health effects from sanitary sewer waste water treating plants.



Philip Lindahl, P. E.
Environmental Control



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

REGION 5
18209 DIXIE HIGHWAY
HOMEWOOD, ILLINOIS 60430

RECEIVED

October 31, 1979 79 NOV 1 PM 12:07

WATER REPLY REFER TO
HED-05

Mr. Gene Wojcik
Chief, EIS Section
Environmental Engineering Branch
Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

The draft environmental statement for the Metropolitan Sanitary District of Greater Chicago, O'Hare Water Reclamation Plant, Chicago, Illinois has been reviewed. The proposed action has no impact on facilities within our functional area of responsibility. Therefore, we have no comments to offer on the statement.

Sincerely yours,

Donald E. Trull
Regional Administrator

By: *W. G. Emrich*
W. G. Emrich, Director
FOIA Office of Environment and Design

1977

136 W. Dover Dr.
Des Plaines, Illinois 60018

November 1, 1979

Mr. Gene Wojcik
Chief, EIS Section (5WEE)
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Re; The following contains comments on the Draft Supplemental EIS for the O'Hare Water Reclamation Plant. It is to be included along with the specific data requested in the final EIS.

Dear Mr. Wojcik:

On Monday October 29, 1979, I attended the Hearing on the Draft Environmental Impact Statement for the O'Hare Water Reclamation Plant. I was disappointed by the EPA Officials. I expected some definitive statement by the EPA on the aerosol emissions from the O'Hare Water Reclamation Plant. I expected and was even told at the door that there would be a question and answer session after the formal statements. There was none. I did not expect, nor appreciate, the role EPA assumed as a nonparticipating moderator. Because of EPA's action, I made a brief unprepared verbal statement. I am expanding on that statement in this letter. I am requesting that this letter be included with my statement. I expect the EPA to make specific, quantitative answers to all requested information contained in this letter within the final EIS. Not to do so would leave grievous doubt in the validity of any operation of the O'Hare Water Reclamation Plant as currently constructed

Background

I am a degreed chemical engineer, registered in the State of Illinois. I am well experienced in the design and construction of chemical process plants. My experience includes quantifying waste streams, both air and water, for operating permits. I appreciate quantified data with clear definite conclusions.

During one project I had to review literature on specific industrial chemicals which could cause allergic reactions. When reading on allergies it was indicated that there is a very wide variation in the sensitivity of individuals to any specific allergenic agent. Even though care is taken to minimize the exposure of highly sensitive individuals to specific allergens, some individuals still have reactions to very low concentrations. In industry, such individuals when exposed will usually seek employment elsewhere. A natural selection process results, leaving employees having resistance to the allergen.

Because EPA has not adequately quantified the data, because I do not have the data or resources for a proper analysis, I am submitting this letter as a "concerned citizen" whose family resides extremely close to the water treatment facility.

EPA

"I have high regards for the EPA. It is a "watchdog" agency which usually works hard to assure a quality environment for the public. Generally EPA forces industry, or assumes the task itself, for the "burden of proof" that adverse environmental effects will not occur. This is the first time I had the feeling that EPA has forced the "burden of proof" onto the public, those they are to protect. This feeling was further heightened by the fact that no EPA Official would make a definitive statement or answer questions. It leaves greivous doubt that the EPA is handling this project in "good faith".

Supplemental Environmental Impact Statement

The EIS leaves me with a very uneasy feeling. There is no data, information or conclusive statement that I can interpet the extent or complete absence of any health effect that will occur from the operation of the O'Hare Plant as currently built. There are no solid conclusions as to what each study means. There are too many qualifying statements and subjective statements. There is no attempt to correlate the data from the various studies to each other and the O'Hare Plant. There is no attempt to statistically verify the validity of the data. Has EPA adequately performed its task?

- 1 | Request #1: What is the resume of the preparer? Age? Education?
Previous experience?

Data Availability

- 2 | So that I could better understand the Supplemental EIS, I attempted to acquire the documents listed on page IV of the EIS through the Des Plaines Library. After three weeks, I was informed that none of the documents were available within any of the local library systems, and probably none were available in the local university libraries. I was informed that I could receive 5 of the 7 documents within 10 days of request from the EPA. The remaining 2 documents were made available just recently. In fact, one document was issued within one or two days of the Hearing. I commend EPA for using all the data at its disposal. I object to the short time available to the public for review of the data before the November 12 deadline for comments.

Validity of the Data Contained in the Seven Studies

Without having the individual study documents available to me, I have tried to understand specifically what the data from each study means, and if the data is valid for extrapolation. There appears to be no contest to the fact that aerosols are generated. There appears to be no contest that these aerosols contain particulates and microorganisms (bacteria and viruses are classed within this category) some of which are pathogens. There appears to be some health effect from these aerosols. The problem appears to be in determining just what the extent of the health effect is. As a result, EPA has chose to employ the statement "no adverse health effect" for incorporation into the EIS.

- 3 | Request #2: Specifically what does "no adverse health effect" mean?
Absolutely no increased respiratory, gastrointestinal,
eye, etc. infections/illness?

The key question is if the data from these seven studies is valid and sufficient to estimate the health effects to residents bordering the O'Hare Plant. The data must be mathematically tested. Statistics, a procedure employed well by Federal Agencies, should answer this question.

Request #3: Please answer the following for each of the seven studies cited in the EIS on an individual basis.

- 4 | 1. Given all the various parameters; wind, solar radiation, humidity, sampling technique, analytical technique, potential contamination of sample with active or sterilizing agent, distribution of samplers, etc. ; what is the confidence level of the accuracy for for each data grouping or point?
- 5 | 2. Given the number of participants, the method of data accumulation, variability of exposure, etc., what is the confidence level that the data acquired accurately indicates the health effects for the general public?
- 6 | 3. Given the number of participants, etc., what is the confidence level that the data acquired accurately indicates the health effects for specific age groups as follows:
 - a. 0 to 4 months?
 - b. 4 months to 2 years?
 - c. 2 to 6 years?
 - d. 6 to 18 years?
 - e. 18 to 59 years?
 - f. over 59 years?
- 7 | 4. If participants dropped out of the study, can the EPA make an unqualified statement that a natural selection process did not occur? This is important because a natural selection process would result in data understating the health effects.
- 8 | 5. If a natural selection process could have occurred, using probability, what would be the new confidence level for Request #3, Items 1,2 and 3?

Correlation of Data to O'Hare Plant

This topic has been inadequately addressed by the EPA. The Plant has a design capacity. For this capacity there are specific associated process flows for chemical additions, air for aeration, etc. Using the correlated data from the various studies and the design parameters for the O'Hare Plant, the EPA should be able to estimate the total emissions for particulates and microorganisms. Further the microorganisms should be able to be estimated for specific pathogens. Employing a dispersion modeling technique for degradation estimate of air quality, the average 24 hour exposure rate and the maximum 8 hour exposure rate for total particulates and the various microorganisms can be developed for key distances from the plant. Typical distances should be 50 meters (nearby residents), 150 meters, 300 meters, 500 meters (Friendship Jr. High), 700 meters (Devonshire) and 1500 meters (Einstein).

Request #4: I am specifically requesting the following:

1. Prepare a dispersion model based on the designed parameters for the O'Hare Plant as built and the best correlated data available for total particulates. Prepare a similar model for each key microorganism and pathogen. It should list the expected average exposure rate for a 24 hour period and the maximum expected exposure rate for an 8 hour period at distances of 50 meters, 150 meters, 300 meters, 500 meters, 700 meters and 1500 meters.
2. Based on the above model, I request that a specific health statement be made that there will or will not be any increased infections (eye, respiratory, gastrointestinal, etc.) as a result of these emissions for each age group listed in Request #3 Item 3 a,b,c,d, e, and f at each distance listed in Request #4 Item 1.
3. I request that both the Water Division and the Air Quality Divisions of Region V EPA verify and without reservation state that the intent of the law for nondegradation of the ambient air quality for the region bordering the O'Hare Plant will be met as the plant is built.

Summary

Since by this date the data requested should have been clearly answered by the Greater Chicago Metropolitan Sanitary District or the EPA, since the data requested is critical in making a true assessment of the adequacy of the Impact Statement, I expect definitive answers to be incorporated in the final EIS. Since the data requested places serious doubt in the adequacy of the Impact Statement by a "concerned citizen directly affected by the action", I would question the legality of the issuance of an operating permit for the O'Hare Water Reclamation Plant as built, until all requested information is specifically and quantitatively answered.

Yours truly,

William H. Radcliffe
William H. Radcliffe



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333

November 5, 1979

WATER DIVISION

NOV 6 AM 10:40

RECEIVED

Mr. Gene Wojcik
Chief, Environmental Impact Statement
Section
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

We have completed our review of the Draft Supplemental Environmental Impact Statement (EIS) for the Metropolitan Sanitary District of Greater Chicago O'Hare Water Reclamation Plant (WRP), Des Plaines, Illinois. We are responding on behalf of the Public Health Service.

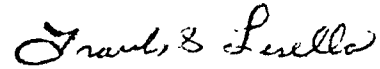
We understand that this supplemental EIS was prepared in order to decide if the original requirement for aerosol suppression facilities at the O'Hare WRP should be retained, rescinded, or modified. Your agency has concluded in the EIS that the requirement for aerosol suppression can be rescinded because recent scientific studies reveal no evidence that direct or indirect health effects would occur without aerosol suppression.

Of the five studies presented in the EIS, three of them, the Egan WRP study, the Tecumseh Wastewater Treatment Plant study, and the sewer worker studies, appear to show some association between health effects and the operation of a wastewater treatment plant. Even though this association may be weak or affected by factors inherent in each of the studies, the studies of wastewater aerosols presented in the EIS do not appear to represent a significant health hazard to individuals living or working around a WRP. Nevertheless, any decision to completely eliminate the possible future need for aerosol suppression based on the limited research to date with total disregard to future studies seems unsound. Until more evidence has accumulated that fully substantiates the insignificance of human health effects from wastewater aerosols, consideration should be given to the modification of the grant condition to allow for (1) the operation of the O'Hare WRP without aerosol suppression, (2) the continued assessment of research involving wastewater aerosols and potential health effects, and (3) the installation of aerosol suppression if future research shows the need for aerosol suppression and this need is determined by your agency. This approach would seem to be the most conservative and environmentally protective.

Page 2 - Mr. Gene Wojcik

We appreciate the opportunity to review this EIS. Please send us a copy of the final EIS when it becomes available.

Sincerely yours,

A handwritten signature in cursive script, reading "Frank S. Lisella".

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Bureau of State Services

Nov. 5, 1979

RECEIVED

'79 NOV 7 PM 12:33

Mr. Gene Wojcik
Chief, E&S Section

WATER DIVISION

Dear Mr. Wojcik,

I am writing to you as a concerned mother of three children and as a taxpayer. I am extremely troubled about what our neighborhood will be experiencing in a very short time. I live at 496 Courtney Ln., 750 ft from the O'Hare Sewage Treatment Plant.

Why is nothing being done about such a pollution source? Why are you allowing the MSD to worsen our already extremely polluted air? Don't we already

have to breathe inferior air because of the airport so nearby. How many other areas living near sewage plants also have airports so close. It is not as though any of us had a choice in this matter as our homes have been here years before the sewage plant.

Certainly anyone with children can understand the agony one goes through with a sick child. I have been through years of it with my children, all of who run fevers of over 105° when ill with strep infections, etc., sometimes resulting in hospitalization. My doctor has told me on several occasions that they are highly susceptible to strep and I abhor the thought of a possible increase in these incidents.

I don't care about the cost.
You must insist that this
plant is covered.

The entire neighborhood
is angered at the lack of concern
over potential hazards resulting
from this plant. The feeble
attempt at research on
sewage plant safety is disturbing
to all of us especially so close
to the site.

How much increased illness
will it take to justify your
making them put covers on
their tanks? How many years
before your research will be
complete and you decide we
were right? For how many
people will the damage already
have been done?

4

If we happen to be wrong,
and by some miracle, this
plant is 100% safe, why
don't you prove it to us.

Why must we wait and
prove it to you, the hard
way, that we were right
all along.

Sincerely,

Mrs. Corrie Drucker
496 Courtney Lane
Des Plaines, Ill. 60018



United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 678
Champaign, IL 61820
217-398-5265

November 5, 1979

Mr. Gene Wojcik
Chief, EIS Section
USEPA Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

We have reviewed the Supplemental EIS on the Metropolitan Sanitary District of Greater Chicago O'Hare Water Reclamation Plant dated September 1979.

The main concerns of this draft EIS is health effects. The plant is constructed and in operation.

We have no comments.

Sincerely,

Warren J. Fitzgerald
State Conservationist

cc:

5 copies to: Director, Office of Federal Activities
EPA
Room 537, West Tower
401 M Street, S.W.
Washington, D.C. 20460

Berg, Administrator, SCS
Strong, Director, MTSC

RECEIVED
79 NOV 8 AM 11:43
WATER DIVISION



November 6, 1979
RECEIVED

United States Environmental Protection Agency
Region V
230 South Dearborn
Chicago, Illinois 60604

NOV 13 PM 12:29
WATER DIVISION

Attn: EIS Section

Gentlemen:

My name is Lynn Moskal and I reside at 1500 Miami Lane, Des Plaines. I attended the Public Hearing at Friendship Jr. High School on October 29, 1979. Having only moved to this area less than three years ago, I have only recently become aware of the problem concerning the residents of this area in regard to the filtration system at the O'Hare Water Reclamation Plant.

I would like to start off by saying how disappointed I was in Monday's hearing. I attended this meeting hoping that some of my questions and those of other concerned neighbors would be answered. There was no basis for discussion or debate with your representatives, who merely acknowledged our questions and replied that they would be answered in your next Draft. I therefore would like to direct my questions at this time.

In your Environmental Impact Statement Draft you state "There is no indication that direct or indirect health effects will result from operation of the O'Hare WRP without aerosol suppression facilities." Twenty years ago my mother was doctor-treated for a serious illness. That treatment cured her but has been proven to have caused her to have cancer today. My first question is: in twenty years when our children are suffering from illnesses due to our air being contaminated, how will you respond then? Will you then acknowledge the fact that aerosol suppression facilities were indeed needed? How will that realization help our children who will already suffer the consequences of today's mistake?

Another point of interest that I would like to question again comes from your Environmental Impact Statement Draft, page 8. In discussing the Egan facilities you state: "The study concluded that the Egan plant appears to be a source of indicator bacteria, coliphage, pathogenic bacteria, enteroviruses, and mercury in the aerosols emanating from its aeration basins." This quote taken from your Draft was brought up at the hearing; however, I would like to continue with your next paragraph "From the patterns observed in the household health survey, the reported incidence of skin disease, and the symptoms of nausea, vomiting, general weakness, diarrhea, and pain in chest on deep breathing may be associated with the nearby operation of the wastewater treatment plant. However, it was considered that this correlation could be due to people biasing their responses to the questionnaire because they were aware of the purpose of the study and consciously or unconsciously recalled a higher incidence than they might have otherwise." I am shocked that you can have such evidence of adverse effects on health and claim that people are "biasing their responses." I would like to ask if every time there is a correlation such as this if you will disregard the facts and blame it on people "exaggerating."

14
30

-continued-

United States Environmental Protection Agency
November 6, 1979
Page Two

20

To be born with good health is a blessing; to have it taken away is an atrocity. There is no price tag that can be put on one person's health. More consideration and protection should be given to the residents surrounding the O'Hare plant by installing aerosol suppression facilities to filter the bacteria and prevent our air from these pollutants.

Mrs Lynn Koskal
Mrs. Lynn Koskal

2

RECEIVED
NOV 9 AM 10:19

WATER DIVISION
Plains, Ill.
Nov. 8, 1979

Mr. Gene Wojcik
Chief, E. S. S. Section
U. S. E. P. A. Region V
230 So. Dearborn St.
Chicago, Ill. 60604.

Sir - I am writing this letter to let you know that both my wife and myself are very concerned about the potential danger to our health that may occur from the sewage plant about to begin operation on Oakton St. here in Mrs. Plaines. We are also concerned with the possible hazard to our grandchildren and of course their parents also, who are our neighbors at this location. We in this community contested the installing of this sewage plant from the beginning and pleaded with all the authorities involved but to no avail our opinions went unheeded, believe me when I say that the politicians in this county and above all in this state do not represent the people and consequently we have rightfully lost our respect for them as well as confidence in their representation, and the handling of this sewage plant on their part increased our distrust in them.

20 Now that this sewage plant is about ready to go into operation our big concern is to get some sort of covering over it because of the hazardous bacterial emissions that will be emitted and we feel that is a reasonable request. It seems that with all the noise and pollution in this area from the planes constantly flying overhead from O'Hare why can't we have our request granted to cover this plant, why gamble with people's health when precautionary measures can be taken to safeguard

any possible health hazard regardless of the cost.

