ENVIRONMENTAL IMPACT STATEMENT
FOR
THE GRANTING OF AN EASEMENT
FOR A SEWER OUTFALL

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GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

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ENVIRONMENTAL IMPACT STATEMENT

FOR

THE GRANTING OF AN EASEMENT

FOR A SEWER OUTFALL

BY

THE GODDARD SPACE FLIGHT CENTER

OF

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

February 1974

Prepared by:

Goddard Space Flight Center
Greenbelt, Maryland 20771

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20 Letter #18768 of June 29, 1973, to Mr. William Gullett, Prince George's County, from Mr. Robert J. McCaffery, GSFC

21 Letter of July 2, 1973, to Mr. Samuel W. Keller, GSFC, from Mr. Richard Schifter, Fried, Frank, et al.

22 Letter of July 19, 1973, to Mr. Alvin Bass, NASA Headquarters, from Mr. Richard Schifter, Fried, Frank, et al.

23 REPORT: AN EVALUATION OF THE GREENBRIAR SEWAGE TREATMENT PLANT FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION by Dr. R. J. Schoenberger, P.E., dated July 23, 1973

24 Letter #1363 of July 26, 1973, to Mr. Richard Schifter, Fried, Frank, et al. from Mr. Samuel W. Keller, GSFC

25 Letter of August 24, 1973, to Mr. James F. Mills, GSFC, from Mr. Richard Schifter, Fried, Frank, et al.

26 Letter of September 18, 1973, to Mr. James F. Mills, GSFC, from Dr. R. J. Schoenberger, P.E., Enviro/Earth Ltd.

27 Letter of September 28, 1973, w/enclosure, to Mr. R. J. McCaffery, GSFC, from Mr. Joseph A. Galda, Region III, U.S. Environmental Protection Agency

28 Letter of October 4, 1973, to Mr. Samuel W. Keller, GSFC, from Mr. Richard Schifter, Fried, Frank, et al. with enclosures

29 Memorandum for Record, Subject: Trip Report - Survey of Wyoming, Michigan Sewage Treatment Plant - September 10 and 11, 1973, by Joseph M. Dalton, Jr., Environmental Protection Specialist, GSFC

30 Memorandum for Record, Subject: Survey of Landover Mall Sewage Treatment Plant, September 27, 1973, by Joseph M. Dalton, Jr., Environmental Protection Specialist, GSFC

31a Letter of October 11, 1973, to Mr. R. J. McCaffery, GSFC, from Neil Solomon, M.D. Ph.D., Department of Health and Mental Hygiene

31b State of Maryland National Pollutant Discharge Elimination System Permit, dated January 10, 1974

31c Resolution No. 74-173, Adopted January 9, 1974 by the Washington Suburban and Sanitary Commission

31d State of Maryland Department of Health and Mental Hygiene Sewerage Permit, dated January 23, 1974

32 Letter of September 21, 1973, to Saul Cohen from David Birenbaum, Fried, Frank, et al.

33 Letter of September 21, 1973, to D. Snyder III, EPA, from R. Schifter, Fried, Frank, et al.

34 Letter of January 9, 1974, to R. Tenney Johnson, NASA Headquarters, from David J. Snyder III, Region III, EPA

SUMMARY SHEET FOR
ENVIRONMENTAL IMPACT STATEMENT
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND
FOR

The Granting of an Easement for a Sewer Outfall Line

(x) Draft ( ) Final Environmental Statement

Responsible Federal Agency:

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Official Contact:

Mr. Samuel W. Keller, Director
Administration and Management Directorate (Code 200)
Goddard Space Flight Center
Greenbelt, Maryland 20771

1. Name of Action: (x) Administrative Action
( ) Legislative Action

2. Brief Description:

The Goddard Space Flight Center (GSFC) of the National Aeronautics and Space Administration (NASA) has under consideration a request by Greenbriar Associates, the developers of the Greenbriar Apartment Project, for an easement across approximately one hundred-fifty feet of GSFC property. The easement would be to permit the laying of an outfall line which would carry the effluent from a temporary private sewage treatment plant serving the Project across GSFC property to a discharge point on GSFC property into an unnamed tributary of Beaver Dam Creek. The sewage treatment plant is necessary if occupancy is to take place in accordance

with the developer's schedule because a moratorium on hookups into the local public sewer system exists in the area until such time as the Western Branch Sewage Treatment Plant can be upgraded and the present overloading conditions relieved. This is expected early in 1975. When the Greenbriar Apartment Project is permanently connected to the public sewer system, the use of the Greenbriar sewage treatment plant will be terminated and the plant dismantled.

3. Summary of Environmental Effects:

The primary environmental effect will be that resulting from discharge of the effluent from the sewage treatment plant upon the receiving stream. This effluent appears to meet all applicable Federal, State and local standards and is expected to have no significant impact upon that stream.

4. Summary of Major Alternatives Considered:

The alternatives open to NASA basically are granting or denying the easement. In its deliberations, NASA considered the following alternatives which were available to the developer in the event the easement were denied:

A. Discharge Into Stream on Greenbriar Property

B. Locating Plant at Western Branch Site

C. Postponement

D. Other Methods of Sewage Disposal

5. Comments:

In the course of NASA's investigation of this matter, comments have been solicited from the following:

Dr. R. S. Schoenberger, P.E. Enviro/Earth Ltd
(NASA Consultant)

U.S. Department of Agriculture

City Council - City of Greenbelt, Maryland

State of Maryland - Department of Health & Mental Hygiene

U.S. Department of Interior

County Executive - Prince George's County

U.S. Environmental Protection Agency, Region 3.

In addition, unsolicited comments were received from Covington & Burling representing the Prince George's Environment Coalition and many other interested parties. Both solicited and unsolicited comments were given careful consideration

Comments on this Draft Environmental Impact Statement are being sought from all those previously solicited; those who submitted substantive unsolicited comments; and

U.S. Department of Health, Education, and Welfare

U.S. Water Resources Council

Interstate Commission on the Potomac River Basin

U.S. Department of Housing and Urban Development

State of Maryland Water Resources Administration

Metrolpolitan Washington Council of Governments.

6. Submittal Date:

This Draft Environmental Impact Statement is being submitted to CEQ February, 1974 and being made available to the public on February, 1974.

I. INTRODUCTION

The Goddard Space Flight Center (GSFC) of the National Aeronautics and Space Administration (NASA) located in Greenbelt, Maryland, has been requested to grant an easement to Greenbriar Associates, developer of the Greenbriar Apartment Project. The Greenbriar Apartment Project, which consists of 1,193 garden type apartment units, is presently under construction and is expected to be available for occupancy early in 1974. The developer has requested that GSFC grant a temporary easement across approximately 150-feet of its land for the purpose of laying an eight-inch cast iron pipe at a depth of approximately three feet. (The complete legal description, a diagram of the easement, and a map of the area, are attached as Exhibit 1.) The pipe is to be used to convey treated sewage effluent from the proposed Greenbriar sewage treatment plant to a discharge point on an unnamed tributary of Beaver Dam Creek located on GSFC property. Figure 1 is an aerial photograph depicting the Greenbriar project in relationship to the Goddard Space Flight Center. NASA previously issued an Environmental Impact Statement covering the facilities and operation of the Goddard Space Flight Center itself. This Final Statement became available to the public on February 10, 1972.

At the present time, there is an existing moratorium which prohibits new sewer connections from being made into

the Washington Suburban Sanitary Commission's (WSSC) system because the existing sewage treatment plant, the Western Branch Sewage Treatment Plant, is overloaded and currently undergoing upgrading. The moratorium on new sewer connections is expected to continue until the upgrading of the plant is completed--early in 1975. Until such time as a public sewer connection becomes available, the developer is constructing a private, temporary sewage treatment plant on his property to serve Greenbriar. The easement is necessary in order to allow the treated effluent to be discharged into a suitable stream.

The proposed Greenbriar Sewage Treatment Plant (STP) would operate until the Western Branch Treatment Plant has the capability of treating this additional sewage presumably early in 1975. At that point, Greenbriar would hook up to the public sewage system, the on-site plant would be dismantled, and the easement terminated.

The apartment development, which is presently under construction, has been approved by the State of Maryland and Prince George's County. According to the developer, except for the sewer moratorium currently in effect, occupancy would have been expected in February 1974. In addition, the State of Maryland has issued the requisite permits for construction of the plant and for discharge of the effluent (Exhibit 31b). The plant is included in the

FIGURE 1

AERIAL VIEW SHOWING THE GREENBRIAR PROJECT

AND GODDARD SPACE FLIGHT CENTER

(NASA Photo G 73-10,499)

Master Plan and is consistent with zoning regulations of Prince George's County (Exhibits 13 and 14). Also, the Environmental Protection Agency has begun processing a National Pollution Discharge Elimination System permit pursuant to section 402 of the Water Pollution Control Act of 1972 (Exhibit 34).

This Draft Environmental Impact Statement has been prepared by GSFC personnel. The Goddard Space Flight Center has attempted to maintain an impartial position in this matter and has been wholly guided by the necessity to reach a responsible and fair decision. GSFC has further been cognizant of its responsibilities under the National Environmental Policy Act of 1969 and has evaluated this request in accordance with the policies and procedures of this Act.

After consideration of the initial request for easement, GSFC advised the developer that it could not grant the easement at that time, but would reconsider if certain conditions were met (Exhibit 24). These were primarily that the effluent be established to comply with Federal and State discharge requirements, and that a discharge permit under section 402 of the Federal Water Pollution Control Act (Public Law 92-500, October 18, 1972) be obtained.

As noted above, the applicable state permits have now been issued and an EPA permit is being processed. Moreover, the request for easement appears to be in order, other

applicable requirements having been met. Therefore, GSFC has decided that upon the developers obtaining an EPA permit, the easement can be granted. Therefore, in accordance with the provisions of the National Environmental Policy Act of 1970, GSFC is filing and circulating this environmental impact statement. This action should continue to provide for thorough review by interested groups and the general public.

Much of the information on which this Environmental Impact Statement is based has been obtained from the developer and also from other sources, including an independent consultant under contract with NASA, Dr. R. J. Schoenberger. Factual material has been independently reviewed and evaluated by GSFC personnel.

II. DIRECT ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

A. Conditions of Approval by Local, State, and Federal Authorities

The developer alleges that the on-site treatment plant will produce a virus-free effluent which will meet or surpass all applicable standards. The plant is to be built in compliance with standards established by the State of Maryland and the WSSC. The latter will operate the plant at the expense of the developer and under the general supervision of the Environmental Health Administration of the Maryland State Department of Health and Mental Hygiene. Federal and State requirements necessitate obtaining discharge permits from the Environmental Protection Agency and the Maryland Water Resources Administration, respectively, before operation can commence. Both have expressed an intent to issue the requisite permits.

The location of the Greenbriar STP within the Greenbriar tract was authorized in the 1972 Annual Revision of the Prince George's County Ten Year Water and Sewerage Plan, adopted by the Prince George's County Council on November 29, 1972 (Exhibit 10). The plant has now also been approved by the State Department of Health and Mental Hygiene (Exhibit 31d). The County Council also required that:

a. The plant must incorporate the advance treatment process proposed by Dr. John T. Cookson, Jr.,* the

*Dr. John T. Cookson, Jr., Associate Professor in the Department of Civil Engineering of the University of Maryland and Director of the University's Environmental Health, Science and Engineering Training Program, has served as technical consultant to Greenbriar Associates.

developer's technical consultant, as described in his Report on the Use of Temporary Wastewater Treatment Plants: Standards and Procedures for Elimination of Health Hazards, a copy of which is contained in Exhibit 2;

b. there may be no mechanism which would allow untreated sewage to by-pass the plant in times of overload;

c. excess chlorine must be removed from the effluent after contact time adequate to effect disinfection has elapsed;

d. virus sampling of the effluent must be done on a rountine basis, at least monthly, by a competent laboratory, at the owner's expense;

e. multi-media filters of the type used at a similar plant located at Lake Tahoe area are required to be installed;

f. there must be a meter to record constantly the flow of sewage into the plant;

g. a pre-set limit to the number of connections allowed and strict adherence to this limit must be established;

h. a large surge tank must be utilized in order to equalize the flow into the plant, so that peak hours and low usage period flows are equalized;

i. a recycling capability must be included, so that if any unit of the plant falls below the expected standard

of treatment, the sewage can be sent back through the plant to insure proper treatment;

j. a double, completely independent, power supply must be included;

k. the plant must be run by WSSC, using a trained and experienced maintenance crew;

l. the method of sludge disposal must be clearly outlined;

m. the plant must be closed as soon as public sewage facilities become available;

n. the effluent must be enclosed in a pipe to a point in the stream where there is a continuous year-round flow of water;

o. an emergency connection with the WSSC community sewer system must be built so that if a problem developed at the plant, sewage could be discharged into the system instead of directly into the receiving stream; and

p. the sewage effluent must be treated with breakpoint chlorination to inactivate viruses and subsequent dechlorination to meet State water quality standards.*

The developer is committed to compliance with these conditions, and WSSC states that they will not commence operations unless these conditions have been met (Exhibit 10).

*This process is described in the memorandum "An Evaluation of Breakpoint Chlorination and Dechlorination of Effluent and Salt Content," prepared by Dr. Cookson. A copy is attached as Exhibit 3.

B. Removal Effectiveness of the Sewage Treatment Plant

The developer has informed NASA that the Greenbriar STP is to operate as follows. Raw sewage will flow into a wet well from which it is pumped to a secondary unit. The secondary unit will be a standard, extended aeration treatment plant which provides for biological oxidation. The plant will be equipped with a surge tank and an effluent holding tank to equalize the flows into the plant and the advanced treatment unit. From the secondary unit, the flow will be directed to the advanced units, which will provide for phosphorus removal by means of precipitation and flocculation using alum, polymer and soda ash. The flow then goes to the tube settler and mixed media filter and is thereafter pumped into the chlorine contact tank where it is retained for a period of one hour. Prior to discharge into the stream, the effluent is dechlorinated using sulphur dioxide. The plant will be equipped with complete recycling capabilities which enable the effluent to be recycled from any of the processes back to the front end of the plant. There will be no by-pass mechanism to discharge raw sewage into the stream. Rather, the plant will include an emergency connection to the WSSC system so that, in case of emergency, any overflow may be pumped into the public sewage system. The sequences described above and their virus removal efficiency are diagrammed in Figure 2. The expected maximum levels of other pollutants in the effluent are set forth in Figure 3.

The Greenbriar STP will receive only domestic waste and will not include any industrial-type waste; therefore, materials frequently found in municipal systems will not be present in Greenbriar STP waste. Since the plant must meet EPA and State of Maryland water quality standards, the effluent will not contain any substances in toxic concentrations. The developer further maintains that virus removal will be completed by breakpoint chlorination (Exhibit 3).

C. Impact on the Stream

The developer contends there is no danger of eutrophication of the receiving stream. The level of phosphorus in the effluent of 0.9 mg/l - 1.0 mg/l (lower than the EPA-mandated limit of 4 mg/l) is predicted by the developer to be below the limit required for increased algae growth.* Inasmuch as the effluent flow will be nearly continuous and will enter a stream, rather than a lake or estuary, stagnation will not occur. The proposed method is alleged to yield an effluent of a higher quality than the stream and which would be consistent with water quality standards,** so that degradation of the water cannot take place unless there is a complete

*Since nitrogen removal is not essential to prevent eutrophication, neither the State of Maryland nor the EPA at present require its removal. The natural level of phosphorus in the stream is 0.4 - 1.0 mg/l.

**This is supported by Neil Solomon, M.D., Ph.D., Secretary, Department of Health and Mental Hygiene, State of Maryland (Exhibit 31).

Diagram of Greenbriar STP Processes and Virus Removal Effectiveness by Sequence

		Likely Virus Removal in Percent	
		Individual Process	Total
Biological Process	Raw Sewage		
	Activated Sludge With Nitrification	(50)	(50)
	Sedimentation	(0)	(50)
Physical-Chemical-Process	Alum, Polymer and Soda Ash		
	Phosphate Precipitation	(95)	(97.5)
	Filtration	(50)	(98.75)
	Chlorination to Breakpoint	(100)	(100)
	Dechlorination and pH Adjustment		
	Effluent		

Exhibit 2 - John T. Cookson, Jr., Ph.D., Environmental Health Engineer

Figure 2

Parameters	Greenbriar Minimum Quality Levels*	Percent Removal
BOD_5	not to exceed 3.9 mg/l	98.5%
suspended solids	not to exceed 1.9 mg/l	99.2%
phosphorus as P	not to exceed 1.0 mg/l	93-95%
total Nitrogen as N	not to exceed 15 mg/l	25%
coliforms	not to exceed 2/100 ml	
dissolved oxygen	not less than 5.0 mg/l	
pH	6.5 - 7.2	
turbidity	less than 1 JTU	
viruses	1 PFU/10 gal.	99.99%

*This data is derived from tests run on the effluent produced by the Landover Mall sewage treatment plant, which the Greenbriar plant has followed, with the addition of some improvements. See the letters of Dr. Cookson, dated August 5, 1973, and September 18, 1973, copies of which are attached as Exhibit 4a and 4b, respectively. As pointed out by Dr. Cookson in Exhibit 4b, the minimum quality levels specified in the table will be achieved constantly. Normally, however, the Greenbriar STP will satisfy the higher - drinking water quality - standards as described in Exhibit 4a. The EPA standards are set forth in "Region III, EPA Policy Statement, Interim Treatment Facilities, Washington, D.C. Metropolitan Areas." The WRA requirements are reflected in its Rules and Regulations at Reg. 08 05164 03.

Figure 3

operational breakdown (i.e., a breakdown in which the treatment plant malfunctions, followed by a procedural failure on the part of personnel to divert the sewage into the WSSC sanitary sewer system by means of the emergency by-pass). Such an occurrence can be considered most unlikely.

"Normal" flow in the stream is estimated to be 1 to 1.5 cubic feet per second, so that the depth at the point of discharge of the effluent will be 0.50 feet to 0.65 feet. When the first stage (see E below) is operating at capacity, the effluent will increase the flow at the rate of 0.466 cfs, changing the depth to 0.65 - 0.74 feet. When the second stage is operating at capacity, the rate of effluent flow will be 0.892 cfs, and the depth at the point of discharge will be 0.74 - 0.84 feet.

D. Long Term Impact of Flow of Effluent

The proposed action should have no long term impact on the stream, inasmuch as the WSSC permit will require that the interim treatment plant be dismantled when public sewer service becomes available.* Thus, the Greenbriar STP will

*The first phase of the new Western Branch Sewage Treatment Facility is to be completed within 450 days of commencement and will increase the treatment capacity of the Western Branch Facility by 15 million gallons per day (mgd). The Director of Planning of the WSSC projects that the second phase should be completed not more than six months thereafter. It will increase capacity to 30 mgd. The present flow at Western Branch is approximately 6 mgd. As of September 1, 1972, all then pending applications for public sewage in the Western Branch Basin which had not yet generated any flow, totaled 6,160,317 gd. This figure includes Greenbriar. It is

discharge effluent into the steam for a relatively brief period.

The change in the depth at the discharge point from 0.50 to 0.84 feet at maximum utilization of the plant does not represent a sufficient alteration to cause the stream to overflow its banks, cut a wider channel or endanger the roots of trees (Exhibit 5). Nor will the salt content and pH level be high enough to represent a danger to plant or aquatic life.

E. Capacity of Greenbriar STP

The developer states the proposed Greenbriar STP will be built in two stages, the first of which will have a capacity of 200,000 gallons/day (gd), and the second, a capacity of 125,000 gd. To determine capacity, each apartment unit was assigned a flow figure of 340 gd, less 20 percent for water saving devices, which resulted in 272 gd per unit.

The developers of Greenbriar expect to complete the 1,193 units in increments of 50 units per month. The projected flow figures, beginning with the first month of occupancy, are as follows:

(continued from page 13) conceivable that upon completion of the Western Branch addition some waste water which is now diverted elsewhere may be transferred to treatment at the Western Branch Plant, but the total amount so transferred is not likely to exceed 3 mgd. according to the estimates of the developer. It follows that the first phase of the Western Branch addition will permit all applications pending on September 1, 1972, for public sewer service in the Western Branch Basin, including Greenbriar, to be honored.

1st	Month	of	Occupancy	13,600
2nd	"	"	"	27,200
3rd	"	"	"	40,800
4th	"	"	"	54,400
5th	"	"	"	68,000
6th	"	"	"	81,600
7th	"	"	"	95,200
8th	"	"	"	108,800
9th	"	"	"	122,400
10th	"	"	"	136,000
11th	"	"	"	149,600
12th	"	"	"	163,200
13th	"	"	"	176,800
14th	"	"	"	190,400
15th	"	"	"	204,000

As these statistics indicate, the first stage of the Greenbriar STP will be capable of treating all flows generated by occupants through the 14th month of occupancy. The WSSC will monitor flows at the plant closely, and the availability of treatment capacity will govern the issuance of occupancy permits. The second stage will be built in June 1974 only if progress on the Western Branch Plant fails to meet present expectations which are that adequate capacity will be available in February 1975.

F. Sludge Disposal

The Greenbriar STP will produce 700 gallons per day of sludge at maximum utilization. This relatively large amount (in relation to the size of the plant) is caused by the phosphorus removal processes provided. The sludge will be of two types: biological and chemical. Both types will be pumped to a 77,917-gallon sludge-holding tank and held in aerobic condition until removal. The WSSC, which uses

trucks having a holding capacity of 10,000-13,000 gallons, will remove the sludge to an existing disposal facility requiring one trip per week.

G. Odor

Dr. Cookson has stated there will be no wind-blown odor emanating from the sewage treatment plant. Dr. Cookson explains:

> "Odor production in wastewater treatment plants results from septic sewage and biological processes which utilize anaerobic organisms. At Greenbriar the sewer lines are very short compared to municipal systems. Therefore, the sewage will not become septic before reaching the treatment plant. Once in the treatment plant, all biological processes are aerobic systems. Odors are only produced by processes using fermentation or anaerobic respiration. It is for this reason that the Greenbriar Plant will not use the common anaerobic digesters for sludge stabilization. Sludge stabilization will occur under aeration, a process called aerobic digestion. Sludge storage tanks will also receive continuous aeration to prevent septic odor producing conditions. No sludge will be disposed of at the Greenbriar site. Thus, there is no process in the plant that will produce odorous gases." (Exhibit 6)

There is an auxilliary blower to oxygenate the sewage, and a stand-by generator, as safety devices which would prevent the sewage from becoming septic should the blower or power supply fail. The surge and holding tanks will be capable of taking sewage flushed to the plant during any emergency repairs.

Since the presence of odors was one of GSFC's chief concerns (Exhibit 24), the matter was investigated by

Dr. R. J. Schoenberger, P.E., GSFC's technical consultant, whose report covers this subject (Exhibits 23 and 26). His conclusion is that with proper operation the possibility of unpleasant odors would be minimal.

The possibility of odors was further investigated by Goddard's Environmental Protection Specialist who visited similar sewage treatment facilities in Grand Rapids, Michigan, and Landover Mall, Landover, Maryland. His conclusion was that no noxious odors would result from the operation of the Greenbriar Sewage Treatment Plant (Exhibits 29 and 30).

H. Esthetics

The plans for the Greenbriar STP have considered esthetics. The plant will be screened by trees and low shrubs. The side facing the apartments will not be covered, because the existing trees could not grow high enough to make an effective screen within the maximum anticipated lifetime of the plant. The developer has, however, agreed to plant a screen of trees along the GSFC fence line. The ground will be sodded and seeded. A chain link fence will be erected to prevent entry by people or pets. The plant itself will consist of blue metal buildings. The tanks will be steel.

I. Noise

Another environmental factor is the noise arising from the Greenbriar Sewage Treatment Plant. Main sources of noise are the emergency standby generator, the aerators, and

the pumps. The genertor will produce noise only when in operation. Since this equipment is for use during emergency breakdown in the Potomac Electric Power Company's delivery system, the generator will be seldom used. It is necessary, however, to exercise the generator for a 30-minute period each week. In order to reduce the level of sound, the generator will be equipped with a critical sound-rated muffler which, according to the specifications, has the lowest sound rating available for the engine. The inside surface of the walls and ceiling of the generator building are to be lined with fiberglass, blanket-type insulation. This system was specified by the WSSC and is of the type commonly used in institutions requiring an emergency power supply and low noise levels, such as hospitals. Another potential source of noise would be the centrifugal-type aerators (2) used to aerate the sewage. This equipment will be housed in a building with the pumps located below grade; the noise, therefore, will be attenuated.

J. Air Pollution

The generator will burn diesel fuel No. 1 or 2, and will meet or exceed the emission standards established for diesel engines in trucks and will produce no visible emissions. In light of the fact that the generator will operate infrequently, any air pollution which it may cause will be minimal.

III. INDIRECT OR SECONDARY IMPACTS OF THE PROPOSED ACTION ON THE ENVIRONMENT

Greenbriar conforms to the Master Plan and is in accordance with the zoning requirements of Prince George's County (Exhibits 13 and 14). The Project is being constructed on privately owned land and is nearing completion. It will be occupied, at the latest, as soon as public sewage is available.*

Secondary environmental impacts are those associated with the accelerated development and occupancy of the apartments made possible by operation of the STP and appear to be insignificant. As noted, State and County Government authorities have approved the project subject only to the sewer moratorium. Secondary impacts are commented on below.

A. Traffic

In compliance with the applicable zoning requirements, Greenbriar will be required to provide approximately 2,020 parking spaces, an average of 1.69 per residential unit (Exhibit 7).

The construction of 1,193 residential units on a previously uninhabited tract of land, of course, will increase the traffic on surrounding roads. There is no basis to

*Additionally, it should be noted that Greenbriar will be completed in stages of 50 units per month, so that an average of less than half of the planned units will be occupied during the period in question.

believe that such adverse traffic effects as Greenbriar may produce would be reduced or otherwise moderated by postponing occupancy until 1975.

B. Impact on Public Services

The Potomac Electric Power Company has adequate facilities to serve Greenbriar commencing November 1, 1973. A copy of PEPCO's letter of September 12, 1973, confirming this is attached as Exhibit 8. Police service to Greenbriar will be provided by the City of Greenbelt.

It is anticipated that the project will generate revenues for the City of Greenbelt in excess of required additional expenditures including those related to increasing policy service (Exhibit 9).

Fire service will be provided by local volunteer fire companies.

C. Soil Erosion

Goddard has investigated the matter of possible soil erosion resulting from the Project. Dr. Schoenberger's observations are contained in Exhibits 23 and 26.
The conclusion is that the soil erosion plan has been designed to meet the requirements of Article 22 of the Prince George's County Building Code entitled "Grading, Drainage, and Erosion Control;" certification to this fact has been attested to by Mr. David Murray, P.E. of Ben Dyer Associates, Inc.

All plans have been approved by Prince George's County Soil Conservation Service, and on-going site inspections are conducted.

D. Noise and Air Pollution of Apartment Complex

Such noise and air pollution as may be generated by Greenbriar would not be affected by delaying occupancy pending completion of the Western Branch Plant. In any case, it is not expected that this residential development will generate noise levels other than those normally associated with garden apartments. Similarly, no significant amount of air pollution is anticipated.

E. Storm Drainage System

The storm drainage system in Greenbriar is designed in accordance with the criteria of the Washington Suburban Sanitary Commission and the Prince George's County Department of Licenses and Permits. These criteria require that all storm drainage systems be enclosed or otherwise improved if the system can be enclosed in a 72-inch pipe. This requirement has been met throughout. In addition, several detention basins have been introduced to handle the runoff caused by the proposed apartment development.

IV. ALTERNATIVES TO THE NASA EASEMENT

The primary alternative for NASA's consideration is denying the request. In considering the possibility of denying the easement, a number of alternatives available to the developer were analyzed. In its analysis, NASA took into account the practicality of these alternatives in view of the constraints resulting from the earlier decisions of State and local authorities.

A. Discharge into Stream on Greenbriar Property

The developer initially proposed that the effluent be discharged into a stream located on the Greenbriar property (which would have eliminated the need for the requested easement). The Prince George's County Council, however, required that the effluent be discharged into a free-flowing stream (Exhibit 10). The Greenbriar stream is classified as intermittent by the State of Maryland (Exhibit 10). Although NASA questions whether the stream located on NASA property is in actuality a "free-flowing" stream, as contrasted with the stream on the developer's property, the State has determined that it is (Exhibit 10). Therefore, determinations by County and State Governments appear to have precluded the developer from using a discharge point on his own property even though the two streams merge at a later point.

One of the reasons offered in support of the requirement for a "free-flowing" stream is to provide for dilution of

the effluent in the event of a failure of the STP. This consideration would seem to be obviated by the provision of an emergency by-pass to the public sewer system. It was, however, nonetheless considered desirable to retain the free-flowing stream requirement capability. In any case, as stated above, Prince George's County and the State of Maryland decisions appear to preclude this alternative.

Other alternatives involving piping the effluent to streams of higher flow volume than either the Greenbriar stream or the stream on Goddard Space Flight Center property would require carrying the outfall line much greater distances and across major traffic arteries with greater probability of mechanical failure. These alternatives were, therefore, given no further consideration. A Federal easement would still be required for these alternatives.

B. Locating Plant at Western Branch Site

Consideration was given to the possibility of enlarging an existing interim sewage treatment plant at the site of the present Western Branch facility or building a new interim treatment plant adjacent to the Western Branch STP. This was done in the case of another developer in Prince George's County for the Capital Center, a sports arena. In either case, the additional sewage treatment capability would be used to treat sewage bled from the main public system in an amount equivalent to that introduced by Greenbriar. The

most obvious advantage of this alternative is that no exceptions to the sewer moratorium would be required as the capacity of the existing public facility would, in effect, be increased. There are a number of other advantages to this alternative as indicated by the Environmental Protection Agency in its letter of September 28, 1973 (Exhibit 27). Briefly, these include close proximity to the main sewage treatment plant for the area, reduction in handling chemicals, and elimination of the major objection to the proposed method, ie., dumping of the effluent into the unnamed stream on Goddard property.

The primary disadvantage of this alternative appears to be the delay necessitated by obtaining the necessary amendment to the Prince George's County Ten-Year Water and Sewage Plan, and the drawing of plans and other actions necessary to the construction. It is alleged that this would delay occupancy of the finished apartments for an unreasonable amount of time (Exhibit 32), and it is noted that the plant on the Greenbriar site is already partially constructed. Furthermore, EPA has informed NASA that it is now processing a permit for the discharge at the NASA discharge point (Exhibit 34).

C. Postponement

Should the easement be denied, the developer has the option of postponing occupancy of the apartment until such

time as the Western Branch Treatment Facility is expanded and the moratorium lifted. Postponement would work a hardship on the developer as the apartments will be ready for occupancy in May 1974 and would entail the interim loss to the County of the 1,193 units. Assuming that inclusion in the Master Plan of apartments on this tract and approval of this development by State and County authorities indicate its desirability from the State and County standpoint, postponement would run counter to the these approvals and possibly impose a burden on the County.

D. Other Methods of Sewage Disposal

A land containment system whereby the effluent would be connected with a sprinkler system on the property was also evaluated according to the developer. This approach was rejected as not feasible since the quantity of discharge would exceed that which could be absorbed by the land (Exhibit 32). Deep well injection, another method of land containment, was rejected by the developer because that system has not yet been used in Maryland and the developer felt that approval was unlikely. No other methods appear feasible.

V. RELATIONSHIP BETWEEN LOCAL, SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM BENEFICIAL USE

The action covered by this Statement is for a temporary right of way to convey treated sewage effluent across Federally-owned property at the Goddard Space Flight Center (NASA). If granted, the easement would permit the conveyance of treated sewage effluent across Goddard's property and discharge of the effluent into an unnamed stream also on Goddard property.

The treated water is expected to be of higher quality, and the plant will be equipped with safeguards to preclude the discharge of low-quality effluent. Since the easement will grant permission for a relatively short period of time (use of the public sewer system is anticipated for early in 1975), no longer term effects are anticipated from granting of the easement.

VI. DISCUSSION OF ANY IRREVERSIBLE AND ANY IRRETRIEVABLE COMMITMENTS OF NATURAL RESOURCES RESULTING FROM IMPLEMENTATION OF THE ACTION

The only danger of irreversible or irretrievable commitment exists in the possibility of downstream eutrification from the temporary discharge of treated sewage effluent into the unnamed stream on Goddard property. However, both engineering and procedural controls are proposed which appear to preclude the possibility of stream degradation.

VII. DISCUSSION OF PROBLEMS AND OBJECTIONS RAISED BY OTHER FEDERAL, STATE, LOCAL AGENCIES, PRIVATE ORGANIZATIONS, AND INDIVIDUALS

The initial request for the easement, dated March 14, 1973, was addressed to Samuel W. Keller, Director of Administration and Management at Goddard Space Flight Center, from Richard Schifter of the law firm of Fried, Frank, Harris, Shriver and Kampelman, attorney for the developer (Exhibit 10). Letters objecting to the easement, primarily on environmental grounds, were received from Mrs. Rhea Cohen of the Prince George's County Environment Coalition and Edward Dunkelberger of the law firm of Covington and Burling representing the same group (Exhibits 11 and 11a). GSFC responded on April 17, 1973, raising questions and requesting additional information (Exhibit 12).

Mr. Schifter responded for the developer in a letter dated May 4, 1973 (Exhibit 13), which contained the requested information and detailed answers to the questions raised. Covington and Burling then submitted a memorandum dated June 23, 1973 (Exhibit 17), in opposition to the developer's request and opposing the developer's contention that an Environmental Impact Statement was not needed. The letter accompanying the memorandum suggested the following:

> "Moreover, the question of whether the right-of-way ought to be granted should not be acted upon until (1) NASA has prepared a thorough draft environmental impact statement pursuant to the CEQ Guidelines, at which point the Environment Coalition and other interested

groups, persons, and federal, state and local agencies will have an opportunity to comment on the draft and the adverse environmental effects of the project, (2) NASA has complied with the other requirements of NEPA, and (3) NASA is satisfied that the proposed project will meet all applicable Federal and state air and water quality and effluent requirements."

These conditions have now been met.

In order to support an objective environmental analysis, NASA employed a consultant, Dr. R. J. Schoenberger, P.E., to study the matter. He reported his findings in a report dated July 23, 1973 (Exhibit 23). NASA also directly solicited the views of a number of other Governmental organizations. In addition, a number of unsolicited comments were received from interested parties, including local environmental groups.

After full consideration, the developer was informed in a letter dated July 26, 1973 (Exhibit 24), from Samuel Keller to Richard Schifter:

"We have determined that the easement cannot be granted at this time for the following reasons:

"1. The information submitted does not demonstrate with finality whether the proposed plant, and particularly its effluent, complies with the requirements and standards of state and local laws. For example, there is nothing from the state authority to indicate whether the effluent meets or is required to meet the Maryland Revised Water Quality Standards, which have recently been approved by the Environmental Protection Agency and which have been imposed subsequent to existing state approvals of your project.

"2. EPA has advised that a discharge of this nature requires a permit under Section 402 of the Federal Water Pollution Control Act as amended (Public Law 92-500, October 18, 1972). Such permit has not been obtained.

"3. We are not satisfied that the plant would not cause noxious odors, particularly to Goddard Space Flight Center. While you state that only carbon dioxide and water will be given off, it appears that the process using sulphur dioxide for dechlorination as well as the aerobic process used for the open settling and storage tanks could present significant odor problems. We are also concerned with the aesthetic appearance of your proposed treatment plant, particularly since we have plans for the construction of a Visitors Center in close proximity thereto.

"We would be willing to reevaluate your request at a later date should we receive information indicating that you were able to satisfy the objections noted. However, before we could reach a final decision to grant this easement, and in order to reach a responsible decision in the light of all relevant interests, we would obtain the views of other Government agencies and the public through the preparation and filing of an environmental impact statement in accordance with established procedures under the National Environmental Policy Act and the Council on Environmental Quality Guidelines."

As noted previously, the developer has met all of these requirements, with the exception of the EPA permit which it is expected will be issued forthwith, and upon which the granting of the easement would be conditioned. Therefore, on the basis of all the data now available and after a detailed and thorough reevaluation, NASA has decided that it can grant the easement and now intends to do so. Thus, in order to comply with the National Environmental Policy

Act and to satisfy the procedural objections raised, NASA is filing this statement.

EXHIBIT 1

4705 QUEENSBURY ROAD, RIVERDALE, MARYLAND 20840
TELEPHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
July 17, 1973

DESCRIPTION OF A RIGHT OF WAY FOR A SEWER

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

TO

WASHINGTON SUBURBAN SANITARY COMMISSION

Being a strip or parcel of land fifteen (15) feet wide, seven and one-half feet on each side of the centerline, hereinafter described, in, through, over and across the property of the first party hereto, being that 18.8245 acre parcel obtained by transfer from the Agricultural Research Center.

Beginning for the said centerline of the said fifteen (15) foot wide strip or parcel of land at a point on the First or Due North, 894.40 foot line of the aforesaid Parcel, 29.00 feet from the end thereof, said line also being a part of the Due South, 2773.36 foot line of Parcel "2-B" as shown on a plat of subdivision entitled "Parcels 1, 2-A and 2-B, Greenbriar," recorded among the Land Records of Prince George's County, Maryland, in Plat Book WWW 77 as Plat No. 96, and running thence North 55° 00' 00" East, true, 161.00 feet to a point; containing 2415.00 square feet of land or 0.0554 acres.

AND ALSO:

The said party of the first part does hereby grant unto the said party of the second part the right to use one (1) additional strip or parcel of land fifteen (15) feet wide, lying northwesterly of the above described strip or parcel of land and adjacent, contiguous and parallel thereto, during the period of the original construction only of the said sewer within the

the above described easement and right of way for any and all purposes pertinent thereto.

AND ALSO:

The said party of the first part does hereby grant unto the said party of the second part the right to use one (1) additional strip or parcel of land, beginning for the said strip or parcel of land at the point of intersection of the aforesaid first or Due North 894.40 foot line with the southeasterly line of the above described strip or parcel of land, and running thence with and along said southeasterly line

North 55° 00' 00" East, true, 166.25 feet to a point; thence
South 35° 00' 00" East, true, 10.00 feet to a point; thence
South 55° 00' 00" West, true, 138.00 feet to a point; thence
South 18° 11' 40" West, true, 28.43 feet to a point; thence
Due West, true, 20.00 feet to a point on the aforesaid First or Due North 894.40 foot line; thence with and along a part of said First line
Due North, true, 19.00 feet to the point of beginning, during the period of the original construction only of the said sewer within the above described easement and right of way for any and all purposes pertinent thereto.

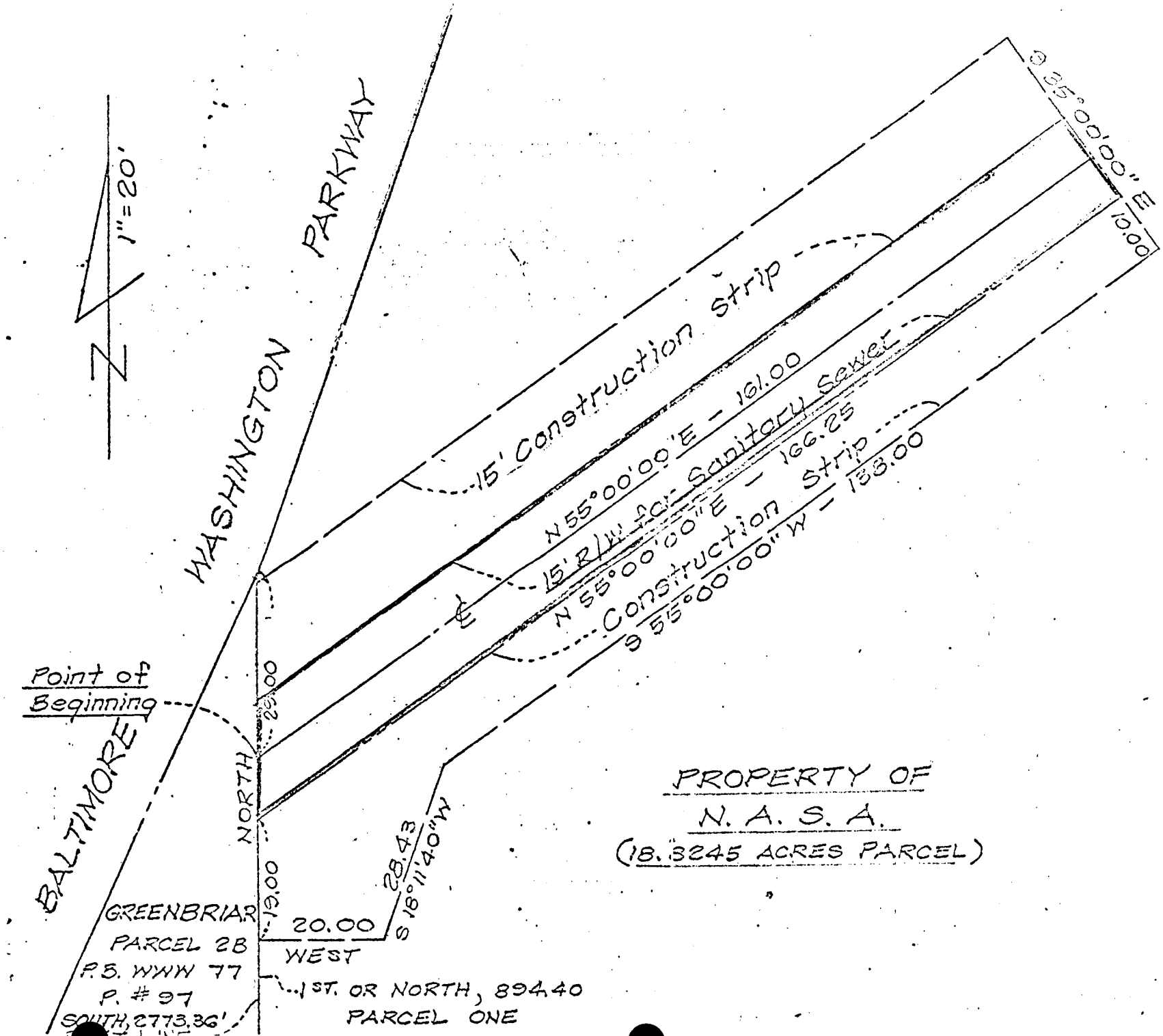

1" = 20'
N
WASHINGTON
PARKWAY
BALTIMORE
15' Construction Strip
N 55°00'00"E - 161.00
15' R/W for Sanitary Sewer
N 55°00'00"E - 166.25
Construction Strip
S 55°00'00"W - 158.00
S 35°00'00"E
10.00
Point of Beginning
29.00
NORTH
19.00
20.00
WEST
28.43
S 18°11'40"W
GREENBRIAR
PARCEL 28
P.S. WWW 77
P. # 97
SOUTH, 2773.36'
1ST. OR NORTH, 89440
PARCEL ONE
PROPERTY OF
N. A. S. A.
(18.3245 ACRES PARCEL)

EXHIBIT 2

A REPORT ON THE USE OF TEMPORARY WASTEWATER TREATMENT PLANTS: STANDARDS AND PROCEDURES FOR ELIMINATION OF HEALTH HAZARDS

Prepared for the Montgomery County Council, State of Maryland
December 5, 1972

by

John T. Cookson, Jr. Ph.D.
Environmental Health Engineer

At present, there are at least nine treatment facilities in the United States that process wastewater for ground water recharge, recreational use or industrial users.

Advanced waste treatment processes are required for effective removal of biological resistant organics, viruses, inorganic nutrients, salts and toxic metals. Once standards are set, treatment facilities must be designed to assure that a wastewater will be treated to a degree that will satisfy these standards. A question that is often asked is how can one project the removal efficiency of a plant that isn't built. The answer is that many studies, both laboratory and fullscale field installations, have provided the needed design information and demonstrated removal efficiencies. For example, virus removals have been established for the complete process sequences in a treatment plant as well as virus removal efficiency in each individual component of secondary and advanced waste treatment.

The following list reviews some of the field-monitoring of enteric viruses in advanced waste treatment processes. There are many other monitoring studies on viruses in secondary treatment plants and individual treatment processes as well as laboratory studies.

<u>Waste Treatment Facilities that have demonstrated virus removal by field monitoring.</u>

1. Santee, California -- secondary treatment with stabilization ponds, disinfection and sand percolation, 2 million gallons per day.

2. South Lake Tahoe, California -- secondary treatment with lime-phosphate precipitation, ammonia stripping, mixed bed filtration, carbon adsorption, and disinfection, 7.5 million gallons per day.

3. Whittier Narrows Reclamation Plant -- secondary treatment with disinfection and percolation, 10 million gallons per day.

4. Met-Pro Plant -- effluent recycled, North Slope of Alaska. Treatment consists of solids-contact precipitation unit, carbon adsorption and disinfection, 200,000 gallons per day.

5. Windhoek Waste Water Reclamation Plant, Southwest Africa -- treatment consists of secondary treatment with oxidation pond, lime precipitation, sand filters, carbon adsorption and disinfection, 3 million gallons per day.

6. Lebanon Advanced Waste Treatment Plant, Ohio -- treatment consists of secondary treatment with lime precipitation and sand filtration, 75,000 gallons per day.

7. District 14 Renovation Plant, Lancaster, California -- treatment with chemical precipitation, filtration and disinfection, 500,000 gallons per day.

The above discussion traces the history of wastewater treatment to the present level of technology. It is important to recognize the level of technology available and that wastewater can be processed to a degree where it is no longer

wastewater but a reusable resource. The important issue, however, deals with the treatment that is needed for the interim program of sewage treatment in Montgomery County. What type of processes and treatment plant is known to meet the standards proposed for viruses and how can this be implemented? A presentation of these processes will follow.

TYPICAL TREATMENT SCHEMES FOR VIRUS-FREE EFFLUENTS

Introduction

In the following, a few typical wastewater treatment schemes that will produce a virus-free effluent will be presented. The compatibility of each treatment scheme with the proposed system for the County's ten year water and sewerage plan is discussed, and the additional cost of the two most compatible schemes presented.

Efficacy of Biological Treatment

There is no doubt that water can be adequately treated so that it is always biologically safe. Biological, chemical and physical treatment procedures all remove viruses from wastewaters. The major problem is that no single process will remove viruses to the degree required for a safe effluent. Each process has a different efficiency for virus removal, and the efficiency of some depends on the degree of pretreatment provided. This is indeed true for disinfection. Disinfection is the one process capable of removing all

viruses, but it is not effective on raw sewage. It can be made to work on secondary effluents, but excessive chemical doses are required. Thus, disinfection of secondary effluents is not considered feasible. Virus removal from secondary effluents has been applied only under emergency conditions. This occurred in 1956 when sewage had to be processed and directly reused for drinking water (46).

During the period 1952-57, Kansas suffered one of the worst droughts in history. In the summer of 1956 the Neosho River ceased to flow and Chanute, Kansas, a city of 12,000, was without a water supply. On October 4, 1956 the city started the direct recycling of its processed sewage for a period of five months, from a secondary plant, to the water purification plant. The purification processes included sedimentation, lime-precipitation sand filtration, and disinfection with chlorine. In 1956 we did not have the extensive advanced waste treatment technology of today, but the water met bacteriological standards and, although viruses were isolated from the raw sewage, none were isolated from the treated water. This incidence has become an oft-quoted classic of water reuse.

Another Midwest reuse occurred as early as 1940 in Ottumwa, Iowa (46). Ottumwa's water source was the Des Moines River. Its intake was located downstream from Des Moines. Sewage from Des Moines was discharged untreated into the river, and hydrologic events during 1939 and 1940 were such that Ottumwa found itself treating water from a river whose

flow of about 26 mgd (million gallons per day) was composed of 14 mgd of raw sewage and 12 mgd of natural flow. In addition, the river was covered with a thick layer of ice and snow. The effect was that of a tight conduit between the Des Moines sewer and the Ottumwa intake. The water purification plant consisted of lime precipitation, filtration and super chlorination.

These are two early occurrences of sewage reuse, the latter not even having secondary treatment. The water purification processes used in these two above situations were

1. lime precipitation and sedimentation
2. filtration in sand beds
3. disinfection with chlorine.

Please note that these are similar to the advance waste treatment processes of today. These processes were utilized in 1940 and 1956. In other words, when the field work on advanced waste treatment was begun, it was not a matter of inventing new processes from scratch. It was a matter of using the technology of secondary waste treatment, water purification, and industrial water treatment and perfecting and combining it all into a single continuum.

It is the application of the advanced waste treatment processes that make virus-free effluents possible. Enteric virus inactivation in primary treatment is little if any. Only three percent virus removal has been found in primary settling, and that was attained after 3 hours (47) (Table 12). Enteric virus removal in secondary treatment processes

TABLE 12

REMOVAL OF VIRUSES FROM WASTEWATER BY BIOLOGICAL TREATMENT

Treatment	Treatment time - hours	Virus Added	Percent Virus Removed	Reference
Primary Settling	3	Poliovirus 1	0 - 3	47
		Poliovirus 1	0 - 11	48**
Activated Sludge	6.0 - 8.4	Coxsackievirus A9	96 - 99	47
	6.0 - 7.5	Poliovirus 1	88 - 94	
	2.75	None*	53	49**
	2.75	None*	71	49**
	-	Poliovirus 1,2&3*	76 - 90	48**
Trickling Filters	-	None*	0 - 84 average 24	50**
Stabilization Pond (oxidation Pond)	20	None*	0 - 95.5 average 67.5	50**

* None - means that testing was done on the natural enteric viruses present. If a virus is noted, it was originally present in the sewage and not added for testing.

** These are field studies on full-scale treatment plants.

vary from 0 to 96 percent in field studies (Table 12) (47) (48)(49). In many cases, no virus removal was achieved with field trickling filters and stabilization ponds.

Viruses are removed from sewage more efficiently by activated sludge treatment than by any other biological process. However, their efficiency is far from adequate for producing a safe effluent. A safe effluent can be produced by using chemical and physical processes. The complete treatment plant may consist of only physical and chemical processes or it may utilize these as additional treatment after biological processes.

Treatment Procedures for Virus-Free Effluents

Various treatment schemes can be developed that will provide a virus-free effluent. Some typical schemes are provided in Figures 4 - 7. There are other alternates that can be used depending on the characteristics of the waste. Those presented will be most typical for domestic sewage. Wastes containing large industrial discharges may need other schemes, and other variations may occur when nitrogen removal is needed.

Although the treatment schemes vary in individual processes, they all have one common feature and that is the use of terminal disinfection for complete virus removal. As Figures 4-7 illustrate, individual treatment processes remove viruses to varying degrees, and thereby constitute adjunctive

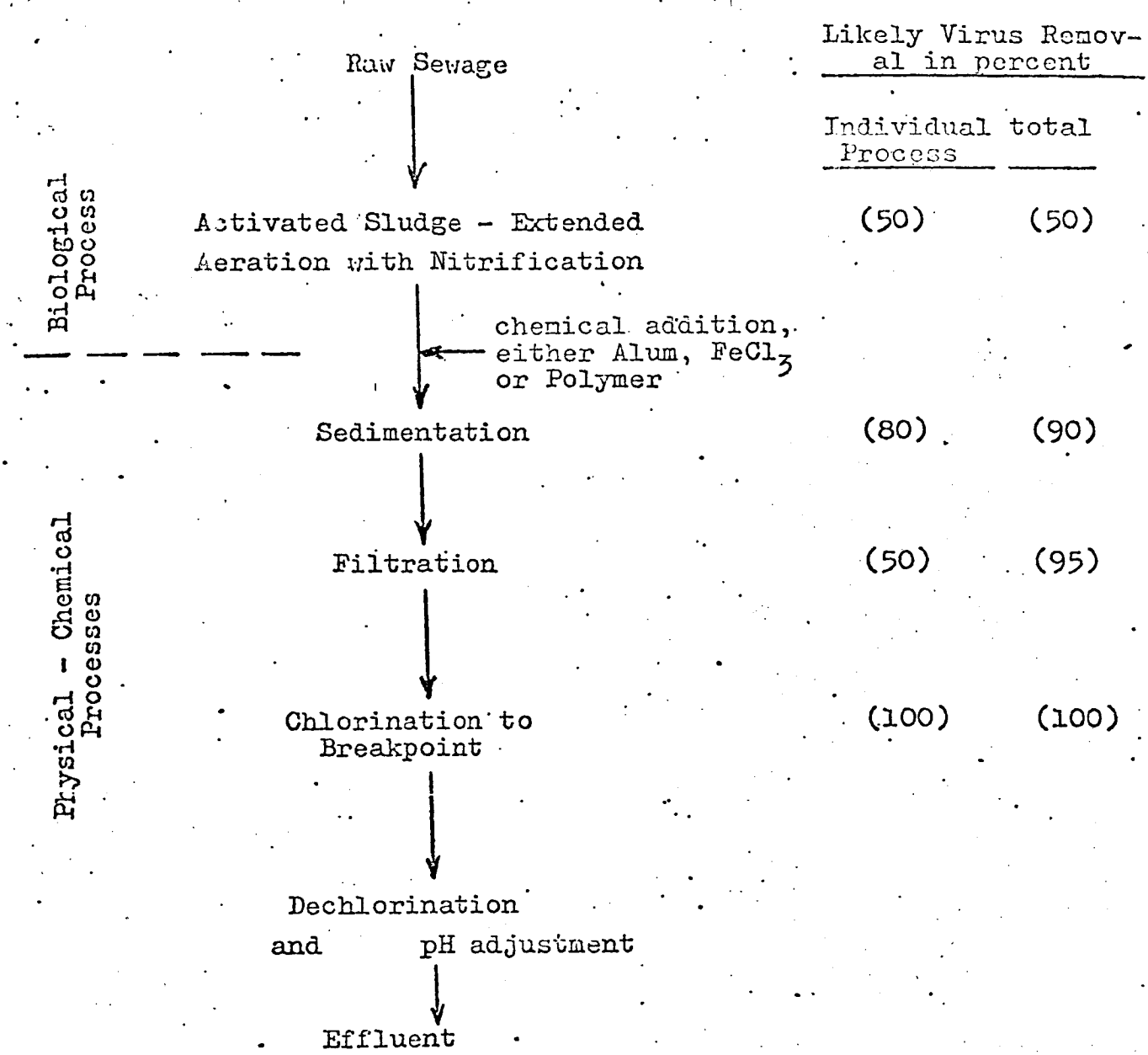
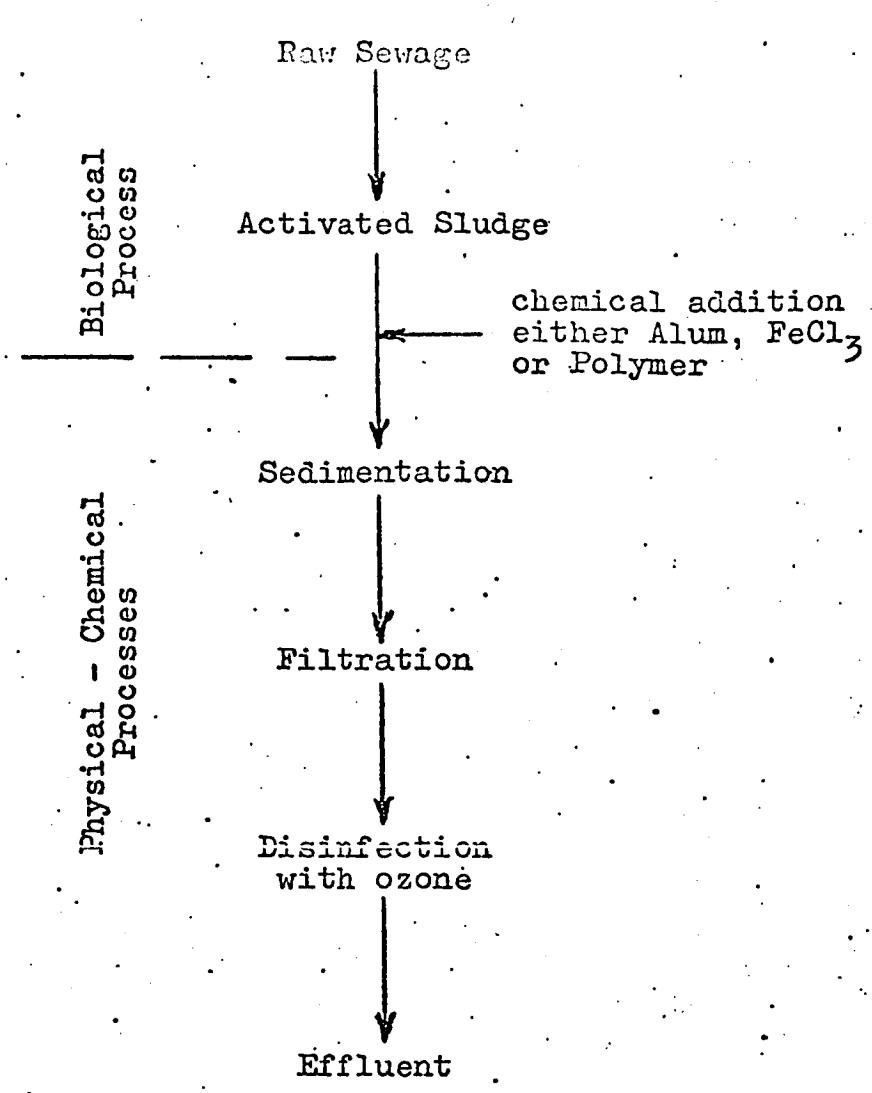


Figure 4. Scheme 1 - Typical Wastewater Treatment for Complete Virus Removal



	Likely Virus Removal in percent	
	Individual Process	Total
Activated Sludge	(50)	(50)
Sedimentation	(80)	(90)
Filtration	(50)	(95)
Disinfection with ozone	(100)	(100)

Figure 5. Scheme 2 - Typical Wastewater Treatment for Complete Virus Removal

All Physical-Chemical-Processes

	Likely Virus Removal in percent	
	Individual Process	Total
Raw Sewage		
↓		
Lime Precipitation	(90 to 99.9) depends on pH	(90 - 99.9)
↓		
Sedimentation		
↓		
Filtration	(50)	(95 - 99.95)
↓		
pH Adjustment	(0)	(95-99.95)
↓		
Carbon Adsorption	(25)	(96.2 - 99.962)
↓		
Breakpoint Chlorination	(100)	(100)
↓		
Dechlorination by Carbon Adsorption		
↓		
Effluent		

Figure 6. Scheme - 3 Typical Wastewater Treatment for Complete Virus Removal

		Likely Virus Removal in Percent	
		Individual Process	Total
	Raw Sewage		
Biological Process	Activated Sludge With Nitrification	(50)	(50)
	Sedimentation	(0)	(50)
	← Either Lime, Alum or $FeCl_3$		
Physical-Chemical-Processes	Phosphate Precipitation	(75-99.9) (depends on the chemical used)	(87.5-99.95)
	Filtration	(50)	(93.75-99.975)
	Chlorination to Breakpoint	(100)	(100)
	Dechlorination and pH Adjustment		
	Effluent		

Figure 7. Scheme - 4 Typical Wastewater Treatment for Complete Virus Removal with Phosphate Removal

removal. The major importance of the individual processes toward virus elimination is the removal of those substances that interfere with terminal disinfection. Thus, they facilitate the final achievement of total removal or destruction of viruses.

These interfering substances are:

1. Organic substances which consume disinfectant (BOD).
2. Turbidity which protects viruses from the action of disinfectants.
3. Ammonia which is an interfering substance when halogens (such as chlorine) are used as disinfectants. Ammonia does not interfere with ozone.

Chapter II presented secondary standards which are directed at the control of these interfering substances, and therefore make total destruction of viruses possible by disinfection. If the secondary standards are applied to any of the treatment schemes in Figures 4-7, complete virus destruction will occur. Thus, we presently have at hand a relatively simple method to produce virus-free effluents. The operational procedures and methods of analysis for compliance with the secondary standards are not only simple, but they are used in some fashion by almost all wastewater and water purification operators today.

Removal of Interfering Substances for Proper Disinfection

The significant aspects of each process in the proposed

treatment schemes (Figures 4-7) will be briefly presented.

In Scheme 1, chlorination is used for terminal disinfection, therefore, ammonia must be removed as well as turbidity and BOD. Ammonia removal will be achieved by designing the activated sludge unit for complete nitrification. This process will biologically convert ammonia to nitrates. High turbidity removal will be achieved by chemical addition to improve sedimentation as well as the filtration process. These combined processes will make breakpoint chlorination easy to achieve, providing for complete virus removal. Dechlorination with chemicals, aeration or effluent storage may be desired before discharge. It should be noted that toxic chloramines will not be produced since ammonia is removed.

In Scheme 2, ozone is used as the disinfectant Therefore, ammonia removal is not needed and the activated sludge process can be designed as a conventional aeration unit. As with Scheme 1, turbidity removal is achieved by chemical flocculation prior to settling and filtration. Excessive ozone concentrations will not have to be removed before discharge. Ozone is readily reduced to oxygen, which will benefit the stream.

In Scheme 3, a completely different approach is present. This system consists only of physical chemical processes. Turbidity removal is achieved by lime precipitation; alum or $FeCL_3$ can also be used, followed with sedimentation and filtration. The BOD in this system is not removed

biologically, but it is removed by adsorption on activated carbon. Ammonia is not removed and breakpoint chlorination will produce chloramines. Since these are toxic to aquatic life, they are removed in the dechlorination process. In this scheme, the dechlorination process is again activated carbon which removes the free chlorine and adsorbs the chlorinated compounds.

In Scheme 4, the interfering substances are removed as discussed for Scheme 1. The difference in Scheme 4 is that a phosphate removal unit has been included to illustrate its compatibility with virus removal.

Compatibility of Virus Removal Schemes with the County's Proposed Sewerage Plan and Costs

The "supplement to the comprehensive ten year water and sewerage plan" recommends the following treatment for the interim program (51).

1. Biological treatment utilizing extended aeration
2. Micro-filtration units
3. Chlorination with 30 minute contact time

The flow diagram for this system is presented in Figure 8.

As comparison of Figure 8 with Figures 4 and 5 shows, they are very similar. Schemes 1 and 2 can be easily applied to the proposed treatment for the County for obtaining a virus-free effluent.

The changes required in the treatment presently proposed for the County are as follows for Scheme 1:

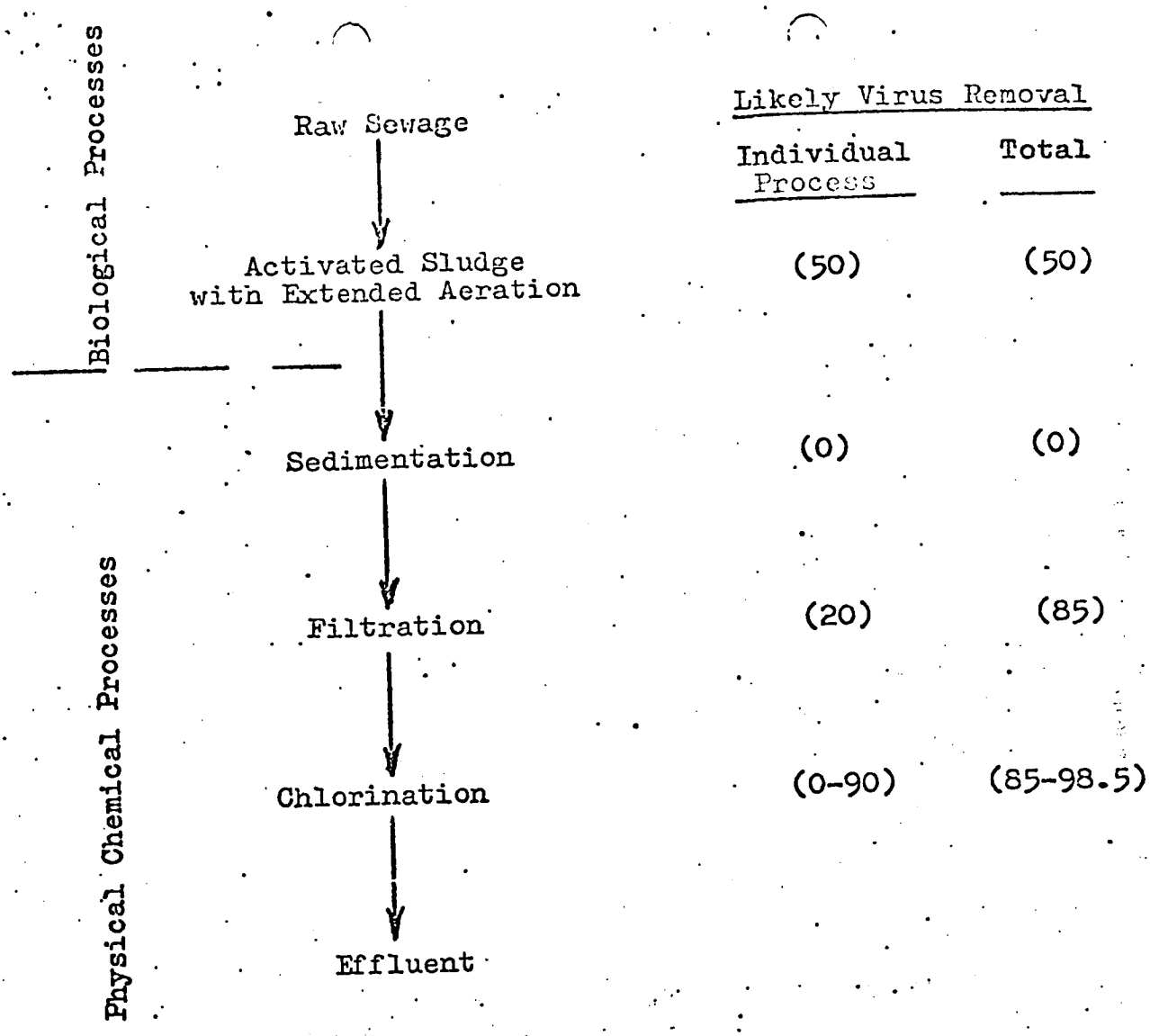


Figure 8. Flow Diagram of Waste Treatment Recommended by the Ten Year Water and Sewerage Plan

1. Design and operation of the activated sludge process not as an extended aeration unit but as a nitrification unit.
2. The addition of chemicals to improve settling and turbidity removal in the filtration process.
3. Chlorine addition to achieve breakpoint and increase contact time to one hour. The Ten Year Water and Sewerage report discusses breakpoint chlorination and dismissed the process because of dangers involved with transporting by truck large quantities of chlorine. This aspect needs clarification. First, large quantities of chlorine will not be needed for breakpoint by Scheme 1 (Figure 4) as is the case with the proposed system in Figure 8. The reasons being the removal of substances by nitrification and improved turbidity removal which creates a high chlorine demand.

The second point is that toxic chlorine gas doesn't have to be used for chlorination, but hypochlorites can be used. In fact, calcium and sodium hypochlorite have been used in small treatment plants for years, where simplicity and safety were far more important than cost. It is interesting to note that New York City changed from chlorine gas in ton containers to sodium hypochlorite, fundamentally for reasons of safety as influenced

by local conditions (52). In brief, breakpoint chlorination for complete virus destruction can be obtained without any danger to the community.

Dechlorination should be performed to remove the excessive chlorine from the effluent. This can be achieved by chemicals or natural processes such as aeration or storage. Aeration has the advantage of adding oxygen as well as removing chlorine.

The increase in man hours to operate a treatment plant on Scheme 1 will not be significant enough to require additional operators over that needed for the plant proposed in the ten year water and sewerage plan.

The additional operating cost of Scheme 1 for virus removal is approximately $35 per day for gas chlorination and $45 per day for sodium hypochlorite for 1 mgd. At 4 mgd the cost would be approximately four times greater. The capital cost increase over that proposed in the ten year water and sewerage plan is approximately $20,000 and $25,000, respectively, for 1 mgd and 4 mgd.

In Scheme 2, the only changes necessary are chemical addition to improve turbidity removal and disinfection with ozone. Ozone does not form toxic chloramines with ammonia and it will impart no undesirable compounds to the effluent.

The increase in man hours to operate a treatment plant on Scheme 2 will not be significant enough to require additional operators over that needed for the plant proposed in the ten year water and sewerage plan.

The additional operating cost is approximately $35 and $150 per day for 1 mgd and 4 mgd. The increase in capital cost over that proposed in the ten year water and sewerage plan is approximately $50,000 and $200,000 for 1 mgd and 4 mgd respectively.

Scheme 3 is not compatible with the proposed treatment plant. It is shown as an alternate approach. I would not recommend the use of Scheme 4 since it produces large volumes of sludge. Schemes 1 and 2 have little sludge production.

Scheme 4 is identical to Scheme 1 except for a phosphate removal process, and it is presented for the purpose of showing compatibility. Phosphate removal can be used with any of the proposed schemes.

DOCUMENATION OF VIRUS REMOVAL

In the final analysis, a virus-free water means terminal disinfection, and only that process needs documentation for virus destruction. However, the other processes will be briefly discussed to provide the rationale for the removal efficiences present in Figures 4-8 and also to illustrate the knowledge known on virus removal in treatment processes. It is often remarked that we know little about virus removal in wastewater treatment processes. The fact is that, in the past two decades, nearly all treatment processes have been evaluated for their ability to remove viruses, and this information was received for record before a subcommittee of the Ninety-Second Congress (53).

Coagulation with Metals and Polymers

Coagulation of wastewater effluents with metals can provide virus removals over 90 percent (Table 13). The use of cationic polyelectrolytes does not increase virus removal when used with alum or $FeCl_3$ (Table 14). However, the polymer does provide a stronger floc and provides for better removal of turbidity in the following filtration process. This aids the performance of disinfection.

The removal of viruses by coagulation correlates with floc formation. Good floc formation and turbidity removal provides the best virus removal (55). This fact provides an easy tool to control chemical addition for effective virus removal. Chemical dosing by observation of good floc formation and high turbidity removal can be easily applied by operators. This technique is common practice in water purification plants.

Lime Coagulation

Coagulating activated sludge effluent with lime can remove 99 to 99.9 percent of poliovirus 1 (Table 15). At low pH values the removal is lowest and, as pH is increased, virus is removed not only by coagulation but also by destruction. At pH values of 11.5, the viruses are inactivated in a relatively short time. Various investigators have shown that pH alone can inactivate 90 percent of poliovirus in distilled water after 90 minutes of contact (59).

TABLE 1E

Virus Removal by Coagulation with Alum and $FeCl_3$

Virus	Water	Percent Removal	Reference
	ALUM		
Poliovirus	sewage effluent	90-98	54
Poliovirus 1	simulated river	75-86	55
Coxsackievirus A2	river	95-99	56
T_4	sewage effluent	96-97	57
MS2	sewage effluent	90-94	57
	$FeCl_3$		
Poliovirus 1	simulated river	20-60	55
Coxsackievirus A2	river	92-94	56

TABLE 14

Virus Removal by Coagulation with Alum and Cationic Polyelectrolytes

Coagulant dose alum mg/l	Polymer mg/l	Virus	Percent Removal	Reference
10	0	Poliovirus 1	86	55
10	1	Poliovirus 1	81	55
25.7	0	T_4	98	58
25.7	0	MS2	99.8	58
25.7	1	T_4	99.9	58
25.7	1	MS2	99.5	58

TABLE 15

Virus Removal by Lime Coagulation and pH Inactivation

Virus	Water	pH	Percent Removed	Reference
	LIME			
Poliovirus	sewage effluent	11.1	98.5-99.9	59
Poliovirus 1	sewage effluent	9.5	88 - 91	54
Poliovirus 1	sewage effluent	10.5	90 - 92	54
Poliovirus 1	sewage effluent.	11.0	92 - 94	54
Poliovirus 1	simulated river	8-9	9 - 70	60
		10.8	99.9	60
		11.2	99.993	60

Filtration

Filtration is an important process in overall virus removal. The major importance of filtration is removal of turbidity to a degree that allows virus inactivation by disinfection. Sand filters remove no viruses when floc particles or polymer is absent. Addition of coagulants or cationic polymers has removed 50 to 99.8 percent of the added virus (Table 16).

Activated Carbon

Activated carbon adsorption will remove virus under low organic loading conditions. A removal of 100 percent has been obtained for tap water, but only 35% is reported for removal from sewage effluents (Table 17). The presence of organic matter hinders the adsorption of virus. Carbon adsorption does remove organics and makes disinfection possible at lower doses for virus inactivation.

Disinfection

Disinfection will produce virus-free water when properly applied. Chlorine in the form of hypochlorous acid (HOCl) is a very rapid virucide and, when it can be maintained in water, no other agent is necessary for disinfection (49). This fact has been illustrated by many investigators. Table 18 provides information on the resistance of twenty enteric viruses to free chlorine (66). Many other studies have been conducted and a few of these are illustrated in Appendix B.

TABLE 16

Virus Removal by Filtration

Virus	Water	Percent Removed	Reference
Poliovirus	sewage effluent with lime	82-99.8	60
Ø x 174	tapwater with polymer	98	61
Ø x 174	tapwater no polymer	0	62
Poliovirus 1	lime precipitation and filtration of sewage effluent	98.5* 50**	

* at pH 11.2; 60

** at pH 10.8 59

TABLE 17

Virus Removal by Activated Carbon

Virus	Water	Percent Removed	Reference
T_2	sewage effluent	35	49
T_4	Tapwater	92	63,64
poliovirus 1	Tapwater	100	65
poliovirus 1	River water	90	65
poliovirus 1	Raw sewage	25	65

TABLE 18

RELATIVE RESISTANCE OF TWENTY HUMAN ENTERIC VIRUSES TO 0.5 MG/L FREE CHLORINE IN POTOMAC WATER (pH 7.8 and 2°C)

	Comparison based on					
	5' survivors		First order reaction		Experimental	
	Virus	%	Virus	Min*	Virus	Min*
1.	Reo 3	<0.0009	Reo 1	2.7	Reo 1	2.7
2.	Reo 2	0.002	Reo 3	<4.0	Reo 3	<4.0
3.	Reo 1	<0.005	Reo 2	4.2	Reo 2	4.2
4.	Adeno 3	<0.008	Adeno 3	4.8	Adeno 3	<4.3
5.	Echo 7	0.135	Cox A9	6.8	Cox A9	6.8
6.	Cox A9	0.161	Echo 7	7.1	Echo 7	7.1
7.	Adeno 7a	0.330	Cox B1	8.5	Cox B1	8.5
8.	Adeno 12	0.330	Echo 9	12.4	Echo 9	12.4
9.	Polio 1	1.118	Adeno 7a	12.5	Adeno 7a	12.5
10.	Echo 29	1.660	Echo 11	13.4	Echo 11	13.4
11.	Echo 9	1.867	Adeno 12	13.5	Polio 1	16.2
12.	Polio 3	2.420	Echo 12	14.5	Echo 29	20.0
13.	Cox B3	7.[illegible]	Polio 1	16.2	Adeno 12	23.5
14.	Cox B1	12.515	Cox B3	16.2	Echo 1	26.1
15.	Cox B5	14.533	Polio 3	16.7	Polio 3	30.0
16.	Echo 12	17.273	Echo 29	20.0	Cox B3	35.0
17.	Cox A5	18.620	Echo 1	26.1	Cox B5	39.5
18.	Polio 2	20.000	Cox A5	33.5	Polio 2	40.0
19.	Echo 11	20.833	Cox B5	39.5	Cox A5	53.5
20.	Echo 1	54.167	Polio 2	40.0	Echo 12	>60.0

* Min required to kill 99.99% of virus.

Elemental iodine (I_2) is also a rapid virucide. The concentration-time relationship for 99 percent inactivation of Coxsackievirus A9 has been determined by Berg (49). This information is presented in Appendix B. Iodine has an advantage over chlorine in effluents with pH's between 7.5 to 8.5. In this pH range, hypoiodous acid (HOI) occurs, and it is a faster virucide than I_2 (49). Chlorine at this pH is not as effective.

Ozone has also been evaluated for virus inactivation (67). Ozone has a number of advantages over other disinfectants:

1. Ozone doesn't change the inorganic salt content nor does it produce any toxic compounds.
2. It does not impart taste or color to water.
3. Ozone inactivates virus in seconds when properly applied and long detention times for disinfection are not needed.

Ozone concentrations above 0.7 mg/l result in more than 99.9 percent virus inactivation in four minutes (68) (Table 19).

AN EVALUATION OF BREAKPOINT CHLORINATION AND DECHLORINATION ON EFFLUENT AND SALT CONTENT

John T. Cookson, Jr., PhD
May, 1973

Purpose

The purpose of this report is to evaluate the need for pH adjustment of effluent from the proposed Greenbriar treatment plant after breakpoint chlorination and dechlorination. The proposed Greenbriar plant will produce an effluent which is highly nitrified, low in BOD, turbidity, and phosphorous. The effluent characteristics before breakpoint chlorination and dechlorination will be similar to that now produced by the Landover Mall plant.

Introduction

The application of breakpoint chlorination and dechlorination to effluents can cause pH changes. The addition of chlorine gas to water increases the hydrogen ion concentration as follows:

$$Cl_2 + H_2O = HOCl + H^+ + Cl^-$$

The addition of sodium or calcium hypochorite causes a decrease in hydrogen ion concentration as given below:

$$Ca\ (OCl)_2 + 2H_2O = Ca^{++} + 2HOCl + 2OH^-$$

Some dechlorination procedures also cause a change in hydrogen ion concentration. An example is the use of sulfur dioxide for chlorine reduction:

$$SO_2 + Cl_2 + 2H_2O = H_2SO_4 + 2HCl$$

The total change in pH of an effluent depends on the amount of chlorine and sulfur dioxide added and the buffer capacity of the water. Solutions that tend to maintain a fixed p H value when H^+ or OH^- is added are said to be buffered. In natural waters and sewage effluents, the pH-stablilzing effect is primarily due to the presence of carbonic acid (or carbon dioxide) and its conjugated base, bicarbonate ion. This buffered capacity is reflected by the alkalinity of the water. The higher the alkalinity, the higher the buffer capacity. For example, the addition of 0.1ml of 0.1M HCl to a liter of pure water changes the pH from 7.0 to 5.0. The same quantity added to a liter of a natural water with pH 7.0 and containing 100 mg per liter of alkalinity changes the pH less than 0.02 pH units.

Evaluation Procedure

The effect of breakpoint chlorination and dechlorination on pH was evaluated on samples taken from Landover Mall. Sample s where collected after the filtration process but prior to chlorination. Four gallon samples were collected on the following days and analyized immediately: April 7, April 8 and April 11, 1973. Alkalanity and pH was measured before chlorination. Initial values are reported in Table 1. It should be noted that pH increased from 7.1 to 7.4 after mixing. This resulted from excessive carbon dioxide in the effluent from Landover Mall. After mixing, this

excessive carbon dioxide was driven off causing a rise in pH.

TABLE I

Initial pH and Alkalinity of Effluent Samples Before Chlorination

Sample	pH initial	pH after mixing	alkalinity as $CaCO_3$
April 7	7.1	7.5	138 mg/l
April 8	7.1	7.4	156 mn/l
April 11	7.0	7.4	110 mg/l

Stock solutions of chlorine and sulfur dioxide were prepared by bubbling Cl_2 gas and SO_2 gas into liter volumes of water and calibrating. A liter of effluent was tritiated with stock chlorine solution to determine the dose required for breakpoint and the chlorine demand. (Table 2) In each case, a chlorine dose of approximately 25 mg/l resulted in a free chlorine residual of 10 mg/l.

Results

Effluent samples were dosed and the total and free chlorine residuals determined. (Table 3) A one hour contact period was allowed before dechlorination with sulfur dioxide. The pH was measured after chlorination and dechlorination. It should be noted that the free chlorine residual was very stable and maintained itself over the hour contact period.

TABLE 2

Chlorine Dose and Resulting

Chlorine Residuals and pH

Chlorine Dose mg per liter	pH	Chlorine Residual total mg/l	Free mg/l
2.7	7.1	0	0
3.6	7.1	0.6	0.1
5.0	7.2	1.0	0.9
5.9	7.3	1.3	1.2
10.4	7.5	6.2	5.2
13.2	7.4	8.6	7.8
16.0	7.4	12.4	9.0
21.6	7.4	16.6	16.0
27.2	7.4	20.8	17.2

Note: pH increased as a result of excessive CO_2 in the initial sample. This excess CO_2 was driven off during the step addition of chlorine.

TABLE 3

Results of Breakpoint Chlorination
Followed by Dechlorination

Sample	Chlorine - mg/l			pH
	dose	total residual	free residual	
CHLORINATION:				
April 7	27	13.6	14.0	7.0
April 8	26.1	15.8	12.4	7.1
April 11	34.6	28.4	12.0	7.2
DECHLORINATION:				
April 7	-	0.6	-	6.7
April 7	-	Zero	-	6.7
April 8	-	0.6	-	6.8
April 8	-	Zero	-	6.8
April 11	-	0.05	-	6.5

As Table 3 indicates, breakpoint chlorination to 12 mg/l of free chlorine reduced the pH to approximately 7.1, and a free residual of 14.0 mg/l lowered pH to 7.0. Free residuals above 3 mg/l with one hour contact will give effective virus kill. Dechlorination with sulfur dioxide reduced pH to 6.7 and 6.8 on samples collected on April 7 and 8. The sample collected on April 11 contained less alkalinity and also required a higher chlorine dose

(28.4 mg/l) to achieve a free residual of 12 mg/l. As a result of these factors, the final pH of 6.5 after dechlorination was lower than the previous samples.

In conclusion, the pH will not drop to 6.0 and will probably not be lower than 6.5. The free chlorine residuals of 12 mg/l used in this study are excessive. Virus kill will result with free residuals of 3 mg/l. Thus, pH will be depressed less. The final pH can also be controlled to some degree by greater addition of soda ash during phosphate removel.

The effect of breakpoint chlorination and dechlorination on effluent color and turbidity was very pronounced on the samples studied. All color and turbidity was removed by oxidation during the one hour contact time with free chlorine.

Salt Addition

Effluent chlorination at a dose of 30 mg/l as Cl will add 0.004 OZ of chloride per gallon of water. This is well below the taste threshold and amounts to only one ounce of chloride per 250 gallons of water. This amount will have an insigificant influence on the streams total chloride content.

Reduction of a free chlorine residual of 10 mg/l with SO_2 will produce one ounce of sulfate per 735 gallons of effluent. This amount of sulfate is also insignificant on the receiving stream.

EXHIBIT 4a

JTC ENVIRONMENTAL CONSULTANTS, INC.

1225 NOYES DR. SILVER SPRING, MARYLAND 20910
(301-589-8532)

August 5, 1973

Mr. Frank O'Toole
Suite 1000, Watergate 600
600 New Hampshire Ave., N.W.
Washington, D. C. 20037

Dear Mr. O'Toole:

I believe that this letter will provide the information that you requested on the effluent characteristics from the proposed Greenbriar wastewater treatment plant. The effluent quality will surpass that required by the State of Maryland. The State requirements, as set forth in a letter dated March 2, 1973 by Mr. Earl S. Quance, Environmental Health Administration, Department of Health and Mental Hygiene, State of Maryland, are as follows:

average daily flow	Not to exceed 0.325 mgd
BOD - 5 day	Not to exceed 5 mg/l
Suspended Solids	Not to exceed 15 mg/l
pH	6.0 to 8.0
Dissolved Oxygen	Not less than 5.0 mg/l
Phosphate	Not to exceed 1.5 mg/l as P
Disinfection	by breakpoint chlorination followed by dechlorination

The effluent from the Greenbriar treatment plant will be suitable for almost any reuse. It is an advanced wastewater treatment facility that could be classified as a water reclamation plant. It is one of the few plants designed for essentially 100 percent removal of suspended solids, turbidity, color, coliforms and viruses. Although some plants are achieving virus removal, this is the first plant designed with virus removal as an explicit effluent requirement. Having a great deal of experience on virus removal from water, I was retained to supervise this phase of the plant's design. The likely effluent characteristics, as based on similar plants, are tabulated below:

BOD 5-day	less than 2 mg/l
Suspended solids	less than 0.5 mg/l
pH	6.5 to 7.2
Dissolved Oxygen	greater than 5.0 mg/l
phosphate	less than 1 mg/l as P
coliforms	less than 2 MPN per 100 ml

Parameters Not Included in
State Requirements

turbidity	less than 1 unit
ammonia as N	zero
viruses*	essentially zero

*County requirement

As is apparent, the effluent from the Greenbriar plant will be of excellent quality and will exceed State requirements.

With regards to your question on toxic substances in the effluent, it should be recognized that the Greenbriar treatment plant will receive only domestic waste from an apartment complex. The nature of domestic waste does not include heavy metals and phenols as is frequently found in municipal systems which serve industry. Thus, the effluent will not contain any substances in toxic concentrations. You asked if any of the following substances will be present in the effluent. The answer is yes, but let me clarify that their concentrations will be no more than that present in the drinking water which supplies the apartment except for aluminum.

Substance	Effluent quantity
Ammonia	zero
Cyanide*	essentially zero
Aluminum	3 - 5 mg/l
Cadmium*	essentially zero
Chromium*	essentially zero
Copper*	essentially zero
Lead*	essentially zero
Mercury*	essentially zero
Nickel*	essentially zero
Selenium*	essentially zero
Zinc*	essentially zero
Phenol*	essentially zero

*Trace amounts as found in the drinking water which supplies the apartment complex may be present. For all practical purposes, these would be considered as zero in the effluent.

Aluminum is the only substance listed above that will be in the effluent in higher concentrations than the incoming water to the apartments. Aluminum addition will result from the phosphate precipitation process. This addition is not considered

as a toxic substance. Aluminum is also added to drinking water during the purification process.

Ammonia is frequently present in wastewater effluents. However, it will not be present in the effluent from the Greenbriar treatment plant. Breakpoint chlorination will be utilized for effective virus removal. This process will also remove any ammonia that is present.

If the Washington Suburban Sanitary Commission indicated that one of these substances would be present in the effluent, they must be referring to the addition of aluminum sulfate for phosphorous removal. If you have any additional questions, please contact me.

Sincerely yours,

John T. Cookson, Jr., Ph.D.
Environmental Engineer

JTC:ed

EXHIBIT 4b

JTC ENVIRONMENTAL CONSULTANTS, INC.

1225 NOYES DR. SILVER SPRING, MARYLAND 20910
(301-589-8532)

September 18, 1973

Mr. David Birenbaum
Fried, Frank, Harris, Shriver & Kampelman
Suite 1000, Watergate 600
600 New Hampshire Ave., N.W.
Washington,.D. C. 20037

Dear Mr. Birenbaum

This letter is in reply to your question regarding effluent quality from the Greenbriar advanced wastewater treatment plant. As I tabulated in a letter dated August 5, 1973 to Mr. Frank O'Toole, the effluent characteristics as based on similar plants are presented as the " likely " effluent quality. By " likely ", I am referring to effluent quality which will normally exist. Effluent quality, however, will on occasions be less than these very high limits reported in that letter.

The quality criteria which the overall treatment processes will always meet are tabulated below, but as I want to emphasize, the effluent will often surpass these values.

Parameter	Effluent Quality	Percent Removal
BOD 5 day	will not exceed 3.9 mg/l	98.5%
Suspended solids	will not exceed 1.9 mg/l	99.2%
Phosphorus as P	will not exceed 1.0 mg/l	93-95%
Total Nitrogen as N	will not exceed 15 mg/l	25%
pH	not less than 6.5 or more than 7.2	
Dissolved oxygen	not less than 5.0 mg/l	
Coliforms	less than 2 MPN per 100 ml	
Viruses	essentially zero	99.99%

Sincerely yours,

John T. Cookson, Jr. PhD
Environmental Consultant

EXHIBIT 5

4705 QUEENSBURY ROAD, RIVERDALE, MARYLAND 20840
TELEPHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
September 20, 1973

Mr. David E. Birenbaum
Fried, Frank, Harris, Shriver & Kampelman
The Watergate 600, Suite 1000
600 New Hampshire Avenue, N. W.
Washington, D. C. 20037

Gentlemen:

Re: Greenbriar Sewage Treatment Plant

This letter is to confirm our recent phone conversation in which the "normal" flow in the treatment plant receiving stream and the relative water surface elevations at each phase of development was discussed.

Based on field observations the "normal" flow in the stream is 1.0 to 1.5 c.f.s. with a depth of 0.5 feet.

At the end of the first phase the "normal" flow will be increased by 0.446 c.f.s. (from the treatment plant) to a total of 1.95 c.f.s. with a resulting depth of 0.65 feet.

At the end of the second phase the "normal flow will be increased by 0.892 c.f.s. (from the treatment plant) to a total of 2.39 c.f.s. with a resulting depth of 0.74 feet.

Very truly yours,

BEN DYER ASSOCIATES, INC.

Richard S. Joshlin
Storm Drain & Paving Department

RSJ/jab

EXHIBIT 6

A SUMMARY STATEMENT ON THE GREENBRIAR WASTEWATER TREATMENT PLANT

Prepared by

John T. Cookson, Jr. PhD.
Environmental Engineer
Consultant to Ben Dyer
Associates, Inc.

July 30, 1973

I have prepared previous reports on the wastewater treatment plant for Greenbriar. These reports have discussed many of the concerns raised by individuals and public agencies. They include testimony before the Prince George's County Council on February 8, 1972, November 16, 1972, a report as requested by the Prince George's County Council dated February 22, 1972 and a report for the Washington Suburban Sanitary Commission dated April 15, 1973. This statement will summarize these reports as well as address several additional questions that have been raised on the Greenbriar wastewater treatment plant.