In closing I might mention that we have been told at a recent meeting that this plant will not start operating until the U.S. EPA gives its 'Ok', then please do not give the authorization until this sewage plant has the proper covering which will possibly eliminate the bacterial emissions that can be hazardous to our health.

Sincerely,

John A. Peterson
466 Dover Drive
Des Plaines, Ill. 60018

666 Debra Drive
Des Plaines, Ill. 60016

November 8, 1979

Mr. Gene Wojcik, Chief,
EIS Section (5WEE),
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

WATER DIVISION

NOV 13 AM 11:21

RECEIVED

Dear Mr. Wojcik,

I attended the public hearing on October 29, 1979 regarding the EIS draft on the MSOBC - WRP. I made no comments, because I felt ill-informed and I'm not prone to rash judgements.

Upon reading the EPA draft, I strongly urge you to take no action and thereby retain the aerosol suppression grant conditions. I myself have endured chronic respiratory problems for ten (10) years, but pray my family will not become newly exposed subjects. → over

Page 2.

Mr. Gene Wojcik, Chief

We have endured basement flooding and although distasteful, it can be handled. Precautions can be taken, because it's a known factor, similar to ozone or mold counts.

The evidence in the EIS merely indicates that no hazard was found, but does not support the conclusion that no hazard exists. According to your Mr. McCabe, the studies he co-ordinated did not have the capability to measure what has to be measured.

Apparently a mere ^{several} thousand dollars, additional, will make this multi-million dollar project acceptable to the public, ^{my} neighbors, present and future
over

Page 3

Mr. Gene Wojcik, Chief.

I urge you to cover the tanks while the health studies continue. 'Tho perhaps naive, I still like to think that you (my government) works to protect its citizens.

Sincerely,

Grace J. O'Mera

(Mrs. John E.)

John E. O'Mera.

C. Water

AK/F

11/11/79
RECEIVED
19 12 55 PM
OFFICE OF THE
ADMINISTRATOR
EPA REGION 1

Mr. King, Jr.,

After attending the meeting and reviewing the available materials, it seems that the question centers around the 900 meter limit. Among other things, I am well aware that limit.

It's bad enough that the plant was put where it was, but you have no responsibility to at least make it safer.

According to your own information, it's your obligation to cover the number of people who are living within the 900 meter limit, at least until the problem is properly removed. I find it

appalling and disgusting that you would even question the matter.

(8)

Remember me, and let not
me forget to express gratitude
to you the ones who put the
demand thing in our front
yards. The least you could
do is make it safe!

Ronald W. Ryckle
1535 S. Ridge Lane
Las Plaines, Ill. 60018
298-6685

P.S. What we are going thru concerning
this matter is just another typical
example of another governmental
agency that does not have
the support that would allow
them to do the things for the people to support or
help and protect.

11-12-79

Dear Mr. S. D. C. P. A.,

My name is Harold Christensen. I live at 1446 Joyce Drive. I have lived in Des Plaines for 10 years.

I would like to start by saying I believe our America, our Constitution, our Bill of Rights, are the most beautiful any nation has or possibly ever will have. But, so many people have lost faith in the system. Politicians and special interest groups wield such huge power that the good and well being of the people is cast aside. It's a sad state when the Politicians will only respond and do what is right when the people resort to force and violence.

My feeling is that The O'Hare Treatment Plant is an abomination. It is a curse on a people of this area. How any good and God fearing people can impose this plant adjacent to a large populated area is beyond comprehension. This plant was built by subterfuge, manipulation and unscrupulous use of political power led by the M. S. Commissioner, Mr. V. Janicki, now serving a long prison sentence. The Godly truth is that the M. S. D. got away with murder by building this treatment plant 40 feet from the residential area.

I took my family to personally look at the M.S.D. facilities at Hanover Park, Elmhurst and Stickney. These Treatment Plants are monuments to the greatness of M.S.D., as the Berlin Wall is a monument to East Germany's greatness. All of these so called "Poop" plants are cess pools. There is little reason to believe the O'Hare Plant will be any different.

20 It is beyond belief the M.S.D.C.P.R. coalition refuses to cover the large open ponds. They spent over 300 million dollars to build the plant and now they refuse to spend a little more to complete the job the way it should be done. It seems to me the M.S.D.C. is getting everything they want and we Des Plaines area people are getting nothing of what we want.

The Federal Government has so much money it does not know what to do with it - When they have 90 million dollars bus 114,000 Chicago School kids or billion of dollars for the Deep Tunnel Project, the largest civil engineering project ever undertaken by man, or 300 million dollars to build O'Hare Treatment plant, money to recover over O'Hare's open ponds should not be a problem. As for the noise and time involved in construction to build the rivers, we have tolerated the building

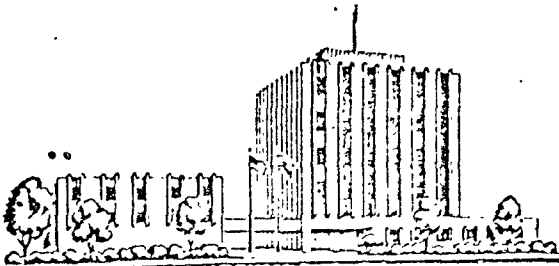
of a "Have for three years, so that would be, no problem as well.

In conclusion, I would like to say, give the people something. A vote to put covers on the ponds would renew the People's faith in C.P.A. It would help the M.S.D. win back some favor in the area. It would restore a semblance of credibility back in government. It would give the People insurance both mentally and physically. In short, it would be the right thing to do!

Finally, you people of the C.P.A., if any of you are of the Christian Faith and walk with God, ask the Lord to help you make the right decision. If you do this, there can only be an affirmative vote to cover the ponds.

Thank you,

Harold C. Christensen, Jr.



THE CITY OF DES PLAINES

1420 MINER STREET III DES PLAINES, ILLINOIS 60016 III 297-1200

November 16, 1979

Mr. John McGuire, Regional Administrator
United States Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. McGuire:

Your letter of November 8, 1979, requests the City's cooperation and support in a proposed Public Health Study.

I understand that, at the Regional V meeting with the City of Des Plaines on October 10, 1979, the U.S.E.P.A. was requested to prepare a list of alternative study sites. This list is to include an estimate of the pre-exposed population living within one thousand feet of the predominant downwind edge of the aeration tanks. Please advise your current best estimate of the date when this information will be available.

If the O'Hare plant is a unique situation, then we will know that controlling the emissions for our pre-exposed citizens will not be a costly precedence in many other areas of the United States. And, if several other potentially unsafe situations are identified, we will have other candidates to consider for the proposed Health Study. Because our citizens have lived with the threat of being infected for many years, it appears to be more acceptable to solicit volunteers adjacent to some other new sewage plant that has been built in the heart of an existing residential community.

1
41 It appears that the U.S.E.P.A. has prejudged the environmental review process and has already concluded that aerosol suppression is not safer. It seems difficult to propose to study our newly exposed citizens unless you already intend to expose them.

1
41

In order to participate in the proposed Study, we would have to embrace the conclusions of the previous insensitive studies that could "not find a significant health hazard". It would require our citizens to abandon their belief that suppression of the aerosols containing bacteria and viruses for newly exposed individuals is safer than uncontrolled release.

C. Waters
cc: R. F.
Canavan

Page 2
November 16, 1979

I do not believe the officials of the City could convince the citizens to change their position based on the available evidence.

When the list of alternative study sites is prepared, I will welcome the opportunity to meet with your staff. Please include this letter in the final E.I.S. on the O'Hare Plant.

Sincerely,

A handwritten signature in dark ink, appearing to read "Herbert H. Volberding, Sr.", with a stylized flourish at the end.

Herbert H. Volberding, Sr.
Mayor

HHV:cc

November 26, 1979

WATER DIVISION

79 NOV 30 PM 1:04

RECEIVED

Mr. Gene Wojik
Chief EIS Section (5WEE)
U.S. Environmental Protection Agency
230 Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojik:

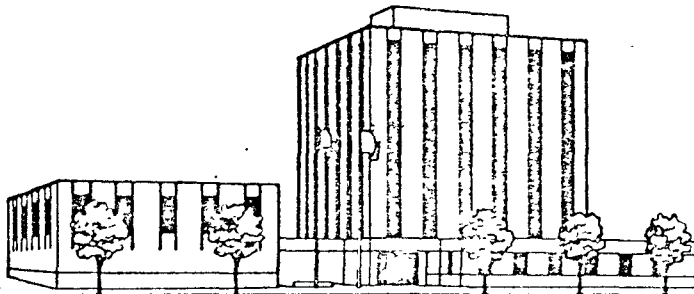
20
18

May we suggest posting several signs along the boundary of the MSD plant stating "DANGER - AEROSOL EMISSIONS MAY BE DANGEROUS TO YOUR HEALTH." This will warn the unsuspecting public that the government recognizes that they don't know how to measure what has to be measured.

20
18

Our families are important to us, and we do not want to accept ANY additional risk to their health.

Mr. & Mrs. Charles Drelicharz
Mr. & Mrs. Charles Drelicharz
1443 Marshall Drive
Des Plaines, Illinois 60018



RICHARD F. WARD
ALDERMAN EIGHTH WARD
1410 MIAMI LANE
DES PLAINES, ILLINOIS 60018
[312] 827-8715

THE CITY OF DES PLAINES

1420 MINER STREET

DES PLAINES, ILLINOIS 60016

297-1200

November 28, 1979

WATER DIVISION

NOV 30 PM 1.05

RECEIVED

Mr. Gene Wojcik, Chief, EIS Section (5WEE)
U. S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

Fourteen years is a long time for the citizens living near the proposed plant site to live in fear of a classic nuisance. Sewage plants have earned their reputation by being notorious air polluters. The odors from sewage plants have not been the figment of someone's imagination. At best they generate a musty odor -- and with the inevitable upset or poor maintenance, the odors can be quite obnoxious. Many of the people near the plant and the federal HUD authorities are concerned that property values could be affected by the mere existence of the sewage plant even if it only gives off the musty odor for the next 30 years. Of course, an upset would echo in every realtor's office.

22

Most of the other states in Region V have minimum isolation distances that average 1000 feet from plant boundary to residential boundary. The Chicago HUD office requires 500 feet. The O'Hare plant provides 100 feet -- the dedicated width of Oakton Street. The IEPA and USEPA reluctantly accepted the poor site location in 1975 simply to avoid losing the federal funds allocated to Illinois. There were no alternate projects that could absorb the \$150 million by June 30, 1975. Since 1965, we have urged isolation or control. Isolation is impossible now so only control remains. Several high odor-generating areas will use ozone for control. The sludge will not be processed at this site. Adequate pre-chlorination has been assured. These concessions will be helpful and our recourse to the complaint machinery and case history of the Illinois Pollution Control Board should provide adequate safeguards. But the aesthetic consideration of home values next to a sewage plant remain as a problem.

Aerosols

From about 1965 through 1973, we were concerned primarily with odors. Then Region V provided a copy of the Clavey Road Highland Park, Illinois 1971 EIS. This cast new light on the O'Hare situation and some very hard to shake fears spread through our community. I was personally responsible for handling a very delicate situation. I wanted to be honest with the people that trusted my representation. And yet I knew that some families would scare easily and a home selling panic could result. It has been estimated by several sources within the community that approximately 50 homes were sold based primarily on this fear.

Those that remain express varying degrees of confidence that the state and federal authorities will do what they said they would do in 1975 -- control the release of the aerosols. No one could argue that it is not safer to control the aerosols. We believe that the expenditure of \$500,000 for safety covers on a \$150,000,000 plant/tunnel system is the minimum that can be expected as an additional cost for the poor site location. The 14 year history of this project and the concerns of the nearby citizens should be sufficient to tip the cost-benefit evaluation in favor of the safer option.

Studies

It is inexcusable that Region V did not advise the citizens near O'Hare that the 1975 promise of evaluating aerosol suppression alternatives would be side-tracked and a high priority put on eliminating the need. Region V gambled and lost. The six studies provided no clear answers -- just the hint that no significant health hazard exists.

Trying to elevate the studies as clear answers, the draft EIS omissions are a blatant example of building a case for a pre-judged objective. Withholding the new O'Hare health study proposal until just minutes after the 270 residents left the public hearing room does not raise our confidence in Region V's objectivity. We wanted to go out to the parking lot and bring the people back to the auditorium, so they could hear the proposal directly that would require them to embrace the theory that uncontrolled aerosol release is safer than suppressing the bacteria and viruses. The public hearing attended by 270 potential health study participants was the perfect opportunity for USEPA to enlist their cooperation. Your decision was prudent because your chance of success was very slim. The evidence of "no significant health hazard" falls apart with any close inspection. Your Mr. McCabe of the USEPA Health Effect Laboratory that helped coordinate the studies said it very clearly, "We don't have the scientific know-how to address this problem of sewage treatment plant aerosols. We have spent somewhat over 3 million dollars in the last several years and we have to conclude that we don't know how to measure what has to be measured." Should we believe Leland McCabe or Rick Beardslee and Steve Poloncsik who wrote the draft EIS?

Another key area of the draft EIS that exhibits questionable reasoning is the last paragraph on page 35, "Despite the fact it could be argued that weaknesses in individual studies may lower their sensitivity, if any significant adverse health effects result from exposure to activated sludge treatment plant aerosols some substantial indications of health effects should have been discovered." This statement infers that the evidence is cumulative when actually you could not expect to find anything more significant than from the most sensitive study. And the most sensitive studies examined the blood of newly exposed individuals. But the Egan subjects were all beyond 400 meters and the newly exposed Northside subjects were too few. Only 60 (847 x 7.1%) lived within 1/2 of a mile from the aeration tanks for less than 1 year. If immunities are developed in 3 months, then the sample size is down to 15. The thousands of potentially newly exposed people near the O'Hare plant cannot accept such weak evidence. How can the federal government possibly reverse their 1975 decision to suppress the aerosols? Please keep the promise that you made to the people and the federal courts. John McGuire's decision to accept the Beardslee/Poloncsik recommendation or the McCabe recommendation should not be difficult.

November 28, 1979

29 | Low cost temporary covering is the only reasonable alternative based on the 1975 grant conditions and the interim studies. As Mr. McCabe said in September, "If the suppression can be accomplished at less costs, then I don't think the health effects would have to be so unequivocal." We agree. | 29

We also realize that the low cost covering alternative would be very unpopular with the MSD. However, Mr. McGuire communicates well with Mr. McMillian and the federal decision selecting the safest option can be effectively explained to the MSD.

Study Recap

Let me recap the studies using primarily selected quotations from the studies themselves.

Egan

30 | "Overall findings did not detect a health hazard for persons living beyond 400 meters (1312 feet) from the well operated wastewater treatment plant." "From patterns observed in the household health survey, the increased incidence of skin disease, and the symptoms of nausea, vomiting, general weakness, diarrhea, and pain in chest on deep breathing may be associated with the nearby operation of the wastewater treatment plant." | 3

Northside

32 | "The overall conclusion that this activated sludge sewage treatment plant had no obvious adverse health effects on residents potentially exposed to aerosol emissions must be tempered by the recognition that only a very small number of people were exposed to the highest pollution levels. It is important to note that this plant was not a source of high concentrations of viable particles, gases, or metals to the study area." The people that prepared the study are telling us that this plant is not representative of all plants in the United States. | 3

Durham School

33 | "The Durham students probably received a peak daily dose of about 9 cfu of mycobacteria and 3.5 cfu of fecal streptococci about one school day per year." "At this dose and frequency, a rather insensitive measure, school attendance, provided no evidence of an adverse health response." "In fact attendance at the nearby school generally improved after sewage treatment commenced." "This change in principal may have been responsible for part of the improvement in attendance at Durham Elementary in the DAWTP operational years." "The lack of an effect on school absenteeism does not necessarily imply the absence of any health hazard." | 34

69 | "Dose-response relationships need to be developed for the pathogenic microorganisms prevalent in wastewater aerosols so that the health hazards of monitored sources can be more adequately assessed." We agree. | 3

Pleasanton, California

"Results obtained from the aerosol studies indicate that use of the traditional indicator organisms to predict human population exposure results in extreme underestimation of pathogen levels." "At sites with aerosol source strengths similar

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35 to the Pleasanton site and with sampling and assay methods currently available it is generally not advisable to conduct microbiological aerosol sampling at distances beyond 200 meters (656 feet) from a wastewater aerosol source."
 "Until the necessary dose-response relationships are developed neither the level of aerosolized microorganisms that constitute a hazard nor the degree of required disinfection can be specified." "The available techniques include epidemiological studies of human populations, sentry animal studies, laboratory animal studies, clinical studies, and/or professional judgment."

Workers In Copenhagen

36 "The only significant difference was an elevated level of gamma globulins among sewer workers, suggesting that they have had more infections than the other groups." "In the report of medical consultations with sewer workers, the doctors conclude that the working environment is responsible for a high level of acute disorders of the gastro-intestinal tract." "Therefore one can conclude that workers who have spent more than 8 years in Copenhagen sewers have about twice the death rate of all Copenhagen males." "It seems probably that biological and chemical insults, caused in part by lax observance and poor enforcement of safety regulations and discharge restrictions have all contributed to the adverse survival expectancy of this group."

Tecumseh, Michigan

37 "During the warmer seasons, summed respiratory illnesses within 600 meters (1968 feet) of the wastewater treatment plant exceeded those expected by 20% and 27% and summed gastrointestinal illnesses exceeded those expected by 78% and 50% when specified for income and education, respectively." "Differences with respect to total and gastrointestinal illness were found significant at the 95% and 99% level of confidence respectively." "Higher rates of illness transmission in areas of higher densities of lower socioeconomic families, could have contributed to these findings." Or conversely the plant could be responsible for the high rate of respiratory illnesses near the plant."

Cincinnati, Chicago, Memphis Workers

"From preliminary analyses of illness rates, unexperienced workers exposed to sewage had a higher rate of gastro-intestinal illnesses than experienced sewage treatment plant workers."

38 Many areas of the 156 page study were difficult to evaluate with the resources available. However, two examples in Tables 44 and 46 seem to be significant and were classified as "no significant difference". Out of 183 exposed workers, 7 or 3.8% showed enterovirus isolation and only 1 out of 77 (1.3%) of the non-exposed workers were positive. In Table 46 the difference was even greater, 3.4% versus 0.6%.

The above quotations from the seven studies that formed the basis of the draft EIS certainly do not support the conclusion of no health hazard. These excerpts plus Mr. McCabe's symposium comments when considered against the history of this controversy can only lead to the decision to continue some modified, low-cost

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(possibly temporary) covering option. If it is anticipated that the final EIS may not agree with our conclusions, then I request the opportunity to meet with Mr. McGuire and any advocate of uncontrolled aerosol release. A decision maker should have the direct benefit of asking questions and I will provide that opportunity.

In a letter to USEPA dated November 21, 1977, I reminded Region V of the aerosol suppression requirement prior to the start-up of the O'Hare plant. I discussed the apparent delays in the aerosol suppression study and cautioned that "The MSD must not be allowed to maneuver the USEPA and IEPA into a pre-programmed decision using the urgency of starting operations at the O'Hare plant before the finally selected aerosol suppression facilities are constructed."

40 Then I went on to discuss the faults of using average data to determine the degree of suppression. I had no idea that six separate studies were quietly progressing to eliminate the very need of suppression. But my comments two years ago are valid today: 4

"Faulty Study of 'Average' Emission Data

While the timing of the study is out of phase with the plant construction timetable, a more serious problem exists with the average emission data that the proposed study will provide for a suppression decision. We must all focus our efforts and attention on the worst case situation. The majority of the study that the MSD proposes will be useless and completely misses the point of our concern. We are concerned with the limits of our resistance to infection from bacteria and viruses during adverse conditions of generation, transmission and intake.

During average conditions, we possibly do not need any aerosol suppression devices at the O'Hare plant because the die-off rate and dispersion will reduce the emissions to near the ambient levels. We should not be subjected to building an immunity with long term low levels of exposure and we are not volunteering.

40 Let me create a very realistic and probable situation in our community. An infant is playing in her crib near an open window on Lincoln Lane. She has been suffering with congestion and is just getting over a cold. An elderly man is walking along the south side of Oakton to the RTA bus stop at Ridge Lane. He has a history of lung ailments. There has been a heavy rain the night before and the plant is running at full capacity processing the first flush concentration from the Elmhurst tunnel. There is a relatively low level temperature inversion with fog and a 3 MPH wind from the south. It could also be presumed that for several days prior to the heavy rain there had been high levels of ozone which had caused lung irritation and a lowering of the resistance to respiratory infections. 4

Now why is this situation dangerous to our infant and elderly gentleman. The activity of both results in an increased air intake volume per unit time. The first flush from a tunnel results in a greater concentration of bacteria and virus in the aerosol generated. The high rain volume that is stored in the tunnel requires full plant capacity and increased aeration tank air flow. The fog condition greatly reduces the die-off of the viable particles in the aerosols due to evaporation and the inversion and mild wind channel the air flow and reduce dispersion.

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The \$1,416,000 proposed MSD study does not even approach examining a similar situation. And I may have omitted other factors that would make a situation even more dangerous.

Page 30 of the work plan refers to the most cost-effective system will be recommended by MSD. What health criteria will be used? What concentration of viral and bacteria pollution is "acceptable" for us to inhale? The burden of proof of the safety of any degradation of our air quality must be on the agency approving the degradation. In considering the cost-effectiveness of each option, it must be considered that varying degrees of aerosol suppression could be required depending on certain atmospheric variables. Using the covered aeration tank option as an example, it may be energy wasteful to incinerate the exhaust air on a windy dry cloudless day. And conversely, incineration may be required on a cool foggy evening. Programmed parameters in a computer could control the degree of necessary air purification. This could also be varied depending on applicable future medical studies at O'Hare or elsewhere."

Please comment on why there was no response or action taken to obtain this adverse data.

On Friday, September 21, 1979 in Cincinnati, Mr. Cecil Lue-Hing of the Metropolitan Sanitary District admitted that his research department misled us in January, 1975. At the meeting in September, he said, "Five years ago, I could not comfortably arrive at the conclusions I can today. While it was my gut feeling that my conclusions were valid then, I couldn't prove them at least as effectively as I can today. I personally can say that based on what I have heard in the last two days, I do not see any additional risk to residents around sewage treatment facilities."

The public and the review agencies relied on the integrity and professionalism of the MSD in 1975 when they stated in a 15-page position paper: "Let us now examine the larger issue of the health implications associated with the generation of microbial aerosols. The major question to be answered is: Are the assumptions concerning the implications valid? Based purely on the experience associated with the construction and operation of activated sludge plants in the United States and the rest of the world since 1915, the answer must be no! (emphasis in original on page 1-7 of EIS).

Now we learn this was only a "gut" feeling and that it was "an uncomfortable conclusion". Will we learn in 1984 that we were misled in 1979?

Some excerpts from the 1975 EIS may help to keep the "safest option" goal in focus:

page 3-31: "The possibility here, if any, of aerosol transmission of bacteria and viruses to the residential area in close proximity to Site 1 should be mitigated given the assurances provided under the National Environmental Policy Act and the concerns of the IEPA and the local residents. Additionally, we feel that to introduce a large facility into an area where none had existed before and which might possibly pose a potential health hazard in an environment which is already severely impacted by the degraded air quality and noise resulting from

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39 | O'Hare International Airport requires certain mitigative measures. We believe
 63 | that the most unacceptable risks are those taken at the potential expense of
 public health. It therefore behooves us to take the conservative approach in
 the application of mitigative measures."

page 5-20: "While aerosols will be generated at the WRP, we believe that it cannot be demonstrated that any health hazard will result from the transmission of these aerosols. However, since there is also an absence of evidence that a potential health hazard does not exist, we believe a conservative approach is required to mitigate any potential risk. We shall therefore require the MSDGC to design, construct and maintain such additional facilities as necessary to adequately suppress aerosol transmission from the aeration tanks, subject to the approval of IEPA and USEPA including demonstration by MSDGC of the effectiveness of aerosol suppression." The residents were pacified and the federal courts were impressed. But with passive encouragement by IEPA and USEPA, the MSD did not design, construct, demonstrate or maintain the aerosol suppression facilities! Public disrespect is warranted.

18 | page 5-22: "Should later evidence demonstrate that these measures are not sufficient, we will require and the MSDGC has indicated its willingness to
 implement, additional necessary mitigative remedies." Note that the "intended" option of doing nothing (less mitigative remedies) was omitted. "In order to further assure the implementation of this finding, it will become a special condition of the grant agreement between USEPA and MSDGC for the proposed Des Plaines-O'Hare WRP." After effectively assuring the public and the courts, the parties quietly set out to prove that aerosol suppression was unnecessary and thereby not cost-effective. But the studies failed and in September, 1979, the coordinator of the studies told the audience of scientists in Cincinnati that: "We have spent somewhat over 3 million dollars in the last several years and we have to conclude that we don't know how to measure what has to be measured." 1
 "We don't have the scientific know-how to address this problem of sewage treatment plant aerosols." "I think we have to have an effect in a micromized exposed population before we can conclude that the exposure is much lower in the neighborhoods. I think your problem is the sample size. Each one has been too small and inadequate." "We just somehow have to do something that we can have a measurable effect we can back off from." "We obviously need to be measuring something that relates to infectious dose." "If the suppression can be accomplished at less costs, then I don't think the health effects would have to be so unequivocal." "I'm sure the public must feel that their interest has been considered and that something could be done within reason to minimize the potential or imagined hazard." I'm sure the USEPA will try to get Mr. McCabe to retract or "clarify" his comments. But his original comments to the scientific community will stand as a pillar of honesty and unusual frankness.

56 | Page 36 of the draft EIS seems to lead the reader to believe that all factors were covered by the studies. It talks of a 292 million MGD plant that was studied and O'Hare will be only 35 MGD initially. But very few people live near the larger plant. It talked of school children within 40 meters of tanks but the study revealed that the surge basin was a very weak source of aerosols and the absentee measure was a very insensitive measure. It talked of workers exposed to high concentrations, but they were all healthy working age males and did not include children or senior citizens. It talked about the "residents" within 117 meters 5

November 28, 1979

- 41 | of the O'Hare tanks but failed to mention children playing on the hills outside
the fence only 42 meters from many acres of aeration tanks. The entire draft
EIS is a classic example of trying to fit the evidence to the desired conclusion. 41
- 42 | The main question remains unanswered. What aerosol dose of bacteria and viruses
results in a response in humans? And how frequently will the plant exceed
this dose under adverse conditions? These are the same questions everyone 42
- 43 | had in 1971 when the Clavey tanks were covered and in 1975 when the O'Hare tanks
were approved only with aerosol suppression. Until the dose-response question 43
is answered, we will expect that new plants built in residential areas will
only be allowed with aerosol suppression. This conforms to the intent of the
National Environmental Policy Act.

As I prepared my oral testimony and these written comments, I tried to keep one objective in mind -- to insure the safest environment for my community. I hope I have presented an effective combination of arguments and delivered them in a tone that will work. Some of the decision makers reading this will be displeased at my apparent disrespect of the system. Some will feel uncomfortable with draft EIS emissions being revealed. Others will know I respect their intelligence, honesty and objectivity. I have sat at my desk in my basement and used my typewriter and phone for 14 years. I have tried to be honest in my relationship with all sides of this issue.

I now bring to a close 14 years of my involvement in this controversy. It has been a frustrating drain on my personal life attempting to steer a consistent course to achieve the safest environment. There is a basic flaw in the environmental review process that requires my involvement to this extent.

I would like to thank the several thousand people in the Devonshire and Einstein areas for their trust and support, and I thank my family for their many personal sacrifices.

Sincerely,



Richard F. Ward
Alderman

Nov. 24, 1979
79 NOV 28 PM 12:37
RECEIVED
WATER DIVISION

Attn: Mr. Gene Wojcik
USEPA Region V
230 South Dearborn Street
Chicago, Illinois 60604

20 If the Environmental Protection Agency is truly for the protection of the people, your agency will require the Metropolitan Sanitary District to install aerosol suppression facilities. There are no concrete studies to prove without a doubt, there will not be health hazards.

As a responsible Environmental Protection Agency, the people should be taken into consideration for a change.

Sincerely yours,

Janet Palocz
(476 Country Ln.
Des Plaines, Ill. 60018)

November 29, 1979.

Mr. Gene Wojcik, Chief, EIS Section (5WEE)
U. S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

15

Has a study been made on the effect of air pollution on people who have various diseases or other medical problems? It is my understanding that persons in the vicinity of a sewage treatment plant are more subject to bacteria that may cause intestinal diseases. Obviously, while this may be a minor problem to most people, persons who have certain permanent medical ailments may have serious problems and/or discomfort. For example, there are persons who have trouble with their digestive system (do not know the medical terms) and diabetics, who must have food to offset insulin shots, (in addition to maintaining their system to protect themselves from other ailments they are more apt to incur than the ordinary person). I am a diabetic and am interested in the amount of risk the MSD is taking with my health and persons with the ailments mentioned above.

From the meeting at Friendship Junior High School, it was my impression that the MSD representatives are not interested in minorities like myself. Their attitude is "So what if it only affects a few people; what is best for the majority is what we should do, if it saves money." This idea is similar to the attitude that was used by several countries (Nazi Germany, for example) and our country fought wars to overcome it.

Please consider the effect the airborne bacteria will have on the minorities like me, who already have problems with their health.

Sincerely,

Donald F. Argus

Donald F. Argus
495 Courtesy Lane
Des Plaines, Illinois 60018

WATER DIVISION

NOV 30 PM 1:05

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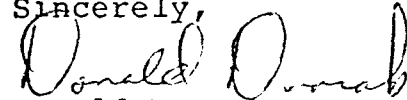
November 29, 1979

Mr. Gene Wojcik, Chief, EIS Section (5WEE)
U. S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

20 | Please include the attached petition in the final Supplemental
EIS on the O'Hare Sewage Plant. They represent the active door-
to-door concern of over 25 citizens who circulated the petition
and collected over 800 signatures of others in our community
that will be directly affected by the plant. We gave up a new
park site because of the fear that it would attract our children
closer to the aerosol source. | 20

Sincerely,



Donald Dvorak
1101 Hewitt Drive
Des Plaines, Illinois

WATER DIVISION
NOV 30 PM 1:05
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BOARD OF COMMISSIONERS, MT. PROSPECT PARK DISTRICT:

The attached petition has been circulated among the Mt. Prospect Park District residents living in the Devonshire and Einstein areas.

Our citizens are far more concerned with meaningful aerosol suppression devices on the aeration tanks to insure our health than we are with an additional 5 acres of leased land on the plant site.

With the possible exception of Rand and 83, this corner of Oakton and Elmhurst has the highest volume of traffic and the highest speed limits in the park district. It does not seem reasonable to the people of this area to expend park district funds to attract our young people to a high risk traffic area. If park district funds are available, we would appreciate completion of the 1969 Friendship Park Plan.

We also object to the MSD diverting even part of the federal funds for the dense vegetation buffer zone to develop a "park" site. We have information from consultants at the University of Illinois and Pittsburg that a vegetation zone has absorptive qualities that will reduce odors.

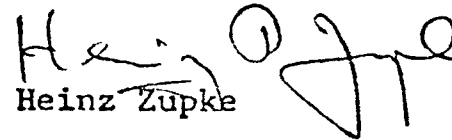
The MSD has already proved their irresponsibility by causing dust, noise and well pollution problems. The MSD has fought for years to avoid controlling their aerosol emissions. They now have to reveal the results of their study on the federal aerosol suppression requirement and their lawyers are still trying to invent evidence that their aerosol emissions are of no particular concern.

If the community welcomes their park site scheme, then that will be strong evidence that our health concerns were not serious.

We thank you for your consideration. If you have any questions a meeting can be arranged with several members of our community.

Sincerely,


Donald Dvorak


Heinz Zupke

PETITION

We, the park district residents living near the O'Hare Sewage Treatment Plant, petition the Mount Prospect Park District Board of Commissioners to cooperate with the City of Des Plaines in pursuing meaningful aerosol suppression devices to protect our health. We do not want to jeopardize covering the aeration tanks by agreeing to the use of the plant site for recreation. Also, the traffic hazards make the plant site unsuitable for a park. If park development money is available, it should be used to complete Friendship Park.

20

<u>Name</u>	<u>Address</u>
Florence Adamczyk	1500 S. Ridge Lane - Des Pl.
Rose Adamczyk	1500 S. Ridge Lane Des Plaines
Matt Adamczyk	1500 S. Ridge Lane Des Plaines
George Kruse	1501 S. Ridge Lane Des Pl.
Arena Kruse	1501 So Ridge Lane Des Pl.
Joannette Brucato	696 W. Lincoln Lane
Charles M. Lemke	714 W. Lincoln Lane
Murtle E. Lemke	714 W. Lincoln Lane Des Pl.
Maria E. Lemke	720 W. Lincoln Lane Des Pl.
Fred H. Lemke	720 W. Lincoln Lane Des Pl.
John H. Singman	710 W. Lincoln Lane Des Pl.
Diethelm Singman	710 W. Lincoln Lane Des Pl.
Kenneth A. Singman	714 W. Lincoln Lane Des Pl.
William E. Gutman	732 W. Lincoln Lane Des Pl.
Mrs. Wm. Gutman	732 W. Lincoln Lane Des Pl.
Mrs. D. Ulrich	740 W. Lincoln Lane Des Pl.
Julia Graczyk	750 W. Lincoln Lane Des Pl.
Sam A. Graczyk	750 W. Lincoln Lane Des Pl.
Patrick M. Gracyan	760 W. Lincoln Lane Des Pl.
Marion Gracyan	756 W. Lincoln Lane Des Pl.