First, it is important to recognize the type and degree of treatment that the Greenbriar Plant will provide. It is not a secondary treatment facility as is Western Branch or Blue Plains, nor is it an advanced waste treatment plant in the category of Landover Mall. The Greenbriar Plant is classified as a water reclamation plant, producing water suitable for almost any reuse. The Greenbriar Plant will be more advanced and have more fail-safe features than any wastewater treatment plant operating East of the Mississippi River. It can only be compared to the water reclamation plants in California and Southwest Africa, where the effluent is reused for recreational activities such as swimming, industrial process and for drinking water.

The effluent characteristics from the Greenbriar Plant will meet the USPHS drinking water standards. It is one of the few plants designed for 100% removal of suspended solids, turbidity and color, and the only wastewater treatment plant designed for explicit virus removal. Although other plants are achieving virus removal, they were not designed with this parameter as an effluent standard.

Salt Addition: There have been many concerns expressed on salt addition to the effluent as a result of the virus inactivation process. Virus inactivation will require breakpoint chlorination followed by dechlorination. It has been documented in a report dated April 15, 1973 to WSSC, that a dose of 30 mg/l of chlorine will be used for virus inactivation of the Greenbriar effluent. This dosage will provide a free chlorine residual, hypochlorous acid, of 10 to 13 mg/l for at least one hour. Effluent chlorination at a dose of 30 mg/l as Cl will add only 0.004 oz. of chlorine per gallon of water. It should be noted that the effluent will pass USPHS drinking water standards for chloride. It will be well below the taste threshold and amounts to only one ounce of chloride per 250 gallons of water. This amount will have an insignificant influence on any receiving water.

Reduction of the free chlorine residual of 10 mg/l with SO_2 will produce one ounce of sulfate per 735 gallons of effluent. This is also an insignificant amount, and less than one tenth the drinking water standard.

Odor Control: Although the prevention of undesirable odors is only one aspect in the development of a successful subdivision, it is without doubt of vital importance. The design of the Greenbriar Wastewater Treatment Plant has avoided processes which are commonly associated with odor production.

Odor production in wastewater treatment plants results from septic sewage and biological processes which utilize anaerobic organisms. At Greenbriar, the sewer lines are very short compared to municipal systems. Therefore, the sewage will not become septic before reaching the treatment plant. Once in the treatment plant, all biological processes are aerobic systems. Odors are only produced by processes using fermentation or anaerobic respiration. It is for this reason that the Greenbriar Plant will not use the common anaerobic digestors for sludge stabilization. Sludge stabilization will occur under aeration, a process called aerobic digestion. Sludge storage tanks will also receive

continuous aeration to prevent septic-odor producing conditions. No sludge will be disposed of at the Greenbriar site. Thus, there is no process in the Plant that will produce odorous gases.

There have been some questions on the SO_2 dechlorination unit and the possibility of odor production. First, it should be noted that no chlorine or sulfur dioxide gases will be discharged to the atmosphere. All chlorine will be converted to water solution species. Sulfur dioxide will be added to the sewage for dechlorination as chemically illustrated below:

$$2\,HOCl + SO_2 \longrightarrow 2H^+ + 2Cl^- + SO_4^{=}$$

free chlorine	sulfur dioxide	hydrogen ions	chloride salt	sulfate salt

As this reaction illustrates, no odor or gas will be produced. The byproducts from the reduction of hypochlorous acid are the salts of chloride and sulfate and hydrogen ions. Sulfate ions, a salt, will not cause any odors and sulfide, which leads to odorous hydrogen sulfide gas, cannot be produced by the dechlorination process. As the equation illustrates, chlorine oxidizes the sulfur atom in sulfur dioxide to the sulfate ion. Sulfide can only be produced by the reduction of sulfur

dioxide and this is chemically impossible in an effluent containing hypochlorous acid. The sulfur atom is oxidized rather than reduced. This process is frequently used for dechlorination. Pilot plant studies were conducted on sewage effluent from advanced wastewater treatment plants for determining dose requirements, contact times and effluent quality after dechlorination. These tests were performed for Ben Dyer Associates, Inc., design engineers for the Greenbriar Plant, and at no time was any trace of odor present from the dechlorination process.

The application of chlorine and sulfur dioxide gases to the effluent will be automatic. In view of the variable flow rates and chlorine demand, an automatic control based on flow and chlorine residual will be used to control chlorine dosage. A chlorine residual analyzer will be used to pace the SO_2 solution feeder. Thus, accurate and automatic control will be provided on each dosing unit.

To sum up: the Greenbriar Wastewater Treatment Plant is a first in the State of Maryland. It is classified as a water reclamation plant, producing water for almost any reuse. From chemical and bacteriological analysis of the receiving stream (documented in a report to the Prince George's County Council, February 22, 1972)

there is no doubt that the effluent from the Greenbriar Plant will be superior to the receiving stream. The effluent will not only meet State and EPA requirements (pH, oxygen, BOD, nutrients and etc.) but it will also meet the USPHS 1962 drinking water standards.

As to the question of mechanical breakdown, the answer lies in the plant design and its duplicating features. These include dual units as well as stand-by units to maintain high effluent quality when mechanical failures result. A stand-by power supply as well as a connection to the municipal sewer are additional safety factors. No health hazards or odor conditions will result with the type of processes selected in the Greenbriar Plant.

John T. Cookson, Jr.

EXHIBIT 7

TRAFFIC IMPACT STUDY

GREENBRIAR LUXURY APARTMENTS

GREENBELT, MARYLAND

SPECIAL EXCEPTIONS: No. 2459
No. 2460
No. 2469

PARKING WAIVER APPLICATION NO. 7

PARKING & TRANSPORTATION CONSULTANTS

7315 WISCONSIN AVENUE, WASHINGTON, D.C. 20014 • (301) 656-2810

July 12, 1971

Mr. George Brugger
Beatty and McNamee
Attorneys-at-Law
4316 Hamilton Street
Hyattsville, Maryland

Dear Mr. Brugger:

At your request, we have prepared a traffic impact study for the proposed Greenbriar Luxury Housing Development to be located on Glenn Dale Road. A complete analysis has been made of the traffic to be generated by the 1,193 dwelling units and the affect this traffic will have on the adjacent roadways.

Analyses have been prepared and traffic assignments made to the roads within a reasonable influence area. The analyses include conditions that may be expected for the morning and afternoon rush hours. During the course of our studies, we reviewed all available information from the State Roads Commission, The Park and Planning Commission and made a series of traffic counts ourselves. All of these factors are considered in our final conclusions

It is our professional opinion that the proposed Greenbriar Project can be accommodated on the existing roadway system within adequate capacity ranges. There is sufficient traffic capacity available to absorb the traffic both in the morning and the afternoon and there is no reason why the project should not receive favorable consideration from the County Council based on the traffic impact.

Yours very truly,

James M. Hunnicutt

JMH:mkg

TRAFFIC IMPACT STUDY

GREENBRIAR LUXURY GARDEN APARTMENTS

PRINCE GEORGES COUNTY, MARYLAND

INTRODUCTION

The firm of Hunnicutt & Neale was retained to prepare a detailed study of the traffic impact of the development of the proposed Greenbriar Garden Apartment Development and the following is a summary of the information which has been gathered and the following analyses. Facts from all known sources have been considered and their implications used in the development of the factual and statistical information.

A number of factors which have been developed in previous studies concerning traffic generation and similar characteristics have been used and the sources of this information credited. In all cases we have used very rigid criteria which will in turn make our proposed traffic volumes even more conservative than those calculated by the Park and Planning Commission staff. The resultant traffic generated which may be expected when the full development is completed is higher than the Park and Planning Commission staff estimate and still, the roadways will accept it without overcrowding.

EXISTING CONDITIONS

The proposed development is located in the norther central part of Prince Georges County and enclosed in a triangle formed by the Baltimore Washington Parkway, Glenn Dale Road and the Goddard Space Flight Center. There are no roads internally within the site at this time.

Glenn Dale Road is a four lane divided facility of high type design. It has an asphalt wearing surface and a 50 mile per hour speed limit.

The Baltimore Washington Parkway is a four lane controlled access facility with concrete pavement and dirt shoulders. It is separated by a median strip of varying width and is heavily planted with trees and other landscaping. The speed limit on the Parkway is 60 miles an hour.

TRAFFIC COUNT INFORMATION

There are several major traffic arterials near the site which give it some of the best possible traffic access of any place in the County. Because of this, the area is under continuing study by the State Roads Commission and other traffic jurisdictions and adequate and up-to-date traffic information is available on which to base valid conclusions. Each year, the Maryland State Roads Commission makes traffic volume counts on a 24 hour basis at their major highways and connecting points. The last count available for these are included in this report. Traffic information is available on Greenbelt Road, Glenn Dale Road, Baltimore Washington Parkway, the Capital Beltway, and the connecting ramps between the major roads at the interchange points. In Table 1 the 24 hour traffic volume counts are shown for the major facilities in the immediate vicinity of the proposed site.

TABLE 1

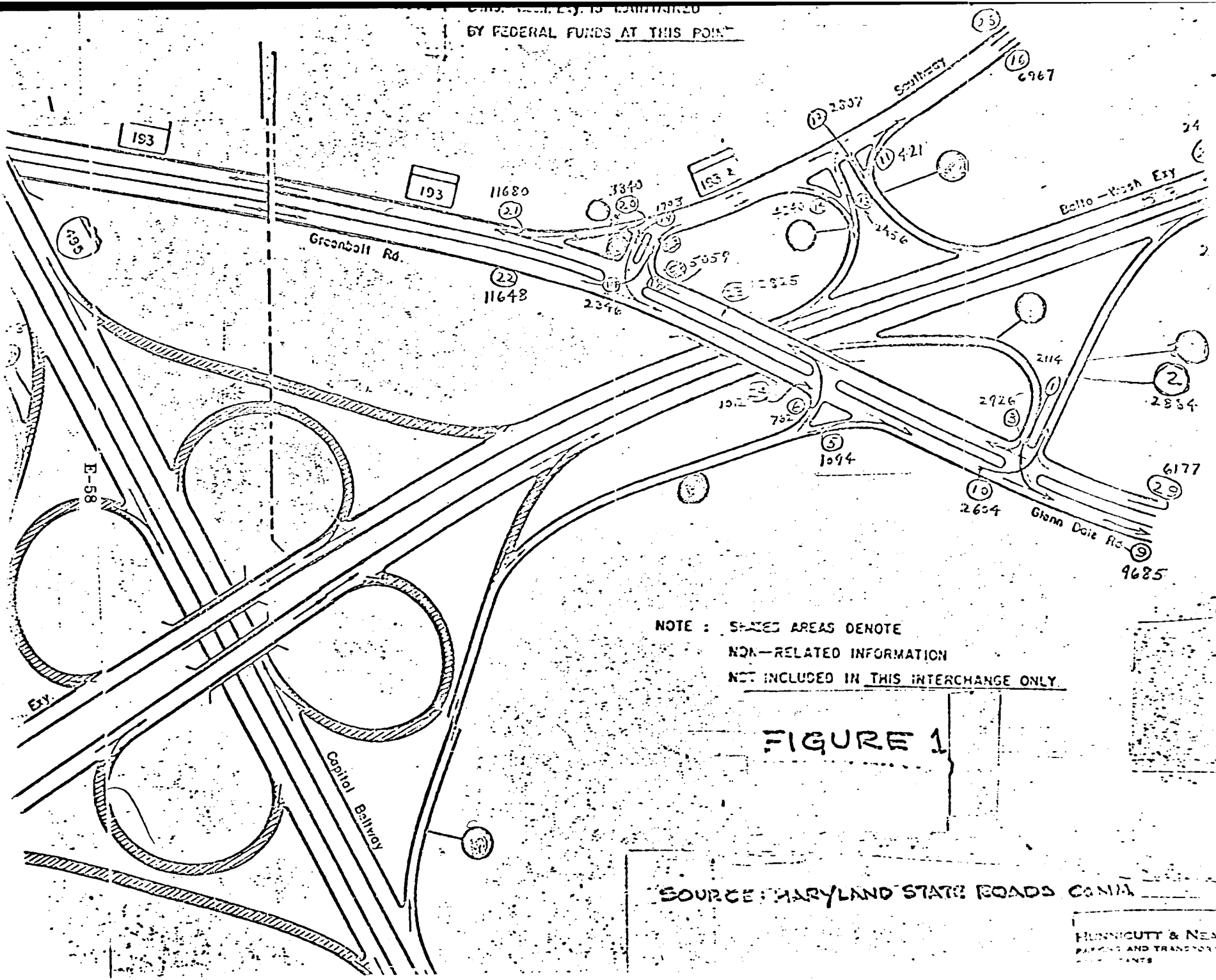
TRAFFIC VOLUMES

HIGHWAY	24 HOUR TRAFFIC VOLUME
Glenn Dale Road	18,800
Greenbelt Road (between Beltway and Parkway	21,200
Capital Beltway (north of Greenbelt Road)	90,100
Capital Parkway (south of Parkway)	63,900
Baltimore Washington Parkway (north of Glenn Dale Road)	52,500
Baltimore Washington Parkway (south of Glenn Dale Road)	57,700

Hourly traffic volumes for each of the interchanges and connecting ramps for the major roads are shown in the Appendix. Figure 1 of this report also gives a physical layout of the ramp direction and configuration.

Additional detailed studies were made by Hunnicutt & Neale on Glenn Dale Road at the approximate location where the west access road will enter the proposed Greenbriar Project. The name of this road is to be Hanover Parkway. The road on the east end of the property entering Glenn Dale Road is proposed to be named Mandan Road. Our counts indicated that the traffic counted by the State Roads Commission more than a year ago was still valid and there is only a slight increase in the total volume. We found that the peak hour traffic occurs earlier in the morning than normal. The peak hour was determined to be between 7:15 and 8:15 A.M. This is reasonable as the peak hour gets earlier the more distance the location is from the core of the central city. By this, it has been measured that the

BY FEDERAL FUNDS AT THIS POINT



NOTE : SHADED AREAS DENOTE NON—RELATED INFORMATION NOT INCLUDED IN THIS INTERCHANGE ONLY

FIGURE 1

SOURCE: MARYLAND STATE ROADS COMM.

HUNNICUTT & NEA

VICINITY MAP

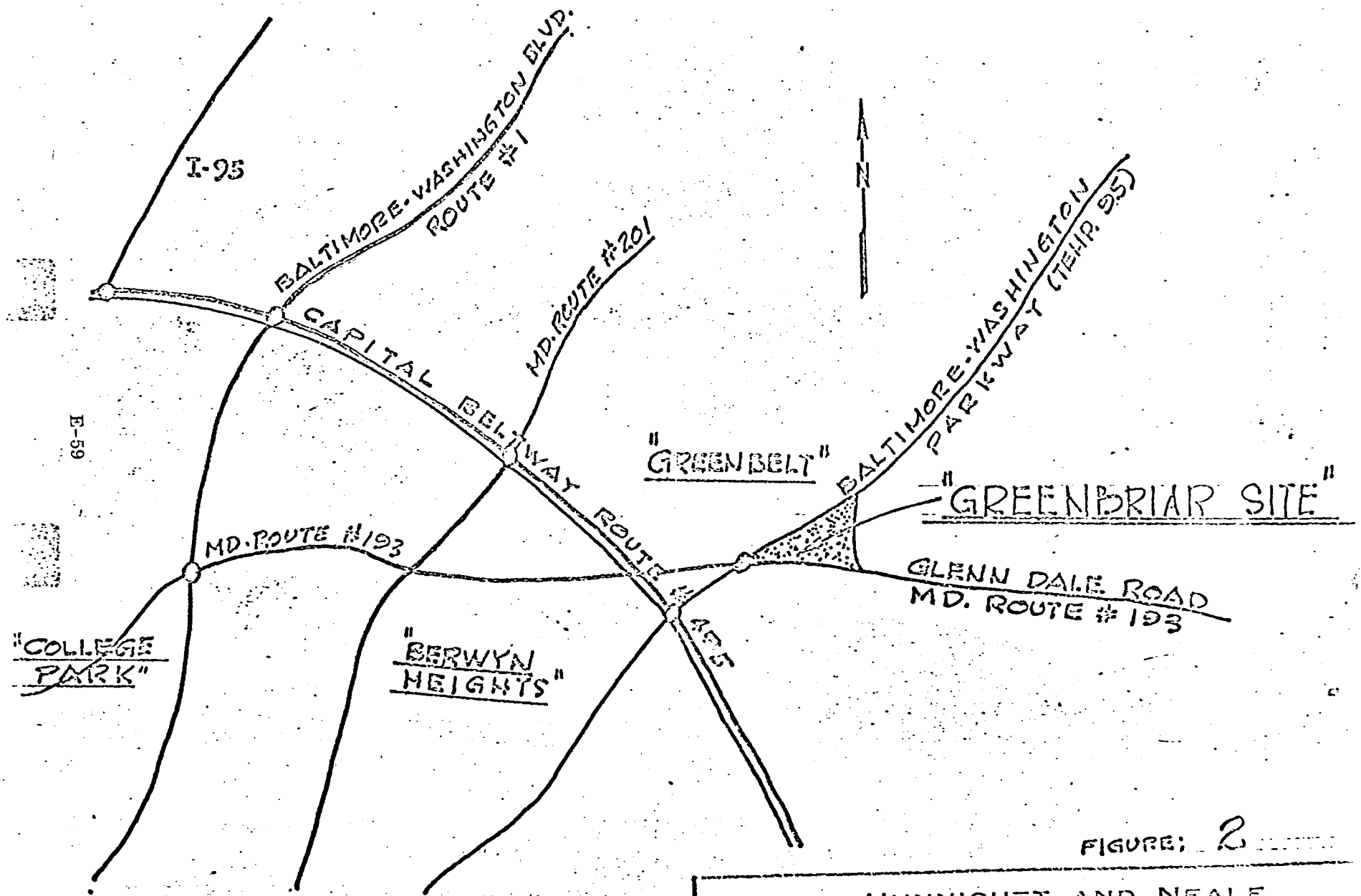


FIGURE: 2

HUNNICUTT AND NEALE

PARKING AND TRANSPORTATION CONSULTANTS

peak hour in downtown Washinton does not reach there until between 8:00 and 9:00 A.M. The two way traffic volume on Glenn Dale Road during the peak hour was 2,083 vehicles. The westbound volume was 970 vehicles and the eastbound volume was 1,113 vehicles. 302 cars were counted entering the northbound Baltimore Washington Parkway entrance and 173 vehicles were tabulated leaving the northbound off-ramp and exiting onto Glenn Dale Road. A detailed 15 minute interval count is included in the Appendix.

The same count was made in the afternoon at the same location and the peak hour was determined to be 4:15 until 5:15 P.M. During this time, there were 1,040 vehicles westbound and 766 cars eastbound. Entering into the northbound Baltimore Washington Parkway Ramp there were 209 vehicles while 434 exited onto Glenn Dale Road from the northbound off-ramp of the Parkway.

TRAFFIC GENERATION

Several studies have been made recently concerning traffic generation for various types of residential developments. One such study was completed in 1968 by the Maryland State Roads Commission in conjunction with the U. S. Department of Transportation to determine the number of auto trips made for single family residential, highrise apartments, townhouse development and garden apartments. Several other states under similar grants made studies in their areas.

The study made by the Maryland State Roads Commission included garden type apartment developments throughout the State and two such developments

were in Prince Georges County. Others were located in Montgomery County and other areas in Baltimore and throughout the State. The summary of this information is shown in Table 2.

TABLE 2

TRIP GENERATION

GARDEN APARTMENTS

TRIPS PER DWELLING UNIT

Apts.	No. of Dwelling Units	ADT	24 Hour Total Per Dwelling Unit
A	199	1,541	7.74
B	176	1,113	6.32
C	200	880	4.40
D	182	1,308	7.20
E	105	628	6.00
F	161	1,902	11.81
G	91	821	9.02
H	679	4,218	6.21
I	383	2,027	5.30
	2,176	14,438	64.00

Weighted Average = $\frac{14,438}{2,176}$ = 6.6 trips/day/D.U.

(From Md. S.R.C., "Trip Generation Study, 1968)

From the Table it can be seen that the weighted average of the number of trips per dwelling unit on a 24 hour basis averages 6.6 trips per day per dwelling unit. To round off the numbers and to give every benefit of the doubt to the conservative view, we increased this for calculation purposes to 7 trips per day per dwelling unit.

For comparative checking purposes, similar studies were investigated that were made in California. It is interesting to note that similar type units in that State averaged 6.7 trips per day per dwelling unit or almost an identical number. Directional distribution of trips used in our study were determined from the California Study and are shown in Table 3.

TABLE 3

TRIP DIRECTIONAL DISTRIBUTION
GARDEN APARTMENTS

Average Trips/D.U. = 6.7

Peak Hour % of ADT - 12.5% (P.M. Peak)

% of ADT = 9.5% (A.M. Peak)

P.M. Peak Hour = .125 x 7.0 Trips/D.U.

= .875 Trips/D.U.

A.M. Peak Hour = .095 x 7.0

= .665 Trips/D.U.

Directional Distribution-

A.M. Peak Hour = 85% out, 15% in

P.M. Peak Hour = 67% in, 33% out

DIRECTIONAL FACTORS

	Inbound	Outbound	Total
A.M. Peak Hour	.100	.565	.665
P.M. Peak Hour	.585	.290	.875
	Peak Hour Trips (1193 D.U.)		
A.M. Peak	119	674	793
P.M. Peak	698	346	1,044

From the assumptions and calculations in the preceding table, it can be seen that we have estimated 793 trips total in and out during the morning peak hour. In the afternoon peak hour, we anticipate 1,044 total in and out. In the morning, 85% of the total trips are expected to be outbound and 15% inbound. During the afternoon peak hour, 67% of the trips are estimated to be in and 33% of the trips are to be out.

TRIP GENERATION

Based on the major roadways and direction of travel and the major employment and shopping generation in the area, we have made an assessment of the probable direction of traffic flowing in and out of the development. It is significant to note that all of the traffic in and out of the project has been distributed to Glenn Dale Road. It has further been distributed to other major traffic carriers in the vicinity.

In the preliminary master plan for the Glenn Dale, Seabrook, Lanham and vicinity, a bridge is proposed to connect Mandan Road across the Baltimore Washington Parkway to the north. This bridge is not programed and there is no way of knowing when it is to be put in in the future. It is very important to note that if this bridge is put in, all of our traffic fugures should be reduced approximately 15 to 20% as this is our estimate of the approximate volume of total traffic that would enter across this bridge. The use of this bridge would make a significant reduction on the amount of traffic that would have to be carried by Glenn Dale Road. In our calculations we have not used this bridge which again makes our figures conservative.

TRAFFIC ASSIGNMENT

Four figures are shown which indicate the estimated traffic directional movements for the west access point which is Hanover Parkway and the east access point which is Mandan Road. Both of these have been analyzed for the A.M. and P.M. Peak Hours. These volumes have been further assigned to the interchange of the Baltimore Washington Parkway and the volumes are shown for both the A.M. and P.M. Peak in Figures 3, 4, 5 and 6.

CAPACITY ANALYSIS

After assigning all of the traffic to the roadway network and the intersections, an analysis was made of the conditions as they now exist and the conditions that may be expected when the Greenbriar Project is in full operation.

Only one intersection is in operation at this time and this one is at the intersection of Glenn Dale Road and the Baltimore Washington Parkway Ramps. This road goes into a private housing development and its counts are shown elsewhere in this report. There are no intersections now where the proposed Hanover Parkway and Mandan Road will intersect and serve the Greenbriar Project. Therefore, the capacity analysis of the intersection is not possible and none has been made. However, we have shown the projected volumes from Greenbriar when added to the existing traffic now on Glenn Dale Road. This is shown in Table 4.

TRAFFIC ASSIGNMENT
MORNING PEAK HOUR @ ACCESS POINTS

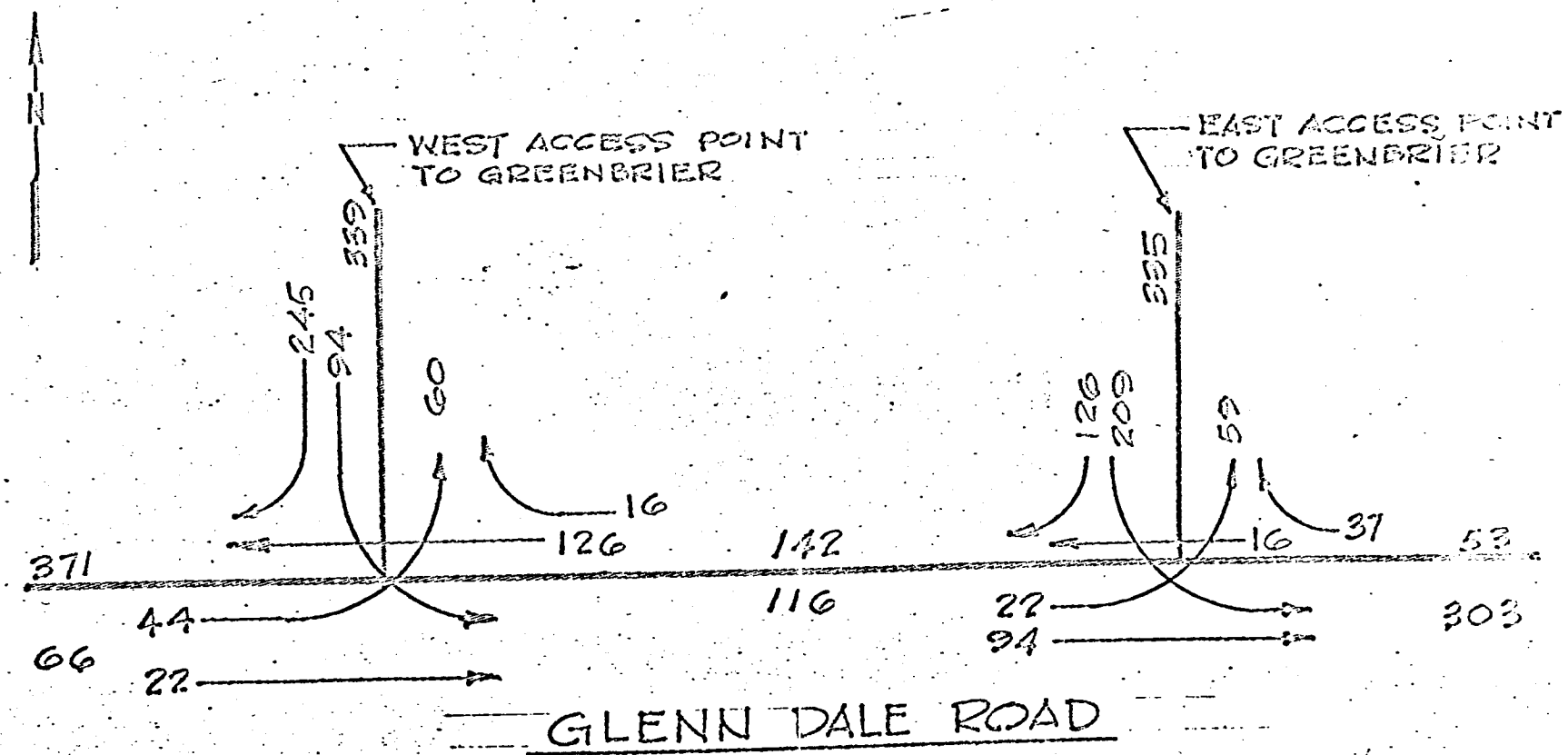


FIGURE: 3

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TRAFFIC ASSIGNMENT
MORNING @ PEAK HOUR

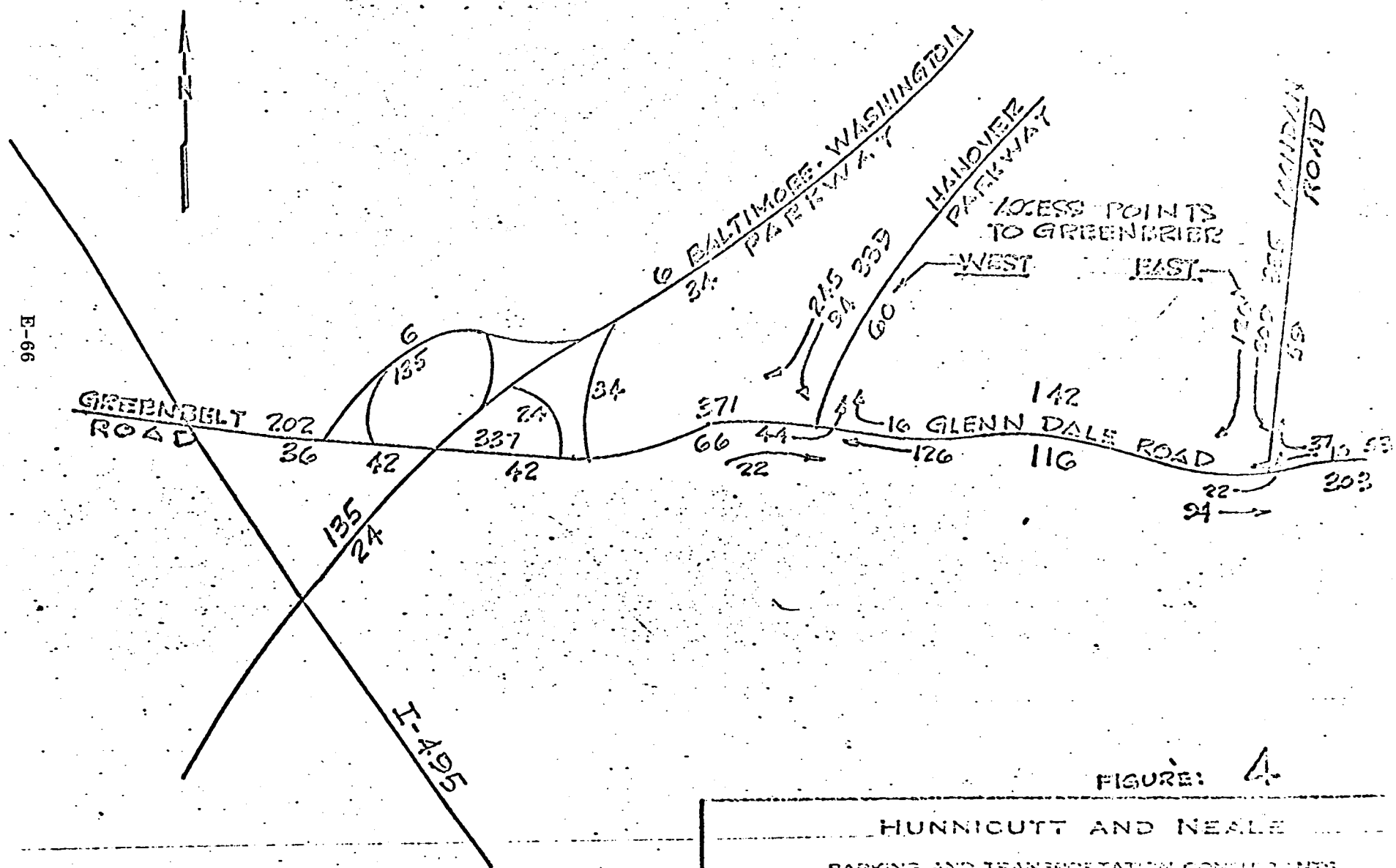

FIGURE: 4

HUNNICUTT AND NEALE

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TRAFFIC ASSIGNMENT
AFTERNOON PEAK HOUR @ ACCESS POINTS

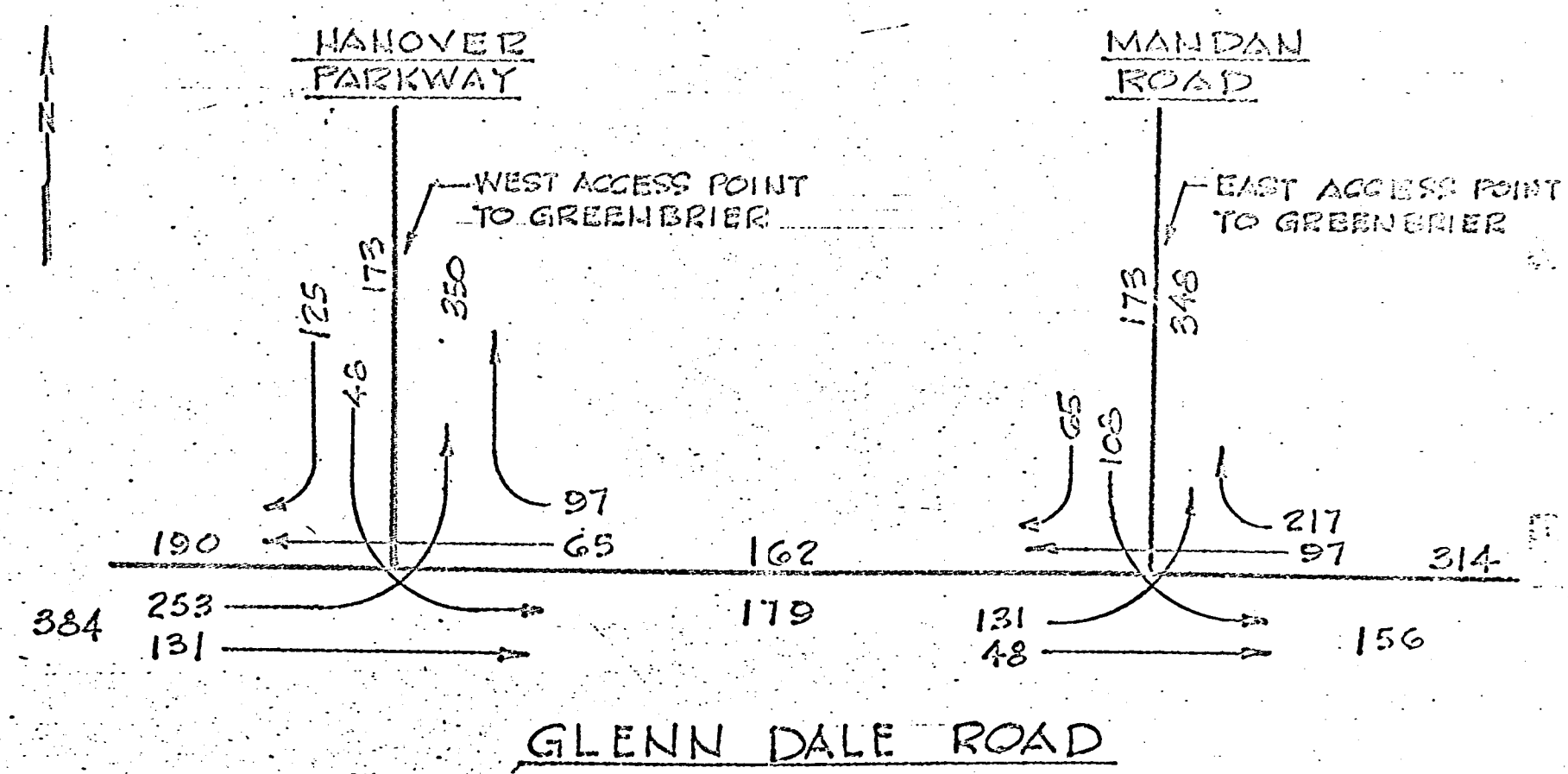

FIGURE: 5

HUNNICUTT AND NEALE

PARKING AND TRANSPORTATION CONSULTANTS

TRAFFIC ASSIGNMENT
AFTERNOON PEAK HOUR

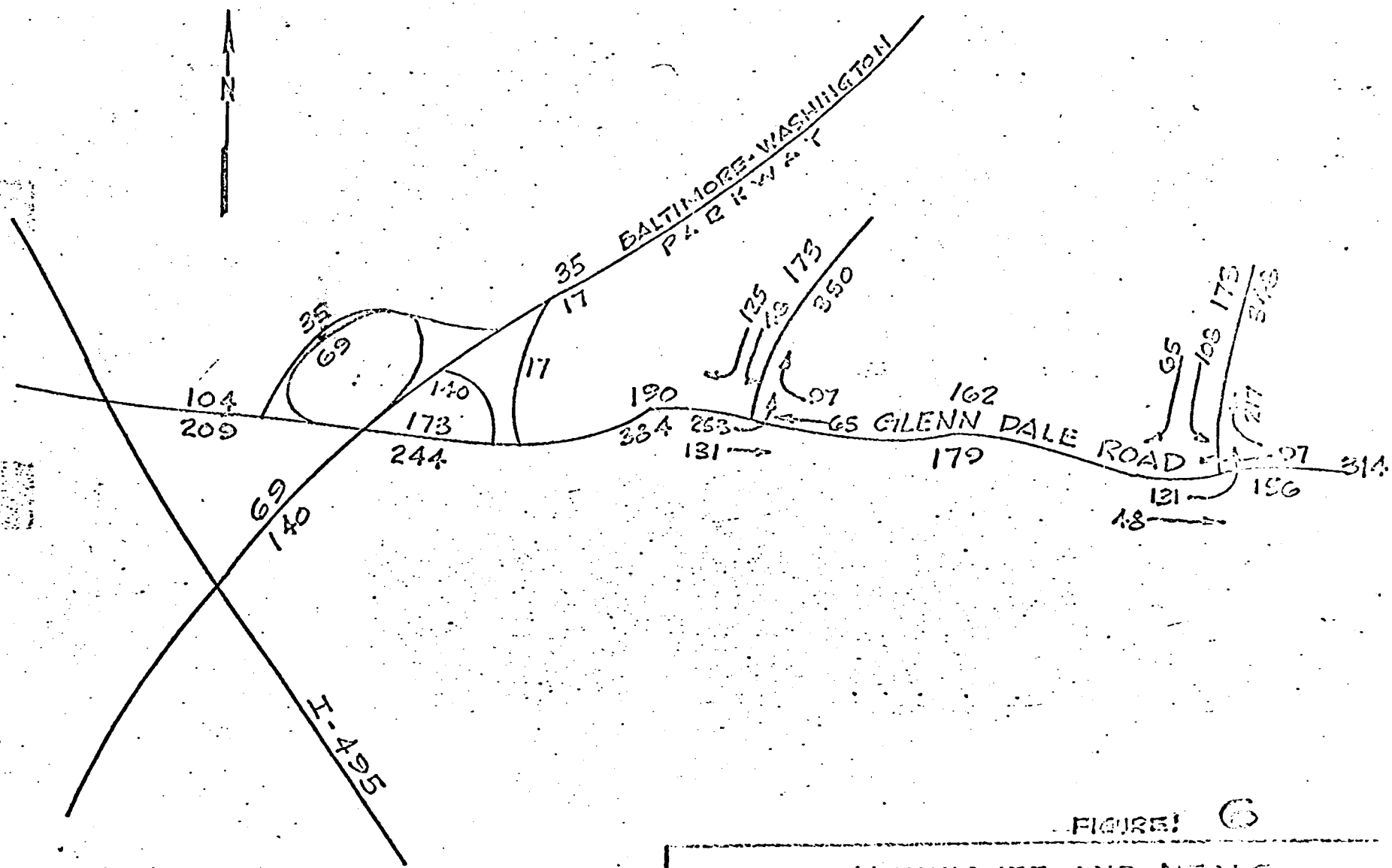

FIGURE: 6

HUNNICUTT AND NEALE

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WASHINGTON, D. C.

TABLE 4

SUMMARY OF CAPACITY ANALYSES

FOR AFFECTED INTERSECTIONS

% OF CAPACITY

Location	Level C A.M.	Level C P.M.	Level D A.M.	Level D P.M.
Glenn Dale Road - Baltimore Washington Parkway Ramps - Private Road				
Existing	66%	72%	59%	64%
Existing + Greenbriar	80%	79%	71%	70%
West Access Point - Glenn Dale Road (Hanover Parkway)				
Existing + Greenbriar	66%	71%	59%	63%
East Access Point - Glen Dale Road (Mandan Road)				
Existing + Greenbriar	68%	67%	60%	60%

TABLE 5

TRIP DISTRIBUTION

East on Glenn Dale Road - 45%

West on Glen Dale Road - 55%

Of the 55% West:

North on B.W. Pkwy. - 5%

South on B.W. Pkwy. - 20%

West on Glenn Dale Road - 30%

Trip Distribution to Access Points

For All Trips With Travel Direction	% Using Each Access Point	
East on Glenn Dale Road	69% East (Mandan Road)	31% West (Hanover Pkwy.
West on Glenn Dale Road	34% East (Mandan Road)	66% West (Hanover Pkwy.

Two levels of traffic service have been shown and calculations made. These levels of service are from the Highway Capacity Manual.[1]

It can be seen that the traffic at the intersection of the ramps for the B.W. Parkway and the private road now accoutn for 66% of the intersections capacity After the Greenbriar Project has been open, this will increase to 80%. Both of these figures are for the morning rush hour. For the afternoon rush hour, the intersection is now operating at 72% of capacity and with Greenbriar added, it will increase to 79% capacity.

[1]Highway Capacity Manual, 1965, Highway Research Board Special Report Special Report No. 87, National Academy of Sciences, Washington, D. C.

It is expected that the access road into the private development south of Glenn Dale Road will be modified to connect with the site of Hanover Road adjacent to the crossover point in the median. After combining both traffic flows, the volumes through the combined intersection will not exceed 80% of the intersections capacity. Therefore, the traffic will flow affectively through both the morning and afternoon peak hours and will reduce the congestion point next to the ramps at the B.W. Parkway.

It can be seen that in all instances, the traffic generated by the Greenbriar Project will not overload either of the two intersections at Glenn Dale Road. There is sufficient capacity on Glenn Dale Road to accommodate all traffic generated by the Greenbriar Project.

PLANNED HIGHWAY IMPROVEMENTS

During the next few years, a number of highway improvements in the general vicinity are planned or scheduled on Master Plan Improvements. These include the following:

1. A grade separation of Greenbelt Road and Kenilworth Avenue will depress Greenbelt Road under Kenilworth and connecting roads will be constructed on both sides of Greenbelt Road in order to provide for turning movements. The intersection will provide access to Kenilworth Avenue and Edmonston Drive. This improvement is shown in the College Park - Greenbelt Master Plan.

2. Studies are now underway with the State Roads Commission for possible improvements of the B.W. Parkway and Glenn Dale Road. The purpose of this improvement would be to improve the ramp system from the

B.W. Parkway onto Glenn Dale Road to reduce any congestion and to improve the design and construction and bring the highway and ramps into compliance with the Federal Safety Standards as they apply to the Interstate Highway System. This improvement is in the Glenn Dale, Seabrook and Lanham preliminary plan. These preliminary discussions are already underway now.

3. The new I-95 from the Beltway to Baltimore has just been opened. It is estimated that this highway will remove as much as 30% or more of the traffic from the B.W. Parkway and result in a considerable reduction of traffic in the vicinity of Glenn Dale Road and the B.W. Parkway. As more motorists become familiar with I-95, this reduction will be felt.

4. The U. S. Congress has passed a bill authorizing the Maryland State Roads Commission to take over the B.W. Parkway. It has also earmarked $65,000,000 for the addition of one lane in each direction to make a total of six traffic lanes and to bring the interchange ramps up to full interstate standards. The State Roads Commission is now considering the act of Congress and the extent of their responsibility for assuming control of the highway. When this change in responsibility moves from the Park Service to the State Roads Commission, the improvements planned will greatly improve the traffic carrying capacity of the B.W. Parkway and the connecting ramps to Glenn Dale Road.

CONCLUSIONS

From all traffic generating factors available, and the assignment of these traffic volumes both in the morning and afternoon peak hours indicate that the existing roadway system can affectively handle any traffic that will be generated by the Greenbriar Project. Detailed analyses have been made of the ramps at the B.W. Parkway and the two new intersections which will be built to serve as access to the proposed project. In none of the cases does the increased traffic overload the intersections. In addition to this, all estimates have been very conservative which leaves a sizable area for future traffic growth. In the event the bridge is built spanning the Parkway from Mandan Road, the traffic flow will be even less than shown.

Future planned improvements and those now under construction and consideration indicate that traffic flow will be eased considerably. The opening of I-95 will substantially reduce traffic in the area to the benefit of the proposed project. Forward thinking planners are anticipating trouble points and making plans for correction before they become serious.

Based on the entire foregoing report, it is our professional opinion that the roadway system surrounding the Greenbriar Project and the internal roads connected with it can safely and affectively carry the traffic that will be generated by the project when it is completed. We see no reason why the project should not be granted full approval from the consideration of a traffic standpoint.

... & TRANSPORTATION CONSULTANTS

7315 WISCONSIN AVENUE, WASHINGTON, D.C. 20014 • (301) 656-2810

June 28, 1971

Mr. George A. Brugger
Beatty & McNamee
Attorneys-at-Law
4316 Hamilton Street
Hyattsville, Maryland

Dear Mr. Brugger:

At your request, we have made an analysis of the parking requirement in conjunction with the planned development of Greenbriar. This is in regard to your application for a waiver in connection with Special Exception Application No. 2459, 2460 and 2469.

According to the plans of the developer, it is proposed to construct 1,193 dwelling units consisting of a variety of various size units. It is our understanding that the units will contain dens and recreation rooms in addition to the normal bedroom and other normal rooms in garden type apartments. The number of parking spaces required for the total 1,193 units according to the new parking ordinance indicates that a total of 2,452 parking spaces will be required to conform to the new ordinance. This will mean that 2.05 parking spaces will be required for each dwelling unit throughout the entire development.

Several years ago, the Maryland State Roads Commission made a detailed study of garden type apartments as well as other trip generators in the State of Maryland.[1] This study made a detailed analysis of nine garden type apartment units in the State of Maryland and two of the developments were located in Prince Georges County. Table 1 gives the information tabulated from this study. It can be seen that the average number of persons living in garden apartment type developments average 2.37 people per dwelling unit throughout the state and a slightly higher value was found for Prince Georges County of 2.65 persons per dwelling unit. Throughout the State, the average number of vehicles per dwelling unit averaged 1.26 while in Prince Georges County, the average was slightly higher of 1.33 vehicles per dwelling unit.

[1] Trip Generation Study, 1968, Maryland State Roads Commission, Bureau of Traffic Planning and U. S. Bureau of Public Roads.

According to the calculation of the parking requirements under the new ordinance where dens and recreation rooms are counted as bedrooms, this will naturally require considerably more parking space than previously under the old ordinance. In the explanation for Special Exception of Greenbriar, a Statement of Explanation accompanied the application. In this explanation, it was stated that dens and family rooms would not be used for sleeping purposes and this was to be enforced by the owner. Based on this information, it is our professional opinion that the number of persons per dwelling unit and the number of vehicles per dwelling unit will be no different than from other garden type apartment units now occupied throughout the State of Maryland and specifically Prince Georges County.

If the actual usage of parking spaces per dwelling unit as measured in the study mentioned previously of the State Roads Commission, the parking spaces per unit was found to be 1.26 spaces per dwelling unit. According to the new ordinance, the parking spaces required for Greenbriar will be 2.05 spaces per dwelling unit. Based on this comparison, it appears that the requirement under the new ordinance as applied to Greenbriar would be 63% more spaces required than that actually measured in the field of other garden type apartment units. We feel this is unnecessary.

The developer proposed to build 2,020 parking spaces which conforms to the new ordinance without the calculation of the dens and family rooms. This will calculate to be 1.69 parking spaces per dwelling unit or 34% more than that measured in the study by the State Roads Commission. It is felt that this additional parking space will provide ample room for all parkers within the development, adequate space for visitors and provide latitude for future increases in automobile ownership should it occur. All parking can be contained within the development and will not cause a burden on any adjacent areas or streets. Nor will this modification in parking have any adverse affect on roadway congestion or add additional traffic volumes to existing roads or streets. The adjustment in parking space requirements will only bring the parking requirements more in line with actual measured usage rather than theoretical planning factors.

Yours very truly,

James M. Hunnicutt

JMH:mkg

TABLE 1

GARDEN APARTMENTS

POPULATION - VEHICLE OWNERSHIP

PER D.U.

Apt.	No. D.U.	Pop.	Pop./D.U.	No. Vehicles	Veh./D.U.
A	199	458	2.30	251	1.26
B	176	405	2.30	217	1.23
C	200	460	2.30	186	0.93
D	182	419	2.30	229	1.26
E	105	242	2.30	126	1.20
F	161	363	2.25	222	1.38
G	91	205	2.25	126	1.38
H	679	1,800	2.65	904	1.33
I	383	1,015	2.65	510	1.33
Total	2,176	5,367	21.30	2,771	11.30
Average			2.37		1.26

Apartments H & I are in Prince Georges County

Source: Trip Generation Study, Maryland State Roads Commission, 1968, Bureau of Traffic Engineers in cooperation with U. S. Department of Transportation.

TABLE 2

PARKING SPACES REQUIRED

	New Ordinance Requirements	Spaces Provided
Parcel 1	992	796
Parcel 2A	340	279
Parcel 2B	1,120	945
TOTAL	2,452	2,020

Calculations:

$$\frac{2{,}452 \text{ spaces required}}{1{,}193 \text{ planned units}} = 2.05 \text{ spaces/D.U.}$$

Average Measured Spaces/D.U.

Statewide	1.26
Prince Georges County	1.33

Excess Spaces Required - New Ordinance:

$$\frac{2.05}{1.26} = 1.63$$ or 63% more required spaces under new ordinance than found in State

Excess Spaces Actual Planned by Developer

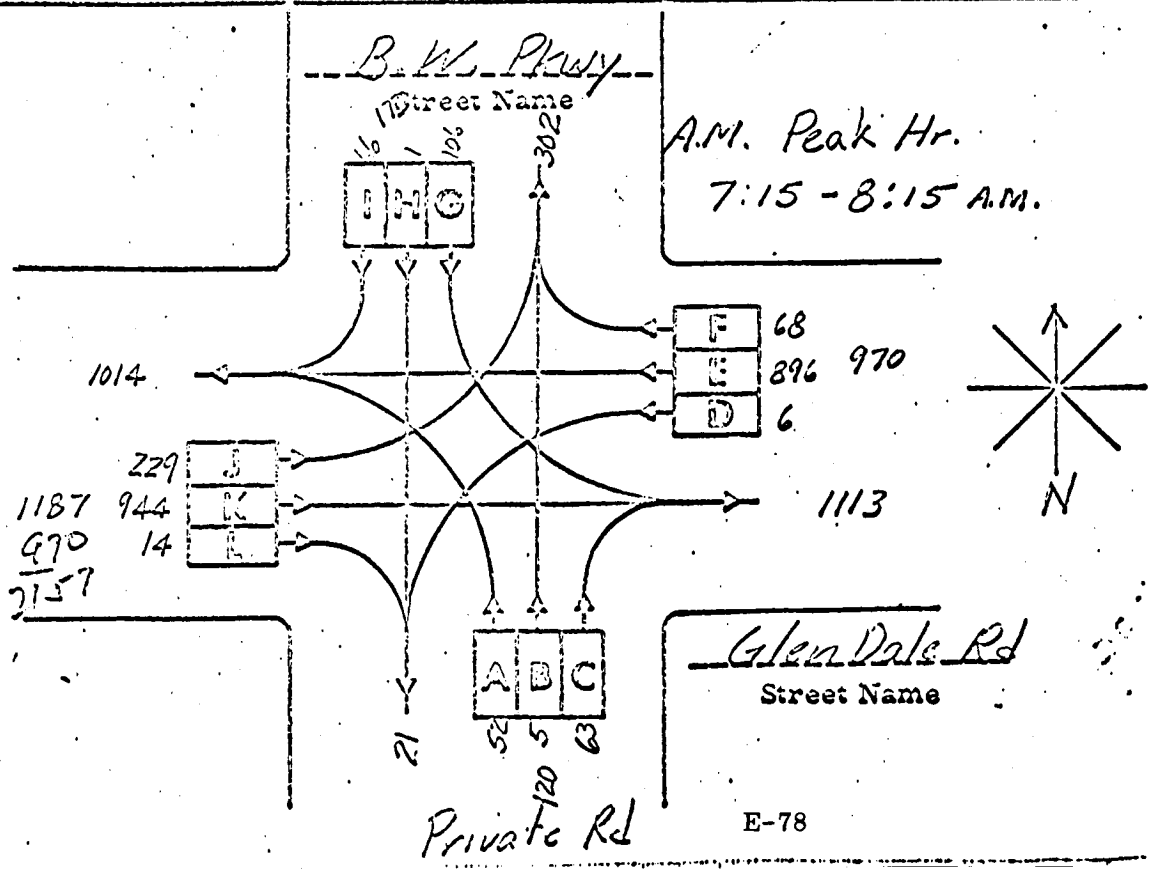
$$\frac{2{,}020}{1{,}193} = 1.69 \text{ spaces/D.U.} \quad \frac{1.69}{1.26} = 1.34$$ or 34% more spaces planned than study shows are needed

CONSULTANTS

Intersection: Glen Dale Rd – B-W Parkway Ramps + Private Rd

Date: [illegible] Day of Week: T Weather: Clear Recorder: [illegible]

Glen Dale Rd (Street) from the S			Glen Dale Rd (Street) from the E			Time	B-W Parkway Ramp (Street) from the N			Glen Dale Rd (Street) from the W			Total
Lt.	St.	Rt.	Lt.	St.	Rt.	15 Min. Period Beginning	Lt.	St.	Rt.	Lt.	St.	Rt.	
A	B	C	D	E	F		G	H	I	J	K	L	
22	—	4	9	213	12	7:00	18	—	19	73	117	4	495
23	—	13	2	231	23	7:15	21	1	24	65	185	5	593
12	1	18	1	262	12	7:30	32	—	19	51	194	2	604
11	3	21	2	214	19	7:45	29	—	9	65	259	1	633
6	1	11	1	189	14	8:00	24	—	14	49	306	6	620
12	1	7	1	190	7	8:15	30	2	23	39	174	3	490
12	—	9	—	182	9	8:30	33	2	16	38	144	—	446
9	1	2	1	199	4	8:45	32	—	27	26	120	5	
113	7	85	17	1619	100	24 hr. Total	219	5	151	405	1479	26	
						Peak Hr.							
52	5	63	6	896	68	7:15-8:15	106	1	66	229	944	14	
						4 Hr. Total							
						8 Hr. Total							

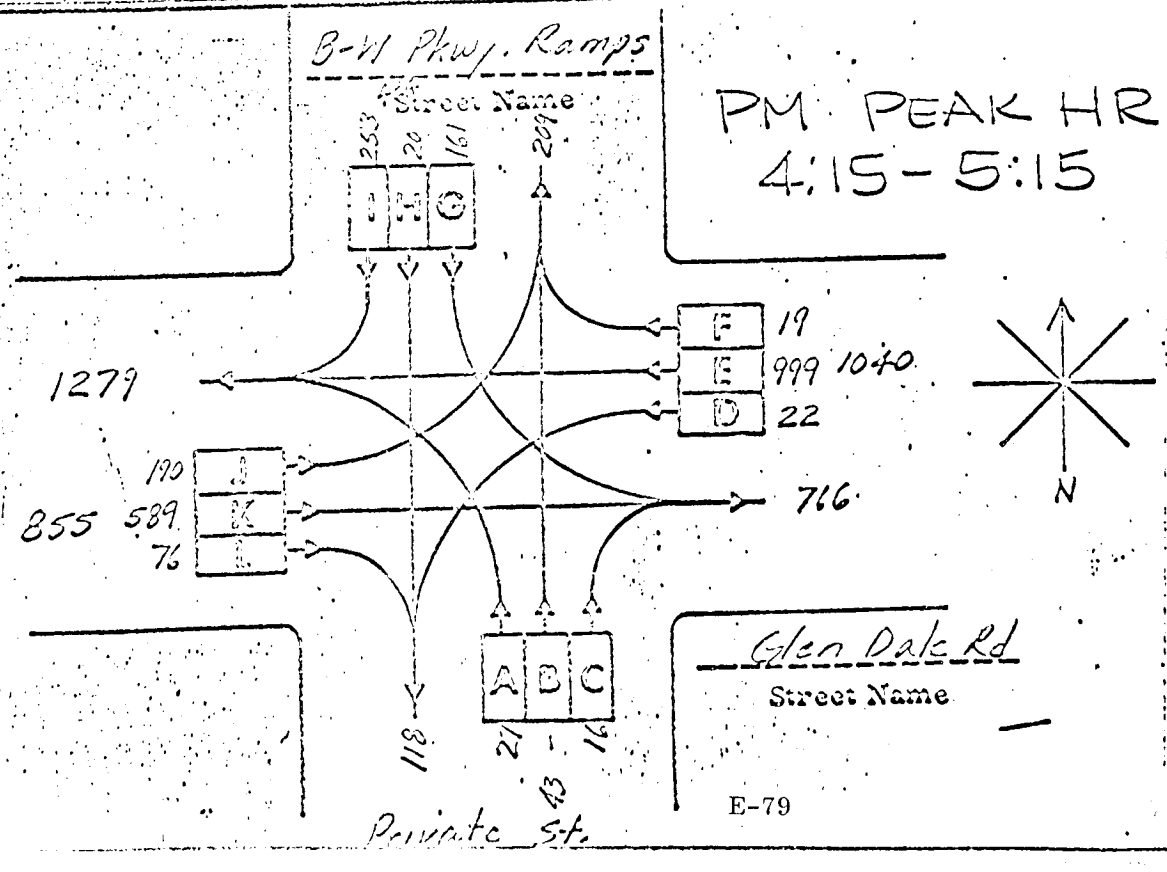


THOMPSON & NICALE
PLANNING AND TRANSPORTATION
CONSULTANTS

Intersection: Glen Dale Rd - B-W Pkwy Ramps - Private Rd

Date: 6/29/79 Day of Week: Th Weather: Clear Recorder: [illegible]

Private Rd (Street) from the S			Glen Dale Rd (Street) from the E			Time 15 Minute Period Beginning	B-W Pkwy Ramps (Street) from the N			Glen Dale Rd (Street) from the W			Total
Lt.	St.	Rt.	Lt.	St.	Rt.		Lt.	St.	Rt.	Lt.	St.	Rt.	
A	B	C	D	E	F		G	H	I	J	K	L	
1	–	2	3	219	6	4:00 pm	33	4	57	43	123	14	5[illegible]
5	–	6	7	227	6	4:15	34	4	63	52	133	11	56[illegible]
1	–	4	6	272	4	4:30	40	7	60	37	139	13	5[illegible]
2	–	3	8	273	4	4:45	31	5	52	53	156	29	6[illegible]
6	–	3	1	207	5	5:00	56	4	72	48	161	22	5[illegible]
7	2	6	4	145	6	5:15	48	5	89	40	192	20	5[illegible]
9	1	4	1	146	4	5:30	46	4	91	28	163	18	5[illegible]
6	1	7	2	126	6	5:45	66	6	73	34	130	12	4[illegible]
55	4	35	32	1635	41	2 Hr. Total	354	39	563	335	1197	140	
						Peak Hr.							
21	–	16	22	909	19	4:15-5:15	161	20	253	190	589	76	
						4 Hr. Total							
						6 Hr. Total							



HUNNICUTT & NEALE
PARKING & TRANSPORTATION CONSULTANTS

7315 WISCONSIN AVENUE, WASHINGTON, D.C. 20014 • (301) 656-2810

August 9, 1971

8/9 oc. John Wright
J. Hunnicutt

MEMORANDUM

TO: Mr. George Brugger, Attorney-at-Law

FROM: Mr. James M. Hunnicutt

SUBJECT: Supplemental Greenbriar Information

At your request, we have made an analysis of several traffic and parking factors which have been raised by Goddard Space Flight Center concerning the planned development of Greenbriar. This is in regard to your application for a waiver in connection with Special Exception Application No. 2459, 2460, and 2469.

One point of concern to Goddard Space Flight Center is that traffic generated by Greenbriar will create particular difficulty for Goddard employees in their trip to and from work, especially on Glenn Dale Road at the ramp connections to the Baltimore-Washington Parkway. Our capacity analyses presented in our July 12 report to you show that adequate capacity is available to accommodate the Greenbriar development. It should be pointed out that the bulk of the Greenbriar traffic will be in the direction opposite to that of the Goddard traffic. For example, in the morning, the bulk of the Goddard traffic on Glenn Dale Road will be eastbound. At the same time, the bulk of the Greenbriar traffic will be westbound on Glenn Dale Road. The condition will be just reversed during the afternoon peak hour. These conditions are illustrated in the attached sketches. The Greenbriar, by virtue of its location, is placing the largest percent of its traffic in the off-peak direction on Glenn Dale Road.

A question has been raised concerning the trip generation factors used and whether they could be considered representative for a "luxury" apartment complex. Our origional data source was a trip generation study by the Maryland State Roads Commission which documented trip characteristics for 9 garden apartments listed only as apartments A to I. A telephone call to the State Roads Commission indicated this was done to allow the individual developments to remain confidential. While not at liberty to divulge apartment names or other identifying information, the State Roads Commission source indicated that the apartments were of similar character and were catering to above average income families. The average number of daily trips per apartment unit was 6.6 with a range from 4.4 to 11.8 trips. Similar information on 9 suburban garden apartments in California showed an average of 6.7 trips per unit with a range of 4.8 to 7.9 trips per unit.

It is difficult to determine whether the apartments studied should properly be called "luxury" units. ~~However, attached is a list of detailed data for three representative apartments included in the California study.~~ The description of the apartments and accessory facilities would indicate occupancy by upper income families. It is expected that ~~"luxury"~~ Greenbriar apartments would not exhibit greatly different characteristics.

It is interesting to note that the traffic generated by Greenbriar would have to be approximately double the anticipated trips (based on 7.0 trips per dwelling unit) to reach a capacity condition on Glenn Dale Road. Other factors which will further increase capacity on Glenn Dale Road are the proposed widening of Glenn Dale Road and the upgrading of the Baltimore-Washington Parkway along with the ramp connections to Glenn Dale Road.

The adequacy of the parking provided by Greenbriar has been a point of contention. I refer you to our letter of June 28 in which we detailed the auto ownership characteristics of the nine previously mentioned apartment developments in Maryland. The auto ownership (vehicles per D.U.) was found to range from 0.93 to 1.38 with an average of 1.26. The parking spaces provided in Greenbriar amount to 1.69 spaces per dwelling unit or 34 percent more than actual field studies show are needed on the average. Even when considering the largest auto ownership of any of the nine apartment units (1.38 autos per D.U.), the number of spaces provided exceeds that figure by 22 percent. Restated, the number of parking spaces provided by Greenbriar exceeds the maximum auto ownership found in field studies in Maryland by 22 percent. It does not appear reasonable to expect a developer to exceed maximum measured usage by a greater percentage even for a "luxury" apartment complex.

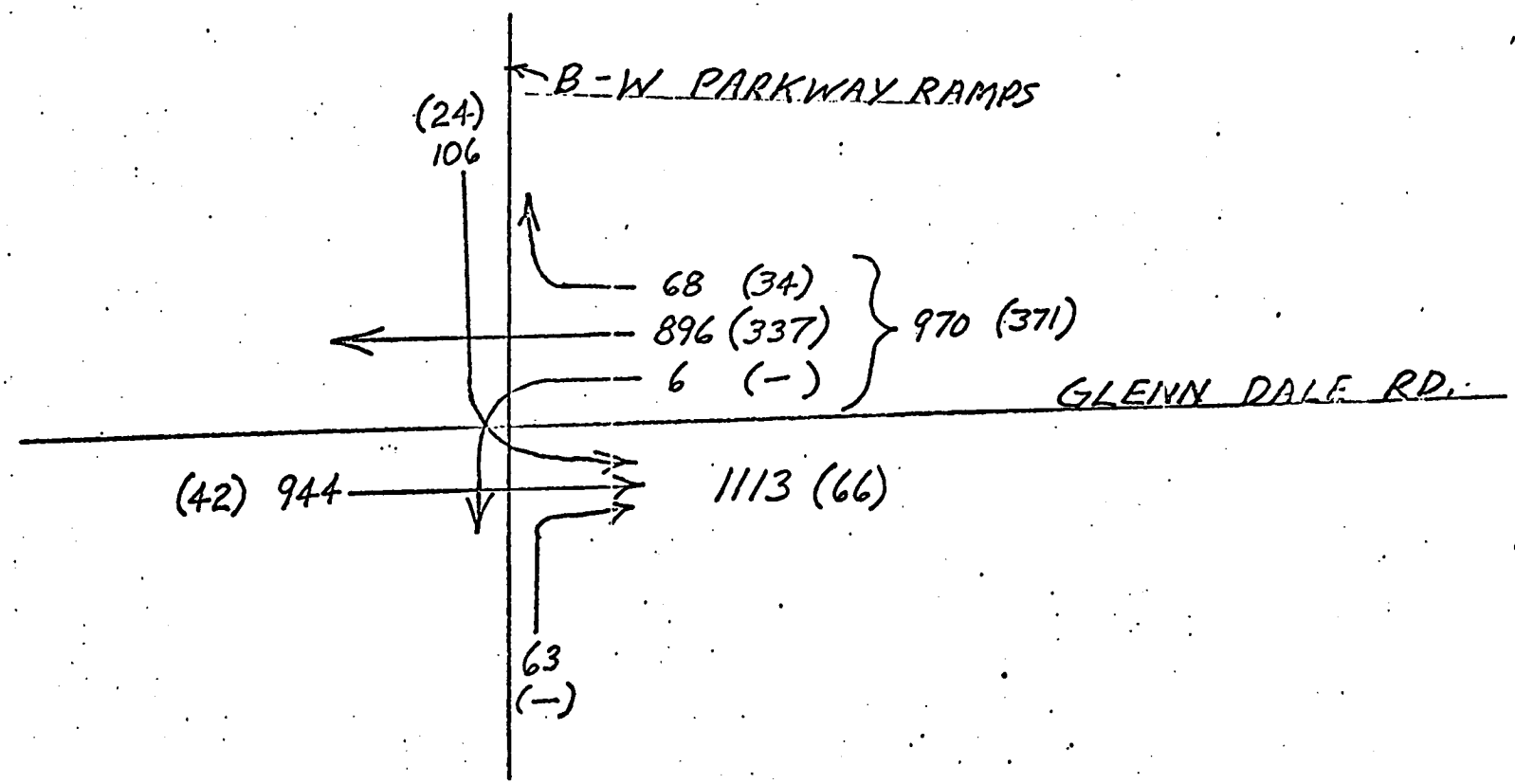
An analysis of the vehicle ownership in the aforementioned California study showed an average car ownership for nine apartment developments of 1.4 vehicles per D.U. with a range from 1.1 to 1.8. It must be remembered that California has probably the highest car ownership of any state and is one of the most mobile. Even here the average car ownership is 21 percent less than the number of spaces provided at Greenbriar. It is our opinion that the parking spaces provided by Greenbriar will be adequate to serve the planned development even as a "luxury" apartment complex.

FIGURE 1

EXISTING AND PROJECTED GREENBRIER TRAFFIC

GLENN DALE ROAD AND NORTHBOUND PARKWAY RAMPS

AM PEAK HOUR



LEGEND

970 - EXISTING TRAFFIC

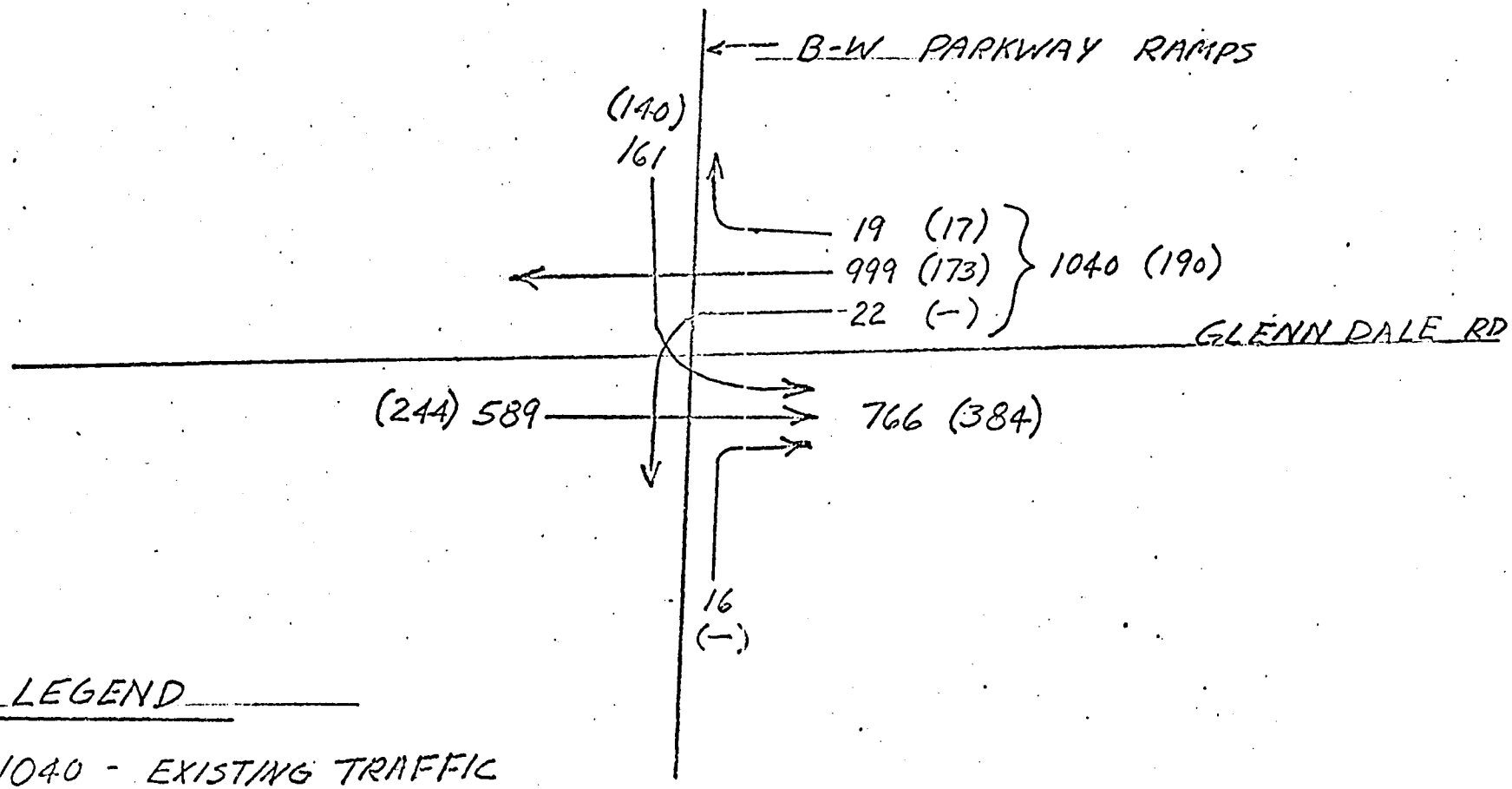
(371) - PROJECTED GREENBELT TRAFFIC

FIGURE 2

EXISTING AND PROJECTED GREENBRIER TRAFFIC

GLENN DALE ROAD AND NORTHBOUND PARKWAY RAMPS

PM PEAK HOUR



LEGEND

1040 - EXISTING TRAFFIC

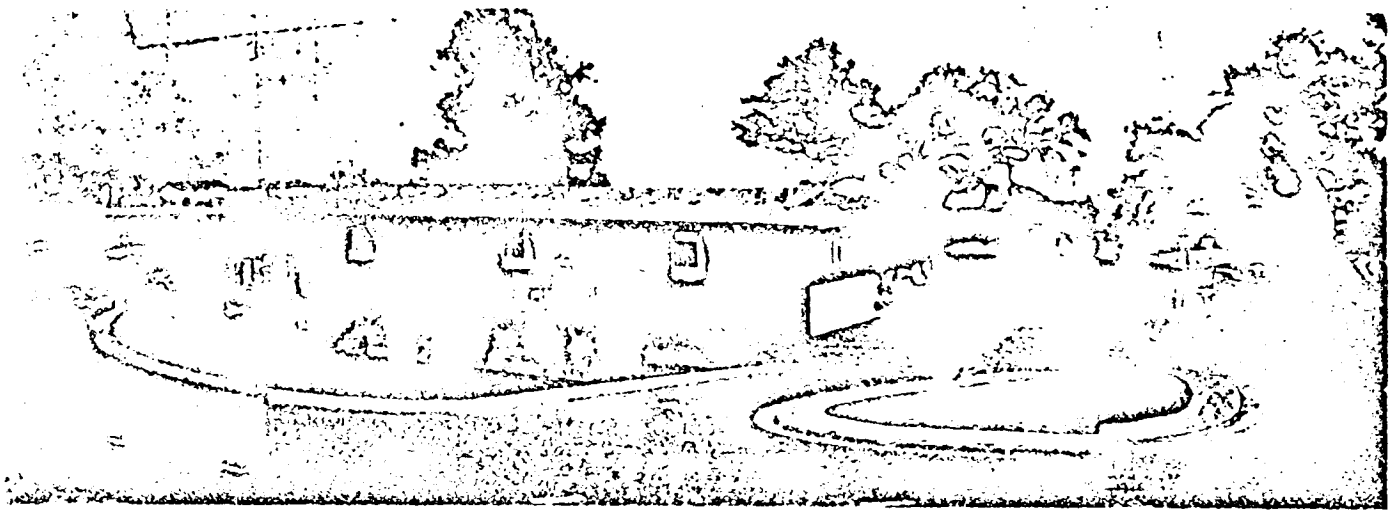
(190) - PROJECTED GREENBRIER TRAFFIC

APARTMENT COMPARISONS

Site	Confi-dential	Confi-dential	Mission Heights	Chateau Manor	The Meadows	Shelter Bay	Harbor Vista	The Uplands	Camelback East	Avg.
Study No.	81	82	83	84	90	91	92	93	107	
Background Data										
Occupied Units	300	182	146	140	220	104	71	126	95	
Persons	550	350	300	380	468	137	110	400	182	
Persons Per Unit	1.8	1.9	2.1	2.7	2.1	1.3	1.5	3.2	1.9	2.1
Vehicles	400	200	196	247	320	---	90	230	141	
Vehicles Per Unit	1.3	1.1	1.3	1.7	1.5	---	1.3	1.8	1.5	1.4
Vehicles Per Person	.73	.57	.65	.64	.68	---	.82	.57	.77	.67
Acres	14.5	11.7	6.8	4.4	24.0	---	2.0	25.0	6.0	
Dwelling Units Per Acre	20.7	15.5	21.6	31.8	9.2	---	35.5	5.0	15.8	11.8
Parking Spaces	---	---	198	142	---	107	---	---	---	
10,000 Sq. Ft. Floor Area	---	---	---	---	---	15.6	---	18.0	8.6	
Traffic Data										
Average Weekday Traffic	2360	1280	1000	720	1290	680	340	900	660	
Peak Hour	5-6p	5-6p	5-6p	5-6p	4-5p	5-6p	6-7p	5-6p	5-6p	
Peak Hour % of ADT	14.0%	13.3%	14.0%	11.1%	28.0%	11.8%	14.7%	11.1%	15.2%	15.3%
Trip Ratios										
Weekday Trips Per:										
Dwelling Unit	7.9	7.0	6.9	5.1	5.9	6.5	4.8	7.1	6.9	6.7
Person	4.3	3.7	3.3	1.9	2.8	5.0	3.1	2.3	3.6	3.2
Vehicle	5.9	6.4	5.1	2.9	4.0	---	3.8	3.9	4.7	4.7
Parking Space	---	---	5.0	5.1	---	6.4	---	---	---	
Acre	163	109	148	164	54	---	170	36	110	91
10,000 Sq. Ft. Floor Area	---	---	---	---	---	44	---	50	77	

The Meadows Apartments
San Rafael - Terra Linda

Modern garden apartments, two swimming pools, tennis courts, putting green, sauna baths, recreation rooms. 24 acres.



Total occupied units: 220
Total persons 468

Average weekday traffic: 1290
Weekday trips per:

Dwelling unit:	5.9
Person	2.8
Vehicle	4.0
Acre	54

California Division of Highways
District 4, San Francisco

TRIP GENERATION STUDY SUMMARY

Name of study site The Meadows

Study 90

Location San Rafael - Terra Linda

Type of development Garden Apartments

Standard land use code 1131

Date March 17-26, 1969

BACKGROUND DATA

220 occupied units — 1, 2, & 3 bedrooms

468 persons — 390 adults, 78 children

320 vehicles

24+ acres

Tennis courts, game rooms, saunas, swimming pools, gym, putting green, club lounge

TRAFFIC DATA

	A M PEAK HOUR				P M PEAK HOUR				24 HOUR TOTAL
	INBOUND	OUTBOUND	TOTAL	TIME HOUR BEGINS	INBOUND	OUTBOUND	TOTAL	TIME HOUR BEGINS	
WEEKDAY			220	8:00			360	4:00	1290
SATURDAY			120	11:00			140	3:00	1780
SUNDAY			110	10:00			120	5:00	1280

TRIP RATIOS

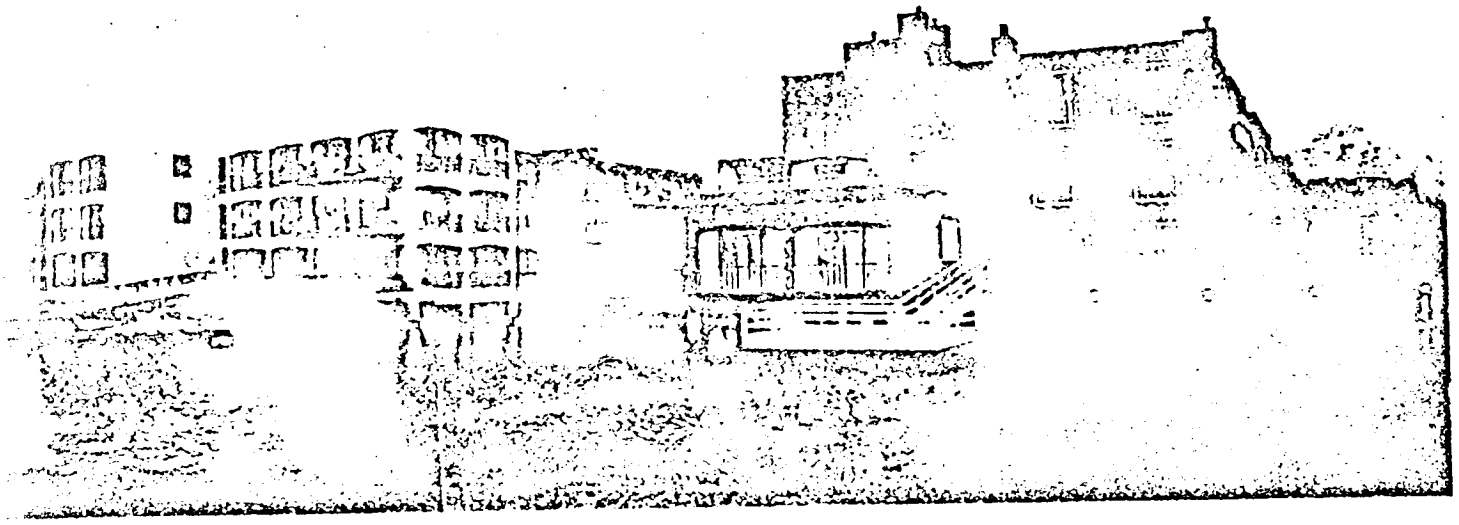
	WEEKDAY	SATURDAY	SUNDAY
Trips/Dwelling Unit	5.9	8.1	5.8
Trips/Person	2.8	3.8	2.7
Trips/Vehicle	4.0	5.6	4.0
Trips/Acre	54	74	53

4 PL 411C
9/69

California Division of Highways
District 4, San Francisco

Shelter Bay Apartments
Mill Valley

Modern, boat-oriented apartments. Docking facilities adjacent, clubhouse, tennis courts, and swimming pool.



Total occupied units:	104
Total persons	137
Average weekday traffic:	680
Weekday trips per:	
Dwelling unit	6.5
Person	5.0
Parking space	6.4
10,000 Sq. Ft. Floor Area	44

California Division of Highways
District 4, San Francisco

TRIP GENERATION STUDY SUMMARY

Name of study site Shelter Bay

Study 91

Location Mill Valley

Type of development Apartments

Standard land use code 1131

Date March 17-26, 1969

BACKGROUND DATA

104 occupied apartments
137 persons, a few children
107 parking spaces
156,000 sq. ft. floor space (1500 sq ft per unit)

Boat docking adjacent, clubhouse, tennis, swimming pool.

TRAFFIC DATA

	A M PEAK HOUR				P M PEAK HOUR				24 HOUR TOTAL
	INBOUND	OUTBOUND	TOTAL	TIME HOUR BEGINS	INBOUND	OUTBOUND	TOTAL	TIME HOUR BEGINS	
WEEKDAY			70	8:00			80	5:00	680
SATURDAY			50	9:00			60	5:00	700
SUNDAY			40	11:00			60	2:00	690

TRIP RATIOS

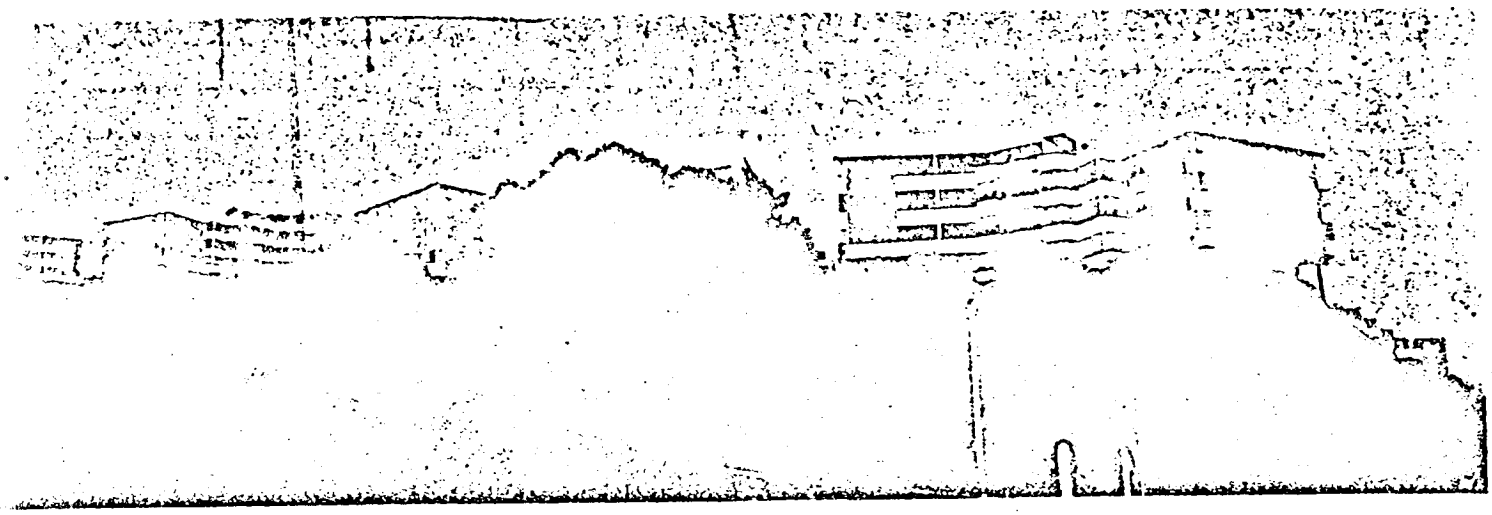
	WEEKDAY	SATURDAY	SUNDAY
Trips/Dwelling unit	6.5	6.7	6.6
Trips/Person	5.0	5.1	5.0
Trips/Parking space	6.4	6.5	6.4
Trips/10,000 sq. ft. flr. area	44	45	44

4 PL 411C

California Division of Highways
District 4, San Francisco

The Uplands Apartments
Corte Madera

Modern apartments, elevators, view-oriented. Two swimming pools, lounge and other recreation facilities. 25 acres.



Total occupied units: 126
Total persons 400

Average weekday traffic: 900
Weekday trips per:

Dwelling unit	7.1
Person	2.3
Vehicle	3.9
Acre	36

California Division of Highways
District 4, San Francisco

TRIP GENERATION STUDY SUMMARY

Name of study site The Uplands — Study 93

Location Corte Madera

Type of development Apartments — Standard land use code 1132

Date March 21-28, 1969

BACKGROUND DATA

126 occupied units — 2 & 3 bedrooms, 2 baths, $195-300 per mo.
400 persons (incl 125 children)
230 vehicles
180,600 sq ft floor space
25 acres

Two swimming pools, lounge, recreation facilities.

TRAFFIC DATA

	A M PEAK HOUR				P M PEAK HOUR				24 HOUR TOTAL
	INBOUND	OUTBOUND	TOTAL	TIME HOUR BEGINS	INBOUND	OUTBOUND	TOTAL	TIME HOUR BEGINS	
WEEKDAY			80	8:00			100	5:00	900
SATURDAY			70	10:00			80	3:00	940
SUNDAY			50	11:00			180	3:00	870

TRIP RATIOS

	WEEKDAY	SATURDAY	SUNDAY
Trips/Dwelling unit	7.1	7.5	6.9
Trips/Person	2.3	2.35	2.2
Trips/Vehicle	3.9	4.1	3.8
Trips/Acre	36	38	35
Trips/10,000 sq ft flr area	50	52	48

4 PL 411C
7/69

California Division of Highways
District 4, San Francisco

HUNNICUTT & NEALE
PARKING & TRANSPORTATION CONSULTANTS

7315 WISCONSIN AVENUE, WASHINGTON, D.C. 20014 • (301) 656-2810

June 28, 1971

Mr. George A. Brugger
Beatty & McNamee
Attorneys-at-Law
4316 Hamilton Street
Hyattsville, Maryland

Dear Mr. Brugger:

At your request, we have made an analysis of the parking requirements in conjunction with the planned development of Greenbriar. This is in regard to your application for a waiver in connection with Special Exception Application No. 2459, 2460 and 2469.

According to the plans of the developer, it is proposed to construct 1,193 dwelling units consisting of a variety of various size units. It is our understanding that the units will contain dens and recreation rooms in addition to the normal bedroom and other normal rooms in garden type apartments. The number of parking spaces required for the total 1,193 units according to the new parking ordinance indicates that a total of 2,452 parking spaces will be required to conform to the new ordinance. This will mean that 2.05 parking spaces will be required for each dwelling unit throughout the entire development.

Several years ago, the Maryland State Roads Commission made a detailed study of garden type apartments as well as other trip generators in the State of Maryland.[1] This study made a detailed analysis of nine garden type apartment units in the State of Maryland and two of the developments were located in Prince Georges County. Table 1 gives the information tabulated from this study. It can be seen that the average number of persons living in garden apartment type developments average 2.37 people per dwelling unit throughout the state and a slightly higher value was found for Prince Georges County of 2.65 persons per dwelling unit. Throughout the State, the average number of vehicles per dwelling unit averaged 1.26 while in Prince Georges County, the average was slightly higher of 1.33 vehicles per dwelling unit.

[1] Trip Generation Study, 1968, Maryland State Roads Commission, Bureau of Traffic Planning and U. S. Bureau of Public Roads.

According to the calculation of the parking requirements under the new ordinance where dens and recreation rooms are counted as bedrooms, this will naturally require considerably more parking space than previously under the old ordinance. In the explanation for Special Exception of Greenbriar, a Statement of Explanation accompanied the application. In this explanation, it was stated that dens and family rooms would not be used for sleeping purposes and this was to be enforced by the owner. Based on this information, it is our professional opinion that the number of persons per dwelling unit and the number of vehicles per dwelling unit will be no different than from other garden type apartment units now occupied throughout the State of Maryland and specifically Prince Georges County.

If the actual usage of parking spaces per dwelling unit as measured in the study mentioned previously of the State Roads Commission, the parking spaces per unit was found to be 1.26 spaces per dwelling unit. According to the new ordinance, the parking spaces required for Greenbriar will be 2.05 spaces per dwelling unit. Based on this comparison, it appears that the requirement under the new ordinance as applied to Greenbriar would be 63% more spaces required than that actually measured in the field of other garden type apartment units. We feel this is unnecessary.

The developer proposed to build 2,020 parking spaces which conforms to the new ordinance without the calculation of the dens and family rooms. This will calculate to be 1.69 parking spaces per dwelling unit or 34% more than that measured in the study by the State Roads Commission. It is felt that this additional parking space will provide ample room for all parkers within the development, adequate space for visitors and provide latitude for future increases in automobile ownership should it occur. All parking can be contained within the development and will not cause a burden on any adjacent areas or streets. Nor will this modification in parking have any adverse affect on roadway congestion or add additional traffic volumes to existing roads or streets. The adjustment in parking space requirements will only bring the parking requirements more in line with actual measured usage rather than theoretical planning factors.

Yours very truly,

James M. Hunnicutt

James M. Hunnicutt

JMH:mkg

TABLE 1

GARDEN APARTMENTS

POPULATION - VEHICLE OWNERSHIP

PER D.U.

Apt.	No. D.U.	Pop.	Pop./D.U.	No. Vehicles	Veh./D.U.
A	199	458	2.30	251	1.26
B	176	405	2.30	217	1.23
C	200	460	2.30	186	0.93
D	182	419	2.30	229	1.26
E	105	242	2.30	126	1.20
F	161	363	2.25	222	1.38
G	91	205	2.25	126	1.38
H	679	1,800	2.65	904	1.33
I	383	1,015	2.65	510	1.33
Total	2,176	5,367	21.30	2,771	11.30
Average			2.37		1.26

Apartments H & I are in Prince Georges County

Source: Trip Generation Study, Maryland State Roads Commission, 1968, Bureau of Traffic Engineers in cooperation with U. S. Department of Transportation.