11-29-79

Dear Sir,

17 From the scientific data that is available please estimate the number of additional times my family will suffer sore throats due to the additional air pollution of the plant. Please do not use an adjective in your answer such as "infrequently", but give me an answer such as: zero (0), 1 in 7 years, 3 times a year, etc. If your answer is more often than zero (0), then estimate the frequency with low cost aerosol suppression.

17

Please do not pollute our environment. The noise and air pollution from the airport already have an impact on our lives.

Thank you,

Fateh Andersen
465 Cordier Dr.
Des Plaines, Ill.
60018

RECEIVED

NOV 30 PM 1:04

WATER DIVISION

November 29, 1979

Mr. Gene Wojcik, Chief, EIS Section (5WEE)
U. S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

As a Commissioner of the Mount Prospect Park District, I have a responsibility to determine if proposals made are in the best interest of the park district residents. The MSD has proposed that certain unused land on the O'Hare sewage plant site could be used for the recreation of nearby residents. Our initial review revealed severe access problems for children crossing Oakton so the Oakton park location was not approved although we realize that the trees and hills will attract our citizens after the MSD moved the fence closer to the aeration tanks.

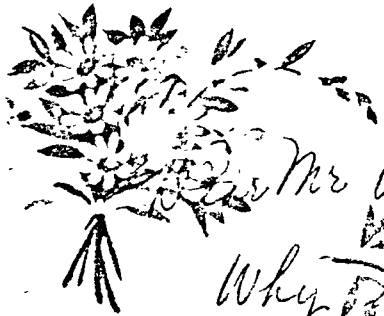
18 The site south of Wille Road has been proposed for an adult baseball location with access primarily by automobile because of its remoteness. This has been tentatively accepted by the park district but there are still reservations on the safety due to the aerosol question. The draft EIS seemed to eliminate this fear but comments made by USEPA officials recently at a scientific symposium revealed that the USEPA doesn't "have the scientific know-how to address this problem of sewage treatment plant aerosols." These comments certainly undermine the assurance in the O'Hare environmental review. When does the USEPA estimate that the necessary dose-response data will be generated by further scientific studies?

Sincerely,

Rosemary S. Argus

Rosemary S. Argus (Mrs.)
Park Commissioner
Mt. Prospect Park District

Home address: 495 Courtesy Lane
Des Plaines, Illinois 60018



Dear Mr. Waycib.

Why ~~did~~ the M. S. D.
build the permanent fence
closer to the aerators tanks than
the temporary fence that kept
our children away from the
construction for 4 years?

Until it is clearly proven
that the emissions will
not cause ~~any~~ increased
infection ~~the~~ fence should be
reconstructed at the property
line.

RECEIVED

NOV 30 AM

WATER

Sincerely

Mrs. Thom Janszke
175 Windsor St.
New Plaines, Cal.

60018



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

DEC 4 1979

WATER DIVISION

79 DEC 6 PM 12:11

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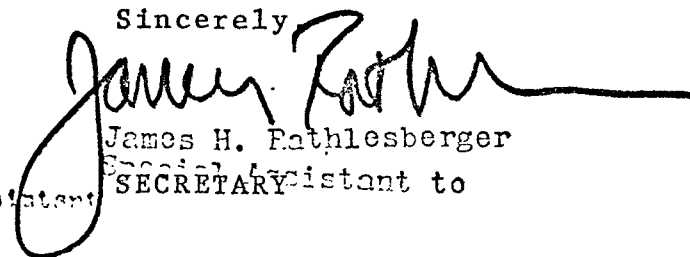
ER 79/944

Mr. Gene Wojcik
Chief, EIS Section
USEPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Wojcik:

Thank you for the letter of September 28, 1979, requesting our views and comments on the draft supplemental EIS, Metropolitan Sanitary District of Greater Chicago, O'Hare Water Reclamation Plant, Illinois. We have reviewed the document and conclude that it adequately considers those areas within our jurisdiction and expertise. Because our review did not reveal any conflicts with existing or proposed projects of this Department, we have no objection to the proposal.

Sincerely,


James H. Rathlesberger
Special Assistant to
Assistant Secretary

C. RESPONSES

COMMENT 1

One commenter inquired about the curriculum vitae of the EIS preparer.

RESPONSE

The environmental impact statement was the result of input from numerous individuals. Parts of the EIS were taken directly from scientific reports prepared by specialists in the field who all have advanced degrees. The overall assessment regarding the safety of operating the O'Hare Water Reclamation Plant was made by personnel of USEPA's Health Effects Research Laboratory in Cincinnati, Ohio. This laboratory has the responsibility for determining whether or not aerosols generated from waste treatment processes constitute a public health hazard and the cognizant personnel have advanced degrees and decades of public health experience. USEPA Regional personnel, who are experienced in NEPA requirements, worked with the laboratory personnel most familiar with the studies, and agreed on the representation and summaries of the studies. The section listing the EIS preparers has been revised.

COMMENT 2

One commenter was concerned about the alleged unavailability of referenced reports and short comment period deadline.

RESPONSE

All referenced reports were available at the Des Plaines Public Library more than 30 days in advance of the October 29, 1979 hearing, except for a referenced draft report which was available after the hearing. The commentator was sent copies of some reports. The library was sent additional copies of all reports so more people could check them out. They all can still be viewed in the reference library. The commentator was notified of this. Notice was given on November 5, 1979, extending the comment period through November 30, 1979.

COMMENT 3

One commenter wanted to know specifically what "no adverse health effect" means.

RESPONSE

No adverse health effect means the absence of clinical symptoms of disease and the absence of indications of infection as determined

by a rise in antibody titer in blood samples.

COMMENT 4

One commenter wanted to know, if given all the various parameters—wind, solar radiation, humidity, sampling techniques, analytical techniques, potential contamination of sample with active or sterilizing agent, distribution of samplers, etc.—what the confidence level of the accuracy for each data grouping or point was.

RESPONSE

The environmental factors of wind, solar radiation, and humidity do not influence the accuracy of the data. Quality control was incorporated into the environmental sampling surveys to assure the accuracy of the results. In addition upwind samples were generally obtained as well as downwind so that the net effect of the wastewater treatment process could be obtained and to equalize the variables. State-of-the-art technology was used to obtain the most accurate data possible. For example, the Anderson six-stage sampler, used in the majority of these studies, is the accepted sampler for measuring viable organisms in air and provides comparability of these studies with other air pollution studies. Discussions of the methodology used may be found on the following pages for each of the seven reports.

Northside Plant: Pages 38 to 58 and 161 to 182.

Egan Plant: Pages 28 to 59.

Tecumseh Plant: Environmental sampling was not conducted because it is a retrospective study using health data collected in the past.

Copenhagen Plant: Environmental sampling was not conducted because it is a retrospective study using health data collected in the past.

Tigard Plant: Pages 20 to 36 and 86 to 94.

Pleasanton Report: Pages 32 to 44 and 289 to 395.

University of Cincinnati Report: Pages 13 to 19 (samples taken for relative exposure only).

COMMENT 5

One commenter wanted to know, if given the number of participants, the method of data accumulation, variability of exposure, etc., what the confidence level is that the data acquired accurately indicates the health effects for the general public.

RESPONSE

Although the studies were not of equal importance, nor intended to be, the results, when considered overall, provide a high degree of confidence in conclusions regarding health effects or lack of health effects for the general public. All studies used standard statistical procedures, where appropriate, in design and evaluation of data. Epidemiological studies must by their nature use existing population (number, age, sex, race) and the results must be adjusted by appropriate statistical techniques for comparison. There are two types of health effects to be expected when a person is exposed to an infectious agent in sufficient dose—clinical and subclinical. The studies were intended to provide indication of such effects, if present. It is important to recognize that exposure does not necessarily result in a health effect. It is only when exposure is sufficiently high that an infection occurs, and only when a person's immune response is overcome would clinical symptoms result. For example, it may take exposure to thousands or even millions of bacteria to cause an infection.

COMMENT 6

One commenter asked, "Given the number of participants, etc., what is the confidence level that the data acquired accurately indicate the health effects for specific age groups as follows: 0 to 4 months, 4 months to 2 years, 2 years to 6 years, 6 years to 18 years, 18 to 59 years, over 59 years?"

RESPONSE

The investigators did not use the above age groupings. In the North-side Plant study, there was no relationship between exposure level and acute illness at a statistical confidence level of 95 percent for any of the four age groups tested (0-12, 13-18, 19-59, and over 59). The John Egan Plant study report contains voluminous statistical data with statistical confidence levels and included data for several age groupings. The most sensitive health effects tests, measurements of antibody to 31 viruses which would be expected in wastewater, showed no infections resulting from living near the plant for any age group. Data were collected on illness in school children of Tecumseh, Michigan, and reported in another report cited. At the 95 percent confidence level, the children attending the nearest school to the wastewater treatment plant, located between 600 and 1200 meters away, had significantly fewer illnesses than expected. Tables 1 through 6 of the Tecumseh report provide a complete breakdown by 9 age groups, 6 distance categories, 2 sexes, and 2 categories of diseases. An examination of the data for persons living between zero and 600 meters of the wastewater treatment plant shows no pattern of illness any different from the control group.

Although the Copenhagen report is not directly applicable to the O'Hare situation because it involves workers who not only would be exposed to aerosols but would be in contact with sewage, it does point out that persons who clean and repair sewers have higher death rates than the average person in Copenhagen, at the 95 to 99.5 percent confidence level. This European experience has not been confirmed in a study of Metropolitan Sanitary District of Greater Chicago workers which is still in progress.

Even though a new sewage treatment plant was constructed next to an elementary school at Tigard, Oregon, and the nearest aeration basins are within 50 meters of the school playground and 400 meters of the class rooms, the illness rates, as reflected by absenteeism, for the children age 6 to 12 were no different after plant operation than before nor any different than 8 control schools.

Numerous confidence levels were presented throughout the preliminary draft report prepared by the University of Cincinnati on sewage-exposed workers. Workers were generally 21 to 60 years of age.

The study at Pleasanton, California is an environmental monitoring study and not an epidemiological study so the question is not applicable.

COMMENT 7

One commenter wanted to know, if participants dropped out of the study, can the EPA make an unqualified statement that a natural selection process did not occur.

RESPONSE

A natural selection process did not occur. An explanation for attrition was presented in Table 7 of the Northside report. In no case was the reason given related to the wastewater treatment plant. In another example, every one of the participants at the Lexington Green Apartments, the participants closest to the John Egan treatment plant, continued through the completion of the study. The emphasis in the sewage treatment plant portion of the University of Cincinnati study was on recruitment of inexperienced workers so as to avoid the natural selection factor. The Tecumseh plant study used data collected for an entirely different purpose and was analyzed retrospectively.

COMMENT 8

One commenter wanted to know if a natural selection process occurred, what would be the new answers for comments 4, 5, and 6 would be.

RESPONSE

A natural selection process did not occur, so this question is not applicable.

COMMENT 9

One commenter requested that we: (1) prepare a dispersion model based on the designed parameters for the O'Hare plant as built and the best correlated data available for total particulates; (2) prepare a similar model for each key microorganism and pathogen, listing the expected average exposure rate for a 24-hour period and the maximum expected exposure rate for an 8-hour period at distances of 50 meters, 150 meters, 300 meters, 500 meters, 700 meters, and 1500 meters.

RESPONSE

An applicable model for an activated sludge plant was developed by Dr. Paul A. Kenline as part of a Ph.D. thesis at the University of Cincinnati. The model was developed at a 12 million gallon per day plant at Hamilton, Ohio. The results at O'Hare are expected to be the same order of magnitude as those found in Hamilton. However, even if they are 2 to 3 times Hamilton values, the Des Plaines exposure would be low.

Bacterial removals are controlled by diffusion, deposition, and die-off, which operate simultaneously. Under average conditions, the percent removal for a 24 hour period at varying distances from the tank would be as follows:

<u>Mechanism</u>	<u>Percent Removal</u>		
	<u>50 ft (15m)</u>	<u>100 ft (30.5m)</u>	<u>150 ft (45.7m)</u>
Diffusion	68	80	85
Deposition	28	28	28
Die-off	61	74	82
Total percent removal	85	91	98

Using this model, the expected average exposure increment from the O'Hare plant aeration basins for total bacteria at various distances would be, at 15 meters: 560 cfu per m³ (colony forming units per cubic meter of air); at 50 meters: 106 cfu per m³; at 150 meters: 11 cfu per m³; at 300 meters: 1 cfu per m³. Over an eight hour period, these densities could be expected to double. While theoretically one could arrive at a bacterial density beyond 300 meters, the model is not valid at these distances. Very few of the total bacteria are pathogens. Total coliforms (used as indicators) would be approximately 5 percent, while enterovirus would be 0.003 percent of the above values. Bacterial pathogens would be expected to be the same order of magnitude as total coliforms or lower. Normal background levels of total bacteria without the treatment plant would be of the order of 100 to 400 cfu per m³. At

50 meters the total coliform value based on Dr. Kenline's model would be expected to be 5 cfu per m³. Table 25 of the Tigard report confirms this same level of total coliforms for several other plants of varying configurations. Enteroviruses are more hardy than the indicator organisms, but these would have an even lower density.

COMMENT 10

One commenter wanted a specific statement, based on the above model, that there will or will not be any increased infections as a result of these emissions.

RESPONSE

Exposure alone does not cause infection or disease. Based on an Oklahoma study (see reference 9), minimum infective dose for various pathogenic bacteria is of the order of 100 to 100,000,000, with most values being in the millions. From correspondence with USEPA's Health Effects Research Laboratory in Cincinnati, Ohio, based on raw data of two ongoing studies (see reference 10), the minimum infective dose for viruses is about 10 to 200.

There is a distance of approximately 385 feet from the edge of the nearest aeration basin to the nearest house at Des Plaines. The incremental total bacteria count at the nearest house would average about 25 colony forming units per cubic meters of air (cfu per m³) with the 8 hour maximum double this value. Both values are well within background levels to which the people are exposed without the plant being considered. Bacterial pathogens would be a maximum of about 1 cfu per m³. With a respiration rate of 1 m³ per hour, and with a large percent of the organisms normally being exhaled, the minimum infective dose is so high that none of the age groups would be infected. Enterovirus at the nearest house would be of the order of 0.0008 cfu per m³. Even with the minimum infective dose of enterovirus so much lower than with bacteria, the exposure is far too low to cause an infection. Persons living farther away would have even less exposure.

Bahman Sheikh-ol-Eslami et al. from Engineering-Science Corporation, in a paper presented at the Water Reuse Symposium, Washington, D.C., March 25-30, 1979 (see reference 11), examined the risk of becoming ill from inhaling bacterial pathogens from spray irrigation of wastewater while standing 50 feet away for 8 hours. The calculated result was 1 chance in 860,000,000.

Knowledge of virus illness is not as complete, but given the low level of virus in the aerosol expected at the closest home and the estimates of infectious dose being greater than a single organism, the probability of an infection caused by the treatment plant is unmeasurable, considering the background levels. The virus shedding rate (indicating infection) was 17.5 percent in the Northside study, where fecal samples from all ages were analyzed every two weeks.

Several studies were conducted with USEPA funding to try to measure any infections which took place as a result of exposure to wastewater. Even when using the very sensitive procedure of measuring seroconversion of numerous viral antibodies, no relationship could be found to exposure to wastewater aerosols.

COMMENT 11

The commenter also requested that both the Water Division and the "Air Quality" Divisions of Region V EPA verify and without reservation state that the intent of the law for nondegradation of the ambient air quality for the region bordering the O'Hare Plant will be met as the plant is built.

RESPONSE

The USEPA undertook studies to evaluate health implications of aerosols emitted from wastewater treatment plants. Since no correlation between health hazards and aerosols has been found and the agency is continuing to study aerosols, the agency has complied with the intent of the law. Also no limits have been established for biological aerosols.

COMMENT 12

Another commentator concurred with the conclusions of the EIS and pointed out that delay in utilizing the O'Hare plant would cause a greater threat to the health of surrounding residents.

RESPONSE

This point is correct since overloading at existing sewerage systems is causing back up of raw sewage into the basement of homes. This is a definite health hazard which must be corrected promptly.

COMMENT 13

A comment was received which recognized the weak association between health and wastewater aerosols. A recommendation was made to operate the plant without aerosol suppression while continuing the assessment of potential health effects.

RESPONSE

Continuing to assess the potential problem is a prudent approach and the Agency will continue to assess the implications of future research involving wastewater aerosols and public health.

COMMENT 14

One commentor requested not only the installation of aerosol suppression facilities, but also took issue with the EIS statement that persons living near the Egan plant could have biased their answers because they knew the purpose of the questions about recent disease incidence.