TABLE 2

PARKING SPACES REQUIRED

	New Ordinance Requirements	Spaces Provided
Parcel 1	992	796
Parcel 2A	340	279
Parcel 2B	1,120	945
TOTAL	2,452	2,020

Calculations:

$$\frac{2{,}452 \text{ spaces required}}{1{,}193 \text{ planned units}} = 2.05 \text{ spaces/D.U.}$$

Average Measured Spaces/D.U.

Statewide	1.26
Prince Georges County	1.33

Excess Spaces Required - New Ordinance:

$$\frac{2.05}{1.26} = 1.63$$ or 63% more required spaces under new ordinance than found in State

Excess Spaces Actual Planned by Developer

$$\frac{2{,}020}{1{,}193} = 1.69 \text{ spaces/D.U.} = \frac{1.69}{1.26} = 1.34$$ or 34% more spaces planned than study shows are needed

EXHIBIT 8

POTOMAC ELECTRIC POWER COMPANY · 1900 PENNSYLVANIA AVENUE, N.W., WASHINGTON, D.C. 20068
[illegible]

September 12, 1973

Mr. George Brugger
4316 Hamilton Street
Hyattsville, Maryland 20782

Reference: Availability of Electric Service, Greenbrier Apartments, Hanover Parkway, Greenbelt, Maryland

Gentlemen:

Reference is made to your request as to the availability of Electric Service to supply the referenced project.

We are pleased to advise you that our facilities will be available and adequate to serve this project. We have a target date of November 1, 1973.

Please contact us if we can be of further assistance.

Very truly yours

Harry R. Allen
Senior Commercial Representative
Commercial and Governmental Services Department

EXHIBIT 9

THE EFFECT OF THE GREENBRIAR DEVELOPMENT ON REVENUES AND EXPENDITURES OF THE CITY OF GREENBELT AT CURRENT TAX RATES AND LEVELS OF SERVICE

Submitted to

Greenbriar Associates

by

Robert R. Nathan Associates, Inc.
Washington, D.C.

September 10, 1973

Summary

This study is addressed to the question: if Greenbriar were fully occupied and part of Greenbelt today, what would be the increase in the city's (1) revenues, and (2) expenditures, at current tax rates and levels of service. The basis of the analysis is the approved budget for 1973/74.

With the addition of Greenbriar, city revenues would be about $243,000 higher and city expenditures would be about $106,000 higher.

At the present level of service and with no change in tax rates, other than the property tax, if Greenbriar were already part of the city, the property tax rate in 1973/74 would be $0.75 per $100 assessed valuation instead of $0.92.

Introduction and Methodology

This is an investigation of the effects of the construction and occupancy of the Greenbriar Development, a garden apartment of 1,193 units under construction within the city, on the revenues and expenditures of the city of Greenbelt. The present population of Greenbelt is about 18,600; Greenbriar will add approximately 3,000 persons, for an increase of about 16.2 percent. Through the property tax, income tax, and many other revenue accounts, the revenues of the city will increase. By providing city services to the new development, the expenditures will also increase. The purpose of this study is to estimate how large these increases will be.

The method of approach is to make the study in current prices, current levels of service, and current tax rates. Specifically, the approved city budget for fiscal year 1973/74

has been used as the basis for the estimates. The following question has been asked for each line item of revenue or expenditure: How large would this item be if Greenbriar were already constructed and occupied during this fiscal year? The question is difficult to answer for many of the items. Assumptions that have been made are stated in the text and in footnotes to the tables.

No projections have been made because of (1) the unpredictable nature of wage increases and the cost of providing city services; and (2) the constant changes that are taking place in intergovernmental transfers. For example, this year for the first time, Prince George's County made a payment called the "Municipal Tax Differential" to the city to compensate its residents for certain free services provided by the county to residents of unincorporated areas. The municipalities of the county are still pressing the county for a payment of this type related to police protection. At the same time, the grants received from the state for police protection are expected to decline. In the Federal grant area, this is the last year that the city will receive a grant under the public employment program, but it will continue to receive grants under the revenue-sharing act.

However, even without projections, the analysis done in terms of the current budget establishes rather clearly the magnitude of the increases in expenditures and revenues and satisfactorily answers the general question of the impact of this particular development on the finances of the city.

Two factors used in both the revenue and expenditure calculations should be introduced here. The first is the expected population of Greenbriar. It has been estimated at 3,007, based on a study made of the population of Glendale Woods, an apartment complex 2 miles from Greenbriar. The method used is illustrated in table 1. In 448 occupied units

Table 1. Estimated Population of Greenbriar Development

Type of unit	Number of units	Average number of persons per unit[a/]	Total persons
1 bedroom.....	374	1.84	688
2 bedroom.....	574	2.43	1,395
3 bedroom.....	245	3.77	924
Total.....	1,193	--	3,007

a/ Based on present occupancy per unit of 448 apartments in Glendale Woods, 2 miles from Greenbriar.

in Glendale Woods, it was found that the average number of persons in one bedroom apartments was 1.84; in two bedroom units, 2.43; and in three bedroom units, 3.77. These averages were multiplied by the number of units that there will be in Greenbriar. The table shows a projected population of 3,007 persons in 1,193 units. The present population of Greenbelt is estimated at 18,600 (p. 13 of the 1973/74 budget). Therefore the anticipated increase in population is 16.2 percent.

The other factor used is the increase in street mileage. The mileage of the new roads in Greenbriar is 1.13 (Plat of Survey, July 15, 1970) and that of the existing roads in Greenbelt is 17.07, so that an increase of 6.6 percent is anticipated.

Revenues

The inclusion of Greenbriar in the city's budget for 1973/74 would result in an increase in revenues of about $243,000; that is, the revenues would be about $1,616,000 instead of $1,373,000. The major sources of increases would be about $149,000 from the property tax, $59,000 from the state income tax, and $11,000 from the state taxes and fees on gasoline and motor vehicles.

The detailed estimates are given in table 2. The footnotes to that table explain the method used in estimating the change in each line item.

Expenditures

Each line item in the expenditure section of the city budget was examined and the question was asked: How much would this item increase with the inclusion of Greenbriar? There are three types of accounts: (1) those that would not be affected at all, such as interest payments on previous debt; (2) those

Table 2. Estimated Revenues, City of Greenbelt, 1973/74 Approved Budget, With Addition of Greenbriar

Account		Estimated revenues ($)		
		Without Greenbriar (1)	Addition of Greenbriar: Increase over column 1 (2)	Addition of Greenbriar: Total revenues (cols. 1+2) (3)
1.1	Property tax at tax rate of $0.92 per $100 assessed valuation	584,200	149,040 a/	733,240
1.2	Penalties and interest	2,000	--	2,000
1.5	State shared taxes:			
	1.51 Admissions	30,000	4,860 b/	34,860
	1.52 Income	266,000	58,874 c/	324,874
	1.53 Franchise	200	32 b/	232
	1.54 Race track	15,000	2,430 b/	17,430
	1.56 Gasoline - motor vehicles	81,000	11,132 d/	92,132
2.2.	Business:			
	2.23 Trades	9,000	--	9,000
	2.24 Occupational	100	--	100
2.4	Other licenses and permits:			
	2.41 Animals	1,000	162 b/	1,162
	2.49.1 Boats	100	16 b/	116
	2.49.2 Permits - roadway and driveway	2,500	-- e/	2,500
3.1	Magistrates	6,000	972 b/	6,972
4.1	Interest and dividends	2,500	405 b/	2,905
4.2	Rents and concessions	5,400	875 b/	6,275
5.1	Federal grants: public employment program	46,000	--	46,000
5.12	Revenue sharing	63,400	-- f/	63,400
5.33	State grant: police	43,000	5,332 g/	48,332
5.91	Grant from county: financial corporations	500	--	500
6.4	Sanitation and waste removal	98,500	-- h/	98,500

continued--

Table 2. continued--

Account	Estimated revenues ($)		
	Without Greenbriar (1)	Addition of Greenbriar: Increase over column 1 (2)	Addition of Greenbriar: Total revenues (cols. 1+2) (3)
6.100 Recreation:			
6.101 Swimming pool	39,000	--[i/]	39,000
6.109 Other recreation	4,000	648[b/]	4,648
6.109-2 Self-supporting activities	31,500	5,103[b/]	36,603
6.120 Miscellaneous	900	146[b/]	1,046
Municipal tax differential:			
Leaf collection, etc	12,374	2,005[j/]	14,379
Street lighting	19,837	1,309[j/]	21,146
Budgeted receipts	1,364,011[k/]		1,607,352
Balance of revenue sharing grant not put into general fund	8,600[l/]	--	8,600
Total estimated receipts	1,372,611	243,341	1,615,952

a/ Property tax. This figure is the estimated assessed valuation of Greenbriar multiplied by the FY 1973/74 tax rate of $0.92 per $100 of assessed valuation. The fair market value of Greenbriar is estimated by Mr. Alan Kay to be $27,000,000 for the land and apartment complex, not including the cost of the sewage treatment plant which will not contribute to the fair market value for assessment purposes. The assessed value is estimated at 60 percent of the fair market value or $16,200,000. According to the assessor's office in Prince George's County, the apartment complex will first be appraised by estimating its reproduction cost. Assessors will use both on-the-site inspection and the plans to estimate the cubic feet of the structures. Then, from manuals and tables from the State Assessor's office, they will estimate the present-day construction cost. After the apartment has been occupied and data

continued--

Table 2. continued--

are available for revenues and operating costs, the assessors will calculate the economic value of the project by captializing the net income. This information, along with the sales prices of comparable properties, will be used over the years to appraise the property.

b/ It is assumed that revenue items marked with this footnote will increase proportionately to the anticipated increase in population of 16.2 percent with the addition of Greenbriar. Thus, 3,007 persons will be added to the present estimated population of 18,600.

c/ Income tax. The city receives 0.37 percent of the taxable income reported to the State of Maryland by residents of Greenbelt. The estimated income of the residents of Greenbriar has been based on the income of the present residents of the Glendale Woods Apartments at the corner of Goodluck Road and Greenbelt Road, about 2 miles from Greenbriar. The incomes as reported on the application blanks were averaged for residents of 1 bedroom, 2 bedroom, and 3 bedroom apartments, respectively, and were found to be $12,491, $13,007, and $14,032 respectively. The average rents of these units are, respectively, $199, $229 and $259, or 19 percent, 21 percent, and 22 percent of average monthly incomes. The rent structure at Greenbriar will be higher than this, averaging $235, $277, and $320. It is assumed that the incomes will bear the same relationship to rents as they do at Glendale Woods, and will be $14,844 for those living in 1 bedroom apartments (that is, $235/.19 times 12), $15,828 for those in 2 bedroom units, and $17,460 for those in 3 bedroom units. The taxable income was derived by allowing a $500 deduction and $800 exemption per person for 1.84, 2.43, and 3.77 persons respectively -- the average number of occupants in Glendale Woods per apartment. The total taxable income from Greenbriar is estimated at $15,912,000, and the revenue to the city from this (0.37 percent) is $58,874.

d/ Gasoline-motor vehicles. In the State of Maryland, all receipts from the gasoline sales tax and motor vehicle fees are pooled into one account. Sixty-five percent of this goes to the State Highway Commission, 17.5 percent to the city of Baltimore, and 17.5 percent to other cities and counties. This last part is divided into two portions. The first portion is allocated on the basis of number of miles of roads that a county or a city maintains. The city of Greenbelt maintains 17.07 miles and in 1972/73 received 17.07/17,356.63 of the fund allocated on the basis of mileage, or $20,839.53. The second portion is allocated on the basis of number of motor vehicle registrations, and the city of Greenbelt had 9,436 registrations out of a total of 1,663,839 in the State, excluding Baltimore. However, cities receive only half of the amount calculated by this formula, the other half going to the county in which the city lies. In 1972-73, the city of Greenbelt received $60,802.34. (Actually,

continued--

Table 2. continued--

there is a small adjustment made because of a change in the formula a few years ago, and the city actually received, as a total from gasoline and motor vehicle revenues, $20,839.53 + $60,802.34 - $85.05, or $81,556.82.) The city has budgeted $81,000 for FY 1973/74, and it assumed that this will be divided between revenues from the mileage fund and from the registration fund in the same ratio that existed in 1972/73 ($60,264 based on registrations and $20,736 on mileage). It is further assumed that the increase in registrations will be the same percentage as the increase in population resulting from the construction of Greenbriar (that is, 16.2 percent). The increased revenue from increased registrations would therefore be 0.162 times $60,264, or $9,763. The mileage of new streets in Greenbriar will be 1.13 miles, which represents an increase of 6.6 percent; revenue from this fund should increase by 0.066 times $20,736 or $1,369. Total revenues from the gasoline-motor vehicle state fund should therefore increase by $11,132.

e/ Permits-roadway and driveway. This is a non-recurring item for work at Greenbriar.

f/ Revenue sharing. The Federal Government makes grants to states, counties, and municipalities according to certain formulas. The amount that a municipality receives "depends on its population relative to the population of all other eligible units of local government within the county area, its relative tax effort (adjusted taxes of that locality divided by the income of the local residents compared to other eligible local governments in the county area) and the relative income of the local government's residents compared to that of other eligible local governments in that county area." (Joint Committee on Internal Revenue Taxation, "General Explanation of the State and Local Fiscal Assistance Act and the Federal-State Collection Act, of 1972", February 12, 1973, p. 32.)

The amount that Greenbelt would have received if Greenbriar had been part of the city in FY 1973/74 can be estimated as follows, if up-to-date statistics are used in the calculations:

(1) Population: increased by 16.2 percent
(2) Tax effort: "adjusted taxes" would be:

	Without Greenbriar	With Greenbriar
Property taxes.....	$584,200	$595,761
Penalties and interest..	2,000	2,000
Business:		
Traders.....	9,000	9,000
Occupational.....	100	100
	$595,300	$606,861

continued--

Table 2. continued--

Income of local residents would be higher by about 16.2 percent. Therefore the tax effort ratio would change by the factor:

$$\frac{\$606,861}{1.162} \div \frac{\$595,300}{1} = .877$$

(3) Relative income: It is assumed that the ratio of per capita income in the other municipalities to per capita income in Greenbelt would not change. The allocation formula would therefore change by the factor:

$$1.162 \times .877 \times 1.00 = 1.02$$

If all these assumptions were true, the revenue-sharing grant would be about 1 percent more. However, there are three elements that affect what will really happen to revenue payments made to the city in the next few years. The first is that the Federal Government is still using 1970 statistics in its formulas, which means that the population figure and the income of local residents figure will remain the same with the addition of Greenbriar. If this procedure is followed, the formula would change by the factor: 1.00 x 1.02, or about the same as the factor above. The second and third elements, however, make prediction virtually impossible: there is a time lag of perhaps 2 years in the use of new adjusted tax data. Third, the Federal Government plans to revise (1) population data and (2) resident income data for the whole country, but it is not certain when this will be done. In light of these uncertainties, it is assumed in this study that the revenue-sharing grant received by the city will remain at about its present level, that any changes will be small, and no adjustment is made for the addition of Greenbriar.

g/ State grant: Police. The state makes grants to county areas based on expenditures made within the county area for police activities as related to the "wealth base" of the county area. Out of the county area grant, payments to cities are based on the rates which municipal expenditures for police protection bear to total police protection expenditures in the county. It is estimated in table 3 that total police expenditures will increase $39,222 over the 1973/74 budget figure of $317,200 (police protection, $305,200 plus traffic control, $12,000), or 12.4 percent. Therefore, under the present allocation system, the state grant for police protection to the city would have been 12.4 percent higher, an increase of 0.124 times $43,000, or $5,332.

h/ Sanitation and waste removal. Greenbriar will not use city services.

i/ Swimming pool. City officials estimate that there will be virtually no additional revenue to the swimming pool based on their observations of present usage. That is, because apartment

continued--

complexes have their own pools and there is a fee charged for the use of the municipal pool, the patronage is almost wholly by those who do not have access to apartment pools. Since Greenbriar will have its own pool, it is predicted that the municipal pool will be used little or none by Greenbriar residents. For the same reason, expenditures on the pool by the city are not expected to increase because of Greenbriar.

j/ Municipal tax differential. For the first time this year, Prince George's County is making payments to municipalities to compensate them for the fact that certain services are provided free of charge by the county to residents outside incorporated limits. The payment this year will be $32,211, consisting of $2,365 for leaf collection, $3,821 for bulky refuse, $3,276 for snow removal, $2,912 for animal control, and $19,837 for street lighting. The amounts of these payments (except for street lighting, which is set equal to actual city expenditures for the lighting) are determined by the population of the city and the cost per capita (whichever is lower, city cost or county cost) for the service. Therefore, if the city population had been 16.2 percent larger, the revenue would have been increased by approximately 0.162 times $12,374, or $2,005, for the miscellaneous services. If it is assumed that street lighting costs are proportional to the mileage of the streets, these costs would have been 6.6 percent higher, or 0.066 times $19,837, or $1,309.

k/ Budgeted receipts. This total, $1,364,011, is higher by $511 than the budgeted total adopted by the City Council on June 4 because the Council subsequently decided to receive the Municipal Tax Differential of $32,211 and reduce the tax rate on property from $0.97 to $0.92 per $100 of assessed valuation. This, strictly speaking, would lead to a reduction in revenue from the property tax from $615,900 to $584,200, or $31,700, to be offset by an increase of $32,211.

l/ Balance of revenue sharing. By the present formula, the city of Greenbelt is entitled to a grant from the Federal Government of $72,000 in FY 1973/74. (Actually the amount will be less than that because the city received an overpayment in 1972/73, but the number used for this analysis is the entitlement of $72,000.) The City Council voted to place $63,400 of this in the General Fund. However, for purposes of this analysis, the entire amount of $72,000 is considered a revenue item for the city. The difference between $72,000 and $63,400, or $8,600, is therefore shown as revenue in this table and as an expenditure or transfer to a reserve in table 3.

that would increase, but not percentage-wise as much as the population increase (most items fall in this category); and (3) those that would probably increase proportionately to the population increase (for example, activities where there is little overhead and most of the expenditures are for direct labor).

Where the expenditures will rise, but will rise less than 16.2 percent (the amount of population increase), two techniques were used. The first was to examine the budget in more detail and identify those items which should not increase. For example, in account 10.1, "Executive," the salaries of the three highest paid persons in the unit are assumed to be unaffected. In other words, there would not be another city manager or assistant city manager. However, it is assumed that the workload of the other people in that unit and other operating expenses would increase by 16.2 percent. This technique was used for finance, police, public works supervision, park and recreation administration, and youth center. The other technique was used where it is difficult to make a reliable breakdown between overhead and direct costs. This technique was to assume arbitrarily that some portion of the costs will not be affected and that the remainder will increase by 16.2 percent. For account 10.51, "Law," the portion was assumed to be one-half. In the case of miscellaneous items, the portion is based on the ratios of the total of the "fixed" and "varying" columns for all other line items.

Although many expenditures are expected to increase because they are dependent on population, a few are related to the number of miles of roads maintained: street maintenance, storm sewers and ditch maintenance, and street cleaning. It is assumed that these will increase by 6.6 percent. The mileage

of the new roads in Greenbriar will be 1.13, which is 6.6 percent of the present mileage of roads in Greenbelt, 17.07 miles.

Expenditures are entered in table 3. Those items not expected to change substantially or at all are listed in the first column, and those expected to change proportionately with population or with mileage are listed in the second column. Expenditures are summarized in table 4, which shows that about $673,000 of expenditures are not expected to change; $621,000 of expenditures are expected to increase 16.2 percent; and $78,600 of expenditures are expected to increase by 6.6 percent. With these increases the budgeted expenditures of about $1,373,000 for 1973/74 would have been about $1,478,000 with the inclusion of Greenbriar.

Effect of Greenbriar on Property Tax Rate

With the data developed above, it can be estimated that the tax rate in 1973/74 would have been $0.75 per $100 assessed valuation if there had been no change in the level of service provided by the city. The method of arriving at this figure is shown in table 5. To maintain the present level of services, the city would have to budget expenditures of $1,478,000 with Greenbriar. [illegible] the revenue from all sources except the property tax would be $883,000. Therefore, the revenues from the property tax would need to be only $596,000, which would be equivalent to a rate of $0.75 on an assessed valuation of $79,700,000 (present Greenbelt assessed valuation, $63,500,000; estimated Greenbriar assessed valuation, $16,200,000).

Table 3. Expenditures from General Fund, City of Greenbelt, 1973/74 Approved Budget, as They Will be Affected by Addition of Greenbriar

(In dollars)

Account	Expenditures not expected to change substantially	Expenditures expected to change proportionately with population (P) or road mileage (M)
General government		
10.13 Mayor and city council	13,500	--
10.1 Executive: salary and wages of three employees	43,246	--
Executive: other salaries, wages and operating expenses	--	32,554 (P)
10.31 Registration and election	--	2,100 (P)
10.40 Finance: salaries and wages of two employees	20,238	
Finance: other salaries, wages and operating expenses		22,962 (P)
10.51 Law	3,650 a/	3,650 (P)
10.80 Municipal building	17,900	--
10.91 Community promotion	8,200	--
10.102 Public officers association	4,300	--
Public safety		
11.11 Police: salaries and wages, chief through sergeants	75,088	--
Police: all other officers, clerks, overtime, repair and maintenance, operating expenses, and capital outlay.	--	230,112 (P)
11.12 Traffic control	--	12,000 (P)
11.13 Public parking facilities	2,200	--
11.91 Animal control	--	3,300 (P)

continued--

Table 3. continued--

Account		Expenditures not expected to change substantially	Expenditures expected to change proportionately with population (P) or road mileage (M)
Public works			
12.11	Public works supervision	21,600	14,300 (P)
13.90	Shopping center maintenance	13,300	--
12.20	Street maintenance	--	60,400 (M)
13.20	Storm sewers and ditch maintenance	--	8,100 (M)
13.30	Street cleaning	--	10,100 (M)
13.40	Waste collection and disposal	105,000	--
13.50	Waste recycling	3,400	--
--	All others	--	22,500
Public health			
14.20	Mosquito control	--	300 (P)
Parks and recreation			
19.31	Administration: salaries and wages	36,800	--
	Administration: other operating expenses	--	4,500 (P)
19.32	Youth center: salaries and wages	24,500	--
	Youth center: other operating expenses and capital outlay	--	15,200 (P)
19.37	Swimming pool: salaries and wages	19,600	--
	Swimming pool: debt service	10,250	--
	Swimming pool: other operating expenses	8,750	--
--	All other	--	152,400 (P)
Miscellaneous			
21.20	Pension contributions	32,242[b/]	33,558 (P)[b/]
21.50	Insurance:		
	Workmen's compensation	7,840[b/]	8,160 (P)[b/]
	Employee health insurance	11,025[b/]	11,475 (P)[b/]
	Other insurance	6,223[b/]	6,477 (P)[b/]

continued--

Table 3. continued--

Account	Expenditures not expected to change substantially	Expenditures expected to change proportionately with population (P) or road mileage (M)
Reserves	44,100 b/	45,900 (P) b/
Debt service	130,500	--
Subtotal (adopted budget)	663,452	700,048
Adjustments:		
For part of revenue sharing grant not included in General Fund	8,600	--
Excess of Municipal Tax Differential over reduction in property tax revenue	511	--
Total expenditures	672,563	700,048

a/ It is assumed that one-half of these expenditures will remain the same and one-half will increase by 16.2 percent.
b/ It is assumed that 49 percent of expenditures on these line items will not increase and that 51 percent will increase by 16.2 percent. These percentages are based on the totals of all other items in the "no change" and in the "proportional change" columns.

Table 4. Estimated Expenditures from General Fund With and Without Greenbriar, FY 1973/74

Item	Estimated expenditures ($)		
	Without Greenbriar (1)	With Greenbriar	
		Increase over column 1 (2)	Total (col. 1+2) (3)
Expenditures that would not change substantially with the addition of Greenbriar.....	672,563	--	672,563
Expenditures that would increase proportionately to the increase in population of 16.2 percent.....	621,448	100,674	722,122
Expenditures that would increase proportionately to the increase in road mileage of 6.6 percent.....	78,600	5,188	83,788
Total.....	1,372,611	105,862	1,478,473

Table 5. Calculation of Property Tax Rate Consistent With Revenue and Expenditure Estimates Including Greenbriar

Revenue with Greenbriar at present tax rates:	
Property tax (rate of $0.92).....	$733,240
All other revenue.....	882,712
Total revenues.....	1,615,952
Expenditures required with Greenbriar.....	$1,478,473
All revenue except property tax.....	882,712
Required from property tax.....	595,761
Tax rate on assessed valuation of $79,700,000.....	$0.75

EXHIBIT 10

FRIED, FRANK, HARRIS, SHRIVER & KAMPELMAN
(STRASSER, SPIEGELBERG, FRIED, FRANK & KAMPELMAN)
SUITE 1000, THE WATERGATE 600
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, D.C. 20037
(202) 965-9400
CABLE "STERIC WASHINGTON"
TELEX 440338

FELIX S. COHEN (1907-1963)

HAROLD P. GREEN
COUNSEL

FRIED, FRANK, HA
SHRIVER & JACO
120 BROADWAY
NEW YORK, N.Y. 10
(212) 964-650
TELEX: 620223
1 THROGMORTON AVE
LONDON, EC2N 2JT, EN
(01) 588-0667
TELEX: 887606

March 14, 1973

Mr. Samuel W. Keller
Administration & Management
Directorate
Code 200
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. Keller:

I refer to the conversation which Mr. Ricker has had with you concerning a right-of-way for the proposed outfall line for the temporary wastewater treatment plant which will serve the Greenbriar project. On behalf of my client, Greenbriar Associates, I hereby respectfully apply for that right-of-way, the details of which are set forth in the drawings which Mr. Ricker left with you.

The temporary treatment plant in question here would ultimately treat up to 325,000 gallons per day. It will be in operation until the Greenbriar project will be allowed to tap into the public sewer system. The date on which such permission is likely to be granted will depend on the plans for completion of an addition to the Western Branch Wastewater Treatment Plant. On the basis of presently available data, it is assumed that the addition to that plant will be completed late in 1974, so that the temporary treatment plant for Greenbriar is likely to be dismantled about that time or early in 1975.

In order for my client to obtain permission to build the treatment plant, it was necessary to have the Prince George's County Government place the plant in its Ten-Year Water and Sewerage Plan. This was done

by action of the Prince George's County Council on November 29, 1972. The Plan, including the temporary treatment plant, was approved on February 10, 1973.

Next, it was necessary for the point of discharge to be reviewed and approved by appropriate State agencies. The Department of Water Resources within the Department of Natural Resources of the State of Maryland approved the point of discharge last month and notified the State Department of Health and Mental Hygiene to that effect. The State Department of Health and Mental Hygiene, in turn, approved the point of discharge on March 2, 1973, as indicated by the enclosure.

The actions of the Prince George's County Government and the State of Maryland were conditioned on construction of the plant at the expense of the developer and its operation by a public agency, namely the Washington Suburban Sanitary Commission. On March 7, 1973 the Washington Suburban Sanitary Commission agreed formally to operate the plant once it has been built. It is understood that the County and State require and the developer plans the installation of an advanced wastewater treatment facility, which will meet all the standards set forth in the enclosed letter.

Detailed plans and specifications of the treatment plant are now on file with the State Department of Health and Mental Hygiene and the Washington Suburban Sanitary Commission. Upon approval of these detailed drawings by these agencies, construction of the plant will be begun.

It is respectfully requested that approval of this application be granted at an early date. If any further information is needed, please let me know.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Enclosure
cc: Mr. Alan I. Kay

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
ENVIRONMENTAL HEALTH ADMINISTRATION
610 N. HOWARD STREET . BALTIMORE, MARYLAND 21201
Neil Solomon, M.D. Ph.D. Secretary

March 2, 1973

Mr. David Murray, P.E.
Dan Dyer Associates, Inc.
4705 Queensbury Road
Riverdale, Maryland 20840

Re: Greenbriar Apartments
Wastewater Treatment Facility
Prince George's County

Dear Mr. Murray:

We have reviewed your application for a wastewater treatment facility to discharge into an unnamed tributary of Beaver Dam Creek in Prince George's County near Greenbelt. You may proceed with the preparation of final plans and specifications which will meet the following effluent requirements:

Average Daily Flow	Not to exceed 0.325 mgd - [illegible] GPM
BOD_5	Not to exceed 5 mg/l
Suspended Solids	Not to exceed 15 mg/l
pH	6.0 to 8.0
Dissolved Oxygen	Not less than 5.0 mg/l
Phosphate	Not to exceed 1.5 mg/l as P

Treatment shall also include disinfection of the effluent. Disinfection shall be by break-point chlorination as required by the County Council. Dechlorination before discharge shall also be required.

Sufficient space shall be available at the site to add additional advanced waste treatment if it should become necessary in the future. The effluent shall be conveyed by pipeline to a point on the stream where free flow prevails.

It should be noted that before a construction permit can be issued for this project, the requirements of the Prince George's County Ten Year Water and Sewerage Plan shall be met.

Very truly yours,

Karl S. Quanco, P.E.
Public Health Engineer
Division of Water and Sewerage

ESQ:fmz
cc: Perry Stearns, M.D.
Mr. David Scull
Water Resources Administration
Maryland Environmental Service
Division of General Sanitation
bcc: Mr. Donald H. Moren
Mr. Richard [illegible]

'BURY ROAD, RIVERDALE, MARYLAND 20840
'31) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
February 2, 1973

Department of Health
& Mental Hygiene
Environmental Health Administration
610 North Howard Street
Baltimore, Maryland 21201

Attention Mr. Earl S. Quance

Gentlemen:

Re: Point of Discharge, Greenbriar Apartments, Prince George's County

We are submitting a revised Point of Discharge Application for this project in accordance with your letter of January 17, 1973.

We have indicated a new point of discharge which we believe will provide both continuous and free flow of stream water. The point now designated as the point of discharge is on the east side of the Baltimore-Washington Parkway on a stream shown on the quadrangle map as continuously flowing. The stream then passes under the Baltimore-Washington Parkway and joins with the stream flowing from Greenbriar immediately on the west side of the Parkway. The drainage area at this junction is more than three times what was shown on the original point of discharge, being approximately 1.1 square miles.

We believe that this is the additional information that you require. If there is anything further needed, please call us.

Very truly yours,

BEN DYER ASSOCIATES, INC.

David F. Murray, P. E.
Assistant Vice President

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
ENVIRONMENTAL HEALTH ADMINISTRATION
DIVISION OF WATER AND SEWERAGE
610 North Howard Street
Baltimore, Maryland 21201

APPLICATION FOR WASTEWATER TREATMENT FACILITY

A. NAME AND LOCATION OF FACILITY

1. Name and character of Community or Project Greenbriar

   County: Prince George's Nearest major community: Greenbelt

2. The location of the proposed plant site, point of discharge and area served shown on a full 7.5 minute quadrangle topographic map, such as those printed by the U. S. Geological Survey. See Item F.

3. Name and address of:

   a. Property Owner: Rozansky & Kay Construction Co.
   Suite 21, 501 Slaters Lane
   Alexandria, Virginia 22314

   b. Developer: "

   c. Agency responsible for operation and maintenance of proposed facility: Washington Suburban Sanitary Commission

   d. Engineer: Ben Dyer Associates, Inc.
   4705 Queensbury Road
   Riverdale, Maryland 20840

B. RECEIVING STREAM CHARACTERISTICS

1. a. Name of Receiving Stream: Unnamed tributary of Beaver Dam Creek.

   b. Name of major drainage basin: Indian Creek/Paint Branch/Anacostia/Potomac River

2. Is plant located in 50-year flood plain? Yes _____ No X

3. Area of Watershed above proposed discharge point: 0.7 square miles.

4. Water Quality Standard: Refer to Water Resources Regulation 4.8:

   Item No. 89 Water Paint Branch & Tributaries

   Zone Headwaters to confluence with Northwest Branch

   Water uses C

   Water uses to be protected III Water Contact Recreation
   IV Propagation of Fish, other aquatic life and wildlife
   V Agricultural Water Supply

5. The location of other wastes reaching the receiving stream within five miles above and five miles below the proposed discharge point must be shown on the map required in Item A2. This must include all waste discharges known to the applicant including liquid wastes from industrial or commercial operations. Attach complete information. If none, so state.

EXISTING WASTEWATER FACILITIES

	Present Flow	Design Flow	Design Flow
Domestic: Avg.	_____ mgd	Avg. _____ mgd	Peak daily _____ mgd
Industrial: Avg.	_____ mgd	Avg. _____ mgd	Peak daily _____ mgd
Total: Avg.	_____ mgd	Avg. _____ mgd	Peak daily _____ mgd

To be completed only when there is an existing sewage plant and this if for the expansion of the existing facilities.

EXPECTED WASTE CHARACTERISTICS

1. Design Waste Volume - Design Calculations must be attached, including industrial wastes by industry.

Domestic: Avg.	0.325 mgd	Peak daily flow 0.455 mgd
Industrial: Avg.	0 mgd	Peak daily flow 0 mgd
Total: Avg.	0.325 mgd	Peak daily flow 0.455 mgd

2. Type of Waste: Sanitary X Industrial _____ Commercial _____

   a. Characteristics of Industrial Waste:

   b. Type of Industrial Waste pretreatment for each industry prior to discharge to sewers:

3. Design Population: 4,056 Design year: 1975

4. Estimated wastewater production per capita per day: 80 gpcd, total including infiltration

5. Chemical characteristics of raw waste (Design Waste Volume)

BOD-5:	375 mg/l	pH:	7.0
BOD-5:	1015 lbs/day	Temperature:	65° F
SS:	300 mg/l	Other (Specify):	
SS:	815 lbs/day		

...racteristics of treated waste (Design Waste Volume)

	3-5	mg/l
	3-5	lbs/day
...:	5-15	mg/l
SS:	5-16	lbs/day

pH: 6.0 - 7.0
Temperature: 65° F.
Other (Specify) : _____

...osphate and Nitrogen removal are to be provided, give quality of ...fluent as follows:

Phosphate:	0.5 - 1.5 mg/l (P)	Removal	90 to 95 %
Total Kjeldahl Nitrogen:	_____ mg/l (N)	Removal	_____ %
(NO_3 + NO_2) :	_____ mg/l (N)	Removal	_____ %

7. What is the basis for the values given in Items 5 and 6?
   Attach information supporting these values - for example, are they actual values or estimated, plant effectiveness is based on what data, etc? Raw values based on normal domestic sewage estimates. Treated values based on experience at Landover Mall Treatment Plant.

E. PROPOSED WASTEWATER TREATMENT FACILITY DESIGN

1. Temporary or Permanent Facility: If temporary, attach evidence as to reasons for determining it to temporary. How long will temporary situation last?
   Temporary, refer to supporing data, enclosed.

2. Type of Treatment:

   Show the schematic flow diagram indicating major treatment units and the anticipated BOD-5 and SS removal in the corresponding units.

   See enclosure.

3. Sludge Treatment and Disposal:

   See enclosure.

.s

.e applicant shall submit his proposal to the Governing Body of .ounty and request a letter, addressed to the Division of Water .d Sewerage, stating that the proposal is contained in the County .omprehensive Water and Sewerage Plan as an approved site for a wastewater treatment plant or a statement that the Plan will be considered for amendment if this application can be approved by the Division. This letter shall be attached to the application. The applicant shall include evidence with this application that comments have been requested of and received from the County Health Officer, Planning and Zoning Commission, and the County Agency having responsibility for sewerage (Sanitary or Metropolitan Commission or Department of Public Works). Item 3C must be supported by a letter from the agency agreeing to maintain and operate the facility.

Four copies of this application must be sent to the Division with an original and three copies of a 7.5 minute quadrangle map showing the data requested in Item A2. Additional data supporting this application must also be submitted in quadruplicate.

No application will be reviewed until the above actions have been completed.

APPLICATION completed by:

NAME David F. Murray, P. E. DATE 12/22/72 PHONE 779-8500

ADDRESS c/o Ben Dyer Associates, Inc., 4705 Queensbury Road

Riverdale, Maryland 20840

6/1/72

JULENSBURY ROAD, RIVERDALE, MARYLAND 20840
PHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

December 26, 1972
February 1, 1973 (Revised)

GREENBRIAR APARTMENTS

Sewage Disposal Report and Application for Point of Discharge

The Greenbriar Apartment project lies within the triangle formed by the Baltimore Washington Parkway, Greenbelt or Glenn Dale Road, Maryland Route #193, and Goddard Space Flight Center in Prince George's County. It consists of 1193 proposed apartment units and a community building. Record plats for the project have been recorded in the Land Records and the street grade establishment plans have been approved by all necessary agencies. The building permit application has been filed, and with the exception of the resolution of the sewer question, has completed processing.

System extensions of the water and sewer lines were authorized by the Washington Suburban Sanitary Commission on February 10, 1971 by Report No. 714927-A. This authorization is subject to the orders of the State Health Department dated May 20, 1970, as modified. Because of the length of time until sewer connections will be permitted to this project, the owners desire to proceed with temporary sewage treatment facilities located on-site. This temporary treatment plant is shown on the 10-year water and sewer plan adopted by the Prince George's County Council in November, 1972.

The site proposed for the treatment facility is in the extreme northern corner of the subdivision. Effluent from the plant would flow into the headwaters of Beaver Dam Creek, which flows under the Baltimore-Washington Parkway in a westerly direction, then northerly into the U. S. Department of Agriculture Research Center, then westerly through the Center, then southwesterly into Indian Creek. The first residences along this stream are approximately five miles form the point of discharge. Approximately two and one half miles down stream from the proposed point of discharge is a sewage treatment plant operated by the Department of Agriculture discharging approximately 400,000 gallons per day into Beaver Dam Creek. It is our understanding that this effluent is of poor quality and the Department of Agriculture has been instructed by the State Health Department to improve the quality of the effluent or request sewer service from the Washington Suburban Sanitary Commission. We know of no other discharges into Beaver Dam Creek or Indian Creek before it reaches the lakes in the gravel pit area near Branchville.

The daily flow to the proposed treatment plant will be approximately 325,000 gallons. The development of this figure is shown elsewhere in this report.

Greenbriar Apartments
Sewage Disposal Report and Application
for Point of Discharge

December 26, 1972
Revised February 1, 1973

It is proposed to construct the facility in two stages; the first stage - 200,000 gallons and the second stage 125,000 gallons.

The plant configuration will be basically the same as that used at the Landover Mall Regional Shopping Center in Prince George's County. A single Davco extended-aeration, secondary unit will be included in each phase. Each phase will also have a Neptune Microfloc tertiary unit using alum as the phosphorus precipitation agent. The effluent from the tertiary plant will be subjected to break-point chlorination with a detention time of approximately one hour to insure total virus removal. This effluent will then be dechlorinated using sulfer dioxide.

Prince George's County Council has imposed additional requirements on the construction of this plant. These features will be provided in the design. A flow meter will record the flow of sewage into the plant. A surge tank will be provided in the extended aeration plant to equalize the flows during peak periods. A recycling capability will be built into the plant so effluent could be recycled if it were deemed necessary. An emergency generator will be provided. An emergency connection will be provided to the Washington Suburban Sanitary Commission system in case of complete plant break-down. This connection will be to the pumping station on the Greenbriar site, for which plans are now being prepared. This pumping station will pump into the Western Branch System.

The proposed point of discharge is on a stream originating in the Goddard Space Flight Center (N.A.S.A.) at a point just east of the Baltimore-Washington Parkway. This stream at this point has a drainage area of approximately 420 acres or 0.7 square miles. The quadrangle map shows the stream to be continuously flowing from the north line of the N.A.S.A. property. This is verified by an on-site investigation of the N.A.S.A. site. Numerous springs are visible at this site and ground water can be observed continually running onto the surface. N.A.S.A. has created a pond with a continuously controlled outlfow on this stream. The area to the pond is approximately 250 acres. The stream at this proposed point of discharge flows on a steep grade under the Baltimore-Washington Parkway and onto concrete paving within the interchange of the north access road to N.A.S.A.

Immediately on the west side of the Baltimore-Washington Parkway the stream joins a stream flowing northward which drains the Greenbriar site itself and a portion of Greenbelt. The drainage area to this stream is approximately 300 acres. The total drainage area to the junction of these two streams, approximately 500 feet west of the proposed point of discharge, is 720 acres. It is estimated that there will be a continuous low flow at the requested point of discharge in excess of 1 cfs and at the junction of the two streams of approximately 2 cfs. Because of the steep gradient of the stream at this point there is free flow and no possibility of stagnation.

LEENBRIAR

EXPECTED WASTE CHARACTERISTICS

Flow

1193 Units X 3.4 people/unit = 4,056 people

4,056 people x 75/gal./person = 304,200
(Water saving devices)

Infiltration: 92.6 ac. x 200 gal./ac./ day = 18,520

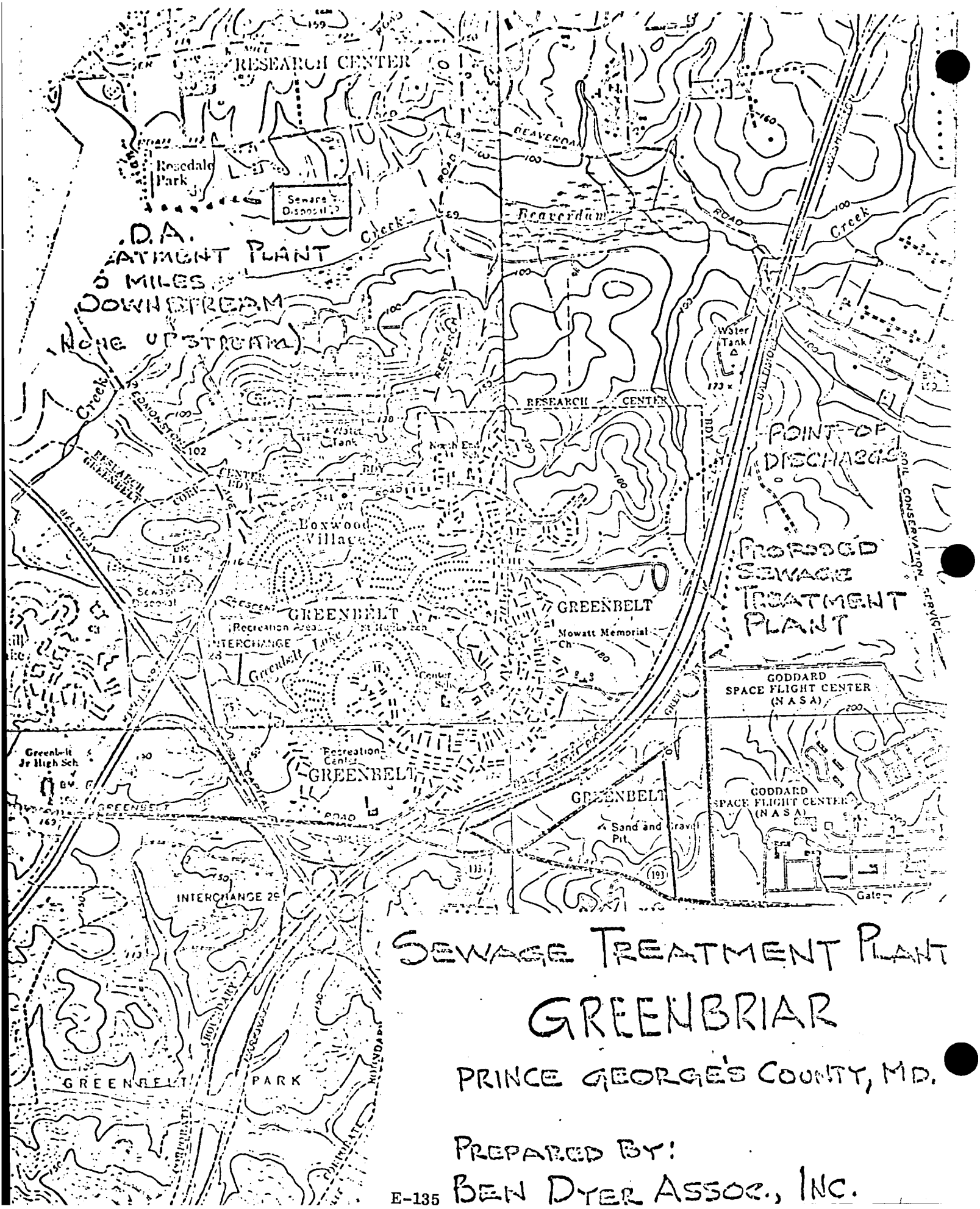
322,720

Use 325,000 gal/day

B.O.D.

4,056 people x 0.25 lb. $B.O.D._5$/day = 1015 lb/day

$$B.O.D._5 = \frac{1015}{8.34 \times 0.325} = 375 \text{ mg/l}$$



SEWAGE TREATMENT PLANT

GREENBRIAR

PRINCE GEORGE'S COUNTY, MD.

PREPARED BY:

BEN DYER ASSOC., INC.

DEPARTMENT [illegible] ... AND
ENVIRONMENTAL HYGIENE
610 N. HOWARD [illegible] ADMINISTRATION
[illegible], MARYLAND 21201

Neil Solomon, M.D. Ph.D. Secretary

[illegible] 8, 1973

Water Resources [illegible]
State Office Building
Annapolis, Maryland [illegible]

Attention: Mr. [illegible]

[illegible]ater Treatment Facility
[illegible]ar Apartments
[illegible] George's County

Gentlemen:

We are tre[illegible] Application for Wastewater Treatment Facility [illegible], Prince George's County.

Please note that [illegible] discharging a smaller volume of effluent which will [illegible] of treatment and discharge to a stream which has [illegible]

While we do not [illegible]valuate a formal Point of Discharge Evaluation, we [illegible] official comment.

[illegible] yours,

[illegible]ngley, P.E., Chief
[illegible] Water and Sewerage

WMcLB:BSB:fmm
Enclosure
Ben Dyer Assoc[illegible]
Perry Stearns, [illegible]

POLICY ON INTERIM TREATMENT PLANTS

1. An interim treatment plant is acceptable in principle, as long as it is a truly interim step in a regional long range sewage treatment plan with a specific date by which permanent facilities will be provided. No permit will be granted for an interim treatment plant which is planned to be in operation longer than five years.

2. The State will issue a permit for such a plant only if it has been included by the County as part of an approved 10-year Water and Sewer Plan, and adequate measures have been taken by the County to assure that growth will be limited to the capacity of such treatment plant. The State will approve only a limited number of such plants and only where they are compatible with appropriate regional plans for such sewerage service.

3. Any such plant must meet all applicable health and water quality requirements.

4. Privately-financed interim treatment plants must be publicly owned and operated.

5. When such a plant is proposed for a sewer system from which raw sewage overflows are presently occurring or threatened, the State may require the capacity of the plant to be enlarged to provide capacity to alleviate or prevent the overflows, where practicable. Financing arrangements for such enlargements must be approved by the Department of Health and Mental Hygiene.

Approved by Council on the Environment - 2/5/73

WASHINGTON SUBURBAN SANITARY COMMISSION

4017 Hamilton Street, Hyattsville, Maryland 20781 | 277-7200

STAFF
ROBERT J. M... General Manager
JOHN T. BON... Secretary
JAMES J. LYNCH, Treasurer
JOHN J. KENKEL, General Counsel

March 12, 1973

Mr. David F. Murray
Ben Dyer Associates, Inc.
7205 Queensbury Road
Riverdale, Maryland 20840

Dear Mr. Murray:

As per instructions included in the State of Maryland Department of Health and Mental Hygiene's "Application for Wastewater Treatment Facility," this office has reviewed the application submitted by you on behalf of Rozansky and Kay Construction Company.

By action on February 28, 1973, the Commission has agreed to maintain and operate the Greenbriar Wastewater Treatment Plant at the expense of the owner Rozansky and Kay Construction Company, upon construction and approval of said facility.

In reviewing your "Application for Wastewater Treatment Facility" we note that in Item D6, you have computed the pounds per day of BOD-5 and suspended solids to be equal to the concentrations of said substances. This appears to be inaccurate.

It is our understanding that the treatment plant will be constructed in two stages which will include a 0.20 million gallon per day plant, followed by construction of a 0.125 million gallon per day plant. Flows to the first stage facility will be monitored to assure that the 0.20 million gallons per day flow is not exceeded. The Prince George's County Department of Licenses and Permits has been requested to submit all Greenbriar "Occupancy Permits" for review and comment by Commission personnel prior to issuance by the County. The County will be requested to deny further "Occupancy Permits" when the design flows are approached, regardless of the number of dwelling units contributing to the flow.

The Prince George's County Ten Year Water and Sewerage Plan presents

Mr. David F. Murray
Ben Dyer Associates, Inc.
Riverdale, Maryland 20840
March 12, 1973

standards for the design and operation of the Greenbriar Wastewater Treatment Facility. These standards must be met before a construction permit can be issued.

Very truly yours,

Clifford A. Helton

Design Division Engineer

CAH:SK/vt

cc: Rozansky & Kay Construction Co.

4705 QUEENSBURY ROAD, RIVERDALE, MARYLAND 20840
TELEPHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
March 29, 1973

Mr. Clifford A. Hilton
Design Division Engineer
Design Division
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

Dear Mr. Hilton:

Re: Greenbriar Sewage Treatment Plant
Prince George's County, Maryland

This letter is in response to your letter of March 22, 1973 in which you made several comments and recommendations concerning the subject plant. The following is an outline of the action we are taking and/or our comments in regard to each of the items:

1. We are proceeding with revisions to the subject treatment plant effluent line so as to comply with the ten-year water and sewer plan for Prince George's County as interpreted by your office. The paved ditch, as presently shown, will be taken out of the project and replaced with an 8-inch pipe. The pipe will be below ground except in the area of the existing 8' x 6' box culvert under N.A.S.A.'s access road. The top of the pipe will be exposed for approximately 10 to 15 feet in this area so that the pipe can extend into the culvert 2 to 3 feet. Revisions will be completed in approximately 7 days and we will supply you with copies at that time.

2. The chlorinator specified for this project has the capacity of dosing at any selected rate from 5.0 mg/l to 83 mg/l. (12 lb/day at 200 gal/min flow to 200 lb/day at 200 gal/min flow). It is our opinion that a free chlorine residual of 3 mg/l after 1 hour is within the range of the chlorinator specified.

   The chlorinator specified requires manual operation of a rate valve to adjust the dosing rate. We are revising the specifications and drawings so as to provide an automatically adjusting system. The system will consist of the following:

Mr. Clifford A. Hilton

J-70071
March 28, 1973

a) Gas chlorinator with the same rate as described above.

b) Chlorine analyzer with sampling point located near the point of overflow from the chlorine contact tank. The analyzer will be capable of measuring free chlorine residual from 0 mg/l to 10 mg/l.

c) Controller which will operate a control valve and adjust the flow of chlorine solution to the effluent thus controlling the dosing rate.

d) A continuous recorder will be provided which will record free chlorine residual from 0 mg/l to 10 mg/l on a strip type 30-day chart.

e) Meters, ejector, diffuser, pump, valves, solenoids and other items for a complete system will be provided.

3. The advance Model 872 Chlorine Residual Analyzer and Monitor which we specified is part of the dechlorination equipment. The point of sampling for the analyzer is at the extreme down-stream side of the dechlorination tank, after dechlorination is completed. At this point there will be no free chlorine in the effluent. The controller specified should be set to operate the dechlorination system so that a total chlorine residual of from 0.5 mg/l to 1.0 mg/l is in the effluent at the point of sampling. With a total chlorine residual in this range, there should be no free chlorine in the effluent.

4. As we have previously advised members of your staff and as required by your preliminary review of the Treatment Plant Plans, we are preparing a detailed study of the effects on the pH of breakpoint chlorination-dechlorination. The study will use both test information from samples of Landover Mall sewage treatment plant effluent subjected to breakpoint chlorination and then dechlorination, and theoretical calculations. We believe that this study will provide us with reliable data required to project the pH of the effluent from Greenbriar Sewage Treatment Plant.

We believe that our actions are in full compliance with your suggestions. However, if there are any questions, or if additional information is required, please do not hesitate to contact this office.

Very truly yours,

BEN DYER ASSOCIATES, INC.

Richard S. Joslin

Richard S. Joslin
Storm Drainage & Paving Dept.

Excerpt from Prince George's County Council enactment of November 29, 1972 concerning Ten-Year Water and Sewerage Plan

1973 PRO GREENBRIAR AND GLEN ORA GARDENS

P sewerage discharge and sewage treatment pl reenbriar and Glen Ora Gardens. There are tw signs currently being considered. Both would pro wastewater treatment. The cost will be born b er and the facility operated by the WSSC. Th te is 325,000 gallons per day by 1975 after whi will be dismanteled.

T treatment plant shall be operated under the fo s:

a. ced treatment processes outlined by Dr. Cookso testimony be installed.

b. no bypass mechanism which would allow untreat pass the plant in times of overload.

c. hlorine be removed from the effluent after ad time has elapsed to effect the disinfection Cookson.

d. pling of the effluent be done on a routine t monthly, by a competent laboratory, at the

e. a filters, similar to those used at the Lak required.

f. a meter to constantly record the flow of sewag t.

g. a pre-set limit to the number of connecti strict adherence to this limit.

h. a large surge tank to equalize the flow int that flow through the treatment process during se approximates the flow during low usage pe

i. apability shall be built into the plant, so that the plant falls below the expected standard , the sewage can be sent back through the pl per treatment.

j. pletely independent, power supply shall be requ

k. The plant shall be run by WSSC using a trained and experienced maintenance crew.

l. The method of sludge disposal shall be clearly outlined.

m. The plant shall be closed as soon as public sewage facilities become available.

n. That the effluent be enclosed in a pipe to a point in the stream where there is a continuous year-round flow of water, as recommended by the City of Greenbelt.

o. That an emergency connection with the WSSC community sewer system will be built so that if a problem developed at the plant, sewage could be placed in the WSSC system instead of directly into the receiving stream.

p. And finally, that sewage effluent will be treated with break-point chlorination to inactivate viruses with subsequent dechlorination to meet State water quality standards.

NORTHEAST BRANCH, . ER DITCH, & BEAVERDAM CREEK

STATEMENT OF JOHN THOMAS COOKSON, JR. ON PROPOSED TREATMENT PLANT FOR GREENBRIAR AND GLEN ORA PROJECTS

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STATEMENT OF JOHN THOMAS COOKSON, JR. ON PROPOSED TREATMENT PLANT FOR GREENBRIAR AND GLEN ORA PROJECTS

Present Position, Educational Background and Experience

I am at present and have been since 1968 an Associate Professor in the Department of Civil Engineering of the University of Maryland and also Director of the Environmental Health Science and Engineering Training Program at the University. I was promoted to these positions from the rank of Assistant Professor (also at the University of Maryland), which I held from 1965 to 1968. The courses I teach include Environmental Health Engineering Analysis, Fundamentals of Sanitary Engineering, Unit Operations of Environmental Health Engineering, Theory of Aqueous and Solid Waste Treatment and Disposal, Design of Water Purification Facilities, Biological Principles of Environmental Health Engineering, and Microbiology of Water.

I am now working in the field in which I received my college and post-graduate education. My B.S. degree was obtained in 1961 from Washington University in St. Louis, Missouri in

Civil Engineering. In 1962 I received an M.S. degree from the same University in the field of Sanitary Engineering. I then continued my education at the California Institute of Technology, which granted me a Ph.D. degree in 1966 in Environmental Health Engineering. My major area of study was Water Pollution Control with a minor in Biology and Chemistry. In 1968 I did post-graduate work at Harvard University in the field of Advanced Water Chemistry.

Over the past decade I have conducted research on viruses in water, filtration theory, adsorption theory, surface chemistry of activated carbon, biological waste treatment processes and presented procedures for designing activated carbon beds.

I initiated my research on viruses in water in 1962. My formal education in virology was received at California Institute of Technology, where I completed my dissertation on the kinetics and mechanism of virus adsorption on activated carbon. From 1963 to 1965 I also served as director of research on enteric virus removal at Whittier Narrows Waste Water Reclamation Plant at Pico Rivera, California. This reclamation plant processed raw sewage for reuse by industry and ground water recharge.

The reuse of waste water necessitated the removal of viruses.

During 1964, I worked jointly with Dr. Robert McAllister, director of virology for the Children's Hospital of Los Angeles, in developing an assay procedure for poliovirus in water and sewage.

Since coming to the University of Maryland in 1964, I have been director of research grants to study the removal, inactivation and survival of viruses in water. I am a technical reviewer for the American Chemical Society on manuscripts submitted for publication in Environmental Science and Technology and a consultant to Monsanto Chemical Company on virus removal from water.

I have been an invited participant in the Second International Congress for Virology held in Budapest, Hungary this past July and at the recent Annual Conference on Viruses in Waste, Renovated, and Other Waters held in Cincinnati, Ohio. I have been guest lecturer at numerous universities, pollution control associations and presided over national research conferences.

A list of my publications, reports, presentations and special lectures is attached to this report. (See pages 19-22)

Purpose of Report

I have been retained to consult with Ben Dyer Associates, Inc. and the Infilco Division of the Westinghouse Electric Corporation for the purpose of advising these organizations on the design of the sewage treatment facility which is proposed to be built for the Greenbriar and Glen Ora projects. As a result of my consultation with representatives of both organizations I am familiar with the design of the proposed plant, which is, of course, still subject to approval by the State Department of Health and Mental Hygiene.

In this report I shall set forth the essential elements of the historical and technological background of waste treatment and then comment on the performance which can be expected from the facility here in issue.

Historical Developments in Waste Treatment

Perhaps the oldest form of waste treatment is to dump raw sewage into streams and rivers and permit these streams and rivers to carry the sewage away and, at the same time, through natural self-purification provide for the decomposition of the organic and other material collected by a sewerage system.

As population densities increased and municipalities found that the ever larger volume of raw sewage made the streams and rivers unsightly, a form of sewage treatment was initiated which later came to be known as primary treatment. It provides for the screening and settling of solid materials from the waste water, so that only a liquid effluent is expelled into the stream or river.

In a good many locations in the country today, primary treatment is still the sole treatment given to waste water. It has the effect of removing the unsightliness of raw sewage and of reducing pollutants to some extent. However, the effluent which has undergone no more than primary treatment

still contains a significant amount of organic and inorganic pollutants. Where the amount of effluent is small when compared with the size of the stream or river into which it is expelled, natural processes in the stream or river could still provide for the needed purification. But the further concentration of population has in a large number of communities served to increase the pollutional loads on streams to the point at which the natural capacity of self-purification was surpassed. Under these circumstances, primary treatment is insufficient from both a health and an ecological point of view. The health problem lies in the fact that the presence of pathogenic micro-organisms and of viruses makes it necessary to close the affected streams to swimming and other water sports. The ecological problem derives from the presence of substances in the effluent which have an adverse effect on fish life.

To cope with the foregoing health and ecological hazards, many communities which recognized the problem of stream pollution moved years ago to what came to be known as secondary treatment. In secondary treatment an effort was

made to duplicate within the wastewater treatment plant the biological processes which took place in the streams and rivers, causing organic material to be degraded to gases, water and inorganic [illegible].

For many years the design and operation of the secondary treatment process was an art rather than a science, relying largely on guesswork. In the last thirty years, however, great technical advances have been made. As of today, secondary treatment will effectively reduce the organic substances, pathogenic organisms, and suspended solids.

Some communities were for a long time unwilling to support the cost of secondary treatment, but most of them adopted that process, in its improved form, and it proved adequate in meeting the need. As a result, it did not appear necessary to move beyond secondary treatment and no research took place designed to discover further improvements.

Such research was, however, stimulated by the most recent changes in our modes of living. Industry developed new chemicals resistant to biological treatment. Water use increased such that the use of treated waste water as drinking water had

to be considered. It was also recognized that the loading of inorganic ions such as phosphorus and toxic metals caused undesirable changes in ecosystems. These conditions provided the impetus for a crash program to develop greater technology. It was initiated about five years ago. As a result of this crash program, the processes now designated as tertiary or advanced waste treatment were developed.

Normally it takes decades to see the results of basic research implemented. This has not been the case with advanced waste treatment. Demonstration projects supported by the Federal Government have quickly moved the results of research into implementation, with the result that tertiary treatment is today an established and successfully tested process.

While tertiary treatment is now a reality, it is relatively expensive and has for that reason not been installed in many places. When it has been installed, however, it has been able to solve the health and ecological problems which it was designed to solve.

With this background in mind, let us now look at the plant proposed for the Greenbriar and Glen Ora projects.

Tertiary Treatment Plant Proposed for Greenbriar and Glen Ora

The proposed plant consists of three basic stages, a biological or secondary treatment stage, a tertiary treatment stage, and a disinfection stage.

(1) Secondary Treatment

The secondary treatment stage consists of a comminutor, an aerobic biological process and a clarifier. This phase of the treatment system will produce effluent low in organic content, low in suspended solids, and low in pathogenic microorganisms.

(a) Comminutor: The comminutor receives raw waste and acts as a grinder to reduce course materials to small pieces.

(b) Aerobic Biological Process: From the comminutor the waste will flow into the biological process. The proposed biological process is referred to as an "Extended Aeration Activated Sludge process". Of the biological processes that can be utilized, this system will provide the highest quality effluent

with regards to organic removal and is the most failproof from an operational standpoint.

To this biological process a concentrated bacterial sludge (called activated sludge) is added from the clarifier and oxygen is supplied by mechanical aerators. The bacteria degrade organic materials to gases, inorganic ions and water.

(c) Clarifier: Effluent from the biological process still contain bacteria. These are settled out by gravity in the clarifier. This bacterial sludge is continuously removed and recycled to the biological process.

(2) Tertiary Treatment

The tertiary treatment stages consist of a phosphate precipitation unit, pressure sand filters, aeration and pH adjustment.

(a) Solids Contact Clarifier: The solids contact clarifier is the beginning of the tertiary treatment system. In this process, lime is added to precipate phosphorus as a sludge, which is drawn off to a sludge holding tank.

(b) Filtration: Four parallel sand filters will be used to remove any remaining solid material that may pass the clarifiers.

(c) Aeration and pH Adjustment: Effluent from the sand filters will be aerated to add dissolved oxygen and the high pH necessary for phosphorus precipation will be reduced by addition of controlled amounts of acid.

(3) Disinfection

The final stage of treatment consists of disinfection. Disinfection will be achieved by the addition of chlorine or ozone. Adequate doses with proper detention time assures disinfection.

Meeting State Standards

The complete treatment plant as proposed above will surpass State requirements. Specific water quality standards have been assigned to Northeast Branch and tributaries so that the intended water uses will be protected. These specific water quality standards and the means for achieving them in the proposed treatment are the following:

(1) The fecal coliform density must not exceed 240 MPN per ml.

The coliform density and pathogenic organisms will be reduced to surpass this requirement. Coliform removal is obtained in all phases of the treatment stages. As a result of the treatment described above, coliform density is likely to be reduced to about 2 MPN per 100 ml.

(2) The minimum monthly average for dissolved oxygen must not be less than 5.0 mg/liter, and must not be less than 4.0 mg/litter at any time.

The organic content as measured by the BOD-5 will be reduced to allow a range of dissolved oxygen of 6-8 mg/l. This BOD-5 reduction will occur in the biological process, phosphorus precipitation, and also as a result of sand filtration. A minimum BOD removal of 95 percent will be achieved at all times.

In many instances, the efficiency of removal will be approximately 98 percent. This high efficiency of BOD removal and aeration of the effluent will maintain the required dissolved oxygen at a level higher than that required by State standards.

(3) The pH (hydrogen ion concentration) must be between 6.0 and 8.5.

The pH of the effluent will simply be adjusted by acid addition to meet these requirements.

(4) The temperature must not exceed 93°F beyond such distance from any point of discharge as specified for the protection of the water use.

The temperature of the effluent will not exceed the specified limit, as the process of tertiary treatment will not appreciably affect the temperature of the effluent.

The ability to meet continuously the above-mentioned water quality criteria depends on (a) the flexibility of a plant's design and (b) the degree of operational supervision. A few mechanical failures can occur even under a consistent maintenance program. However, by providing design flexibility, a waste treatment plant can be operated in a manner that eliminates the possibility of reduced efficiency as a result of mechanical failure. The design procedure simply incorporates

dual mechanical facilities for treatment processes. During mechanical failure the stand-by unit is put into operation. The proposed plant for Greenbriar and Glen Ora is planned to contain the dual facilities necessary to permit continuing operation of the required level of efficiency.

To prevent the possibility of inadequately treated effluent escaping, the comminutor is equipped with a bypass channel with bar screens in case of a mechanical malfunction. The filtration process will be composed of four sand filters of such capacity that three can effectively treat the waste water if one unit breaks down. The disinfection process will be equipped with dual units, one acting as a stand-by. Pumping units will also have back-up pumps. Piping will provide flexible operation to allow the bypassing of any unit and 100 percent return of effluent to the biological process for a continuous period of 24 hours.

Thus, as designed, the proposed plant has features that duplicate each other's function in preventing any inadequacy in the treatment of waste water. With all these safeguards and the 24-hour back-up capacity, it is highly unlikely that a mechanical

failure will ever affec[illegible] efficiency.

With the [illegible] mechanical failure for all practical purposes eli[illegible] the only remaining problem is human failure, i.e. a[illegible] the the necessary corrective steps in case of a mal[illegible] the plant is placed under continuous supervisio[illegible] personnel, that danger, too, can be avoided.

Discussion on Virus Removal

The possibility that water may spread virus disease was noted in 1945 when infectious hepatitis was demonstrated in well water. It is evident from the literature that there is little, if any, virus reduction in secondary treatment.

Viruses ejected into rivers and streams from poorly treated waste waters are a potential hazard to downstream recreationalists, and to those in downstream communities who must consume these waters. Although these problems are realized, quality standards have not been placed on water concerning viruses. This condition is a result of the extreme difficulty in detecting and assaying enteric viruses in water. There is no standard assay procedure.

Nevertheless, high efficiency of virus removal can be achieved in tertiary processes and disinfection units with free residual chlorine or ozone. This result is a side-benefit of the tertiary treatment processes and requires merely a change in operational procedure to assure virus inactivation.

Tertiary treatment processes with disinfection will be operated in the proposed plant to achieve effective virus removal. The phosphorus precipitation process will utilize excess lime, raising the water pH to 11.5 or above. At this pH a 99 percent inactivation of virus will occur during the detention in the solids contact unit. Greater phosphorus removal will also occur at a pH 11.5 rather than pH 10.0. Additional removal of virus and phosphorus will occur in the sand filters. This step will provide an additional 50 to 70 percent removal of viruses.

Disinfection of secondary effluent does not insure virus inactivation, as the presence of significant concentrations of ammonia, suspended solids and organics in secondary effluent reduces the disinfection potential. But disinfection applied to tertiary effluent, which contains little ammonia, suspended solids and organics, can be used to achieve an additional 99.9 percent inactivation of viruses. Chlorine addition from 10 to 25 mg/l will achieve this during a 30-minute contact period.

The use of excess lime, to pH 11.5 or over during phosphate removal, followed by filtration, pH reduction to 7.0 and disinfection will provide an estimated virus removal efficiency of 99.9995 percent for the whole plant. Effluent treated to this extent cannot constitute a health hazard. This would provide a virus concentration of about 5 viruses per 1,000 liters of water, less than found in river waters presently being processed for drinking purposes.

January 11, 1972

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Cookson, John T., "Research on Removal of Submicron Particles in Activated Carbon Beds", prepared for the Water Pollution Control Administration, Department of Interior (1968).

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PRESENTATIONS AND SPECIAL LECTURES

1970 "Removal of Viruses and other Organic Substances in Sand Filters" presented before Fifth Middle Atlantic Regional Conference of American Chemical Society, University of Delaware, April 1-3, 1970.

1969 "Design of Activated Carbon Adsorption Beds" presented before 42nd Annual Conference of Water Pollution Control Federation, Dallas, Texas.

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1969 Special lecture: "Removal of Viruses from Water", presented at Monsanto Chemical Company, St. Louis, Missouri, May 1969.

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1967 "Adsorption of Viruses to Activated Carbon", presented at American Water Works Association's 87th Annual Conference at Atlantic City, New Jersey, June 4-9, 1967.

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Presentations and Special Lectures (Continued)

1965 "Kinetics and Equilibria of Virus Adsorption on Activated Carbon", presented at New Mexico State University, University Park, New Mexico, May 1965.

1963 "Isolation and Identification of Anaerobic and Facultative Bacteria Present in the Digestion Process of a Sewage Treatment Plant", presented before the 36th Annual Conference of Water Pollution Control Federation, Seattle, Washington, October 7-10, 1963.

1971 - "Adsorption of Sulfur Containing Taste and Odor Compounds on Activated Carbon", 44th Annual Conference Water Pollution Control Federation, San Francisco, California (October 10-13, 1971).

1971 - "Removal of Viruses from Water by Chemical and Physical Methods - Concentration procedures." Annual Conference on Viruses in Waste, Renovated, and Other Waters, Cincinnati, Ohio (October 1, 1971).

1971 - "Physicochemical Processes Involved In the Removal of Viruses From Fluids by Activated Carbon and Sand Beds," Second International Congress for Virology, Budapest, Hungary (July 1, 1971).

1971 - "Functional Surface Groups on Activated Carbon Responsible for Adsorption of Organics from Water," American Institute of Chemical Engineers 69th National Meeting, Cincinnati, Ohio (May 16-19, 1971).

EXHIBIT 11

RHEA L. COHEN

MEMBER OF COUNCIL, CITY OF GREENBELT
10 GREENDALE PLACE GREENBELT, MARYLAND 20770

March 22, 1973

Mr. Robert McCaffery, Chief,
Technical Services
Goddard Space Flight Center
Greenbelt, Md., 20771

Re: Greenbriar sewage treatment plant

Dear Mr. McCaffery,

The above-referenced plant was contemplated over two years ago, as may be seen in Exhibit 1, the March 1, 1971, Greenbriar Associates' application for Maryland Health Department approval for a point of discharge.

Perhaps your staff may recall that during a County zoning action of July 1971 the same developers successfully amended their agreement with NASA concerning their building setback along the NASA property line. Presumably they did not inform NASA at the time about their proposed sewage treatment plant.

Now that the plant and the apartment complex are about to be built, your agency has received a request from the law firm of Fried, Frank, Harris, Shriver and Kampelman for an easement across Goddard property for their sewage discharge line.

Because the culvert(s) below the point of discharge might be too small to accommodate the sewage effluent plus storm water runoff, there would be the possibility of backflow onto NASA property. Another problem would be the rapid blow-out of the stream banks if the pipeline were to discharge at right angles to the receiving creek bed.

The State Health Department letter of March 2, 1973, requires the use of the break-point chlorination process plus de-chlorination, for the purpose of reducing the amount of viruses in the effluent before it empties into the Greenbelt woods west of the Baltimore-Washington Parkway. Daily or even weekly testing for virus content are not required. Neither is de-salting of the effluent, although the break-point chlorination process is known to load the discharge heavily with chlorides.

As no removal of nitrogen compounds is required, the total pollutant load of the discharge would be quite significant.

It is important to note that the USDA sewage treatment plant 2.5 miles downstream on Beaverdam Creek is being upgraded to meet the Potomac River Enforcement Conference Standards, which require removal of 85% total nitrogen, 96% total phosphorus and 96% BOD (organic content). The Greenbriar plant would not be in compliance and would degrade the very stream that the USDA plant will clean up.

The Greenbelt City Resolution #225 (Exhibit 4) is dated February 7, 1972, eight months before the application was amended, and is therefore silent on the subject of salt loading. However, it requests removal of

/contd.

nitrogen and piping of effluent to a perennial stream.

Even though the state-approved point of discharge may be into a perennial stream, the stream after it crosses under the Parkway is by no means a free-flowing, year-round, or perennial, stream. Rather, it spreads out into lagoons, stagnates in puddles, is ponded by beaver dams and in general would not carry a sufficient amount of surface run-off to safely dilute the sewage effluent.

In your deliberations on this matter, your staff may find the following documents useful:

Exhibit 1: Point of discharge application date stamped March 1, 1971, for a flow of 700,000 gallons per day, including map.

2: Revised point of discharge application dated October 16, 1972, for a flow of 350,000 gpd, including map.

3: EPA letter to Agricultural Research Center dated Dec. 29, 1970, requiring upgrading of sewage treatment plant.

4: Greenbelt Resolution #226 dated Feb. 7, 1972, requesting nitrogen removal.

5: Prince George's County Council Amendment #1 to CB-191-1972, the County's Ten-Year Water and Sewer Plan, which was passed as amended in November 1973, requiring in point #n., an effluent pipeline to a perennial stream.

6: Maryland Environmental Health Administration letter dated March 2, 1973, to Ben Dyer Associates, setting Greenbriar effluent requirements, ordering break-point chlorination and an effluent pipeline to a perennial stream.

7: Letter from the County Health Officer to the Chairman of the County Council dated Feb. 14, 1972, opposing construction of the plant and describing stream conditions.

8: Memorandum from the County Executive to the County Council Chairman, opposing the plant, dated Feb. 8, 1972.

9: Letter from the Planning Commission Chairman to the State Department of Health opposing the plant, dated Nov. 9, 1971.

10: Letter from the US Department of Interior dated April 5, 1972, noting that agency's interest in the sewage flow's effect on the Parkway.

11: Interfederation Council resolution dated March 19, 1973, expressing the opposition of metropolitan area-wide organizations to the use of package sewage treatment plants for new development;

12: Greenbelt Save Our Community Committee letter of January 14, 1973, to the State Secretary of Health detailing problems associated with the Greenbriar plant; with exhibits. (Co-signed by seven Washington area organizations.) /contd.

15: EPA letter dated November 13, 1972, to the President of the Montgomery County Council stating that the same requirements apply to package plants as to permanent plants.

Mr. McCaffery, I hope these papers will be of help to you. I am definitely opposed to the construction of the Greenbriar package plant, and would much rather that the development wait for permanent sewer service, which will be available by late 1974.

If you have any questions, please call me at 345-1052. Thank you for your kind consideration of this matter.

Yours truly,

Rhea Cohen

Rhea L. Cohen

WOULD YOU PLEASE FURNISH ME, IN ACCORDANCE WITH THE FEDERAL FREEDOM OF INFORMATION ACT, COPIES OF THE REQUEST — TOGETHER WITH ANY DOCUMENTS ATTACHMENTS — FROM THE ATTORNEYS FOR GREENBRIAR ESTATES AND FROM THE INFORMATION SUBSIDIARY SANITARY COMMISSION, FOR AN EASEMENT ACROSS A PROPERTY FOR AN EFFLUENT PIPELINE.

THANK YOU.

— Rhea Cohen

11a

COVINGTON & BURLING
888 SIXTEENTH STREET, N.W.
WASHINGTON, D.C. 20006

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March 22, 1973

Mr. Samuel W. Keller
Director, Administration
& Management
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. Keller:

We are representing the Prince Georges Environment Coalition on several matters involving water quality in the Washington metropolitan area. The Coalition is an informal federation of citizens and citizen groups seeking to preserve and improve the environment, particularly in the Prince Georges County area, and in the greater Washington area generally.

It has recently come to the attention of the Coalition that a request has been submitted to the Center on behalf of Greenbriar Associates for an easement across the Center's property for the discharge of effluent from a private treatment plant. On behalf of the Coalition, Mrs. Rhea Cohen has discussed this matter with several officials at the Center and has made available certain background information bearing on the request for the easement.

The purpose of this letter is to express the particular and continuing interest of the Coalition with regard to the requested easement, and to indicate the degree of concern as to the adverse environmental impact that will result if it is granted. In view of the fact that the grant of the easement would clearly affect the quality of the receiving waters, there can be no doubt that any action taken must be accompanied by full compliance with the provisions of the National Environmental Policy Act, and particularly the preparation of an environmental impact

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statement. Accordingly, will you please let me know at your early convenience how the Center intends to process the request for the easement, and whether the necessary steps will be taken for compliance with NEPA. We also request that we be kept informed of any action with regard to the request, and that we be given an opportunity to review and comment on a draft environmental impact statement.

As we have already indicated, we stand ready and willing to cooperate in any appropriate manner in facilitating the Center's evaluation of the request for the easement.

Sincerely,

Edward Dunkelberger

Edward Dunkelberger

sed
cc: Mrs. Rhea Cohen

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO ATTN OF: Code 200

April 17, 1973
FILE 15131

Richard Schifter, Esq.
Fried, Frank, Harris, Shriver
& Kampelman
Suite 400, The Watergate 600
600 New Hampshire Avenue, N. W.
Washington, D. C. 20037

Subject: Greenbriar Associates - Application for Right-of-Way

Ref: Application Letter Dated March 14, 1973, Schifter to Keller, GSFC and Letter Dated March 16, 1973, Schifter to Cohen, GSFC

Dear Mr. Schifter:

We are in receipt of your application on behalf of your client, Greenbriar Associates, for a right-of-way across NASA/Goddard Space Flight Center property. The right-of-way, as we understand it, would be for a proposed outfall line from a sewage treatment plant to serve the proposed Greenbriar Apartment project. The site of the Greenbriar project is on Glendale Road, adjacent to the western boundary of GSFC. The proposed outfall line would require approximately 2927 square feet of GSFC property. The point of discharge would be a culvert on GSFC land, which empties into a small stream which eventually flows into Indian Creek.

From the point of view of the Goddard Space Flight Center, so long as the proposed outfall line is properly engineered and sited, it probably would have no adverse effect on Center operations per se. Moreover, prior to reaching a decision, we are required to analyze the request in light of the environmental protection laws of the United States. A number of points, therefore, require clarification and some additional information is necessary.

1. This application must be considered, in part, against the background of the policies and purposes of the National Environmental Policy Act of 1969 (Public Law 91-190, approved January 1, 1970; The Federal Water Pollution Control Act, as amended (33 U.S.C. 466); The Clean Air Act, as amended (42 U.S.C. 1857), Executive Order 11507, July 20, 1970; and the Council on Environmental Quality's Guidelines on Proposed Federal Actions Affecting the Environment (Federal Register, Volume 36 No. 79, April 23, 1971).

We will, therefore, initially require a complete and detailed analysis of the environmental impacts of the proposed action which should include all of the factors enumerated in the CEQ Guidelines cited above. Special attention should be given to the consideration of alternatives of lesser environmental impact. This analysis should consider environmental impact primarily from two standpoints:

a. The impact of the right-of-way and outfall line itself, including its effect on water quality, stream flow and other related factors. This would entail analysis of the quality of waste treatment, and how the plant will fit in the plan for the watershed. For example, we understand that the Department of Agriculture is being required to upgrade a plant that they operate which discharges into the same stream.

b. The environmental impact of the proposed apartment project on the community. This will require analysis of land use plans for the area, increased noise, air pollution, traffic congestion, parking, effect on schools, etc. It also requires a discussion of construction plans, methods, etc. and the disruption, if any, that the construction will cause.

2. The plant and outfall line, as we understand it, was also intended to serve the proposed Glen Ora Gardens (another apartment project located across Glendale Road from Greenbriar). We would like further information with respect to these future plans and the additional sewer requirements in order to be able to assess the total environmental impact.

3. It appears from the plans, that the proposed site of the sewage treatment buildings is within the boundaries of a fifty (50) foot building restriction covenant dated 3 May 1971 (recorded at Liber 5942 Folio 384, 5/18/71). We would expect that the covenant "to not at any time ... permit to be erected any building of any kind or nature upon any part of the ... property" would be adhered to by your client. It, therefore, appears that the proposed plans will have to be modified accordingly to take this restriction into account.

4. The plans indicate that the outfall line would end in an "open sluice" line. This would most likely be unacceptable. A closed line would be highly preferable. The discharge point should be carefully sited to insure that it is at a point in the stream where there is a continuous year-round flow of water.

On receipt of the requested information, we can give further consideration to your application. We have also been contacted by Mr. Edward Dunkelberger of Covington and Burling representing the Prince George's Environment Coalition, a group of local residents, and Glenn T. Harrell, Jr., Associate County Attorney, Prince George's County, who are interested in this application and wish to be kept informed. By copy of this letter, we are notifying them of the current status. Similarly, we are informing the National Capital Planning Commission of your request, and will ask for their comments.

Sincerely,

Samuel W. Keller
Director of Administration
and Management

cc: Edward Dunkelberger, Esq.
Covington & Burling

National Capital Planning Commission

Glenn T. Harrell, Jr.
Associate County Attorney

Ronald H. Walker, Director
National Park Service
Interior Building
Wash., D. C. 20240

Department of Agriculture
Agricultural Research Center
Beltsville, Md. 20705
Attn: Director of Management

EXHIBIT 13

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May 4, 1973

Mr. Samuel W. Keller
Administration and Management
Directorate
Code 200
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. Keller:

I am writing in response to your letter of April 17, 1973 concerning the request of Greenbriar Associates for a right-of-way across NASA/Goddard Space Flight Center property. The right-of-way would permit an outfall line to be laid from a temporary wastewater treatment plant on land of Greenbriar Associates to a creek on NASA property. The outfall line would traverse approximately 150 feet of Federal land.

The following are our answers to the questions posed by your letter:

(1)(a). Environmental Impact of the Outfall Line

The outfall line as such will have no significant environmental impact. A narrow grassy strip will be temporarily disrupted while an 8-inch cast iron pipe is laid, but that strip will be immediately restored to its original condition through resodding.

The pipe is needed to permit the effluent from an on-site treatment plant on the applicant's property to be discharged into a free-flowing stream on NASA property. The effluent, fully described in Exhibit 1, would if operating at peak capacity discharge a monthly average of 325,000 gd, with a peak daily flow of 455,000 gd. The average flow per second which would thus be added at peak capacity is 0.8 cu. ft.

Mr. Samuel W. Keller May 4, 1973

You have inquired about the quality of waste treatment and have asked how the plant will fit into the plan for the watershed. Both of these questions have been carefully and thoroughly considered by agencies of Prince George's County and the State of Maryland. The quality of treatment meets the standards determined by the State and the plant has been expressly placed in the County's Ten-Year Water and Sewerage Plan.

To be specific, the characteristics of the treated wastewater will be:

BOD-5:	3-5 mg/l
Suspended solids:	5-15 mg/l
pH:	6.0-7.0
Phosphate:	0.5-1.5 mg/l as P.

All of the foregoing is within the requirements set forth in a letter from the Maryland Environmental Health Administration which authorized our client to proceed with the preparation of final plans, dated March 2, 1973 (Exhibit 2). The point of discharge and the concept of the on-site treatment plant had much earlier, namely in December 1971, been approved by the Maryland Water Resources Administration (then known as the Department of Water Resources) (Exhibit 3). The 1971 report stated:

> "On the basis of information provided by the consultants, Ben Dyer and Associates, and on the basis of calculations performed by this Department, the proposed discharge from this sewage treatment plant will not result in violation of the State's water quality standards and/or the Department's regulations. The Department of Water Resources, therefore, recommends approval of this discharge."

As pointed out in a letter from the Environmental Health Administration, dated February 8, 1973, revisions in the proposed plant following the 1971 report had the result of "discharging a smaller volume of effluent which will receive a greater degree of treatment and discharge to a stream which has a greater flow." (Exhibit 4).

Article 43, Sec. 388 of the Annotated Code of Maryland provides that the State Board of Health (now the State Department of Health and Mental Hygiene) shall pass upon all points of sewage discharge and the design and construction of all sewerage systems. It is in accordance with the policies laid down by the State that the proposed plant was designed to provide tertiary wastewater treatment and thus produce an effluent of the highest quality. The State's most recent policy statement on "Interim Treatment Plants" approved by the Council on the Environment on February 5, 1973, is attached as Exhibit 5. It provides that interim treatment plants (a) may not be planned to operate for more than five years, (b) must be in the County's Ten-Year Water and Sewerage Plan, (c) must meet applicable health and water quality requirements, (d) must be publicly owned and operated, (e) must alleviate a raw sewage overflow problem where it exists.

The plant in issue here (a) is planned to operate for not more than two years, when the proposed addition to the Western Branch Treatment Plant will permit connection to the public sewer system, (b) is contained in the County's Ten-Year Plan, (c) meets applicable health and water quality requirements, as indicated above, (d) will be operated by the Washington Suburban Sanitary Commission, a public agency (see Exhibit 6); see also response to W.S.S.C. (Exhibit 7). The raw sewage overflow problem does not exist in this set of circumstances.

Under the laws of the State of Maryland, responsibility for dealing with problems of health and the environment is vested in State agencies. Land-use planning, on the other hand, is the responsibility of the Counties. With regard to the installation of a temporary on-site wastewater treatment plant, the County discharges that function by adopting the so-called Ten-Year Water and Sewerage Plan and annual revisions thereof, pursuant to Article 43, Sec. 387C of the Maryland Annotated Code.

Although health matters are a responsibility of the State and the Ten-Year Plan is merely a planning

tool, the unique character of interim treatment plants (the Prince George's County Council has, to date, approved only three such plants) has caused the County to use its power under the Ten-Year Plan law to impose conditions on the operation of the proposed on-site plant beyond those imposed by the State. These conditions, incorporated into the annual revision of the Ten-Year Plan, adopted by the Prince George's County Council on November 29, 1972 and effective upon approval by the State Department of Health and Mental Hygiene on February 1, 1973 (Exhibit 8), impose the further additional requirements:

a. That the advanced treatment processes outlined by Dr. Cookson in his written testimony be installed.

b. That there be no bypass mechanism which would allow untreated sewage to by-pass the plant in times of overload.

c. That excess chlorine be removed from the effluent after adequate contact time has elapsed to effect the disinfection proposed by Dr. Cookson.

d. That virus sampling of the effluent be done on a routine basis, at least monthly, by a competent laboratory, at the owner's expense.

e. That multi-media filters, similar to those used at the Lake Tahoe plant be required.

f. That there be a meter to constantly record the flow of sewage into the plant.

g. There shall be a pre-set limit to the number of connection allowed and strict adherence to this limit.

h. There shall be a large surge tank to equalize the flow into the plant so that the flow through the treatment process during peak hours of use approximates the flow during low usage periods.

i. A recycling capability shall be built into the plant, so that if any unit of the plant falls below the expected standard of treatment, the sewage can be sent back through the plant to insure proper treatment.

j. A double, completely independent, power supply shall be required.

k. The plant shall be run by WSSC using a trained and experienced maintenance crew.

l. The method of sludge disposal shall be clearly outlined.

m. The plant shall be closed as soon as public sewage facilities become available.

n. That the effluent be enclosed in a pipe to a point in the stream where there is a continuous year-round flow of water, as recommended by the City of Greenbelt.

o. That an emergency connection with the WSSC community sewer system will be built so that if a problem developed at the plant, sewage could be placed in the WSSC system instead of directly into the receiving stream.

p. And finally, that sewage effluent will be treated with break-point chlorination to inactivate viruses with subsequent de-chlorination to meet State water quality standards.

The Dr. Cookson referred to in the foregoing conditions is Dr. John T. Cookson, Jr., Associate Professor in the Department of Civil Engineerings of the University of Maryland and Director of the University's Environmental Health Science and Engineering Training Program. He has served as technical consultant to Greenbriar Associates. His statement to the Prince George's County Council, which was incorporated into the conditions by reference, is attached as Exhibit 9.

You have also inquired about the Department of Agriculture wastewater treatment plant in the vicinity of Greenbelt. That plant is located approximately two and one half miles downstream from the Greenbriar point of discharge. It discharges approximately 400,000 gd. As distinct from the Greenbriar plant which will employ the latest advances in technology and produce an effluent of high quality, the Department of Agriculture plant is an older unit, whose effluent is of relatively poor quality. The State Department of Health, which has set the standards to which the Greenbriar Plant will adhere, has instructed the Department of Agriculture to upgrade its plant. It is our understanding that such upgrading will take place in the foreseeable future.

(1)(b). Environmental Impact of the Apartment Project

The reason for building the on-site treatment plant is to permit construction to proceed on the Greenbriar garden apartment project. Greenbriar is an attractively-designed apartment project, which is to contain 1,193 units, described in detail in Exhibit 10.

The tract is identified as Residential Neighborhood Area 21 in the Master Plan for College Park - Greenbelt and Vicinity, which recommended R-30 zoning for the tract. It has been zoned in accordance with the Plan and the construction is to take place in accordance with the zoning. Though completely in compliance with the Plan and the zoning, the proposed development differs slightly from the requirements of the County's so-called "bedroom ordinance". An exception to those requirements has been granted by the County.

What I want to emphasize at this point is that Prince George's County no longer permits uncontrolled growth. The Greenbriar project has been carefully and closely scrutinized by all local agencies having jurisdiction over the matter and was ultimately cleared for construction. Most, if not all, of the questions raised by you have been examined at the local level.

The planning for the development has to the maximum extent possible attempted to make this development harmonious with its surroundings. Seventy percent of the ground area will be left as open space. It is

undoubtedly true that the construction of this residential development will have some environmental impact. However, due to the self-contained location of the area,being enclosed by the NASA installation on one side and major highways on the other sides, direct environmental impact will not extend beyond the confines of the development.

No detrimental effects to the immediate senses in the form of noise or air pollution are likely. It is not expected that noise levels will be affected other than immediately adjacent to the buildings, themselves, which, in a residential community, is not undesirable. There will be no increase in noise outside the confines of the development. Such a garden-type development, also, with substantial green areas will not create significant increases in air pollution, particularly when consideration is given to the fact that the developer will be donating to the City of Greenbelt the funds needed to purchase five additional acres of adjacent land, which will be used for recreation purposes.

The question of traffic congestion was carefully considered by the Prince George's County Council. A copy of the traffic study submitted by the developer to the Council is enclosed herewith as Exhibit 11. Since the study was prepared, the decision to widen the Washington-Baltimore Parkway has been made.