RESPONSE

The Agency agrees that the statement that people may have been biasing their responses because they knew why the questions in the questionnaire were asked is inappropriate. The statement has been removed in the final EIS.

COMMENT 15

Another person asked about increased risk of infection from the wastewater treatment plant for persons that have medical conditions such as diabetes.

RESPONSE

In general, a compromised host, such as a diabetic, has an increased risk when compared to a normal person, when certain infections occur. With a serious case of diabetes there is decreased leukocyte chemotaxis, so an infection of an extremity, such as a toe, is more difficult to control. Various studies have shown the nasal carrier rate for Staphylococcus aureus to be 1.7 to 3 times higher in diabetics as compared to non-diabetics. In the John Egan study, isolation rates of S aureus from people varied in time but were not associated with plant operation. The people of Des Plaines, including the higher risk groups, are not expected to be affected by the operation of the treatment plant.

COMMENT 16

One person wanted to know why the permanent fence is closer to the aeration tanks than the temporary construction fence and requested it be moved to the MSD property line.

RESPONSE

The fence is in its present location to be away from the heavy street traffic and for aesthetic reasons since it is behind the landscaped berm.

COMMENT 17

One person wanted an estimate of the number of additional sore throats to be expected in her family as a result of the emission from the plant.

RESPONSE

No additional sore throats are expected. The emissions will be very small and primarily confined to the MSDGC property. The plant will treat fecal wastes, and bacteria and viruses that cause respiratory infections are generally not contained in such wastes. Incidents of sore throats were specifically checked at the Egan plant and no increase was found.

COMMENT 18

A commenter mentioned a statement by Mr. McCabe of the USEPA that we do not have the complete, scientific know-how to detect minute differences with the problem of sewage treatment plant aerosols and asked when the dose-response data will be generated.

RESPONSE

A number of persons have misconstrued Mr. McCabe's comment. To clarify his comments he has provided input and concurred in the following clarification.

He recognizes that scientific procedures exist which can detect infections with a high degree of accuracy. These procedures, involving antibody levels in blood, were utilized in three of the USEPA-sponsored studies. The other approach utilized, the traditional epidemiological approach looking for increases of disease, is not as sophisticated, and a number of disease incidents are required to show a difference from normality. In addition, other variables unrelated to wastewater treatment plants could result in false positives and give misleading results.

It is common knowledge that, given a sufficient exposure to a microorganism via the proper mode of entry, a susceptible person will become infected and possibly become diseased. What is happening near wastewater treatment plants is that the exposure levels are too low to result in an infection or disease. Other complex points, such as proper receptor site for the organism, minimum infective dose, the relatively small number of respiratory-type organisms in sewage with the principal mode of entry for the host being inhalation, the rapid decrease in density if the microbes become airborne, etc., all tend to reduce the possibility of an infection from wastewater aerosols.

Environmental monitoring for microorganisms, despite the comments to the contrary made by a few persons, is relatively good when put in its proper perspective. The various studies have shown that bacteria and viruses can be detected in extremely low densities, although heroic measures were used for viruses in two instances. For example, in the Pleasanton study enteroviruses were detected at a density of 1 in 71 cubic meters of air.

Scientists naturally prefer to have positive controls along with the systems being tested, to assure that the procedure being used is capable of providing a positive result, if one exists. In animal studies the dose can be

increased until an effect is noted, but in epidemiological studies this would be unethical and only naturally occurring situations can be studied. It is possible in some clinical studies to assure that no real adverse effects will result and exposure can be carefully evaluated. USEPA has sponsored two dose/response studies to determine the minimal infective dose of viruses by ingestion with a range of doses. Here positive results were obtained and illness producing infections were noted at the higher doses.

The series of USEPA studies discussed in this EIS was designed to provide a gradient of exposure. It was expected that sewage treatment plant workers would have a maximum exposure to the aerosols and would have demonstrated infection and illness rates that could be compared to the much lower exposures offsite. The results of the study of workers indicate that even at higher exposures, infections were not noted by the antibody or clinical chemistry tests used. Without a positive response it is impossible to know if the correct agents were sought.

The illness inquiry technique (2-week basis) showed that new workers at wastewater treatment plants have reported an increase in minor gastrointestinal symptoms. When similar techniques were used in the Northside study, the persons living near the plant did not report increased illness. A three-month recall questionnaire was used in the John Egan Plant study which does not supply as reliable data on these subjective measurements. But the John Egan study involved the startup of a new plant with illness data obtained before and after startup for comparison. Symptoms of nausea, vomiting, and diarrhea were associated with the initial operation of the sewage treatment plant and may be related to the same phenomena noted in the new plant workers. The rate of these transient symptoms in the new workers and for neighbors living closest to the plant was double that reported by the other individuals studied. Because such an illness increase was not noted in the experienced workers or the residents around an old plant, the illness would likely not be expected to continue and may only be associated with a first exposure to contaminated aerosols.

The etiological agent of the illness is not known and is unlikely to be one of the viral or bacterial agents checked for in the studies. The situation is something like the classic drinking water contamination problem where, in half of the instances where an illness is reported, the etiological agent cannot be determined. Methods for serological surveys are being developed for several new agents thought to be associated with waterborne disease, but such techniques are not available at this time. Lacking these techniques, an objective study of the risk associated with unknown agents cannot be made, and the only evidence available is the more subjective measurement of symptoms in an illness inquiry survey.

COMMENT 19

Another commenter reviewed the results of the several USEPA-sponsored health effects studies and agreed with conclusions of the draft EIS. It was asked that the draft be finalized and its conclusions implemented.

RESPONSE

The Agency has proceeded as rapidly as practicable and considered all comments before finalizing the conclusion presented in this final EIS.

COMMENT 20

Numerous citizens wrote to request that the O'Hare wastewater treatment plant aeration basins be covered so as to avoid health problems in the community. Also, some citizens requested that the aeration basins be covered, no matter what the cost, because of a fear of health effects.

RESPONSE

The USEPA is sincerely sympathetic with the concerns of the citizens. These concerns are understandable in view of citizen exposure to partial information and a fear of the unknown. The Agency has made a substantial effort over the past several years to obtain the facts and make a scientific determination of whether or not the citizens living near the O'Hare treatment plant would be exposed to a health hazard when the plant is in operation. All evidence indicates that there will be no hazard.

In addition to a responsibility to protect the environment and the health of people from environmental insults, the Agency has a responsibility to society to spend government funds wisely. This responsibility includes withholding the expenditure of funds to correct non-existent problems.

If the Agency had found that serious health effects to the point of a health hazard would be associated with the operation of the O'Hare plant, aerosol suppression facilities would have continued to be required. The quality of the Agency studies has been scientifically sound and the studies have been lauded by persons in the public health field. Individual studies do not carry equal weight, nor was this intended. While each has its strengths and weaknesses, the overall conclusion remains that when the results are applied to the O'Hare plant, there will not be a public health hazard for the residents of Des Plaines.

COMMENT 21

Another person, commenting on the referral to limitations of methodologies used in the USEPA-sponsored studies, questioned the validity of the findings in view of these limitations. This person also referred to the conclusion of the Egan study that no health hazard existed for persons living beyond 400 meters of the treatment plant and asked about persons living 400 feet from a plant.

RESPONSE

Limitations of methodology are relative. While one person may believe a procedure provides excellent sensitivity, another may want to improve

it even more. The procedures used were adequate to detect a health effect resulting from a wastewater treatment plant, if an effect existed. The investigator for the Egan study did not want to speculate on health effects within 400 meters because no one lived less than this distance from the plant and all of the persons he tested resided beyond 400 meters. Closer distances were left to other studies.

COMMENT 22

One commenter was concerned that the distance from plant boundary to residential boundary is only 100 feet.

RESPONSE

The distance from the nearest aeration tank to the nearest house is about 385 feet, and the aeration tank is back from the plant boundary about 240 feet. The nearest basin would have been 1300 feet from these houses if the City of Des Plaines had not refused to vacate Wille Road.

COMMENT 23

One commenter stated that, in 1975, state and federal authorities promised to control the release of aerosols.

RESPONSE

The Agency initially required aerosol suppression facilities because at that time not enough was known about aerosols. (Also see response 46.)

COMMENT 24

One commenter stated that the expenditure of \$500,000 for covers is the minimum that can be expected.

RESPONSE

This Agency looked at various covering schemes. One design scheme utilized corrugated fiberglass panels as suggested by the commenter. This scheme included a 3 foot spacing of 2 X 12's spanning the channel with transverse 2 X 4's at 4 feet spacing, peripheral closure boards, peripheral 1/2 inch round cinch anchors on 4 foot centers, washable screen filters per 3 foot section, and the plumbing and hoses necessary to flush the filters.

We concur with the commenter's findings that covers would exceed \$500,000. We do not, however, agree with their need because all evidence indicates that there is no health hazard to the public from wastewater aerosols.

The decision to install covers at the Clavey Road plant was made before much information was known about aerosols, and these covers increased the cost of the plant by 24 percent.

COMMENT 25

One commenter stated that "if a waiting room of a lawyer's office is compared to one at a pediatrician's office, the lawyer's office would be the more healthy place to be. A sewage treatment plant is just the type of operation where the worth combination of viable microbial aerosols are just waiting to affect those living in close proximity."

RESPONSE

The Agency agrees with the scenario that a greater risk is encountered by a person waiting in the pediatrician's office. On the other hand, Des Plaines parents send their children to school every day without fear. The classroom presents a far greater risk to the children of getting an infection than would be the case with living near the O'Hare wastewater treatment plant. Safety may be defined as the acceptability of a risk. If going to school is considered safe, living near the plant is even safer.

At times, numerous basements are flooded with raw sewage when sewers back up. This condition is a health hazard and will be corrected by the MSD project when operational. The Mayor of the Village of Mount Prospect, contiguous to Des Plaines, put the situation in perspective in a letter which is printed on Volume II, page 6-134 of the original environmental impact statement. Part of his letter is quoted below.

"Inadequacy of the present MSD facilities for removing sewage from our community have been well documented over the past ten years and it is the same for our sister communities, Elk Grove Village and Des Plaines. The inability of the MSD interceptors to handle our accumulated sewage results in raw sewage being overflowed into our creeks and drainage ditches and backed up into the basements of our residents. For seven years the means to resolve this major area problem has been at hand, but the specter of bad environmental impact has been used to delay the implementation of this most needed facility. No one can convince me that raw sewage stored in the basements of residences and spread across the open land is preferable to storage of such sewage in controlled circumstances. Unless your Agency can assure our citizens that the storage of raw sewage in and about our properties is a lesser health hazard than the storage of such sewage at the O'Hare treatment facility, I would believe it mandatory that you approve this facility for immediate construction. I do not

believe that a project designed via established experts in the sanitary field can be so patently deficient as to warrant the attacks being made on this project. If after seven years the "alleged" deficiencies have escaped the notice of the Federal experts, I would suspect that political pressure is not replacing reason. We are not considering a beautification project for the area, but a much needed reclamation plant to treat our own sewage in a controlled and healthy mannner."

COMMENT 26

One commenter wrote, "It is inexcusable that Region V did not advise the citizens near O'Hare that the 1975 promise of evaluating aerosol suppression alternatives would be side-tracked and a high priority put on eliminating the need."

RESPONSE

Phase 1 of the suppression study is still ongoing and will be completed in March 1980. Initiation of Phase 2 and 3 for the construction of a pilot plant and the evaluation of alternate suppression systems is pending the outcome of this work.

COMMENT 27

One commenter wrote, "The six studies provided no clear answers - just the hint that no significant health hazard exists."

RESPONSE

This point is discussed in each study. All studies together, though, indicate that no health hazard exists. (Also, see response nos. 5 and 21.)

COMMENT 28

One commenter quoted Mr. McCabe's statement that we don't have the scientific know-how to address the aerosol problem.

RESPONSE

A discussion of Mr. McCabe's statement is presented in response no. 18.

COMMENT 29

One commenter quoted the following comment made by Mr. McCabe and used it out of context: "If the suppression can be accomplished at less cost, then I don't think the health effects would have to be so unequivocal."

RESPONSE

Mr. McCabe's statements reads:

"If we are requested to continue the health effects studies, it would be well to also research the cost of aerosol suppression; then more realistic trade offs could be made in the future. If suppression were very costly, we would need unequivocal health effects to justify the cost; but if some less costly techniques are available, health effects data would not need to be as firm. From what we have heard there would seem to be little justification for large expenditures to contain aerosols based on a national policy, or even for a single plant. The designer of sewage treatment plants must continue to be concerned, however, and do what can be done to minimize aerosols. Here is where the more than scientific considerations are involved - the public must feel that their interests are considered."

COMMENT 30

The following two sentences were quoted by a commenter from the report of the sero-epidemiological study near the John Egan wastewater treatment plant.

"Overall findings did not detect a health hazard for persons living beyond 400 meters (1312 feet) from the well operated wastewater treatment plant." "From patterns observed in the household health survey, the increased incidence of skin disease, and the symptoms of nausea, vomiting, general weakness, diarrhea, and pain in chest on deep breathing may be associated with the nearby operation of the wastewater treatment plant."

RESPONSE

The illnesses quoted increased from 1.2 percent to 3.5 percent. Not mentioned were the number of illnesses shown to decrease during the same period based on questionnaire results. Examples are colds, fevers, and sore throats for the people living close in. A more sensitive testing procedure, checking 31 viral antibodies and attempted isolations of many pathogenic bacteria, parasites, and virus yielded no evidence of an adverse wastewater treatment plant effect.

COMMENT 31

The following is a quote of one commenter. "... you could not expect to find anything more significant than from the most sensitive study. And the most sensitive studies examined the blood of newly exposed individuals. But the Egan subjects were all beyond 400 meters and the newly exposed Northside subjects were too few. Only 60 ... lived within 1/2 mile from the aeration tanks for less than 1 year. If immunities are developed in 3 months, then the sample size is down to 15. The thousands of potentially newly exposed people near the O'Hare plant cannot accept such weak evidence."

RESPONSE

Immunity is conferred when antibody to a microorganism is increased as a result of sufficient exposure. As stated previously, a rise in antibody titre related to exposure to wastewater was considered by the Agency to be an adverse health effect. However, the development of immunity was not found. The situation at the Northside plant is almost identical to the Des Plaines location. At Northside, the nearest houses are only 500 feet from the nearest aeration basins and a school is located 1500 feet from the basins. No health effects were found in the nearby residents. In the Northside study persons were checked for antibody at the beginning of the observation period as well as at the end. A rise in antibody to a microorganism for which immunity was not present at the beginning, even for a person in residence longer than a year, could be considered equivalent to a similar occurrence in a newly exposed person. At O'Hare, thousands of potentially newly exposed people do not live within a few hundred meters of the plant as implied.

COMMENT 32

In summarizing the Northside plant study one commenter wrote, "The people that prepared the study are telling us that this plant is not representative of all plants in the United States."

RESPONSE

The investigators had no intention of implying a comparison to all other plants in the U.S. However, the Northside plant is representative of the O'Hare plant because it has essentially the same aeration basin design. This was the basis for selecting this plant by the University of Illinois and the USEPA.

COMMENT 33

One commenter wrote, "The Durham students probably received a peak daily dose of about 9 cfu of mycobacteria and 3.5 cfu of fecal streptococci about one school day per year."

RESPONSE

A peak, by definition, is the highest day only. The classroom was exposed half-time 54 days per year from the aeration basin and 53 days per year from the surge basin. The playground was exposed half-time 74 days per year from the aeration basin and 96 days per year from the surge basin.

COMMENT 34

About the Durham school student exposure one commenter wrote, "At this dose and frequency, a rather insensitive measure, school attendance, provided no evidence of an adverse health response.

RESPONSE

Illness, as reflected by school absenteeism is generally considered a relatively insensitive measure of health effects because absenteeism is also related to socioeconomic factors and teachers. These problems are more prevalent in lower socioeconomic groups, but Durham elementary school serves upper middle class children.

COMMENT 35

On the Pleasanton study one commenter wrote, "Until the necessary dose-response relationships are developed neither the level of aerosolized microorganisms that constitute a hazard nor the degree of required disinfection can be specified."

RESPONSE

The Pleasanton study covered a period from May 1976 to April 1977, prior to the results from the several epidemiological studies being available. The dose-response relationship was attempted in subsequent studies.

COMMENT 36

On the workers in Copenhagen, one commenter wrote, "Therefore one can conclude that workers who have spent more than 8 years in Copenhagen sewers have about twice the death rate of all Copenhagen males."

RESPONSE

Copenhagen sewer workers have lower sick leave rates than street repairman, garden and park workers, and workshop and warehouseman. A mortality study of former employees of the MSDGC has shown no significant departure from normal expected rates.