Parking was another issue considered by the Council. The Greenbriar development will contain 2,020 parking spaces or 1.69 spaces per apartment.

Careful consideration was also given to the prospective additional school enrollment in the area. Under the occupancy limitations to which the developer has agreed (not more than two persons in a one-bedroom apartment, not more than four persons in a two-bedroom apartment and not more than five persons in a three-bedroom apartmnet) and which have been incorporated into the conditions of development, the development will produce 768 public school students. Under the Board of Education formula (which assumes six persons for every three-bedroom apartment), the number of public school children from Greenbriar would be 899. Plans of the

public school system of Prince George's County are based on the development of Greenbriar. A senior high school which is, in fact, surrounded by the Greenbriar tract is now under construction and is expected to open in September 1975. An elementary school site immediately adjacent to Greenbriar has been purchased by the Prince George's County Board of Education. In view of the extensive long-distance busing engaged in by the Prince George's County public school system, local impact is not significant. The total school system is equipped to pick up the children who would be living at Greenbriar.

Plans for the construction of Greenbriar are fully described in Exhibit 10. As to methods of construction, the following approach is used: Bulldozers initially clear and grade the site. A backhoe is then used to dig the footings. Concrete is poured and the heavy equipment is withdrawn. From then on brick and block are laid until the roof is reached. Wood floors are installed as the brick and block work proceeds. The roof is then completed, consisting of wood and asphalt shingles. Then the inside work, putting up of dry walls, plumbing, electrical work is completed. Toward the end of the job, heavy equipment is brought in again to pave the parking lots and build the public streets.

All the work is done on the property. There is, therefore, no disturbance of the area. On an average day, 50 - 75 workmen will be on the job.

In the process of construction, as many trees as possible will be left in place. Those that will be removed, largely scrub pine, will be replaced by shrubs and trees of better quality. About $250,000 will be spent by the developer on the initial landscaping.

Several other factors should also be considered with regard to the proposed development. As currently planned, the development will improve the recreational environment of the area. The developers are committed to contribute $43,000 for park purposes and five acres of land. This is in addition to the open spaces and recreational amenities provided by the developer which will include a community building, several swimming pools, volleyball, basketball and tennis courts.

Also, the proposed tertiary wastewater treatment plant will produce an effluent of extraordinarily high quality and could easily serve as a model for similar upgrading of the quality of wastewater treatment in other communities and for the use of small on-site plants to solve localized problems of wastewater treatment.

Furthermore, by speeding up the development of the tract, the proposed on-site plant will help partially to offset the problem which is now developing in Prince George's County as a result of the tightening of the sewer moratorium in the Anacostia and Western Branch Basins. As a result of the moratorium, a housing shortage is beginning to be felt and the construction industry in the County as well as related business and professional establishments are beginning to suffer from the decline in the volume of business and employment in the construction field. It is expected that by 1974 the results of the moratorium will be felt severely both with regard to the housing market and the depression in the construction industry. Greenbriar, with its 1,193 units, will help bridge the gap until the public sewer system is again available for connections.

Finally, the Greenbriar project is expected to be a significant tax asset to the City of Greenbelt and to Prince George's County. The revenue generated by it is expected to exceed the cost of the public services which it will require.

(2) Glen Ora Gardens

You have inquired about the plans for Glen Ora Gardens. Initially, it was thought that the proposed on-site wastewater treatment plant would serve both Greenbriar and Glen Ora. The plant was then scaled down to serve only Greenbriar. The capacity as now approved (325,000 gd) can serve only Greenbriar.

A few months ago, the developer informed the City of Greenbelt that he would be prepared to purchase and develop the Glen Ora tract (90% of which is owned by a subsidiary of the Westinghouse Corporation) at a lower density than is authorized if there were no community opposition to an increase in the capacity of the on-site treatment plant. When opposition was voiced by Mrs. Rhea Cohen and her associates, the plan was dropped.

Mr. Samuel W. Keller

May 4, 1973

Accordingly, there are no present plans for the development of Glen Ora prior to the availability of a connection to the public sewer system. If you wish to condition the grant of the right-of-way so as to limit the developer's authority to discharge an average of 325,000 gd per month, that would be acceptable to the developer.

(3) Building Restrictions

Mr. George Brugger, the developer's Prince George's County counsel, has been in touch with you on the subject of the building restrictions.

(4) Plans for Outfall Line

Plans for a closed line have been submitted to you. This matter is, therefore, resolved.

In looking for an alternative to the granting of this right-of-way, the following options are available:

(a) run the line across adjacent Interior Department land;

(b) run the line to an intermittent stream on the developer's land;

(c) run no line at all.

The first of the foregoing options is not significantly different from this request.

The second option is eliminated by the fact that the County, out of an abundance of caution, has required the line to be laid to a free-flowing stream.

The third option would have seriously adverse financial consequences for the developer and would not entail any benefits from the point of view of the community, for the people who need housing exist and there is a developing shortage of housing. Because of its high quality Greenbriar has been found a desirable

Mr. Samuel W. Keller

May 4, 1973

development by both the City of Greenbelt and Prince George's County and their decisions are entitled to great weight, particularly as both of these units of government are aware of environmental problems and have taken them into account in their land use policies.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Enclosures
HAND-DELIVERED

EXHIBIT 14

Rozansky & Kay
CONSTRUCTION COMPANY
801 SLATERS LANE, SUITE 21
ALEXANDRIA, VIRGINIA 22314 · PHONE (703) 836-5888

May 14, 1973

Mr. Saul Cohen
Goddard Space Flight Center
Good Luck Road
Greenbelt, Maryland 20771

RE: Greenbriar

Dear Mr. Cohen:

I have enclosed a copy of the Prince Georges County Ten Year Sewer and Water Plan map that was approved by the Prince Georges County Government and accepted by the State Department of Health and Mental Hygiene. One of the requirements in the Prince Georges County Ten Year Sewer and Water Plan was that the temporary treatment plant must be dismantled and the project connected to permanent sewer facilities as soon as they were available (in this instance, the expanded Western Branch Plant, in the fall of 1974). Also enclosed is a copy of the minutes of the February 28, 1973 meeting of the Washington Suburban Sanitary Commission, showing the Commission's agreement to operate and maintain the temporary sewer treatment plant for Greenbriar.

The letters from the Maryland State Department of Transportation and our engineer, Ben Dyer Associates, explain the 20-foot planned taking for the widening of the Baltimore/Washington Parkway. As you will note, we have had to move our plant, pipes, pumping station, etc., out of the planned right-of-way taking.

The Building Permit for the plant, issued by Prince Georges County, signifies that all criteria and requirements imposed by the County have been met.

If there is any additional information I can furnish, please do not hesitate to let me know. Thank you in advance for your cooperation.

Very truly yours,

Alan I. Kay

AIKSG
ENC'S

Wednesday, February 28, 1973
Hyattsville, Maryland

Invitation to Visit Can-Tex Fabrication Plant, Mineral Wells, Texas, March 14-15, 1973

On motion of Commissioner Brooks, seconded by Commissioner Peterson, and with the affirmative vote of Commissioners Brooks, Peterson, Elliott, McRory and Norris, Commissioner Hubbel being temporarily absent, the Commission approved participation in a trip to Can-Tex Fabrication Plant, Mineral Wells, Texas, March 14-15, 1973, for the appropriate Commission personnel involved in both the design and operation of Prefabricated Wastewater Treatment Plants in or proposed for the WSSD, and further authorized the designation of the individuals by the General Manager.

Operation and Maintenance Greenbriar Temporary Sewage Treatment Plant - Greenbelt, Prince George's County

Report 73S05712A:

On motion of Commissioner Norris, seconded by Commissioner Peterson, and with the affirmative vote of Commissioners Norris, Peterson, Brooks, Elliott and McRory, Commissioner Hubbel being temporarily absent, the Commission authorized the acceptance of the operation and maintenance for the proposed wastewater treatment facility for the Greenbriar Sewage Treatment Plant, and further stipulated that the Commission will, in fact, maintain and operate this temporary sewage treatment plant at the developer's expense, and directed the staff to advise the interested parties accordingly.

Commissioner Hubbel returned to the meeting at this time.

Commission Recognition of Carter C. Hubbel

Chairman Elliott formally thanked Commissioner Carter C. Hubbel for his participation as a Commissioner, and presented a Certificate of Appreciation and Willing Water Plaque.

Commissioner Hubbel then stated that it had been a pleasure to work with the Commission.

Each of the Commissioners then expressed their individual thanks to Mr. Hubbel, and wished him continuing success for the future.

Adjournment

The Commission meeting adjourned at 5:55 p.m., EST.

Secretary

Maryland Department of Transportation
State Highway Administration

Harry R. Hughes
Secretary
David H. Fisher
Administrator

GREENBELT

PLEASE REPLY TO:
OFFICE OF DISTRICT ENGINEER
9300 KENILWORTH AVENUE
GREENBELT, MARYLAND 20770
M. S. Caltrider
District Engineer

April 26, 1973

Mr. Allan I. Kay
Greenbriar Associates
501 Slaters Lane
Alexandria, Virginia 22314

Baltimore-Washington Parkway
Future Reconstruction in the
Vicinity of NASA Interchange
Prince George's County

Dear Mr. Kay:

I refer to recent correspondence and conversations concerning your proposed development of a temporary sewage treatment plant adjacent to the Baltimore-Washington Parkway near the NASA interchange.

As indicated in my letter dated April 19, 1973, all of your facilities whether temporary or permanent in nature must be located outside the existing Baltimore-Washington Parkway right-of-way, and also outside of the proposed twenty feet addition to the existing Baltimore-Washington Parkway right-of-way. The State Highway Administration has no jurisdiction now and will not have jurisdiction over land development on private property adjacent to the Baltimore-Washington Parkway.

A review of a letter dated March 19, 1973 addressed to Mr. John Woryk, of the Prince George's County Department of Licenses and Permits, by Charles Lee, Chief, of the Development Engineering Section of the State Highway Administration, indicates the same information which I have outlined in this letter. Mr. Lee's letter dated March 19, 1973 and my letter to your dated April 19, 1973 are in agreement as to the requirements necessary for the protection of future right-of-way for the reconstructed Baltimore-Washington Parkway.

Very truly yours,

M. S. Caltrider
District Engineer

MSC:gf

Maryland Department of Transportation
State Highway Administration

Harry R. Hughes
Secretary
Bernard M. Evans
Administrator

May 7, 1973

Mr. Clifford A. Hilton
Division Engineer
Design Division
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

Re: Prince Georges County
Baltimore/Washington Parkway
Bldg. Permit 299-73CG
GREENBRIAR SEWAGE PLANT
& PUMPING STATION

Dear Mr. Hilton:

Reference is made to your letter dated April 9, 1973, concerning the proposed temporary Greenbriar Wastewater Treatment Plan and the Permanent Sewage Pumping Station.

Pursuant to your request, we contacted our Bureau of Highway Design who have determined that approximately 20 ft. of additional Right of Way will be required to support the proposed reconstruction of the Baltimore/Washington Parkway in the area of the subject site. The above was determined in consultation with District Engineer, M. S. Caltrider.

It is our understanding that Ben Dyer Associates are revising their plans to insure that all facilities whether temporary or permanent in nature are located outside of the proposed 20' addition to the Baltimore/Washington Parkway right of way.

Very truly yours,

Charles Lee, Chief
Development Engineering Section

by: Paul E. Finck
Asst. Development Engineer

CL:PEF:bk

cc: Mr. John Woryk
Mr. M. S. Caltrider
Mr. Wm. Lins, Jr.
Mr. D. Murray
Ben Dyer Associates
4705 Queensbury Rd.
Riverdale, Md. 20840

4705 QUEENSBURY ROAD, RIVERDAI MARYLAND 20840
TELEPHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

April 23, 1973

Greenbriar Associates
Suite 21, 501 Slaters Lane
Alexandria, Virginia 22314
ATTN: Mr. Alan Kay

RE: Greenbriar
Revision of Sewage Treatment
Plant Plans

Gentlemen:

In accordance with your request, we are revising the plans for the sewage treatment plant at this site to show no roads. buildings, pipe lines or other facilities within twenty (20) feet of the existing right of way line of the Baltimore-Washington Parkway.

We estimate that this revision will be completed by Wednesday, April 25, 1973.

Very truly yours,

BEN DYER ASSOCIATES, INC.

David F. Murray
Assistant Vice President

DFM/jd

A TOWN PERMIT IS REQUIRED

Prince George's County

DEPARTMENT OF LICENSES & PERMITS

BUILDING PERMIT

HAS BEEN ISSUED

PERMIT NUMBER 294-73-CG 299-73-CC

DATE ISSUED 4/25/73

BUILDING ADDRESS: Washington Parkway 7915 Marlboro Road Greenbelt, Md.

This authorization generally applies to the following:

LOT NO.	BLOCK NO.	LIBER	FOLIO
Parcel No. 23		[illegible]	95

DESCRIPTION OF WORK: Construct Sewage Treatment Plant

SUBDIVISION: Greenbelt

ELECTION DISTRICT:

OWNER'S NAME AND ADDRESS: Greenbelt Associates, 5012 Eleven Long Mobile 22, Alexandria, Va. 22314

PHONE NO.: [illegible]

PERMIT STICKER

TO BE ACCOMPLISHED BY: 9/25/73

THIS PERMIT MUST BE POSTED

Be sure to read your Permit and call for inspections.

It shall be unlawful to deviate in any manner from, or to erase, or modify any lines or figures contained upon drawings after being stamped by the Inspector of Buildings or filed with him for reference; provided that if during the progress of the execution of such work it is desired to deviate in any manner affecting the construction or other essentials of the building from the terms of the application or drawing, notice of such intentions to alter or deviate shall be given in writing to the Inspector of Buildings, and his written assent shall be obtained before such alteration or deviation may be made. It shall be unlawful to fail or refuse to keep one full set of approved plans, officially stamped in the office of the Inspector of Buildings, on the building under erection, alteration or repair at all times.

It shall be the duty of the holder of every permit to notify the Inspector of Buildings verbally or in writing of the time when such building will be ready for inspection. Three such inspections must be called for on all buildings except sheds and garages, and two inspections shall be called for on such buildings — first and third.

The first of these inspections shall be called for as soon as the trenches for footings are completed.

The second inspection shall be called for when the main structural members are in place, but before covering same with lath or plaster, or other covering.

The third inspection shall be called for final approval.

Fences and free standing awnings require only a final inspection.

CALL BUILDING INSPECTION 24 HOURS BEFORE POURING FOOTINGS OR ANY CONCRETE

Phone 779-3850

County Service Building — Hyattsville, Maryland.

This permit is void six months from date issued if construction has not been started.

Fee: [illegible]

4703 QUEENSBURY ROAD, RIVERDALE, MARYLAND 20840
TELEPHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
April 6, 1973

Mr. George Ames
Environmental Matters
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

Dear Mr. Ames:

Re: Greenbriar Sewage Treatment Plant

This letter is to advise that we are revising the sediment control measures on the outfall line from the subject treatment plant. As per your suggestion, the earth diversion dikes with gravel filters are being replaced by dikes constructed of bailed straw.

Also, the plans for the outfall line are being made a part of the sewage treatment plant contract as per the requirements of Mr. Steve Kanofsky, Structural and Hydraulics Division, Washington Suburban Sanitary Commission.

Plans will be submitted for your review and comments when revisions are completed.

If there are any questions, please do not hesitate to contact this office.

Very truly yours,

BEN DYER ASSOCIATES, INC.

Richard Joshlin
Storm Drainage & Paving Section

RJ:pb
CC: Mr. Steve Kanofsky
Mr. Richard Schifter
Mr. George Brugger
Mr. Stanley Kay
Mr. Alan Kay

TELEPHONE (301) 779-6500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
April 6, 1973

Mr. Steve Kanofsky
Structural & Hydraulics Division
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

Dear Mr. Kanofsky:

Re: Greenbrier Sewage Treatment Plant

This letter is to confirm our recent phone conversation in which the following items, in regard to maintenance of the subject project, were discussed and agreed upon.

1. Electrical service to the treatment plant will be in the name of the Owner. The Owner will be billed directly by the Power Company.

2. The Storm Water Detention Basin will be maintained by the Owner.

3. The grounds in the area of the Treatment Plant will be maintained by the Owner. This will primarily consist of cutting the grass and making repairs to the access road.

4. The Owner will be responsible for the painting of tanks, inside walls of buildings and/or other items that may require repainting in the event the Treatment Plant remains in service for a longer period of time than the life of the initial painting.

It is understood that charges for the above listed items will not be included as part of the Commission's estimates of maintenance cost.

If there are any questions, please do not hesitate to contact this office.

Very truly yours,

BEN DYER ASSOCIATES, INC.

Richard S. Joshlin

Richard S. Joshlin
Storm Drainage & Paving Section

REPUBLIC INSURANCE COMPANY
129 FULTON STREET
NEW YORK, NEW YORK 10038

BOND

KNOW ALL MEN BY THESE PRESENTS, That WE, GLENN DALE CONSTRUCTION CO INC., of 9913 Good Luck Road, Seabrook Maryland as Principal and JEROME D KAY AND STANLEY G KAY AS Co-Principals and the REPUBLIC INSURANCE COMPANY, a Texas corporation authorized to do business in the state of Maryland, having an office and place of business at 129 Fulton Street, New York, New York, as Surety are held and firmly bound unto the PRINCE GEORGES COUNTY MARYLAND, as Obligee, in the sum of ONE HUNDRED SIXTY FIVE THOUSAND AND00/100 ($165,000.00) DOLLARS, lawful money of the United States for the payment whereof to the Obligee, the Principal and the Surety bind themselves, their successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DATED THIS 3rd day of April 1973.

WHEREAS, Greenbriar Associates and the Obligee entered into a certain written Agreement dated March 21,1973 relative to installation of improvements and other conditions as indicated on map entitled "Greenbriar" to wit:

"Neptune NicroEloc tertiary treatment plant unit, pump control inside piping, filter building, dechloration building and equipment and chloration equipment"
and which said Agreement is hereby made a part hereof with the same force and effect as if it were fully set forth herein.

WHEREAS, THE Co-Principals have a beneficial interest in said project;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal and CoPrincipals shall well and truly perform all of the terms covenants and conditions of said Agreement on their part to be performed, then this obligation to be null and void; otherwise to remain in full force and effect.

GLENN DALE CONSTRUCTION CO INC.,

BY: _____

Jerome D Kay, Co-Principal

_____

Stanley G Kay, Co-Principal

REPUBLIC INSURANCE COMPANY

BY: _____

Thomas J Keenan,
Attorney-in-Fact

BOND #910566

ACKNOWLEDGMENT

COPARTNERSHIP

STATE OF MARYLAND
COUNTY OF PRINCE GEORGE'S } SS:

On this 4th day of April 1973, before me personally appeared JEROME D. KAY to me known and known to me to be one of the firm of Glenn Dale Construction Co. Inc. described in and who executed the foregoing instrument and he thereupon acknowledged to me that he executed the same as and for the act and deed of said firm.

Sharon S. Goodrich

My commission expires July 1, 1974.

CORPORATE

STATE OF MARYLAND
COUNTY OF PRINCE GEORGE'S } SS:

On this 4th day of April 1973, before me personally appeared JEROME D. KAY to me known, who, being by me first duly sworn, did depose and say that he resides in Maryland; that he is the President of Glenn Dale Construction Co. Inc. the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the corporate seal affixed to said instrument is such corporate seal; that it was so affixed by order and authority of the Board of Directors of said corporation, and that he signed his name thereto by like order and authority.

Sharon S. Goodrich

My commission expires July 1, 1974.

INDIVIDUAL

STATE OF MARYLAND
COUNTY OF PRINCE GEORGE'S } SS:

On this 4th day of April 1973, before me personally appeared JEROME D. KAY, to me known and known to me to be the individual described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

Sharon S. Goodrich

My commission expires July 1, 1974.

FORM E-23

THE REPUBLIC INSURANCE COMPANY

Eastern Department: 129 FULTON STREET, NEW YORK, N.Y. 10038

FINANCIAL STATEMENT DECEMBER 31, 1971

ASSETS	1971
Cash	$ 1,495,296
Bonds, at mortized cost (Schedule I):	
United States Government	8,288,699
Other bonds	35,826,406
Commercial notes	15,100,000
Total Bonds	59,215,105
Investments in stocks other than stocks of affiliates (Schedule II):	
Preferred stocks, at market	10,446,176
Common stocks, at market	20,282,689
Savings and loan association shares, at cost	374,427
Total stocks	31,103,292
Investments in stocks of affiliates at underlying book value (Schedule II)	29,212,180
Agents' balances and reinsurance balances—net	16,965,336
Premium notes, less unearned interest	10,438,484
Real estate, at cost less accumulated depreciation of 467,598	1,516,521
Federal income tax refund	1,100,000
Other assets	748,451
Receivable from affiliates	946,876
	$152,501,841

LIABILITIES, RESERVES AND CAPITAL FUNDS	
Liabilities:	
Reserve for losses	$ 16,211,160
Reserve for loss adjustment expenses	1,895,309
Unearned premium reserve (Schedule VII)	85,153,150
Taxes, other than Federal income taxes	830,000
Dividends payable to shareholders	300,000
Other liabilities	1,160,855
Payable to affiliates	—
Statutory reserves:	
Excess of statutory reserves over loss and loss expense reserves	26,702
Reinsurance in companies not licensed in Texas	6,124
Total liabilities	105,583,300
Capital shares and surplus:	
Capital shares:	
Preferred stock, $100 par value per share. Authorized 200,000 shares, issued 150,000 shares	15,000,000
Common stock, $5 par value per share. Authorized 2,000,000 shares, issued 1,000,000 shares	5,000,000
Paid-in surplus	665,434
Retained earnings	5,544,210
Excess (deficiency) of market value of stocks over cost, other than stocks of affiliates	12,271,151
Excess of underlying book value of stocks of affiliates over cost	8,737,746
Total capital shares and surplus	47,218,541
	$152,501,841

Note: All securities are carried in accordance with the requirements of the National Association of Insurance Commissioners as follows: eligible bonds at amortized values; stocks of associated insurance companies at pro rata share of capital and surplus; all other securities at quotations prescribed by the Association.

BE IT REMEMBERED, that at a regular meeting of the Board of Directors of Republic Insurance Company, duly called and held at the office of the Company in the City of Dallas, Texas, on the 28th day of February, 1967, a quorum being present, the following By-Laws was duly adopted to become effective February 28, 1967:

ARTICLE XI – APPOINTMENT OF ATTORNEYS-IN-FACT

Appointment of Attorney-in-Fact. The President, or any Executive Vice President, may from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Company in the execution of policies of insurance, bonds, undertakings, and other obligatory instruments of like nature. Such attorney-in-fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Company by their signature and execution of any such instruments and to attach the seal of the Company thereto. The President, or any Executive Vice President, or the Board of Directors, may at any time revoke all power and authority previously given to any attorney-in-fact.

STATE OF NEW YORK
COUNTY OF NEW YORK } ss:

Geogge J McGovern, being duly sworn, deposes and says: I am Attorney-in-Fact of the Republic Insurance Company, I have compared the foregoing By-Law with the original thereof, as recorded in the Minute Book of the said Company, and do hereby certify that the same is a correct and true transcript therefrom and of the whole Article XI, of said original By-Law and that the same is now in full force and effect. Pursuant to said By-Law, George J. McGovern, Thomas J. Keenan, John F. Knight, Ralph L. Price, and Martin F. Perry were duly appointed Attorneys-in-Fact of this Company without limitation as to amount of bond executed and that said appointment is now in effect.

The above is a true statement of the assets and liabilities of said Company at the close of business December 31, 1971 taken from the books and records of said Company and is prepared in accordance with the statements on file with the Insurance Department of the State of New York.

The Superintendent of Insurance of the State of New York has, pursuant to Section 327 of the New York Insurance Law (Chapter 882 of the Laws of 1939 of the State of New York, constituting Chapter 28 of the Consolidated Laws of the State of New York, as amended) issued to the Republic Insurance Company his certificate that said Company is qualified to become and be accepted as surety or guarantor on all bonds, undertakings and other obligations or guarantees, as provided in the Insurance Law of the State of New York, and all laws amendatory thereof and supplementary thereto; and that such certificate has not been revoked.

George J McGovern

Sworn to before me this 3rd day of April, 19 73

Notary Public, State of New York
No. 24-2425750
Qualified in Kings County
Commission Expires March 30, 1973

STATE OF NEW YORK
COUNTY OF NEW YORK } ss:

On this 3rd day of April, 19 73, before me personally came Thomas J Keenan New York to me known, who being by me duly sworn, did depose and say that he resides Massapequa that he is an attorney-in-fact of the Republic Insurance Company, the corporation described in, and which executed, the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal; that it was affixed thereto by the order of the Board of Directors of said corporation and that he signed his name thereto, as attorney-in-fact, by like order and authority.

Notary Public

REPUBLIC INSURANCE COMPANY
129 FULTON STREET
NEW YORK, NEW YORK 10038

BOND

KNOW ALL MEN BY THESE PRESENTS, That We, GLENN DALE CONSTRUCTION CO. INC, of 9913 Good Luck Road, Seabrook, Maryland as Principal and JEROME D KAY AND STANLEY G KAY AS Co-Principals and the REPUBLIC INSURANCE COMPANY, a Texas corporation authorized to do business in the State of Maryland having an office and place of business at 129 Fulton Street, New York, New York, as Surety are held and firmly bound unto the PRINCE GEORGE"S COUNTY MARYLAND, as Obligee, in the sum of ONE HUNDRED SEVENTY FIVE THOUSAND AND 00/100 ($175,000.00) DOLLARS, lawful money of the United States of America for the payment whereof to the Obligee, the Principal and the Surety bind themselves, their successors and assign s, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DATED THIS 3rd day of April 1973.

WHEREAS, Greenbriar Associates and the Obligee, entered into a certain written agreement Dated March 21,1973 relative to installation of improvements and other conditions as indicated on map entitled " Greenbriar" to wit:

"Site improvements, clearing, grading, access roads, DAVCO primary and secondary treatment, plant unit, blowers, blower building emergency generator, outside piping and pumping station
and which Agreement is hereby made a part hereof with the same force and effect as if it were fully set forth herein.

WHEREAS, THE Co-Principals have a beneficial interest in said project;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal and Co-Principals shall well and truly perform all of the terms, covenants and conditions of said Agreement on their part to be performed, then this obligation to be null and void; otherwise to remain in full force and effect.

GLENN DALE CONSTRUCTION CO INC.,

BY: _____

Jerome D Kay, Co-Principal

_____

Stanley G Kay, Co-Principal

REPUBLIC INSURANCE COMPANY

BY: _____

Thomas J Keenan,
Attorney-in-Fact

BOND # 910565

COMPANY

BOND

KNOW ALL MEN BY THESE PRESENTS, That We, GLENN DALE CONSTRUCTION CO., INC., of 9913 Good Luck Road, Seabrook, Maryland as Principal and JEROME D. KAY AND STANLEY G. KAY AS Co-Principals and the REPUBLIC INSURANCE COMPANY, a Texas Corporation, authorized to do business in the State of Maryland having an office and place of business at 129 Fulton Street, New York, New York as Surety, are held and firmly bound unto the PRINCE GEORGE'S COUNTY, MARYLAND AS Obligee, in the sum of ONE HUNDRED SIXTY THOUSAND AND 00/100 ($160,000.00) DOLLARS, lawful money of the United States, for the payment whereof to the Obligee, the Principal and Surety bind themselves, their successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DATED THIS 3rd day of April, 1973.

WHEREAS, Greenbriar Associates and the Obligee entered into a certain written Agreement dated March 21, 1973, relative to installation of improvements and other conditions as indicated on map entitled, "Greenbriar", to Wit: Second phase of construction, complete inculding primary and secondary unit, tertiary treatment plant unit, building addition, outside piping, blowers and additional emergency generator, and which said Agreement is hereby made a part hereof with the same force and effect as if it were fully set forth herein.

WHEREAS, the Co-Principals have a beneficial interest in said project;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal and Co-Principals shall well and truly perform all of the terms, covenants and conditions of said Agreement on their part to be performed, then this obligation to be null and void, otherwise to remain in full force and effect.

GLENN DALE CONSTRUCTION CO., INC.

BY: _____

Jerome D. Kay, Co-Principal

_____

Stanley G. Kay, Co-Principal

REPUBLIC INSURANCE COMPANY

BY: _____

Thomas J. Keenan, Attorney-in-Fact

BOND #910567

WASHINGTON SUBURBAN SANITARY COMMISSION
4017 Hamilton Street, Hyattsville, Maryland 20781 | APpleton 7-7700

AGENDA

COMMISSION MEETING WEDNESDAY, MARCH 28, 1973

12:00 Commissioners' Lunch

1:00 Board of Trustees Meeting

2:00 Commissioners', Staff and Committee Reports

2:30 Administrative Items
- Approval of Previous Minutes - March 14, 1973
- Approval of Draft Minute Entry Montgomery County Assessment Hearing

2:45 General Manager Items
1. National Microfilm Association Conference
2. Budget Supplement - Burns Guard Service
3. Reprinting of Triadelphia Lake Map and Printing of New T. Howard Duckett Reservoir Map.
4. Discussion Items

3:15 Personnel Items - Personnel Director
- Memo - Establishment of Training and Development Officer Classification.

3:30 Legal Items - Principal Counsel

Land and Property Items:
1. 72AW5453A - Water Ext. Pooks Hill Road, Bethesda
   Zebulon J. Brodie, et ux

Miscellaneous Items:
1. Authorization for settlement of claim for property due to sewer backup - $1,750.00
   William Carey, et ux vs. WSSC, Law #50,524
2. Review of disposal of surplus property at 4100 Gallatin Street, Hyattsville, Maryland.
3. Report on Legislation (Messrs. Niles and Byrd)

General Counsel Items
1. Litigation Report.
2. General Matters.

4:00 Storm Drain Hearing - 730473 - Cool Spring Village

4:15 Storm Drain Hearing - 730472 - New Carrollton - 89th Place

AGENDA
COMMISSION MEETING
WEDNESDAY, MARCH 28, 1973

4:30 **Financial Items**

1. Comments on Eight Months Statement Fiscal 72-73 Compared with 71-72.
2. Treasurer's Explanation of the Eighth Month Payroll Data and Overtime By Years.
3. Approval of Purchasing Contract #9555 Asphalt Maintenance Mixture.
4. Approval of Purchasing Contract #9553 WSSC Standardized Fire Hydrants Complete.

4:45 **Engineering Items - Director of Planning and Engineering**

Authority to Advertise for Bids
Award of Contracts

Retention of Consultants - Over $200,000

Water & Sewer Reports

1. 735845 - Orrison Property	Letter of Regret
2. 735846 - Sycamore Acres	Letter of Regret
3. 735851 - Beau Monde Estates	Letter of Regret
4. 735855 - Beau Monde Estates	Letter of Regret
5. 714927 - Greenbriar Apartments - Anacostia	Water & Sewer
6. 735815 - Rocky Brook Park (Anacostia)	Water
7. 735847 - Spring Park (Piscataway Creek)	Water
8. 735843 - Dixie Dale (Anacostia - Health Dept.)	Sewer
9. 735854 - Damascus Area (Little Bennett Creek) Health Dept.	Water
10. 735855 - Columbia Highlands (Anacostia) (To be distributed at meeting)	Water
11. 683461 - Parkside Sub. (Anacostia)	Reauth. W&S, Part III
12. 704165 - Cipriano Woods Twnhse. Western Br.	Time Ext. Part II
13. 715025 - Goddard's Add. to Waldon Woods Piscataway Creek	Time Ext. Part I & II

Structure Relocation

14. 736606 - Southlawn Lane	Temp. 8" Water Conn.

Additional Engineering Items

15. Montgomery County AWT Plant Task Order Number 3.
16. Montgomery County AWT Plant Task Order Number 4.
17. Letter Re: CIP FY 1974-79.

6:00 Adjourn

* * * * * * *

REPUBLIC INSURANCE COMPANY
129 FULTON STREET
NEW YORK, NEW YORK 10038

B O N D

KNOW ALL MEN BY THESE PRESENTS, That We, GLENN DALE CONSTRUCTION CO. INC, of 9913 Good Luck Road, Seabrook, Maryland as Principal and JEROME D KAY AND STANLEY G KAY AS Co-Principals and the REPUBLIC INSURANCE COMPANY, a Texas corporation authorized to do business in the State of Maryland having an office and place of business at 129 Fulton Street, New York, New York, as Surety are held and firmly bound unto the PRINCE GEORGE"S COUNTY MARYLAND, as Obligee, in the sum of ONE HUNDRED SEVENTY FIVE THOUSAND AND 00/100 ($175,000.00) DOLLARS, lawful money of the United States of America for the payment whereof to the Obligee, the Principal and the Surety bind themselves, their successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DATED THIS 3rd day of April 1973

WHEREAS, Greenbriar Associates and the Obligee, entered into a certain written agreement Dated March 21,1973 relative to installation of improvements and other conditions as indicated on map entitled " Greenbriar" to wit:

"Site improvements, clearing, grading, access roads, DAVCO primary and secondary treatment, plant unit, blowers, blower building emergency generator, outside piping and pumping station
and which Agreement is hereby made a part hereof with the same force and effect as if it were fully set forth herein.

WHEREAS, THE Co-Principals have a beneficial interest in said project;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal and Co-Principals shall well and truly perform all of the terms, covenants and conditions of said Agreement on their part to be performed, then this obligation to be null and void; otherwise to remain in full force and effect.

GLENN DALE CONSTRUCTION CO INC.,

BY: _____

_____
Jerome D Kay, Co-Principal

_____
Stanley G Kay, Co-Principal

REPUBLIC INSURANCE COMPANY

BY: _____
Thomas J Keenan,
Attorney-in-Fact

BOND # 910565

REPUBLIC INSURANCE COMPANY
129 FULTON STREET
NEW YORK, NEW YORK 10038

BOND

KNOW ALL MEN BY THESE PRESENTS, That WE, GLENN DALE CONSTRUCTION CO INC., of 9913 Good Luck Road, Seabrook Maryland as Principal and JEROME D KAY AND STANLEY G KAY AS Co-Principals and the REPUBLIC INSURANCE COMPANY, a Texas corporation authorized to do business in the state of Maryland, having an office and place of business at 129 Fulton Street, New York, New York, as Surety are held and firmly bound unto the PRINCE GEORGES COUNTY MARYLAND, as Obligee, in the sum of ONE HUNDRED SIXTY FIVE THOUSAND AND00/100 ($165,000.00) DOLLARS, lawful money of the United States for the payment whereof to the Obligee, the Principal and the Surety bind themselves, their successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DATED THIS 3rd day of April 1973.

WHEREAS, Greenbriar Associates and the Obligee entered into a certain written Agreement dated March 21,1973 relative to installation of improvements and other conditions as indicated on map entitled "Greenbriar" to wit:

"Neptune NicroBloc tertiary treatment plant unit, pump control inside piping, filter building, dechloration building and equipment and chloration equipment"
and which said Agreement is hereby made a part hereof with the same force and effect as if it were fully set forth herein.

WHEREAS, THE Co-Principals have a beneficial interest in said project;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal and CoPrincipals shall well and truly perform all of the terms covenants and conditions of said Agreement on their part to be performed, then this obligation to be null and void; otherwise to remain in full force and effect.

GLENN DALE CONSTRUCTION CO INC.,

BY: _____

Jerome D Kay, Co-Principal

_____

Stanley G Kay, Co-Principal

REPUBLIC INSURANCE COMPANY

BY: _____

Thomas J Keenan,
Attorney-in-Fact

BOND #910566

COMPANY

NEW YORK, NEW YORK

B O N D

KNOW ALL MEN BY THESE PRESENTS, That We, GLENN DALE CONSTRUCTION CO., INC., of 9913 Good Luck Road, Seabrook, Maryland as Principal and JEROME D. KAY AND STANLEY G. KAY AS Co-Principals and the REPUBLIC INSURANCE COMPANY, a Texas Corporation, authorized to do business in the State of Maryland having an office and place of business at 129 Fulton Street, New York, New York as Surety, are held and firmly bound unto the PRINCE GEORGE'S COUNTY, MARYLAND AS Obligee, in the sum of ONE HUNDRED SIXTY THOUSAND AND 00/100 ($160,000.00) DOLLARS, lawful money of the United States, for the payment whereof to the Obligee, the Principal and Surety bind themselves, their successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DATED THIS 3rd day of April, 1973.

WHEREAS, Greenbriar Associates and the Obligee entered into a certain written Agreement dated March 21, 1973, relative to installation of improvements and other conditions as indicated on map entitled, "Greenbriar", to Wit: Second phase of construction, complete incuding primary and secondary unit, tertiary treatment plant unit, building addition, outside piping, blowers and additional emergency generator, and which said Agreement is hereby made a part hereof with the same force and effect as if it were fully set forth herein.

WHEREAS, the Co-Principals have a beneficial interest in said project;

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GLENN DALE CONSTRUCTION CO., INC.

BY: _____

_____
Jerome D. Kay, Co-Principal

_____
Stanley G. Kay, Co-Principal

REPUBLIC INSURANCE COMPANY

BY: _____
Thomas J. Keenan, Attorney-in-Fact

BOND #910567

71AS4927A(Sup.)
71CT4927A(Sup.)
71CP4927A(Sup.)

INTER-OFFICE MEMORANDUM

WATER AND SEWER
HANOVER PARKWAY AND VARIOUS STREETS
GREENBRIAR APARTMENTS
BERWYN ELECTION DISTRICT #21
PRINCE GEORGE'S COUNTY
(See Report #71AS/CT/CP5094A dated May 11, 1971)

(Anacostia)

On February 10, 1971, the Commission granted for Rozansky and Kay, a conditional authorization for the Greenbriar Apartment Project. Sewerage service was to be provided by extensions within the Anacostia Watershed.

On May 21, 1971, the Commission approved "Plans Only" to serve this development and the Glen Ora Apartments by means of pumping into the Western Branch Watershed until the Anacostia sewer moratorium is lifted or modified.

The developer, Rozansky and Kay Construction Company, now intends to proceed with the development on the basis of a temporary sewage treatment plant to be located in the northern portion of the property as indicated on the attached sketch. The construction of the temporary sewage treatment plant has been included in the approved Ten Year Plan. This was approved by Prince George's County subject to certain operating standards, one of which was "that an emergency connection with the W.S.S.C. community sewer system will be built so that if a problem developed at the plant, sewage could be placed in the W.S.S.C. system instead of directly into the receiving stream." The Commission, on February 28, 1973, agreed to operate the temporary plant at the developer's expense and the Health Department, on March 2, 1973, approved a point of discharge application. The temporary plant will remain in operation until such time as service can be provided either by the Western Branch or the Anacostia Sewerage Systems.

The water and sewerage facilities necessary to serve Greenbriar Apartments initially by means of the temporary sewage treatment plant including the cost of the pumping station and force main is indicated under Part One and is estimated to cost $674,384.00, excluding the cost of the sewage treatment plant which will be built at the developers expense. To provide the above-mentioned emergency connection between the temporary plant and the Commission's sewerage system it will be necessary at this time to increase the size of certain relief sewers and to build other relief sewers in the Bald Hill Branch as indicated on sketch "B". The cost of this augmentation is estimated to be $206,670.00 and should be borne by the applicant ($21,480.00 has already been paid).

It should be noted that in the event of a malfunction the sewage from the temporary plant would be pumped to the Western Branch Sewers.

The cost of the sewers to be built under Part Two to permit service to be provided eventually by the Anacostia System is estimated to cost $154,402.00.

If the construction of water and sewer necessary to serve Greenbriar Apartments by means of the temporary sewage treatment plant is authorized, the Commission should require the necessary financial commitments from the developer to ensure the construction of the pumping station, force main and gravity sewers necessary for the abandonment

HYATTSVILLE, MARYLAND

71AS4927A(Sup.)
71CT4927A(Sup.)
71CP4927A(Sup.)

INTER-OFFICE MEMORANDUM

WATER AND SEWER
HANOVER PARKWAY AND VARIOUS STREETS
GREENBRIAR APARTMENTS
BERWYN ELECTION DISTRICT #21
PRINCE GEORGE'S COUNTY
(See Report #71AS/CT/CP5094A dated May 11, 1971)

(Anacostia)

of the temporary sewage treatment plant. On the basis of giving the developer credit of 50% of the sewer usage charge toward the pumping station, force main, and the cost of the outfall sewers, over and above normal, as set forth in the May 11, 1971 memorandum, the developer should be required to pay 88% of $431,136 being the estimated cost of the pumping station and force main. In addition, the developer should be required to agree to sign an agreement to assessment for the number of units necessary to finance the remainder of the project.

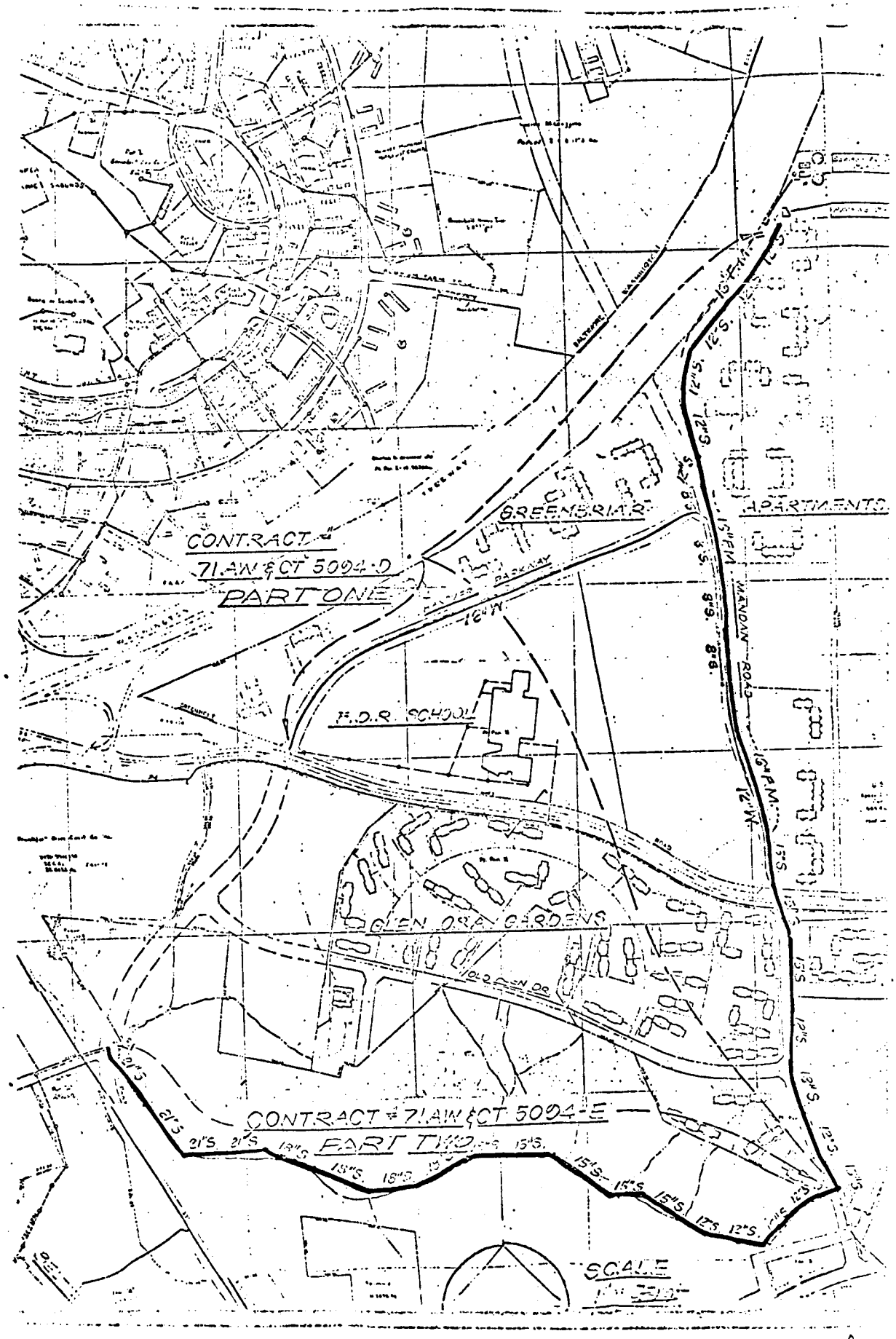
WWA:dsp
Endorsed:

E. J. LG

William W. Amos

Endorsed and transmitted to the Commission:

		Total Cost	Fixed Charge	Small Acreage				Total Yield	Surplus	Deficit
				1" 30'	1½" 60'	2" 150'	Over 300'			
Greenbriar Apartments										
1193 Units										
Part One										
2"W	5,400'	19.00	102,600.00	8,464.50						8,464.50
"S	11,283'	22.00	28,226.00	2,328.65						2,328.65
"S	1,892'	28.00	52,976.00	4,370.52						4,370.52
"S	1,269'	30.00	38,070.00	2,664.90						2,664.90
"S	668'	32.00	21,376.00	1,496.32						1,496.32
Total S	5,112'	-	190,648.00	10,860.39						10,860.39
Total S	10,512'	-	243,248.00	19,324.89	Total Assessment W&S 1193 Units X 15' per Unit X $2.31 =			49,604.94	30,280.05	
Force Main and Pumping Station										
	3,688		431,136.00	30,179.50						30,179.50
Total	14,200'	-	674,384.00	49,504.39				49,604.94	100.55	
Part Two										
"S	858'	28.00	24,024.00	1,981.98						1,981.98
"S	1,400'	30.00	42,000.00	2,940.00						2,940.00
"S	1,439'	32.00	46,048.00	3,223.36						3,223.36
"S	1,245'	34.00	42,330.00	2,963.10						2,963.10
Total S	4,942'	-	154,402.00	11,108.44						11,108.44
Total Parts One and Two										
S	19,142'	-	828,786.00	60,612.83						11,007.89
Less			379,400.00	26,558.00					26,558.00	
Total	19,142'	-	449,386.00	34,054.83					15,550.11	


CONTRACT
71.AW&CT 5094-D
PART ONE
GREENSBURG
APARTMENTS
MANDAN ROAD
H.D.R. SCHOOL
GLEN ORA GARDENS
OLD GLEN DR.
CONTRACT 71.AW&CT 5094-E
PART TWO
SCALE

Sheet 20

EXHIBIT 15a

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO
ATTN OF:

FILE 17280

MAY 31 1973

Mr. Robert Almond
Director of Operation
Department of Agriculture
Beltsville, Maryland 20705

Subject: Treatment of Sewage Treatment Effluent

Dear Mr. Almond:

Goddard Space Flight Center is presently confronted with a request for permission by the Greenbriar Apartment Project to dump treated sewage effluent from the Project into a drainage culvert located on Goddard property. This culvert crosses under the Baltimore-Washington Parkway and empties into an unmarked tributary of Beaver Dam Creek which crosses National Parkway Commission, City of Greenbelt, and Department of Agriculture property.

The type of treatment plant to be utilized by the apartment project is a tertiary treatment plant with a disinfectant unit utilizing a break-point chlorination process to disinfect the sewage effluent prior to dumping into the Goddard culvert. This Center has received information recently that the Department of Agriculture was instructed to upgrade the quality of effluent from its sewage treatment plant by the Potomac River Enforcement Conference, an instruction that was also concurred in by the State of Maryland Department of Health and Mental Hygiene.

Currently this Center has undertaken the task of evaluating the total impact of the above mentioned apartment project on the Center including a legal assessment of being party to (joint tort) possible dumping untreated or low quality sewage on adjoining property.

In order to take a position regarding the request, we are presently collecting factual information which will assist the Center in reaching a decision on this matter. It would be helpful, therefore,

Subject: Treatment of Sewage Treatment Effluent

2

if you would provide a brief summary describing actions taken by the Department of Agriculture to upgrade its sewage effluent. In addition if you would kindly forward required specifications for sewage effluent of the Potomac River Enforcement Conference this information would be useful.

Your cooperation in this matter is appreciated.

Yours truly,

Original Signed By

Robert J. McCaffery, Chief
Technical Services

EXHIBIT 15b

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
DIVISION OF OPERATIONS
AGRICULTURAL RESEARCH CENTER
BELTSVILLE, MARYLAND 20705

June 7, 1973

Mr. Robert J. McCaffery,
Chief, Technical Services
Goddard Space Flight Center, NASA
Greenbelt, Maryland 20771

Subject: Treatment of Sewage Effluent

Dear Mr. McCaffery:

In response to your memo of 31 May 1973, the Beltsville Agricultural Research Center is planning to upgrade its two secondary waste water treatment plants in order to meet the Potomac River Washington Metropolitan Area Enforcement Conference criteria for tertiary treatment. This criteria requires the following:

5-Day Biochemical Oxygen Demand (BOD) - 96% Removal
Total Nitrogen (N) - 85% Removal
Total Phosphorus (P) - 96% Removal

In order to provide the best course of action, a feasibility study was conducted by Matz, Childs, & Associates, Inc., Consulting Engineers. Expansion of the existing secondary plant with tertiary lagoons and the overland method of land treatment were recommended as most economical and feasible. This approach was accepted by us and design funds were obtained for its accomplishment. Presently, the final designs have been completed by the Consulting Engineers, and are being reviewed by my staff. In addition, an Environmental Impact Statement is also being compiled by my staff for this purpose.

If effluent of the Greenbriar Apartment project meets with all County, State, and Federal requirements, the Beltsville Agricultural Research Center will not object to the emptying of the effluent into the tributary of Beaver Dam Creek crossing Department of Agriculture property.

Hopefully, this information may be of use to you. Please feel free to call on Mr. D. J. Milano of my staff, or myself, if we can be of any further assistance.

Sincerely yours,

Robert L. Almond, Sr.
Head
Division of Operations

EXHIBIT 16a

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO
ATTN OF

FILE 1974
JUNE 25.

Greenbelt City Council
25 Crescent Road
Greenbelt, Maryland 20770

Gentlemen:

Rozansky and Kay Construction Company, developers of the Greenbriar Apartment Project, has requested permission from the Goddard Space Flight Center to dump treated sewage effluent into a drainage culvert located along the northwest property line of this Center.

The effluent would then flow under the Baltimore-Washington Parkway along with the normal drainage water from the Center and eventually find its way into an unnamed tributary of the Beaver Dam Creek, which according to our records flows through the City of Greenbelt property.

Building Permit Number 299-73-CG was issued by Prince Georges County on April 25, 1973 for the construction of a sewage treatment plant at the above apartment project. Information from the developers' law firm indicates that the Greenbriar Project "has been found a desirable development by both the City of Greenbelt and Prince George's County and their decisions are entitled to great weight, particularly as both of these units of Government are aware of environmental problems and have taken them into account in their land use policies."

Information on hand indicates that the City of Greenbelt is aware of the apartment project and the proposed, interim method

for sewage disposal. This Center, therefore, would appreciate any comments and concurrence, if appropriate, in the proposed Greenbriar Apartment Project and the ancillary sewage treatment plant. Information furnished will assist in arriving at a final decision.

Sincerely,

R. J. McCaffery, Chief
Technical Services

EXHIBIT 16b

CITY OF GREENBELT, MARYLAND
25 CRESCENT ROAD, GREENBELT, MD. 20770
PHONES: OFFICES 474-8000 • POLICE 474-5454 • RECREATION 474-6878

July 16, 1973

Mr. R. J. McCaffery, Chief
Technical Services
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. Mc Caffery:

At its meeting of July 9 the City Council discussed your request for comments with reference to the pipe extension across Goddard Space Flight Center property to discharge in a nearby stream for the temporary sewage treatment plant for the Greenbriar apartment development. The Council requested that the City Manager prepare a report concerning whether or not the treatment plant to be built complies with each of the conditions that the City Council set forth in its Resolution No. 226.

Upon the receipt of that report Council will advise you further as to its position on the proposed right-of-way. This matter is scheduled to be considered again by the Council at its special meeting to be held July 23, 1973.

Sincerely,

James K. Giese
City Manager

JKG:dc

Greenbelt Homes, Inc.
HAMILTON PLACE
GREENBELT, MARYLAND 20770

OFFICE OF
GENERAL MANAGER

TELEPHONE
474-5566

July 13, 1973

Mr. R. J. McCaffery
Chief, Technical Services
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. McCaffery:

We are aware that you have asked for the comments from the City of Greenbelt in regards to the application of Greenbriar Associates for a right-of-way across NASA property for a pipeline to serve the proposed sewage treatment plant in Greenbriar.

The Board of Directors of Greenbelt Homes, Inc., on behalf of its 1,600 members, has consistently opposed the use of on-site sewage treatment to serve this project. It is our opinion, and one that should help guide you in your decision, that this project should await permanent sewage facilities as is the case with other residential projects within Prince George's County.

We therefore ask you to disapprove the right-of-way application for a pipeline to serve the package sewage treatment plant.

Respectfully yours,

Royal D. Breashears
General Manager

EXHIBIT 16c

CITY OF GREENBELT, MARYLAND
25 CRESCENT ROAD, GREENBELT, MD. 20770
PHONES: OFFICES 474-8000 • POLICE 474-5454 • RECREATION 474-6878

July 26, 1973

Mr. R. J. McCaffery, Chief
Technical Services
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. McCaffery:

At its special meeting of July 23, 1973 the City Council once again discussed the subject of the Greenbriar sewage treatment plant. At that time I submitted a report relating to the compliance of the treatment plant to be built to the requirements set forth by the City Council in its Resolution No. 226, together with a memorandum providing some supplemental information. For your information, I am enclosing a copy of this report and this memorandum.

The Council deferred making recommendations to you until its meeting of August 13th, so that it might receive the following additional information:

The plant's ability to handle excess flow; the effluent's loading per gallon of inorganic salts - phosphorus and nitrogen - and a description of virus tests which would be employed; which viruses would be isolated, and the intervals of sampling and testing in terms of amount of days and locations along the receiving stream; the sludge holding capacity of the sewage treatment plant plus the amount of trips per week required to haul away the sludge. This information is being sought from Mr. Robert Scharf of Greenhorne and O'Mara and Mr. Richard Joshlin of Ben Dyer Associates, and the Washington Suburban Sanitary Commission.

Sincerely,

James K. Giese
City Manager

JKG/ghm

CITY OF GREENBELT
MARYLAND

July 23, 1973

To: The Mayor and Council

Re: Conversations Relating to Greenbriar Sewage Treatment Plant

Friday evening I talked to Mr. Ralph Griffith, Special Project Officer, Municipal Waste Water System Division of the Environmental Protection Agency. Mr. Griffith indicated that he expected the new standards to be released by EPA to be essentially the same as the interim standards now in effect. These are basically for secondary treatment of sewage. The effluent standards are for 30 mg/l of suspended solids as compared to the State's requirement of 15 mg/l and 30 mg/l BOD as compared to the State's requirement of 5 mg/l and 2 million ppm coliform (State standard is unknown.) Mr. Griffith says there is not at present, and he does not anticipate any standards relating to nitrogen removal.

Also on Friday afternoon I talked to Mr. Clifford A. Hilton, Acting Director, Design and Construction at W.S.S.C. Mr. Hilton indicated that the situation as relates to standards is confused at the present time because of new EPA standards coming out but that he does not believe nitrogen removal is required. He indicated that W.S.S.C. has been a strong advocate of State licensing and that he expects treatment plant operators at Greenbriar to be licensed operators.

Mr. Joshlin of Ben Dyer called to make the following corrections and to provide me with added information concerning my memo of July 20:

On Page 2, Paragraph (b) 4, Mr. Joshlin advises that the ph level will be between 7.5 and 8 rather than 11.5. This is the optimum ph level for precipitating phosphorus if alum is used as is now proposed with the Neptune system.

On page 3, Paragraph (d) 5, Mr. Joshlin advises that the surge tank and weir that regulates the flowage of sewage through the treatment plant is at the beginning of the treatment process and that there is no partial treatment prior to the sewage leaving the surge tank and flowing across the weir.

On page 3, Item 4, Mr. Joshlin advises he cannot give me statistics as to nitrogen removal. The equipment used is not designed to remove nitrogen but incidental to the operation of the extended aeration process some nitrogen is removed. However, after discussing the matter with Dr. Cookson, they believe there are too many variables involved to advance any figures on the amount removed.

I talked to Mr. Phillip Graham, who is concerned with regional water quality at the Council of Governments. Mr. Graham advised that it was his

understanding that the Potomac River Enforcement Conference standards were goals and that they had to be implemented by the passage of laws by the various states. He is not aware of the standards being implemented. He indicated that the Environmental Protection Agency has conducted studies as to the effect upon algae growth of nitrogen and phosphates and that they found it more effective to curtail nitrogen than to curtail phosphates. He indicated that the problem would not be in the stream into which the effluent falls but in the quality of water down in St. Charles County and the Potomac Estuary.

Sincerely,

James K. Giese
City Manager

JKG.dc

P. S. I talked to Mrs. Kandler today, who advised that Greenbriar taxes have been paid and that there are no delinquent City real estate taxes for the last fiscal year.

CITY OF GREENBELT
MARYLAND

July 20, 1973

To: The Mayor and Council

Re: Greenbriar Sewage Treatment Plant--
Compliance with City Resolution No. 226

On Thursday, July 19, I met with Mr. Dave Murray and Mr. Richard Joshlin of Ben Dyer Associates, Inc., engineers for the Greenbriar Sewage Treatment Plant, and Mr. Robert Scharf and Mr. Jack Thye of Greenhorne and O'Mara, engineers for the City. The purpose of the meeting was to review the plans for the treatment plant to ascertain compliance with City Resolution No. 226. Mr. Joshlin is the designer of the treatment plant under Mr. Murray's supervision. Mr. Scharf is Greenhorne and O'Mara's engineer specializing in this type of facility and the designer of the Greenbelt swimming pool renovation. Mr. Thye is Greenhorne & O'Mara's consulting engineer to the City. Greenhorne & O'Mara are the designers of a treatment plant in operation at Poolesville and the treatment plant to be built for M-NCPPC for the Largo Sports arena.

Prior to discussion of the Resolution I raised questions concerning standards for nitrogen removal. I was advised by their engineers and our engineers that there are presently no requirements for nitrogen removal. The Potomac River Compact standards are not in effect. The Environmental Protection Agency has no standards for either nitrogen or phosphorus removal, and its present standards go no further than secondary treatment. New E.P.A. standards are to be released shortly, and these standards could necessitate modifying the plant if it does not meet any new standard established. The basic regulatory agency at present is the Maryland State Health Department, and it does not require nitrogen removal. I will attempt to get further information on this matter.

I was also advised that W.S.S.C. had issued shortly before the meeting its permit for the plant. A copy of that permit is attached. I also have a set of the W.S.S.C. approved plans and the treatment plant specifications.

Mr. Scharf cautioned that the plant should not be considered of acceptable design until it had the approval of the State Health Department. It was noted that a letter was read before the Sanitary Commission indicating that the State would approve the plant upon W.S.S.C. issuing its permit.

The present W.S.S.C. permit is for only a 200,000 gallon per day plant. A second permit will have to be obtained for expanding the plant to its maximum authorized capacity of 325,000 gallons per day.

As to the requirements set forth in Resolution No. 226:

(a) The plant provides for secondary treatment consisting of utilization of a communitor, an aerobic biological process known as an "Extended Aeration Activated Sludge Process" and a clarifier which will continuously remove and recycle the bacterial sludge to the biological process.

(b) The plant provides tertiary or advanced waste treatment. However, at the time of Resolution No. 226 the engineers were proposing an Infilco unit for a 700,000 g.p.d. plant and had indicated a Neptune Microfloc unit as an alternate. W.S.S.C. requested the Neptune because of its successful experience with this type unit at Landover Mall. The reduced capacity also reduced the need for the filter capacity required by Resolution No. 226.

(b) 1. The plant uses a solid contact clarifier using alum to precipitate phosphorus as a sludge and drawing off the sludge to a holding tank. Resolution No. 226 specified lime.

(b) 2. There is one mixed media filter tank in the Neptune process. When the plant is expanded to 325,000 gallons there will be two filters. Resolution No. 226 required 4 filters for 700,000 gallons.

(b) 3. There will be aeration to add dissolved oxygen. The State requires not less than 5.0 milligrams per litre (mg/l). The plant will provide 6 to 7 mg/l and 75%-85% saturation according to Mr. Joshlin.

(b) 4. The plant will provide soda ash as a base with a feeder having capacity to achieve the high ph (11.5) necessary for phosphorus precipitation. The State requires that phosphates not exceed 1.5 mg/l.

(c) The plant provides disinfection by a combination of adequate doses of chlorine and sufficient detention time. The chlorinators specified can deliver chlorine to a dosing rate of up to 50 mg/l, well above the 10 to 25 mg/l required by Resolution No. 226. The detention time is 60 minutes, according to Mr. Joshlin, well above the 30 minutes required by Resolution No. 226.

(d) The plans provide for dual mechanical and electrical facilities to guard against breakdown throughout the plant. In addition, sewage can be diverted to the Western Branch Treatment Plant.

(d) 1. The communitor is equipped with a bypass channel with bar screens.

(d) 2. Provision is made for dual disinfection units.

(d) 3. There is piping to permit bypassing of any unit.

(d) 4. There is piping to allow 100 per cent return of effluent to the biological process. Resolution No. 226 calls for a continuous period of 24 hours. See discussion below concerning capacity.

(d) 5. There is a surge tank into which the effluent is pumped. After partial treatment a weir is used to regulate an even flowage. Excess sewage is returned to the surge tank. Because the ability of the plant to handle unusual flows without exceeding maximum flowage and thereby resulting in effluent being discharged that is only partially treated is important, Mr. Scharf requested Mr. Joshlin to submit certified computations as to the ability of the plant to handle excess flowage for his review. This will be done.

(d) 6. Provision is made for a completely independent diesel power generator.

Besides the above requirements recommended by Resolution No. 226, the resolution also called upon the State Health Department to consider requiring additional safeguards. These are discussed below.

1. A meter will be installed to record constantly the flow of sewage into the plant. Also, a meter will record the plant effluent as well.

2. The disposal of sludge is an operational matter. W.S.S.C. staff stated that the sludge will be trucked to a W.S.S.C. incinerator used for disposal of sludge from other plants. Mr. Joshlin estimated there will be 70,000 - 75,000 gallons per month to be removed. The sludge will be in a highly liquid form and will be transported in tank trucks.

3. There are no limits as to the number of connections allowed other than W.S.S.C. has limited connections only to units in Greenbriar, and the number of units in Greenbriar are limited by zoning regulations. W.S.S.C., in Condition 3 of its permit, also limits connections to such that the daily flow capacity of 200,000 gallons is not exceeded. W.S.S.C. can withhold occupancy permits. The 200,000 gallon capacity will not serve all of Greenbriar, and the plant addition will have to be constructed for all of Greenbriar to use the facility.

4. As stated before, there is no State requirement for the removal of nitrogen. Mr. Scharf noted, however, that the treatment process will remove some nitrogen and that the amount could be calculated. Mr. Joshlin will make computations. He estimated that removal would be less than 50%.

5. The State licenses treatment plant operators, thereby regulating the competency of plant personnel. Neither engineer knew to what extent the State licensed W.S.S.C. personnel. W.S.S.C. will staff the plant. W.S.S.C. is subject to State regulation.

6. The plant will be provided with a laboratory. In any treatment facility it is necessary to make laboratory analysis of various treatment processes on a more than daily basis. Council appeared to be most concerned with virus removal. Both the County Council and W.S.S.C. (Condition 15) will require the owner to pay the cost of virus sampling of the effluent on a monthly basis by a competent laboratory. W.S.S.C. will be responsible for the routine laboratory analysis.

7. Resolution No. 226 suggested requiring the piping of the discharge to a point in the stream where it is no longer intermittent. Instead, the State required that it be piped to a point where the stream has been certified to be free flowing by the State Department of Water Resources. The engineers all agreed that the effluent resulting from tertiaary treatment could be discharged into a dry stream without ill effect, and the State has so permitted at other locations.

8. The plant provides for dechlorination. This was required by the County Council.

Mr. Scharf advised that he could not certify compliance with all aspects of Resolution No. 226 without detailed analysis of plans, specifications, and computations which he could not do without spending considerably more time than the few hours which he gave to it on Thursday. As a result of our meeting, however, he found no matter in which to be concerned. He advised that no plant design should be considered acceptable until it had been approved by the State Health Department.

I, too, cannot do more than make the above report as I am not an expert on this subject. I will continue to pursue obtaining added information from other sources.

Respectfully submitted,

James K. Giese
City Manager

JKG:dc

EXHIBIT 16d

CITY OF GREENBELT, MARYLAND
25 CRESCENT ROAD, GREENBELT, MD. 20770
PHONES: OFFICES 474-8000 • POLICE 474-5454 • RECREATION 474-6878

THE CITY OF GREENBELT

MEMBERS OF COUNCIL
Richard R. Pilski, Mayor
Charles F. Schwan, Jr., Mayor Pro-Tem
Rhea L. Cohen
Elizabeth K. Maffay
Gil Weidenfeld

August 24, 1973

Mr. R. J. McCaffery, Chief
Technical Services
National Aeronautics and Space
Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. McCaffery:

At the August 13 meeting of the City Council the Council adopted by unanimous vote a motion directing that I inform you that the City Council's position on the proposed Greenbriar temporary sewage treatment plant remains that which it expressed in Resolution No. 226, that it has asked the City Manager to investigate to what extent current plans provide for meeting the standards specified by Council and to investigate other matters, and that it will submit a statement to NASA as soon as these investigations have been completed and reports made to Council. The Council also directed that I express to you the City Council's appreciation for NASA's decision to have an environmental impact statement prepared.

I am enclosing additional material which I have submitted to Council containing information relating to my investigations of the Greenbriar treatment plant.

Sincerely,

James K. Giese
City Manager

JKG:dc
Enclosures

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WASHINGTON SUBURBAN SANITARY COMMISSION

4017 Hamilton Street, Hyattsville, Maryland 20781 | 277-7700

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General Counsel

RECEIVED
AUG 6 1973

August 2, 1973

Mr. James K. Giese
City Manager
City of Greenbelt
25 Crescent Road
Greenbelt, Maryland 20770

Dear Mr. Giese:

This is in reference to our telephone conversation, this date, concerning the effluent standards that have been established by the State Department of Health and Mental Hygiene for the Western Branch Wastewater Treatment Plant Expansion.

These standards are as follows:

1. BOD-5 no greater than 10 milligrams per liter.
2. Ammonia nitrogen no greater than 1 milligram per liter.
3. Organic nitrogen no greater than 1 milligram per liter.
4. Dissolved oxygen at least 4 milligrams per liter.

Denitrification and phosphorous removal facilities will be added if and when required by the State Department of Health and Mental Hygiene.

Very truly yours,

Clifford C. Helton
Division Engineer
Design Division

CAH:ffk

cc: Connor 8-6-73

"Willing Water" — Symbol of Quality Service to the Suburban Maryland Area

AN EVALUATION OF BREAKPOINT CHLORINATION AND DECHLORINATION ON EFFLUENT AND SALT CONTENT

Purpose

The purpose of this report is to evaluate the need for pH adjustment of effluent from the proposed Greenbriar treatment plant after breakpoint chlorination and dechlorination. The proposed Greenbriar plant will produce an effluent which is highly nitrified, low in BOD, turbidity, and phosphorous. The effluent characteristics before breakpoint chlorination and dechlorination will be similar to that now produced by the Landover Mall plant.

Introduction

The application of breakpoint chlorination and dechlorination to effluents can cause pH changes. The addition of chlorine gas to water increases the hydrogen ion concentration as follows:

$$Cl_2 + H_2O = HOCl + H^+ + Cl^-$$

The addition of sodium or calcium hypochorite causes a decrease in hydrogen ion concentration as given below:

$$Ca(OCl)_2 + 2H_2O = Ca^{++} + 2HOCl + 2OH^-$$

Some dechlorination procedures also cause a change in hydrogen ion concentration. An example is the use of sulfur dioxide for chlorine reduction:

$$SO_2 + Cl_2 + 2H_2O = H_2SO_4 + 2HCl$$

The total change in pH of an effluent depends on the amount of chlorine and sulfur dioxide added and the buffer capacity of the water. Solutions that tend to maintain a fixed p H value when H^+ or OH^- is added are said to be buffered. In natural waters and sewage effluents, the pH-stablilzing effect is primarily due to the presence of carbonic acid (or carbon dioxide) and its conjugated base, bicarbonate ion. This buffered capacity is reflected by the alkalinity of the water. The higher the alkalinity, the higher the buffer capacity. For example, the addition of 0.1ml of 0.1M HCl to a liter of pure water changes the pH from 7.0 to 5.0. The same quantity added to a liter of a natural water with pH 7.0 and containing 100 mg per liter of alkalinity changes the pH less than 0.02 pH units.

Evaluation Procedure

The effect of breakpoint chlorination and dechlorination on pH was evaluated on samples taken from Landover Mall. Samples where collected after the filtration process but prior to chlorination. Four gallon samples were collected on the following days and analyized immediately: April 7, April 8 and April 11, 1973. Alkalanity and pH was measured before chlorination. Initial values are reported in Table 1. It should be noted that pH increased from 7.1 to 7.4 after mixing. This resulted from excessive carbon dioxide in the effluent from Landover Mall. After mixing, this

excessive carbon dioxide was driven off causing a rise in pH.

TABLE I

Initial pH and Alkalinity of Effluent Samples Before Chlorination

Sample	pH initial	pH after mixing	alkalinity as $CaCO_3$
April 7	7.1	7.5	138 mg/l
April 8	7.1	7.4	156 mn/l
April 11	7.0	7.4	110 mg/l

Stock solutions of chlorine and sulfur dioxide were prepared by bubbling Cl_2 gas and SO_2 gas into liter volumes of water and calibrating. A liter of effluent was tritiated with stock chlorine solution to determine the dose required for breakpoint and the chlorine demand. (Table 2) In each case, a chlorine dose of approximately 25 mg/l resulted in a free chlorine residual of 10 mg/l.

Results

Effluent samples were dosed and the total and free chlorine residuals determined. (Table 3) A one hour contact period was allowed before dechlorination with sulfur dioxide. The pH was measured after chlorination and dechlorination. It should be noted that the free chlorine residual was very stable and maintained itself over the hour contact period.

TABLE 2

Chlorine Dose and Resulting

Chlorine Residuals and pH

Chlorine Dose mg per liter	pH	Chlorine Residual total mg/l	Free mg/l
2.7	7.1	0	0
3.6	7.1	0.6	0.1
5.0	7.2	1.0	0.9
5.9	7.3	1.3	1.2
10.4	7.5	6.2	5.2
13.2	7.4	8.6	7.8
16.0	7.4	12.4	9.0
21.6	7.4	16.6	16.0
27.2	7.4	20.8	17.2

Note: pH increased as a result of excessive CO_2 in the initial sample. This excess CO_2 was driven off during the step addition of chlorine.

TABLE 3

Results of Breakpoint Chlorination
Followed by Dechlorination

Sample	Chlorine - mg/l			pH
	dose	total residual	free residual	
CHLORINATION:				
April 7	27	13.6	14.0	7.0
April 8	26.1	15.8	12.4	7.1
April 11	34.6	28.4	12.0	7.2
DECHLORINATION:				
April 7	-	0.6	-	6.7
April 7	-	Zero	-	6.7
April 8	-	0.6	-	6.8
April 8	-	Zero	-	6.8
April 11	-	0.05	-	6.5

As Table 3 indicates, breakpoint chlorination to 12 mg/l of free chlorine reduced the pH to approximately 7.1, and a free residual of 14.0 mg/l lowered pH to 7.0. Free residuals above 3 mg/l with one hour contact will give effective virus kill. Dechlorination with sulfur dioxide reduced pH to 6.7 and 6.8 on samples collected on April 7 and 8. The sample collected on April 11 contained less alkalinity and also required a higher chlorine dose

(28.4 mg/l) to achieve a free residual of 12 mg/l. As a result of these factors, the final pH of 6.5 after dechlorination was lower than the previous samples.

In conclusion, the pH will not drop to 6.0 and will probably not be lower than 6.5. The free chlorine residuals of 12 mg/l used in this study are excessive. Virus kill will result with free residuals of 3 mg/l. Thus, pH will be depressed less. The final pH can also be controlled to some degree by greater addition of soda ash during phosphate removel.

The effect of breakpoint chlorination and dechlorination on effluent color and turbidity was very pronounced on the samples studied. All color and turbidity was removed by oxidation during the one hour contact time with free chlorine.

Salt Addition

Effluent chlorination at a dose of 30 mg/l as Cl will add 0.004 0% of chloride per gallon of water. This is well below the taste threshold and amounts to only one ounce of chloride per 250 gallons of water. This amount will have an insigificant influence on the streams total chloride content.

Reduction of a free chlorine residual of 10 mg/l with SO_2 will produce one ounce of sulfate per 735 gallons of effluent. This amount of sulfate is also insignificant on the receiving stream.

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WASHINGTON SUBURBAN S... OPERATIONS DIVI

Landover Mall WASTE WATER PLANT

DATE	RAW SEWAGE FLOW MG *	RAIN FALL INCHES	WW TEMP RAW -OF	ACTIVATED SLUDGE: AIR THOUS CU FT PER MG.	MIXED LIQUOR: AVG SUS SOL mg/l	MIXED LIQUOR: LBS BOD PER LB ML SOLIDS	MIXED LIQUOR: SLUDGE VOL INDEX	FILTER: TOTAL FILTERED MG	FILTER: AVER LENTH FILTER RUN hr.	CHEMICAL DOSAGE: POLYMER lbs.	POLYMER mg/l	SODA ASH lbs.	SODA ASH mg/l	ALUM lbs.	ALUM mg/l	Cl_2 FINAL EFFLUENT lbs	Cl_2 FINAL EFFLUENT DOSAGE PPM	Cl_2 FINAL EFFLUENT RES mg/l	BOD: RAW mg/l	BOD: SEC EFFL mg/l	BOD: FINAL PLANT EFFL mg/l	BOD: RAW TO FINAL % REMOVED	pH: RAW	pH: SEC EFF	pH: FINAL PLANT EFF	pH: FINAL PLANT
1	.081		73		3164		140	.085	10.2	.98	1.3	204	281	262	362	8.0	11	2.6					6.8	6.2	7.0	7.
2	.090		72					.068	8.1	.88	1.6	186	330	251	441	7.0	12	2.7					6.9	6.4	6.9	6.
3	.041		71					.036	6.1	.47	1.7	102	343	132	475	3.5	12	1.8	650	11	4	99	6.7	6.4	6.9	7.
4	.083	.16	76		3664	.05	152	.069	11.3	.79	1.4	172	294	246	312	6.0	10	2.5	410	12	4	99	7.0	6.4	6.8	7.
5	.094		75		4100	.04	134	.076	8.4	.84	1.3	204	324	263	417	6.0	10	2.3	350	6	3	99	6.7	6.3	6.8	6.
6	.089		74		3624	.05	162	.083	11.9	.87	1.3	210	304	292	423	8.5	12	2.5	380	8	3	99	6.7	6.3	6.8	6.
7	.089		77		4316	.04	139	.083	8.2	.94	1.4	210	304	283	410	7.0	10	2.7	410	6	4	99	7.0	6.5	6.7	6.
8	.100		76		3956		172	.085	8.3	.95	1.3	167	234	281	396	6.5	9	2.0					6.8	6.8	6.9	6.
9	.111	.30	79					.085	7.5	.87	1.2	195	275	240	338	7.0	10	1.5					7.1	7.0	7.1	7.
10	.051	.01	79					.057	10.1	.70	1.5	166	346	197	410	5.5	11	1.7	280	10	1	99	6.9	7.0	7.1	6.
11	.089		81		4104	.04	182	.085	11.7	.82	1.2	190	268	229	323	6.5	9	1.8	410	10	4	99	6.9	7.0	7.0	6.
12	.102		81		4160	.05	172	.080	11.8	.88	1.3	196	293	233	348	6.5	10	2.2	410	7	2	99	7.0	7.0	7.1	7.
13	.102	.08	77		3780	.05	185	.080	9.3	1.00	1.5	222	331	283	422	7.5	11	2.4	380	7	1	99	6.9	7.0	7.1	7.
14	.087		76		4548	.05	150	.083	9.4	1.07	1.6	232	336	304	441	8.0	12	2.8	530	8	3	99	7.1	7.2	7.0	7.
15	.092		77		4640		141	.089	8.8	1.01	1.4	207	297	295	399	7.5	10	2.5					7.1	7.0	7.0	7.
16	.119	.20	77					.086	7.6	.95	1.3	193	268	268	372	9.0	12	2.2					7.0	7.0	7.0	7.
17	.055	.01	75					.071	6.8	.86	1.5	174	295	235	398	7.5	13	2.9	590	8	2	99	7.3	7.0	7.0	7.
18	.083	.05	75		3192	.08	211	.090	7.5	.90	1.2	196	261	258	344	7.5	10	3.0	600	8	1	99	7.1	7.0	7.0	7.
19	.117		74		4108	.06	170	.081	8.2	.91	1.3	181	193	253	372	6.5	10	2.9	440	12	4	99	7.3	7.0	7.1	6.
20	.098		80		4176	.05	169	.097	9.4	.64	.8	187	231	222	274	6.5	8	2.0	390	11	3	99	6.9	6.8	6.9	6.
21	.107	.99	78		7284	.05	171	.102	10.3	.98	1.2	215	253	283	309	6.5	8	1.7	280	15	1	99	7.1	7.0	6.9	7.
22	.111	.43	76		4276		173	.087	8.1	.94	1.3	140	192	266	364	6.5	9	2.3					7.3	7.0	7.0	6.
23	.121	.25	76					.101	8.0	.92	1.1	197	235	267	118	6.0	7	2.0					6.9	6.9	6.9	6
24	.048	.26	71					.046	8.3	.44	1.2	114	300	144	379	3.5	9	2.4	580	6	2	99	6.8	6.9	6.9	6
25	.087	.01	74		4592	.03	167	.084	9.3	.90	1.3	195	279	256	366	6.0	9	2.5	320	6	3	99	6.9	6.8	6.9	6.
26	.105		75		4500	.05	158	.093	10.3	.98	1.3	217	278	281	360	6.5	8	2.7	420	6	3	99	7.1	6.7	6.8	6.
27	.101	.02	76		4744	.07	150	.106	11.7	.79	.9	211	238	289	325	6.0	7	2.4	620	7	3	99	6.9	6.7	6.9	6.
28	.098	.13	75		4270	.05	160	.094	9.4	.99	1.3	152	198	272	354	6.0	8	2.0	480	7	2	99	6.7	6.7	6.7	6.
29	.107	.65	75		4704		148	.095	11.5	.95	1.2	204	258	283	358	6.0	8	2.0					6.9	6.9	6.7	6
30	.109		76					.086	12.7	.98	1.4	202	284	258	359	8.0	11	3.1					6.8	6.8	6.8	6.
31																										
TOTAL	2.762	2.45						2.463		26.22		5591		7626		199.0										
AVG	.092	.12	76		4284	.05	162	.082	9.4	.87	1.3	186	277	254	366	6.6	9.9	2.3	447	8.6	2.7	99	7.0	6.8	6.9	6.

BURBAN SANITARY COMMISSION
ERATIONS DIVISION

MONTHLY REPORT FOR June 1973

BOD SEC EFFL mg/l	BOD FINAL PLANT EFFL mg/l	BOD RAW TO FINAL REMOVED %	pH RAW	pH SEC EFFL	pH TUBE SETTL	pH FINAL PLANT EFFL	SUSPENDED SOLIDS RAW mg/l	SUSPENDED SOLIDS SEC EFFL mg/l	SUSPENDED SOLIDS TUBE SETTL mg/l	SUSPENDED SOLIDS FINAL PLANT EFFL mg/l	SUSPENDED SOLIDS RAW TO FINAL REMOVED %	DO RAW mg/l	DO AER BASIN EFFL mg/l	DO SEC EFFL mg/l	DO FINAL PLANT EFFL mg/l	TOTAL PHOSPHATE AS P RAW mg/l	TOTAL PHOSPHATE AS P SEC. EFFL mg/l	TOTAL PHOSPHATE AS P FINAL PLANT EFFL mg/l	TOTAL PHOSPHATE AS P RAW TO FINAL REMOVED %	TURBIDITY FILTER INFL mg/l	TURBIDITY FILTER EFFL mg/l	REMARKS
			6.8	6.2	7.0	7.0						2.1	2.1	.7	5.0							
			6.9	6.4	6.9	6.9						3.1	2.2	.8	6.3							
11	4	99	6.7	6.4	6.9	7.0	430	24	2	2	99	2.7	2.5	.8	5.5	34.2	12.1	.1	99	2	1	
12	4	99	7.0	6.4	6.8	7.2	160	20	2	1	99	2.5	2.2	.8	5.5	5.4	8.0	.2	96	2	1	
6	3	99	6.7	6.3	6.8	6.7	150	22	10	2	99	1.4	1.5	.6	5.2	7.5	9.8	.1	99	1	1	
8	3	99	6.7	6.3	6.8	6.9	130	18	6	1	99	2.5	1.8	.5	5.8	7.8	8.7	<.1	99	2	2	
6	4	99	7.0	6.5	6.7	6.6	170	14	4	1	99	2.9	2.5	.7	5.6	9.0	5.9	.1	99	1	1	
			6.8	6.8	6.9	6.8						3.7	2.0	.2	5.2							
			7.1	7.0	7.1	7.0						2.8	2.1	.1	7.0							
10	1	99	6.9	7.0	7.1	6.9	70	14	2	1	99	3.3	1.5	.4	6.5	3.3	.7	.1	97	2	1	
10	4	99	6.9	7.0	7.0	6.9	190	12	10	2	99	2.8	1.9	.7	6.5	7.2	4.6	.1	99	5	1	
7	2	99	7.0	7.0	7.1	7.0	150	8	4	1	99	2.6	2.0	.5	6.0	18.1	4.6	<.1	99	2	1	
7	1	99	6.9	7.0	7.1	7.0	130	10	2	1	99	3.2	2.2	.6	7.0	8.0	5.6	<.1	99	1	1	
8	3	99	7.1	7.2	7.0	7.1	680	14	6	3	99	3.6	2.4	.4	7.0	9.8	5.6	<.1	99	1	1	
			7.1	7.0	7.0	7.0						3.4	3.2	.9	5.8							
			7.0	7.0	7.0	7.0						3.7	2.4	.7	5.5							
8	2	99	7.3	7.0	7.0	7.1	190	4	2	1	99	3.1	3.0	.3	6.7	12.9	5.9	<.1	99	1	1	
8	1	99	7.1	7.0	7.0	7.1	300	6	2	1	99	4.1	2.9	.7	5.5	7.3	8.0	<.1	99	1	1	
12	4	99	7.3	7.0	7.1	6.8	188	12	4	1	99	4.8	2.5	.8	6.8	11.7	9.4	.1	99	2	1	
11	3	99	6.9	6.8	6.9	6.9	100	8	8	1	99	3.4	2.4	.5	5.5	9.0	10.8	.2	98	3	1	
15	1	99	7.1	7.0	6.9	7.0	180	22	8	2	99	4.3	2.0	.5	5.5	8.0	7.5	.1	99	1	1	
			7.3	7.0	7.0	6.9						4.3	1.9	.4	5.5							
			6.9	6.9	6.9	6.9						3.3	1.7	.4	5.8							
6	2	99	6.8	6.9	6.9	6.9	410	4	2	1	99	2.6	2.4	.2	6.0	6.0	7.8	<.1	99	1	1	
6	3	99	6.9	6.8	6.9	6.9	590	2	2	1	99	3.5	2.9	.3	6.0	8.0	9.4	<.1	99	2	1	
6	3	99	7.1	6.7	6.8	6.8	110	2	2	1	99	3.8	2.4	.6	6.1	10.1	7.8	<.1	99	1	1	
7	3	99	6.9	6.7	6.9	6.8	870	4	14	1	99	3.6	2.7	.5	6.8	14.6	7.6	<.1	99	1	1	
7	2	99	6.7	6.7	6.7	6.6	200	6	4	1	99	4.0	2.2	.2	5.8	8.7	7.5	<.1	99	1	1	
			6.9	6.9	6.7	6.8						4.3	2.4	.8	6.0							
			6.8	6.8	6.8	6.9						3.0	1.7	.3	5.5							
8.6	2.7	99	7.0	6.8	6.9	6.9	270	11	4.8	1.3	99	3.3	2.3	.53	6.0	10.3	7.4	<.11	99	1.7	1.1	

* THIS FLOW IS ESTIMATED FROM PUMP TIME METERS.

SUBMITTED W.W. Mathew
W.W. S.H.

EXAMINED T. Eichler
OPRS. DIV. ENG.

APPROVED O. Backe
DIR. PLANNING & OPERATIONS

E-237

CITY OF GREENBELT
MARYLAND

August 9, 1973

To: The Mayor and Council

Re: Greenbelt Sewage Treatment Plant
Additional Information

Report of Greenhorne and O'Mara

Mr. Scharf advised me on Thursday that he has not completed his review of the data concerning the plant's ability to handle excess flow. He hopes to have something submitted to the city by Monday. Mr. Scharf also made known to me that he had learned that Greenhorne and O'Mara are doing work for Rozansky and Kay on another subdivision. Mr. Scharf was most interested that the members of the Council were made aware that this situation existed. He asked if he should continue with his review of the data provided by Ben Dyer, and I requested that he complete the review.

Composition of Effluent

I have been furnished with a paper prepared by Dr. Cookson relating to breakpoint chlorination and dechlorination on effluent and salt content. The report indicates that there will be one ounce of chloride per 250 gallons of water and one ounce of sulphur dioxide per 735 gallons of effluent. These are termed insignificant amounts. As to phosphorus, the state requires that the effluent not exceed 1.5 milligrams per liter. The plant, according to Mr. Joshlin at Ben Dyer, is capable of achieving removal to .05 milligrams per liter. How much is removed depends upon how the plant is operating. Mr. Joshlin transmitted data for the Landover Hall treatment plant for the month of June which indicates that the average phosphorus load in the final effluent for that plant is less than .11, or 99% removal. As to nitrogen, Mr. Joshlin indicated previously that there is insufficient data available to indicate the quantity of nitrogen in the effluent. I have talked to Mr. Herb Brody at the University of Maryland, who has indicated that the nitrogen content of sewage is relatively insignificant. Mr. Clifford Hilton of W.S.S.C. indicated that the treatment process would result in nitrification but not in denitrification. Nitrification converts organic nitrogen and ammonia into nitrites and nitrates. He termed these as insoluble solids that are not readily available for nutrient purposes. Mr. Joshlin of Ben Dyer, while agreeing with Mr. Hilton as to nitrification and denitrification, did not want to go as far as Mr. Hilton as to the lack of nutrient value of nitrates and nitrites. On the other hand, Mr. Scharf indicated that the nitrification process was an important consideration.

Viral Removal

The County Council has required in the 10-Year Water and Sewer Plan "that virus sampling of the effluent be done on a routine basis, at least monthly, by a competent laboratory, at the owner's expense." As best I am able to determine, W.S.S.C. has not made a decision as to who will be employed to do the testing and what the testing will involve. Mr. Joshlin indicated that he anticipated that the viral testing would be of the plant effluent and that there was no value in testing the water in the stream, which water would be affected by extraneous sources other than the operation of the treatment plant.

Sludge Removal

Mr. Joshlin advises that there will be 70 to 75 thousand gallons of sludge generated per month when the plant is at capacity. W.S.S.C. uses trucks which can hold 13,000 gallons of liquid. It is more probable that they will carry 10,000 gallons. Thus, there would be fewer than two trips per week by trucks for sludge removal. The sludge holding capacity of the treatment plant is 77,917 gallons.

EPA Standards

The new EPA standards for treatment plants are to be released August 14 and published in the Federal Register on August 22. I have again been told that they are to provide for secondary treatment and no nitrogen removal. I was advised, however, that EPA water quality standards might set the standards for sewage treatment plants. I therefore talked to Mr. Sachs in the Water Planning Division of EPA, who advised me that if the sewage treatment plant meets the Maryland standards it meets the federal standards, that the Maryland standards have been approved by EPA, and that the standards do not provide for nitrogen removal.

Effect Upon Stream

I talked with Mr. Herb Brody of the Agricultural Section of the University of Maryland, who has advised the city previously on algae growth in Greenbelt Lake. Mr. Brody's first concern was with the effective chlorination upon the stream, and when I advised there would be dechlorination he felt there would be little effect. There are many variable factors that affect algae growth, and what effect this particular effluent would have on this particular stream is difficult to say. As to nutrient value, he felt that the effect of fertilizers being washed into the stream would be far more significant because streams are flushed during each heavy rainfall. The most significant effect of algae growth would be in downstream ponds or estuaries. Mr. Brody felt that if the state approved the effluent it would be all right.

Effect Upon Potomac Estuary

It has been noted that any contribution of nutrients, however minor, will affect the total problem of algae growth in the Potomac estuary. The alternative to the Greenbriar sewage treatment plant is the Western Branch

treatment plant when it is expanded. I have obtained from Mr. Hilton the standards for the Western Branch treatment plant. Western Branch will not provide for either phosphorus removal or denitrification. The Western Branch plant is permitted to have twice the BOD-5 count. As to ammonia, nitrogen and organic nitrogen, Western Branch will provide an effluent that is no greater than 1 milligram per liter. Mr. Joshlin advises that the Greenbriar secondary treatment process will do better and that the breakpoint chlorination process will reduce it even further so that the Greenbriar plant's effluent will be approximately .09 milligram per liter. Therefore, if the Greenbriar plant is put into operation and the operation is subsequently terminated and the sewage from Greenbriar is then pumped to the Western Branch treatment plant for treatment, it would appear that the effect of transferring the sewage from the Greenbriar plant to the Western Branch plant would have a detrimental effect upon the Potomac estuary, or, in other words, so far as the Potomac estuary is concerned it would be better for the Greenbriar sewage to be treated by the Greenbriar treatment plant than by the Western Branch.

Respectfully submitted,

James K. Giese

James K. Giese
City Manager

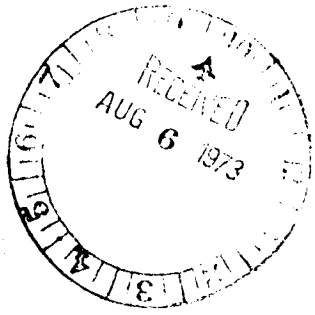
JKG:dc

LAW OFFICES
NANNA & JAMES
5132 BALTIMORE AVENUE
HYATTSVILLE, MARYLAND 20781

EMMETT H. NANNA, JR.
RICHARD ALLEN JAMES

APPLETON 7-4030
APPLETON 7-4031

August 3, 1973



Mr. James K. Giese, City Manager
25 Crescent Road
Greenbelt, Maryland 20770

Dear Mr. Giese:

I am writing in response to your letter of July 27, 1973, requesting a legal opinion as to any possible violation of the City's water pollution ordinance, that is, Section 17-24 through 17-28 of Chapter 17 of Article III of the Greenbelt City Code, as a result of the operation of the Greenbrier sewage treatment plant by the Washington Suburban Sanitary Commission.

Under the right of creating municipal corporations expressly reserved to the legislature and the additional express right contained in Article 43, Section 645, the legislature may create a district for the purpose of local improvements essential to health and welfare of the area included, and so it may create a sanitary district for the purpose of establishing a complete system for water supply, sewage, and drainage in the district. (Dinnen vs. Rider, 152 Md. 343). The legislature had authority to create Washington Suburban Sanitary Commission and to vest it with appropriate powers to carry on its work essential to the health and welfare of the people in the designated district. (Neuenschwander vs. Washington Suburban Sanitary Commission, 187 Md. 67). The aforegoing citations illustrate the fact that the Washington Suburban Sanitary Commission is a creature of the constitution and general laws of the State of Maryland, having been created by the State Legislature. However, the Legislature may confer police power on a municipal corporation over subjects within the provisions of existing state laws and ordinarily, if there is no conflict with general law, municipal corporations, under the police power delegated to them, may regulate with respect to municipal subjects on which the state has acted. (State vs. Brown, 142 Md. 27). However, as a general rule, municipal police regulations should not, directly or indirectly, contravene the general laws of the State and, in the event of a conflict between them, the municipal regulations must yield.

cc Council 8-6-73

(Heubeck vs. City of Baltimore, 205 Md. 203). So, a municipal police ordinance which assumes directly or indirectly to prohibit acts or conduct permitted by the general laws of the state are invalid. (Heubeck vs. City of Baltimore, supra). Even a public general law of the state enacted after the adoption of a municipal regulatory ordinance on the same subject may repeal the municipal ordinance to the extent that there is an irreconcilable conflict between them, even though such ordinance was adopted in the exercise of express authority delegated to the municipality. (Atkinson vs. Sapperstein, 192 Md. 301).

Since the Greenbrier sewage treatment plant will be operated under permits granted by the Washington Suburban Sanitary Commission as well as the State Department of Health, any attempt to enforce the municipal ordinance would be in direct conflict of the general laws of the state. In such instances municipal regulations must then give way to the general law. (56 AM JUR 2nd, Municipal Corporations, Section 433) and (123 ALR 1378). It is contemplated by the State Constitution that the State Legislature has the absolute right by general law to enact statutes which will have validity in all parts of the state, including municipalities, and where the legislature so acts, local laws in conflict therewith, ipsofacto, become void. (21 ALR 1172) and (64 ALR 981).

For the reasons set out above I am of the opinion that the City could not prevail in any attempt to enforce Sections 17-24 through 17-28 of Article III of the City Code against a legally created State Agency.

Very truly yours,

Emmett H. Nanna, Jr.
City Solicitor

EHN:jsr

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EXHIBIT 17

June 23, 1973

Mr. Alvin S. Bass, Esq.
Environmental Affairs Liaison
Office of the General Counsel
National Aeronautics and Space
Administration
Room 7069
400 Maryland Ave., S.W.
Washington, D.C. 20546

Re: G4(73-35030)

Dear Mr. Bass:

On behalf of the Prince Georges Environment Coalition, we submit the attached comments on the request of Greenbriar Associates for a right-of-way across NASA/Goddard Space Flight Center property.

The Greenbriar Associates' assessment of the environmental impact of its sewage discharge proposal for the 1193 unit apartment complex, as set forth in its attorney's letter of May 4, 1973 to Mr. Samuel Miller, with enclosures, fails to consider many environmental problems which would be created by the Greenbriar project, and deals with others only superficially. Our examination of the project indicates that it clearly will have a significant adverse impact on the quality of the human environment and that the granting of a discharge right-of-way would not be in the public interest. Moreover, the question of whether the right-of-way ought to be granted should not be acted upon until (1) NASA has prepared a thorough draft environmental impact statement pursuant to the CEQ Guidelines, at which point the Environment Coalition and other interested groups, persons, and federal, state and local agencies will have an opportunity to comment on the draft and the adverse environmental effects of the

Rec'd 6/28/73

project, (2) NASA has complied with the other requirements of NEPA, and (3) NASA is satisfied that the proposed project will meet all applicable Federal and state air and water quality and effluent requirements.

Sincerely,

Edward Dunkelberger

Edward Dunkelberger

Theodore L. Garrett

Theodore L. Garrett

coa

Attachment

cc: Richard Schifter, Esq.
Hon. Russell E. Dickenson

June 23, 1973

MEMORANDUM

Re: Application For Right-Of-Way
By Greenbriar Associates Across
Goddard Space Flight Center Property

This memorandum is submitted on behalf of the Prince Georges Environment Coalition in connection with the request of Greenbriar Associates for a right-of-way across NASA/Goddard Space Flight Center property for the outfall line of a private sewage treatment plant for a 1193 unit apartment complex.

The Greenbriar Associates' assessment of the environmental impact of its sewage discharge proposal and the 1193 unit apartment complex, as set forth in its attorney's letter of May 4, 1973 to Mr. Samuel Keller, with enclosures, fails to consider many environmental problems which would be created by the Greenbriar project, and deals with others only superficially. Our examination of the project indicates that it clearly will have a significant adverse impact on the quality of the human environment and that the granting of a discharge right-of-way would not be in the public interest. Moreover, the question of whether the right-of-way ought to be granted should not be acted upon until (1) NASA has prepared a thorough draft environmental impact statement

pursuant to the CEQ Guidelines, at which point the Environment Coalition and other interested groups, persons, and federal, state and local agencies will have an opportunity to comment on the draft and the adverse environmental effects of the project, (2) NASA has complied with the other requirements of NEPA, and (3) NASA is satisfied that the proposed project will meet all applicable Federal and state air and water quality and effluent requirements.

I. Principal Environmental Effects

Almost as soon as it was announced, the proposed Greenbriar Apartment project has been criticized and opposed by state and county officials, public interest groups, and citizens on a number of environmental grounds. These concerns are reflected in the letters and other materials attached as Exhibit A hereto.

The sewage treatment process will not remove nitrogen and other nutrients, despite the fact that for several years it has been the position of the Federal Government that such nutrients must be removed.[1/] Nitrogen

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1/ For example in May, 1969 the Secretary of the Interior adopted effluent standards for the Piscataway Sewage Treatment Plant which provide for 85% total nitrogen removal in addition to 96% BOD_5 removal and 96% phosphorous removal. The EPA has withheld funds from Piscataway until these effluent limits are met. In April, 1971 the Environmental Protection Agency recommended 0.30 - 0.50 mg/l as criteria for inorganic nitrogen in the Potomac Estuary. Environmental Protection Agency, Water Quality Office,

nutrients cause cultural eutrophication, a process which greatly accellerates oxygen depletion and the death of a stream.[2/] As the Environmental Protection Agency (EPA) stated in a 1971 report:

(footnote continued)

"Water Resource - Water Supply Study of the Potomac Estuary," Technical Report 35, (April 1971) at VII-30 (hereinafter "EPA Technical Report 35").

Most of the references cited herein are on file at the offices of the Coalition's attorneys.

2/ In Soap and Detergent Association v. Clark, 330 F. Supp. 1218 (S.D. Fla. 1971), which upheld a Dade County ordinance banning the sale of detergents containing phosphates, Judge Cabot described the process of eutrophication as follows:

> "Eutrophication is 'the process of nutrient enrichment of water accompanied by a depletion of oxygen.' Environment Reporter, Vol. 2, No. 16, Monograph 9. Cultural eutrophication is the acceleration of the eutrophication of a body of water by reason of discharge into it of man-derived nutrients, particularly phosphorous and nitrogen. A body of water normally has a life span of thousands of years in natural conditions, progressing from its pristine state through stagnant waters, to a swamp and finally to dry land. But the death of the waterway through cultural eutrophication can take place in a fraction of the time required for natural eutrophication. The immediate result of cultural eutrophication is increased production of algae and aquatic plants. Expert testimony brought out by the County revealed that on some waterways in Dade County the amount of algae growth is so heavy that solid objects that would ordinarily sink below the surface

(continued)

"The effects of nutrient enrichment and the resulting algal growth are fourfold: (1) an increase in organic oxygen demanding load, (2) an increase or decrease in dissolved oxygen caused by algal photosynthesis or respiration, (3) the creation of nuisance and aesthetically objectionable conditions, and (4) the possible toxic effects on other plants and aquatic life."3/

Beaverdam stream is particularly susceptible to cultural eutrophication because, even after a heavy rainfall, the flow is hardly noticeable.4/ A sufficiently large stream flow is necessary to dilute the effluent discharged, and to inhibit stagnation.

The Coalition is also concerned with the low phosphorous treatment provided by the project. In April,

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(footnote continued)

of the water are unable to do so and rest on top of the algae growth. In turn, this same blanket of algae convering the water blocks out sunlight normally available and necessary to the growth of aquatic plant life whose principal function is to produce oxygen, and thus deprives the water of the oxygen level essential to the life-support of many freshwater game fish. The increased accumulation of algae also restricts the recreational uses of the County's fresh waters. (Id. at 1220.) See also Science, Vol. 180 (1973) pp. 955, 956.

3/ EPA Technical Report 35, supra at V-42.

4/ Before and after a heavy rainfall counsel walked alongside the stream from the proposed point of discharge to the point at which the stream turns north along the south-bound lanes of the Baltimore-Washington Parkway. Before the rainfall the flow was imperceptible. Immediately after the rainfall the flow was barely noticeable.

1971, EPA's Technical Report 35 recommended a total phosphorous level of 0.03 - 0.10 mg/l for the Potomac Estuary (at VII-30). However, the developers admit that their average treated 325,000 gallons per day of sewage will have a phosphate level of 0.50-1.50 mg/l (assessment at 2). As a consequence of the small flow of the stream (about 0.7 cu. ft./sec. average), the effluent is diluted by only a factor of two, leaving an effluent roughly five times greater than that recommended by EPA. This is a significant deficiency of the project because the combination of phosphorous with nitrogen is critical to the eutrophication process.[5/] Further, the foregoing figures do not reflect the treatment level at the peak flow of sewage, which is estimated to be 455,000 gallons per day.

Before the plans for the plant become final, there should be a careful consideration of alternatives and additional means of sewage treatment. For example, land containment would obviate the need for any sewage discharge into the stream, thus avoiding the aforementioned eutrophication problems. Furthermore, consideration should be given to the use of electrodialysis to remove

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5/ Soap and Detergent Association v. Clark, supra, n.2.

salt from the effluent, since salt can kill plants and other vegetation. Finally, we would recommend an analysis of the merits of requiring carbon adsorption in the proposed treatment process. Carbon adsorption consists of passing the effluent through a bed of activated carbon granules. This process can remove more than 98% of the dissolved refractory organics, which matter resists normal biological treatment and often results in taste and odor problems in water, tainting of fish flesh, foaming of water, and fish kills.[6/]

The Coalition is concerned with the fact that neither chlorination nor any other procedure for virus removal appears to have been adequately tested. In view of this fact, we see no basis for subjecting the populace to risk of viral infection. At the 13th Annual Water Quality Conference the EPA's Director of Water Hygiene emphasized the deficiencies of the chlorination treatment which is proposed for use at the Greenbriar project.[7/]

6/ Department of the Interior, Federal Water Pollution Control Administration, "A Primer on Waste Water Treatment" 15, 16 (1969).

7/ J. H. McDermott, Director, Division of Water Hygiene, Office of Water Quality, E.P.A., "Virus and Water Quality: Occurrence and Control - Conference Summary," February 16-17, 1971, at 217:

> "A great deal, however, is still unknown concerning the performance of chlorination, as

(continued)

More specific remarks were made with respect to the Greenbriar project by Dr. Sidney Shifrin of the National Institutes of Health:

> "Internationally known virologists at the National Cander Institute in Bethesda with whom I have spoken concerning the proposed plant at Greenbriar have been been appalled that such a situation could be proposed in 1972 when we are so aware of the dangers of viral infections and so little can be done to avert dangerous exposure."8/

The findings of EPA and the NIH illustrate that the developer's proposed use of chlorination for the huge Greenbriar apartment complex is unproven and would constitute a substantial risk of virus infection.

The assessment ignores evidence which indicates that traffic from the Greenbriar project will have s significant impact upon the city of Greenbelt and on NASA

(footnote continued)

> well as other processes, in the field. Several areas are in need of further documentation as to field efficacies . . .
>
> * * *
>
> "Thus, it is clear that considerable work remains to be accomplished in order to conclusively demonstrate the effect of each process on the removal or destruction of the whole spectrum of enteric viruses. At the moment, we are by no means sure that these processes are capable of achieving the desired objective. In addition, we are unsure as to the margin of safety provided by the combination of these processes."

8/ Letter from Dr. Sidney Shifrin, National Institutes

itself.[9/] For example, any time any member of the 1193 families wishes to travel to the nearest shopping center in Greenbelt, he is likely to traverse the already overcrowded Kenilworth intersection in the course of his shopping.[10/] There is also a likelihood that the development of Greenbriar would lead to demands for public access to the NASA-Goddard interchange with the Baltimore-Washington Parkway; similar demands are now being made by Reston residents with respect to the Dulles Airport access road. Indeed, NASA has already expressed its disapproval of the Greenbriar project on such grounds.

9/ The recently proposed revised CEQ Guidelines for implementing NEPA stress the significance of secondary as well as primary effects of federal action:

> "Many major Federal actions, in particular those that involve the construction or licensing of infrastructure investments (e.g., highways, airports, sewer systems, water resource projects, etc.), stimulate or induce secondary effects in the form of associated investments and changed patterns of social and economic activities. Such secondary effects, through their impacts on existing community facilities and activities, may often be even more substantial than the primary effects of the original action itself. For example, the effects of the proposed action on population and growth may be among the more significant secondary effects." § 8(d), 38 Fed. Reg. 10856, 10859 (May 2, 1973).

10/ A letter from Glenn T. Harrell, Jr., Associate County Attorney, to Members of the Prince George's County Council

(continued)

After investigating the traffic implications of the project on request of the Maryland-National Capital Park and Planning Commission, NASA-Goddard's Chief Facilities Engineer stated:

> "Since this special exception [Greenbriar] proposes to increase the density of this area's development, which could appreciably effect Greenbelt Road traffic, Goddard recommends that Special exception, SE 2469 not be approved. We will continue to oppose any such development until improvements are made to Greenbelt Road and its interchange with the Baltimore-Washington Parkway."11/

The improvements required by NASA, which include widening of Greenbelt Road and widening of the Baltimore-Washington Parkway, have not been made.12/

(footnote continued)

January 4, 1972, at 2, states that the developer's traffic consultant acknowledged Greenbriar-related traffic problems at the Kenilworth intersection which might be resolved by an underpass. Neither the underpass nor any other improvement in the intersection was funded in the five-year highway construction program.

11/ Letter from James F. Mills, Chief, Facilities Engineering Division of Goddard Space Flight Center, to James M. Hennessey, Chief, Planning and Zoning, Maryland-National Capital Park and Planning Commission, February 19, 1971, included as Exhibit C.

12/ The assessment's statement (at 7) that "the decision to widen the Washington-Baltimore Parkway has been made" is misleading. No environmental impact statement has been filed. No hearings have been held and none are scheduled. Hence the road widening which theoretically would alleviate the project's traffic burden on the city of Greenbelt will not occur for quite a while, if at all.

II. Other Matters Which Should Be Considered

The following are other environmental aspects of the Greenbriar project which should be given further study.

There is no indication of what will be done with the rags and sticks which are caught on the screens at the beginning of primary treatment, or with the part of sewage (sludge) which settles to the bottom of the sedimentation tanks. How will the water be removed from the sludge? And, more importantly, where will the water be put? Where will the sludge be dried (the drying process takes between one and two weeks and often emits an offensive odor).[13/] What will be done with the dried sludge? If burned, where will it be burned? Will the burning be in compliance with the EPA proposed regulations for sewage plant incinerators[14/] and will the ash be used to fill barren countryside, thus resulting in reduced acid drainage and improved visual appearance? If the sludge is not burned, what will be done with it? These questions should be fully answered before NASA takes any further action with respect to the Greenbriar project,

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13/ Primer, supra n.6, at 22.

14/ 38 Fed. Reg. 15405, 15411 (June 11, 1973).

especially in view of the recent statement by the developer's consultant, Dr. Cookson, to the Montgomery County Council: "I would not recommend the use of Scheme 4 [identical to the proposed Greenbriar treatment system] since it produces large volumes of sludge."[15/]

The coalition is also concerned with whether floor drains from the basements will flow into the sewage treatment plant even though the developer's engineer has experienced problems with such a drainage system in another project, Landover Mall. We understand that on July 17, 1972 air conditioning fluid was spilled in the Landover Mall generator building. The fluid flowed into the sewer and was carried to the treatment plant where it killed the activated sludge, a bacterial part of the treatment system which will degrade organic materials to gasses, inorganic ions, and water,[16/] which system will also be used in the Greenbriar plant. The fluid was not immediately noticed. As a result, untreated sewage was discharged

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15/ Dr. John T. Cookson, Jr., "A Report On the Use of Temporary Wastewater Treatment Plants: Standards and Procedures for Elimination of Health Hazards," prepared for the Montgomery County Council, December 5, 1972, at 64.

16/ Statement of John Thomas Cookson, Jr., Exhibit 9 of the Greenbriar Assessment, at 10.

into the receiving waters. When the fluid was noticed, all of the Mall's sewage was diverted through a sewer line to the overloaded Blue Plains treatment facility.[17/]

An overflow mechanism which discharges without treatment the sewage which cannot be pumped, is included in the plans for the pumping station near the apartment buildings,[18/] despite the Prince George's County Council's requirement, acknowledged in the assessment (at 4), that "there be no bypass mechanism which would allow untreated sewage to by-pass the plant in times of overload."[19/] We feel that this requirement serves a salutary purpose and should be followed. The proposal for an overflow mechanism at Greenbriar will have obvious negative public health aspects and will emit an offensive odor. It will result in the discharge of untreated sewage (1) when in times of heavy rainfall storm water overloads the pumping station by infiltration, (2) when there is a power failure,

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17/ See testimony of Dr. Alfred Machis, an engineer, before the Washington Suburban Sanitary Commission (July, 1972). See also the memorandum of the plant engineer to Dr. Machis, dated July 25, 1972.

18/ "'On-Site' Sewage Lift Station, Green Briar Apartments, Prince George's County, Maryland," (Drawing No. 8 of 10).

19/ Prince George's County Ten Year Water and Sewage Plan (Adopted November 29, 1972) at 55.

and (3) when there is a mechanical breakdown of the pump(s). These contingencies can be guarded against by installation of a wet well or some other water holding capacity, hooking up the pumps to auxiliary power for the plant, and installing auxiliary pump(s). Since the pumping station is near the apartment complex there should also be an evaluation of the pumping station's expected noise level.

The assessment does not examine the effect of the sewage discharge upon the heavily-clustered trees which surround the stream between the north-bound and south-bound lanes of the Baltimore-Washington Parkway. If the 325,000 gallons a day will be sufficient to make the stream flow rapidly, will this volume cause the stream to carve out a wider bed and thus uproot the trees and vegetation along its original border? Similarly, will the effluent's high pH level and salt content be sufficient to kill the tree roots? Destruction of trees should occur only after the most thorough consideration, especially when the trees serve as a life-saving barrier along a national parkway.[20/]

The assessment does not mention the air pollution that will be created by the emissions from the heating and air conditioning equipment of 1193 unit apartment.

20/ Cf. West Virginia Highlands Conservancy v. Island Creek Coal Co., 441 F.2d 232, 2 ERC 1422 (4th Cir. 1971).

Similarly, the assessment ignores air pollution arising from fuel combustion at the generating plant[21/] and from windblown odors from the open sewage settling tanks.

Assuming that a housing shortage does not exist in Prince George's County, the assessment fails to explain why the project provides housing only for the affluent.

The revised site plan of May 21, 1973, included as Exhibit 10, shows a twenty-foot setback from a boundary, parallel to the Parkway, which is labeled "Present Property Line." This setback appears to indicate pending action by the State of Maryland or the Federal Government to buy or reserve land for widening the Parkway. The assessment does not say anything about this apparent setback. This is a critical omission because the implications of such a setback are significant. The new boundary line may well reduce the "green area" to less than the 70% required for the Greenbriar project (R-30 zoning), and result in violations of the County's building setback requirement.

21/ The Goddard Space Flight Center recently had to use its similar generating plant for a long period of time because of a power failure in underground wires. The diesel fuel exuded an offensive odor and the noise was quite loud.

III. An Impact Statement Should Be Prepared

It is clear that the procedural provisions of NEPA, "which are designed to see that all federal agencies do in fact exercise the substantive discretion given them . . . establish a strict standard of compliance."[22/] Paramount among these procedural provisions is the requirement in Section 102(2)(C) that "responsible officials of all agencies prepare a 'detailed statement' covering the impact of particular actions on the environment, the environmental costs which might be avoided, and alternative measures which might alter the cost-benefit equation."[23/] A related requirement under Section 102(2)(D) is that "all agencies . . . 'study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources'."[24/]

The purpose of these explicit provisions "is to aid in the agencies' own decision making process and

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22/ Calvert Cliffs' Coordinating Committee, Inc. v. Atomic Energy Commission, 449 F.2d 1109, 1112 (D.C. Cir. 1971).

23/ Calvert Cliffs', supra, 449 F.2d at 1114; 42 U.S.C. § 4332(2)(C) (1970).

24/ Calvert Cliffs', supra, 449 F.2d at 1114; 42 U.S.C. § 4332(2)(D) (1970).

to advise other interested agencies and the public of the environmental consequences of planned federal action."[25/] These provisions are intended not only to ensure that each agency "takes into proper account all possible approaches to a particular project," but "most importantly, [to] allow those removed from the initial process to evaluate and balance the factors on their own."[26/]

These procedural requirements of the Act, of course, apply to "all agencies of the Federal Government" with respect to "every recommendation or report on proposals for . . . major Federal actions significantly affecting the quality of the human environment."[27/] Failure to observe these requirements has been repeatedly held to invalidate the federal proposal or action in question, and to necessitate remand of the matter to the agency for full compliance.[28/]

25/ Calvert Cliffs', supra, 449 F.2d at 1114.

26/ Id.

27/ 42 U.S.C. § 4332(2)(C) (1970).

28/ Natural Resources Defense Council v. Morton, 458 F.2d 827, 838 (D.C. Cir. 1972); Greene County Planning Board v. FPC, 455 F.2d 412, 415, 422 (2d Cir. 1972).

If NASA comtemplates approval of the sewage discharge right-of-way despite the many environmental problems indicated above, it is clear that such decision would constitute major federal action having a significant adverse impact upon the quality of the human environment and would therefore require preparation of an environmental impact statement.[29/] The CEQ proposed NEPA Guidelines discuss the considerations governing identification of such action as follows:

> "The statutory clause 'major Federal actions significantly affecting the quality of the human environment' is to be construed by agencies with a view to the overall, cumulative impact of the action proposed (and of further actions contemplated). Such actions may be localized in their impact, but if there is potential that the environment may be significantly affected, the statement is to be prepared. Proposed major actions, the environmental impact of which is likely to be highly controversial, should be covered in all cases." § 6(a) 38 Fed. Reg. 10857 (May 2, 1973).

The conclusion that the NEPA peocedures must be followed here is clear from judicial interpretations

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29/ The views of the National Park Service on the need for complying with NEPA are indicated in a letter attached as Exhibit D.

of the National Environmental Policy Act. At the outset, there is no doubt that NASA must consider a broad range of environmental effects in its determination of whether the Greenbriar project will have a "significant" environmental effect. As the Second Circuit stated:

> "The National Environmental Policy Act contains no exhaustive list of so-called 'environmental considerations' but without question its aims extend beyond sewage and garbage and even beyond water and air pollution. . . The Act must be construed to include the protection of the quality of life for city residents. Noise, traffic, overburdened mass-transportation systems, crime, congestion, and even availability of drugs all affect the urban 'environment' and are surely results of the 'profound influences' of high-denisty urbanization [and] industrial expansion. . . . Thus plaintiffs do raise many 'environmental considerations' which should not be ignored." 30/

The NEPA procedures must be followed with the full participation of the public, even with respect to assessments which are used to determine whether an impact statement need be filed. In Hanly v. Kleindienst, 4 ERC 1785 (2d Cir. 1972), the court held as follows:

> "[T]his court has already held in Hanly I . . . that federal agencies must 'affirmatively develop a reviewable environmental record . . . even for a threshold § 102(2)(C) determination.' We now go further and hold that before preliminary or threshold deter-

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30/ Hanly v. Mitchell, 460 F.2d 640, 4 ERC 1152, 1157 (2d Cir. 1972). See also § 8 of the CEQ Guidelines, supra n.9.

> mination of significance is made a responsible agency must give notice to the public of the proposed major federal action and an opportunity to submit relevant facts which might bear upon the agency's threshold decision." (Id. at 1793).

Hence NASA should not only evaluate the considerations expressed in this letter, but also the concerns of the public, as manifested in the petitions, letters, and other material attached hereto as Exhibit A.

Situations in which federal courts have held housing projects to be significant, considered in the light of the many environmental problems described above, leave little doubt that the Greenbriar project is also significant. These include issuance of a permit for a mill site in connection with the sale of timber[31/] a HUD loan for a high-rise apartment building,[32/] a LEAA grant for a Virginia prison reception and medical center,[33/] and a downtown urban renewal project in the District of Columbia.[34/]

31/ Sierra Club v. Hardin, 325 F. Supp. 99 (D. Alas. 1971).

32/ Echo Park Residents Committee v. Romney, ____ F. Supp. ____, 3 ERC 1255 (C.D. Cal. 1971).

33/ Ely v. Velde, 451 F.2d 1130 (4th Cir. 1971).

34/ Businessmen Affected Severely By The Yearly Action Plans, Inc. v. D.C. City Council, 339 F. Supp. 793, 3 ERC 1906 (D.D.C. 1972).

In Goose Hollow Foothills League v. Romney, 334 F. Supp. 877, 3 ERC 1087 (D. Ore. 1971) the court held that construction of a 221 unit, 16 story apartment building would have a significant impact on the environment:

> "Because the area presently has no high-rises the new building will undoubtedly change the character of the neighborhood. Housing a significant number of students, it will concentrate population in the area and will serve to draw a greater concentration in the future.
>
> "The defendants gave virtually no weight to these factors nor to the incidental increase of automobile traffic. Neither did the defendants indicate that any weight was given to the loss of view from certain neighboring properties. I believe the defendants ignored cumulative effects on the quality of the human environment which are by no means insignificant." 334 F. Supp. at 879-80.

Since the Greenbriar project contains five times as many units, extends over a much broader area, and has more environmental problems, it too is "singificant" within the meaning of NEPA.[35/] Similarly in Sierra Club v.

35/ In addition, in Billings v. Camp, 4 ERC 1744 (D.D.C. 1972) the court held that construction of a single building (a bank) in the village of Woodstock, Vermont "is a major federal action significantly effecting the quality of the human environment." (Id. at 1745.) See also McLean Gardens v. National Capital Planning Commission, 4 ERC 1708 (D.D.C. 1972) (Redevelopment of McLean Gardens with 2210 apartment units, a shopping mall, and an office building is significant.) Furthermore, approval of sewage discharge which might destroy trees by a widened stream bed or highly acidic effluent upon the surrounding trees without compliance with NEPA would not comport with the Fourth Circuit's decision in West Virginia Highlands Conservancy v. Island Creek Coal Co., 441 F.2d 232, 2 ERC 1122 (4th Cir. 1971)

Sargent, 3 ERC 1905 (W.D. Wash. 1972) the court stated that issuance of an Army Corps of Engineers permit to the Atlantic Richfield Company for the discharge of treated sewage into a navigable stream "appears to be major federal action which may significantly affect the human environment." (Id.)

In conclusion, NASA should disapprove the Greenbriar sewage right-of-way because it will have a significant adverse impact upon the quality of the human environment. If NASA is considering approval of the discharge, such decision should occur only after full compliance with the procedures required by Section 102 (2)(C) and (D) of the National Environmental Policy Act.

Finally, the implementation of the Federal Water Pollution Control Act amendments of 1972, 33 U.S.C.A. § 1251 et seq. (1973), is well underway. Two provisions of this Act are of particular relevance to the Greenbriar project. Section 208, 33 U.S.C.A. § 1288, requires that an Areawide Waste Treatment Management (AWTM) plan be adopted by each State, specifying over a twenty-year period municipal and industrial waste treatment needs and establishing construction priorities for treatment works. Furthermore § 402, 33 U.S.C.A. § 1342, provides for a National Permit Discharge Elimination System (NPDES),

which prohibits the discharge of any sewage into any tributary of a navigable stream without a permit from the Federal Government (EPA) or from an authorized State agency. Such permits can be issued only on condition that the facility meets applicable water quality and effluent standards established under the Act. AWTM and NPDES guidelines were recently promulgated and are applicable to the Greenbriar project.[36/] Thus, if NASA does not reject the right-of-way request on substantive environmental grounds, it should at least postpone its decision until coordination with the AWTM and NPDES procedures is achieved.

36/ Environmental Protection Agency, "Areawide Waste Treatment Management Planning Areas and Responsible Planning Agencies - Proposed Designation," 38 Fed. Reg. 14230 (May 30, 1973); Environmental Protection Agency, "National Pollutant Discharge Elimination System [Final Regulations]" 38 Fed. Reg. 13528 (May 22, 1973.

DEPARTMENT OF HEALTH
PRINCE GEORGE'S COUNTY, CHEVERLY, MARYLAND 20785
(301) 773-1400

OFFICE OF THE
HEALTH OFFICER

February 14, 1972

The Honorable Winfield M. Kelly, Jr.
Chairman, County Council
Prince George's County
Courthouse
Upper Marlboro, Maryland

Dear Mr. Kelly:

Councilman Garrity asked me to answer this specific question: Will the proposed Greenbriar Treatment Plant present a health hazard?

After listening to the expert testimony of Dr. Sidney Shifrin, and as the result of my experience with sewage treatment plants, I cannot with any intellectual or professional honesty assure you that a health hazard would not be created. It is entirely possible that a child at play could come down with infectious hepatitis, or other viral infection, as the result of contact with the sewage plant effluent. If this happened, I would be held responsible as Health Officer, and there would be little I could do about it after the apartments are occupied until a community sewage treatment plant became available.

No compelling, or existing need, for the plant has been presented. Therefore, I am opposed to the construction of the proposed Greenbriar Sewage Treatment Plant.

Mayor Pilski of Greenbelt also asked for assurance that the proposed sewage treatment plant would not represent an "ecological hazard". I feel that it is certain that the quality of the stream will be changed, probably for the worse, as the result of the presence of the plant effluent in a dry or intermittent stream bed. I have walked a mile of the stream bed from the proposed point of discharge and find it, at this time of year, to be a slow flowing stream whose character lends itself to ponding and stagnation.

The Honorable Winf. .d M. Kelly, Jr. February 14, 1972
Chairman, County Council
Prince George's County

Factors such as green space; population density; staging of development; surface runoff and its effect on streams and flooding; impact on highways, bus lines, schools and fire departments; as well as the economic value of the proposal should be considered by you as the people's elected representative. Health and ecological effects have been given very high priority in the hearings concerning this proposal. The existing Public Health Laws in the County and in the State of Maryland do not touch on many considerations brought out in the hearings. As one instance, population density has a definite effect on the health of the public, but cannot be considered by me under existing laws in evaluating a sewage treatment plant.

More comprehensive Legislation is necessary if Public Health decisions shall shall be made from a strong legal basis rather than as the result of an individual Health Officer's personal opinion-- no matter how well-informed the Health Officer is.

The problem of viruses in sewage effluent is one of relatively recent understanding. Methods for isolating viruses from sewage effluent are still being developed and have not been perfected for routine use in monitoring sewage treatment plants.

On the other hand, it has been conclusively proven that viruses, infectious to humans, do occur in sewage treatment plant effluent. That two (2) California plants appear to have been able to effectively remove viruses from the effluent is no assurance that the same will happen here. Both plants are large, heavily subsidized, research oriented pilot plants which have been changing and perfecting their methodologies and techniques over a number of years. They are not comparable to the small, privately financed plant proposed for Greenbriar.

I stated in the hearing that I have two (2) major concerns over the Greenbriar proposal. The first is that the plant will empty into a stream bed which is dry a good part of the year. This completely eliminates the factor of dilution which has been one of the basic tenets of sewage treatment over the years. Also, it is very likely that swampy areas, or stagnant pools, will develop which will turn septic if there is any organic material left in the

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My second concern is the lack of experience with this kind of plant. I can categorically state that there is no similar plant operating in the State of Maryland. Landover Mall is similar in design, but has not been completed. As you know, I opposed the Landover Mall Plant. The Ocean Pines Plant is completed, but not operating due to unexpectedly low sewage flow. The Marlton plant is not comparable in design to the proposed Greenbriar plant. Since we have no experience with such plants, we are forced to rely on the engineers' estimate.

The Maryland Laws and Regulations governing approval of sewage treatment plants set minimum standards for treatment, not necessarily desirable standards. They require a percentage removal of B.O.D., not total removal, and they are reviewed for health implications by engineers, not by physicians or scientists. In view of the above, it is entirely possible for a sewage treatment plant to be approved by the State Department of Health and Mental Hygiene that is far below the standard needed for Greenbriar, and below what the builders in public hearings have already indicated a willingness to provide. Again, let me remind you that the capability of pollution dilution is an underlying assumption of sewerage treatment law.

As long as there is a possibility (and there is a distinc possibility if there is divided opinion at the County level, or if County Council recommends the plant) that the treatment plant will be approved, it is my duty as Health Officer to recommend the highest quality of treatment that is needed, or obtainable. It is due to the above that I have made recommendations that appear to some to be contradictory, but which I feel are necessary under the circumstances.

If you as County Council recommend to the State that the Greenbriar plant be approved despite the absence of dilution capaci of the stream, I suggest that you recommend to the State Department of Health and Mental Hygiene that the following stipulations be included in their requirements to the builder:

a.) That the advanced treatment processes outlined by Dr. Cookson in his written testimony be required.

b.) That there be no bypass mechanism which would allow untreated sewage to by-pass the plant in times of overload.

c.) That excess chlorine be removed from the effluent after adequate contact time has elapsed to effect the disinfection proposed by Dr. Cookson.

d.) That virus sampling of the effluent be done on a routine basis, at least monthly, by a competent laboratory, at the owner's expense.

e.) That multi-media filters, similar to those used at the Lake Tahoe plant be required.

f.) There should be a meter to constantly record the flow of sewage into the plant.

g.) There should be a pre-set limit to the number of connections allowed and strict adherence to this limit.

h.) There should be a large surge tank to equalize the flow into the plant so that flow through the treatment process during peak hours of use approximates the flow during low usage periods.

i.) A recycling capability should be built into the plant, so that if any unit of the plant falls below the expected standard of treatment, the sewage can be sent back through the plant to insure proper treatment.

j.) A double, completely independent, power supply should be required.

k.) The plant should be run by WSSC using a trained and experienced maintenance crew.

l.) The method of sludge disposal should be clearly

The Honorable Winfield M. Kelly, Jr.
Chairman, County Council
Prince George's County

February 14, 1972

n.) and finally, that the effluent be enclosed in a pipe to a point in the stream where there is a continuous year-round flow of water, as recommended by the City of Greenbelt.

If these recommendations are followed, I believe that the plant will be as safe as is possible, and will present a minimum danger to the public health. However, my position remains that the plant should not be built.

Sincerely yours,

Perry Stearns, M.D.
County Health Officer

PS:md

cc: The Honorable Wm. M. Gullett, County Executive, PGC
Mr. Edward Chen, Planning Coordinator, PGC
Mr. Frank M. Hoot, Dir., Bur. of Env. Health, PGC

February 11, 1972

ADDENDUM

THE STREAM LEADING FROM
THE PROPOSED GREENBRIAR TREATMENT PLANT

This little woodland creek originates in a marshy, wooded area approximately where the treatment plant is proposed to be placed. At this time of year there is a flow of water of about 1" depth and 3' in width, as it goes into the culvert under the Baltimore-Washington Expressway. The stream flows under both lanes of the expressway and turns north immediately beside the expressway. It passes north under the NASA exit and then turns north, northwest and passes under a tall, chain link fence into Greenbelt City property. The stream, at this point, is already partially polluted with a surface scum, some oil and various car parts. It is immediately beside the expressway, flows slowly or puddles, and could easily create an odor problem if further polluted.

In Greenbelt City property the stream flows slowly in a channel about 3' deep and 4' or 5' wide. The water at this point varies in depth from inches to 1'. It is widely separated from any Greenbelt homes, but is readily accessible from the old Greenbelt landfill. Children do occasionally play in it as is evidenced by two (2) partially completed dams.

There is a complete lack of stream clearance, so that the channel is frequently blocked, resulting in ponding and sluggish flow. There is also evidence of occasional flooding up over the bank.

PS:gh

Mr. Mathias Ferenbacy

PRINCE GEORGE'S COUNTY
Courthouse, Upper Marlboro, Maryland 20870
TELEPHONE: 627-3000 (AREA CODE 301)

May 18, 1971

Mrs. Georgina Havlik
Public Health Engineer
Division of Water and Sewerage
Department of Health and Mental Hygiene
Environmental Health Services
2305 N. Charles Street
Baltimore, Maryland 21218

DIVISION OF WATER & SEWERAGE
MAY 24 1971
ANSWERED

Dear Mrs. Havlik:

Reference is made to your letter of April 5, addressed to the Board of County Commissioners, concerning the application for a point of discharge for the proposed sewage treatment facility serving the Greenbriar and Glen Ora Apartments in Prince George's County.

We have concluded the review of this proposed project. Our review has indicated that the proposed project is not in conformance with the County Water and Sewerage Plan and will not be included in our annual review of the said Plan. The County does not favor the use of temporary treatment plants substituting public sewer to accommodate the proposed development.

It is the adopted County policy that future development be supported by adequate public facilities, especially adequate sewer capacity in terms of treatment as well as collection. The proposed development should use public sewer subject to the Order of the State Department of Health and Mental Hygiene on May 20, 1970.

Very truly yours,

William W. Gullett

William W. Gullett
County Executive

TOWN OF RIVERDALE
MARYLAND

OFFICE OF THE MAYOR,

February 8, 1972

County Executive and
County Council
Prince George's County
County Courthouse
Upper Marlboro, Maryland

Gentlemen:

A motion was made by the Mayor and Common Council of Riverdale to oppose the treatment plant for the Greenbriar and Glen Ora projects in Greenbelt, Maryland.

Very truly yours,

THE MAYOR AND COMMON COUNCIL
OF RIVERDALE

Earl J. Schmitt

Earl J. Schmitt
Mayor

E-274

4224 71st Avenue
Landover Hills, Md.
February 13, 1972

Chairman Winfield Kelly and Members
of the Prince George's County Council
Office of the County Council
County Courthouse
Upper Marlboro, Md.

RE: CB #45 (For the record of the hearing of Feb. 8, 1972)

Dear Chairman Kelly and Members of the Prince George's County Council,

As Town Councilman of Landover Hills, I must express my disapproval of CB #45 and urge you not to approve a package sewage treatment plant for Greenbelt, Maryland.

Possible health and environmental danger and downstream flooding are proper reasons for our County officials to vote against the application for the plant. Your primary responsibility is to protect the health, safety and property of the people of Prince George's County.

There is another good reason. Approval of a package sewage treatment plant to serve new apartment housing in Greenbelt paves the way for apartment complexes to spring up all over the county without regard to the sensible idea of staging development to meet the level of public facilities that are available. Crocks cannot substitute for public sewer lines and should not be allowed to.

Please consider these matters very carefully and disapprove of the package sewage treatment plant for Greenbelt.

Thank you.

Sincerely,

Charles E. Condor

Charles E. Condor, Councilman,
Town of Landover Hills

cc: W. W. Gullett, County Executive
Dr. Perry Stearns, County Health Officer
Mayor and Council, City of Greenbelt
Dr. Neil Solomon, Secy., State Department of Health
Howard Chaney, Director, State Bureau of Environmental Health
Herbert Sachs, Secy., State Department of Water Resources

PRINCE
GEORGE'S
COUNTY

Courthouse.
Upper Marlboro, Maryland 20870
(301) 627-3000

County Council
RONALD R. REEDER
Councilman
Fourth District

March 27, 1972

Mr. William M. Hunt
Executive Director
Office of Urban Renewal
4500 Knox Road
College Park, Maryland

Dear Mr. Hunt:

Thank you for your article concerning the Greenbelt package sewerage plant being considered under CB-45-1972.

I quite agree with you that this plant should not be placed in Greenbelt at this time. The fact of the matter is through my office, I have been able to hold up the approval for this plant since last October.

With citizens like yourself helping me, we shall continue to keep Prince George's County a good place to live. I shall continue to oppose this plant.

Sincerely yours,

Ronald R. Reeder

Ronald R. Reeder
Councilman, Fourth District

bg

PRINCE GEORGE'S COUNTY

Courthouse,
Upper Marlboro, Maryland 20870
(301) 627-3000

County Council
RONALD R. REEDER
Councilman
Fourth District

April 12, 1972

The Honorable
Dr. Neil Solomon
Secretary of Health and Mental Hygiene
301 West Preston Street
Baltimore, Maryland 21201

Dear Dr. Solomon:

A copy of Senator Meyer Emanuel's letter to you of April 4 on package sewage treatment plants has been presented to me for comment, and, as I suppose you already know, it is chiefly aimed at the Greenbriar/Glen Ora package sewage treatment plant.

I am sure that you are aware that Dr. Perry Stearns has indicated that this plant would be a potential health hazard. I am sure you are also aware that a great many citizens as well as two town councils located below where the effluent would run, namely the College Park and the Berwyn Heights Townships, are vigorously opposed. Perhaps you are not aware that the Department of Inspections and Permits have taken a very dim view of this project.

Very simply, Dr. Solomon, this will open Prince George's County for a number of such plants to be built. We now have before this County Council an application for another such plant at the busy intersection of Routes 301-50. I have taken a position that if with the absolute assurance there are no health hazards and if, in fact, the water is going to be so pure as to be fit for drinking or swimming in, and that is what the owners say, then perhaps we might need in Prince George's County package sewage treatment plants instead of such large expensive disposal plants as Piscataway and Blue Plains.

Would you, Dr. Solomon, as head of our Health and Mental Hygiene Department, give us your very wise counsel in this matter? We look to you for guidance.

Sincerely yours,

Ronald R. Reeder

Ronald R. Reeder, Councilman
Fourth District

COMMISSIONERS OF BERWYN HEIGHTS
8601 Fifty-Seventh Avenue
BERWYN HEIGHTS, MARYLAND 20740
474-6550

In Reply Refer To:
81-72

February 8, 1972

The Honorable Winfield M. Kelly, Jr.
Chairman, County Council of Prince George's County
Courthouse
Upper Marlboro, Maryland

Dear Mr. Kelly,

Re: Bill No. CB-45-1972

This statement is submitted in response to your solicitation for comments concerning Bill No. CB-45-1972, to amend the adopted Prince George's County FY 1972-1981 Comprehensive Water and Sewerage Plan to permit the use of a temporary sewage treatment plant to be located within the City Limits of Greenbelt, Maryland. I respectfully request that this statement be considered by all members of the Prince George's County Council at the public hearing on this Bill on February 8, 1972.

I must, in all sincerity, request that enactment of this Bill be delayed until positive actions are taken to provide for the effects that the proposed sewage treatment plant will have downstream, specifically in the Town of Berwyn Heights. However, please do not interpret this request for deferment as an objection to any improvements and progress within the County. On the contrary, we are gratified to see wisdom exercised in the planned development of Prince George's County and commend your efforts in this progress.

There is a condition which will result from construction of this facility that I implore you to give further consideration. There will be, as presented in the plans for this structure, an emission of eight gallons of effluent per second. Compounded, this means that we in Berwyn Heights will experience an additional 691,200 gallons of water per day in an already overflowing Indian Creek.

This is the point I wish to make in this statement -- that no provisions have been made for flood control in the drainage basin serving this area, and any additional sources of water add to an already emergency condition. I am certain that you and the members of the Council will take into consideration the overall effects that this new development will have in the area.

COMMISSIONERS OF BERWYN HEIGHTS
8601 Fifty-Seventh Avenue
BERWYN HEIGHTS, MARYLAND 20740
474-6550

In Reply Refer To:

Flooding has plagued areas of Berwyn Heights as well as the surrounding municipalities for decades. Flood control is not yet a reality; however, a proposed plan by the Army Corps of Engineers in the early 1960's to channelize Indian Creek and Paint Branch has been advocated. The flood victims, not only in Berwyn Heights but in the entire area, have waited long enough, and up to now patiently, for this much-needed relief.

There has been much correspondence provided to Prince George's County over past years on this very same subject. All facts and a reiteration of the conditions were additionally provided to members of the Council at very recent public hearings on the situation. A copy of the Berwyn Heights statement at the hearing held January 13, 1972, is attached.

In view of the fact that the Prince George's County Council scheduled the consideration of the referenced Bill, I submit that prior preference must be given to existing conditions. At the very least, equal consideration should be given to present taxpaying property owners rather than total emphasis on new development.

Thank you for the opportunity to present these comments at this hearing, and for giving consideration to the serious conditions indicated.

Sincerely,

Harry L. Ballew

Harry L. Ballew
Chairman, Commissioners
of Berwyn Heights

COLLEGE PARK ECOLOGICAL ASSOCIATION, INC.

7324 Radcliffe Drive
College Park, Maryland 20740

February 19, 1972

Dr. Perry Stearns, County Health Officer
Prince George's County Health Department
Cheverly, Maryland

Dear Dr. Stearns:

We commend you for your courageous, honest, and forthright evaluation of the temporary sewage treatment plant for the Greenbrier-Glen Ore Development in Greenbelt, Maryland. It is high time intellectual and professional honesty became the standard at the Prince George's County Health Department. We on the downstream end of this proposed "package plant" are particularly grateful that your predecessors are no longer making evaluations which affect the health of Prince George's citizens.

The Greenbrier proposal is receiving support from no one except the developer, his "experts" and certain others whose main concern obviously is not the public health. One wonders how, in a matter of such gravity, financial commitments could transcend concern for the safety of the citizenry.

It took courage to do what you did, Dr. Stearns--to buck the establishment of private interests which for so long have operated in our County. Although for the time being, your stand may be a lonely one among County officials you will receive the support of countless thousands of citizens and outside experts whose health you are protecting.

You have set the good example. You have placed professional integrity above single-minded political maneuverings. We thank you, we commend you, and we offer our continued support of any and all policies of your Department which are in the interest of protecting the public health, safety and welfare.

Most sincerely,

COLLEGE PARK ECOLOGICAL ASSOCIATION, INC.

Judy Comparetto
President

72-R-5

Position of the City of College Park
with respect to the Greenbrier-Glen Ora
Project

WHEREAS, the so called package plant for the proposed Greenbrier-Glen Ora Project will put an effluent into a stream system that flows through our City and

WHEREAS, the receiving streams are intermittently a dry bed, and

WHEREAS, such effluent will not be diluted with a larger mass of water until it empties into Paint Branch, and

WHEREAS, technology cannot really assure us that such effluent is free of virus and other pathogenic organisms, and

WHEREAS, such effluent would be substantially higher in certain minerals than is presently allowable in secondary treatment plants which will cause serious problems, and

WHEREAS, such a plant would be operated by W.S.S.C. and such agency in the past has had spills, and

WHEREAS, W.S.S.C. as operator, at this time, does not have the capability on a day to day basis to determine if in fact viruses are eliminated, and

WHEREAS, the concept of temporary package treatment facilities is of recent origin and the effectiveness and/or efficiency of such facilities have not been sufficiently documented, and poses a potential threat to the health and safety of our community, and

WHEREAS, this Greenbrier-Glen Ora project will not provide for on site retention of storm water but plans to use for storm water runoff that stream system converging in the vicinity of Berwyn Heights and Lakeland, already plagued with storm water problems

NOW BE IT HEREBY RESOLVED that the City Council of College Park is gravely concerned and is thereby opposed to the use of a "Package Sewage Treatment Plant" and the failure to provide for on site retention and storage of storm water runoff at the proposed Greenbrier-Glen Ora project until such time as assurances can be given by Prince George's County and the Maryland State Department of Health that there will be no adverse downstream effects.

Adopted this 8th day of February, 1972

William K. Reading, Mayor

ATTEST:

Miriam P. Wolff, City Clerk

Introduced Mr. Schwan 1st Reading 2/7/72
Amended 2/7/72 Passed 2/7/72
Posted 2/8/72 Effective 2/7/72
Resolution Book No. 2, Page

RESOLUTION NUMBER 226

A RESOLUTION REGARDING THE PROPOSED GREENBRIAR AND GLEN ORA GARDENS TEMPORARY SEWAGE TREATMENT FACILITIES

WHEREAS, since May 1970, there has been imposed in Prince George's County a moratorium on public sewer connections except with respect to those for which permits had been issued prior to such date; and

WHEREAS, the developers of Greenbriar and Glen Ora Gardens apartment projects have applied for a permit to install temporary sewage treatment facilities to serve such projects until such time as connection can be made to the public sewer system; and

WHEREAS, the Greenbriar and Glen Ora Garden tracts are in Area 3 of the Prince George's County Ten-Year Water and Sewerage Plan under which community systems are to be given immediate priority; and

WHEREAS, the County Council of Prince George's County, pursuant to Resolution CR-11-72, has found the apartment projects to be in Area 3 of the Ten-Year Water and Sewerage Plan and, therefore, ready for immediate development were it not for the sewer moratorium, and has tentatively approved the proposed Greenbriar and Glen Ora Gardens temporary sewage treatment facilities subject to the fulfillment of certain conditions; and

WHEREAS, the County Council will hold a hearing on February 8, 1972 on a proposal to amend the Ten-Year Water and Sewerage Plan to permit the installation of such facilities to serve the Greenbriar and Glen Ora Gardens apartment projects; and

WHEREAS, the State Department of Water Resources has reviewed the

to the State Department of Health and Mental Hygiene approval of the discharge subject to its meeting prescribed effluent characteristics to assure compliance with Maryland's Water Quality Standards, and the Applicants' meeting other conditions; and

WHEREAS, pursuant to Article 43, Section 33 of the Annotated Code of Maryland, as amended, the State Department of Health and Mental Hygiene "shall investigate.....all points of sewage discharge.....[and] pass upon the design and construction of all.....sewerage systems.....within the State....."; and

WHEREAS, the stream into which the effluent from the proposed facilities would be discharged flows through the City of Greenbelt, the Greenbelt City Council has held three hearings on this subject during which it heard Mr. William E. Chicca, State Department of Water Resources; Dr. Perry Stearns, Prince George's County Health Officer; representatives of the developers, and many citizens of Greenbelt and surrounding communities, and has discussed this matter at other meetings of the City Council; and

WHEREAS, during the course of the hearings and meetings, fears and doubts were expressed by citizens and by Members of Council concerning the discharge of effluent into an intermittent stream that flows through a generally forested area to which residents nearby have ready access, with particular reference to possible health hazards were virus removal from the effluent not adequate or were there to be a malfunction or operational failure of the sewage treatment facilities, and to the possible ecological effects downstream from the point of discharge; and

WHEREAS, the City Council of Greenbelt is not competent to assess fully such fears or resolve such doubts, nor is it the responsibility of the City Council to do so, it does have a responsibility to make known to the County

State Department of Health and Mental Hygiene for its consideration those recommendations that the City Council feels should be incorporated as necessary conditions should the State Department of Health and Mental Hygiene determine that a permit should be issued; now, therefore,

BE IT RESOLVED by the City Council of Greenbelt, Maryland, that in its view, the possibility that the effluent discharged from the proposed temporary sewage treatment facilities might constitute a health hazard or have adverse ecological effects is sufficient reason to warrant the County Council's requiring an assurance from the County Health Officer that the effluent from the proposed temporary sewage treatment facilities would not represent a health or ecological hazard as a condition precedent to its approving the proposed amendment to the Ten-Year Water and Sewerage Plan; and

BE IT FURTHER RESOLVED by the City Council that, in view of the possible health and ecological hazards, it recommend to the State Department of Health and Mental Hygiene, should it see fit to issue a permit, that, among other conditions it might impose, it require that the temporary sewage treatment facilities meet those conditions specified by the State Department of Water Resources in its Evaluation of Greenbriar and Glen Ora Gardens (PCDE #144) and by the County Council of Prince George's County in Resolution CR-11-72; and

BE IT FURTHER RESOLVED that the City Council recommend to the State Department of Health and Mental Hygiene that it require the developers of the Greenbriar and Glen Ora apartment projects meet those specifications for the temporary sewage treatment facilities and processes which the developers described to the City Council, including:

(a) Secondary treatment consisting of utilization of a communitor, an aerobic biological process known as an "Extended Aeration Activated Sludge Process" and a clarifier which will continuously

(b) Tertiary or advanced waste treatment consisting of:

1. A solid contact clarifier utilizing lime to precipitate phosphorus as a sludge and drawing off the sludge to a holding tank;
2. Filtration using four parallel mixed media filters;
3. Aeration to add dissolved oxygen; and
4. Addition of sufficient amounts of base to achieve the high pH (11.5) necessary for phosphorus precipitation;

(c) Disinfection accomplished by a combination of adequate doses of chlorine (10 to 25 mg/l) and sufficient detention time (30 minutes); and

(d) Installation of dual mechanical and electrical facilities to guard against breakdown, including:

1. Equipping the communitor with a bypass channel with bar screens;
2. Provision of dual disinfection units;
3. Piping to permit bypassing of any unit;
4. Piping to allow 100 per cent return of effluent to the biological process for a continuous period of 24 hours;
5. Installation at a point in the treatment process after there has been partial treatment of a closed storage or surge tank of sufficient size to equalize the flow through the treatment process during peak hours of use so that it will approximate the flow during low usage periods; and
6. Provision of a completely independent power generating capacity; and

BE IT FURTHER RESOLVED that the City Council recommend to the State Department of Health and Mental Hygiene that it consider requiring the developers of the Greenbriar and Glen Ora apartment projects to install a meter to record constantly the flow of sewage into the temporary sewage treatment facilities; to prescribe the method of sludge disposal; to establish a limit on the number of connections allowed; to require the removal of nitrogen; to prescribe the level of competency of plant personnel; to require laboratory analysis of the discharge on a daily basis; to require the piping of the discharge to a point in the stream where it is no longer intermittent; and, to avoid possible adverse ecological effects downstream, to require chlorine removal before the effluent is discharged; and

BE IT FURTHER RESOLVED that nothing in this resolution is to be construed as an endorsement of a circumvention of the moratorium on public sewer connections if, in the view of the State Department of Health and Mental Hygiene, the installation of the Greenbriar and Glen Ora Gardens apartment projects temporary sewage treatment facilities would constitute such a circumvention.

BE IT FURTHER RESOLVED that this resolution shall become effective immediately upon its passage.

PASSED by the Council of the City of Greenbelt, Maryland at its Regular Meeting, February 7, 1972.

_____
Mayor

ATTEST:

November 9, 1971

Mrs. Georgine Havlik
Public Health Engineer
Division of Water and Sewerage
State of Maryland
Department of Health and Mental Hygiene
Environmental Health Services
Baltimore, Maryland 21201

Re: Point of Sewerage Discharge
Greenbrier and Glen Ora Apts.

Dear Mrs. Havlik:

Please accept our apologies for not responding directly to your April 5, 1971 letter. Our interpretation of the letter was that comment was not necessary on our part, due to subsequent actions taken on the project by the County. These actions are summarized in a letter to you dated May 18, 1971 from Mr. Gullett, Prince George's County Executive. In addition to Mr. Gullett's statement, we will add that we are opposed to a package treatment plant disposing treated sewerage into an intermittent stream such as was proposed at Greenbrier, Glen Ora.

Subsequent to the County review and action on the package treatment plant proposal, the Prince George's Comprehensive Water and Sewerage Plan was amended to include community sewerage projects 27.1, 27.3, 27.4 and 57.6 to provide service to the apartments.

A copy of The Maryland-National Capital Park and Planning Commission staff report dated June 15, 1971 and letter dated June 29, 1971, to the County Executive are sent to you for your information on these sewerage amendments.

Very truly yours,

Philip R. Hogue
Chairman

PRINCE GEORGE'S CIVIC FEDERATION

November 25, 1971

William W. Gullett, County Executive
Office of the County Government
Upper Marlboro, Md.

Dear Mr. Gullett,

On November 4, 1971, the Civic Federation unanimously passed a motion opposing the installation of a package sewage treatment plant in the Greenbriar subdivision of Greenbelt.

The main reason cited was the danger to the health and welfare of the citizens of Greenbelt, Berwyn Heights, College Park, Lakeland and other points downstream along Indian Creek.

Therefore, the Prince George's Civic Federation respectfully urges you to disapprove of the application for the treatment plant.

Yours truly,

Kenneth C. Styers

Kenneth C. Styers, President

February 4, 1972

The Honorable Richard Pilski
Mayor of Greenbelt
15 Crescent Road
Greenbelt, Maryland

Dear Mayor Pilski:

At its meeting on January 13, 1972, the Board of Directors of Greenbelt Homes, Inc., approved the following action: That we communicate Greenbelt Homes' opposition to the temporary Greenbriar Sewage Treatment Plant which is proposed for Greenbelt. We base this opposition on the following points:

1. The point of discharge for the effluent from this plant is into an intermittent stream with a rated flow of zero.

2. The State of Maryland and Prince George's County have no standards for tertiary treatment.

3. The route of the treated sewage would pass through wetland, with recreational uses, flood plain which come precariously close to residential areas and ultimately into the portion of Northeast Branch.

4. The disposal of sludge (estimated at 10 cubic yards per day) would constitute a violation of the present sewer moratorium in effect in Prince George's County.

5. The State Department of Water Resources' Point of Discharge Report which granted approval has in it information which is not factual, errors in substance and judgment and should be withdrawn; such as, calculations as to population density; distance for nearest residential areas is overstated; when permanent sewer connection can be made is not accurate.

All of the above reasons point out the unnecessary risks involved in granting approval for such a facility in the planned City of Greenbelt. We urge it be disapproved.

Sincerely yours,

EXHIBIT D

United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

REPLY REFER TO:
D24-NCP (MCA)

MAY 21 1973

Mr. Edward Dunkelberger
Covington & Burling
888 Sixteenth Street, N.W.
Washington, D.C. 20006

Dear Mr. Dunkelberger:

After receiving your letter of April 26, we had an opportunity to discuss the proposal by Greenbriar Associates to construct an outfall line from their private sewage treatment plant to a discharge point along an existing receiving stream in the Greenbelt, Maryland, area with their legal counsel.

We have informed Greenbriar Associates, through their counsel, that we will not consider their application until their initial request, filed with the National Aeronautics and Space Administration, is disposed of. We have also informed them that the proposed action appears to require the preparation of an environmental impact statement in accordance with CEQ guidelines, should consideration of the substance of their request become necessary.

Sincerely yours,

Russell E. Dickenson

Director, National Capital Parks

EXHIBIT C

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO
ATTN OF:

11633

February 19, 1971

Mr. James M. Hennessey
Chief, Planning and Zoning
Administration Division
Regional Headquarters Building
6600 Kenilworth Avenue
Riverdale, Maryland 20840

Dear Mr. Hennessey:

In response to your letter of December 2, 1970, we have reviewed the Prince George's County Application for Special Exception, SE 2469.

Since this special exception proposes to increase the density of this area's development, which could appreciably effect Greenbelt Road traffic, Goddard recommends that Special Exception, SE 2469 not be approved. We will continue to oppose any such development until improvements are made to Greenbelt Road and its interchange with the Baltimore-Washington Parkway.

The covenant restricting the construction of structures within 250 feet of this Center's boundaries is now being reviewed to determine the impact on this Center's projects and programs if the covenant were relaxed. We will advise you as soon as a decision has been reached.

Very truly yours,

James F. Mills
Chief, Facilities
Engineering Division

breaks of enteric virus disease was not large, which indicated that many may not be reported or understood to be viral in origin.

The enteric virus density of domestic sewage has been estimated at 700 virus units/100 ml of sewage(*216*). Northington et al.(*217*), while studying the health aspects of waste water reuse, noted that if such sewage underwent activated sludge treatment with a subsequent virus removal efficiency of 80–90%(*216,218–220*), the secondary effluent would contain 70 virus units/100 ml. Further flocculation processes would effect a 90–99% virus reduction(*221*), so that the tertiary effluent would contain about 1–7 virus units/100 ml. A figure of 5 units/100 ml was now assumed to be in the renovated water prior to chlorination. If a 99.99% reduction of virus units occurred after chlorination, the virus density would be reduced to 1 unit/50 gal. Thus, 1×10^5 virus units could be present in a 50 million gpd water supply. If 0.2% of this water is consumed as drinking water, about 2000 virus units could be ingested daily by the consumer.

The importance of such low level transmission to man is evident when consideration is given to what constitutes a minimal virus dose capable of producing infection and disease in man. Plotkin and Katz(*224*) reviewed the available literature concerning the minimal dose of viruses that would be infective for man via the oral route and concluded that one tissue culture infectious dose is sufficient to infect a human if it comes in contact with susceptible cells. Recent experimentation by these workers(*225*) with the attenuated poliovirus demonstrated that one tissue culture infectious unit (1 $TCID_{50}$) constituted an infectious dose.

E. Occurrence and Importance of Bacterial Viruses

The detection of bacteriophage levels in water and waste water has been recommended by a number of investigators as being a sensitive, convenient, and reliable index of water contamination by pathogenic enteric microbes, and as a useful epidemiological tool in determining the origins of waterborne microbial diseases. Bacteriophages are bacterial viruses, i.e., viruses that infect, reproduce in, and eventually destroy specific bacterial cells. They are widely distributed in nature(*226*). D'Herelle(*226*) noted in regard to the ubiquity of the bacteriophage that:

> It is everywhere present, one might say. Up to the present time it has been shown to be present not only in the intestinal contents of the normal man and of healthy animals but particularly in those who are convalescent from a bacterial infection, in the urine of these convalescents, in their blood, in pus, in river water, and in cultivated soil. Being in fact, a constant inhabitant of the intestinal tract it may be encountered in everything which may be contaminated by fecal material.

Over 100 new human enteric viruses have been described since t investigations of Enders et al.(*215*) on viral propagation techniques usi tissue cultures. Enteric viruses are the most important virus agents infectivity for man known to be present in water and waste water. T group includes all viruses known to be excreted in quantity in the feces man; they are listed in Table 6 along with their associated diseases. Th

TABLE 6
Human Enteric Viruses and Their Associated Diseases[a]

Major subgroup	Number of types	Associated disease
Poliovirus	3	Paralytic poliomyelitis, aseptic meningitis
Coxsackievirus		
Group A	26	Herpangina, aseptic meningitis, paralytic disease
Group B	6	Pleurodynia, aseptic meningitis, and infantile myocarditis
Echovirus	29[b]	Aseptic meningitis, fever and rash, diarrheal disease, respiratory infections
Infectious hepatitis	1(?)[c]	Infectious hepatitis
Adenovirus	30+	Respiratory and eye infections
Reovirus	3	Fever, respiratory infections, and diarrhea

[a]From Refs. *129, 214, 216, 223*.
[b]Echovirus serotype designations were assigned originally to 32 viruses, but serotypes 9, 10, and 28 have now been reclassified and these numbers are now unused (*129*).
[c]Isolation uncertain.

the enteric viruses consist of the enteroviruses (poliovirus, Coxsack virus, and echovirus), infectious hepatitis, adenoviruses, and reovirus Other viruses may be swallowed by man (e.g., influenza, mumps, and co or fever sore viruses) and may also be isolated later from his feces. Ho ever, these latter are not believed to be particularly significant in disea transfer via contaminated water. Clarke et al.(*214*) pointed out that sin enteric viruses are found in the feces of infected individuals and a readily isolated from urban sewage, especially in the late summer or ea fall, they may enter water supplies and present a health hazard to huma However, it was noted that the number of *recognized* waterborne o

Chapter 13 Bacterial and Viral Analysis of Water and Waste Water

Pasquale V. Scarpino
ENVIRONMENTAL HEALTH ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF CINCINNATI
CINCINNATI, OHIO

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I. Microbiological Analysis of Water and Waste Water

A. Disease Transmission by Water

Water has always been a medium for the transmission of human microbial diseases—the bacterial-caused diseases of typhoid fever, paratyphoid fevers, bacillary dysentery, and cholera, and nonbacterial diseases such as amoebic dysentery and infectious hepatitis—but we have known definitely for only a century that this is so. Before then, man indicated in his writings and by his public works, customs, and religious practices

Water and Water Pollution Handbook

VOLUME 2

(*in four volumes*)

Edited by LEONARD L. CIACCIO
GTE LABORATORIES INCORPORATED
BAYSIDE, NEW YORK

MARCEL DEKKER, INC., New York 1971

E-295

testing. I am certain that Dr. Cookson would be happy to consult for such an undertaking.

I am enclosing a copy of several pages in a recent (1971) volume entitled "Water and Water Pollution Handbook" edited by Dr. Leonard Ciacci This book is designed for the sanitary engineer and not for the use of environmentalists alone. I have highlighted the sentences that I believe you must consider before you approve a sewage treatment plant whose effluent will flow into an open intermittent stream accessible to the citizens of Greenbelt. Internationally known virologists at the National Cancer Institute in Bethesda with whom I have spoken concerning the proposed plant at Greenbriar have beena appalled that such a situation could be proposed in 1972 when we are so aware of the dangers of viral infections and so little can be done to avert dangerous exposure.

D. Odors- Dr. Cookson assured the Council that there would be no odor emanating from the sewage treatment plant since everything is converted to carbon dioxide and water. He forgot to add that hydrogen sulfide is also formed which gives sewage its distinctive odor. Hydrogen sulfide is a gas and would permeate the area.

In summary, it is my firm conviction that the Greenbriar sewage treatment plant should not be approved as long as the effluent will run into an intermittent stream. Please wait until sewers can be connected to the main treatment centers so that the public is not needlessly exposed to dangerous viruses.

Thank you for considering these points.

EXHIBIT B

Tuesday, January 25, 1972

Mayor and Council
City Of Greenbelt
Greenbelt, Maryland

Gentlemen:

I would like to make some comments concerning the report Dr. Cookson read to the council on Monday night, January 24, 1972.

A. Removal of Nutrients- While the plant described by Dr. Cookson indicates that 90-95% of phosphate will be removed by precipitation with lime, no mention was made of nitrogen removal. The plant as described should remove between 10-15% nitrogen, but the EPA will require that the Potomac and its estuaries have 90% nitrogen removal by 1974. Nitrogen as well as phosphorus is an excellent nutrient for algal growth and destroys our streams and rivers.

B. Sludge generated by the use of lime as a precipitant is not an insignificant amount. In fact the volume of sludge doubles when lime is added. Many communities using lime in sewage treatment are having problems with the large volumes of sludge.

C. Virus Removal- Although Dr. Cookson assured the Council that the proposed plant will remove 99.9995% of viruses, that figure cannot be confirmed or disputed. For one thing the plant has not yet been built so its efficiency cannot be tested. It is also apparent that there are no plans to test it before it is installed since the Council was told several times how expensive it would be to test for viruses. There are many laboratories

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Volume 35, Number 10 Thursday, January 27, 1972

Balancing The Scale

The issue of a temporary package sewage treatment plant for the Greenbriar apartment project on the Smith-Ewing tract essentially boils down to whether the project is thought to be of such urgent nature as to warrant approval of this installation during a period when there is a State-imposed moratorium on sewage hookups to the permanent WSSC system.

Unfortunately, the issue has been clouded by other considerations. There are those who oppose the package plant mainly because they are opposed to any apartment development of the Smith-Ewing tract. They cling to the hope that, if the Greenbriar project is delayed long enough or killed, the tract, which was zoned for R-30 apartments long before Greenbriar was a gleam in the developer's eye, will somehow be downgraded and zoned for something less dense than apartments.

On the other hand, there are those who feel that the proposed "luxury-type" apartment project should be encouraged to proceed as rapidly as possible because of the benefits to the county and city in terms of additional tax revenues generated and recreational facilities provided (including the donation by the developer of 5 acres of open space), when compared to what a conventional R-30 garden-type project would produce. Especially, they fear that failure to provide sewage facilities for the project would cause its collapse and eventually result in the construction of "ordinary run-of-the-mill" apartments on the tract.

It thus follows that the former group tends to see nothing good and the latter group nothing bad about a temporary package treatment plant, when the real situation is something in between.

Scientists in the field are convinced that tertiary sewage plants (such as is proposed in the package treatment plant) are the wave of the future. Because of technological developments, it is generally acknowledged that such plants can be guaranteed to produce effluent of "drinking water" quality if sufficient sums of money are spent.

Unfortunately, only limited experience exists with these advanced plants and little data have been accumulated regarding the consequences of inadequate design, plant malfunction, and operational errors. Conceivably a plant, if not operated or designed properly, could create a health hazard by discharging poorly treated sewage into a stream bed that some of the time would have no diluting water (as would be the case here in Greenbelt). Reportedly, built-in safeguards could reduce this risk to a minimum.

Nevertheless, what must be weighed is whether any risk — slim and remote as it may be — should be taken to insure the immediate development of the Greenbriar project. We think not. However desirable the Greenbriar project may be per se, we do not deem it of such high priority in the social value scale as to warrant circumvention of the moratorium by the use of a package sewage treatment plant. As the Greenbelt city council understood at the time it [illegible] special exception for the Green-

COLLEGE PARK ECOLOGICAL ASSOCIATION

7324 Radcliffe Drive
College Park, Maryland 20740

November 5, 1971

Mr. W. MacClean Bingley
State Department of Health
and Mental Hygiene
301 Preston Street
Baltimore, Maryland 21201

Dear Mr. Bingley:

It has been brought to our attention that Rozansky and Kay, the developers of Greenbrier and Glen Ora, Greenbelt, Maryland, have applied to your Department for a permit to install a temporary sewage treatment facility for this apartment complex. We hereby request all details and specifications regarding this facility in order that it may be revieved by our Staff. We would specifically like to have details of the type of effluent treatment. Is it equivalent to secondary treatment? Is it equivalent to tertiary treatment? What is the percentage removal of: (1) BOD, (2) suspended solids, (3) nitrogen, (4) phosphrous? Also, what is the presumed effect on the watershed?

As you are undoubtedly aware, there presently exists a serious threat to the public health, welfare, and safety because of the large volume of poorly treated and untreated sewage which daily is polluting and further degrading our streams and rivers. We take an extremely dim view of any and all actions, plans, proposals, or applications for permits which may cause any further degradation of our waterways or reduce environmental quality.

Our organization is dedicated to insuring that the laws of Prince George's County, the State of Maryland, and the United States of America are enforced. We are further dedicated to halting any further environmental degradation and exploitation of our dwindling natural resources. It is hoped that you will join us in working toward these most worthy goals.

Sincerely yours,

Judy Comparetto
President

GREENBELT HOMES, INC.

MEMBERSHIP RESOLUTION ON GREENBRIAR SEWAGE TREATMENT PLANT

May 13, 1973

WHEREAS, the use of a temporary, on-site sewage treatment plant has been proposed to serve the Greenbriar apartment development in Greenbelt, and

WHEREAS, the Board of Directors of Greenbelt Homes, Inc., have consistently opposed the use of temporary sewage treatment facilities in Greenbelt, and

WHEREAS, the use of on-site sewage treatment in Greenbelt is expressly contrary to the adopted community goals and master plan for Greenbelt, and

WHEREAS, the following agencies or bodies have formally recommended against the use of package sewage treatment plants except to relieve an existing health hazard or raw sewage overflow:

(1) The Community Goals Advisory Committee of Prince George's County,

(2) The Prince George's County Task Force for 10-Year Sewer and Water Planning,

(3) The Policy Committee Report of the Washington Interstate Water Resources Program,

(4) The Interfederation Council of Metropolitan Civic Associations, and

WHEREAS, the effluent from the proposed Greenbriar plant will constitute a potential health hazard, and seriously endanger the wooded stream valley that adjoins GHI property on the east and the north,

NOW THEREFORE, BE IT RESOLVED that the GHI Membership at the 1973 Annual Meeting does charge the GHI Board of Directors and staff to actively and zealously pursue the following:

1. Communicate the language of this resolution to all elected and appointed government officials with a responsibility in the area of health, environment, and wastewater management, including the City of Greenbelt, the County of Prince George's, Bi-county sewer and planning agencies, the state of Maryland and appropriate federal agencies,

2. Investigate and pursue appropriate legal actions to protect the rights of GHI residents and to assure the intents of this resolution, namely, that temporary, on-site sewage treatment not be allowed in Greenbelt,

3. Keep the membership of GHI informed of Corporation efforts in carrying out this resolution.

IT FURTHER RESOLVED that this resolution shall become effective

THE GREENBELT SAVE OUR
COMMUNITY COMMITTEE
8 Woodland Way
Greenbelt, Maryland 20770

JANUARY 14, 1973

CHAIRMAN
THOMAS X. WHITE
VICE CHAIRMAN
DOROTHY SALUCH

PURPOSE

"Shall be to promote non-partisan citizen activity and support for sound governmental decisions affecting the health, economy, ecology general welfare and to protect the rights of the individual and of the community of Greenbelt and its immediate environs."

Dr. Neil Solomon, Secretary
Maryland Department of Health and Mental Hygiene
State Office Building
301 West Preston Street
Baltimore, Maryland 21202

Re: Point of Discharge Application, Greenbriar package sewage treatment plant, Greenbelt, Prince George's County

Dear Dr. Solomon:

As Chairman of the Greenbelt Save Our Community Committee, I urgently ask you to intervene personally to deny a permit for the above-referenced Greenbriar point of discharge (POD) and to disapprove of the Prince George's County 1973-1982 Ten Year Water and Sewerage Plan as long as it includes said POD. You will note that the Save Our Community Committee is joined in this request by a number of Washington area organizations which have co-signed this letter.

In late November the Prince George's County Council voted in favor of the 1973-1982 Ten Year Water and Sewerage Plan. Subsequently County Executive William W. Gullett refused to sign the bill enacting the Plan because of the inclusion of the POD for a package sewage treatment plant (STP) to serve the future 1193-unit Greenbriar garden apartment complex in Greenbelt, Md. (See map, Exhibit 1.)

Although land use is the County Council's self expressed major concern in the siting of sewage treatment plants, the Council was unable to consider the land use implications of the Greenbriar STP before approving it along with the Ten Year Plan. While the record of the hearing on the Plan was still open, the applicants, Greenbriar Associates and Alan I. Kay, announced several substantial changes in the projected STP capacity, design and performance features and met several times with various officials, verbally promising to change the design still further.

A separate hearing should have been held on the subject because it was impossible for interested citizens, local associations, municipalities and agencies, as well as the Council, to evaluate the possible impact of what was substantially a new proposal. As

on the Greenbriar plant POD have not changed their opinions. Only the applicants favored the proposal; all others opposed it.

A year ago the County Council attempted to amend the 1972-81 Ten Year Water and Sewerage Plan for the purpose of siting the Greenbriar STP in Greenbelt. Opposition to the amendment, CB 45-1972, was registered by petitions of over 1,100 Greenbelt citizens and other Prince George's County residents; County Executive William W. Gullett; the Maryland-National Capital Park and Planning Commission; the downstream municipalities of College Park, Riverdale, and Berwyn Heights; Greenbelt Homes, Inc.; and numerous local, county-based and metropolitan area civic and conservation organizations.

As the plant would discharge into an "intermittent stream", a wooded valley that is dry in dry weather, the steady flow of effluent would be undiluted much of the time. Prince George's County Health Officer Dr. Perry Stearns recognized this and, because he could not guarantee that no health or environmental hazard would result, he disapproved of the POD in a letter to the Council dated February 14, 1972.

Repeatedly, citizens and officials alike pointed out that it would be more likely for authorities to close down a commercial or industrial project rather than a residential complex in the case of an on-site STP breakdown.

As a result of all the opposition, the County Council took no final action on the amendment. Instead, they took an end run around public opinion and simply included the Greenbriar POD in the new Ten Year Plan. It is in actual contradiction to the goals of the Plan, as stated on page 4 of the text. Drawn from the 1971 and 1972 reports of the County's Goals Advisory Committee, the recommendations concerning package plants limit their use to cases of existing community health hazards and of solutions of sewer problems in isolated communities. The future Greenbriar apartment project fits in neither category.

The County Health Officer ultimately gave his approval of the Greenbriar POD in a letter (Exhibit 2) to the Prince George's Council dated November 28, 1972. However, he predicated that approval on his understanding that the conditions listed therein would be incorporated into the STP plans by means of a "legally binding document." To our knowledge no such document exists.

The County Council's subsequent amendments to the new 1973-1982 Plan do not require such a legal agreement as a condition to be imposed on the Greenbriar plans.

Whether or not such a document does in fact exist, the health and ecological threats which this STP would present to the nearby and downstream residents cannot be eliminated by a mere piece of paper. That paper would signify official sanction of the discharge

of 325,000 gallons per day of sewage effluent into the headwaters of the populous Anacostia River basin unless it could not meet certain "advanced" secondary treatment standards, in which case, the effluent would instead be piped via "emergency" line to the already overloaded and still unexpanded standard secondary Western Branch STP on the Patuxent River.

Prince George's County has an unforgettable history of public health crises related to sewage which public officials have seemed unable to reverse.

The fact remains that neither the Potomac River, to which the Anacostia is tributary, nor the Patuxent River can safely assimilate a heavier load of nutrients and other pollutants than they presently carry. Moreover, the citizens who reside in both watersheds presently are exposed to waterborne infectious agents such as viruses from treated effluent as well as from frequently recurring raw sewage spills from overburdened mains, pumping stations and treatment plants.

Every effort should be directed towards reducing, not increasing, the incidence of public health hazards and environmental insults. Approval of the Greenbriar STP/POD would only exacerbate present problems in Prince George's County and in two major river systems. It would also stretch the State Department of Health's already over-extended budget and staff to oversee yet another source of potential trouble in two basins already under sewer moratoria.

Serious policy and land use implications would result from approval of this STP/POD to serve a residential development in an area under sewer moratorium with an "emergency" line to an overloaded permanent plant. In effect your office would be granting an exception to the moratorium and setting a precedent for future overdevelopment in advance of necessary regional treatment plant expansion and upgrading. Such a sewer connection would give the appearance of being a safety factor, but it would actually be a premature hook-up, contrary to the public interest in the long run, once the precedent were established.

It is our understanding that you have every intention of enforcing the sewer moratoria, and we certainly give you our strongest support.

It is our further expectation that your first concern in this matter as the chief public health officer of the state of Maryland is to comply with the new Federal Water Pollution Control Act of 1972. According to a letter dated November 13, 1972, to Dickran Hovsepian, Chairman of the Montgomery County Council, Carl Eardley of the Water Enforcement Office of the Environmental Protection Agency stated that, "Package plants have to comply with the same requirements imposed on other municipal plants." (Exhibit 3)

The EPA intends to review all POD applications for permits "to control discharges by industries, municipalities and other point sources of pollution," as shown in the EPA Citizens' Bulletin of December 1972. (Exhibit 4)

Already in effect are the Potomac River Enforcement Conference standards which the EPA applies in the Potomac River Basin and which call for removal of 85% of total nitrogen. The plans for the Greenbriar STP provide for no removal of soluble nitrogen; thus, the plant would not be in compliance.

Obviously, the Greenbriar plant would not meet Federal Advanced Wastewater Treatment (AWT) standards, regardless of the developer's claim that it would provide "advanced" wastewater treatment.

This fact is all the more striking when notice is taken of the Federally-owned STP already in operation just two miles downstream from the proposed Greenbriar POD. In a letter to C. A. Logan, Director of the U.S. Agricultural Research Center in Beltsville, dated December 29, 1970, from the Acting Regional Director of the EPA, the Enforcement Conference standards are to be met for upgrading the plant for advanced waste treatment (AWT) by July 1, 1974. (Exhibit 5) Remodeling plans are currently underway.

Since the State Department of Health and Mental Hygiene has been governed in this case by Article 43, Sec. 387C of the Annotated Code of Maryland, it must be pointed out that the law requires the Department of Water Resources to advise the Health Department of "the effect of...waste discharges on waters of the State."

The Water Resources Department apparently gave little thought to the Federal requirements to be imposed upon Beaver Dam Creek, and the approved POD would allow effluent of lower quality to be emptied into the stream with the result that the USDA plant would be in compliance and the Greenbriar plant would not.

Recognizing the limitations of the present Federal water quality standards, we stress the importance of revision of State and Federal regulations to require removal of viruses, chlorine and other harmful materials and chemicals from sewage treatment plant effluent. Nonetheless, we see an imperative need at this time for a moratorium on all permits for points of discharge in the State of Maryland until such time as the State has adopted new water quality standards in conformance with the Federal Water Pollution Control Act of 1972.

In summary, Dr. Solomon, we appeal to you as our chief health officer to protect the public by denying a point of discharge permit for Greenbriar and by disapproving of the Prince George's County 1973-1982 Ten Year Water and Sewerage Plan as long as it includes the Greenbriar POD.

We would appreciate your kind consideration and we await an early reply.

Yours sincerely,

Thomas X. White, President
Greenbelt Save Our Community
Committee

Co-signers:

s/Willard K. Morris, President — Prince Georges Environment Coalition

s/James F. Vance, Esq., President — Prince George's Civic Federation

s/Raye-Paige, Chairman — Maryland Wilderness Association

s/
Judy Comparetto, President — College Park Ecological Assn., Inc.

s/Virginia Carter, Chairman — Maryland Wetlands Committee

s/Sidney Shifrin, Chairman — Montgomery Environmental Coalition

s/Jesse Maury, President — Montgomery County Civic Federation

EXHIBIT 18a

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO
ATTN OF

JUN 29 1973

Neil Solomon, M. D.
State of Maryland
Department of Health and Mental Hygiene
Environmental Health Administration
610 North Howard Street
Baltimore, Maryland 21201

Dear Dr. Solomon:

Reference is made to Mr. Earl S. Quance's letter of March 2, 1973 regarding the Greenbriar Apartments, Wastewater Treatment Facility, Prince George's County.

Greenbriar Apartment Project has requested permission from this Center to dump effluent from the Projects Wastewater Treatment Facility into a drainage ditch located at the Northwest section of this Center's property. The drainage ditch flows intermittently under the Baltimore-Washington Parkway and eventually empties into an unnamed tributary of Beaver Dam Creek.

At the present time this Center is making an evaluation of the request to determine whether or not permission should be granted.

Mr. Earl S. Quance of your staff in the aforementioned letter indicated that in addition to meeting certain effluent requirements, the effluent shall be conveyed by pipeline to a point on the stream where free flow prevails.

A "Point of Discharge Report - Evaluation of Greenbriar and Glen Ora Gardens" prepared by your office by Paul W. Slunt, Jr. and dated December 1971, excerpts of this report indicate that (1) ponding results because of the high elevation of the stream crossing at the Baltimore-Washington Parkway; (2) very negligible flow was observed in this stream at the time of inspection; (3) the stream flow at the point of discharge is negligible as the stream is an intermittent stream; and (4) the stream flow for purposes of analysis has been assumed to be zero.

Goddard to Dr. Solomon

Federal Guidelines contained in "Design, Operation, and Maintenance of Waste Water Treatment Facilities dated September 1970, (Federal Water Quality Administration) advises that Page 11, V (d) "there should be no discharge of effluents to swamps, stagnant waters, small lakes, or intermittent streams if possible alternates are available; and (e) Outfalls shall be extended and designed as necessary to insure adequate mixing and dispersal of the effluent."

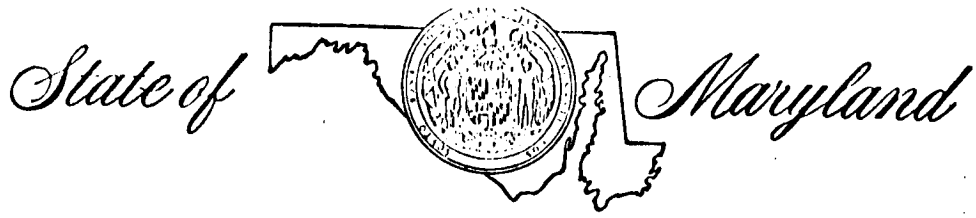
Since your Office has conducted surveys and evaluated the impact of the Greenbriar Apartment Project, would you kindly confirm approval of this waste-treatment plant and provide information regarding any restrictions, if any, imposed upon the Project by your Office. All information furnished will assist this Center in evaluating this request.

Your cooperation in this matter is appreciated.

Yours truly,

R. J. McCaffery
Chief, Technical Services

EXHIBIT 18b



DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Neil Solomon, M.D., Ph.D., Secretary
ENVIRONMENTAL HEALTH ADMINISTRATION
610 N. HOWARD STREET • BALTIMORE, MARYLAND 21201 • Area Code 301 • 383-2949

August 9, 1973

National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Re: Greenbriar Wastewater
Treatment Facility
Prince George's County

Gentlemen:

Your recent letter to Dr. Neil Solomon regarding the Greenbriar Wastewater Treatment Facility has been referred to me for reply.

The point of discharge report that was prepared by Mr. Paul W. Slunt, dated December 1971, pertained to a point of discharge that was requested at that time. This was to a small intermittent stream that passed under the Baltimore and Washington Expressway before joining Beaverdam Creek further down. Consequently, the analysis was made on the basis of discharge to that stream. Since that time, the point of discharge has changed and hence the request for right-of-way across the National Aeronautics and Space Administration's property.

A second evaluation was made by the Water Resources Administration on the basis:

1. That the flow was to be restricted to approximately one-half of the original request and

2. That the stream to which it would discharge was purported to be a flowing stream and not the intermittent stream previously requested.

National Aeronautics and
Space Administration

August 9, 1973

A site investigation was made by the Water Resources Administration to determine specifically the conditions at the point of discharge and to ascertain if the stream was "free flowing" or not. Their finding was that it was not an intermittent stream and that the water quality standards of the State would not be violated by this discharge.

We trust that this information will be helpful in making your evaluation of the request of the owner to extend the outfall pipe across the National Aeronautics and Space Administration's property. If you have any additional questions regarding this, please contact me.

Very truly yours,

Earl S. Quance

Earl S. Quance, P.E.
Public Health Engineer
Division of Water and Sewerage

ESQ:bb

cc: Dr. Perry Stearns

EXHIBIT 19a

Mr. John Parsons
Department of the Interior
18th & C Street, N. W.
Washington, D. C. 20240

Subject: Greenbriar Apartment Project

Dear Mr. Parsons,

Goddard Space Flight Center is presently confronted with a request for permission by the Greenbriar Apartment Project to dump treated sewage effluent from the Project into a drainage culvert located on Goddard property. This culvert crosses under the Baltimore-Washington Parkway and empties into an unmarked tributary of Beaver Dam Creek which crosses National Parkway Commission, City of Greenbelt, and Department of Agriculture property.

The type of treatment plant to be utilized by the apartment project is a tertiary treatment plant with a disinfectant unit utilizing a break-point chlorination process to disinfect the sewage effluent prior to dumping into the Goddard culvert.

Currently this Center has undertaken the task of evaluating the total impact of the above mentioned apartment project on the Center including a legal assessment of being party to possible dumping untreated or low quality sewage on adjoining property.

In order to take a position regarding the request, we are presently collecting factual information which will assist the Center in reaching a decision on this matter. It would be helpful, therefore, if you would provide this Center with the Department of Interior's position concerning the flow of treated effluent through National Parkway Commission property.

Your assistance in this matter is appreciated.

Yours truly,

R. J. McCaffery
Chief, Technical Services

EXHIBIT 19b

United States Department of the Interior

NATIONAL PARK SERVICE
NATIONAL CAPITAL PARKS
1100 OHIO DRIVE SW.
WASHINGTON, D.C. 20242

IN REPLY REFER TO:

D24-NCP(MPC)

JUL 19 1973

Mr. R. J. McCaffery
Chief, Technical Services
National Aeronautics and Space
Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. McCaffery:

This is in response to your June 29 letter concerning the Greenbriar Apartment Project in Greenbelt, Maryland.