COMMENT 37

On Tecumseh, one commenter wrote, "Higher rates of illness transmission in areas of higher densities of lower socioeconomic families could have contributed to these findings. Or conversely the plant could be responsible for the high rate of respiratory illnesses near the plant."

RESPONSE

The investigator stated, "The larger than expected number of persons developing illnesses nearest the wastewater treatment plant during the summer may be attributable to reduced levels of sanitation within a lower socioeconomic group during a period of higher enterovirus infection incidence." Also see Response No. 58.

COMMENT 38

On the sewage treatment plant workers study, one commenter wrote, "However, two examples in Tables 44 and 46 seem to be significant and were classified as "no significant difference." Out of 183 exposed workers, 7 (or 3.8%) showed enterovirus isolation and only 1 out of 77 (1.3%) of the non-exposed workers were positive. In Table 46 the difference was even greater, 3.4% versus 0.6%."

RESPONSE

These differences yielded a "p" value of 0.28 and 0.06 respectively. The "p" value must be less than 0.05 to be stated significant. Therefore neither was considered significant.

COMMENT 39

One commenter wrote, "I had no idea that six separate studies were quietly progressing to eliminate the very need of suppression."

RESPONSE

The initial decision to require aerosol suppression devices was made because not enough was known about aerosols. The Agency went ahead to further evaluate aerosols, not secretively and not with the intent to eliminate the need for suppression.

COMMENT 40

After developing a worst case scenario, one commenter asked, "Please comment on why there was no response or action taken to obtain this adverse data."

RESPONSE

The EPA Health Effects Research Laboratory conducted a research program to answer the health questions. Persons were exposed to varying weather conditions during the study period. All natural occurring health responses which took place during the study period were investigated. A worst case situation may have occurred. In Response Nos. 9 and 10 on dispersion models, a worst case bacterial count was given. Also, Response No. 15 considers the risk to persons with a medical problem.

COMMENT 41

One commenter wrote, "The entire draft EIS is a classic example of trying to fit the evidence to the desired conclusion."

RESPONSE

The conclusion was based on the evidence obtained since 1975.

COMMENT 42

One commenter asked, "What aerosol dose of bacteria and viruses results in a response in humans?"

RESPONSE

See Response No. 18.

COMMENT 43

One commenter asked, "And how frequently will the plant exceed this dose under adverse conditions?"

RESPONSE

The plant will not cause exposure exceeding that discussed in Response No. 18.

COMMENT 44

One commenter stated, "Apparently, they just continue to take data until the averages ended up where they wanted them. The USEPA's staff in Cincinnati should reconstruct this data to see if the implications or conclusions are justified."

RESPONSE

Sampling protocols were developed in advance. It is inappropriate for the commenter to try to draw conclusions based on only the first 20 percent of the samples. These studies were sponsored, reviewed and approved by the USEPA staff in Cincinnati.

COMMENT 45

One commenter quoted Dr. Johnson, "Primary negative findings were found relative to adverse health effects related to the transport of pathogenic aerosols to exposed populations. These results should not be accepted as conclusive findings."

RESPONSE

This was the first health study completed and the results of this one study was not accepted as conclusive findings. Additional studies were carried out.

COMMENT 46

One commenter stated, "Another quote from the study reveals ... that increased incidents of skin disease and symptoms of nausea, vomiting, general weaknesses, diarrhea and pain in the chest on deep breathing occurred close to the sewage treatment plant... You won't find that in the blue book handed out this evening."

RESPONSE

This statement was included in the draft EIS on Page 8.

COMMENT 47

One commenter made the following statement, "One of the study conclusions was 'Results for alpha and gamma hemolytic streptococci isolations in the throat swabs for the subjects from the Lexington Green Apartments provide some evidence that the pattern may relate to exposure to the wastewater treatment plant aerosols.'"

RESPONSE

The commenter omitted the next two sentences, which state, "However, alpha- and gamma-hemolytic streptococcus species are part of man's normal flora in the intestinal tract, upper respiratory tract and skin, and of his environment (e.g., vegetation, insects, and animal feces) and do not normally produce disease. Therefore, their presence in the vicinity of the wastewater treatment plant or in the throat swabs is of little practical health concern.

Thirty-one viral antibody tests and attempted isolations of many pathogenic bacteria, parasites, and viruses yielded no evidence of an adverse wastewater treatment plant effect.' Streptococcus alpha and gamma isolations are common in all people as indicated by the high percentage found. Alpha streptococci colonize the human upper respiratory tract within the first few hours after birth.

COMMENT 48

One commenter stated, "If you have not read the basic report [Pleasanton study] which has not been distributed yet, then this will be news to everyone except the Region V people who apparently dread any reference to dose response... Until the necessary dose response relationships are developed, neither the level of aerosolized microorganisms that constitute a hazard nor the degree of required disinfection can be specified."

RESPONSE

Since the study developed a model to determine dose and did not evaluate populations, a response was not determined. A dose response was attempted in the several other studies which found the exposure did not cause a response. The low exposure was apparently below the minimum infection dose. Also, see Response No. 18.

COMMENT 49

One commenter quoted Dr. Sorber, "The fact is that considerable questions remain as to the level of risk to be associated with microbiological aerosol from wastewater operations in this country including spray irrigation."

RESPONSE

Dr. Sorber did not say that the risk is high. He was asking about a numerical value. Such a value is presented in another response as calculated by Bahman Sheikh-ol-Eslami. Also, see Response No. 10.

COMMENT 50

One commenter concluded by saying, "The audience is very patient with the review of the seven studies and my presentation leads to considerably different conclusions than the whitewash in the draft EIS."

RESPONSE

The EIS presented relevant information from reports by scientists outside of USEPA and tried to be objective. The conclusions of the outside scientists and USEPA scientists differ from those of the commentator.

The following responses are listed without listing the specific comment.

RESPONSE 51

The closest homes to the O'Hare aeration basins are 385 feet away, not 150 feet as stated.

RESPONSE 52

The one effect reported by the workers studied was an increase in gastrointestinal illness for new workers exposed to sewage when compared to experienced workers with similar exposure. These workers are chronically exposed to much higher levels of aerosols than nearby residents and have direct contact with sewage.

RESPONSE 53

Exposure levels at Tigard were estimated using 4 wind direction measurements per day, and therefore variable exposure levels could have resulted from wind direction variations between the wind direction measurements made.

RESPONSE 54

This statement seems to be in error, since Mr. McCabe's written text of his speech states that "there seems to be little justification as far as expenditures for aerosol suppression at this time...." Also see Response No. 18.

RESPONSE 55

This statement is included in the final EIS.

RESPONSE 56

This information is discussed on Pages 36 through 38 of the final EIS.

RESPONSE 57

People moved into the Lexington Green Apartments while the study was in progress, and these residents were 400 m (1312 feet) from the plant. This study was designed as an exploratory study to see if further study was necessary. It indicated possible effects, so more research was initiated.

RESPONSE 58

The researchers reached this conclusion since, "In general persons living in the WWTP 600 m boundary concentric circle had less education and lower income than in either the comparable control group or other WWTP rings." Also, significant differences in illness incidence between the control and WWTP groups were found only in the least educated group, and not intermediate and higher educated families. Also, no significant differences in illness incidence were found for individuals dwelling at

specified distances from the control location, or WWTP group when specified for education. Furthermore, significant illness incidence differences were seen in both the WWTP and control location concentric rings when income was specified, the most significant being for the lowest income level in the WWTP and control group.

Therefore, these differences indicate that "Higher rates of illness transmission in areas of higher densities of lower socioeconomic families could have contributed to the findings."

RESPONSE 59

We concur and have removed this information.

RESPONSE 60

A statement which is similar to the claimed omission was included in the draft and final EIS: "Sewer workers experienced a high rate of gastrointestinal tract disorders which the workers associate with chemical odors and infectious agents."

RESPONSE 61

This statement was not withheld and has been included. The report in which it was made was available as a reference document.

RESPONSE 62

See Response 63 and 18.

RESPONSE 63

While additional information and further research is always desirable to have in a decision making process, it is also necessary at times to make decisions based on the best available information. It is our determination that sufficient information has been developed since May 1975 to allow us to review the decision originally reached in the May 1975 EIS.

RESPONSE 64

Organisms and sampling methods considered appropriate were used in the studies which evaluated possible demographic and socioeconomic effects before drawing conclusions about possible health effects.

RESPONSE 65

We agree that it is important to continue to examine research related to the health effects of wastewater aerosols.

RESPONSE 66

In the Tecumseh, Michigan study the data suggests that the higher illness rates detected may be related to higher densities of lower socioeconomic families near the WWTP. Also see Response No. 58.

RESPONSE 67

The Egan study did not detect a significant health hazard for persons living beyond 400 meters of the WTP. Other studies referenced in the draft EIS evaluated potential health effects of residents as close as 152 meters, elementary school children as close as 40 meters from the aerosol source, and STP workers who are exposed to the highest aerosol levels and have direct contact with sewage.

RESPONSE 68

We agree that the basement flooding resulting from the existing overloaded sewerage system is a known hazard. This situation presents the hazard of direct contact and transmission of pathogens from wastewater accumulated in basements.

RESPONSE 69

The Northside, Egan, and University of Cincinnati studies attempted to develop more sensitive clinical dose-response relationships for the pathogenic microorganisms prevalent in wastewater.

VI. LIST OF PREPARERS

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VII. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THIS STATEMENT WERE SENT:

The following Federal, State, and local agencies were requested to comment on the Draft Supplement Environmental Impact Statement:

Council on Environmental Quality
Department of Agriculture
Soil Conservation Service
U.S. Army Corps of Engineers
North Central Division
Chicago District
Department of Energy
Argonne National Laboratory
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Heritage Conservation and Recreation Service
Fish and Wildlife Service
Geological Survey
Department of Transportation
Federal Aviation Administration

Governor of Illinois
Illinois Sanitary District Observer
Illinois Institute for Environmental Quality
Illinois Environmental Protection Agency
Illinois Division of Waterways
Illinois Department of Conservation
Illinois Department of Public Health

Northeastern Illinois Planning Commission
Cook County Department of Environmental Control
Metropolitan Sanitary District of Greater Chicago

City of Des Plaines
Village of Elk Grove
Village of Arlington Heights
Village of Mount Prospect
Village of Palatine
Village of Wheeling

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IX. GLOSSARY OF TERMS

acquired immunity--specific immunity attributable to the presence of antibody and to a heightened reactivity of antibody-forming (and phagocyte) cells after exposure to an infective agent or its antigens.

activated sludge sewage treatment plant--a biological wastewater treatment system in which a mixture of wastewater and biological sludge (microorganisms) is agitated and aerated. The solids are separated from the treated wastewater and returned to the aeration process, as needed.

adenovirus--a group of thirty-one viral sero-types that cause diseases of upper respiratory tract.

aerosol--colloidal-size droplets dispersed in the atmosphere (air).

alpha and gamma hemolytic streptococci--aerobic, facultative/anaerobic *Streptococcus* genus of bacteria; gram positive spheric (or oval) cells occurring in pairs or chains. Beta hemolytic group include human and animal pathogenic; alpha hemolytic occur as normal flora in upper respiratory and intestinal tract.

antibody--an immunoglobulin molecule of specific amino acid sequence which interacts only with the antigen that initiates its synthesis in lymphoid tissues or with antigen closely related to it.

antigen--any substance which is capable, under appropriate conditions, of inducing formation of antibodies and of reacting specifically, in some detectable manner, with the antibodies so induced.

bacteria--typically one-celled microorganisms containing no chlorophyll--some cause diseases and others are necessary, e.g., for nitrogen transformations, fermentation and organic matter decomposition.

Biochemical Oxygen Demand (BOD)--a standard test, used in assessing wastewater composition, which measures the oxygen required to oxidize the organic matter in a sample under standard conditions.

cfu--colony forming units.

cfu/m³--colony forming units per cubic meter.

Chemical Oxygen Demand (COD)--the amount of molecular oxygen required to oxidize all compounds in water, organic and inorganic.

Clostridium perfringens--a gas-producing species of bacteria that produce several toxins and are the principal cause of gas gangrene in humans. Also known as *Clostridium welchii*.

coefficient of variation--the statistical ratio of the standard deviation of a distribution to its arithmetic mean.

coliform--an organism found in the intestinal tract of humans and animals. Its presence in water indicates pollution and potentially dangerous bacterial contamination.

coliphage--any bacteriophage able to infect Escherichia coli.

composite sample--a combination of individual samples taken at selected intervals that represents the total material (population) being sampled.

coxsackievirus--one of the enteroviruses producing a disease resembling poliomyelitis but with no paralysis.

echovirus--one of a subgroup of the picornoviruses infecting the gastrointestinal tract and discharged in the excreta; includes polioviruses, coxsackieviruses and echoviruses.

enterovirus--a subgroup of human viruses including the coxsackieviruses and the echoviruses.

epidemiology--a field of medicine concerned with the determination of specific causes of local outbreaks of infection, e.g., hepatitis and toxic disorders such as lead poisoning and other diseases of recognized etiology.

flora--plant life in a specific location.

free chlorine--the free elemental form of chlorine from a chemical used for the disinfection or oxidation of drinking water, sewage, or industrial waste.

gamma globulin--any of the serum proteins with antibody activity. Also known as immune globulin.

gastrointestinal--pertaining to that portion of the digestive system including the stomach, intestine, and all accessory organs.

health hazard--a health effect which represents an increased risk of exposure to danger, harm, injury, or loss which has distinct medical concern in comparison with the risks of infection otherwise encountered in normal daily life.

intestinal flora--bacteria normally residing in the lumen of the intestine.

Klebsiella--a genus of nonmotile, rod-shaped bacteria in the family of Enterobacteriaceae; species are human pathogens.

liter--a unit of metric volume or capacity equal to 1000 cubic centimeters.

mfc--membrane filter count.

mixed liquor--a mixture of activated sludge and water containing organic matter undergoing activated sludge treatment in the aeration tank.

micrometer (μm)--a unit of metric length equal to one-millionth of a meter.

mucoid type--pertaining to large colonies of bacteria characterized by being moist and sticky.

parasitic worms--worm-like organisms that live in or on another organism of different species from which it derives nutrients and shelter.

particulates--fine solid particles which remain individually dispersed in gases and stack emissions.

pathogen--disease-producing organism.

pfu--plaque forming unit.

pH--a term used to describe the hydrogen ion activity of a system, or how acid or alkaline a material is presently.

Proteus--a genus of Enterobacteriaceae that occurs in the motile and non-motile forms.

Protozoa--a diverse phylum of microorganisms; the structure varies from a simple uninucleate protoplast to colonial forms.

Pseudomonas--a genus of the Pseudomonadaceae family; most species are aerobic and include cellulose decomposers and human, animal, and plant pathogens.

regression analysis--analysis which measures the mean expectation one variable to another, given two dependent random variables.

Salmonella--a genus of rod-shaped pathogenic bacteria of the family Enterobacteriaceae that are usually motile by flagella.

scatter diagrams--statistical diagrams involving the plotting of the pairs of values of two variates in rectangular coordinates.

Shigella--the dysentery bacilli, a genus of the family Enterobacteriaceae.

serological--pertaining to the branch of science dealing with the properties and reactions of blood sera.

sero survey--a survey involving the properties and reactions of blood sera.

sputum--matter discharged from the surface of the respiratory passages, mouth, or throat; may contain saliva, microorganisms, blood, or inhaled particulate matter in any combination.

Streptococcus--a genus of the tribe Streptococceae including many pathogenic strains; the cells are round and occurring characteristic chains.

titer--the concentration in a solution of a dissolved substance as shown by titration.

total organic carbon (TOC)--a measure of the amount of organic material in a water sample expressed in milligrams of carbon per liter of solution.

total suspended solids (TSS)—the total number of small particles of solid pollutants in sewage that contribute to turbidity and that resist separation by conventional means.

viable—capable of living, e.g., a pathogen capable of infecting.

virus—a large group of infectious agents capable of infecting animals, plants, and bacteria; characterized by total dependence on living cells.

windrose pattern—a diagram in which statistical information concerning direction and speed of the wind at a location may be summarized.

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 MS:gw:Tape #10:12-27-79

ELMHURST RD.

OAKTON ST.

O'HARE W.R.P.

NORTHWEST TOLLWAY

TOUHY AVE.