In considering all proposals which involve discharge of effluent into surface streams, the Department of Interior refers to the provisions contained in the Federal Water Pollution Control Act as amended on October 18, 1972, by Public Law 92-500. This public law requires that a permit for discharging effluent into any surface stream be issued by the Environmental Protection Agency. In the case of Greenbriar, this would be handled by Mr. Daniel J. Snyder III, Administrator, Region III of the EPA in Philadelphia.

If a discharge permit is issued by EPA we would most likely have no objections to the effluent passing through National Park property at this location on the Baltimore-Washington Parkway.

Sincerely yours,

John G. Parsons
Chief, Division of Urban Project
Coordination and Environmental Impact

EXHIBIT 20

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO
ATTN OF:

JUN 29 1973

Mr. William Gullett, County Executive
14735 Main
Upper Marlboro, Maryland 20870

Dear Mr. Gullett:

Rozansky and Kay Construction Company, developers of the Greenbriar Apartment Project, has requested permission from the Goddard Space Flight Center to dump treated sewage effluent into a drainage culvert located along the northwest property line of this Center.

The effluent would then flow under the Baltimore-Washington Parkway along with the normal drainage water from the Center and eventually find its way into an unnamed tributary of the Beaver Dam Creek, which according to our records flows through the City of Greenbelt property.

Building Permit Number 299-73-CG was issued by Prince Georges County on April 25, 1973 for the construction of a sewage treatment plant at the above apartment project. Information from the developers' law firm indicates that the Greenbriar Project "has been found a desirable development by both the City of Greenbelt and Prince George's County and their decisions are entitled to great weight, particularly as both of these units of Government are aware of environmental problems and have taken them into account in their land use policies."

This Center is presently giving consideration to the above request. Two points of consideration are:

1. It appears unreasonable that a building permit was issued when the disposition of the treated effluent was unknown?

2. Several of the treatment tanks are to be erected within an existing fifty-foot easement granted this Center; there is no request for permission to build within the easement by Rozansky and Kay Construction Company.

Goddard to Mr. Gullett

Our present information indicates that Prince George's County views the Greenbriar Apartment Project from a favorable standpoint. This Center would, therefore, appreciate confirmation of this viewpoint or advisement of any negative feelings which the County may have. Furthermore, if the two points of consideration can be clarified by your office, it will assist this Center in reaching a final decision in this matter.

Your assistance in this matter is appreciated.

Yours truly,

R. J. McCaffery, Chief
Technical Services

EXHIBIT 21

FRIED, FRANK, HARRIS, SHRIVER & KAMPELMAN
(STRASSER, SPIEGELBERG, FRIED, FRANK & KAMPELMAN)
SUITE 1000, THE WATERGATE 600
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, D.C. 20037
(202) [illegible]
CABLE "STERIC WASHINGTON"
TELEX 440355

July 2, 1973

Mr. Samuel W. Keller
Administration and Management
Directorate
Code 200
Goddard Space Flight Center
Greenbelt, Maryland 20771

Re: G4(73-35130)

Dear Mr. Keller:

Transmitted herewith are three copies of sections I - IV of the response of Greenbriar Associates to the memorandum filed with you by the Prince George's Environment Coalition on June 23, 1973 in the matter of Greenbriar Associates' application for a right-of-way. A fifth section of the response, dealing with the legal aspects of the matter, will be filed with you within the next few days.

As the response explains in detail, most of the contentions advanced by the Coalition have been advanced by it before at the local and State level and have been determined to lack merit. Such arguments as are new are equally without merit. Greenbriar will most certainly not have an adverse impact on the quality of the human environment.

We have responded to your inquiries and are now responding to the Coalition's memorandum to demonstrate that Greenbriar Associates have nothing to hide as far as the environmental implications of the project are concerned. This is not to suggest that we agree that the action requested of you constitutes "major Federal action significantly affecting the quality of the human environment". On

the contrary, it is our view that application of the National Environmental Policy Act to the fact situation here in issue reaches far beyond the Congressional intent and the judicial decisions interpreting the Act. A full exposition of our position will be contained in the aforementioned Section V of the response.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Enclosures
cc: Edward Dunkelberger, Esquire
(with enclosure)

FRIED, FRANK, HARRIS, SHRIVER & KAMPELMAN
(STRASSER, SPIEGELBERG, FRIED, FRANK & KAMPELMAN)
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FELIX S. COHEN (1937-1953)

MAX M. KAMPELMAN
ARTHUR LAZARUS, JR.
RICHARD SCHIFTER
DANIEL M. SINGER
MILTON EISENBERG
JOEL R. FEIDELMAN
RICHARD B. BERRYMAN
PETER D. EHRENHAFT
WILLIAM JOSEPHSON
PATRICIA ROBERTS HARRIS
STEPHEN P. GOLDMAN
S. BOBO DEAN
MATTHEW S. WATSON
JAMES B. BLINKOFF
STEVEN D. NEWBURG RINN
SAMUEL H. WEISSBARD
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1 THROGMORTON AVENUE
LONDON, EC2N 2JT, ENGLAND
(01) 588-0667
TELEX: 887606

July 2, 1973

MEMORANDUM OF APPLICANT

RE: Application for Right-of-Way by Greenbriar Associates Across Goddard Space Flight Center Property

I. The Application

On March 14, 1973, Greenbriar Associates applied to the Director of Administration and Management of the Goddard Space Flight Center for a temporary right-of-way across approximately 150 feet of land of the Goddard Space Flight Center (hereinafter "GSFC") for the purpose of laying an eight-inch cast iron pipe in the ground, at a depth of approximately three feet, from applicant's property line to a stream on the land of GSFC. The right-of-way, needed for a period ending early in 1975, would permit effluent from an on-site wastewater treatment plant on applicant's property to be expelled into the stream in question here.

Shortly after the aforesaid application was submitted, GSFC appears to have been contacted by a group styled the "Prince Georges Environmental Coalition"

(hereinafter "PGEC") in opposition to the grant of the right-of-way. Subsequently, by letter dated April 17, 1973, applicant was notified by GSFC that "so long as the proposed outfall line is properly engineered and sited, it probably would have no adverse effect on Center operations per se." The letter went on to point out, however, that GSFC is "required to analyze the request in light of the environmental protection laws of the United States." It, therefore, suggested that applicant provide certain background information on questions concerning the environment. Applicant responded by letter dated May 4, 1973.

On June 23, 1973 PGEC filed a memorandum with GSFC, urging, in its essence, a careful examination of the environmental aspects of applicant's request and making certain allegations concerning these aspects. The purpose of this memorandum is to respond to the allegations contained in the PGEC memorandum.

II. Applicable Statutory and Regulatory Provisions

The application in issue here was filed under the provisions of 40 U.S.C. §319, under which an executive agency may grant such right-of-way over real property of the United States "as the head of such agency determines will not be adverse to the interests of the United

States." By regulation, the Administration of the National Aeronautics and Space Agency (hereinafter "NASA"), the parent agency of GSFC, determined that

> "an easement will not be adverse to the interests of the United States if and to the extent that the interest in real property conveyed thereunder is not required for a NASA program and the grantee's exercise of rights under such easement will not interfere with NASA operations." 14 C.F.R. §1204.503.

The April 17, 1973 letter from GSFC to the applicant suggests that the agency is inclined to find that applicant qualifies for an easement under the provisions of 40 U.S.C. §319 and 14 C.F.R. §1204.503. The letter poses the question, however, whether the application must also be reviewed under the provisions of the National Environmental Policy Act of 1969, 42 U.S.C. 4332(2)(C) and the appropriate NASA regulations, 14 C.F.R. §1204.11.

III. Background Facts

As indicated above, applicant is desirous of obtaining permission to lay an eight-inch pipe across 150 feet of GSFC land and to expel the effluent of an on-site wastewater treatment plant into a stream on GSFC land. The grant of the right-of-way will enable the applicant to operate an on-site small advanced wastewater treatment plant. Operation of the plant, in turn, will permit occupancy of a housing project, known as

Greenbriar, which is now under construction. PGEC has seemingly demanded of NASA to review not only the environmental impact of the outfall line as such, but also of the treatment plant as such and of the housing project itself.

It is evidently not contended that the outfall line of and by itself will have an adverse environmental impact. The issue posed by PGEC is that the wastewater treatment plant and the housing project might have such consequences. It is, therefore, the environmental aspect of the on-site treatment plant and the housing project which will be the subject of this discussion.

As explained in applicant's letter to GSFC of May 4, 1973 and the attachments thereto, the Greenbriar project is an attractively-designed garden apartment development which is to contain 1,193 units. It is being built in accordance with Prince George's County's Master Plan for College Park - Greenbelt and Vicinity. Though completely in compliance with the Plan and the zoning classification established for the tract, the proposed development differs slightly from the requirements of the County's so-called "bedroom ordinance". An exception to those requirements was granted by the Prince George's County Council after an extraordinarily thorough review of all relevant factors.

Applicant developed plans for Greenbriar and made financial commitments in that context on the basis of plans and statements by the Washington Suburban Sanitary Commission that public sewer service for the project would be available by October 1972. By the time the Commission's projections for the provision of public sewer service turned out to be overly optimistic, applicant was financially so deeply committed that it had to move forward with the Greenbriar project. To provide sewer service for Greenbriar, applicant proposed to construct an on-site treatment plant of the most advanced design, producing an effluent of drinking-water quality. The plant is to be built in compliance with standards of the State of Maryland and the Washington Suburban Sanitary Commission and is to be operated by the Commission at applicant's expense.

The concept of the on-site plant was thoroughly examined by the Prince George's County Council and was approved by it as part of the County's Ten-Year Water and Sewerage Plan. The Plan, in turn, was approved by the Maryland State Department of Health and Mental Hygiene. That Department subsequently approved the point of discharge for the treatment plant, concurring in a determination made by the Maryland Department of Natural Resources.

Plans and specifications of the on-site treatment plant require approval of the Washington Suburban Sanitary Commission and the Maryland State Department of Health and Mental Hygiene and such approvals have been requested. As indicated, the plant will be operated by the Commission, but such operation will be under the general supervision of the Environmental Health Administration within the State Department of Health. The State Department of Health, in turn, is required to operate in this field under the provisions of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. §1251 ff.

Applicant originally proposed that the effluent from the on-site plant be allowed to flow into an intermittent stream on its property. The Prince George's County Council, however, out of an abundance of caution, insisted that the effluent be carried to the nearest free-flowing stream, which is on NASA property. It is because of that requirement that the application in issue here came to be.

Because of the financial constraints under which applicant has been forced to proceed ever since its initial mistaken reliance on the W.S.S.C. estimate of the availability of public sewer and also because it felt that (a) it met the standards of eligibility for a

NASA easement contained in 40 U.S.C. §319 and 14 C.F.R. §1204.503, and (b) it had met all applicable water quality and other environmental requirements, applicant has begun construction of the Greenbriar project. The first 50 units of the project are likely to be completed in November 1973. In view of the fact that the final decisions on the construction of the addition to the Western Branch Treatment Plant have at long last been made, public sewer is now likely to be made available to Greenbriar by early 1975. The issue as to the housing project is thus no longer whether it will be built, but whether it will be permitted to be occupied in November 1973 or whether occupancy will have to be delayed for an additional fifteen months, with disastrous financial consequences to the applicant.

IV. Environmental Considerations

A. The On-site Treatment Plant

In response to applicant's assertion that the proposed Greenbriar Treatment Plant will be in compliance with all applicable Federal, State and local standards, the PGEC Memorandum appears to contend that these standards are insufficient and that NASA ought to use this opportunity to establish even higher standards. The appropriateness of requiring NASA to establish and enforce environmental standards in a field in which numerous other

agencies are exercising regulatory authority will for the moment be put aside and consideration will here be given to the specific environmental contentions advanced by PGEC. Most of these contentions have previously been presented by PGEC to the public bodies which considered the Greenbriar Plant and have not been found to be of merit.

(1) Nitrogen Removal

PGEC contends that the Greenbriar treatment process "will not remove nitrogen and other nutrients". This statement is correct as to nitrogen and false as to other nutrients. The other nutrient, phosphorus, will indeed be removed.

The simple fact is that applicant has designed the Greenbriar Plant to meet all applicable requirements. If nitrogen removal were required or would in the future be required, applicant would remove it. As applicant's consultant, Dr. John T. Cookson, Jr., explains in Exhibit 1, p. 1, nitrogen removal is not necessary and has not been required where (a) the plant is small and (b) the effluent is expelled into a stream rather than a lake or estuary. Dr. Cookson points out (Exhibit 1, p. 2) that the growth of algae depends on the availability of both nitrogen and phosphorus. The removal of only one of these nutrients inhibits the growth of

algae. It is for that reason that neither EPA nor the State of Maryland have required the removal of nitrogen in the case of the Greenbriar plant.

The discussion in the PGEC Memorandum, at pp. 2-4, of the conditions under which the Piscataway Treatment Plant would be granted permission to build an outfall line across National Park Service land, of the EPA standards for the Potomac Estuary and of Soap and Detergent Association v. Clark, 330 F. Supp. 1218 (S.D. Fla. 1971), is simply off the point. The Piscataway Plant would be nine times as large as the Greenbriar Plant and would not expel its effluent into a flowing stream. The other comments have similarly no bearing at all on the status and condition of the Greenbriar Plant.

(2) Phosphorus Removal

PGEC argues also that Greenbriar's proposed phosphorus removal is "low" (Memorandum, at pp. 4-5). The applicable State Standard is treatment to a level of 0.5 - 1.5 mg/l as P. Dr. Cookson points out (Exhibit 1, p. 2) that the Greenbriar Plant will actually operate at a level of 0.5 - 0.8 mg/l and that the phosphorus level could be reduced below 0.2 mg/l. Here again the discussion by PGEC of the proposed phosphorus level in the Potomac Estuary has no bearing on the

appropriate level of treatment in a wastewater treatment plant. The fact is that the level of treatment at the Greenbriar Plant will be extraordinarily high.

(3) Alternate Treatment Methods

Disposal of the effluent through land containment, as suggested by PGEC(Memorandum, p. 6) has been considered by the applicant and rejected as either technically not feasible or unlikely to obtain State approval.[1/] Electrodialysis, Dr. Cookson points out (Exhibit 1, p. 3), is totally unnecessary because the salt level of the effluent is not high enough to require it. Similarly, according to Dr. Cookson (Exhibit 1, p. 3), carbon adsorption would be pointless here as it would not improve the quality of treatment.

There is no indication in the PGEC Memorandum that the alternate methods of treatment were proposed by experts in environmental engineering. They have not been suggested or required by the responsible reviewing agencies and, as shown in Exhibit 1, the expert consulted by the applicant considers them unnecessary in the setting of the Greenbriar Plant.

1/ There is no precedent for deep-well injection in Maryland. By contrast, the proposed Greenbriar Treatment Plant, copies, with some improvements, the Landover Mall Plant, which has met approval and has been in operation in Prince George's County since 1972.

(4) Virus Removal

The PGEC Memorandum states on page 7 that "[t]he findings of EPA and the NIH illustrate that the developer's proposed use of chlorination for the huge Greenbriar apartment complex is unproven and would constitute a substantial risk of virus infection". This allegation would, if substantiated, be a matter of serious concern. It is, however, based on a misunderstanding by the author of the Memorandum of the character of the supporting evidence.

There are no such "findings of EPA and the NIH". What the Memorandum shows is that the director of the Division of Water Hygiene of EPA stated in February 1971 that "considerable work remains to be accomplished in order to conclusively demonstrate the effect of each process [of virus removal]" and that "we are by no means sure that these processes are capable of achieving the desired objective". Twenty months later the Chief of Virology of EPA's National Environmental Research Center stated flatly (see attachment to Exhibit 1, Appendix A):

> "As a matter of fact, according to our most current data, one milligram per liter of HOCl applied to a turbidity-free water for one hour at 5 C or higher should achieve a virus-safe water."

The more recent statement of the person directly in charge of EPA's virology research is obviously of

greater weight than the relatively vague and uncertain earlier observation of an EPA official not directly concerned with virology research. The statement of the virologist coincides fully with the conclusions reached by Dr. Cookson (see Exhibit 1, pp. 4-5 and attachment).

The alleged NIH finding is based on statements by one Sidney Shifrin. That gentleman is President of a group which calls itself the Montgomery County Environmental Coalition, a sister organization of PGEC. He has testified at numerous public hearings in the Washington suburbs as an environmentalist. Such statements as he has made on the subject of the Greenbriar Treatment Plant have been made by him in his capacity as a private citizen and most certainly not as an official spokesman for NIH. Though Mr. Shifrin does work for the National Cancer Institute, there is no evidence that he qualifies as an expert in environmental engineering or virology. As Dr. Cookson points out (Exhibit 1, p. 4), the "internationally known virologists" of which Mr. Shifrin speaks have not been identified by him, nor does he reveal what evidence he placed before them on which they passed judgment on the Greenbriar Plant.

It follows that the PGEC Memorandum's allegations on the issue of virus removal lack merit.

(5) Removal of Sludge and Other Matter

The PGEC Memorandum inquires further as to what will be done with rags and sticks as well as with the sludge which settles to the bottom of the sedimentation tanks. The simple answer offered by Dr. Cookson (Exhibit 1, pp. 5-6) is that (a) rags will be removed, (b) there are not likely to be any sticks in the system, and (c) rags and sludge, consisting of about 700 gallons per day at full capacity, will be trucked by W.S.S.C. for disposal in one of its larger treatment plants, such as Piscataway. It is Dr. Cookson's understanding that there will be no burning of sludge.

There is no doubt that the amount of sludge which the Greenbriar Plant is expected to produce at maximum utilization[2/] can easily be handled through trucking and disposal at Piscataway. Nevertheless 700 gallons per day is a substantial amount and it is for that reason that Dr. Cookson suggested to the Montgomery County Council that treatment schemes producing less sludge are preferable. However, as he points out in Exhibit 1, p. 6, sludge removal is necessary where there is phosphate removal. One cannot have the latter without the former. PGEC has stressed the need for

2/ Though the Plant is designed to serve the entire Greenbriar project, there is an excellent chance that public sewer service will be available by the time the project is about two-thirds occupied.

phosphorus removal (see pp.9-10, supra). The consequence of phosphorus removal is that excess sludge will have to be taken out of the plant regularly.

(6) Floor Drains

PGEC has expressed concern over floor drains at Greenbriar in light of an incident which occurred a year ago at the Landover Mall Plant (PGEC Memorandum, p. 12). In discussing the Landover Mall problem, the Memorandum makes certain factual allegations which appear to be incorrect. As Ben Dyer Associates, Inc., engineers for both the applicant and for the owners of Landover Mall, point out in Exhibit 2, there was no discharge of untreated sewage at Landover Mall. There was a drop in the efficiency of the Plant, which was noticed and corrected. As the engineers further point out, the problem arose at the Landover Mall Plant as a result of the draining into the sewer system of a fluid used to clean the airconditioning system. A comparable situation is not likely to develop at Greenbriar because (a) it is a residential rather than a commercial facility and its residents will thus be using biodegradable cleaning substances and (b) the 1,193 separate households at Greenbriar are unlikely to duplicate the Landover Mall situation by putting the same unusual substance into the sewer system simultaneously.

(7) Overflow Mechanism

PGEC expresses concern that the overflow mechanism at the pumping station could be used to "allow untreated sewage to by-pass in times of overload" (PGEC Memorandum, p. 12). As the engineers explain in Exhibit 2, the Greenbriar Plant is designed to take care of the overload problem. The overflow mechanism is installed throughout the WSSC system to protect against the backing up of sewage in case of a major emergency in which all other safeguards have failed.

(8) Effect on Trees

PGEC's concern that the flow of effluent would uproot or kill trees and other vegetation (Memorandum, p. 13) is dispelled by Dr. Cookson's statements that the flow would not carve out a wider bed for the stream and that the pH level and salt content are not sufficient to kill tree roots (Exhibit 1, p. 6).

(9) Air Pollution from Generator

The stand-by generator about which PGEC expresses concern (Memorandum, p. 14) is required in case there is a power failure. The air pollution problem which it will cause is, in light of the fact that it will most surely not be in regular use, de minimis.

(10) Windblown Odors

The concern over windblown odors from the open sewage settling tanks (PGEC Memorandum, p. 14) is answered by the engineers' explanation that the Greenbriar Plant will use an aerobic treatment process, whose by-products are odorless CO_2 and H_2O (Exhibit 2).

(11) Conclusion

To sum up, the arguments put forward by PGEC against the Greenbriar Treatment Plant are based on (a) appeals to NASA to impose treatment and operating requirements greater than those imposed by the governmental bodies having responsibility for the construction and operation of the Plant,[3/] faulty analysis of engineering and scientific considerations,[4/] and expressions of concern which are easily and simply answered.[5/] Hardly any of the arguments are new. As was pointed out earlier, in one form or another most of PGEC's arguments have previously been expressed to the Greenbelt City Council, the Prince George's County Council, and the Maryland State Department of Health and Mental Hygiene. They have not been found to be meritorious.

3/ See IV A(1) and (2), pp. 8-10, supra.

4/ See IV A(3), (4), (6), and (7), pp.10-11, 14-15, supra.

5/ See IV A(5), (8), (9) and (10), pp. 13, 15-16, supra.

B. The Housing Project

Interspersed among the arguments against the Greenbriar Treatment Plant are arguments which PGEC has advanced against the Greenbriar project itself. These arguments have here been segregated, so that they can be dealt with separately.

(1) Traffic

There is no doubt that the construction of 1,193 residences on a previously uninhabited tract will increase the flow of traffic on surrounding roads. Such traffic implications were carefully weighed by the Prince George's County Council at the time the Council considered applicant's request for an exception from the provisions of the so-called bedroom ordinance. The Council, after full examination of the traffic problem, authorized the Greenbriar project to proceed. (Applicant's traffic study was submitted as Exhibit 11 with the letter to GSFC of May 4, 1973.) The Council thus concluded that the traffic implications were not of such magnitude as to justify restrictions on the scope of the Greenbriar development. PGEC's concerns (Memorandum, pp. 7-9) are unjustified.

(2) Air Pollution from Heating and Air Conditioning Equipment

PGEC mentions an air pollution problem "created by the emissions from the heating and air conditioning equipment" (Memorandum, p. 13). The memorandum fails, however, to explain the nature of the air pollution problem which would thus be created.

(3) Quality of Housing

PGEC argues that "[a]ssuming that a housing shortage does not exist in Prince George's County, the assessment fails to explain why the project provides housing only for the affluent" (Memorandum, p. 14). The fact is that a shortage does exist in Prince George's County of the type to be built at Greenbriar. The project is designed to serve families in the $12,000 - $20,000 income bracket, which would qualify as middle class rather than affluent.

(4) Open Space

Concern is also expressed by PGEC as to the results of a future widening of the Baltimore-Washington Parkway in light of Prince George's County's open-space and set-back requirements (Memorandum, p. 14). The answer is that the applicant will at all times adhere to those provisions of local law which are applicable to it and the County will certainly see to it that those laws are enforced.

(5) Conclusion

Greenbriar is now under construction. As to any of the arguments listed under this Subsection B it must be kept in mind, therefore, that the environmental impact of the requested Federal action is merely that the project will be occupied from late 1973 on rather than from early 1975 on. But even if that aspect of the matter were ignored, it would be fair to characterize the concerns expressed by PGEC as not deserving serious consideration in the context of this application.

EXHIBIT 1

1225 Noyes Drive
Woodside Park, Maryland

June 29, 1973

Richard Schifter, Esquire
Fried, Frank, Harris, Shriver & Kampelman
Suite 1000
600 New Hampshire Avenue, N.W.
Washington, D. C. 20037

Dear Mr. Schifter:

At your request I have reviewed the memorandum of June 23, 1973 filed by the law firm Covington & Burling with the National Aeronautics and Space Administration, entitled "Application for Right of Way by Greenbriar Associates Across Goddard Space Flight Center Property". The following are my comments on the specific issues raised in the memorandum concerning the operation of the Greenbriar Treatment Plant.

(1) On page 2 there appears the statement that the Greenbriar sewage treatment process "will not remove nitrogen and other nutrients". This statement is correct as to nitrogen and incorrect as to "other nutrients". Phosphorus is "another nutrient" which will be removed.

(2) On page 2 there appears the further statement that "for several years it has been the position of the Federal Government that such nutrients must be removed". It is not clear just what this statement attempts to cover. The fact is that the standards applicable to the Greenbriar Treatment Plant are the standards imposed by the State of Maryland, which bases its standard on its environmental assessment of the stream receiving the discharge. EPA follows a policy of reviewing State standards. There has been no imposition of the requirement of nitrogen removal on small (less than 3 mgd) treatment plants. The amount of discharge from small treatment plants is relatively insignificant. The amount of nitrogen discharged at Greenbriar would be 80 lbs. per day as compared to 1,300 lbs. per day at Western Branch and 75,000 lbs. per day at Blue Plains. The receiving of nutrients is important in estuaries and lakes and relatively unimportant in flowing streams.

(3) On pages 2 and 3 there appears the statement that "nitrogen nutrients cause cultural eutrophication, a process which greatly accelerates the oxygen depletion and the death of a stream". It should be understood that the growth of algae, which does indeed deplete oxygen, depends on the availability of both nitrogen and phosphorus. If either of these nutrients is removed, algae will not grow. In the case of the Greenbriar Plant the high level of phosphorus removal will certainly suffice to prevent the growth of algae in the stream in question here.

(4) On page 4 there appears the statement that "Beaverdam stream is particularly susceptible to cultural eutrophication because, even after a heavy rainfall, the flow is hardly noticeable. A sufficiently large stream flow is necessary to dilute the effluent discharged, and to inhibit stagnation." This statement is quite confusing. The fact is that the Greenbriar Treatment Plant will produce an effluent of extraordinarily high quality, from which phosphorus will have been so effectively removed that cultural eutrophication will not be encouraged. Because the flow will be continuous, stagnation is not likely to occur. Finally, because of the high quality of the effluent, we need not be concerned about dilution of the effluent by the stream. On the contrary, the effluent is likely to be of a higher quality than the water in the stream, so that the effluent will, in effect, be diluting the stream water rather than the other way around.

(5) On pages 4 and 5 there appears a discussion of the level of phosphorus removal. The State standard would permit the retention of 0.5 to 1.5 mg/l as phosphorus. I note that you stated in your letter to Mr. Keller of May 4, 1973 that this will indeed be a characteristic of the treated wastewater. On the basis of my knowledge of the design of the Greenbriar Treatment Plant and of the details of the operation of the Landover Mall Treatment Plant, which in most respects would be duplicated by the Greenbriar Plant, I am prepared to state that the phosphorus level at the Greenbriar Plant will be 0.5 - 0.8 mg/l. This compares to a natural level in a stream of 0.4 - 1.0 mg/l. If the State were to require it, the phosphorus level could be reduced to less than 0.2 mg/l, but that would be necessary only in estuaries and lakes, not in flowing streams.

(6) On page 5 there is the further statement that "as a consequence of the small flow of the stream the effluent is diluted by only a factor of two, leaving an effluent about five times greater than that recommended by EPA." I simply do not understand to which EPA standard the statement refers. Here again it must be kept in mind that the effluent is likely to be of greater purity than the stream itself, so that the discussion of dilution is devoid of meaning.

(7) On page 5 is the further statement that "a significant deficiency of the process [is] the combination of phosphorus with nitrogen." As already explained, the level of phosphorus removal will be so high as to eliminate the problem of eutrophication resulting from the effluent.

(8) On page 5 there is the further suggestion that land containment be considered as a possible alternative. If that term is to mean the use of the effluent as part of a sprinkler system, the problem is that there will be too much effluent as compared to the need on the Greenbriar property. If the suggestion is that the effluent be discharged through deep well injection, the answer is that that system has not as yet been used in Maryland and may not, at this point, win approval as a matter of established State policy. By contrast, treatment through the system such as that proposed for Greenbriar has been approved and has worked successfully at Landover Mall.

(9) On page 5 there is the further suggestion that consideration be given to the use of electrodialysis to remove salt from the effluent. The fact is that the salt content of the effluent is so low that there is simply no need for electrodialysis in this situation. Besides, electrodialysis has been found to be an inadequate process from the operating standpoint.

(10) On page 6 it is suggested that the merits of requiring carbon adsorption be considered. In light of the fact that we are not dealing with industrial waste in this situation, there is simply no need for carbon adsorption here. The purpose of carbon adsorption is to remove organic matter. The effluent at Greenbriar will, as it is, contain far less organic matter than the receiving stream and will be in the order of magnitude of our drinking water. The system which has been designed for the Greenbriar Treatment Plant will thus meet the needs of the residential Greenbriar development.

(11) On pages 6 and 7 there are references to a statement by J. H. McDermott and Sidney Shifrin concerning the problems of virus removal. I have no knowledge of Mr. Shifrin's qualifications in the field of environmental engineering and do not know who the "internationally known virologists" to whom he spoke are or what he told them. Be that as it may, his statement that "little can be done to avert dangerous exposure [to viruses]" is incorrect.

With regard to the statement by Mr. McDermott, in February 1973, that "a great deal...is still unknown concerning the performance of chlorination", I can say that a great deal is indeed now known. I have had occasion to study this field thoroughly and am prepared to stand on the following statements which I have made to the Montgomery County Council in the attached report, dated December 5, 1972 (pp. 46 ff.):

> While advanced treatment is now a reality, it is relatively expensive and has for that reason not been installed in many places. When it has been installed, however, it has been able to solve the health and ecological problems which it was designed to solve. There is no doubt that wastewater can be treated to be suitable for any use....
>
> There is no doubt that water can be adequately treated so that it is always biologically safe. Biological, chemical and physical treatment procedures all remove viruses from wastewaters. The major problem is that no single process will remove viruses to the degree required for a safe effluent. Each process has a different efficiency for virus removal, and the efficiency of some depends on the degree of pretreatment provided....
>
> It is the application of the advanced waste treatment processes that makes virus-free effluents possible. Enteric virus inactivation in primary treatment is little if any.... Enteric

virus removal in secondary treatment processes vary from 0 to 96 percent in field studies....

Viruses are removed from sewage more efficiently by activated sludge treatment than by any other biological process. However, their efficiency is far from adequate for producing a safe effluent. A safe effluent can be produced by using chemical and physical processes. The complete treatment plant may consist of only physical and chemical processes or it may utilize these as additional treatment after biological processes. (Emphasis supplied.)

My position on this subject is shared by Dr. Gerald Berg, Chief of Virology at the Advanced Waste Treatment Research Laboratory of the Environmental Protection Agency in Cincinnati, Ohio, who wrote to me on November 14, 1972:

"I have suggested in the past that renovated waters should be treated with a disinfectant for a period long enough to destroy 12 log units of reference virus at 5 C. In an effluent free of turbidity, such as you described, the HOCl residual of five to ten milligrams per liter that you suggested, maintained for an hour at 5 C or higher should easily provide an essentially virus-free water.

"As a matter of fact, according to our most current data, one milligram per liter of HOCl applied to a turbidity-free water for one hour at 5 C or higher should achieve a virus-safe water."

The process on which Dr. Berg commented is the process proposed to be used at the Greenbriar Plant. It would result in an "essentially virus-free" effluent.

(12) On page 10 the question is raised as to what will be done with rags and sticks as well as with the sludge which settles to the bottom of the sedimentation tanks. I doubt that sticks will be found in the Greenbriar

Treatment Plant. Rags which may come through the system will be hauled away, as will be the sludge, in trucks provided by the Washington Suburban Sanitary Commission (at the expense of the owners of Greenbriar).

(13) On page 10 questions are asked as to how water will be removed from the sludge, where the water will be put, where the sludge will be dried and whether it will be burned. This is a matter not handled within the confines of the Greenbriar Treatment Plant. The sludge (including the water) which will be removed from the Plant will total approximately 5,000 gallons per week when the Plant is operating at a capacity of 325,000 gallons per day. This small amount will, as I understand it, be taken by the Washington Suburban Sanitary Commission to one of its other treatment plants, such as Piscataway. It is my understanding that it will not be burned.

(14) On page 11 there is a quotation of my statement to the Montgomery County Council that "I would not recommend the use of Scheme 4 since it produces large volumes of sludge". This statement compared Scheme 4, which is indeed identical to the proposed Greenbriar treatment system and which provides for the removal of phosphorus, with Schemes 1 and 2 which do not provide for the removal of phosphorus. In other words, if it were not for phosphorus removal, the amount of sludge would be insignificant. As phosphorus removal is here required, the amount of sludge generated by it must be accepted.

(15) On page 13 there are questions whether the additional flow is sufficient to carve out a wider bed for the stream and thus uproot the trees and vegetation along its original border and whether the effluent's pH level and salt content will be sufficient to kill the tree roots. The answers are that the flow is not sufficiently large to carve out a wider bed for the stream and that the pH level and salt content are not sufficient to kill tree roots. Salt content, for example, will be 1 oz. of chloride for 250 gallons of water, below the threshold level for tasting salt.

Sincerely yours,

John T. Cookson, Jr.

MONTGOMERY COUNTY COUNCIL
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A REPORT ON

THE USE OF TEMPORARY WASTEWATER TREATMENT PLANTS: STANDARDS AND PROCEDURES FOR ELIMINATION OF HEALTH HAZARDS

Prepared for the Montgomery
County Council, State of Maryland
December 5, 1972

by

John T. Cookson, Jr. Ph.D.
Environmental Health Engineer

E-342

UNIVERSITY OF MARYLAND
COLLEGE PARK 20742

DEPARTMENT OF CIVIL ENGINEERING
COLLEGE OF ENGINEERING

December 6, 1972

Mr. Dickran Y. Hovsepian, President
Montgomery County Council
County Office Building
Rockville, Maryland 20850

Dear Mr. Hovsepain:

In accordance with the meeting on Monday, November 13, with the County Council and further discussions with Mr. Robert McDonell, the following categories are reported on:

1. An evaluation of virus hazards in sewage effluents with documentation of the types of waterborne viruses and their health significance

2. The survival of viruses in surface waters, concentrations proven to be present and their epidemiology

3. Recommended standards for viruses in sewage effluents for elimination of health hazards

4. The rationale of proposed standards and procedures for assuring compliance

5. Procedures for controlling toxic compounds

6. Typical treatment systems that will meet the proposed standards with documentation of their efficacy of virus treatment

7. A brief appraisal of the additional costs and staffing for the treatment systems for producing virus-free effluents

There is no question that sewage effluent will discharge significant virus concentrations when advanced waste treatment processes are not employed. There are over 100 enteric viruses that can be present in sewage and many of these are found in surface waters from sewage effluents. Only a few cases of virus outbreaks are definitely known to be caused by water. However, the procedures for determining waterborne outbreaks are not adequate to detect all that have occurred.

Mr. Hovsepian

December 6, 1972

On the positive side, we can treat sewage to provide a virus-free effluent with little increase in cost. The report recommends standards for control of virus as well as treatment systems that provide a virus-free effluent.

I believe that this report will provide the answers and documentation of the above questions.

Sincerely yours,

John T. Cookson, Jr.

John T. Cookson, Jr. Ph.D.
Associate Professor of
Civil Engineering

JTC:ed
Enc.

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CHAPTER I

INTRODUCTION

In the interim period until Montgomery County's Advanced Wastewater Treatment Facility goes on line, several steps for pollution abatement are proposed in the Comprehensive Ten Year Water and Sewerage Plan, FYS 1973-82. One portion of this plan proposed the use of temporary treatment plants to relieve burdens caused by restricted wastewater treatment capacity. Package treatment plants will reduce sewer flows by providing treatment and discharge of the effluent into local streams.

Installation of small local facilities as proposed for interim treatment is not a new idea, but is employed by the Sanitation Districts of Los Angeles County on a permanent basis. In Los Angeles County the motive for locating small wastewater treatment facilities in the County is to extract sewage from trunk sewers for reclaiming a valuable resource, water. At present, there are six plants producing renovated wastewater for replenishing ground water supplies and for users under long-term contracts.

One of the specific objectives of this report is to set forth the level of treatment needed for the interim facilities with stress on health and documentation of treatment processes that will achieve a safe effluent. Montgomery County sewage is not expected to contain toxic organics such

as herbicides, pesticides, or toxic metals in concentrations to cause health hazards. Methods, however, are presented on assuring that a health hazard from these will not occur. The main stress will be on viruses. Without doubt, domestic sewage contains viruses in hazardous concentrations. Until recently, little attention was given to the virus hazard of sewage, and most treatment processes have not been designed to affect virus removal.

The maximum viral content of raw sewage has been measured at 10,000 plaque forming units (PFU) per liter or ~~2650~~ 38,000 PFU per gallon of water (1). A treatment plant that achieves 99% removal will discharge an effluent containing ~~26~~ 380 PFU per gallon. Since only one viral PFU is an infectious dose for man, this effluent is highly infectious. When effluents of this nature are not diluted by over one hundred times by receiving streams, then potential health hazards exist for any individual coming in body contact with the stream.

In some cases, effluents from package treatment plants may be discharged to streams that will provide little or no dilution. Since the receiving streams pass through residential areas, and it is the nature of children to be attracted to streams, the possible measures for removing these health hazards must be evaluated. Any evaluation is useless unless it is coupled with standards that can be implemented to curb a potential hazard.

Standards for the enteric virus content of drinking water, bathing water and sewage effluents have not been

established by the Environmental Protection Agency. The foremost problem has been the lack of an easily run test to measure and therefore enforce standards on virus removal. In recent years, however, several techniques have proven to be sensitive tests for virus measurement and individual researchers have recommended virus standards. Of greater importance is the fact that various combinations of wastewater treatment processes have been found to effect virus removal, and the efficiency of these processes can be controlled by readily measured parameters. It is the objective of the following to address these aspects and:

1. to set forth in a clear and understandable fashion standards for the interim treatment of wastewater with particular stress on viruses.
2. to propose treatment processes for wastewater that are known to meet the proposed standards regarding viruses.
3. to set forth procedures for the evaluation of interim wastewater treatment plants that will assure compliance with the standards set forth in 1 and 2 above. These will follow this report under separate cover.

Before developing the above objectives, it is essential to review the nature of viruses, their diseases, survival in water, and epidemiology.

VIRUSES

Viruses do not have the three common properties of cells. They do not reproduce themselves by division or any sexual reproduction method, nor can they conduct energy-yielding metabolism. It is best to consider viruses as an infection chemical unit. Viruses are much smaller than organisms ranging in size from 150 Å for Φ x 174, a virus that infects Escherichia coli C, to 2600 Å for smallpox virus. The smallest bacteria is about 0.3 microns or 3000 Å (Figure 1).

Viruses are composed of an infectious unit which is either deoxyribonucleic acid (DNA) or ribonucleic acid (RNA). This infectious unit is contained within a protein coat, or capsid. The nucleic acids are genetic material and infect living cells by blocking the cell's own genetic system, replacing it with the viral DNA or RNA. The cell's machinery then operates according to the new genetic messages. The results that occur depend on the type virus and the cell which it has entered, referred to as the host. The genetic messages may provide the host cell with the information for synthesis of new viral particles. This results in destruction of the host and liberation of more viruses. If this does not occur, the virus particle may merely become incorporated into the host cell and its genetic material reproduced in synchrony with that of the host, which survives and undergoes normal cell division.

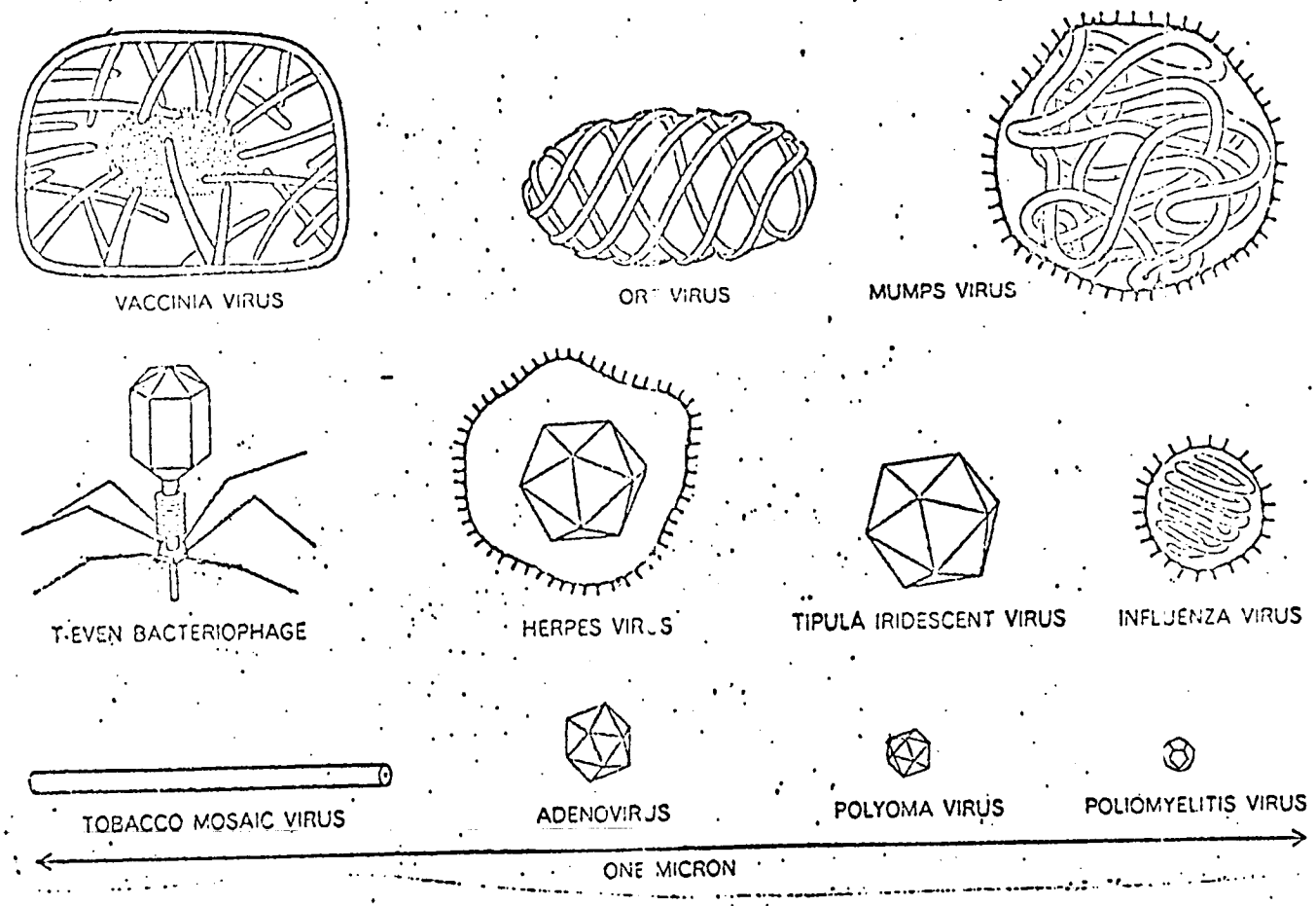

Figure 1. Relative sizes of viruses. One micron equals a thousandth of a millimeter; it is enlarged 175,000 times.

(Source: The Structure of Viruses, by R. W. Horne, Scientific American).

Another possible result of virus infection is the alteration of the cell's genetic information center in such a way that unregulated growth of the cell results. This process of transformation, as it is called, causes a number of striking changes in the cell. The growth of cells without restraint forms tumors or neoplasms. Some tumors, such as warts, are benign: they remain localized. Other tumors are malignant and are referred to as cancer.

Virus Assay

There are two methods used to quantify or assay viruses: the quantal assay technique and the plaque assay technique. The quantal procedure refers to the infective dose needed for 50 percent infection of the test specimens. Usually designated as $TCID_{50}$. The tissue culture procedure consists of making serial dilutions of the sample to be assayed and then inoculating a number of tissue tubes with these dilutions. Following an incubation period, the occurrence or absence of cytopathic effect (CPE) in the cells of each tube is observed. The 50 percent value can be calculated.

The plaque method is the most precise method, since a plaque or plaque-forming unit (PFU) can be caused by a single virion. In the plaque assay procedure, the sample is placed on a monolayer of tissue cells. A virus will adsorb on a cell and initiate infection. New virus particles are produced and these infect adjacent cells. A semi-solid agar overlay holds the virus and cells in place to enable the

viewing of cytopathic effect. Each area of destroyed cells are known as plaques.

Significant Viruses Found in Water

All enteric viruses occur in sewage in considerable numbers, and recent detection techniques make it possible to find these viruses in almost all streams receiving sewage effluents. The potential waterborne viral disease agents are given in Table 1. For practical purposes, these viruses are

TABLE 1

Potential Waterborne Viral Disease Agents

Virus	Number of Types
Poliovirus	3
Infectious hepatitis	1 (?)
Coxsackieviruses A and B	32
Echoviruses	34
Adenoviruses	32
Reoviruses	3
Gastroenteritis Virus	?
Diarrhea Virus	?

present in feces of infected individuals and in sewage. In many cases, they are referred to as enteric viruses.

As stated by Mosely of the Public Health Service National Communicable Disease Center (2):

> "Any virus excreted in the feces and capable of producting infection when ingested should theoretically be transmissible in drinking water. Waterborne transmission has accordingly been suspected for enteric virus thought to be transferred from person-to-person by the fecal-oral route. We now know, however, that some viruses transmitted by the respiratory route are also excreted in the stool in quantities detectable by tissue culture technics. The agent of rubella is a recently demonstrated example-Green et al., 1965 (3a). Past experience has indicated that the circumstances under which

contaminated water may be used for drinking are almost as numerous as the ways in which drinking water may become contaminated. It is conceivable therefore, that at some time almost any virus can be transmitted through water."

Any human virus excreted in feces may theoretically be transmitted by water; however, consideration should be limited to those that grow in or near the intestinal wall and are discharged in large numbers in feces. These are tabulated in Table 1.

It does not appear necessary or desirable to list the very large numbers of virus types, now approaching 100, which have been recovered on one or more occasions from feces. The role of feces in transporting a varied viral flora has been demonstrated repeatedly.

Infection with these viruses is widespread in normal populations especially during the summer and early fall. For most viruses, the infection rates in any given area are greatly dependent on hygienic conditions. Thus, infants and young children of the lowest socioeconomic groups usually suffer the highest attack rate. This illustrates that personal contact and not water is the major route of disease transfer. The water aspects will be further discussed below.

Possible Waterborne Virus Diseases

The health hazards associated with human enteric viruses have become a source of increasing concern to engineers who deal with the impact of water quality on mankind. The enteric viruses are characterized by their ability to infect the

pharynx and alimentary tract. They multiply and are shed in fecal matter. Disease symptoms are produced when the virus finds its way to one or more target organs such as meninges, Ganglian nerve cells of brain or spinal cord, striated muscle, myocardium, or skin.

The associated disease symptom is briefly given for each virus found in sewage:

Poliovirus:

The polioviruses are responsible for paralytic poliomyelitis, a large percentage of aseptic meningitis (nonparalytic poliomyelitis) and possible mild gastrointestinal upsets.

Infectious hepatitis:

This virus has been a problem to virologists and environmental researchers for years. The human hepatitis virus has not been positively isolated. Illness results in jaundice.

Coxsackieviruses:

Coxsackieviruses are responsible for aseptic meningitis, pleurodynia and infantile myocarditis. They commonly cause diarrheal disease in infants and young children.

Echoviruses (enteric cytopathogenic human orpahn viruses):

These viruses have been associated with illnesses of aseptic meningitis, rash, and respiratory diseases.

Adenoviruses:

Many of the adenoviruses have been associated with a variety of respiratory diseases (e.g. colds, influenza-like

illnesses, bronchitis, croup, atypical pneumonia).

Reoviruses:

Many of the reoviruses are associated with respiratory diseases similar to those noted for adenoviruses.

Gastroenteritis and Diarrhea Viruses:

Viruses have been incriminated as agents of gastroenteritis and diarrhea. This has been the case when another recognized pathogen cannot be found. Although many of these disease episodes may not be due to viruses, experimental studies have indicated that agents with characteristics of viruses are responsible in some instances. At present no association of enteroviruses with water-borne episodes has been achieved (2). However, in terms of magnitude, gastroenteritis and diarrheal disease are the most important diseases transmitted by water (2).

Besides the general disease symptoms given above, these same viruses have been incriminated with other illnesses of deep concern. Some examples of these were recently reported by McDermott (3) as given below:

1. Acute Myocarditis: Coxsackieviruses have long been recognized as the causative agents of idiopathic myocarditis, and recently the echoviruses have also been attached to this list. The former group of viruses has also been associated with cardic infection in infants. This disease is definitely more prevalent than is recognized clinically, and it has a serious effect on patients.

2. Congenital Heart Abnormalities: The Coxsackie-viruses are known to have a high affinity for heart tissues. When such an infection occurs in the uterus, the infant may develop a congenital heart anomaly. The incidence of this particular disease in the United States is estimated to be approximately 12,000 cases per year.
3. Other Diseases: Coxsackievirus may trigger an insulin-dependent diabetes. High incidence of Down's Syndrome is reportedly associated with hepatitis infections in mothers. The possiblity of tumor production has not been ruled out by these enteroviruses.

Enteric Virus Survival in Water

Enteric virus survival times in water vary with the specific virus, temperature and the general quality of the water. For example, in controlled studies, poliovirus exhibited a greater survival ability than echovirus 12 in fresh water at 28°C. At 4°C the results were just the opposite. Echovirus 7 had a greater survival potential than poliovirus 1 or echovirus 12 in sewage regardless of its ambient temperature (4). Purity of water has a significant effect on virus survival time. In general, enteric viruses have been found to survive longer in distilled water than in polluted water and, interestingly, longer in grossly sewage-polluted water than in moderately polluted water (5). Survival times for enteric

viruses under laboratory and field conditions by numerous investigators have been tabulated by Akin and coauthors (6). These are presented in Tables 2 and 3.

As the numerous studies in Tables 2 and 3 illustrate, viruses survive for significant lengths of time and generalizations on this survival period cannot be made. The most resistant viruses can survive up to 200 days.

Viruses in Surface Waters

Enteric viruses have been isolated from surface water samples collected throughout the world (6). In this country, water samples taken from polluted tidal rivers have contained enteric viruses 27 to 52 percent of the time (7), and much of this work was done before sensitive virus detection techniques were available. Using newly developed techinques for sampling river water in the Houston (Texas) area, nearly 100 percent of the samples collected 5 miles downstream from the nearest sewage outfall were positive for enteric viruses (8).

Considerable data are available concerning the viral contamination of surface waters. Berg (9) has recovered 19 viral plaque forming units (PFU) per 50 gallons of Ohio river water. This constitutes a considerable hazard since these waters are used for drinking water supplies. Numerous studies on viral contamination of surface waters are tabulated in Table 4.

TABLE 2

AVERAGE TIME IN DAYS OF 99.9 PERCENT REDUCTION IN TITER OF INDICATED ENTERIC VIRUSES WHEN SUSPENDED IN WATER WITH THREE LEVELS OF DOMESTIC POLLUTION AT THREE TEMPERATURES(29)

Amount of Pollution	Poliovirus 1			Echovirus 7			Echovirus 12			Coxsackievirus A-9		
	28°C	20°C	4°C	28°C	20°C	4°C	28°C	20°C	4°C	28°C	20°C	4°C
Low (river water)	17	20	27	12	16	26	5	12	33	[illegible]	[illegible]	10
Moderate (river water)	11	13	19	5	7	15	3	5	19	5	8	20
Heavy (sewage)	17	23	110	28	41	130	20	32	60	6	N.D.*	12

* N.D. = not done.

TABLE 3

Loss of Infectivity of Enteric Viruses When Suspended In Various Aqueous Environments

Type Water	Investigator	Virus	Temperature (C°) 4-6	15-16	20-25
			days/log titer reduction		
Sea or estuary water	Cioglia & Loddo (1962)	Coxsackie B-3	90/3	8/3	2/3
	Shuval (1970)	Polio 1	-	-	2-6/3
	Akin (1970)	Coxsackie B-1	-	-	3/3
	Matossian & Garabedian (1967)	Polio 1	-	-	3-6/3
	Lycke (1965)	Polio 3	-	-	4/3
	Akin (1970)	Reo 1	-	-	/3
	Akin	Echo 6	-	-	4/3
	Akin	Polio 1	-	-	5/3
	McLean & Brown (1968)	Polio 2	9/2	-	5/3
	Shuval (1971)	Polio 1	-	9/3	8/3
	Cioglia & Loddo (1962)	Polio 1	45/3	15/3	8/3
	Cioglia & Loddo	Polio 2	60/3	15/3	8/3
	Cioglia & Loddo	Polio 3	30/3	8/3	8/3
	Cioglia & Loddo	Echo 6	30/3	15/3	15/3
	Metcalf & Stiles (1967)	Coxsackie B-3	-	14/3	28/3
	Metcalf & Stiles	Echo 6	88/3	16/3	-
	Metcalf & Stiles	Polio 1	130/3	15/3	-
Tidal river water	Akin (1970)	Coxsackie B-1	-	-	3/3
	Akin	Reo 1	-	-	5/3
	Akin	Echo 6	-	-	6/3
	Akin	Polio 1	-	-	6/3

TABLE 3 (Continued)

Type Water	Investigator	Virus	Temperature (C°) 4-6	15-16	20-25
River water	Cioglia & Loddo (1962)	Coxsackie B-3	75/3	8/3	2/3
	Prier & Riley (1967)	Echo 6	7/0.5	-	3/3
	Prier & Riley	Polio 1	7/1	-	3/3
	Prier & Riley	Coxsackie B-3	7/1.7	-	3/3
	Clarke et al. (1964)	Echo 12	19/3	-	5/3
	Clarke et al.	Echo 7	15/3	-	7/3
	Clarke et al.	Coxsackie A-9	10/3	-	<8/3
	Cioglia & Loddo (1962)	Polio 2	75/3	15/3	8/3
	Cioglia & Loddo	Polio 3	30/3	8/3	8/3
	Cioglia & Loddo	Echo 6	60/3	15/3	8/3
	Clarke et al. (1964)	Coxsackie A-9	20/3	-	8/3
	Clarke et al.	Echo 12	33/3	-	12/3
	Clarke et al.	Polio 1	19/3	-	13/3
	Cioglia & Loddo (1962)	Polio 1	60/3	45/3	15/3
River water (cont.)	Clarke et al. (1964)	Echo 7	26/3	-	16/3
	Clarke et al.	Polio 1	27/3	-	20/3
	Poynter (1968)	Polio 3	50/3	18/3	-
	Taylor (1967)	Polio 3	67/3	7/1.3	7/2.1
	Clarke & Chang (1959)	Coxsackie A-2	-	-	5/2
	Clarke & Chang	Coxsackie A-2	-	-	47/2
	Taylor (1967)	Coxsackie B-5	-	24/1	-
	Poynter (1968)	Coxsackie B ?*	18/2	-	-
Impounded fresh water	Prier & Riley (1967)	Coxsackie B-3	7/1.7	-	3/3
	Prier & Riley	Polio 1	7/1.5	-	3/3
	Clarke (1970)	Echo 7	22/3	-	4/3
	Prier & Riley (1967)	Echo 6	5/3	-	5/3
	Clarke (1970)	Coxsackie A-9	6/3	-	<6/3
	Clarke	Polio 1	27/3	-	6/3
	Joyce & Weiser (1967)	Coxsackie ?	18/3	-	8/3
	Clarke (1970)	Echo 12	14/3	-	<6/3
	Joyce & Weiser (1967)	Polio ?	21/3	-	10/3
	Joyce & Weiser	Echo ?	23/3	-	12/3
	Joyce & Weiser	Echo ?	21/3	-	20/3
	Joyce & Weiser	Polio ?	52/3	-	21/3
	Joyce & Weiser	Polio ?	52/3	-	22/3
	Joyce & Weiser	Echo ?	42/3	-	24/3

TABLE 3 (Continued)

Type Water	Investigator	Virus	Temperature (C°) 4-6	15-16	20-25
Tap water	Clarke (1970)	Echo 7	85/3	-	10/3
	Clarke	Echo 12	130/3	-	11/3
	Clarke	Coxsackie A-9	98/3	-	15/3
	Clarke	Polio 1	140/3	-	95/3
	McLean & Brown (1968)	Polio 2	12/No loss	-	5/1
	Clarke & Chang (1959)	Coxsackie A-2	-	-	100/3
	Taylor (1967)	Polio 3	167/3	-	-
	Poynter (1968)	Polio 3	168/3	-	-
Deionized or distilled water	Akin et al. (1970)	Reo 1	-	-	3/3
	Akin et al.	Coxsackie B-1	-	-	5/3
	Akin et al.	Echo 6	-	-	14/3
	Akin et al.	Polio 1	-	-	11/1
	Poynter (1968)	Coxsackie B ?	95/2	-	-
	Poynter	Polio 3	180/1	56/1	-

TABLE 4

Viral Contamination of Surface and Drinking Water

Type Water	Percent of samples positive for Enteric virus	Reference
River Water (France)	21%	10
River Water (France	9%	11
Drinking Water (France)	8%	11
River Water (Moscow)	34%	12
River Water (Swiss)	38%	13
River Water (Swiss)	63%	13
Domestic Water Supplies (Israel)	2%	14
Domestic Water Supplies (England)	56%	6
Tidal Rivers (U.S.)	27 to 52%	7
Illinois River (U.S.)	27%	6

Epidemiology

The importance of water as the mode for transfer of virus disease is difficult to evaluate. The characteristics of many viral diseases are such that their recognition as being waterborne cannot be documented. Infections from contaminated water, where the virus concentration is low, appears to give rise to inapparent carriers who then transmitted the virus at high doses by direct person-to-person transmission (15). Thus, the amount of disease caused as a

result of virus-contaminated surface waters is completely unknown.

It is expected that small amounts of viruses ejected into rivers and streams are a potential health hazard to downstream recreationalists, and to downstream communities who must consume these waters. The dose of virus required for infection is extremely low for some viruses, as illustrated in Table 5 (16). However, most epidemiologists who have worked in this field do not believe that a community's sewage represents a special threat (17). Published reports of virus outbreaks due to contaminated drinking water are presented in Tables 6 and 7 as from Mosely (2).

Mosely's (2) analysis suggests that only one of the poliomyelitis episodes, the 1952 outbreak involving defects in the water distribution system at Huskerville, Nebraska, could be reasonably accepted as waterborne. With regard to the reported infectious hepatitis outbreaks, Mosely states:

> "Any attempt to evaluate the adequacy of the evidence in these various epidemics necessitates an arbitrary classification upon which no two persons reviewing the same material are likely to agree. In at least 30 of the 50 published epidemics, however, the data appear to be adequate to substantiate the contention of water-borne transmission. In many of the remainder it is a plausible hypothesis."
>
> "Infectious hepatitis is the only viral disease which is known to be water-borne. Even though many water-borne epidemics are undoubtedly unrecognized, transmission of infectious hepatitis by drinking water appears to be a relatively infrequent occurrence. To say this is not to minimize its considerable importance from several standpoints."

TABLE 5

Minimal Infective Dose of Viruses for Man*

Virus	Dose**	Route of inoculation	No. infected / No. inoculated	% infected
Poliovirus 1 (SM)	2 PFU	Oral (gelatin capsule)	2/3	67
Poliovirus 3 (Fox)	1 TCD_{50}	Gavage	3/10	30
Measles	1 TCD_{50}	Intranasal	8/35	24

* Plotkin, S.A. and Katz, M. (1967). In "Transmission of Viruses by the Water Route," edited by G. Berg, John Wiley and Sons, New York, New York, p. 151, abstracted and revised, and Katz, M. and Plotkin, S. A. (1967). J. Am Publ Health Assoc. 57:1837, abstracted and revised.

** Given in plaque-forming units (PFU) or that amount of virus that will infect 50% of the tissue cultures inoculated (TCD_{50}).

TABLE 6

Published Reports of Poliomyelitis Attributed to Contaminated Drinking Water as taken from Mosely (2)

No.	Year of occurrence	Country	Place or type of population	No. cases attributed to supply	Duration of water-borne phase	Type of supply held responsible
1	1913(?)-39	Sweden	Rural district	10[b]	Years	Private well, pond
2	1944	Sweden	Town	63	5 Months	Municipal system Filtered surface water
3	1944	Sweden	Town	53	3 months	Municipal system Untreated deep well water
4	1948	Sweden	Stockholm suburb	9	3 Months	Municipal system Proximate contamination
5	1948	Sweden	Town	63[a]	7 Months	Municipal system Untreated deep well water
6	1949	Sweden	Malmoe	138	6 Months	Municipal System Filtered surface water
7	1952	U.S.A.	"Huskerville"	45	5 Weeks	Municipal system Proximate contamination
8	1953	Canada	Edmonton	75[b]	2 Weeks	Municipal system Chlorinated surface water

TABLE 7

Published Reports of Infectious Hepatitis Attributed to Contaminated Drinking Water as taken from Mosely (2)

No.	Year of occurrence	Country	Place or type of population	No. cases attributed to supply	Duration of water-borne phase	Type of supply held responsible
1	1895	England	Village	34	8 Months	Community supply
2	1916	Sweden	Millworkers	14	18 Days	Utility supply
3	1930	Canada	College	173	2 Months	Open spring
4	1937	Sweden	Village	68	4 Months	Stream
5	1939	Sweden	Village	50	10 Months	Private shallow wells
6	1940	France	German Army	64[b]	19 Days	Institutional system
7	1941	Sweden	Sanitorium	178	87 Days	Institutional system
8	1941–42	Sweden	Town	122[a]	13 Months	Municipal system
9	1941–42	Sweden	Village	52[a]	14 Months	Municipal system
10	1943	Sweden	Institution	34	53 Days	Institutional system
11	1944	U.S.A.	Summer camp	348[b]	9 Weeks	Deep well
12	1944–45	U.S.A.	City	52	7 Months	Municipal system
13	1944–46	Sweden	Resort hotel	41[b]	2 years	Private supply
14	1945	Italy	U.S. Army	86	18 Days	Shallow well
15	1945–47	Sweden	Hotel, Hospital	56[a]	27 Months	Private supplies
16	1946	Germany	U.S. Army	21	24 Days	Municipal system
17	1947	Germany	U.S. Army	20	5 Months	Utility supply
18	1947–48	Germany	U.S. Army	52	6 Months	Municipal system
19	1948–49	Sweden	Village	391[a]	7 Months	Municipal system
20	1943	U.S.A.	Rural area	9	6 Months	Deep well
21	1949–50	Canada	Canadian Army	260[a]	Not defined	Institutional system
22	1950	Hong Kong	British Army	71[b]	41 Days	Municipal system
23	1952	U.S.A.	Summer Camp	102	25 Days	Deep well
24	1952	Germany	Town	Not given	2 Months	Municipal system
25	1952–53	Norway	Village	24[a]	14 Months	Municipal system
26	1954	Germany	School	90	Not given	Municipal system
27	1955	Austria	Resort hotel	18	19 Days	Utility system
28	1955	Alaska	Village	21	29 Days	Ponds
29	1955–56	India	Dehli	28,745	37 Days	Municipal system
30	1955–56	U.S.S.R.	Village	47[a]	6 Months	Community supply
31	1955–56	U.S.S.R.	Villages	Not given	6 Months	Community supplies
32	1955–56	Australia	Village	72[a]	16 Months	Irrigation ditch
33	1956	U.S.A.	Village	189	39 Days	Municipal system
34	1956	Denmark	Summer comp	54[b]	4 Weeks	Shallow well
35	1956	U.S.A.	Village	10	14 Days	Private deep wells
36	1956	U.S.A.	Village	68	28 Days	Municipal system
37	1956–57	New Zealand	School	183[b]	12 Weeks	Municipal system
38	1956–57	Sweden	Village	43	Not found	Deep well
39	1957	France	U.S. Army	96	28 Days	Institutional system
40	1957	Australia	Students	6	13 Days	River
41	1958	Germany	Village	127	43 Days	Municipal system
42	1958–60	New Zealand	Village	58[a]	25 Months	Municipal system
43	1959	India	Bombay	800	9 Weeks	Municipal system
44	1959	India	Railway colony	50	19 Weeks	Utility supply
45	1959	U.S.A.	Village	38[a]	13 Weeks	Private deep wells
46	1959	India	College	65	16 Weeks	Institutional system
47	1960	U.S.A.	School	20	14 Days	Institutional system
48	Not given	India	Apartment houses	16[a]	2 Months	Contaminated buckets
49	1963	Czech-oslovakia	Village	85	21 Days	Municipal system
50	1964	Czech-oslovakia	Village	300	36 Days	Municipal system

The Committee on Environmental Quality Management consolidated knowledge on important questions involving viruses and water (17). They concluded that:

> "There is no doubt that the virus of infectious hepatitis can be transmitted by drinking water. Although the evidence is scanty, it should also be assumed that the enteric viruses and other possible causative agents of viral gastroenteritis can be transmitted by drinking water."
>
> "Epidemiological opinion uniformly supports the conclusion that infectious hepatitis can be transmitted by ingestion of inadequately treated drinking water. The evidence available does not, however, support a contention that the water route is important in transmitting such disease in the United States. The number of cases attributed to contaminated drinking water is small compared to that resulting from fecal-oral exposures. Yet it is clear that any departure from rigorous, alert water sanitation practice could be accompanied by occurrence of numerous cases of infectious hepatitis. Further, it is reasonable to assume that primary cases resulting from ingestion of contaminated water might produce a large number of secondary cases. Prudence requires also an assumption of waterborne viral gastroenteritis as a disease entity. On the other hand, an association of viruses in water with production of tumors is in the realm of conjecture at this time."

The annual hepatitis incidence from 1952 to 1968 has remained near a level of 50,000 to 60,000 as shown in Figure 2 by McDermott (3). The total annual incidence of typhoid fever has dropped from 2000 in 1952 to 300 in 1968 (Figure 2). It is believed that one out of ten hepatitis infections results in clinical illness. On this basis, the total number of infections is approximately a half-million per year in the United States. With regards to infections of Coxsackieviruses and echoviruses, it is estimated by the National Communicable Disease Center that there are approximately two million infections per year.

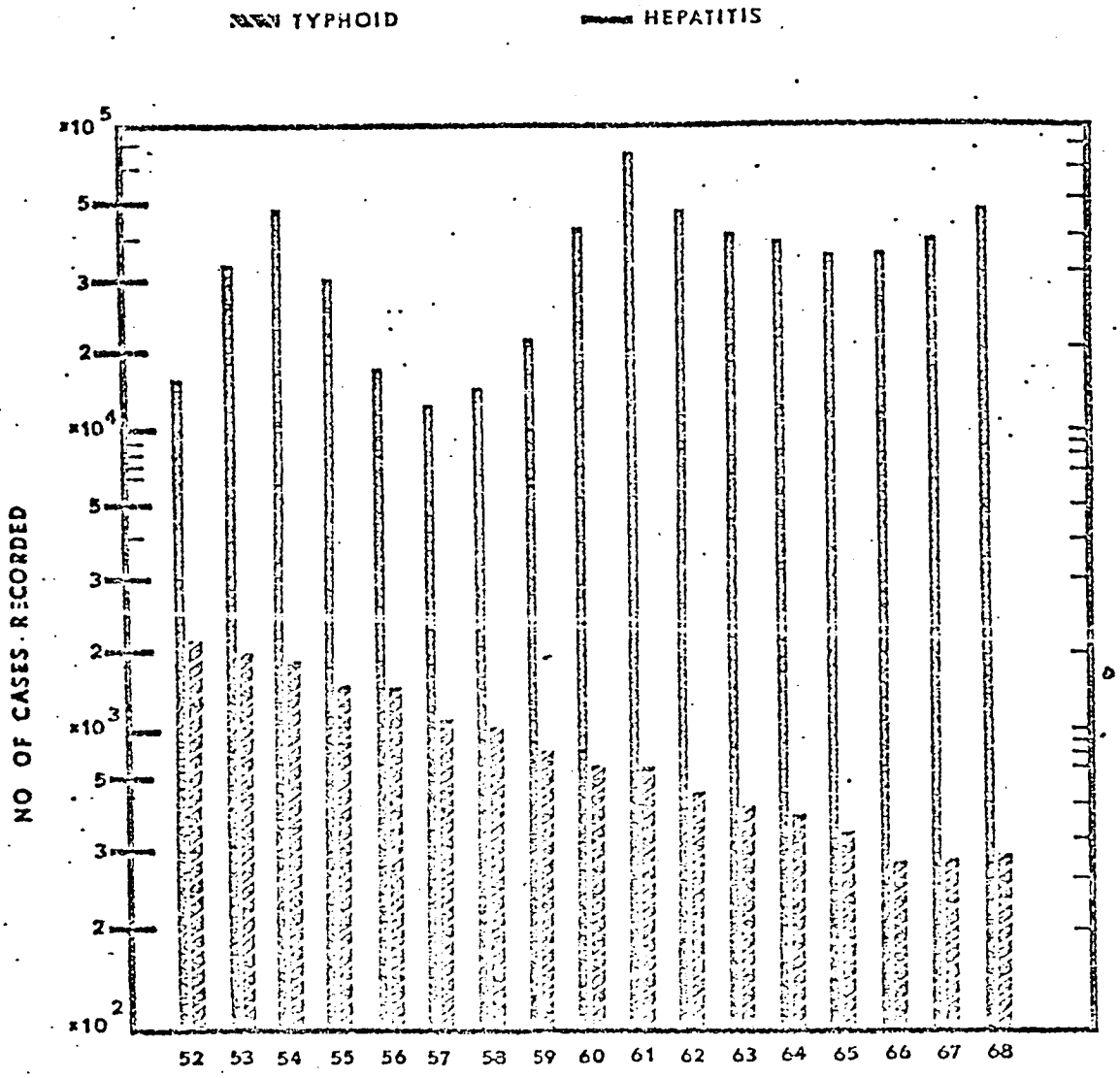

FIGURE 2. THE ANNUAL INCIDENCES OF INFECTIOUS HEPATITIS AND TYPHOID FEVER IN THE UNITED STATES FROM 1952 TO 1968

McDermott (3) has illustrated the various modes of virus transmission by Figure 3. The transmission by droplets, insects, and hands has been well documented. The more indirect routes are very poorly understood. However, their transmission is largely dependent upon water as the vehicle.

In conclusion to the present hazard of viruses in water, epidemiological studies intended to show that water plays a very minor role in virus transmission. However, this evidence must be viewed with caution for several reasons:

1. Improper epidemiological procedures
2. The greater amount of sewage discharged with regards to the streams' dilution capacity as populations increase

Improper epidemiological procedures are likely, since a disease can be initially transferred by water and then spread by the personal contact route.

There is little doubt that water can transmit virus and result in an epidemic. Spread of virus disease by contaminated water has been conclusively demonstrated by several epidemics. Virus outbreaks have occurred from contamination of municipal water supplies in New York, Pennsylvania, Kentucky and many foreign countries (18-25). Outbreaks of hepatitis have resulted from well water and consumption of raw oysters and clams harvested from beds receiving water that contained sewage effluents (26)(27)(28).

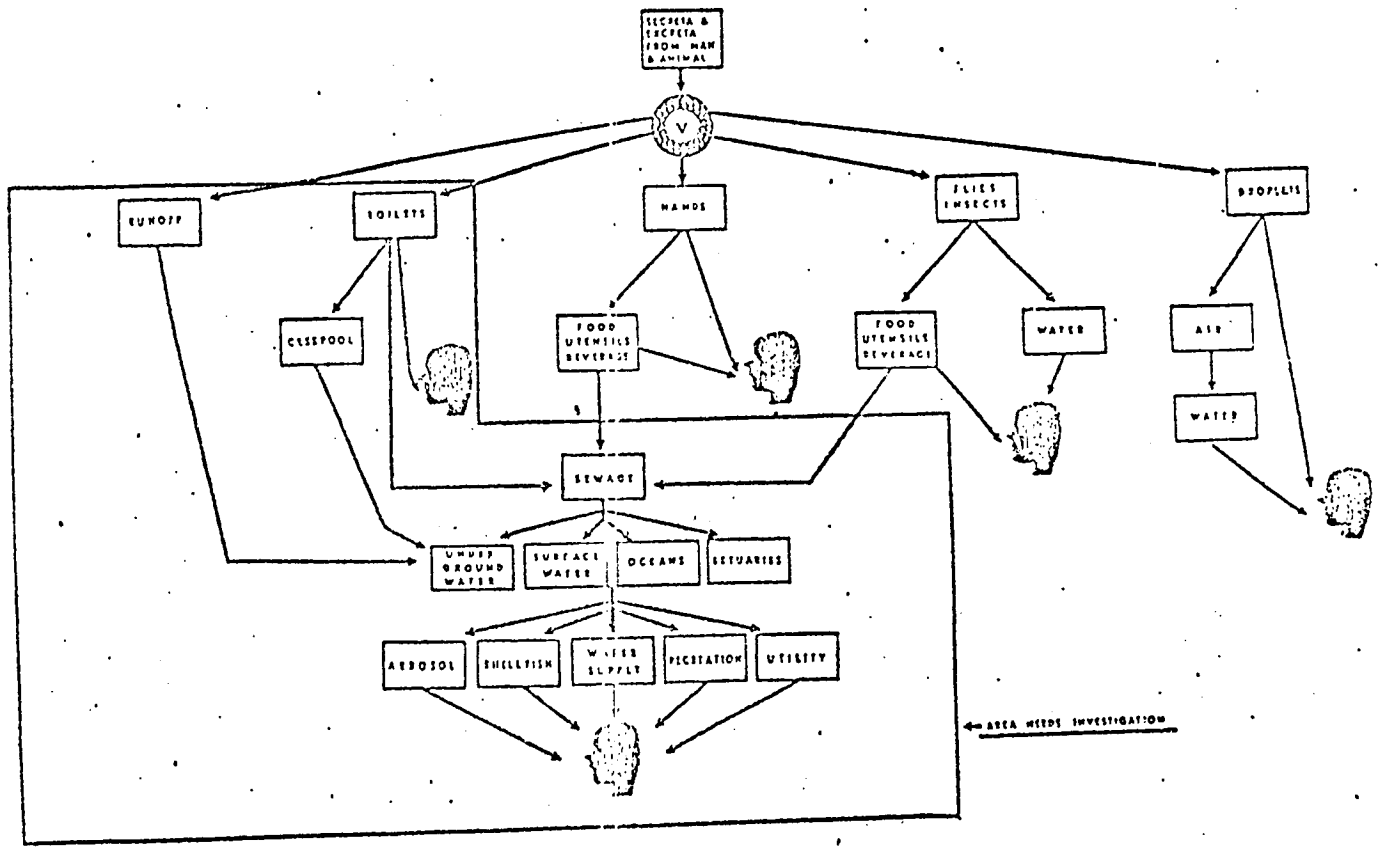

FIGURE 3. THE POSSIBLE MODES OF TRANSMISSION OF HUMAN ENTERIC VIRUSES

CHAPTER II

RECOMMENDED WASTEWATER TREATMENT STANDARDS FOR TEMPORARY SEWERAGE TREATMENT PLANTS

Evaluation of a resource's quality and the implementation of controls to curb pollution are made with reference to standards and quality criteria provided for the protection of that resource. The term "standard" applies to any definite rule, principle, or measure established by authority. "Criteria" is a scientific parameter on which a standard may be based concerning the suitability of a stream to support a designated use. It should be noted that a standard does not necessarily mean that it is based on sound scientific knowledge, for it may have been based on inadequate technical data tempered by a cautious factor of safety. Where health is involved and where scientific data are sparse, such arbitrary standards are justified.

Treatment facilities must be in accordance with the water quality standards of the State and the Federal government. The standards for wastewater treatment to be proposed here are not in place of those specifically required by Maryland's Water Quality Standards, but are additional requirements to provide for specific control of viruses.

Microbiological Standards

Although disease-producing organisms cannot grow in relatively pure water, they can survive for several days.

Viruses have been shown to survive for 200 days or more in river water (29). The importance of measuring pathogenic organisms to prevent their discharge and achieve their removal from wastewaters is obvious. The analytical procedures for pathogenic bacteria are far from reliable. Fortunately, the presence of pathogenic bacteria can be monitored to a large degree by using indicator bacteria, the coliform bacteria. The coliform index, while a good laboratory tool for pathogenic bacteria, is not a reliable index for viruses.

The demonstrated occurrence of enteric viruses in estuary water virtually lacking coliform bacteria offers evidence of the inadequacy of bacterial indicators to reflect the presence of viral pathogens (21). There is no doubt that a positive coliform index in treated effluent means that viruses are present, but, unfortunately, the absence of coliforms may not mean that viruses are absent. The absence of enteric viruses can only be noted by specific concentrating and assay procedures for viruses.

Testing for virus removal is not always needed when processes in which viruses are reliably removed are employed in waste treatment. These processes will be documentated in Chapter III.

VIRUS STANDARDS

Rationale

Any potential health hazard associated with treatment plants in developed areas will result from direct contact of

individuals with the receiving stream. For this reason it is recommended that the receiving streams be viewed as bathing waters and a virus standard established to assure no health hazard for direct contact.

The recommendation of a standard for virus may raise questions when such action has not been taken by the Environmental Protection Agency (EPA), and no standard for viruses in drinking water are being proposed in the revised drinking water standards (30). This is apparently due to the difficulties in detecting viruses, and the manpower shortage that would occur in the virology profession if standards were nationally proclaimed. For example, there are about 40,000 individual drinking water purification facilities in this country, not to mention waste treatment (30). Several sensitive procedures are available for detecting viruses in water and local authorities must not wait for the others to take action. This philosophy was very adequately presented by Dr. Melnick of the Department of Virology and Epidemiology, Baylor College of Medicine (15):

> "What should we do in the meantime? Methods are now available to detect small amounts of virus in large volumes of water. These viruses are pathogens; they can make people sick and they can sometimes kill. There is reason to suspect that some viruses may produce disease years after the initial infecting event. I feel that the time has now come to use our new methods, such as those discussed at this conference, to allow us to set up minimum standards of virus pollution, at a level, let us say, of no more than one detectable infectious virus unit per 10 gal. of recreational water used for bathing and swimming, and no more than one detectable infectious virus unit per 100 gal. of water used for drinking and food preparation. This is a practical level to aim at. The cost for monitoring would not be excessive, and the rewards might be high."

A committee formed by the Sanitary Engineering Division of the American Society of Civil Engineers recently concluded the following (17):

> "Inadequacy of methods for detecting, identifying and enumerating viruses in samples of water still constitutes an important gap in water quality control."

This conclusion is correct, but the same can be said for our methods of measuring the organic strength of wastewaters, the biochemical oxygen demand (BOD). This parameter has been criticized by many. The use of coliform bacteria to detect pathogenic bacteria has been equally criticized. The detection of viruses requires a suitable method for concentrating them from large volumes of water. Another aspect is concerned with laboratory isolation, identification, and enumeration of the recovered viruses. A third is the availability of facilities and trained personnel.

The fact that methods are presently available to detect small amounts of viruses in water is illustrated in Tables 8, 9, 10 and 11 as taken from a review by Hill and coauthors on virus detection (35). Procedures that can be implemented by the County to evaluate wastewater treatment facilities for compliance with the virus standard will be presented in a later report.

As mentioned above, one of the difficult, time-consuming and costly tasks involves laboratory isolation, identification and enumeration of specific viruses. However, the control of water quality does not require individual isolation and identification of viruses. Do we presently isolate and identify

TABLE 8

Recovery of Virus From Water by The Membrane - Adsorption Technique

Reference	Type of Water	Voluem of Water	Percent of Virus Recovered
Wallis and Melnick (1967) (31)	Sewage	1.5 gal	100
Rao and Labzoffsky (1960) (32)	Surface Water	500 ml	53-100
Cliver (1970) (33)	Tap Water	1 liter	26-90
Moore et al. (1971) (34)	Wastewater	1 gal	81-100
Berg (1971) (21)	Distilled Water	25 gal	50-75
Hill et al. (35)	Estuarine Water	100 gal	56-79

TABLE 9

RECOVERY OF VIRUS FROM WATER BY ADSORPTION TO PRECIPITABLE SALTS AND IRON OXIDE

Reference	Adsorbent Used	Type of Water	Volume of Water	Percent of Virus Recovered
Wallis and Melnick (1966)(36)	$Al(OH)_3$	Sewage effluent	1 liter	- 80
England (1970)(32)	$Al(OH)_3$	Sewage effluent	400 ml	80 - 100
Rao et al. (1968)(37)	Iron oxide	Tap water	500 ml	87 - 90
Rao (1970)(37)	Iron oxide	Tap water	150 liters	- 100
Jakubowski and Hoff (1970)(38)	Iron oxide Iron oxide	Estuarine water Tap water	10 liters 10 liters	22 - 37 40 - 64
Metcalf (1970) (39)	Iron oxide	Tap water	1-10 liters	80 - 97
Schäfer and Borneff (1970) (33)	$FeCl_3$	Surface water	5 liters	45 - 100
England (1970)(33)	Protamine sulfate	Sewage effluent	1 liter	80 - 100

TABLE 10

RECOVERY OF VIRUS FROM WATER BY ADSORPTION TO POLYELECTROLYTE

Reference	Type of Water	Volume of Water	Percent of Virus Recovered
Johnson et al. (1967) (39)	Distilled water	5 ml	- 52
Wallis et al. (1969) (40)	Sewage effluent	1 gal	- 93
England (1970)(33)	Sewage effluent	2 liters	90 - 100
Jakubowski and Hoff (1970)(36)	Tap water Estuarine water	10 liters 10 liters	58 - 74 12 - 17
Kalter (1970)(33)	Tap water	1 liter	- 60
Berg (1971)(30)	Distilled water	1 liter	14 - 53
Wallis et al. (41)	Tap water Swimming pool water	100 gal 300 gal	65 - 80 - 40

TABLE 11

RECOVERY OF VIRUS FROM WATER BY THE AQUEOUS POLYMER TWO-PHASE SEPARATION METHOD

Reference	Type of Water	Volume of Water	Percent of Virus Recovered
Shuval et al. (1967)	Distilled water	640 ml	37 - 98
Shuval et al. (1969)	Sewage effluent	1 liter	35 - 100
Lund (1970)	Sewage effluent	200 ml	- 100
Cliver (1970)	Tap water	1 liter	59 - 164
Nupen (1970)	Wastewater	1 liter	- 40
Liu et al.	Tap water	2 liters	57 - 100

pathogenic bacteria when coliforms are found in a water sample? The answer is no. The presence of a coliform bacteria in a specified volume of water is indication of inadequate water quality. In the same manner, the positive occurrence of cytopathic effects in test cells from viruses should be accepted as inadequate water treatment regardless of the type of virus present.

Proposed Standards

Giving consideration to the standard for viruses in water intended for swimming and bathing purposes, as proposed by Dr. Joseph L. Melnick, Baylor College of Medicine (15) and those recommended by Dr. Gerald Berg, Chief of Virology, Environmental Protection Agency (42), the following standard is proposed:

MAJOR STANDARD

RECOMMENDED STANDARD FOR ENTERIC VIRUSES IN SEWAGE EFFLUENTS

Effluent discharges shall contain no more than one detectable infectious virus unit per 10 gallons. A detectable infectious virus unit shall be defined as the occurrence of

cytopathic effect in either cell cultures and/or laboratory animals.

The criteria used in selecting this standard, one infectious virus unit per 10 gallons of effluent, are as follows:

1. The probability that an individual will swallow the specific portion of sewage effluent that contains virus is very unlikely. Exposure of individuals to viruses in crowded rooms is likely greater, although there is no data on virus concentration under such conditions.

2. If the total volume of sewage effluent was used for drinking water and each person consumes 6 oz., only one person out of 213 would receive a viral dose. Thus, the probability that any individual will swallow a viral dose by drinking 6 oz. of sewage effluent is less than one-half of a percent. It must be noted that we are discussing sewage effluent with no dilution by receiving water and the intentional consumption of this effluent.

3. After dilution of the sewage effluent by the receiving stream, the virus concentration will be many times less. Most streams provide at least 1/10 and many 1/1000

fold dilution of effluents. Thus a 1/10 dilution by the stream will place that stream in the category recommended for drinking water with respect to virus.

4. The proposed standard, requiring the discharge effluent to meet virus standards for contact sports, as recommended by Melnick (15), is considered necessary. As Tables 9, 10, 11, and 12 illustrate, the detection of viruses may not be 100 percent efficient, and the minimum detection efficiency will not be below 10 percent. A 10 percent detection efficiency combined with a 1/10 dilution of the effluent by the receiving stream will provide assurance that streams will not contain more viruses than that recommended by Melnick (15) for swimming.

5. The detection of one infectious virus unit per 10 gallons can be achieved. As Tables 9 through 12 illustrate, detection in 100 to 300 gallons is possible.

Secondary Standards

As will be documentated in Chapter 3, there is not yet a single treatment process that will achieve virus devitalization to produce safe water. However, a combination of proper treatment processes will provide complete virus inactivation and remove health hazards. The ability of a treatment plant to achieve this removal depends on the interaction of individual treatment systems followed by terminal disinfection.

One of the most important processes is terminal disinfection, and it must be employed to achieve the standard

proposed above. Proper disinfection can provide a virus free effluent. A personal letter from Dr. Gerald Berg is provided in Appendix A which supports this statement. The ability of terminal disinfection to produce safe water depends on the previous treatment processes and their performance. These treatment processes must remove substances that interfere with terminal disinfection. This aspect is most important in providing proper disinfection and therefore a virus-free effluent.

Treatment systems which will remove these interfering substances can be easily designed and operated. When such treatment is provided, followed by proper disinfection, a virus-free effluent can be produced. There are various parameters that can be routinely monitored which will assure such treatment and production of virus-free effluents. These parameters are:

1. turbidity
2. biochemical oxygen demand (BOD)
3. ammonia-nitrogen
4. pH
5. disinfectant concentration and contact time

Specific standards are provided for these parameters below. They are referred to as secondary standards, since they provide the means by which the major standard for viruses in effluents can be assured. Documentation that virus-free effluents can be produced by treatment which satisfies these secondary standards is given in Chapter III as well as Appendix A.

When these secondary standards are applied, the Major Standard proposed above for virus content of effluents will be achieved, and virus assays are not necessary to show compliance.

SECONDARY STANDARDS

The following standards, 1 through 5, shall be applied to the effluent before disinfection.

THE FOLLOWING STANDARDS SHALL BE REQUIRED REGARDLESS OF THE DISINFECTANT USED.

1. Turbidity[1] -------- Not to exceed one Jackson Unit
2. BOD-5 day 20°C[2] --- Not to exceed 10.0 mg/liter

THE FOLLOWING STANDARD SHALL BE REQUIRED WHEN A HALOGEN IS USED AS THE DISINFECTANT

3. Ammonia - N[3] ------ Not to exceed 1.0 mg/liter (measured as nitrogen)

THE FOLLOWING STANDARDS SHALL APPLY TO THE DISINFECTION PROCESS

4. For Chlorine:

4a. pH[4] ---------- Not more than 7.5

4b. Chlorine Residual* -------- Free chlorine residual of 3 mg/liter shall be provided over a contact time of one hour

5. For Ozone

5a. Ozone Residual*-----Residual ozone of 1 mg/l shall be provided over a contact time of 4 minutes

*The specified residual and contact time can be reduced only if virus monitoring is employed and data supports the request.

Rationale of Secondary Standards

1. Viruses, being very small, become enmeshed in suspended solids that impart turbidity to waters. Turbidity will enable the viruses to escape the disinfecting action. It is therefore necessary that turbidities before terminal disinfection be no more than one Jackson unit (42). Low turbidities are also necessary to assure low disinfectant demands and eliminate the need for excessive addition of disinfectant.

2. The limit on BOD is necessary to prevent high disinfectant demands. High BOD values make disinfection for virus inactivation difficult if not impossible.

3. The limit on ammonia is necessary if chlorine is to be used for terminal disinfection. There are several reasons which make ammonia nitrogen in effluents undesirable:

a. Ammonia consumes dissolved oxygen in the receiving water.

b. Ammonia is toxic to aquatic life.

c. Ammonia reacts with chlorine to form chloramines.

d. Ammonia increases the chlorine demand for disinfection.

It is for the last two reasons that the above standard is needed when halagens such as chlorine are used for assuring a virus-safe effluent. It has been shown that combined forms of halogens, such as chloramines, possess very little, if any, virucidal properties (4)(5)(9)(43). Chloramines are also toxic to fish and it is the presence of this compound that makes high chlorinated effluents undesirable. A highly nitrified effluent, that with ammonia nitrogen below 1mg/liter, will eliminate appreciable chloramine production and prevent discharge of this toxic chlorinated compound to receiving waters. This standard will also allow virus inactivation with low chlorine doses. Chloramines are not virucidal, and chlorine must be added to achieve free chlorine residuals, referred to as breakpoint. Highly nitrified effluents also contain less organic matter (BOD) and little chlorine demand is required by organic compounds (44). Thus, no significant amounts of chlorinated organics will be produced.

4a. The pH of the water during disinfection with chlorine must not exceed 7.5. At higher pH values, the disinfectant HOCl ionizes to the poorly virucidal hypochlorite ion, OCl^- (21)(22).

Secondary standards 4b, 4a, 5a will be documented in discussion of treatment processes for virus inactivation, Chapter III.

CONTROLLING TOXIC COMPOUNDS

Sewage from strictly residential developments will contain no more toxic metals or toxic organics than the drinking water that supplies the residents. Toxic materials can only enter sewage from industrial developments, and these consist of only the industries that utilize chemicals in some form. Thus, little if any of these substances will be found in sewage of Montgomery County.