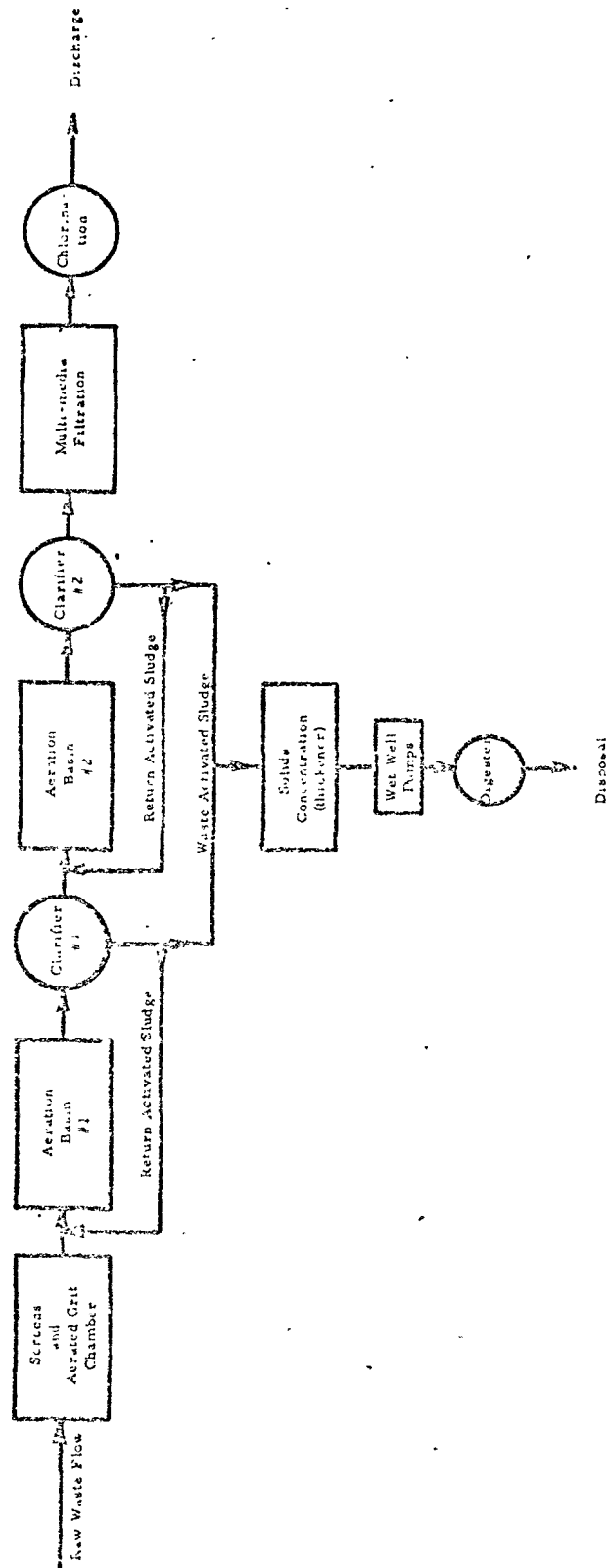


Figure 3. John E. Egan Water Reclamation Plant Flow Diagram.

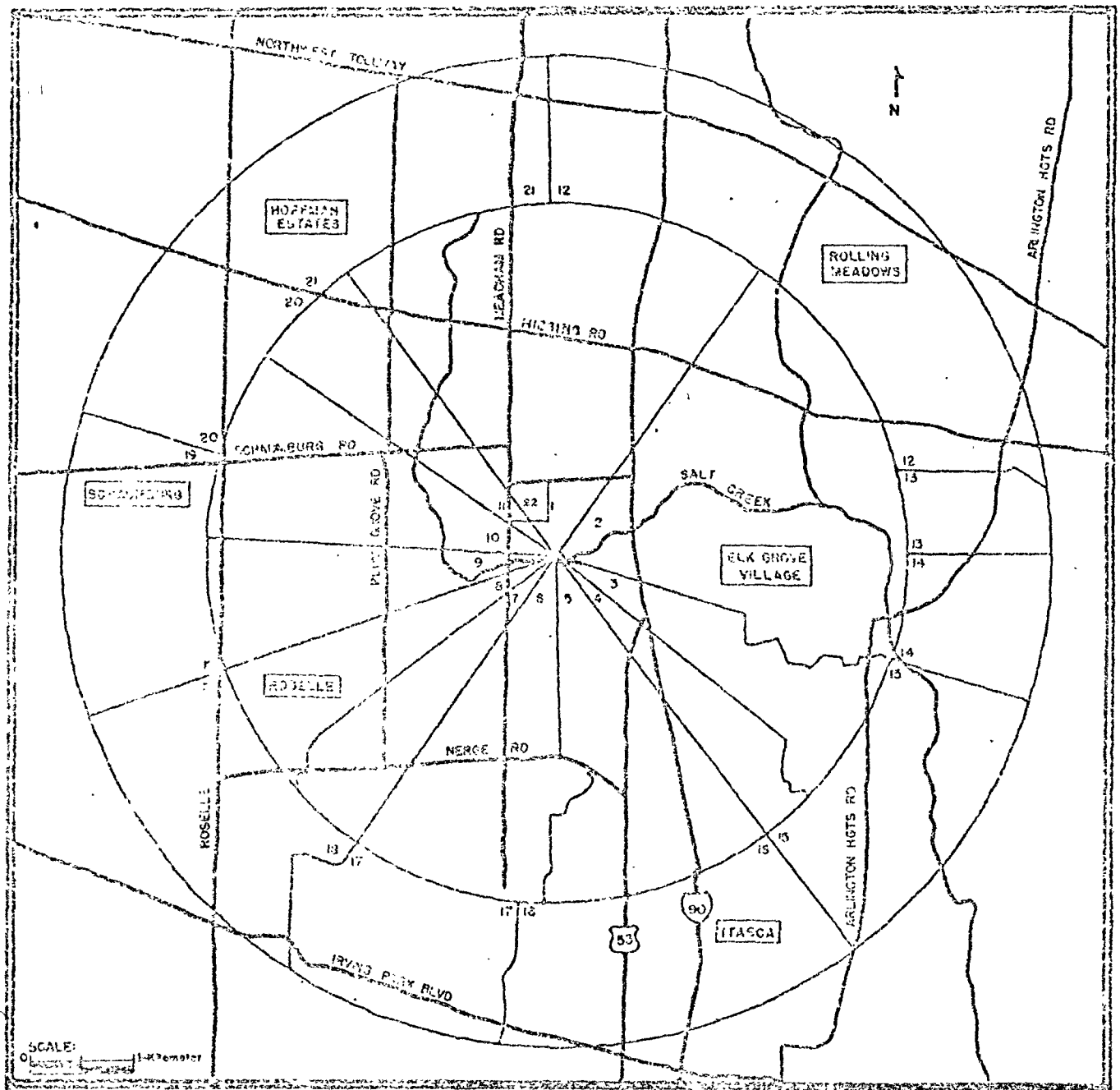


Figure 4. John E. Egan STP project study area map.

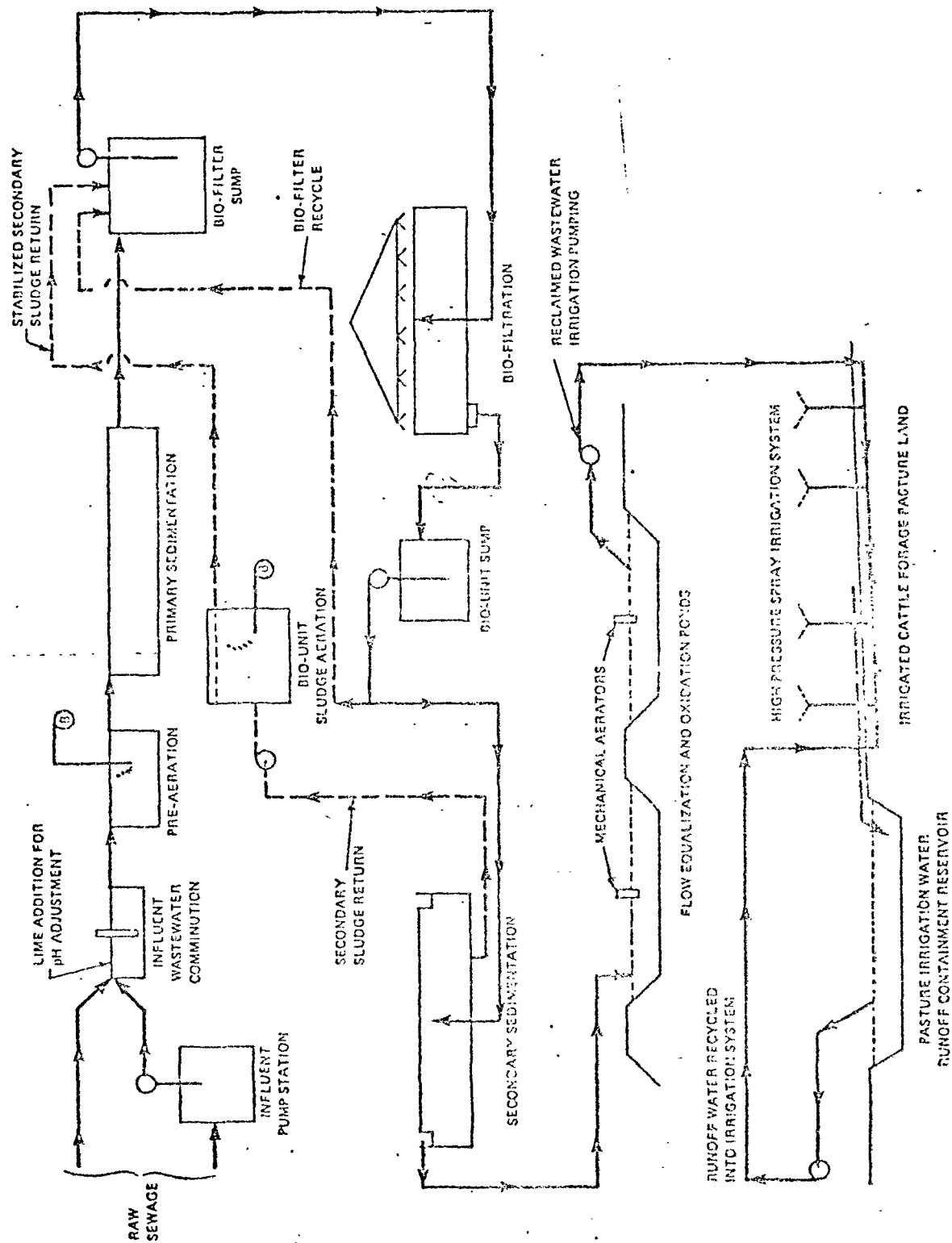
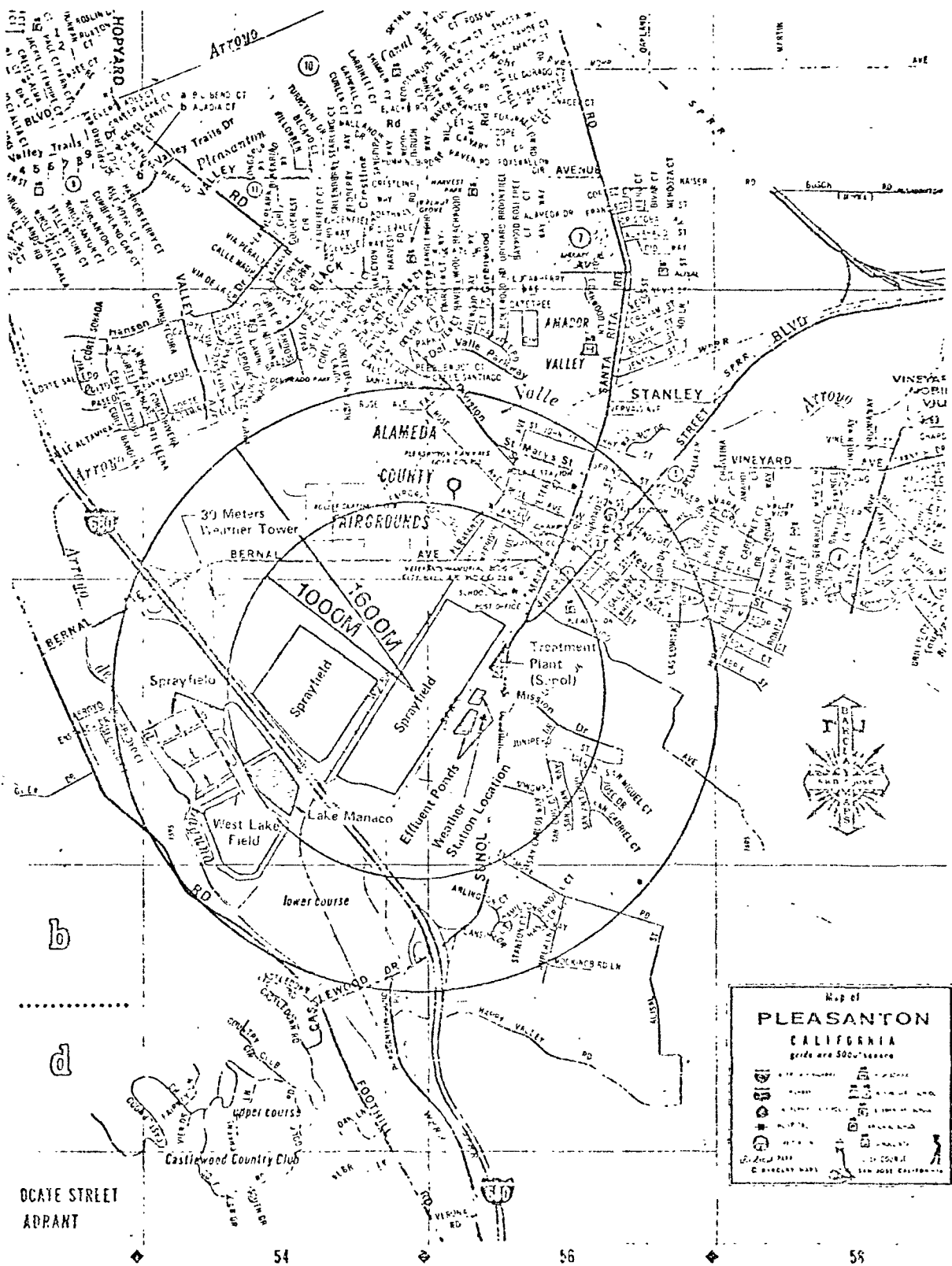


Figure 5
PLANT AND DISPOSAL FACILITY FLOW SCHEMATIC

Figure 6
SCHEMATIC OF STUDY SITE



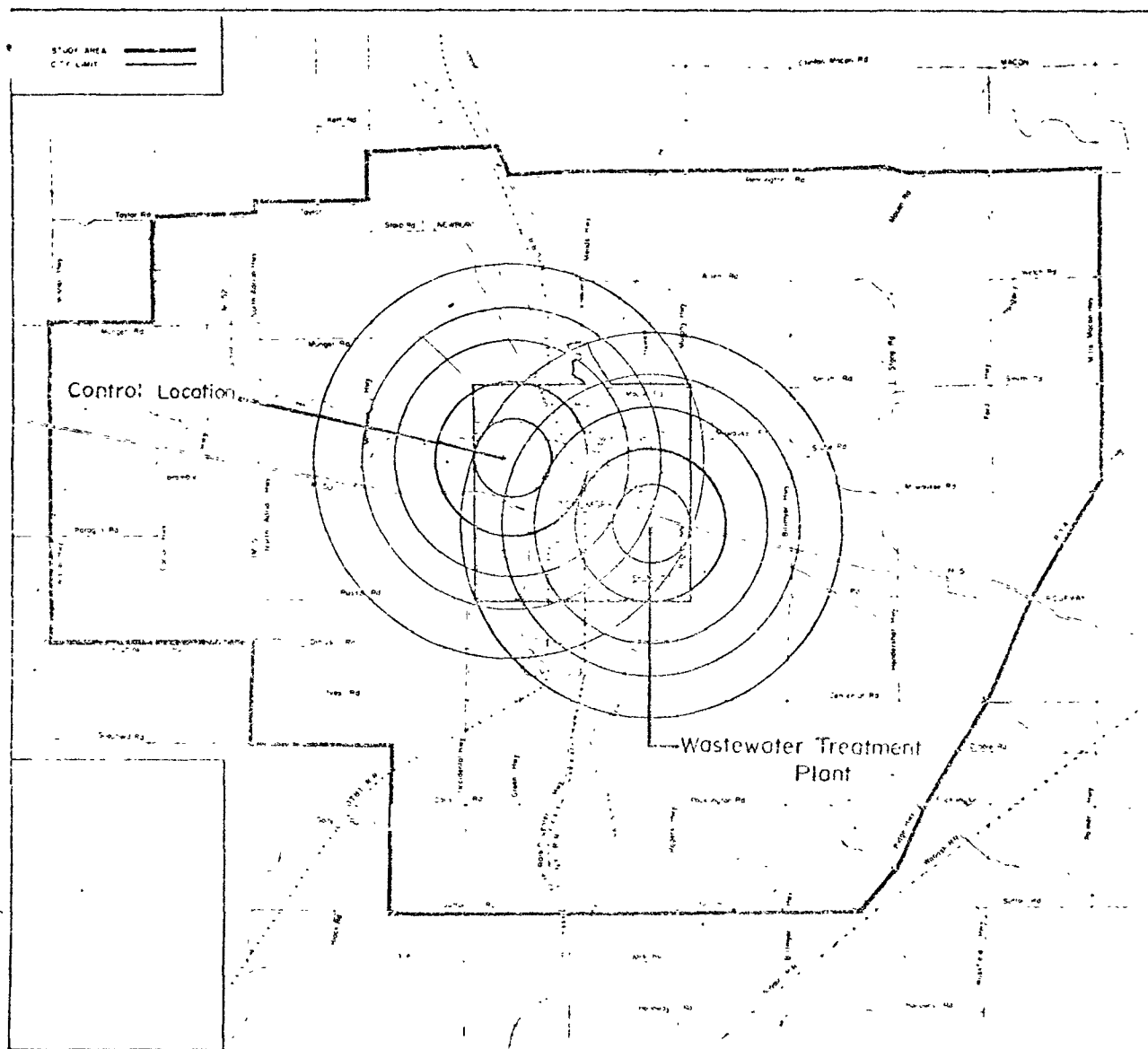


FIGURE 7 Wastewater treatment plant and control location concentric circles within Tecumseh study area.