It would be a simple procedure to determine if toxic materials will enter the proposed temporary treatment plants in Montgomery County. There is no need to form an expensive chemical survey of the sewage to receive temporary treatment. In Montgomery County, the number of industrial operations is small, and those industries that will be served by a temporary treatment plant can be located. It would be a simple task to individually inspect the purchasing records of each industry to determine if it is using toxic chemicals. If toxic substances are to be found in the sewer, they must first be purchased and discharged. If a potential hazard is found, then chemical analysis can be performed on that industry's discharge to determine if a hazardous concentration exists. If a hazardous condition is found, it can be corrected or treated at the industrial discharge before entering the sewerage system.

The particular task is actually quite simple, and I recommend that such an evaluation be performed to assure the

protection of the County's streams. The need for this evaluation is mainly for protecting aquatic life. There would be no direct health hazard to County residents from any toxic compounds in the streams. Unlike viruses, an individual would have to drink large quantities of the stream water to result in health problems.

CHAPTER III

TYPICAL TREATMENT PROCESSES FOR MEETING THE RECOMMENDED EFFLUENT STANDARDS

As mentioned before, there is no single treatment process that will produce a virus-free effluent, but there are processes that will effect complete removal of viruses when operated in series. In this chapter, these processes will be discussed and documentation provided on their effectiveness. Before discussing treatment systems, it is essential to review the historical background of wastewater treatment.

HISTORICAL DEVELOPMENTS IN WASTE TREATMENT

The principles for providing a healthful environment have largely provided the motivation and development of the present day waste treatment systems. The practice of the early 1800's was to dispose of human excreta in any manner reasonably available to an individual. During this time, wastes were placed in piles or privies. The relationship between pollution and disease was not recognized until the cholera epidemics of 1832 and again in 1848.

The discharge of human waste to storm drains was forbidden well into the nineteenth century. In 1815 and 1833 the cities of London and Boston approved the discharge of fecal matter to storm sewers. This solution for removing fecal matter from urban centers was of short term, since it shifted the nuisance to the receiving water. As population densities increased, the natural purification provided by

streams was surpassed, and the first form of sewage treatment was initiated. The first treatment facilities were developed to remove suspended solids from wastewater. They provided for the screening and settling of solid materials which came to be known as primary treatment.

Primary treatment has the effect of removing the unsightliness of raw sewage and of reducing pollutants to some extent. However, effluent which has undergone no more than primary treatment still contains a significant amount of organic and inorganic pollutants. Where the amount of effluent is small when compared with the size of the stream or river into which it is expelled, natural processes in the stream or river could still provide for the needed purification. But, under most circumstances, primary treatment is insufficient from a health and ecological point of view. The health problem lies in the fact that the presence of pathogenic mircoorganisms and of viruses makes it necessary to close the affected streams to swimming and other water sports. The ecological problem derives from the presence of substances in the effluent which have an adverse effect on aquatic life.

To cope with the foregoing health and ecological hazards, many communities which recognized the problem of stream pollution moved years ago to what came to be known as secondary treatment. In secondary treatment an effort was made to duplicate within the wastewater treatment plant the biological processes which took place in the streams and rivers, causing organic material to be degraded to gases, water and inorganic ions.

For many years the design and operation of the secondary treatment process was an art rather than a science, relying largely on guesswork. In the last thirty years, however, great technical advances have been made. As of today, secondary treatment will effectively reduce the organic substances, pathogenic organisms, and suspended solids.

Some communities were for a long time unwilling to support the cost of secondary treatment. As late as 1962 less than 50% of the treatment plants used secondary treatment and only 56 percent of the country's population was provided treatment facilities (45). As a result, it did not appear necessary to move beyond secondary treatment and little research took place designed to discover further improvements.

Such research, however, was stimulated by the most recent changes in our modes of living. Industry developed new chemicals resistant to biological treatment. Water use increased such that the use of treated wastewater as drinking water had to be considered. It was also recognized that the loading of inorganic ions such as phosphorus and toxic metals caused undesirable changes in ecosystems. These conditions provided the impetus for a crash program to develop greater technology. In 1960 the Federal Government initiated the Advanced Waste-Treatment Research Program. Much of this research resulted in new and improved approaches to wastewater treatment. As a result, the processes now designated as tertiary or advanced waste treatment were developed.

Advanced waste treatment can be defined as any process that goes one step beyond what is called secondary treatment. Thus, advanced waste treatment will have varying degrees of wastewater treatment. Those advanced treatment facilities that remove all health hazards and produce an esthetic water are often referred to as water reclamation plants. Water from these plants can be reused for domestic and industrial water supplies.

Normally it takes decades to see the results of basic research implemented. This has not been the case with advanced waste treatment. Demonstration projects supported by the Federal Government have quickly moved the results of research into implementation, with the result that advanced treatment is today an established and sucessfully tested process.

While advanced treatment is now a reality, it is relatively expensive and has for that reason not been installed in many places. When it has been installed, however, it has been able to solve the health and ecological problems which it was designed to solve. There is no doubt that wastewater can be treated to be suitable for any use. There are excellent examples of such systems in operation today. In Windhoek, Southwest Africa, the Windhoek Wastewater reclamation plant reclaims domestic sewage for 40 percent of the city's drinking water system. Since 1962, Los Angeles County has been using renovated wastewater to replenish groundwater supplies that are a source of the municipal water supply.

At present, there are at least nine treatment facilities in the United States that process wastewater for ground water recharge, recreational use or industrial users.

Advanced waste treatment processes are required for effective removal of biological resistant organics, viruses, inorganic nutrients, salts and toxic metals. Once standards are set, treatment facilities must be designed to assure that a wastewater will be treated to a degree that will satisfy these standards. A question that is often asked is how can one project the removal efficiency of a plant that isn't built. The answer is that many studies, both laboratory and fullscale field installations, have provided the needed design information and demonstrated removal efficiencies. For example, virus removals have been established for the complete process sequences in a treatment plant as well as virus removal efficiency in each individual component of secondary and advanced waste treatment.

The following list reviews some of the field-monitoring of enteric viruses in advanced waste treatment processes. There are many other monitoring studies on viruses in secondary treatment plants and individual treatment processes as well as laboratory studies.

<u>Waste Treatment Facilities that have demonstrated virus removal by field monitoring.</u>

1. Santee, California -- secondary treatment with stabilization ponds, disinfection and sand percolation, 2 million gallons per day.

2. South Lake Tahoe, California -- secondary treatment with lime-phosphate precipitation, ammonia stripping, mixed bed filtration, carbon adsorption, and disinfection, 7.5 million gallons per day.
3. Whittier Narrows Reclamation Plant -- secondary treatment with disinfection and percolation, 10 million gallons per day.
4. Met-Pro Plant -- effluent recycled, North Slope of Alaska. Treatment consists of solids-contact precipitation unit, carbon adsorption and disinfection, 200,000 gallons per day.
5. Windhoek Waste Water Reclamation Plant, Southwest Africa -- treatment consists of secondary treatment with oxidation pond, lime precipitation, sand filters, carbon adsorption and disinfection, 3 million gallons per day.
6. Lebanon Advanced Waste Treatment Plant, Ohio -- treatment consists of secondary treatment with lime precipitation and sand filtration, 75,000 gallons per day.
7. District 14 Renovation Plant, Lancaster, California -- treatment with chemical precipitation, filtration and disinfection, 500,000 gallons per day.

The above discussion traces the history of wastewater treatment to the present level of technology. It is important to recognize the level of technology available and that wastewater can be processed to a degree where it is no longer

wastewater but a reusable resource. The important issue, however, deals with the treatment that is needed for the interim program of sewage treatment in Montgomery County. What type of processes and treatment plant is known to meet the standards proposed for viruses and how can this be implemented? A presentation of these processes will follow.

TYPICAL TREATMENT SCHEMES FOR VIRUS-FREE EFFLUENTS

Introduction

In the following, a few typical wastewater treatment schemes that will produce a virus-free effluent will be presented. The compatibility of each treatment scheme with the proposed system for the County's ten year water and sewerage plan is discussed, and the additional cost of the two most compatible schemes presented.

Efficacy of Biological Treatment

There is no doubt that water can be adequately treated so that it is always biologically safe. Biological, chemical and physical treatment procedures all remove viruses from wastewaters. The major problem is that no single process will remove viruses to the degree required for a safe effluent. Each process has a different efficiency for virus removal, and the efficiency of some depends on the degree of pretreatment provided. This is indeed true for disinfection. Disinfection is the one process capable of removing all

viruses, but it is not effective on raw sewage. It can be made to work on secondary effluents, but excessive chemical doses are required. Thus, disinfection of secondary effluents is not considered feasible. Virus removal from secondary effluents has been applied only under emergency conditions. This occurred in 1956 when sewage had to be processed and directly reused for drinking water (46).

During the period 1952-57, Kansas suffered one of the worst droughts in history. In the summer of 1956 the Neosho River ceased to flow and Chanute, Kansas, a city of 12,000, was without a water supply. On October 4, 1956 the city started the direct recycling of its processed sewage for a period of five months, from a secondary plant, to the water purification plant. The purification processes included sedimentation, lime-precipitation sand filtration, and disinfection with chlorine. In 1956 we did not have the extensive advanced waste treatment technology of today, but the water met bacteriological standards and, although viruses were isolated from the raw sewage, none were isolated from the treated water. This incidence has become an oft-quoted classic of water reuse.

Another Midwest reuse occurred as early as 1940 in Ottumwa, Iowa (46). Ottumwa's water source was the Des Moines River. Its intake was located downstream from Des Moines. Sewage from Des Moines was discharged untreated into the river, and hydrologic events during 1939 and 1940 were such that Ottumwa found itself treating water from a river whose

flow of about 26 mgd (million gallons per day) was composed of 14 mgd of raw sewage and 12 mgd of natural flow. In addition, the river was covered with a thick layer of ice and snow. The effect was that of a tight conduit between the Des Moines sewer and the Ottumwa intake. The water purification plant consisted of lime precipitation, filtration and super chlorination.

These are two early occurrences of sewage reuse, the latter not even having secondary treatment. The water purification processes used in these two above situations were

1. lime precipitation and sedimentation
2. filtration in sand beds
3. disinfection with chlorine.

Please note that these are similar to the advance waste treatment processes of today. These processes were utilized in 1940 and 1956. In other words, when the field work on advanced waste treatment was begun, it was not a matter of inventing new processes from scratch. It was a matter of using the technology of secondary waste treatment, water purification, and industrial water treatment and perfecting and combining it all into a single continuum.

It is the application of the advanced waste treatment processes that make virus-free effluents possible. Enteric virus inactivation in primary treatment is little if any. Only three percent virus removal has been found in primary settling, and that was attained after 3 hours (47) (Table 12). Enteric virus removal in secondary treatment processes

TABLE 12

REMOVAL OF VIRUSES FROM WASTEWATER BY BIOLOGICAL TREATMENT

Treatment	Treatment time - hours	Virus Added	Percent Virus Removed	Reference
Primary Settling	3	Poliovirus 1	0 - 3	47
		Poliovirus 1	0 - 11	48**
Activated Sludge	6.0 - 8.4	Coxsackievirus A9	96 - 99	47
	6.0 - 7.5	Poliovirus 1	88 - 94	
	2.75	None*	53	49**
	2.75	None*	71	49**
	-	Poliovirus 1,2&3*	76 - 90	48**
Trickling Filters	-	None*	0 - 84 average 24	50**
Stabilization Pond (oxidation Pond)	20	None*	0 - 95.5 average 67.5	50**

* None - means that testing was done on the natural enteric viruses present. If a virus is noted, it was originally present in the sewage and not added for testing.

** These are field studies on full-scale treatment plants.

vary from 0 to 96 percent in field studies (Table 12) (47) (48)(49). In many cases, no virus removal was achieved with field trickling filters and stabilization ponds.

Viruses are removed from sewage more efficiently by activated sludge treatment than by any other biological process. However, their efficiency is far from adequate for producing a safe effluent. A safe effluent can be produced by using chemical and physical processes. The complete treatment plant may consist of only physical and chemical processes or it may utilize these as additional treatment after biological processes.

Treatment Procedures for Virus-Free Effluents

Various treatment schemes can be developed that will provide a virus-free effluent. Some typical schemes are provided in Figures 4 - 7. There are other alternates that can be used depending on the characteristics of the waste. Those presented will be most typical for domestic sewage. Wastes containing large industrial discharges may need other schemes, and other variations may occur when nitrogen removal is needed.

Although the treatment schemes vary in individual processes, they all have one common feature and that is the use of terminal disinfection for complete virus removal. As Figures 4-7 illustrate, individual treatment processes remove viruses to varying degrees, and thereby constitute adjunctive

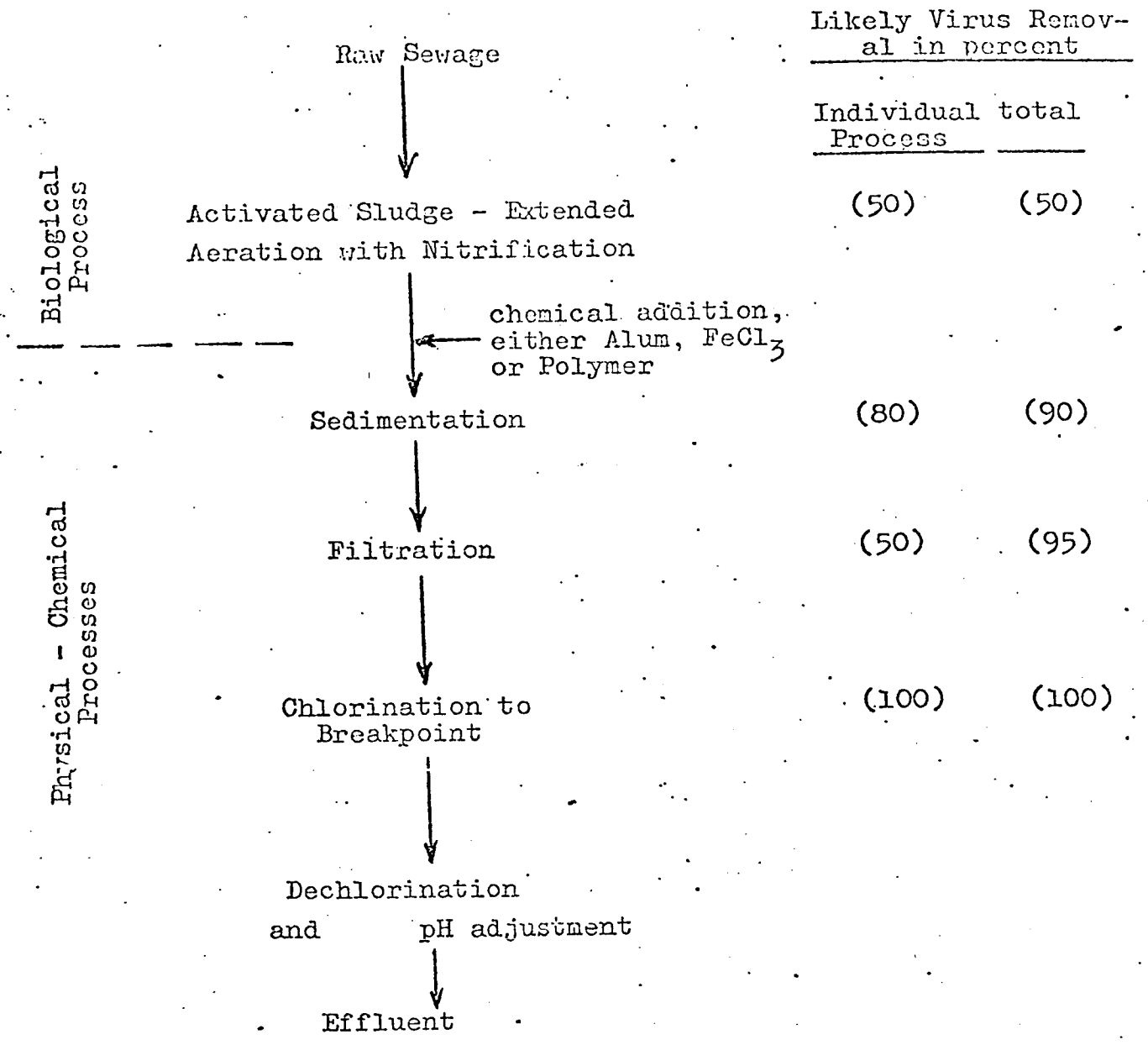

Figure 4. Scheme 1 - Typical Wastewater Treatment for Complete Virus Removal

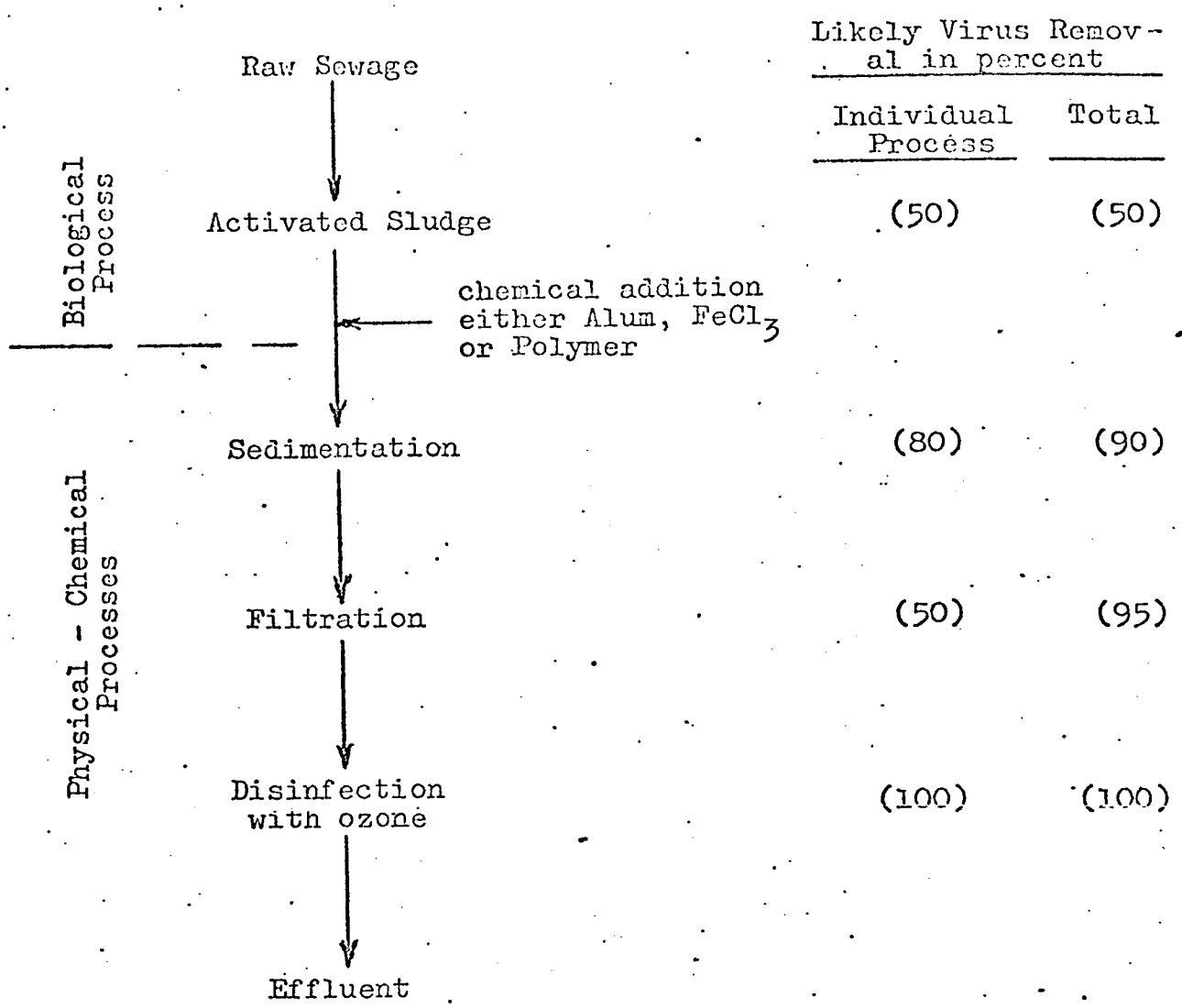

Figure 5. Scheme 2 - Typical Wastewater Treatment for Complete Virus Removal

All Physical-Chemical-Processes

	Likely Virus Removal in percent	
	Individual Process	Total
Raw Sewage		
↓		
Lime Precipitation		
↓	(90 to 99.9) depends on pH	(90 - 99.9)
Sedimentation		
↓		
Filtration	(50)	(95 - 99.95)
↓		
pH Adjustment	(0)	(95-99.95)
↓		
Carbon Adsorption	(25)	(96.2 - 99.962)
↓		
Breakpoint Chlorination	(100)	(100)
↓		
Dechlorination by Carbon Adsorption		
↓		
Effluent		

Figure 6. Scheme - 3 Typical Wastewater Treatment for Complete Virus Removal

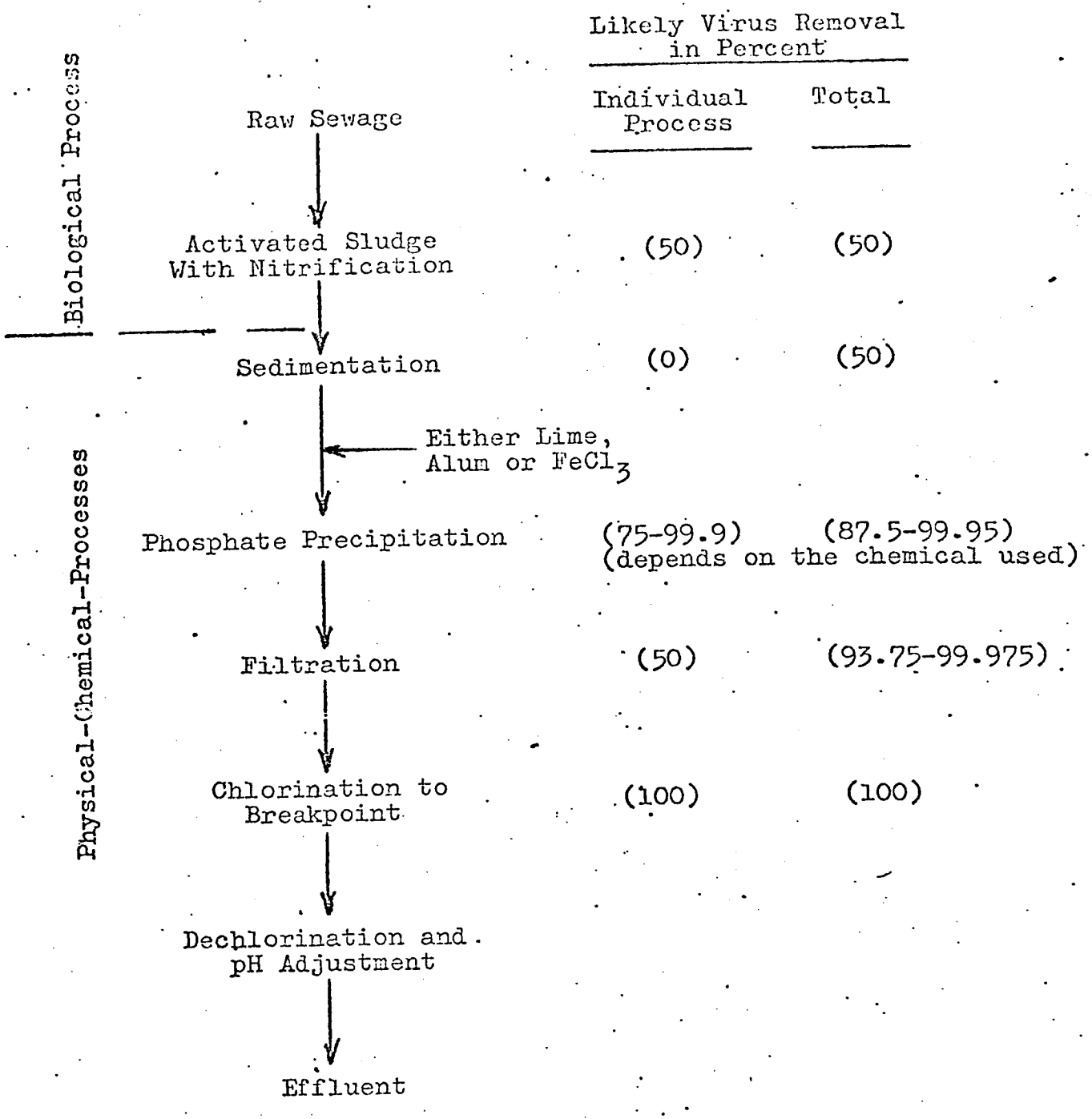

Figure 7. Scheme - 4 Typical Wastewater Treatment for Complete Virus Removal with Phosphate Removal

removal. The major importance of the individual processes toward virus elimination is the removal of those substances that interfere with terminal disinfection. Thus, they facilitate the final achievement of total removal or destruction of viruses.

These interfering substances are:

1. Organic substances which consume disinfectant (BOD).
2. Turbidity which protects viruses from the action of disinfectants.
3. Ammonia which is an interfering substance when halogens (such as chlorine) are used as disinfectants. Ammonia does not interfere with ozone.

Chapter II presented secondary standards which are directed at the control of these interfering substances, and therefore make total destruction of viruses possible by disinfection. If the secondary standards are applied to any of the treatment schemes in Figures 4-7, complete virus destruction will occur. Thus, we presently have at hand a relatively simple method to produce virus-free effluents. The operational procedures and methods of analysis for compliance with the secondary standards are not only simple, but they are used in some fashion by almost all wastewater and water purification operators today.

Removal of Interfering Substances for Proper Disinfection

The significant aspects of each process in the proposed

treatment schemes (Figures 4-7) will be briefly presented.

In Scheme 1, chlorination is used for terminal disinfection, therefore, ammonia must be removed as well as turbidity and BOD. Ammonia removal will be achieved by designing the activated sludge unit for complete nitrification. This process will biologically convert ammonia to nitrates. High turbidity removal will be achieved by chemical addition to improve sedimentation as well as the filtration process. These combined processes will make breakpoint chlorination easy to achieve, providing for complete virus removal. Dechlorination with chemicals, aeration or effluent storage may be desired before discharge. It should be noted that toxic chloramines will not be produced since ammonia is removed.

In Scheme 2, ozone is used as the disinfectant Therefore, ammonia removal is not needed and the activated sludge process can be designed as a conventional aeration unit. As with Scheme 1, turbidity removal is achieved by chemical flocculation prior to settling and filtration. Excessive ozone concentrations will not have to be removed before discharge. Ozone is readily reduced to oxygen, which will benefit the stream.

In Scheme 3, a completely different approach is present. This system consists only of physical chemical processes. Turbidity removal is achieved by lime precipitation; alum or $FeCL_3$ can also be used, followed with sedimentation and filtration. The BOD in this system is not removed

biologically, but it is removed by adsorption on activated carbon. Ammonia is not removed and breakpoint chlorination will produce chloramines. Since these are toxic to aquatic life, they are removed in the dechlorination process. In this scheme, the dechlorination process is again activated carbon which removes the free chlorine and adsorbs the chlorinated compounds.

In Scheme 4, the interfering substances are removed as discussed for Scheme 1. The difference in Scheme 4 is that a phosphate removal unit has been included to illustrate its compatibility with virus removal.

Compatibility of Virus Removal Schemes with the County's Proposed Sewerage Plan and Costs

The "supplement to the comprehensive ten year water and sewerage plan" recommends the following treatment for the interim program (51).

1. Biological treatment utilizing extended aeration
2. Micro-filtration units
3. Chlorination with 30 minute contact time

The flow diagram for this system is presented in Figure 8.

As comparison of Figure 8 with Figures 4 and 5 shows, they are very similar. Schemes 1 and 2 can be easily applied to the proposed treatment for the County for obtaining a virus-free effluent.

The changes required in the treatment presently proposed for the County are as follows for Scheme 1:

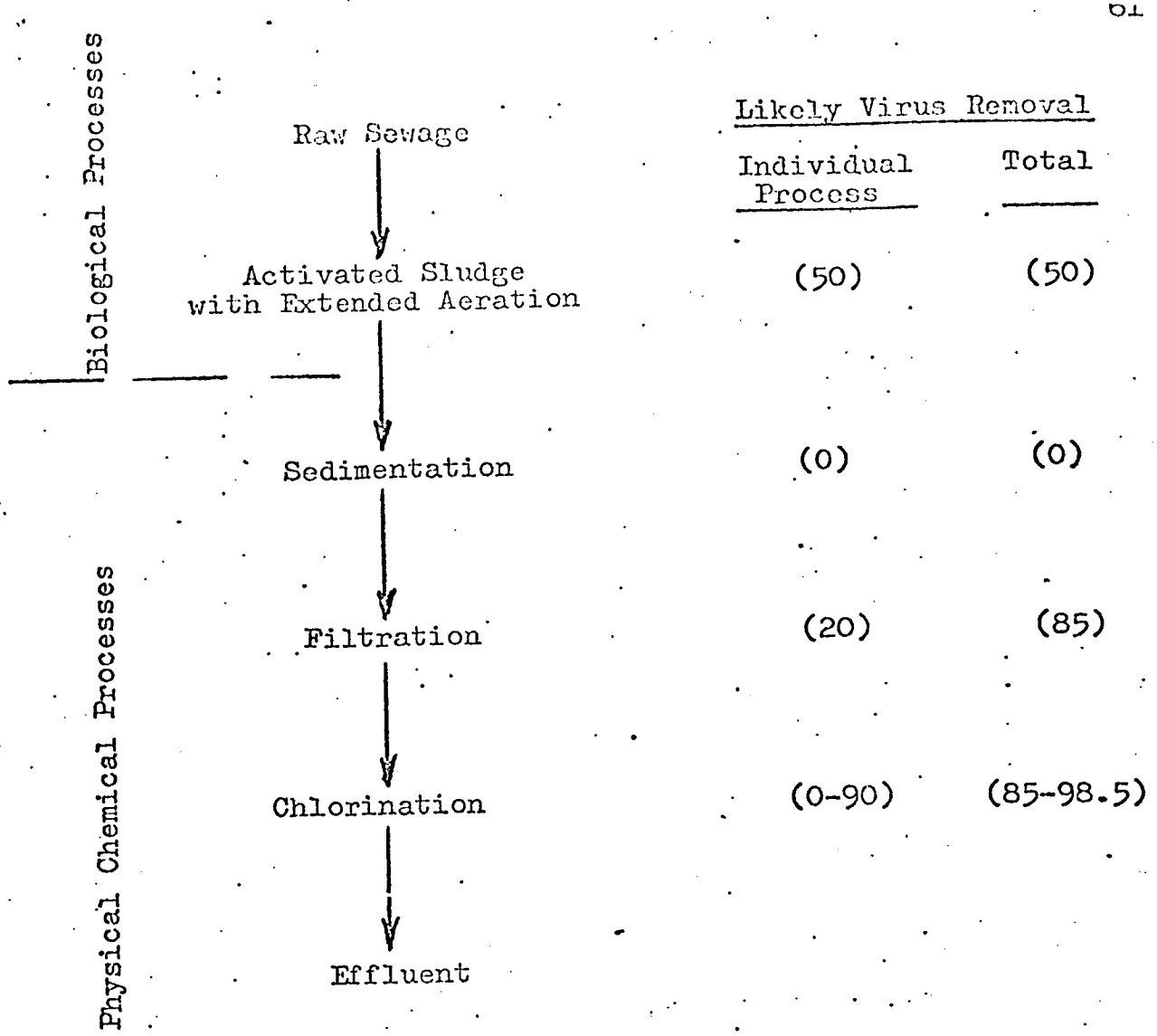

Figure 8. Flow Diagram of Waste Treatment Recommended by the Ten Year Water and Sewerage Plan

1. Design and operation of the activated sludge process not as an extended aeration unit but as a nitrification unit.
2. The addition of chemicals to improve settling and turbidity removal in the filtration process.
3. Chlorine addition to achieve breakpoint and increase contact time to one hour. The Ten Year Water and Sewerage report discusses breakpoint chlorination and dismissed the process because of dangers involved with transporting by truck large quantities of chlorine. This aspect needs clarification. First, large quantities of chlorine will not be needed for breakpoint by Scheme 1 (Figure 4) as is the case with the proposed system in Figure 8. The reasons being the removal of substances by nitrification and improved turbidity removal which creates a high chlorine demand.

   The second point is that toxic chlorine gas doesn't have to be used for chlorination, but hypochlorites can be used. In fact, calcium and sodium hypochlorite have been used in small treatment plants for years, where simplicity and safety were far more important than cost. It is interesting to note that New York City changed from chlorine gas in ton containers to sodium hypochlorite, fundamentally for reasons of safety as influenced

by local conditions (52). In brief, breakpoint chlorination for complete virus destruction can be obtained without any danger to the community.

Dechlorination should be performed to remove the excessive chlorine from the effluent. This can be achieved by chemicals or natural processes such as aeration or storage. Aeration has the advantage of adding oxygen as well as removing chlorine.

The increase in man hours to operate a treatment plant on Scheme 1 will not be significant enough to require additional operators over that needed for the plant proposed in the ten year water and sewerage plan.

The additional operating cost of Scheme 1 for virus removal is approximately $35 per day for gas chlorination and $45 per day for sodium hypochlorite for 1 mgd. At 4 mgd the cost would be approximately four times greater. The capital cost increase over that proposed in the ten year water and sewerage plan is approximately $20,000 and $25,000, respectively, for 1 mgd and 4 mgd.

In Scheme 2, the only changes necessary are chemical addition to improve turbidity removal and disinfection with ozone. Ozone does not form toxic chloramines with ammonia and it will impart no undesirable compounds to the effluent.

The increase in man hours to operate a treatment plant on Scheme 2 will not be significant enough to require additional operators over that needed for the plant proposed in the ten year water and sewerage plan.

The additional operating cost is approximately $35 and $150 per day for 1 mgd and 4 mgd. The increase in capital cost over that proposed in the ten year water and sewerage plan is approximately $50,000 and $200,000 for 1 mgd and 4 mgd respectively.

Scheme 3 is not compatible with the proposed treatment plant. It is shown as an alternate approach. I would not recommend the use of Scheme 4 since it produces large volumes of sludge. Schemes 1 and 2 have little sludge production.

Scheme 4 is identical to Scheme 1 except for a phosphate removal process, and it is presented for the purpose of showing compatibility. Phosphate removal can be used with any of the proposed schemes.

DOCUMENATION OF VIRUS REMOVAL

In the final analysis, a virus-free water means terminal disinfection, and only that process needs documentation for virus destruction. However, the other processes will be briefly discussed to provide the rationale for the removal efficiences present in Figures 4-8 and also to illustrate the knowledge known on virus removal in treatment processes. It is often remarked that we know little about virus removal in wastewater treatment processes. The fact is that, in the past two decades, nearly all treatment processes have been evaluated for their ability to remove viruses, and this information was received for record before a subcommittee of the Ninety-Second Congress (53).

Coagulation with Metals and Polymers

Coagulation of wastewater effluents with metals can provide virus removals over 90 percent (Table 13). The use of cationic polyelectrolytes does not increase virus removal when used with alum or $FeCl_3$ (Table 14). However, the polymer does provide a stronger floc and provides for better removal of turbidity in the following filtration process. This aids the performance of disinfection.

The removal of viruses by coagulation correlates with floc formation. Good floc formation and turbidity removal provides the best virus removal (55). This fact provides an easy tool to control chemical addition for effective virus removal. Chemical dosing by observation of good floc formation and high turbidity removal can be easily applied by operators. This technique is common practice in water purification plants.

Lime Coagulation

Coagulating activated sludge effluent with lime can remove 99 to 99.9 percent of poliovirus 1 (Table 15). At low pH values the removal is lowest and, as pH is increased, virus is removed not only by coagulation but also by destruction. At pH values of 11.5, the viruses are inactivated in a relatively short time. Various investigators have shown that pH alone can inactivate 90 percent of poliovirus in distilled water after 90 minutes of contact (59).

TABLE 13

Virus Removal by Coagulation with Alum and $FeCl_3$

Virus	Water	Percent Removal	Reference
	ALUM		
Poliovirus	sewage effluent	90-98	54
Poliovirus 1	simulated river	75-86	55
Coxsackievirus A2	river	95-99	56
T_4	sewage effluent	96-97	57
MS2	sewage effluent	90-94	57
	$FeCl_3$		
Poliovirus 1	simulated river	20-60	55
Coxsackievirus A2	river	92-94	56

TABLE 14

Virus Removal by Coagulation with Alum and Cationic Polyelectrolytes

Coagulant dose alum mg/l	Polymer mg/l	Virus	Percent Removal	Reference
10	0	Poliovirus 1	86	55
10	1	Poliovirus 1	81	55
25.7	0	T_4	98	58
25.7	0	MS2	99.8	58
25.7	1	T_4	99.9	58
25.7	1	MS2	99.5	58

TABLE 15

Virus Removal by Lime Coagulation and pH Inactivation

Virus	Water	pH	Percent Removed	Reference
	LIME			
Poliovirus	sewage effluent	11.1	98.5-99.9	59
Poliovirus 1	sewage effluent	9.5	88 - 91	54
Poliovirus 1	sewage effluent	10.5	90 - 92	54
Poliovirus 1	sewage effluent.	11.0	92 - 94	54
Poliovirus 1	simulated river	8-9	9 - 70	60
		10.8	99.9	60
		11.2	99.993	60

Filtration

Filtration is an important process in overall virus removal. The major importance of filtration is removal of turbidity to a degree that allows virus inactivation by disinfection. Sand filters remove no viruses when floc particles or polymer is absent. Addition of coagulants or cationic polymers has removed 50 to 99.8 percent of the added virus (Table 16).

Activated Carbon

Activated carbon adsorption will remove virus under low organic loading conditions. A removal of 100 percent has been obtained for tap water, but only 35% is reported for removal from sewage effluents (Table 17). The presence of organic matter hinders the adsorption of virus. Carbon adsorption does remove organics and makes disinfection possible at lower doses for virus inactivation.

Disinfection

Disinfection will produce virus-free water when properly applied. Chlorine in the form of hypochlorous acid (HOCl) is a very rapid virucide and, when it can be maintained in water, no other agent is necessary for disinfection (49). This fact has been illustrated by many investigators. Table 18 provides information on the resistance of twenty enteric viruses to free chlorine (66). Many other studies have been conducted and a few of these are illustrated in Appendix B.

TABLE 16

Virus Removal by Filtration

Virus	Water	Percent Removed	Reference
Poliovirus	sewage effluent with lime	82-99.8	60
Ø x 174	tapwater with polymer	98	61
Ø x 174	tapwater no polymer	0	62
Poliovirus 1	lime precipitation and filtration of sewage effluent	98.5* 50**	

* at pH 11.2; 60

** at pH 10.8 59

TABLE 17

Virus Removal by Activated Carbon

Virus	Water	Percent Removed	Reference
T_2	sewage effluent	35	49
T_4	Tapwater	92	63,64
poliovirus 1	Tapwater	100	65
poliovirus 1	River water	90	65
poliovirus 1	Raw sewage	25	65

TABLE 18

RELATIVE RESISTANCE OF TWENTY HUMAN ENTERIC VIRUSES TO 0.5 MG/L FREE CHLORINE IN POTOMAC WATER (pH 7.8 and 2°C)

	Comparison based on					
	5' survivors		First order reaction		Experimental	
	Virus	%	Virus	Min*	Virus	Min*
1.	Reo 3	<0.0009	Reo 1	2.7	Reo 1	2.7
2.	Reo 2	0.002	Reo 3	<4.0	Reo 3	<4.0
3.	Reo 1	<0.005	Reo 2	4.2	Reo 2	4.2
4.	Adeno 3	<0.008	Adeno 3	4.8	Adeno 3	<4.3
5.	Echo 7	0.135	Cox A9	6.8	Cox A9	6.8
6.	Cox A9	0.161	Echo 7	7.1	Echo 7	7.1
7.	Adeno 7a	0.330	Cox B1	8.5	Cox B1	8.5
8.	Adeno 12	0.330	Echo 9	12.4	Echo 9	12.4
9.	Polio 1	1.118	Adeno 7a	12.5	Adeno 7a	12.5
10.	Echo 29	1.660	Echo 11	13.4	Echo 11	13.4
11.	Echo 9	1.887	Adeno 12	13.5	Polio 1	16.2
12.	Polio 3	2.420	Echo 12	14.5	Echo 29	20.0
13.	Cox B3	7.[illegible]	Polio 1	16.2	Adeno 12	23.5
14.	Cox B1	12.[illegible]15	Cox B3	16.2	Echo 1	26.1
15.	Cox B5	14.533	Polio 3	16.7	Polio 3	30.0
16.	Echo 12	17.273	Echo 29	20.0	Cox B3	35.0
17.	Cox A5	18.620	Echo 1	26.1	Cox B5	39.5
18.	Polio 2	20.000	Cox A5	33.5	Polio 2	40.0
19.	Echo 11	20.833	Cox B5	39.5	Cox A5	53.5
20.	Echo 1	54.167	Polio 2	40.0	Echo 12	>60.0

* Min required to kill 99.99% of virus.

Elemental iodine (I_2) is also a rapid virucide. The concentration-time relationship for 99 percent inactivation of Coxsackievirus A9 has been determined by Berg (49). This information is presented in Appendix B. Iodine has an advantage over chlorine in effluents with pH's between 7.5 to 8.5. In this pH range, hypoiodous acid (HOI) occurs, and it is a faster virucide than I_2 (49). Chlorine at this pH is not as effective.

Ozone has also been evaluated for virus inactivation (67). Ozone has a number of advantages over other disinfectants:

1. Ozone doesn't change the inorganic salt content nor does it produce any toxic compounds.
2. It does not impart taste or color to water.
3. Ozone inactivates virus in seconds when properly applied and long detention times for disinfection are not needed.

Ozone concentrations above 0.7 mg/l result in more than 99.9 percent virus inactivation in four minutes (68) (Table 19).

TABLE 19

Inactivation of Viruses
with Ozone

Virus	Time Required	Ozone-mg/l Applied	Ozone-mg/l residual	Percent Inactivation	Reference
poliovirus	4 min.	-	0.7	99	(68)
poliovirus	4 min.		greater than 0.7	99.9	(68)
poliovirus	2.5 min.	1.27	0.23	99.99	69
poliovirus	2.5 min.	1.38	0.2	99.99	69

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APPENDIX A

Correspondence from Dr. Gerald Berg, Chief of Virology, EPA, on virus-free effluents by chlorination.

ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ENVIRONMENTAL RESEARCH CENTER
Cincinnati, Ohio 45268

November 14, 1972

Dr. John T. Cookson
1225 Noyes Drive
Silver Spring, Maryland 20910

Dear John:

This letter is my response to your telephone inquiry of this morning.

I believe we should make every effort to remove all viruses from sewage effluents that enter into water courses which serve recreational purposes or as municipal water sources.

I have suggested in the past that renovated waters should be treated with a disinfectant for a period long enough to destroy 12 log units of reference virus at 5 C. In an effluent free of turbidity, such as you described, the HOCl residual of five to ten milligrams per liter that you suggested, maintained for an hour at 5 C or higher should easily provide an essentially virus-free water.

As a matter of fact, according to our most current data, one milligram per liter of HOCl applied to a turbidity-free water for one hour at 5 C or higher should achieve a virus-safe water.

Sincerely yours,

Gerald Berg, Ph.D.
Chief of Virology
Advanced Waste Treatment
Research Laboratory

APPENDIX B

Tables and Figures illustrating the magnitude of studies on virus inactivation by disinfectants.

Tables are taken from Reference 66 and as noted:

Figures are taken from References 9 and 49 and as noted:

TABLE 3

EFFECT OF Cl ON POLIOVIRUS TYPE 1 AT 2°C

Contact Time (min)	Demand-Free Water 0 mg PFU/ml (x 10^3)	0.5 mg PFU/ml	0.5 mg % *	1.5 mg PFU/ml	1.5 mg %	Potomac Water 0 mg PFU/ml (x 10^3)	0.5 mg PFU/ml	0.5 mg %	1.5 mg PFU/ml	1.5 mg %
0	5.10 ±0.79					7.63 ±1.00				
(15")							4,330 ±750		257.00	0.541
5		6.70 ±10.71	0.13 ±0.21	2.00	0.039 ±0.02		85.30 ±24.76	1.12 ±0.23	41.30	
10		5.00 ±3.06	0.10 ±0.06	<0.17	<0.003		13.30 ±8.0	0.175	<0.17	<0.002
15	5.23 ±0.35	<0.17	<0.003			6.80 ±1.15	<0.17	<0.002		
30										
60	5.53 ±0.28					6.90 ±1.50				
120										

* % of surviving virus.

** ± one standard deviation.

TABLE 4

EFFECT OF Cl ON POLIOVIRUS TYPE 1 IN DEMAND-FREE AND POTOMAC WATERS AT 22°C

(pH 7.8)

Contact Time (min)	Demand-Free Water 0 mg/l PFU/ml (x 10^2)	0.5 mg/l PFU/ml	0.5 mg/l %*	1.5 mg/l PFU/ml	1.5 mg/l %	Potomac Water 0 mg/l PFU/ml (x 10^2)	0.5 mg/l PFU/ml	0.5 mg/l %	1.5 mg/l PFU/ml	1.5 mg/l %
0	37.33 ±7.52**					34.67 ±6.88				
(15")							13.33 ±16.30		2.34 ±2.1	
5		<0.17±0	<0.005	<0.17±0	<0.005		2.00 ±2.70	0.06	1.34 ±1.70	0.04
15		<0.17±0	<0.005	<0.17±0	<0.005		<0.17	<0.005		
30	23.00 ±4.52					39.67 ±8.14				
120	28.33 ±7.10					34.00 ±7.00				

* % of surviving virus.

** ± one standard deviation.

TABLE 5

FREE RESIDUAL CHLORINE* (MG/L) THROUGHOUT THE INACTIVATION EXPERIMENTS FOR POLIOVIRUS 1

(pH 7.8)

Contact Time (min)	Demand-Free Water				Potomac Water			
	2°C		22°C		2°C		22°C	
	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg
0	0.52	1.53	0.55	1.60	0.36+	1.45+	0.42+	1.52
5	0.46+	1.45+	0.35+	1.50+	0.57	1.51	0.51	1.45
15	0.60	1.45	0.55	1.46+	0.52	1.45	0.44+	1.45+
30	0.60	1.55	0.55	1.53	0.52	1.50	0.51	1.42
60	0.60	1.52	0.56	1.45	0.56	1.52	0.51	1.42+
120	0.54	1.55	0.62	1.50	0.66	1.51	0.50	1.45

* Free residual chlorine determined by an amperometric titrator (Fisher & Porter, Warminster, Pennsylvania).

\+ Indicates point at which additional chlorine was added to bring the free residual back to desired level.

TABLE 6

EFFECT OF Cl ON COXSACKIEVIRUS A9 AT 2°C

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg	0.5 mg		1.5 mg		0 mg	0.5 mg		1.5 mg	
	PFU/ml (x 10^3)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^3)	PFU/ml	%	PFU/ml	%
0	91.70 ±5.80**					103.00 ±11.08				
(15")							1970.00 ±750			
5		17.00 ±10.03	0.019 ±0.011	<0.17 ±0	<0.0002		163.50	0.16 ±0.01	0.17 ±0	0.00016
10		<0.17 ±0	<0.0002	<0.17 ±0	<0.0002		<0.17 ±0	<0.00016	<0.17 ±0	<0.00016
15	89.70 ±7.10	<0.17 ±0	<0.0002			101.30 ±23.30	<0.17 ±0	<0.00016		
30										
60	82.70 ±9.2					83.00 ±11.64				
120										

* % of surviving virus.

** ± one standard deviation.

TABLE 7

EFFECT OF Cl ON COXSACKIEVIRUS TYPE A9 AT 22°C

(pH 7.8)

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg/l	0.5 mg/l		1.5 mg/l		0 mg/l	0.5 mg/l		1.5 mg/l	
	PFU/ml (x 10^2)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^2)	PFU/ml	%	PFU/ml	%
0	89.30 ±12.18**					80.70 ±40.80				
(15")							8730 ±1764		4.75 ±4.66	0.0059
5		6.83 ±3.46	0.008	<0.17 ±0	<0.0002		1966 ±532	2.437	<0.17 ±0	<0.0002
15		<0.17 ±0	<0.0002	<0.17 ±0	<0.0002		0.17 ±0.60	<0.0002±		
30	50.00 ±8.86	<0.17 ±0	<0.0002			69.00 ±24.00	<0.17 ±0	<0.0002		
120	15.00 ±3.94					48.00 ±11.52				

* % of surviving virus.

** ± one standard deviation.

TABLE 8

FREE RESIDUAL CHLORINE* (MG/L) THROUGHOUT THE INACTIVATION EXPERIMENTS FOR COXSACKIEVIRUS A9

Contact Time (min)	Demand-Free Water				Potomac Water			
	2°C		22°C		2°C		22°C	
	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg
0	0.50	1.50	0.55	1.52	0.32+	1.30+	0.50	1.50
5	0.37+	1.48	0.50	1.47	0.15+	1.40+	0.25+	1.42+
15	0.58	1.49	0.45+	1.45+	0.52	1.48	0.53	1.55
30	0.55	1.48	0.40+	1.55	0.53	1.45	0.52	1.46
60	0.55	1.47	0.50	1.52	0.52	1.46	0.51	1.44
120	0.55	1.48	0.55	1.55	0.53	1.46	0.51	1.46

* Free residual chlorine determined by an amperometric titrator (Fisher & Porter, Warminster, Pennsylvania).

\+ Indicates point at which additional chlorine was added to bring the free residual back to desired level.

TABLE 9

EFFECT OF Cl ON COXSACKIEVIRUS B1 AT 2°C

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg	0.5 mg		1.5 mg		0 mg	0.5 mg		1.5 mg	
	PFU/ml (x 10^3)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^3)	PFU/ml	%	PFU/ml	%
0	10.13 ±0.9**					8.47 ±0.39				
(15")										
5		348.35 ±27.82	3.44 ±0.28	4.66 ±3.10	0.046 ±0.003		1060.00 ±93.17	12.52 ±1.10	40±10	0.48 ±0.12
10		<0.17±0	<0.002±0	<0.17±0	<0.002±0		<0.17±0	<0.002±0	<0.17±0	<0.002±0
15	7.67 ±1.96	<0.17±0	<0.002±0			12.80 ±3.18	<0.17±0	<0.002±0	<0.17±0	<0.002±0
30										
60	7.47 ±1.55					11.00 ±2.59				

* % of surviving virus.

** ± one standard deviation.

TABLE 10

EFFECT OF Cl ON COXSACKIEVIRUS B-1 AT 22°C

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg	0.5 mg		1.5 mg		0 mg	0.5 mg		1.5 mg	
	PFU/ml (x 10^3)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^3)	PFU/ml	%	PFU/ml	%
0	31.50 ±5.09**					21.17 ±4.45				
(15")							5567.00 ±362.00	26.77 ±1.17	1193.40 ±253.00	5.63 ±1.19
5		790.00 ±89.78	2.51 ±0.29	<0.17 ±0	<0.0005		630.00 ±180.00	3.26 ±0.57	<0.17 ±0	<0.0008
15		<0.17 ±0	<0.0005				<0.17 ±0	<0.0008		
30	31.17 ±3.17					21.17 ±3.49				
60										
120	25.84 ±3.44					22.67 ±2.07				

* % of surviving virus

** ± one standard deviation.

TABLE 11

FREE RESIDUAL CHLORINE* (MG/L) THROUGHOUT THE INACTIVATION EXPERIMENTS FOR COXSACKIEVIRUS B1

Contact Time (min)	Demand-Free Water				Potomac Water			
	2°C		22°C		2°C		22°C	
	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg
0	0.51	1.52	0.55	1.55	0.12+	1.10	0.06+	1.50
5	0.06+	1.45+	0.35+	1.35+	0.38+	1.35	0.25+	1.42+
15	0.63	1.50	0.53	1.48	0.52	1.50	0.59	1.42+
30	0.60	1.50	0.52	1.41+	0.35+	1.50	0.50+	1.52
60	0.55+	1.48	0.32+	1.20+	0.53	1.50	0.30+	1.35+
120	0.12	1.46	0.66	1.48	0.50	1.49	0.52	1.52

* Free residual chlorine determined by an amperometric titrator (Fisher & Porter, Warminster, Pennsylvania).

\+ Indicates point at which additional chlorine was added to bring the free residual back to desired level.

TABLE 12

EFFECT OF Cl ON ECHOVIRUS TYPE 7 AT 2°C

(pH 7.8)

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg	0.5 mg		1.5 mg		0 mg	0.5 mg		1.5 mg	
	PFU/ml (x 10^3)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^3)	PFU/ml	%	PFU/ml	%
0	9.20 ±3.14**					7.87 ±2.38				
(15")							4668.00 ±1632.00	59.31 ±20.74	<0.17 ±0	<0.002
5		<0.17 ±0	<0.002	<0.17 ±0	<0.002		10.66 ±6.30	0.14 ±0.03	<0.17 ±0	<0.002
15		<0.17 ±0	<0.002				<0.17 ±0	<0.002		
30	9.47 ±3.09					7.73 ±1.49				
60										
120	7.47 ±2.00					4.67 ±3.20				

* % of surviving virus.

** ± one standard deviation.

TABLE 13

EFFECT OF Cl ON ECHOVIRUS TYPE 7 AT 22°C

(pH 7.8)

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg	0.5 mg		1.5 mg		0 mg	0.5 mg		1.5 mg	
	PFU/ml (x 10^3)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^3)	PFU/ml	%	PFU/ml	%
0	3.80 ±0.42					2.48 ±0.24				
(15")									<0.17 ±0	<0.0069
5		<0.17 ±0	<0.0045	<0.17 ±0	<0.0045		<0.17 ±0	<0.0069	<0.17 ±0	<0.0069
15		<0.17 ±0	<0.0045	<0.17 ±0	<0.0045		<0.17 ±0	<0.0069	<0.17 ±0	<0.0069
30	3.24 ±0.51					2.33 ±0.19				
60										
120	3.47 ±0.57					2.00 ±0.50				

* % of surviving virus.

** ± one standard deviation.

TABLE 14

FREE RESIDUAL CHLORINE* (MG/L) THROUGHOUT THE INACTIVATION EXPERIMENTS FOR ECHOVIRUS 7

Contact Time (min)	Demand-Free Water				Potomac Water			
	2°C		22°C		2°C		22°C	
	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg	0.5 mg	1.5 mg
0	0.5	1.50	0.5	1.5	0.025+	1.55	0.5	1.55
5	0.3	1.30+	0.3	1.35	0.21+	1.50	0.48	1.50
15	0.36+	1.45+	0.25	1.25	0.35+	1.48	0.45	1.42
30	0.46+	1.50	0.22	1.22	0.45+	1.46	0.40+	1.40+
60	0.50	1.50	0.22	1.22	0.45+	1.50	0.42+	1.55
120	0.50	1.50	0.12	1.11	0.45	1.37	0.45	1.38

* Free residual chlorine determined by an amperometric titrator (Fisher & Porter, Warminster, Pennsylvania).

\+ Indicates point at which additional chlorine was added to bring the free residual back to desired level.

TABLE 15

EFFECT OF Cl ON ADENOVIRUS TYPE 3 IN DEMAND-FREE AND POTOMAC WATER AT 2°C
(pH 7.8)

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg/l	0.5 mg/l		1.5 mg/l		0 mg/l	0.5 mg/l		1.5 mg/l	
	TCD_{50}/ml*	TCD_{50}/ml	%**	TCD_{50}/ml	%	TCD_{50}/ml	TCD_{50}/ml	%	TCD_{50}/ml	%
0	4.50 ±1.17					3.92 ±1.22				
5	4.18 ±1.59	<0.82±0	<0.002	<0.82±0	<0.002	3.91 ±1.33	<0.82±0	<0.008	2.13 ±1.27	1.62
15	4.10 ±1.44	<0.82±0	<0.002	<0.82±0	<0.002	3.96 ±1.33	<0.82±0	<0.008	<0.82±0	<0.008
30	3.85 ±1.42	<0.82±0	<0.002			4.92 ±1.26	<0.82±0	<0.008	<0.82±0	<0.008
60	4.12 ±1.43					4.06 ±1.39				
120	4.29 ±1.09					3.89 ±1.39				

* TCD_{50}/ml in log 10.

** % of surviving virus.

TABLE 16

EFFECT OF Cl ON ADENOVIRUS TYPE 3 IN DEMAND-FREE AND POTOMAC WATER AT 22°C
(pH 7.8)

Contract Time (min)	Demand-Free Water					Potomac Water				
	0 mg	0.5 mg		1.5 mg		0 mg	0.5 mg		1.5 mg	
	TCD_{50}/ml* (x 10^3)	TCD_{50}	%**	TCD_{50}	%	TCD_{50}/ml (x 10^3)	TCD_{50}	%	TCD_{50}	%
0	4.29±1.26					5.05±1.47				
5	4.63±1.33	<0.82	<0.0034	<0.82	<0.0034	4.97±1.46	<0.82	<0.0006	<0.82	<0.0006
15	4.78±1.25	<0.82	<0.0034	<0.82	<0.0034	4.71±1.47	<0.82	<0.0006	<0.82	<0.0006
30	4.82±1.32	<0.82	<0.0034	<0.82	<0.0034	4.72±1.19	<0.82	<0.0006	<0.82	<0.0006
60	5.33±1.29					5.26±1.11				
120	4.44±1.51					4.55±1.29				

* TCD_{50}/ml in log 10.

** % of surviving virus.

TABLE 17

FREE RESIDUAL CHLORINE* (MG/L) THROUGHOUT THE INACTIVATION EXPERIMENTS WITH ADENOVIRUS TYPE 3

(pH 7.8)

Contact Time (min)	Free Residual Chlorine (mg/l)			
	Demand-Free Water		Potomac Water	
	2°C	22°C	2°C	22°C
0	0.50	0.85	0.46	0.32+
5	0.15+	0.65	0.22+	0.61
15	0.35+	0.52	0.52	0.49+
30	0.50	0.52	0.52	0.58
60	0.50	0.52	0.55	0.47+
120	0.50	0.27	0.52	0.55

*The values were determined by using an amperometric titrator (Fisher & Porter, Warminster, Pennsylvania.

+Indicates points at which additional chlorine was added to bring the free residual back to 0.5 mg/l.

TABLE 18

EFFECT OF Cl ON REOVIRUS TYPE 3 IN DEMAND-FREE AND POTOMAC WATERS AT 22°C

(pH 7.8)

Contact Time (min)	Demand-Free Water			Potomac Water		
	0 mg/l	0.5 mg/l		0 mg/l	0.5 mg/l	
	PFU/ml (x 10^2)	PFU/ml	%*	PFU/ml (x 10^2)	PFU/ml	%*
0	49.00 ±4.45**			47.00 ±2.94		
5		<0.33±0	<0.0006		<0.33±0	<0.0006
15	52.00 ±4.7	<0.33±0	<0.0006	44.00 ±4.50	<0.33±0	<0.0006

* % of surviving virus.

** ± one standard deviation.

TABLE 19

EFFECT OF Cl ON REOVIRUS TYPE 3 AT 2°C
(pH 7.8)

Contact Time (min)	Demand-Free Water					Potomac Water				
	0 mg/l	0.5 mg/l		1.5 mg/l		0 mg/l	0.5 mg/l		1.5 mg/l	
	PFU/ml (x 10^3)	PFU/ml	%*	PFU/ml	%	PFU/ml (x 10^3)	PFU/ml	%	PFU/ml	%
0	40.00 ±2.14					35.00 ±5.28				
5		0.33 ±0.41	0.0008	<0.33±0	<0.0008		<0.33±0	<0.001	<0.33±0	<0.001
15	45.00 ±4.93	2.00 ±0.89	0.005	<0.33±0	<0.0008	35.00 ±6.70	<0.33±0	<0.001	<0.33±0	<0.001
30		<0.33	<0.0008							

* % of surviving virus.

TABLE 20

FREE RESIDUAL CHLORINE* (MG/L) THROUGHOUT THE INACTIVATION EXPERIMENTS WITH REOVIRUS TYPE 3

(pH 7.8)

Contact Time (min)	Free Residual Chlorine (mg/l)			
	Demand-Free Water		Potomac Water	
	2°C	22°C	2°C	22°C
0	0.52	0.50	0.32+	0.40+
5	0.25+	0.18+	0.50+	0.53
15	0.46+	0.59	0.45+	0.45+
30	0.51	0.63	0.52	0.50
60	0.52	0.63	0.52	0.52
120	0.51	0.40	0.52	0.52

*The values were determined by using an amperometric titrator (Fisher & Porter, Warminster, Pennyslvania).

+Indicates points at which additional chlorine was added to bring the free residual back to 0.5 mg/l.

TABLE 21

EFFECT OF TEMPERATURE ON CHLORINATION EFFECT

Virus	Water	% of surviving virus after 5 min contact					
		0.5 mg/l			1.5 mg/l		
		2°C	22°C	Dif	2°C	22°C	Dif
Polio 1	DFW*	0.130	<0.005	>0.125	0.039	<0.005	>0.034
	Potomac**	1.118	0.060	1.058	0.541	0.040	0.501
Cox A9	DFW	0.019	0.008	0.011	0.0002	<0.002	-
	Potomac	0.161	2.437	-2.276	<0.0002	<0.0002	-
B1	DFW	3.439	2.508	0.931	0.046	<0.0005	>0.0455
	Potomac	12.515	3.259	9.256	0.480	<0.008	>0.472
Echo 7	DFW	<0.002	<0.005	-	<0.002	<0.005	-
	Potomac	0.135	<0.007	>0.128	<0.007	<0.002	-
Adeno 3	DFW	<0.002	<0.003	-	<0.002	<0.003	-
	Potomac	<0.008	<0.001	-	1.620	<0.0006	>1.6194
Reo 3	DFW	0.008	<0.005	>0.002	-	-	-
	Potomac	<0.001	<0.001	-	<0.001	-	-

* DFW = demand-free water.

** Potomac = partially treated Potomac estuarine water.

TABLE 22

INFLUENCE OF WATER USED ON CHLORINATION STUDY

Virus	Chlorine mg/l	% of surviving virus after 5 min contact					
		2°C			22°C		
		DFW*	Potomac**	Dif	DFW	Potomac	Dif
Polio 1	0.5	0.130	1.118	0.988	<0.005	0.060	>0.055
	1.5	0.039	0.541	0.502	<0.005	0.040	>0.035
Cox A9	0.5	0.019	0.161	0.142	0.008	2.437	2.429
	1.5	0.0002	<0.002	-	<0.0002	<0.0002	-
B1	0.5	3.439	12.515	9.076	2.508	3.259	0.851
	1.5	0.046	0.480	0.434	<0.0005	<0.008	-
Echo 7	0.5	<0.002	0.135	>0.132	<0.005	<0.007	-
	1.5	<0.002	<0.007	-	<0.005	<0.002	-
Adeno 3	0.5	<0.002	<0.008	-	<0.003	<0.001	-
	1.5	<0.002	1.620	>1.618	<0.003	<0.0006	-
Reo 3	0.5	0.008	<0.001	->0.007	<0.006	<0.001	-
	1.5	<0.001	<0.001	-	-	-	-

* DFW = demand free water.

** Potomac = partially treated Potomac estuarine water.

TABLE 23

EFFECT OF CHLORINE DOSE ON VIRAL INACTIVATION

Virus	Water	% of surviving virus after 5 min contact					
		2°C			22°C		
		0.5 mg	1.5 mg	Dif	0.5 mg	1.5 mg	Dif
Polio 1	DFW*	0.130	0.039	0.091	<0.005	<0.005	-
	Potomac**	1.118	0.541	0.567	0.060	0.040	0.020
Cox A9	DFW	0.019	0.0002	0.0188	0.008	<0.0002	0.0078
	Potomac	0.161	<0.0002	0.1608	2.437	<0.0002	2.4368
B1	DFW	3.439	0.046	3.395	2.508	<0.0005	>2.5075
	Potomac	12.515	0.480	12.035	3.259	<0.008	>3.251
Echo 7	DFW	<0.002	<0.002	-	<0.005	<0.005	-
	Potomac	0.135	<0.007	>0.128	<0.007	<0.002	-
Adeno 3	DFW	<0.002	<0.002	-	<0.003	<0.003	-
	Potomac	<0.008	1.620	->1.612	<0.001	<0.0006	-
Reo 3	DFW	0.008	<0.001	>0.007	<0.006	-	-
	Potomac	<0.001	<0.001	-	<0.001	-	-

* DFW = demand-free water

** Potomac = partially treated Potomac estuarine water.

Table 6—Time Required for 99.9 Per cent (or Greater) Inactivation by Free Residual Chlorine

Temperature	Virus Strain	Concentration of Free Chlorine ppm	Time (Minutes) pH. 6	7	8	9	10
25°–28° C	Polio 1 (Mahoney)	0.01–0.10		16			
		0.11–0.20			5		
		0.21–0.30	2	3	4	8	30
	Polio 1 (487)	0.21–0.30		4			
	Polio 1 (MK 500)	0.21–0.30	4	6	12	16	>30
	Polio 2	0.11–0.20		2			
	Polio 3	0.11–0.20		2	8	16	
	Coxsackie B 1	0.21–0.30		8	4	8	
		0.31–0.40		2			
	Coxsackie B 5	0.21–0.30	2	1	2	8	16
1°–5° C	Polio 1 (Mahoney)	0.11–0.20		8			
		0.21–0.30	4	8			16
	Polio 1 (MK 500)	0.21–0.30		30	120		
	Polio 2	0.01–0.10		60			
		0.11–0.20		30			
		0.21–0.30		16			
	Polio 3	0.11–0.20		30			
	Coxsackie B 5	0.21–0.30		16	30		

Taken from Kelly, S. and Sanderson, W. W., "The effect of Chlorine in water on enteric viruses," Am. Jour. of Public Health, 48 p. 1323 (1958).

TABLE 2

Time required to inactivate 99.6 per cent of purified Coxsackie virus in water by free chlorine

pH	Temp.	Range free chlorine (*p.p.m.*)	Estimated time in minutes to reduce inoculum to 2 LD_{50} (99.6 per cent inactivation)	95 per cent confidence limits (*minutes*)
6.9–7.1	3– 6 C	0.58–0.62	9.7	9.1–10.3
		0.90–1.2	5.6	4.8– 6.3
		1.9 –2.2	4.1	3.6– 4.5
		2.8 –3.3	3.5	2.9– 4.0
		3.8 –4.2	2.3	2.1– 2.6
8.8–9.0	3– 6 C	1.9 –2.0	21.9	19.6–41.8
		2.9 –3.0	13.6	11.6–20.4
		3.7 –4.3	8.8	7.0–10.1
		5.6 –6.0	7.9	6.8–10.6
		7.4 –8.3	4.6	3.9– 5.6
6.9–7.1	27–29 C	0.16–0.18	3.8	3.5– 4.1
		0.25–0.35	3.7	3.2– 4.3
		0.44–0.58	3.0	2.5– 3.4
		0.86–1.2	1.7	1.3– 2.1
8.8–9.0	27–29 C	0.10–0.14	9.6	8.5–10.9
		0.16–0.18	9.7	9.3–10.1
		0.27–0.32	6.9	6.4– 7.5
		0.92–1.0	3.2	2.7– 3.6

Taken from Clarke, N. A., and Kabler, P. W., "The inactivation of purified Coxsackievirus in water by chlorine," Amer. Jour. of Hygiene, 59, p. 119 (1954).

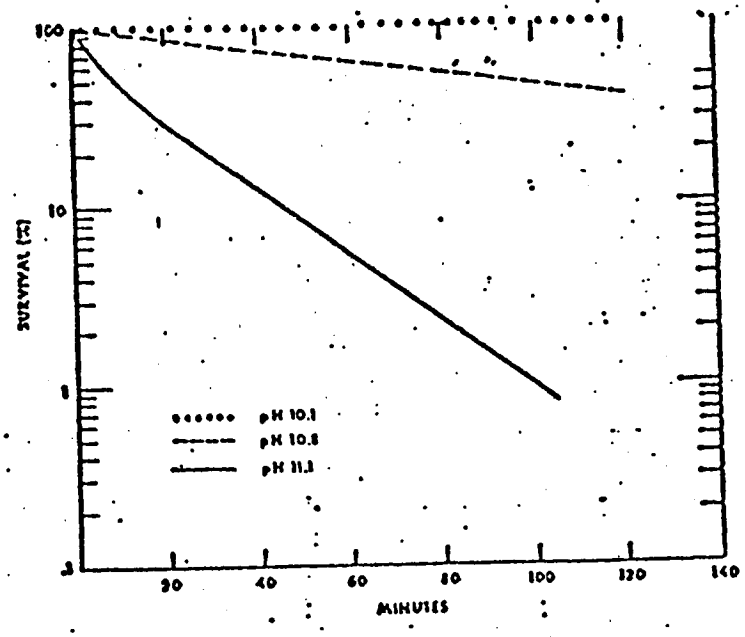

Fig. 1. Effect of high pH on poliovirus 1 in flocced (500 mg/l $Ca(OH)_2$), sand-filtered secondary effluents at 25 C. From: Berg, G., Dean, R. B., and Dahling, D. R. (1968). J. Am. Water Works Assoc. 60:193.

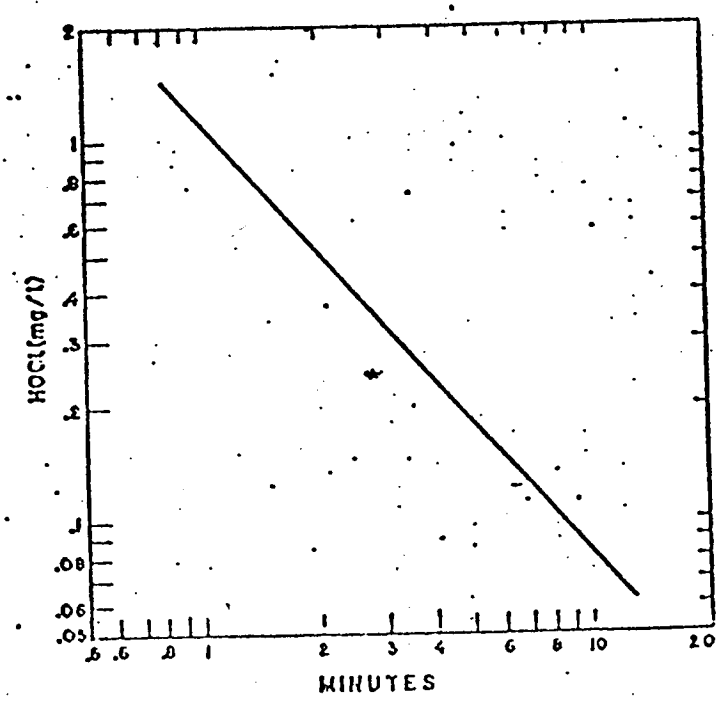

Fig. 2. Time-concentration relationship for the inactivation of 99% poliovirus 1 at 0 C. From: Weidenkopf, S. J. (1958). Virology 5:56, abstracted and revised.

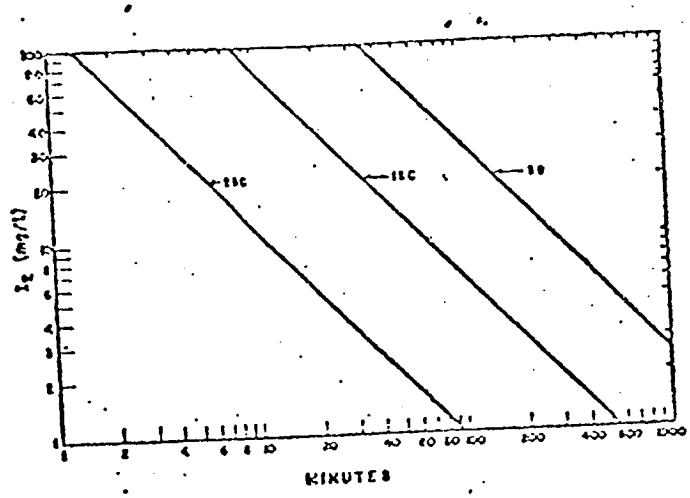

Fig. 7. Time–concentration relationship for 99% inactivation of coxsackievirus A9 by I_2. From: Berg, G., Chang, S. L., and Harris, E. K. (1964). Virology 22:469.

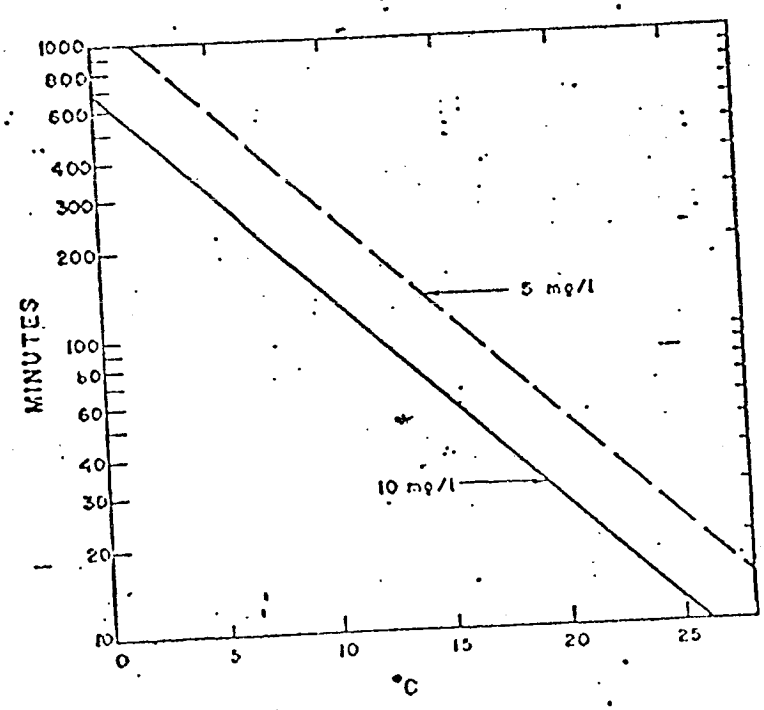

Fig. 8. Temperature–time relationship for 99% inactivation of coxsackievirus A9 by I_2. (Constructed from data in Fig. 7)

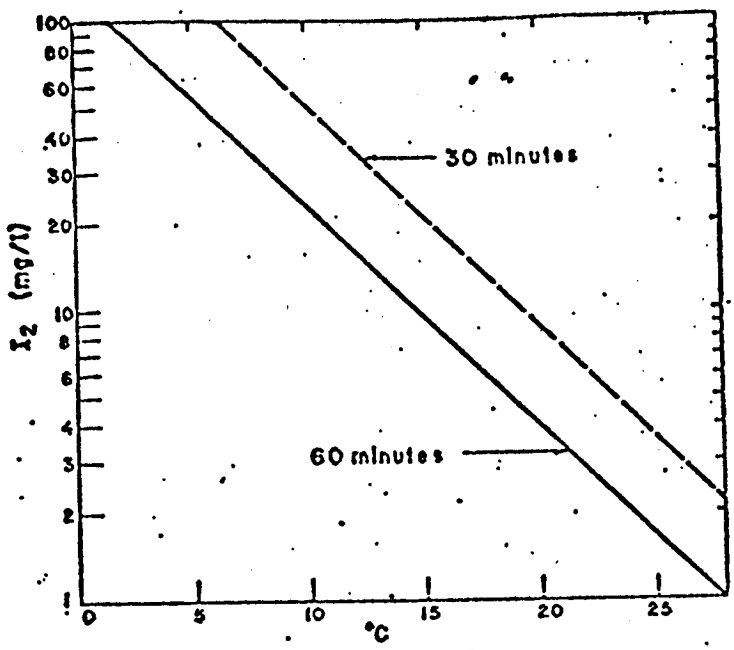

Fig. 9. Temperature–concentration relationship for inactivation of 99% coxsackievirus A9 by I_2. (Constructed from data in Fig. 7)

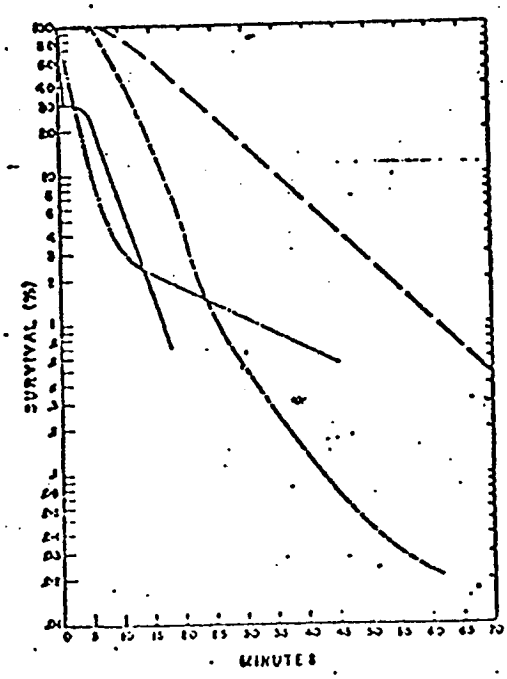

Fig. 10. Aberrations in survival curves probably resulting from aggregation of viruses into clusters of different sizes. From Berg, G., Clark, R. M., Berman, D., and Chang, S. L. (1967). In Transmission of Viruses by the Water Route. Edited by G. Berg. John Wiley and Sons, New York, N. Y., p. 235, revised.

EXHIBIT 2

4705 QUEENSBURY ROAD, RIVERDALE, MARYLAND 20840
TELEPHONE (301) 779-8500

BEN DYER ASSOCIATES, INC.
ENGINEERS | SURVEYORS | PLANNERS

J-70071
July 2, 1973

Mr. Richard Schifter
Fried, Frank, Harris, Shriver & Kampelman
Suite 1000, Watergate 600
600 New Hampshire Avenue, N. W.
Washington, D. C. 20037

Dear Mr. Schifter:

You have asked us to discuss certain aspectes of the Greenbriar Treatment Plant and we are hereby responding to your request.

1. The problem at the Landover Mall Treatment Plant arose when the people responsible for janitorial services at the Mall cleaned out the entire air conditioning system with a fluid designed to kill algae and let it all drain into the sewer system. The large quantity of this fluid killed the bacteria in the activated sludge and temporarily impaired the efficiency of the treatment system. It is incorrect to say that as a result untreated sewage was discharged. The tertiary portion of the treatment plant, which involves physical and chemical rather than biological processes continued operating unimpaired. However, there was a drop in the quality of the effluent from the secondary phase, which was immediately observed.

   Even after the damage was done to the secondary phase, the final effluent was still of high quality and did not require diversion into the public sewer system. That diversion took place only after the Washington Suburban Sanitary Commission decided that rather than waiting for the secondary phase to recover entirely, which would have taken approximately 14 days, it would shut the plant down temporarily and restore the condition of the secondary phase. At no time was untreated sewage discharged into the receiving stream.

   This incident was most unusual and the result was caused by the massive amount of the cleaning fluid from the Mall. Even if similar substances were used in individual apartments at Greenbriar and permitted to drain into the sewer system the dilution factor would be such as to render them harmless. Actually, in private homes, people do not use the kind of cleaning fluid which is used in commercial enterprises. In recent years, cleaning material sold for home use have been biodegradable and do not cause the kind of upset which occurred at Landover.

2. The overflow mechanism proposed for the on-site pumping station is a standard mechanism used generally at pumping stations installed in the system of the

Washington Suburban Sanitary Commission. It prevents a back-up into the homes of users of the system in a situation in which there has been a total break-down of all emergency stand-by facilities. The pump was designed to be large enough to accomodate overloads from heavy rainfalls. A wet well is provided for and so is an auxiliary pump.

3. The pumping station will be underground. No noise will be noticeable.

4. It is not correct to say that there will be windblown odors from the settling tanks. As distinct from the larger plants in the Washington Suburban Sanitary System which use the anaerobic treatment processes, Greenbriar will use an aerobic process with an extended aeration system. The end products of this process are CO_2 and H_2O..

Very truly yours,

BEN DYER ASSOCIATES, INC.

David F. Murray, P. E.
Assistant Vice President

DFM:pb

EXHIBIT 22

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HAROLD P. GREEN
COUNSEL

July 19, 1973

Alvin Bass, Esquire
Office of General Counsel
National Aeronautics and
Space Administration
Room F7069
400 Maryland Avenue, S.W.
Washington, D. C.

Dear Mr. Bass:

We regret the need to respond further to the July 16, 1973 memorandum of the Prince George's County Environment Coalition. Unfortunately, however, that memorandum is so studded with errors of fact or misunderstanding that a further clarification is needed. PGEC's major factual errors or misunderstandings and our comments thereon will here be set forth in brief.

(1) PGEC Statement (p. 1): "[The Greenbriar Plant] would to our knowledge be the largest in Prince Georges County".

Response: On-site treatment plants such as Greenbriar, which would treat 325,000 gd, are generally referred to as small plants. The medium-sized plants which are part of the County's public sewer system include Parkway, with a capacity of 2.4 mgd (about to be increased to 7.5 mgd), Western Branch at 5 mgd, Piscataway at 15 mgd.

(2) PGEC Statement (p. 2): "...[N]either the Prince Georges County master plan nor the zoning classification show the sewage treatment plant thereon."

Response: Sewage treatment plants belong neither in master plans nor in zoning

classifications. They belong in the County's Ten-Year Water and Sewerage Plan. The Greenbriar Plant was, in fact, expressly authorized by the 1972 revision of the Ten-Year Plan.

(3) PGEC Statement (p. 2): "[T]he project seems to violate the R-30 zoning requirement that there be a 70 percent green area."

Response: Plans for the construction of the project are drawn so as not to violate the green area requirement.

(4) PGEC Statement (p. 2): "...[E]xceptions were granted by the Prince Georges County Council in 1971...without knowledge that a private sewage treatment plant was being planned for the project."

Response: The treatment plant was not relevant to the discussion under the bedroom ordinance. The fact is that the County Council in 1972 expressly authorized the Greenbriar Plant when it approved the revision of the Ten-Year Plan.

(5) PGEC Statement (p. 2): "...[T]he decision of County and local officials, particularly without knowledge that a private sewage treatment plant was planned, cannot be given any weight."

Response: As already stated, the Greenbriar plant was expressly authorized by the Ten-Year Plan.

(6) PGEC Statement (p. 2): "The Applicant's plan to go ahead with this project using a private sewage treatment plant is not consistent with the public policies embodied in the [sewer] moratorium."

Response: The moratorium was imposed by the State Department of Health and Mental Hygiene in 1970. The Greenbriar Plant was authorized by the same Department in 1973. These decisions are by no means in conflict. The sewer moratorium has only one purpose: to prevent further connections to the public sewer system in basins in which flows to sewage treatment plants exceed the capacity of these plants. It is because of the sewer moratorium that Greenbriar cannot now be connected to the Western Branch Treatment Plant and is building an on-site plant whose effluent will not flow to the Western Branch Plant.

(7) PGEC Statement (p. 3): "If half of the discharges along a stream are unrestricted in their discharges of nitrogen and the other half are allowed unrestricted discharges of phosphorus, eutrophication will soon follow."

Response: With that very point in mind, the State of Maryland uniformly restricts the discharge of phosphorus.

(8) PGEC Statement (p. 3): "...[T]he level of phosphorus removal is simply not sufficient. In May 1969, the Potomac River Enforcement Conference established effluent standards generally requiring 96 percent phosphorus removal, 85 percent nitrogen removal, and 96 percent BOD_5 removal."

Response: The State of Maryland established a phosphorus level of 0.5 - 1.5 mg/l. Dr. Cookson has indicated that the actual level of treatment efficiency will be about 0.5 - 0.8 mg/l, which compares to a natural level in the stream of 0.4 - 1.0 mg/l. The Plant will thus effect approximately 96-98% phosphorus removal. As it is, the Enforcement Conference standards do not apply.

(9) PGEC Statement (p. 4): "[Applicants] have never disclosed what the level of salt discharges will be from the sewage treatment plant."

Response: The discharges will contain approximately 2 ounces of chloride per 250 gallons. This amount, which is below the taste threshold, will have an insignificant effect on plant life.

(10) PGEC Statement (p. 4): "...Dr. Cookson's analysis...of virus removal...deals with a research estimate which apparently has not been field tested."

Response: Not so. Dr. Cookson's Report to the Montgomery County Council lists the field tests.

(11) PGEC Statement (p. 4): "The discussion of the floor drain...problem is also puzzling."

Response: We have just been made aware of the fact that under plumbing regulations applicable to Greenbriar, floor drains may no longer be connected to the sanitary sewer system.

(12) PGEC Statement (p. 5): "The Coalition is very concerned with the provision of an overflow mechanism which discharges without treatment of sewage which cannot be treated. There is no need for such a mechanism if adequate safeguards are provided by way of wet wells and auxilliary pumps and power."

Response: The Greenbriar Treatment Plant does have a wet well, auxiliary pump and auxiliary power.

(13) PGEC Statement (p. 13): "...[W]e understand that pursuant to Section 303(a) of the FWPCA, EPA has disapproved those portions of Maryland's water quality standards applicable to the Greenbriar project...."

Response: The Regional Office of EPA in Philadelphia has informed us that Maryland's water quality standards were approved by letter of July 2, 1973. (A copy of that letter as dictated to us over the telephone is attached hereto as Attachment 1.)

We have imposed upon you further because we consider it important that the true facts stand out clearly. We shall not burden the record any further with additional discussions of the applicable law other than to say that all the points raised in PGEC's memorandum of July 16, 1973 are anticipated and fully answered in our memorandum of July 10, 1973. There is no doubt that the action which PGEC asks NASA to take would be arbitrary and capricious and thus an abuse of discretion.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Attachment
cc: Mr. Samuel W. Keller
Edward Dunkelberger, Esquire
(with attachment)

HAND-DELIVERED

Honorable Marvin Mandel
Governor of Maryland
Annapolis, Maryland 21404

Dear Governor Mandel:

On April 17, 1973 Mr. Herbert M. Sachs, Director of the Water Resources Administration transmitted Maryland Revised Water Quality Standards applicable under the Federal Water Pollution Control Act Amendments of 1972 for our review. These consist of the water quality uses and criteria contained in Maryland Water Pollution Control Regulations 08.05.04.01; 04.02; .04.03; .04.09; and .04.11 which became effective May 1, 1973.

I am pleased to inform you that I am approving the Maryland Revised Water Quality Standards in their entirety.

The Water Resources Administration should be commended for undertaking a program of water quality criteria revision prior to the adoption of the Federal Water Pollution Control Act Amendments of 1972. It has responded in an excellent manner to the requirements of the amendments within the tight time constraint established.

I think we both realize that while the requirement for the revision of water quality standards has been met, further advancement in water pollution control technology will make more information available to better determine allowable tolerances in water quality criteria. We will cooperate with the State of Maryland in making any necessary adjustments to the standards that have been heretofore approved.

I am looking forward to working with you in the future to enhance the quality of waters of your State.

With kindest regards,

Sincerely,

/s/ Daniel J. Snyder III

Regional Administrator

AN EVALUATION OF

GREENBRIAR SEWAGE TREATMENT PLANT

FOR

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Philadelphia, Pennsylvania

July 23, 1973

Dr. R. J. Schoenberger, P. E.

20529

E-457

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SUMMARY

Greenbriar Associates proposes to construct 1193 dwelling units on a parcel of land adjacent to GSFC near Greenbelt, Maryland. The parcel of land is generally triangular and is shown in Figure 1. The site is approximately 81 acres and is totally landlocked by GSFC, Route 193 and the Baltimore-Washington Parkway.

There are no new sewer connections allowed by the responsible planning agency (Prince Georges County) nor the responsible operating agency (Washington Suburban Sanitary Commission, WSSC) because the existing sewage treatment plant, the Western Branch Sewage Treatment Plant, is overloaded and is under renovation. Until such time as the upgrading is complete, a moratorium on new construction has been in effect.

To circumvent this moratorium, Greenbriar Associates proposed to construct a temporary plant on the 81 acre site. This plant would be used only until the Western Branch Sewage Treatment Plant is renovated. Estimated time for this to occur is two years.

Figure A-12 shows the area where the Greenbriar complex will be constructed. It can be seen that the trees have been stripped and grading has begun. The GSFC pond is located slightly to the left of center and the proposed site of the sewage treatment plant is at the cleared area in the extreme lower right corner of the aerial photograph. Figure A-11 is a closeup of the sewage treatment plant site.

Since the treatment plant is located in the extreme corner of the triangular parcel, they do not have direct access to a stream which can be used to discharge the effluent. Since Greenbriar must have a stream for the effluent, they can either discharge to a stream fork on Federal property owned by the National Park Service, or to the second stream fork of Beaver Dam Creek on Federal

property of the GSFC.

In either case, an easement or right-of-way is required from a Federal agency. While a right-of-way does not fall into a specific category requiring an impact statement (see page 46), the National Park Service has stated (item 16 of Covington and Burling letter, page 51) that an Environmental Impact Statement conforming to the Council on Environmental Quality Guidelines is required. GSFC/NASA made no similar requirement.