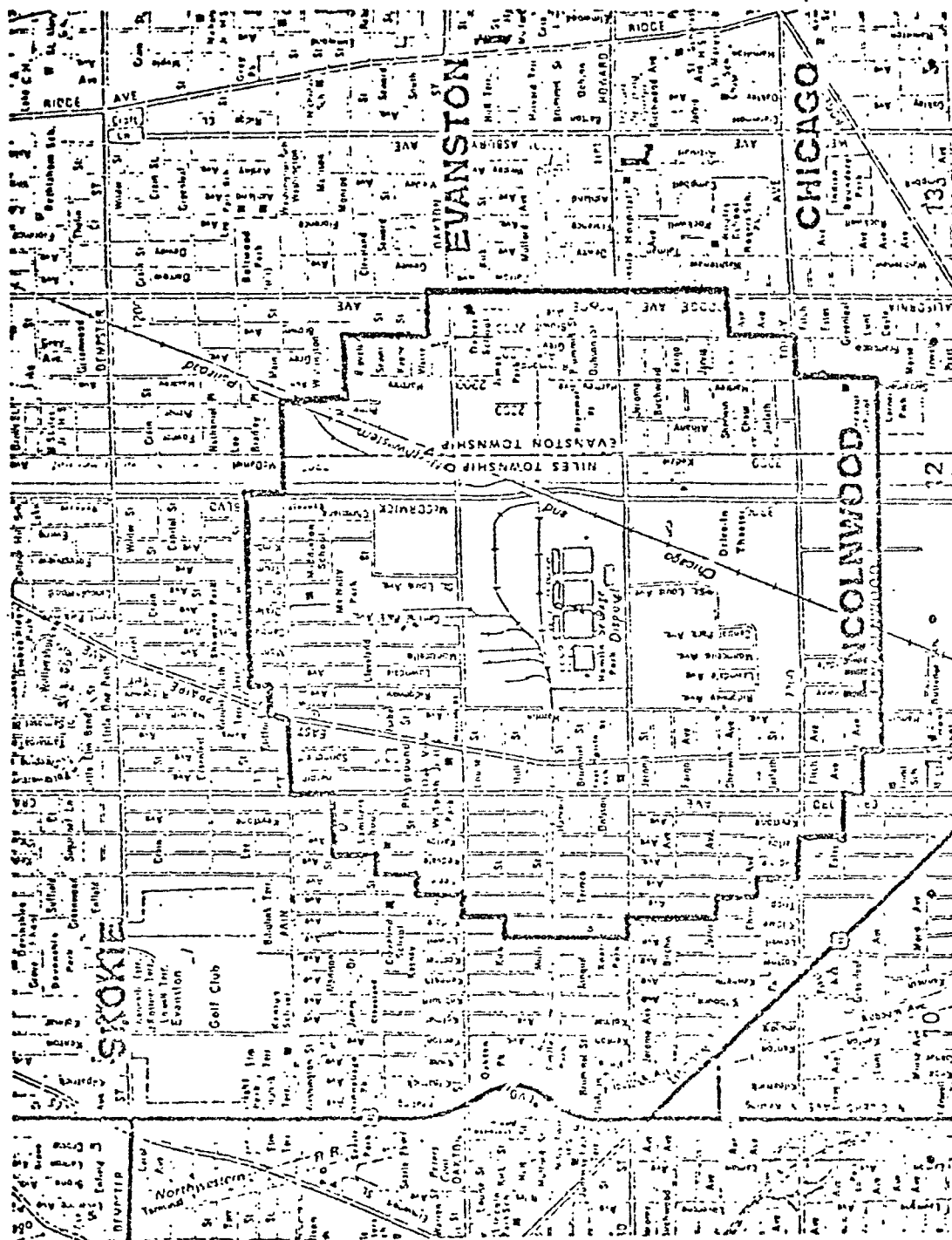
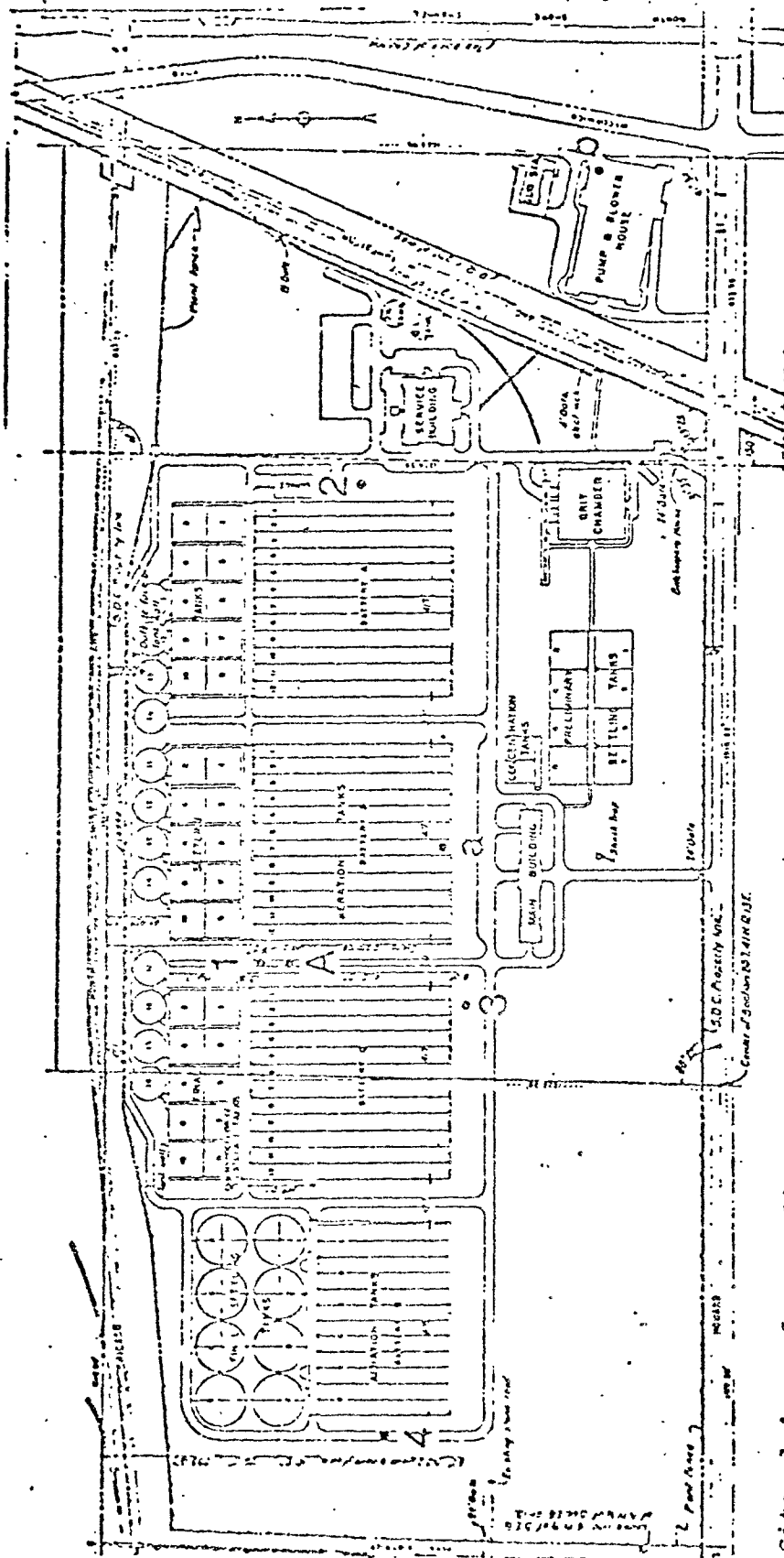


Figure 8. Map of study area.



Sites 1-4 are for sampling of airborne viable constituents.
 Site A is for sampling of airborne non-viable constituents.
 Sites a and b are points for grab samples of sewage for analysis of viable and non-viable constituents.

Figure 9. Schematic of North Side Sewage Treatment Works with on-plant sampling sites.

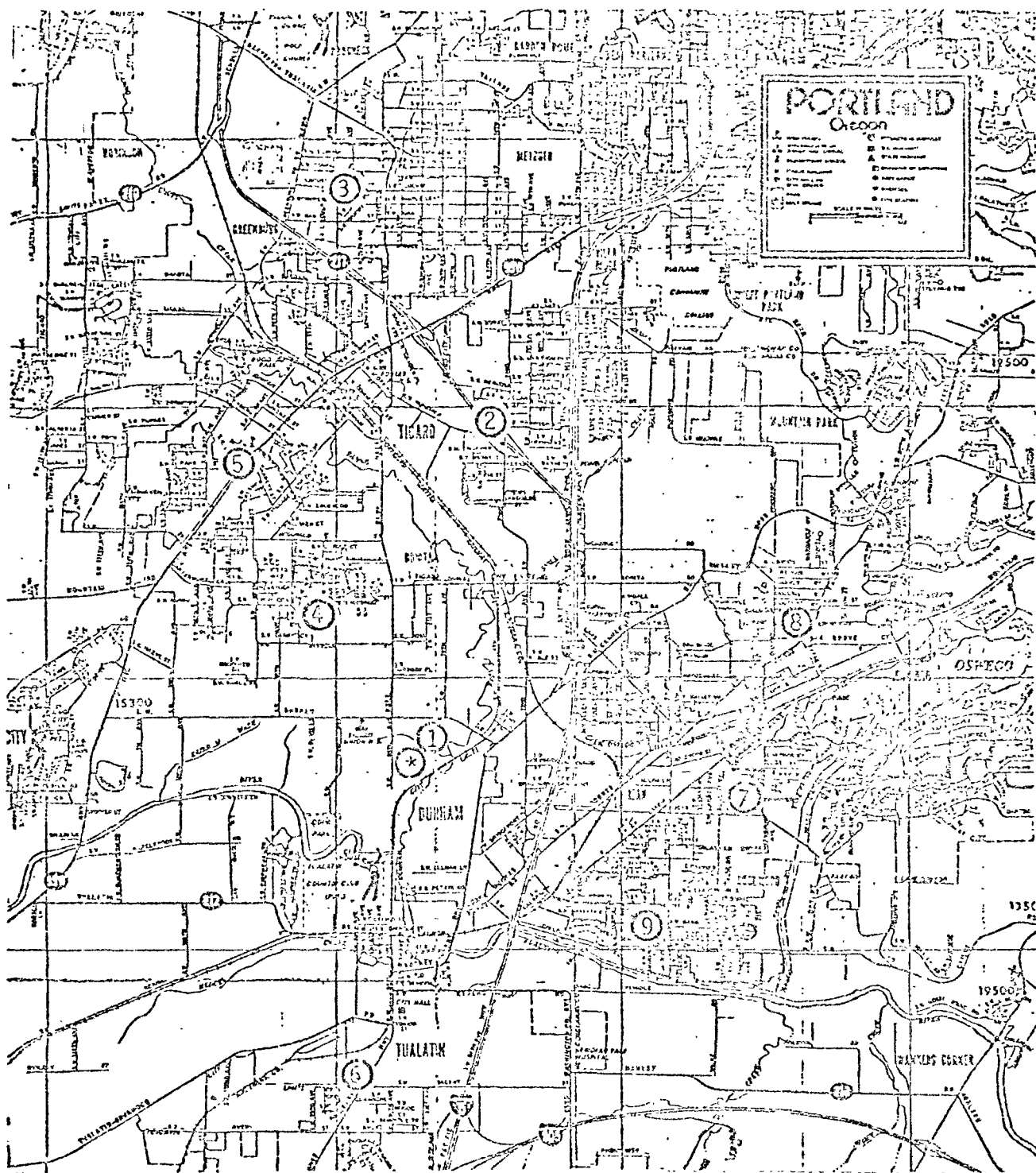


Figure 10 Map of Study Area

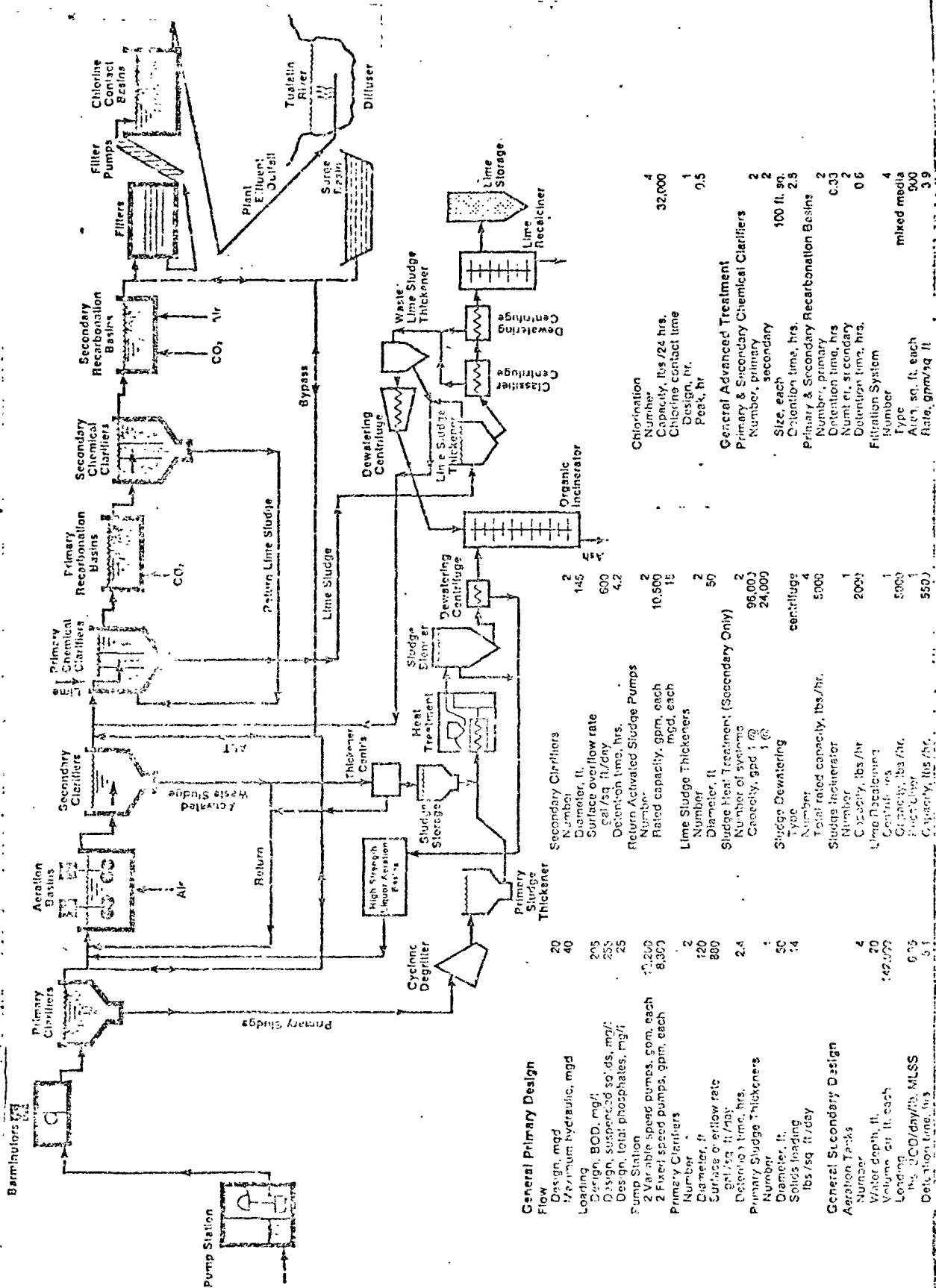


Figure 11. Durham Advanced Wastewater Treatment Plant Processes