The Greenbriar development has been planned since 1971 and all necessary zoning variances and building permits have been obtained. Greenbriar first requested an easement from NASA in early 1973. This was after an application with plans was filed with WSSC, Prince Georges County and the Maryland Department of Health and Mental Hygiene in the first quarter of 1971, a full two years earlier. On April 17, 1973 Mr. Samuel W. Keller of GSFC addressed a letter to the legal counsel of Greenbriar requesting additional information. On May 4, 1973 Greenbriar legal counsel sent a letter to Mr. Keller addressing the question of the April 17th letter.

On May 17, 1973 Dr. Robert Schoenberger, P.E., of Saunders, Pearson, Appleton and Partners, met with a Branch Chief of the Facilities Engineer Division to discuss an evaluation of the proposed treatment plant with peripheral evaluation of the effect of Greenbriar on the environment. On June 5, 1973 in another meeting, the scope of work was detailed and a schedule discussed. Only one month was allowed for evaluation and report writing with the first draft due on July 9, 1973. In the interim several new documents were received which added to the length of the evaluation. This report is the result of the survey evaluation performed by SPAP for GSFC. Based upon the actual study and investigation by SPAP, the following list of questions

and comments should be answered. These questions represent points of insufficient data which do not allow for a complete evaluation of the Greenbriar housing and Greenbriar sewage treatment plant.

1. The method of ultimate slude disposal must be answered. The point of disposal, including a thorough evaluation of any landfill used to dispose of the sludge should be evaluated.
2. Details of the tertiary flocculation and settling chamber should be given. The amount of sludge and the method of disposal should also be stated.
3. All construction should be done at one time. The phased development does not allow for flexibility in operating the plant. The size of each phase should be carefully enumerated and the time schedule for construction must be meshed with other construction and occupancy. The entire basis of design is vague and, in parts, contradictive.

4. The concept of chlorination/dechlorination should be investigated further. Advantages of the proposed system and its effect on the stream biota should be studied in greater detail.

5. Greenbriar does not meet the minimum standards for discharge to Beaver Dam Creek. The plant lacks nitrogen removal and sufficient phosphorus removal.

6. The dissolved oxygen requirement can't be achieved by the proposed plant. An additional aeration step is needed after dechlorination.

7. Odors and excess SO_2 could effect the GSFC facility, especially at the following buildings: 11, 21, 26 and 18, 19, 20.

8. The development will increase the runoff, soil erosion and increase the size of the stream channel. A better erosion control plan should be provided.

9. A complete environmental impact statement should be submitted to NASA/GSFC before final approval of the right-of-way.

10. Beaver Dam, the receiving stream, has a low flow and the amount of dilution will be small to none. The flow is probably intermittent and ceases during the summer months.

11. No construction should be allowed on the old sand and gravel pit unless precautions are taken to assure structural stability.

12. The cost of the plant will be a minimum of $400,000 and is planned to be used only two years. Future use and possible incorporation as a permanent facility should be explored with Prince Georges County.

13. Alternatives to discharge to Beaver Dam Creek should be explored. In particular spray irrigation should be investigated.

14. The effluent of the Greenbriar plant should be continuously monitored by placing a dissolved oxygen meter on the effluent. When the DO drops below 4.0 mg/l an alarm should ring at GSFC and all discharge cease.

15. A schedule of how the plant will be phased out by WSSC should be submitted. Are all units to be abandoned at one time? How will the plant be dismantled?

16. Methods of odor control from the sludge holding tanks and settling tanks should be explored in detail.

17. Estimate the increased noise levels from the operation of the Greenbriar Treatment plant. Describe in detail construction methods which will be employed to prevent sound levels above existing background from being measured at GSFC.

RECOMMENDATIONS

The requirement of the National Park Service that a complete Environmental Impact Statement developed according to the Council on Environmental Quality Guidelines be submitted before any further review places GSFC/NASA in a position of vulnerability unless the same requirement is imposed. Thus, GSFC/NASA should require the submission of such a statement before any decision is made.

In addition to this requirement, the remaining sixteen items should be answered to the fullest extent possible. After all questions are answered and the EIS is complete, a comparison with the findings of the report should be made and ultimately the right-of-way approved or disapproved at that time.

There are many questions which should be answered before approval to discharge is granted. The design and operation of the Greenbriar plant leaves several areas of incomplete data, especially in phosphorus removal.

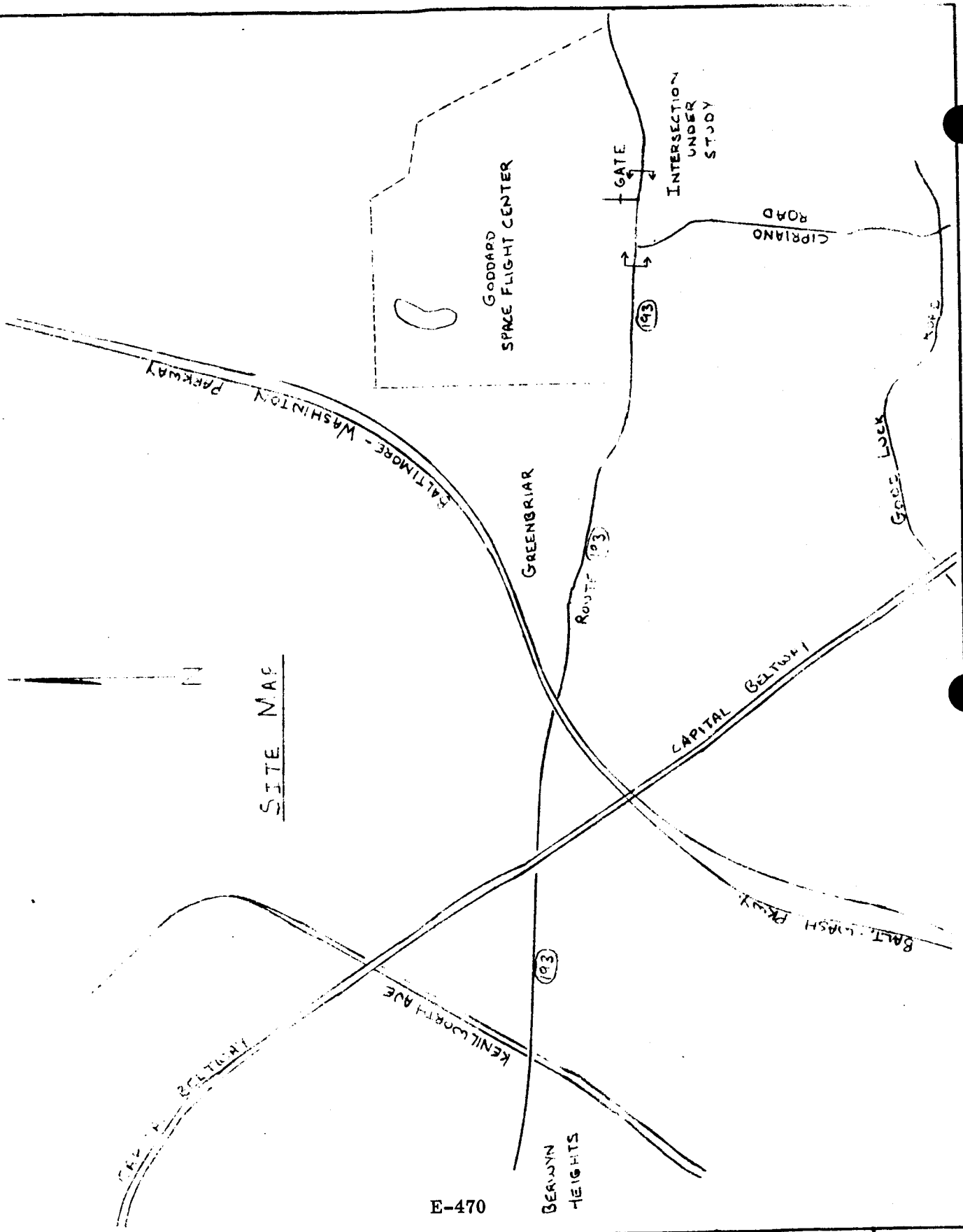
BACKGROUND

Greenbriar Associates, a Maryland partnership, has filed application for building permits with Prince Georges County, Maryland. Building permits Nos. 1558-71-CG through 1578-71-CG are the numbers which accompany the permits. These permits are for the construction of 1,193 dwelling units broken into 3 parcels and designated 1, 2A and 2B. The location of these plans and layout are shown in drawings prepared by Bucher, Myers and Assoc. Architect, 1511 K Street, Northwest, Washington, D. C. These drawings bear job number 70071 and consist of 3 sheets.

Site Location:

The site is situated in Prince Georges County, Maryland and is on the north side of Maryland Route 193 and lies in a triangle bounded by Maryland Route 193 and the Baltimore-Washington Parkway while the other side will parallel Maryland Route 193, and the third side of the triangle will parallel the National Aeronautics and Space Administration's Goddard Space Flight Center property. The corner of the site as shown in Figure 1 formed by the triangle of GSFC and Baltimore-Washington Parkway property will be the site of a package sewage treatment plant to serve the development. Figures A-11 and A-12 show the location and site topography of Greenbriar.

The sewage treatment plant has been approved by the Washington Suburban Sanitary Commission and the the minutes of the February 26, 1973 meeting show that approval. The report, 73S05712A, is as follows and is taken from the minutes of the meeting of the WSSC. "On motion of Commissioner Norris, seconded by Commissioner Peterson, and with the affirmative vote of Commissioner Norris, Peterson, Brooks, Elliot and MacGrory, Commissioner Hubbel being temporarily absent, the Commision authorized the acceptance of the operation and maintenance for the proposed waste water treatment facility for the Greenbriar Sewage Treatment



ENVIRO/EARTH Ltd.
Environmental and Earth Science Services

Proj. No: 101873	Sheet: FIGURE 1
Date: 7/5/73	
Scale: 1" = 2000'	

Plant and further stipulate that the Commission will, in fact, maintain and operate this temporary sewage treatment plant at the developer's expense, and directed the staff to advise the interested parties accordingly." It can be seen from this motion that the Commission accepted the operation and maintenance of the waste water treatment facility, but no mention is made of approving its construction. The temporary sewage treatment plant is not a part of the Prince Geroges County 10 year sewer and water plan which must be prepared by the County Government and accepted by the State Department of Health and Mental Hygiene. One of the requirements imposed by Prince Georges County 10 year Sewer and Water Plan is that a temporary treatment plant must be dismantled and the project connected to permanent sewer facilities as soon as they are available. According to the schedule of Prince Georges County, permanent sewers should be available in the fall of 1974 and the expanded Western Branch Plant will also be available. This is subject to completion of that facility to accept the additional sewage loads which will be generated.

Other permits and approvals required by Greenbriar are from the Maryland Department of Health and Mental Hygiene and from the Maryland Water Resources Authority. The former agency is responsible for the health and safety aspects of the plant while the latter is responsible for the stream flow and water availability in the receiving streams.

As part of the approval for the temporary treatment plant, Greenbriar had to have the plan modified and then approval was granted. The final approval by Prince Georges County came in a Bill No. CB - 191 - 1972 adopted on November 29, 1972. The following section discusses the salient aspects of that plan modification.

PRINCE GEORGES COUNTY 10 YEAR WATER AND SEWAGE PLAN

The 10 year Water and Sewer plan of Prince Georges County does allow for temporary treatment plants to be constructed with some limitations. There is a time limitation whereby the facility must be replaced and connected into permanent sewers. This is five years. In the case of the Greenbriar Sewage Treatment plant, the plant shall be removed from service upon the completion of all additions and alteration to the West Branch Treatment Facility of WSSC. The projected date is 1974. Also, the following operating and construction procedures are to be followed. These are excerpted from the Prince Georges County Council meeting November 29, 1972. These conditions were placed as part of the modified water and sewer plan.

a. That the advanced treatment processes outlined by Dr. Cookson in his written testimony be installed.

b. That there by no bypass mechanism which would allow untreated sewage to bypass the plant in times of overload.

c. That excess chlorine be removed from the effluent after adequate contact time has elapsed to effect the disinfection proposed by Dr. Cookson.

d. That virus sampling of the effluent be done on a routine basis, at least monthly, by a competent laboratory, at the owner's expense.

e. That multi-media filters, similar to those used at the Lake Tahoe plant be required.

f. That there be a meter to constantly record the flow of sewage into the plant.

g. There shall be a pre-set limit to the number of connections allowed and strict adherence to this limit.

h. There shall be a large surge tank to equalize the flow into the plant so that flow through the treatment process during peak hours of use approximates the flow during low usage periods.

i. A recycling capability shall be built into the plant, so that if any unit of the plant falls below the expected standard of treatment, the sewage can be sent back through the plant to insure proper treatment.

j. A double, completely independent, power supply shall be required.

k. The plant shall be run by WSSC using a trained and experienced maintenance crew.

l. The method of sludge disposal shall be clearly outlined.

m. The plant shall be closed as soon as public sewage facilities become available.

n. That the effluent be enclosed in a pipe to a point in the stream where there is a continuous year-round flow of water, as recommended by the City of Greenbelt.

o. That an emergency connection with the WSSC community sewer system will be built so that if a problem developed at the plant, sewage could be placed in the WSSC system instead of directly into the receiving stream.

p. And finally, that sewage effluent will be treated with break-point chlorination to inactivate viruses with subsequent dechlorination to meet State water quality standards.

HIGH SCHOOL

The triangular piece of property planned for development by Greenbriar Associates also includes one portion which will be developed by the Prince Georges County School District. This school is presently under construction and the method of sewage treatment was checked to see if it too would drain into the temporary Greenbriar plant.

The school will be called the Franklin D. Roosevelt Senior High School and is being constructed by the Prince Georges County Board of Education. Sewage from the high school will be piped in a sanitary sewer to the West Branch Sewage Treatment Plant. The trunk sewer is the same sewer serving the Goddard Space Village housing development.

The Prince Georges County School District has let a contract by the Sanitary Commission to continue the sewer under Greenbelt Road to tie into an existing sewer in the Goddard Space Village.* At the present time the sanitary sewer dead ends in a manhole that is completely filled with water. This manhole is approximately 500 feet west of the school site immediately adjacent to Maryland Route 193. The Goddard Space Village trunk sewer drains to the West Branch Sewage Treatment Plant. The question of why a new connection was permitted for the school while the area is in a construction moratorium must be answered. Presently the plant is being upgraded and it may be finished before the school connects.

The fact that the manhole is filled with water before any sewers are connected is indicative of the high water table in the area. The high water table makes construction and drainage a major problem in the site development. Further discussion is found on page 43 concerning the soils. Construction of sewers results in some infiltration. Typical infiltration rates for an eight inch sewer are 500-1000 gallons per day per mile of sewer.

* Goddard Space Village is a private housing develpment and is totally separate from the GSFC of NASA. The development is sited close to GSFC.

BASIS OF PLANT DESIGN

A treatment plant is designed on two bases: hydraulic capacity and weight of organic loading (pounds of BOD* per unit time). The Greenbriar plant. is designed for a hydraulic load of 80 gallons per person per day. Because of the luxury type complex to be built, this figure is low. A more conventional figure of 100 gals. or more per person per day should have been considered. However, the smaller figure will mean that the plant will have to expand sooner than expected because of the increased flow. Pennsylvania requirements are for a minimum of 100 gals. per person per day.

Irrespective of flow rate, the weight of BOD per person is a vital consideration in the plant. The total BOD was stated to be 625 pounds per day and was arrived at using a flow of 0.200 mgd and 0.25 pounds of BOD per day. On the basis of ultimate population, the BOD is greater than the 625 pounds used in the design. Hence, based on the hydraulic and organic load criteria, the plant appears to be undersized for the final phase of construction.

The plans for initial construction, second phase construction and plant phaseout are confusing. If the plant is to be abandoned by 1975 as stated, will the second phase be needed? Should the entire plant be built at once? Because of the small size of the plant, all construction should be done at one time. Phase I will accommodate 2,500 persons and Phase II the difference between 4,056 and 2,500. There appears to be no phasing in the occupancy. There should be no phasing in the construction of the plant.

The narrative of Ben Dyer Associates to the Maryland Department of Health and Mental Hygiene lists the phase construction, while the second

* BOD is the organic load called Biochemical Oxygen Demand. A more complete description is given on page 17.

sheet of the construction drawings lists a less complete and different basis of design. Questions concerning these discrepencies should be answered and are raised in item 3, page 6 of the Summary.

SEWAGE TREATMENT

Treatment of sewage is performed in facilities which use a combination of biological, chemical, and physical processes to reduce the pollution potential. Pollution results from several types of wastes in the sewage: organic materials which are dissolved and can only be removed by conversion to energy or biomass, and organic and/or other materials which are not dissolved and must be removed by physical or chemical means.

An analogy of the first type is to dissolve sugar in water. The sugar water will look clear, but contamination could occur. If microorganisms are dropped in the sugar water, they could ferment and cause the formation of alcohol or other metabolic products. If the dissolved organic material is not removed from solution in the the plant, then the microorganism in the stream could cause the material to degrade. The source of oxygen for decomposition would be the oxygen in the water. This could reduce the stream oxygen level to a point of not allowing fish or other aquatic life to live. The result is a dissolved oxygen sag which causes the stream to become odorous and to change the character of the type of fish and other life which can live in the water.

This type of waste is difficult to characterize because sewage contains many types of dissolved wastes. To quantify the wastes on a broad basis, the standard Biochemical Oxygen Demand (BOD) test was established. This test was developed by placing seed microorganisms in a waste solution and to perform a materials balance on the oxygen. The loss in oxygen was equated to the amount of oxygen which is needed to oxidize the waste. This then becomes the definition of BOD. The standard BOD test is run for five days, but to completely oxidize the waste might require 20 or more days.

Examples of treatment of the second type of waste is to separate oil or grease from water. The waste in this case is oil and it too is a liquid, and to remove it requires flotation of other physical unit processes. Sometimes it is necessary to add a chemical transfer agent so that the grease can be removed from solution. Another example is the solids (silt, clay, garbage or foodwastes from grinders, other solids in sewage) which are present in the waste water. These can be removed by settling if they are large enough. However, some of the solids are too small and they cannot be removed unless chemicals (coagulants and flocculants) are added to increase the agglomeration capacity to the point where they will settle by gravitational forces. This is the purpose of clarifiers or settling tanks in sewage treatment. The first example is a liquid-liquid system and the second is a liquid-solid system.

A sewage treatment plant is not a totally efficient process, and only a portion of the BOD will be removed. A secondary plant will remove 85 to 90 percent of the BOD. If more treatment is needed, some additional process is usually added on the end (in series) of the secondary plant. This addition can be called either advanced waste treatment or tertiary treatment. Generally, the removal of nutrients (nitrogen, phosphorus and potassium as in fertilizers) is one requirement for advanced waste treatment. In the case of Greenbriar, additional BOD removal and some phosphorus removal was planned. No nitrogen or potassium removal was contemplated. The requirement for discharge to the stream is 85 percent nitrogen removal. No nitrogen removal is either proposed or anticipated at Greenbriar. The USDA treatment plant, when upgraded, will have provisions for nitrogen removal.

With this background in mind, the proposed treatment plant will be discussed in the following section.

PROPOSED TREATMENT PLANT

The process flow diagram of the Greenbriar Sewage Treatment Plant is shown in Figure 2. The plant is essentially a secondary plant followed by a phosphorus removal system. The raw waste (influent) enters the plant and is pumped to the comminutor (small grinder) and then to the surge tank where the peak flows are leveled out. The waste goes to an aeration tank where the microorganisms remove some of the colloidal solids and the dissolved organic matter by converting these to a biomass called activated sludge. The biomass is settled and returned to the aeration tank and the waste water is stored in an effluent holding tank. The waste is said to have received secondary treatment at this point. At Greenbriar the waste is then mixed with polymer, soda ash and alum to coagulate the remaining solids and allow them to settle in the tube settler. The only removal of phosphorus in this process is that present in the residual biomass. Dissolved phosphorus will not be affected, except superficially. The tertiary plant will also remove the solids which remain after secondary treatment, and little effect will be made on the remaining dissolved material. The substitution of lime for alum would probably improve the efficiency of the plant. Final solids which have not settled are removed in the mixed media filter before the chlorination and dechlorination stage. The latter two operations will be discussed in more detail in the CHLORINATION section.

The proposed plant is a conventional installation which has been constructed many times over in the United States. The secondary plant will be purchased in modular form from the Davco Corporation and will be considered a conventional extended aeration plant. However, the basis of design is somewhat nebulous and confusing. This question was raised before and clarification is requested (see item three of Summary, page 6).

ADVANCED WASTE TREATMENT

In order to achieve the degree of treatment demanded by the stream standards of the Maryland Department of Health and Mental Hygiene, the design engineer has proposed to append a Neptune phosphorus removal system onto the secondary plant. This plant (erroneously termed a tertiary unit) will remove the phosphorus by flocculation and will filter out the final suspended solids.

Plans submitted by the design engineer list some of the mechanical details of the unit on plan Nos. 12 and 13. However, the details of the tube settlers, flocculator and mixer are not shown. Only simple volumes of the tertiary unit are shown on page 2, and details are totally lacking on where the sludge from the tube settler will be discharged. No details are present on its quantity, characteristics, or its ultimate disposal method. It would seem logical that the sludge be discharged to the backwash holding tank, but this is not substantiated by the drawings.

To reduce the amount of sludge which is produce, the designer proposed to adjust the pH with soda ash (sodium carbonate) rather than lime. Soda ash will be much less efficient in removing the phosphorus than the lime would be, but the sludge volume is reduced.

Complete details of this unit are lacking and should be completed and evaluated before approving the final plan. The construction drawings are incomplete and must be completed.

The tertiary treatment proposed and discussed by Dr. Cookson* used lime for a variety of purposes including raising the pH to a high level to improve

* Dr. John Cookson, Jr. Associate Professor of Civil Engineering, University of Maryland, testified on behalf of Greenbriar before Prince Georges County.

virus deactivation. In general, the lime in the tertiary plant would be better than the proposed unit and the original proposal of Dr. Cookson should be reconsidered.

SLUDGE DISPOSAL

Disposal of sludge from the sewage treatment plant is based upon the use of Washington Suburban Sanitary Commission facilities at other installations. The plans are to have the sludges from the various processes stored in a holding tank and then pumped to a truck for removal from the site. Frequency of removal and the point of ultimate disposal are not known at this time.

The sludge holding facility for backwash water is of the wet well/dry well type and is equipped with two pumps. One pump is to remove the sludge and it has a six inch suction line connected to a 300 gpm pump. The discharge line is to the water in the effluent holding tank. In general, the physical facility conforms to standard design criteria for sludge holding facilities. However, the proximity of the inlet to the decant suction line is low in the tank and could create eddying effects in the vicinity of the settled sludge blanket. The efficiency of settling in this facility is questionable using the proposed design.

The piping and decant diagrams indicate that the decant supernatant will be discharged to the effluent holding tank. This is not an acceptable method of disposal, and the effluent should be returned to the aeration tanks. To allow the waste water to be discharged without further treatment will result in a much higher BOD in the effluent and also some of the sludge will not have been subjected to the phosphorus removal portion of the plant.

The quantity of waste sludge which will be generated is not stated nor is the method of design, e.g., the removal frequency, solids volume, etc. The amount of sludge generated in the plant is expected to be quite high since the precipitation of phosphorus results in large quantities of sludge. Since this sludge is to be disposed of offsite, the ultimate disposal should be explicitly spelled out. This material, if placed in a landfill, will leach into the ground water and ultimately return to the river system. If the ultimate disposal is not properly performed, the secondary effects on the enviroment will be the same as the primary effects of phosphorus. The question of ultimate disposal should be answered before any decision is made.

Sludge from the activated sludge process will be stored in separate sections of the aeration unit. This sludge will also be removed by truck by WSSC for processing and disposal at some other location. The number of trucks, amount of waste sludge and method of disposal must be answered.

Items one and two (page 6) of the summary ask for clarification of these points. In particular sludge disposal must be discussed. At no point in the drawings or reports is the question of sludge disposal fully addressed. Clarification of this question is also asked by Prince Georges County in item 1, page 14. Sludge volumes from the aeration part of the plant and from phosphate removal are variable based on influent concentration and volume. However, sludge volumes of 25,000 gallons per day total can be expected.

After the sewage has been treated in the facility, it is necessary to discharge the treated effluent. Control of the effluent and approval to discharge is the function of the State of Maryland Department of Health and Mental Hygiene.

STREAM STANDARDS

Discharge of effluent into waters of the State of Maryland must be approved by the Department of Health and Mental Hygiene. The requirements of Maryland for discharge are as follows:

1. Maryland Water Quality Standards, Regulation 4.8 (requires that northeast branch and tributaries of the Anacostia River be protected, in the area under review for the following uses:
    a. Water contact recreation
    b. Propagation of fish, other aquatic life and wildlife
    c. Agricultural water supply
    d. Industrial water supply
2. Specific water quality standards have been assigned to northeast branch and tributaries so that the intended water uses will be protected. These specific quality standards are:
    a. Coliform organism density shall not exceed 240 MPN per hundred milliliters.
    b. The minimum monthly average for dissolved oxygen must NOT be less than 5.0 mg/l and not less than 4.0 milgrams per liter for any specific sample.
    c. The pH must be between 6.0 and 8.5.
    d. The temperature must not exceed 93°F beyond such distances from any point of discharge as specified by the department as necessary for the protection of water use.

Information as provided by Ben Dyer Assoc., Inc. to the State of Maryland claims the following quality:

a. The BOD5 of the treated effluent will be 6 to 8 miligrams per liter.
b. The pH of the treated water will be 7.0 (item 2-C).

c. The temperature of the effluent will be about 60°F (item 2-d).

d. Disinfection will be provided by chlorination (item 2-a).

On the basis of this information the Department of Water Resources approves the discharge. The operation of the sewage treatment plant must assure compliance with Maryland's water quality standards. The following recommended standards are thereby made by Maryland.

a. The treated waste water flow shall not exceed 325,000 gallons per day as a daily average.

b. The treated waste water shall not exceed 6 to 8 miligrams per liter of 5 day BOD.

c. Sufficient space should be provided and reserved at the treatment plant's site so as to allow for the addition of advanced waste treatment facilities in the event that such additional treatment is deemed necessary.

d. The applicant shall make sufficient provision for immediate connection of this interim facility to the Washington Suburban Sanitary Commission's Sanitary Sewer System as soon as trunk lines are available. The Department of Water Resources shall be notified immediately as soon as connections have been completed and after the effluent from this temporary treatment plant has been directed to the WSSC Sanitary System.

e. The applicant must consult with the Surface Water Management Division of the Department of Water Resources with regard to alteration of the water course below the proposed point of discharge.

In conversation with Mr. Quance* he stated that the Water Resources

* Earl S. Quance, Division of Water AND Sewage, Maryland Department of Health and Mental Hygiene, Baltimore, Maryland. Mr. Quance reviewed the Greenbriar documents and recommended approval of the plant and discharge.

people did check the stream at the proposed point of discharge and they do consider the stream a continuous flowing stream. This is the stream which begins on NASA property at the lake. These were personnel from the Department of Health and Mental Hygiene and not from the Maryland Water Resources Agency. The flow in the stream which begins on Greenbriar property is not a continuously flowing stream and has been reported as intermittantly flowing in the report dated December 1971 and prepared by Paul W. Slunt, Jr. The probable effects of a waste water discharge on a tributary of the Anacostia-Potomac River System", prepared for the Maryland State Department of Health and Mental Hygiene Environmental Health Service. More detailed information on the quantity of stream flow is given in the following section entitled STREAM FLOW (page 26).

Stream standards must also conform to the discharge requirements to the Potomac Estuary. Recommendations for discharge to the estuary include some rather high levels of nutrient removal for both phosphorus and nitrogen. Their proposed plant will not meet the phosphorus removal (1.5 mg/l is only 15 mg/l. In all probability the PO_y level will be 20-30 mg/l. Nitrogen removal is not contemplated although 85 percent removal is recommended.

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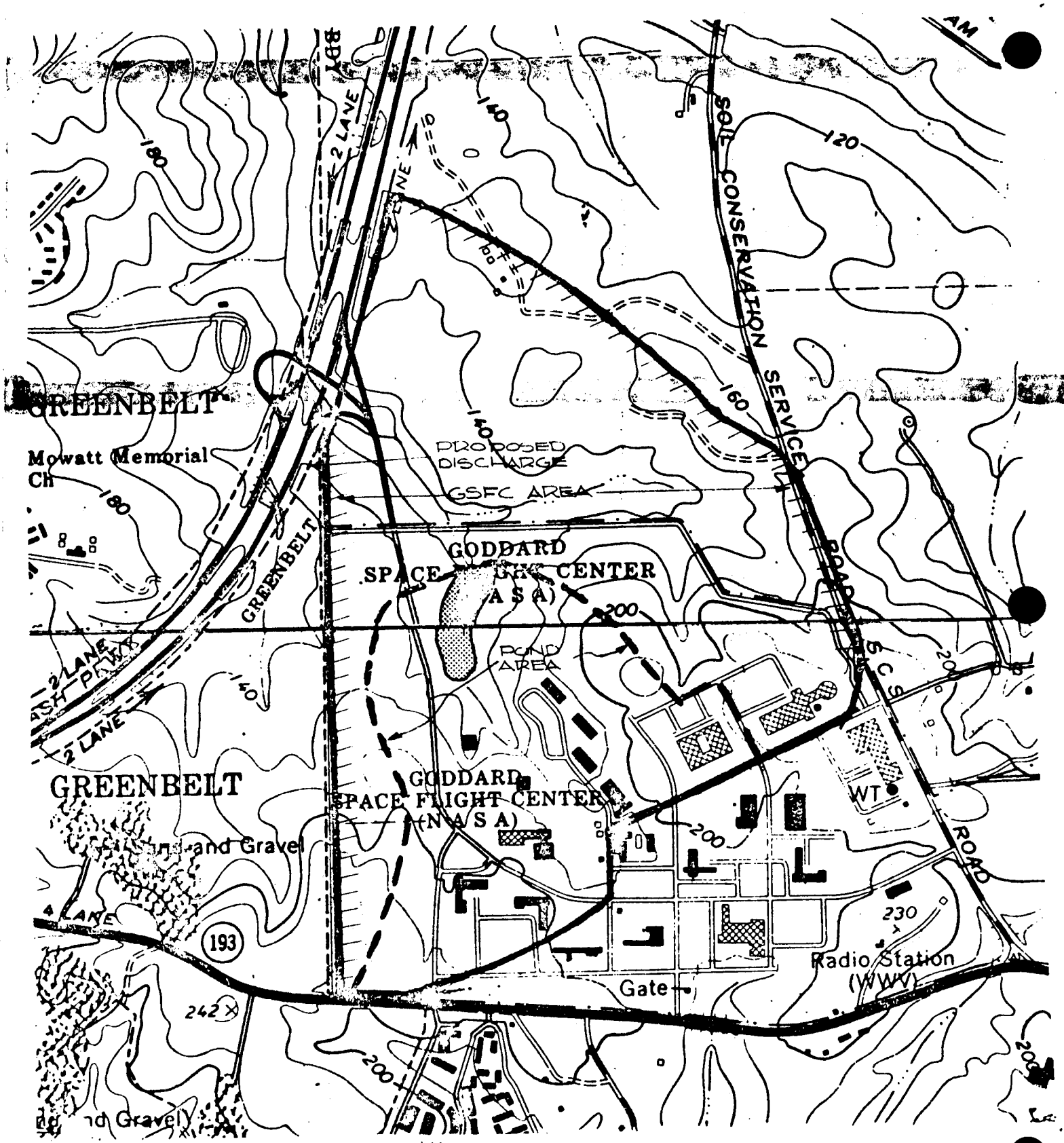
STREAM FLOW

Beaver Dam Creek has two forks at its headwaters which join together at the overpass connecting the Goddard Space Flight Center and the Baltimore-Washington Parkway. The drainage area at this point is 716 acres (1.1 mi^2). The left fork begins on the property of Greenbriar and flows parallel to the Baltimore-Washington Parkway (Figure 3). The stream flows beneath the Parkway in a culvert and then continues to flow parallel to the Parkway until its confluence with the other fork. On June 19, 1973 the flow in this stream was not measurable. This was after a period of rainfall where 1.5 inches fell on the 2 preceding days. In the report by Paul W. Slunt for the Maryland Department of Health and Mental Hygiene, he measured no flow and concluded that that fork was intermittant.

Drainage area above the Goddard Space Flight Center pond is about 0.22 mi^2 and based upon normal precipitation and evaporation rates (Table 1), the flow from the pond is intermittant. This means that the stream at the point of discharge relies upon a drainage area of 0.6 square miles. Of this area the employees entrance gate, access road and NASA/GSFC cloverleaf are all paved and do not allow infiltration of rainwater. In addition, some of the embankments are quite steep and the drainage ditches are concrete lined. Most of the soils are well drained and of moderate to fast permeability.

Based upon the flow measurements of June 19, 1973 (0.4 CFS total or 0.24 CFS below pond) and May 17, 1973 when the flow was about the same, it is doubtful that the stream at the point of confluence can meet Maryland's definition of a perenniel stream (measurable flow at time of 7 day low flow for 10 year return period). Before modification of the headwaters, the stream might have met this definition, but not in its present state of description. Drainage areas are shown in Figure 3.



NASA PROJECT - GREENBRIAR.
DRAINAGE AREAS OF BEAVER DAM CRK.
PROJECT NO. 101873
FIGURE: 3

ENVIRO/EARTH Ltd.
Environmental and Earth Science Services

TABLE 1

CLIMATOLOGICAL DATA

ENVIRONMENTAL DATA SERVICE

Month	Mean Temp. °F	Average Monthly Precipitation (inches)	Prevailing Winds
Jan.	37	3.03	NW
Feb.	38	2.47	S
March	45	3.21	NW
April	56	3.15	S
May	66	4.14	S
June	74	3.21	S
July	78	4.15	S
Aug.	77	4.90	S
Sept.	70	3.83	S
Oct.	59	3.07	SSW
Nov.	48	2.84	S
Dec.	38	2.78	NW

TABLE 2

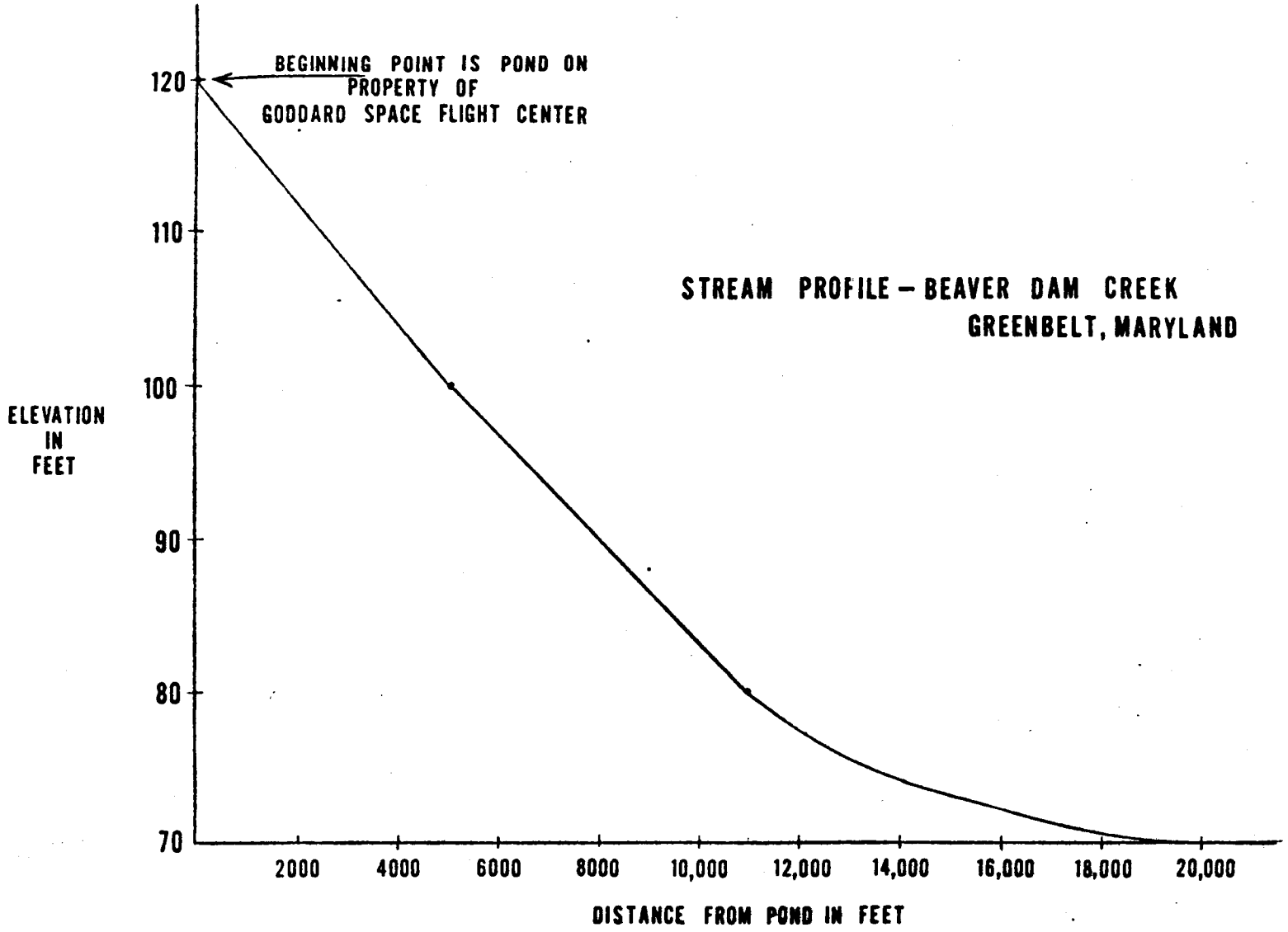
SUMMARY OF CHEMICAL ANALYSES

	GSFC POND	BEAVER DAM CREEK AT PARKWAY	LEACHATE FROM GREENBRIAR
pH	7.3	6.9	6.9
Total Alkalinity	46	24	64
Total Solids	158	84	6672
Dissolved Solids	122	69	422
Chloride	16.5	14.8	27.8
Sulfate	27	22	17.5
Hardness	56	42	52
Kjeldahl Nitrogen	1.6	1.6	2.75
COD	34.5	65	272

Figure 4 is the stream gradient for the unnamed tributary and for Beaver Dam Creek. It has an average gradient of 1.5 feet per 1000 feet which is quite low. The amount of aeration in the stream will be dependent upon simple surface diffusion since only minor riffles were seen. This is added evidence that the BOD removal must be high to assure a minimal DO sag.

Table 2 shows the results of chemical analyses on the NASA pond and Beaver Dam Creek. The COD (Chemical Oxygen Demand) is very high and could account for the lack of organisms. Also, the high COD will tend to cause the DO sag, thereby aggrevating the lack of oxygen problem. A COD of up to 10 mg/l is considered to be normal for a surface stream. The high COD and nitrogen values are evidence of gross contamination in Beaver Dam Creek.

With Beaver Dam Creek in as degraded a condition as is shown, it is imperative that the Greenbriar plant be completely reliable and that no untreated or improperly treated wastes be discharged. The duplication and return systems are excellent ways of assuring this effluent quality. However, except in the case of obvious breakdown, the quality of the effluent will not be known for hours or days after the discharge occurs. Instrumentation to monitor the effluent should be installed including a complete recording system of dissolved oxygen in the effluent with an alarm to GSFC.



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Environmental and Earth Science Services

Proj. No: 101873
Date: 6-29-73
Scale: AS SHOWN
Sheet: FIGURE 4

STREAM DISCHARGES

The proposed Greenbriar sewage treatment plant will discharge its effluent into Beaver Dam Creek. Beaver Dam Creek is in the Anacostia River/Potomac River Basin. Both forks of Beaver Dam Creek have their headwaters in close proximity to the proposed point of discharge. There are no discharges above the Greenbriar plant from point sources. There is general discharge from agricultural and urban non-point sources.

Below the proposed point of discharge the stream parallels the Baltimore-Washington Parkway and then flows through the ground of the USDA's Agricultural Research Center. The only point source at the Center is the 0.400 mgd sewage treatment plant serving the Center. In a letter dated June 7, 1973, Mr. Robert L. Almond, Sr., Head, Division of Operations, advised Mr. Robert J. McCaffery, Chief, Technical Services, GSFC/NASA that the plant will be upgraded. The plant will have the following effluent characteristics:

1. BOD_5 - 96 percent removal
2. Total Nitrogen - 85 percent removal
3. Total Phosphorus - 96 percent removal

The above criteria are the requirements of Section 4.8 of the Maryland Stream Standards. They are the same criteria which any discharge into Beaver Dam Creek should meet. However, the Greenbriar plant fails to meet either the phosphorus or the nitrogen criteria.

Discharge of the effluent from Greenbriar must contain 5.0 mg/l of dissolved oxygen before discharge. The purpose of the minimum DO requirement is that fish and aquatic life are protected downstream. The proposed plant will not be capable of achieving this requirement without some additional aeration after the dechlorination step. This is discussed further in the DECHLORINATION Section.

DECHLORINATION

Effluent from the multi-media filter will be subjected to breakpoint chlorination to destroy any viruses in the effluent. Prior to discharge to Beaver Dam Creek the effluent will be sprayed with sulfur dioxide to remove the residual chlorine.

Virus deactivation is a trial and error science, especially where many different types are present. There is evidence to support the fact that numerous types are present in sewage effluent. The desirability and public health necessity of total virus deactivation is unsubstantiated. In fact, the low level residual (conservative) organic materials may not degrade in the stream if the effluent is superchlorinated. Acclimated micro-organisms will be destroyed as well as the bacteriophages which are needed to degrade most of the organisms.

Assuming that the superchlorination/dechlorination scheme is carried out, the effect on the stream could be quite detrimental. The residual combined chloride and SO_2 will cause a blockage in the stream channel, thereby preventing aquatic life migration. No fish will be able to migrate and propagate in the stream. Other life will also be adversely affected and the overall desirability of the scheme should be re-evaluated.

Both sulfur dioxide and chlorine are noxious, toxic gases which must be carefully handled. To use sulfur dioxide to remove the excess chlorine could create odor problems at the plant. The excess sulfur dioxide will be discharged to the atmosphere. Quantities of SO_2 needed will depend upon the chlorine excess, so that it could be smelled at the proposed visitor's building on the grounds of GSFC.

It can be seen from Table 1 that the dominant winds are from either the west or northwest for three months of the year. These are the months

when odor will be a potential problem at the visitor's building. The close proximity can be seen from Figure A-12, where the visitor's building will be located directly west of the plant along the employee's entrance road.

ALTERNATIVE OUTFALLS

All treated sewage must be discharged to a part of the environment where it can be absorbed. Hopefully, this is done where a minimum of environmental harm will result. In most cases, the least harmfull is not the method of choice, but rather discharge to surface streams is chosen becuase it is the easiest method. Greenbriar does have the following choices available for implementation or further investigation.

1. Discharge into the NASA fork of Beaver Dam Creek
2. Discharge into the Greenbriar (Baltimore-Washington Parkway) fork. This is the closest point of discharge.
3. Use of spray irrigation or subsurface disposal of the effluent. Spray irrigation is attractive when green space is close by, especially woodlands which can be used during the winter months.

Consideration has been given to items one and two above but no mention is made of three. This is one of the questions which should be explored in the Greenbriar Environmental Impact Statement.

To assess the state of the natural resources and to evaluate the construction drawings of Greenbriar, the development and natrual resources were studied. The following six sections on AQUATIC CHEMISTRY, AQUATIC BIOLOGY, WILDLIFE, VEGETATION, SOILS, and EROSION AND SURFACE RUNOFF are presented as a base line set of data.

AQUATIC CHEMISTRY

The chemical quality of Beaver Dam Creek was analyzed to check upon its absorptive capacity for sewage effluent. Table 2 lists the results of water

sample analyses taken from three locations. Sample 1 was taken from the pond on the property of GSFC because this will be the background water quality in Beaver Dam Creek. Sample 2 was taken from Beaver Dam Creek at a point immediately below the confluence of both forks. A sample was desired from the Greenbriar fork of Beaver Dam Creek, but on the day of sampling there was no flow in that stream. The third sample was taken from "springs" along Maryland Route 193 which flows from the banks. Numerous such "springs" or leachate were noted and the dark red or rust color is characteristic of leachate from swampy areas or from old "dumps".

It was suspected that the sand and gravel pit situated on the Greenbriar plot may have been filled with refuse in recent years. As part of the surface stripping of trees and soils, non-degradable refuse such as tires were seen.

Analysis of the sample indicates a character quite different from the other samples. In particular, the dissolved solids content is much higher. This high level is indicative of leaching of mineral matter from fill material. However, the age of the fill appears to be several years and any organic material present has become stabilized. Unearthing and redistributing the material could cause foundation problems and no construction should be allowed on the old sand and gravel fill area unless special structural precautions are taken.

The sample from GSFC pond and from Beaver Dam Creek indicate no gross contamination but do have high levels of organic nitrogen. In streams, where the trophic* level is either oligio or mesotrophic, the organic nitrogen would

* Trophic levels are indicative of the degree of aging which is measured by the amount of biological plant life, and in particular the amount of rooted plants. During the oligiotrophic age the amount of algae and other plant life is minimal and the nutrient levels are low.

be almost zero. Beaver Dam creek does have a high nutrient level and this is seen from both the chemical and biological analyses.

Discharge of the effluent from the Greenbriar plant will increase the flow and the peak flow is estimated at 0.8 CFS. Measured flow in June and May was only one-half that value. While the carbonaceous matter remaining in the effluent will be low (6-8 mg/1), coupled with the other nutrients present, the downstream effects could lead to greater plant growth and diurnal oxygen effect, which in turn could limit the type of aquatic life present to more hardy species. However, there is the possibility that the increased flow in the stream could reduce the aquatic problems by maintaining a positive flow and not allowing static conditions to exist in the stream.

Reduced stream flows and the presence of rooted plants are clearly shown in the pictures of the appendix. In particular refer to Figures A-3, A-5, and A-6.

AQUATIC BIOLOGY

The stream which is proposed as the receiving stream has two forks as shown in Figure 3 and discussed on page 26. At the present time the stream is highly enriched and the aquatic species present are limited.

A survey was made for approximately one-quarter mile below the point of confluence of the two branches. The stream is choked with vascular plants, mostly "cattails", "water chestnuts" and "skunk cabbage". In the section immediately adjacent to confluence, the bottom is heavily silted from soil runoff. The pools and riffles are about 100 yards apart, and the pools are long, wide and shallow, and hence are poorly defined.

In addition to being choked with rooted plants, few species were sighted. Macro invertebrates were scarce and only crayfish and non-segmented worms were spotted. Examination of bottom rocks showed a complete absence of insect larvae

or other aquatic life. Surface skimmers in the form of water spiders and beetles (Donocia or Dineutus) were seen. Some bottom plants of sphaerotules were seen. Some frogs and tadpoles were seen, and no fish were sighted. Both the pools and riffles had a lack of minnows and larger fish. Because of the lack of fish, no census was performed.

Results of the aquatic biology survey indicated that the stream is in poor condition and cannot support game fish and diverse aquatic life. In particular the high nutrient load and the quantity of rooted plants mean a large diurnal variation in the dissolved oxygen level. A survey should be performed on the stream to see if a sag occurs in the night hours.

WILDLIFE

Animals and wildlife found on the site and in the immediate proximity appear numerous both as to number and specie. While no extensive census was made observations were performed in the field. The bird population is the most extensive wildlife present and numerous specie were sited. As expected the most numerous species were of the sparrow group. Others sighted were swallows, wrens, woodpeckers and robins.

There was no evidence that any large animals inhabit the area. This is probably due to the infringement of housing and human habitation in the close proximity of the site. Evidence of squirrel, field mice, chipmunks, rabbits and groundhogs were seen, but normal game animals were scarce. With restricted hunting and access by NASA/GSFC and the USDA Research Center, the animal census should be greater. With the animal population already stressed, the Greenbriar development will accelerate the encrouchment on the animal habitats. The effects will be most evident on the small animals which presently inhabit the area.

In the stripping of the land for development (Figure A-12) it was evident that the wildlife ahd already been effected. No small animal habitats were seen and the insect and bird population was diminished from the contiguous areas.

VEGETATION

The vegetation present on the Greenbriar site and the adjacent NASA/GSFC and Baltimore-Washington Parkway right-of-way is highly variable and ranges from native vegetation to specialty plantings from prior development. Vegetation on the Greenbriar site has been disrupted and removed, exposing the soil surface. Because of this it was not possible to catalogue the vegetation before the stripping began. Hence, the inventory was made on the properties contiguous to Greenbriar, with the assumption made that the basic vegetation is similar.

Basic vegetation of the Greenbriar vicinity consists mostly of hardwoods and coniferous second growth trees. The forest will climax in a dominant hardwood stand at some future time. However, the diversity of species and the size of the trees indicates that the existing stand has been undisturbed for 25-40 years. Many of the hardwoods are greater than one foot in diameter, which can only be achieved in the growth occurrs over this period of time.

No effort was expended to preserve the vegetation and to incorporate it into the Greenbriar development. All trees except a small stand were removed and either buried or burned in a pit incenerator constructed on-site by the developer.

Table 3 is an inventory of vegetation made at the site. While this list may not be exhaustive, it does represent the basic vegetation.

TABLE 3

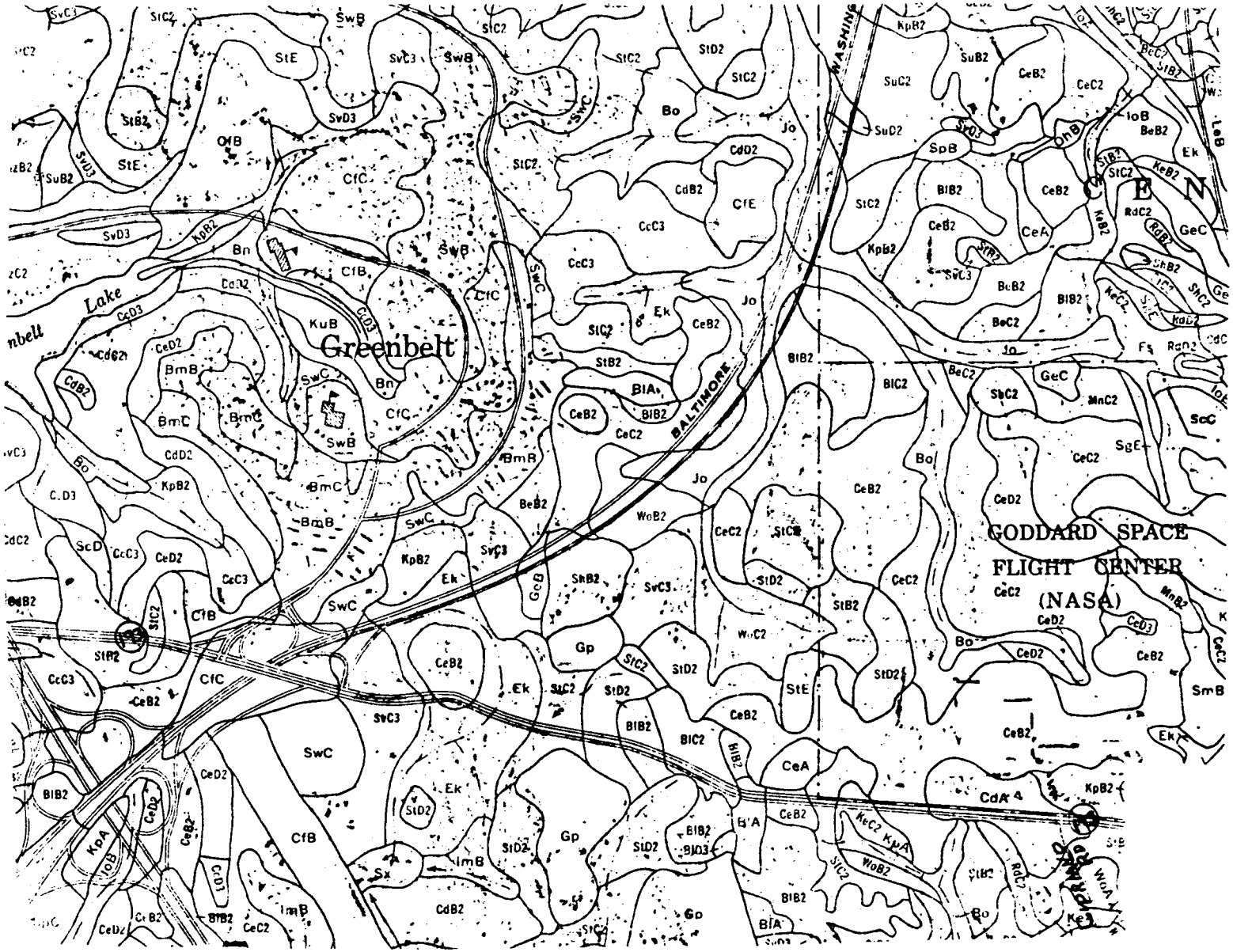
VEGETATION AT GREENBRIAR

1. Red Maple
2. Silver Maple
3. Red Oak
4. White Oak
5. Tulip Poplar
6. American Ash
7. Pine Oak
8. Willow
9. American Beech
10. Elderberry
11. Fox Grape
12. Rye Grass
13. Cat Tail
14. Elm
15. Sweet Gum
16. Aspen
17. Momosa
18. Southern Pine
19. Sumac
20. Scotch Pine
21. Poison Ivy
22. Magnolia
23. Numerarec Legumes, Grasses and Ground Cover
24. Wild Cherry

TABLE 4

ONSITE SOILS AT GREENBRIAR

	Type	Name	Slope %
1.	BiB2	Beltsville Silt Loam	2-5
2.	Jo	Johnston Silt Loam	Nil
3.	CeCz	Christiana Silt Loam	5-10
4.	StC2	Sunnyside Sandy Loam	5-10
5.	StD2	Sunnyside Sandy Loam	10-15
6.	WoC2	Woodstown Sandy Loam	5-15
7.	ShB2	Sassafras Sandy Loam	2-5
8.	CeB2	Christiana Silt Loam	2-5
9.	Ek	Elkton Silt Loam	Nil
10.	CeA	Christiana Silt Loam	0-2
11.	StE	Sunnyside Fine Sandy Loam	15-30
12.	SvC3	Sunnywide Sandy Clay Loam	5-10
13.	Gp	Gravel and Borrow Pit	
14.	GeB	Galestown-Evesboro Loam Sand	0-8



Soils at Greenbriar

ENVIRO/EARTH Ltd. Environmental and Earth Science Services	1873 / 3/73	5

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SOILS

All the soils on the development site and Goddard Space Flight Center are of the Christiana, Sunnyside, Beltsville association. Figure 5 shows the soils as mapped by the Soil Conservation Service of the United States Department of Agriculture. Soils found on site are given in Table 4.

Soils such as the Beltsville are very dense in the subsoil, hence vertical drainage is poor. This poor drainage could be seen on the construction site where numerous ponds of standing water can be seen. The water creates problems with drainage of the surface water and special precautions should be taken.

Other soils, such as the Sunnyside series, are very easily erodable. They should be kept covered with rooted cups to prevent washing of the soils.

Soils of the Christiana series are those which have the characteristic red color which is readily visable. This series has dense clay in the subsoil which also causes the surface water to pond. Permeability of the Christiana soils is less than 0.2 inches per hour. This makes any infiltration of surface water extremely slow.

In contrast to the slow permeability of the Christiana soils, the Galestown-Evesboro soils are coarse and well drained. The infiltration is greater than 6.3 inches per hour. However, it is easily erodable because the soil dries quickly. While the amount of the Galestown-Evesboro onsite is limited to several small patches, care must be taken to control the erosion and soil loss from the area. More complete ramifications are given in the section on EROSION.

The water table in the vicinity of Greenbriar is near the surface. Numerous springs and seepages can be seen on the sides of embankments. Special precautions should be taken to assure proper design of the plant as to protect the ground water from excessive infiltration of contaminating runoff.

EROSION AND SURFACE RUNOFF

Construction of Greenbriar is proceeding by stripping all trees and vegetation before grading and construction proceed. The total area which has been stripped is 81 acres and this will affect downstream channels due to enlargement from the increased runoff. The site before stripping had a well defined forest floor. Runoff from the site would be based upon a Rational Method Coefficient of 0.2-0.40. The new runoff coefficient will be between 0.8 and 0.9. This means that the stream channel will be further enlarged and the amount of sediment will increase.

The runoff from the site will be increased because the developer chose to pay a fee in lieu of open space dedication. Population densities of almost 15 persons per acre should require open space to reduce the adverse environmental effects.

The exposed soil will be eroded at a much faster rate. For one inch of runoff (recurrence interval of less than one year) the amount of soil removed will be about two tons. All this sediment could be deposited in Beaver Dam Creek or further downstream in the estuary. In addition, if the runoff occurs in one hour, the change will be enlarged by 35 cubic feet or else the stream will flow over its banks. Figure A7 shows some efforts to control the stream channel enlargement by lining with concrete. While the overbank frequency can be reduced with this technique, it increases the flow and velocity, thereby adding to the bottom scour.

One effort at controlling erosion by settling the runoff has been proposed. However, the one pond is insufficient to control the site and more should be provided.

PLANT COST AND CONCEPT OF TEMPORARY CONSTRUCTION

Construction of the treatment plant as proposed will be a costly item to build. Although the plant will be temporary, all construction is on concrete slabs and reinforced concrete foundations. When the tertiary part of the plant is added along with the other extras such as the chlorination/dechlorination for virus control, the plant will cost between $400,000 and $600,000. With a cost at this level, the concept of a temporary plant must be re-evaluated.

There are many alternatives to use of the plant which could include its incorporation into a master plan on a permanent basis. Certainly the high initial cost is difficult to justify for a two year period. Since the responsibility for operation will rest with WSSC, a plan of phasing out the plant should be developed by WSSC including the method of abandonment and the controls which will be implemented while the plant is being abandoned.

Because of the complex nature of the decision involving the plant, there is a need for an EIS. The following section has been developed describing and elaborating upon the philosophy of impact statements.

ENVIRONMENTAL IMPACT STATEMENT

Environmental Impact Statements describing environmental assessment are required under certain conditions of the National Environmental Policy Act (NEPA). In areas where the Act is vague, the Council on Environmental Quality (CEQ) developed guidelines for implementation. Executive Order 11514 encourages some agencies to hold public hearings.

Section 102 (2)(A) of NEPA requires "a systematic, interdisciplinary approach which will insure integrated use of the natural and social sciences and the environmental design arts in planning and decision-making which may have an impact on man's environment.

Section 102 (2)(C) requires an Environmental Impact Statement (EIS) whenever a proposed action will "significantly affect the quality of the human environment". The statement must consider the environmental impact of the proposed action; any unavoidable adverse effects; possible alternatives; the relationship of short-term uses and long-term effect; and any irreversible and any irretrievable commitments of resources.

Under NEPA and CEQ Guidelines an EIS must be prepared for all projects directly undertaken by federal agencies; supported in whole or in part through federal agencies, contracts, grants, subsidies, loans or other forms of funding assistance; or requiring a federal lease, permit license or certificate.

When private industry requires a federal license or permit for a new development, that industry must file a preliminary environmental report analyzing the environmental aspects of what it proposes to do.

It can be seen that the legal implications of Greenbriar and GSFC/NASA relative to a right-of-way are vague. A right-of-way is not a permit in the sense of the regulation, nor does a right-of-way fall into the category of

lease, license, or certificate. However, the broad intent of the regulation and Executive Order 11514 make it explicit that whenever questions of potential deleterious effects arise, an EIS must be prepared. Clearly this question has been raised (see Covington and Burling Correspondence, page 50) by many persons, agencies and organizations. The NEPA requirements also make the requirement clear that the responsibility for an EIS rests with the private enterprise and not the federal agency. However, there is precedent for the federal agency to prepare the EIS, e.g., the Corps of Engineers EIS on Trans-Alaska Pipeline.

In a letter to Mr. Samuel W. Keller from Mr. Richard Schifter of Fried, Frank, Harris, Schriver and Kampelman, attempts were made to answer questions on environmental impact. That document clarifies some of the methods of approach and ties together questions which are related. However, it is not a true EIS because it lacks the following items:

1. A complete ecological and natural resource inventory of the site.
2. A description of any probable adverse environmental effects which can't be avoided.
3. Analysis of studies and description of appropriate alternatives.
4. A concern for the relationship between local, short-term uses of man's environment and the maintenance and enhancement of long term beneficial use of the environment, on the grounds that each generation is trustee of the environment for succeeding generations.
5. Analysis of political, social and economic effects both primary and secondary in nature.
6. A thorough substantiation that in fact the project is needed, and failure to build the project will have a negative effect on Item 5.

With this background as a basis for analysis, GSFC/NASA can request from Greenbriar Associates a full draft Environmental Impace Statement, before the Right-of Way is granted.

When an EIS is presented in draft form a review by the public is encouraged and allowed. Time limitations for comment are given and all interested parties can respond. There are several interested groups which can give valuable input to NASA on the Greenbriar project. One such consortium sent a letter to NASA and that transmittal is discussed in the following section.

DISCUSSION
COVINGTON AND BURLING LETTER

On June 23, 1973 the law firm of Covington and Burling delivered to Mr. Alvin S. Bass, Environmental Affairs Liaison, Office of the General Counsel, National Aeronautics and Space Administration, a letter on behalf of the Prince Georges County Environment Coalition. The letter was signed by Edward Dunkelberger and Theodore L. Garrett and requested that NASA deny to Greenbriar Associates the right-of-way requested to lay a pipe which would carry effluent from the treatment plant on Greenbriar property and discharge it into Beaver Dam Creek. Attached to the letter were the items found in Table

It is evident that the people involved spent a huge amount of time to study the situation and to prepare these remarks. The legal presentation, Item 1, Table 5 is well done and presented as a legal brief. As in most briefs there are spots where counter opinions can be supplied. This, of course, only points out the state of legal chaos relative to our environment. As an environmental engineer, we will address some of the items raised in this letter and all its addenda, but we can't possibly address each point.

The cover letter requests that any decision by NASA be postponed until three conditions are met. The first condition is that NASA prepare a draft environmental impact statement pursuant to CEQ Guidelines. Second, that NASA will meet all conditions of NEPA and, third, that NASA be satisfied that all applicable state and Federal requirements are met.

The report being prepared for NASA/Goddard Space Flight Center by Saunders, Pearson, Appleton and Partners is not a EIS as specified in the CEQ Guidelines. The scope of work is such that the final product will be a combination of conditions 1 and 3, but will not fully satisfy Condition 1. It is our belief that

Condition 1 is not the responsibility of NASA, but rather the responsibility of Greenbriar. Our involvement with NASA should be to review the EIS submitted by Greenbriar and to verify its findings and recommendations, but not to duplicate its content. Our report and investigation will, however, cover many of the requirements of an EIS.

Condition 2 of the letter is one point of possible discussion relative to just what is the responsibility of NASA relative to the Environmental Protection Agency rules and requirements. At this point in time, the general conclusion must be that there are no applicable requirements. The NEPA requirements as subsequently argued in the Memorandum (item 1, Table 5) are covered in Condition 3. This makes Condition 2 superfluous. In this case, NASA is not the landlord, builder nor financier, hence the extent of their responsibility is poorly defined.

TABLE 5

ATTACHMENTS TO COVINGTON AND BURLING
LETTER TO ALVIN BASS

1.	Memorandum	22 pp.
2.	Letter, Perry Stearns, M.C. to Prince Georges County Council	5 pp.
3.	Addendum to 1	1 p.
4.	Letter, Georgina Haulik to Prince Georges County Council	1 p.
5.	Letter, Earl Schmitt to Prince Georges County Council	1 p.
6.	Letter, Charles Condor to Prince Georges County Council	1 p.
7.	Letter, Ronald Reeder to William Hunt	1 p.
8.	Letter, Ronald Reeder to Dr. Neil Solomon	1 p.
9.	Letter, Commissioners of Berwyn Heights to Winfield M. Kelly, Jr.	2 pp.
10.	Letter,Judy Comparetto to Perry Stearns	1 p.
11.	Resolution, City of College Park, No. 72-R-5	1 p.
12.	Resolution 326, City of Greenbelt	5 p.
13.	Letter, Phillip R. Hogue to Georgina Haulik	1 p.
14.	Letter, Kenneth Styers to William Gullett	1 p.
15.	Letter, Greenbelt Homes, Inc. to Richard Pilaki	1 p.
16.	Letter, Russell E. Dickerman to E. Dunkelberger	1 p.
17.	Letter, J. F. Mills to James M. Hennessey	1 p.
18.	Letter to Greenbelt	2 pp.
19.	Letter, Judy Comparetto to W. Maclean Bingley	1 p.
20.	Resolution, Greenbelt Homes, Inc.	1 p.
21.	Letter, Greenbelt Save Our Community Committee to Dr. Neil Solomon	5 pp.

TRAFFIC FLOW ANALYSIS AT THE ENTRANCE TO GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

LOCATION OF TRAFFIC STUDY: The intersection which was studied is located on Maryland Route 193 in Greenbelt, Maryland. The area involved is located between a point just West of the intersection of Ciprlano Road and Route 193 and a point just East of the Goddard Space Flight Center Gate on Route 193. This area is shown on an accompanying map (Figure 6).

PRESENT SITUATION

The current traffic flow situation at the intersection studied is very good. This is due to the good facilities and signal control provided for turning moves. One existing problem occurs with the present situation where the turning move labeled CIPS occurs. During the morning and early evening peak traffic counts several near accidents were observed between vehicles making the movement CIPS and those going through the intersection in the direction marked N. This hazardous situation was caused by poor vehicle operator judgement and could have been avoided. Still the intersection should be designed to minimize this hazard.

The intersection directly in front of the main gate of the Goddard Space Flight Center (with the traffic signal) was analyzed to determine the maximum capacity it could handle and still have good flow through the intersection. The present situation was compared to the maximum capacity to determine at what percent of capacity the intersection is currently operating. The results of the analysis showed for a Level of Service "B" [1] during the peak hours the through traffic is flowing at 67% of capacity.

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1 Level of Service is a qualitative measure of a number of flow factors which broadly defined denote various operating conditions with LOS "A" being best, few vehicles, and LOS "D" being crowded conditions.

The turning moves are operating between 83-90% of capacity at LOS "D" during the peaks for the individual moves, except for NASA S which is not controlled by a traffic signal and has the ability to accommodate many more vehicles.

OTHER OBSERVATIONS OF PRESENT SITUATION

MOVEMENT NASA N

During the morning and lunch peak there would often be a long queue formed waiting for the turn signal. At no time did the queue ever exceed the capacity of the two turning lanes. Also, the queue formed while waiting for the turn signal always made the turn on the following signal. In other words, no vehicle had to wait more than one cycle to make move NASA N. Also, the through traffic queue was never long enough to block vehicles from entering the turning lanes.

MOVEMENT N

The queue never exceeded ten (10) vehicles while waiting for the green traffic signal and the queue never had to wait more than one (1) cycle.

MOVEMENTS S AND NASA S

The maximum queue for movement S was 25 vehicles, with the most common queue length being 12 vehicles. As in the other cases the queue never had to wait through more than one (1) cycle. Only in the case of the 25 vehicle queue were vehicles prevented from entering the turning lane for movement NASA S.

MOVEMENTS NASA GN AND NASA GS

Both of these movements are signal controlled so that the queue formed while waiting for the traffic never waits more than one (1) cycle before making the turn.

GREENBRIAR DEVELOPMENT IMPACT ON TRAFFIC FLOW AT G. S. F. C. ENTRANCE

The firm of Hunnicutt & Neale, Parking and Transportation Consultants, Washington, D,C, prepared a "Traffic Impact Study, Greenbriar Luxury Garden Apartments, Prince George's County Maryland" in July, 1971. As part of their study they made a trip generation analysis. The data generated from their trip generation analysis was used in this report to determine the effect of the Greenbriar Development of the traffic flow in the area being studied.

The critical periods for the through traffic in both directions are during the morning, lunch and early evening peak hours. Hunnicutt & Neale estimated that 300 vehicles would leave the Greenbriar Development and travel East during the morning peak hour. Of these 300 vehicles 27 would make turn CN based on the current traffic flow pattern. This would leave 273 vehicles to travel through the intersection. This extra number of vehicles would not exceed the capacity of the intersection, even for the 15 minute peak within the peak hour. The increase though would have an effect on the vehicles making turns CIPN, CIPS, & CS. The degree of effect is impossible for us to determine. One thing that can be determined is that the increase in vehicles will not cause long enough queues to interfere with turn NASA N. An adverse effect would be that queues would develop waiting to make turn CS. At the present time queues develop which cause through traffic to divert to the right-hand lane. An increase in through traffic in both directions would aggravate the present situation.

The traffic between the morning and early evening peak hours would not be significantly affected since this traffic would be mostly shopping traffic and would travel in the opposite direction, West on Route 193, towards College Park.

TURNING MOVES AT CIPRIANO ROAD

A mathematical analysis to determine the maximum number of vehicles that could make each turn would be very difficult to perform since there are variables which control each movement. A visual observation though, can be very useful to analyze the situation.

Turn CN is made with little interference from the other turns, even CS, and could accommodate more vehicles desiring to make this turn and use Cipriano Road. Turn CIPN is dependent on the amount of through traffic, especially since approximately 70% of the CIPN vehicles make turn NASA N during the morning and lunch peaks. With most of the present through traffic of the plug flow type, the waiting time is usually less that two (2) minutes before a vehicle can make turn CIPN safely.

Some of the U-turns, movement US, are not made very safely. The safety of this intersection would be improved if the U-turns were eliminated. From visual observation the majority of the U-turning vehicles are coming from the housing developments just West of Cipriano Road. They come to Cipriano Road and make the U-turn since there are no cross-overs provided at the housing developments which they can use.

Turn CIPS was already mentioned as being a dangerous turn at times due to the poor judgement of the vehicle operator. The removal of the U-turns should help to improve the safety of the intersection.

Turn CS is made without difficulty since most of the N traffic is of the plug flow type. Also the removal of the U-turn vehicles will improve the visibility of the drivers making the turn.

The early evening peak traffic would have less of an effect on the turning moves since the turning moves are protected by the traffic signal from the heaviest flow increase. The increase in vehicles travelling West on Route 193 will almost equal the capacity of the intersection if Level of Service "B" is to be maintained. The turning moves CIPN, CIPS & CS will be affected by the increase in vehicles travelling East, but again the degree is hard to determine.

OTHER EFFECTS

The vehicles leaving the Greenbriar Development and travelling West on Route 193 will have a significant impact on the Baltimore-Washington Parkway Interchange Cloverleaf. There is currently a problem with vehicles backing up on the entrance ramp from Route 193 to Balt.-Wash. Pkwy. South. The addition of 135 vehicles during the morning peak and 69 vehicles during the evening peak will cause a serious congestion problem at this intersection by blocking through and turning lanes. Planned improvments for the ramp system connecting Route 193 and the B-W Pkwy. will help to alleviate this problem.

The vehicles leaving Greenbriar and travelling West on Route 193 past the B-W Pkwy. will encouter traffic congestion at the intersection of Route 193 and Kenilworth Avenue. A current problem exists during morning and evening peaks which the additional traffic generated by Greenbriar would aggravate. A grade separation is planned which would depress Route 193 under Kenilworth Avenue and provide separate turning roads which would connect the two. This plan, when implemented. would most likely eliminate most of the congestion at this intersection.

A plan has also been proposed which would make Cipriano Road a four (4) lane roadway instead of its present two (2) lanes. It is assumed that Cipriano Road would need to be expanded because of increased residential housing along Cipriano and Goodluck Roads. The expansion of Cipriano Road, and increase in traffic, would neccessitate the installation of a traffic signal and intersection improvements at the intersection of Cipriano Road and Route 193.

One other road building project is being planned near the area being studied. The Park and Planning Commision of Prince George's County is planning to build a road to connect Goodluck and Cipriano Roads in another location. As far as can be determined this road will not affect traffic on Route 193.

SUMMARY

The increase in through traffic in the vicinity of the main gate of Goddard Space Flight Center will not seriously affect the flow of through traffic. The increase in through traffic generated by the Greenbriar Development will affect those vehicles attempting to make turns to or from Cipriano Road. The degree of effect can not be determined, but the intersection of Route 193 and Cipriano Road will become more dangerous.

The increase in vehicles on Route 193 resulting from the Greenbriar Development will seriously affect the flow of traffic where Route 193 intersects with the Baltimore-Washington Parkway and its intersection with Kenilworth Road. The effect will be to cause congestion of through traffic at both intersections and to cause congestion on the South-bound ramps leading to the Baltimore-Washington. It is not known whether or not planned improvements will solve all of the congestion problems at both intersections, but it is doubtful that they will, especially on the ramps leading from Route 193 to the South-bound lanes of the Baltimore-Washington Parkway.

CAPACITY ANALYSIS OF INTERSECTION AT NASA MAIN GATE

Rural Intersection approach service volume in vehicles per hour of green time, for two-way streets with no parking, thru volume only.

1) 24 ft. approach width - 2 lanes
2) Load Factor = 0.1 Los "B"
3) PHF = 1000/1280 = 0.78 - North, 542/600 = 0.90 - South
4) T = 2%
5) B = 2%
6) 0% Rt. Turns
7) 0% Lt. Turns - separate turn lanes

S.V. = 1650 veh./hour of Green, Unadjusted

S.V. = 1240 vph 45 min green time/hour for North 90/120

S.V. = 660 vph 24 min green time/hour for South 60/150

.4 Hours

North & South Adjustments

North: R.T. = 1.05 L.T. = 1.10 B & T = 1.01 PHF = 1.1 North

South: 4% R.T. 1.03 PHF = 1.3 South

North

S.V. Adj. = 1240 x 1.05 x 1.10 x 1.01 x 1.1 = 1585 vph

South

S.V. Adj. = 660 x 1.03 x 1.10 x 1.01 x 1.3 = 980 vph

Another Method

Urban intersection approach service volume, in vehicles per hour of green time, for 2-way streets with no parking.

L.F. = 0.1 Los "B"

PHF = 1.78 North, 0.90 South

T = 2% B = 2%

Fringe Area

North - 0% R.T. 0% L.T., South 4% R.T. 0% L.T. Residential Area 1.25

24 ft. approach width

S.V. unadj. = 1600 veh/hour green time

NORTH: 1200 vph 45 min. green time/hour

SOUTH: 640 vph 24 min. green time/hour

NORTH & SOUTH ADJUSTMENTS

PHF = 0.86 North, 0.95 South Adjustments

Fringe Area = 1.25

North: R.T. = 1.05 L.T. = 1.10

South: R.T. = 1.03 L.T. = 1.10

% T & B = 1.01

North

	Capacity		% Capacity
1200 x 0.86 x 1.25 x 1.05 x 1.10 x 1.01 =	1500 vph,	998 =	66% Morning Peak
		562 =	37% Evening Peak

South

640 x 0.95 x 1.25 . 1.03 x 1.10 x 1.01 =	870 vph,	602 =	70% Morning Peak
		421 =	48% Evening Peak

Turning Movement Capacity

NASA N - Separate turn lane with separate signal

60 sec. green/cycle

@ peak

150 sec. cycle

12' turning lane - 2

From Highway Capacity Manual: Service volume = 800 vphg/10' width

for LOS A, B & C & S.V. 2nd lane = S.V. 1st lane x 0.8

800 x 12/10 x 60/150 = 384 vph

Assuming 5% T & B

800 x 12/10 x 60/150 x 0.8 = 303 vph, 2nd lane

692 vph total turning volume @ LOS "C" & 5% T & B

@ LOS "D"

1000 x 12/10 x 60/150 = 480 vph

= 864 vph total turning capacity

1000 x 12/10 x 60/150 x 0.8 = 384 ph

777 vph = current max.

currently operating at 90% of capacity

TURNING MOVEMENT CAPACITY

NASA GN - At afternoon peak we have maximum flow for this turning movement.

1) 30 sec. green/cycle - 150 sec./cycle

2) Single 12' turning lane

LOS"D"

1000 x 12/10 x 30/150 = 240 vph 199 vph present max.

199/240 = 83% of capacity

WEAVING SECTION ANALYSIS

CIPN to NASA N - cannot be performed since there is not a steady flow of thru traffic-i.e., light @ intersection. A visual analysis though was performed and weaving is not currently a problem.

NASA GS

LOS "D" 60 sec. green, 120 sec. cycle at peak, 2 lanes, 12' each

1000 x 12/10 x 60/120 = 600 vph

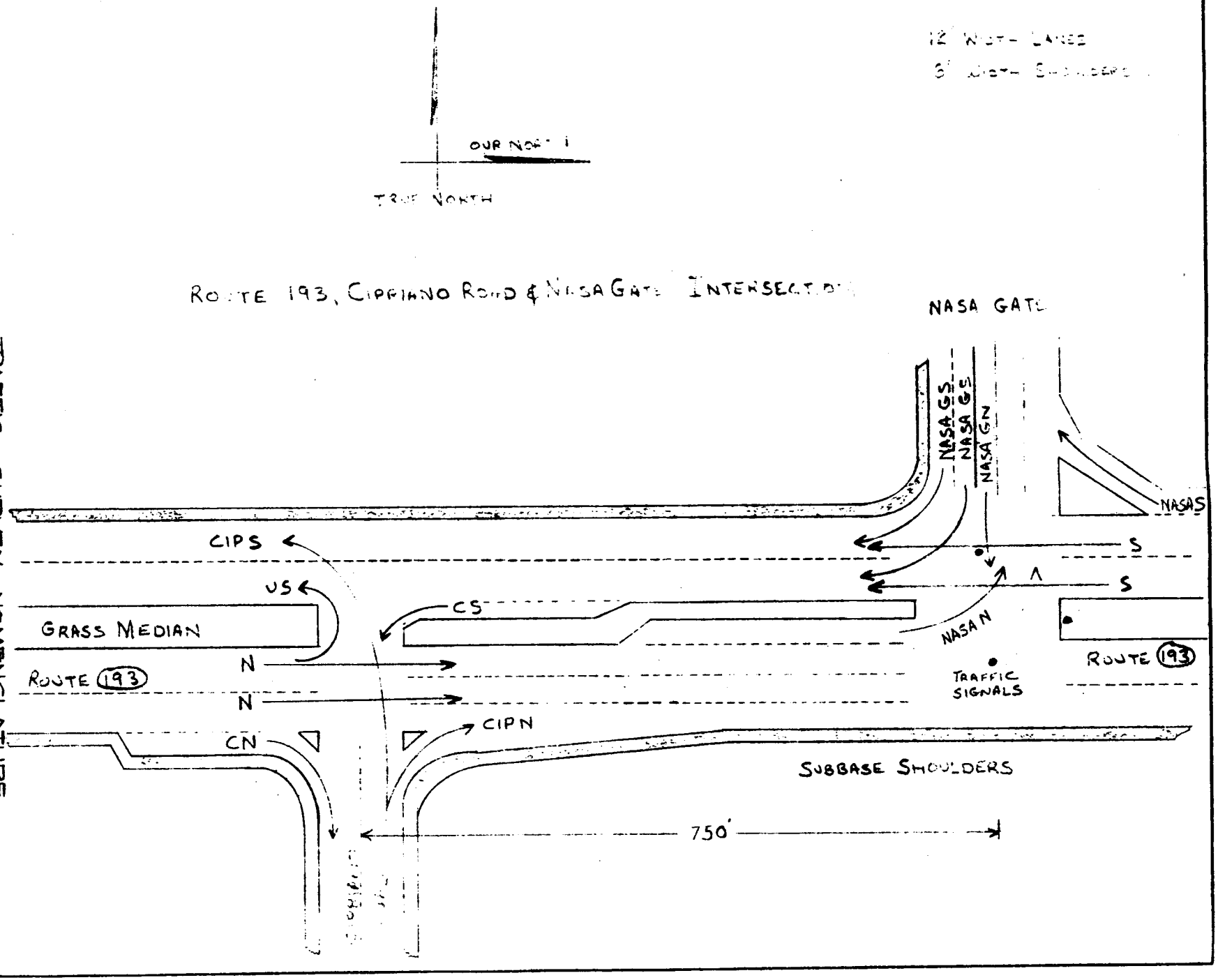
100 x 12/10 x 60/120 x 0.8 = 480 vph = 1080 vph - capacity @ LOS "D"

V/HR.

HOURLY TRAFFIC VOLUMES - FOR INDICATED MOVEMENTS

TIME	N	S	CIPN	NASA N	NASA GS	CS	CN	CIPS	US	NASA GN	NASA S
7:15 AM - 8:15 AM	998	602	273	777	128	36	89	127	156	35	152
8:15 AM - 9:15 AM	630	321	190	361	81	33	76	98	118	15	101
9:15 AM - 10:15 AM	328	244	36	187	94	27	72	65	47	15	32
10:15 AM - 11:15 AM	294	236	42	103	160	67	78	55	49	30	18
11:15 AM - 12:15 PM	337	359	74	210	516	304	85	67	45	87	31
12:15 PM - 1:15 PM	515	264	201	449	203	110	76	72	46	36	39
1:15 PM - 2:10 PM	452	220	40	150	128	42	86	72	32	32	40
2:10 PM - 3:10 PM	389	238	44	129	103	40	93	82	41	31	36
3:10 PM - 4:10 PM	505	312	67	179	312	110	121	86	52	69	20
4:10 PM - 5:10 PM	535	421	35	112	1004	255	187	87	52	238	13
5:10 PM - 6:10 PM	562	364	31	65	319	121	242	112	88	115	5
6:10 - 7:10 PM	344	280	20	32	84	64	180	80	72	9	9

TABLE 6

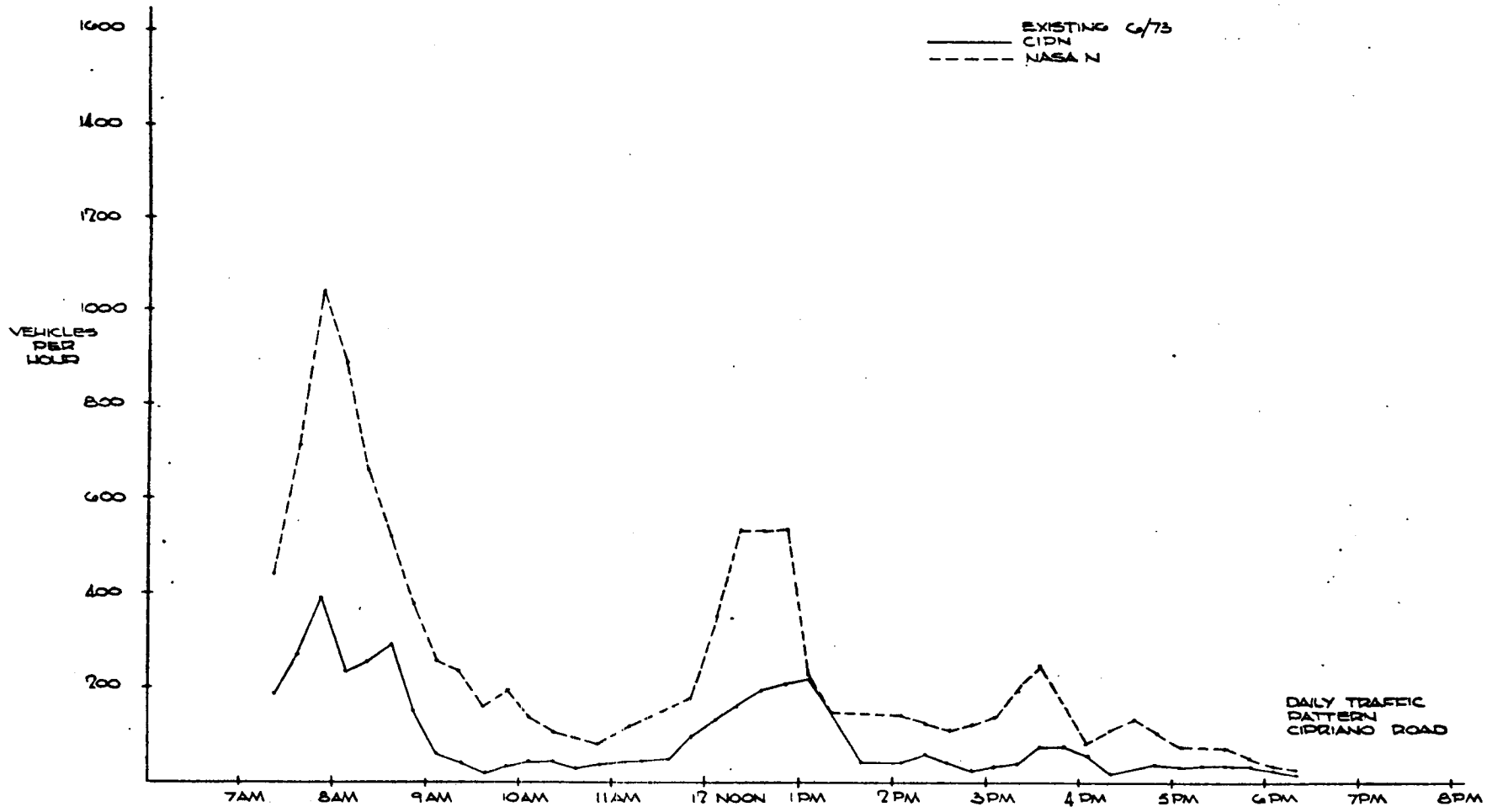


TRAFFIC SURVEY NOMENCLATURE

ENVIRO/EARTH Ltd.
Environmental and Earth Science Services

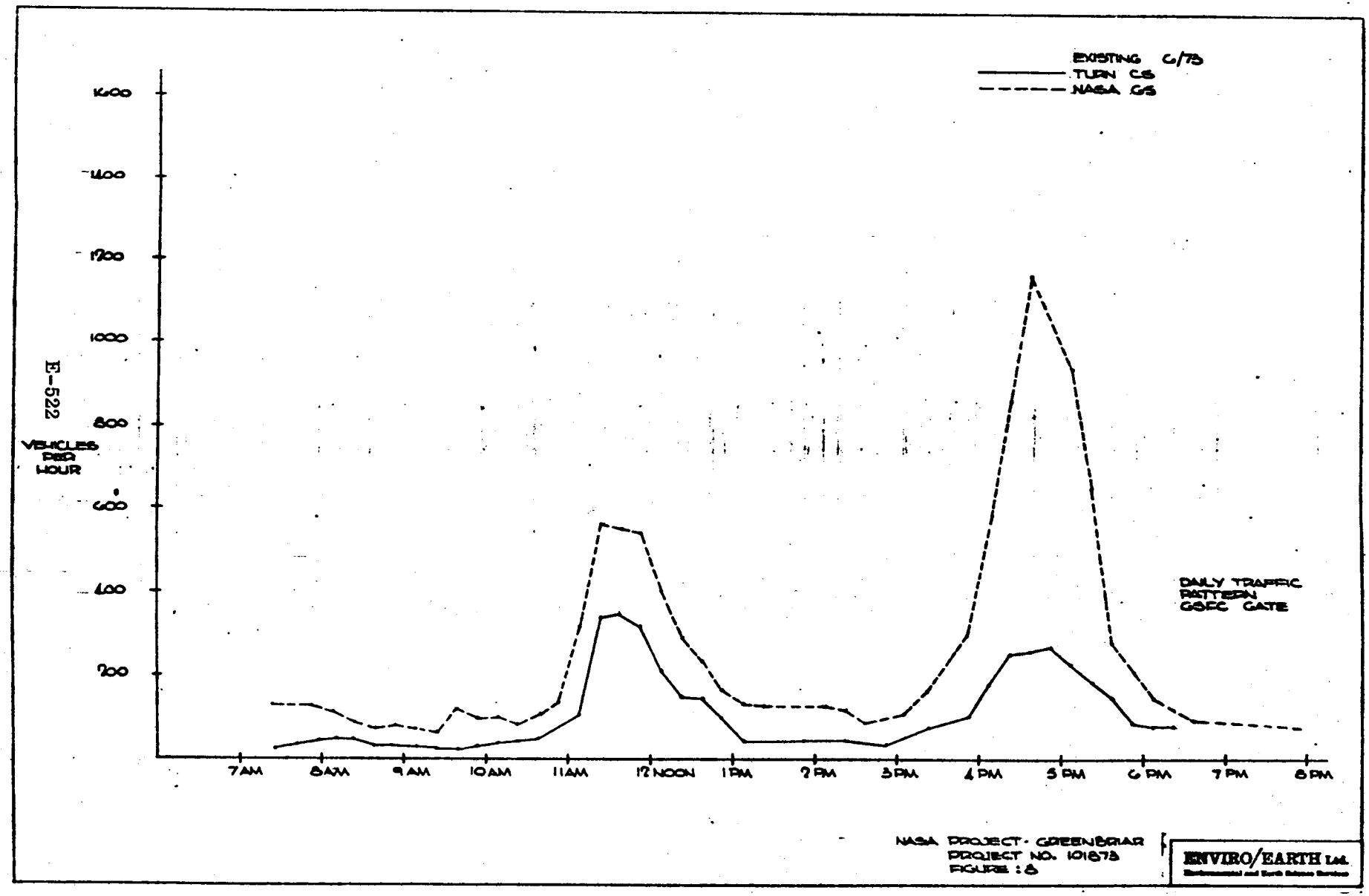
Proj. No: 101873
Date: 7/5/73
Scale: AS SHOWN
Sheet: FIGURE 6

E-520



NASA PROJECT - GREENBRIAR
PROJECT NO. 101873
FIGURE : 7

ENVIRO/EARTH Ltd.



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PROJECT NO. 101673
FIGURE : 8

ENVIRO/EARTH Ltd.
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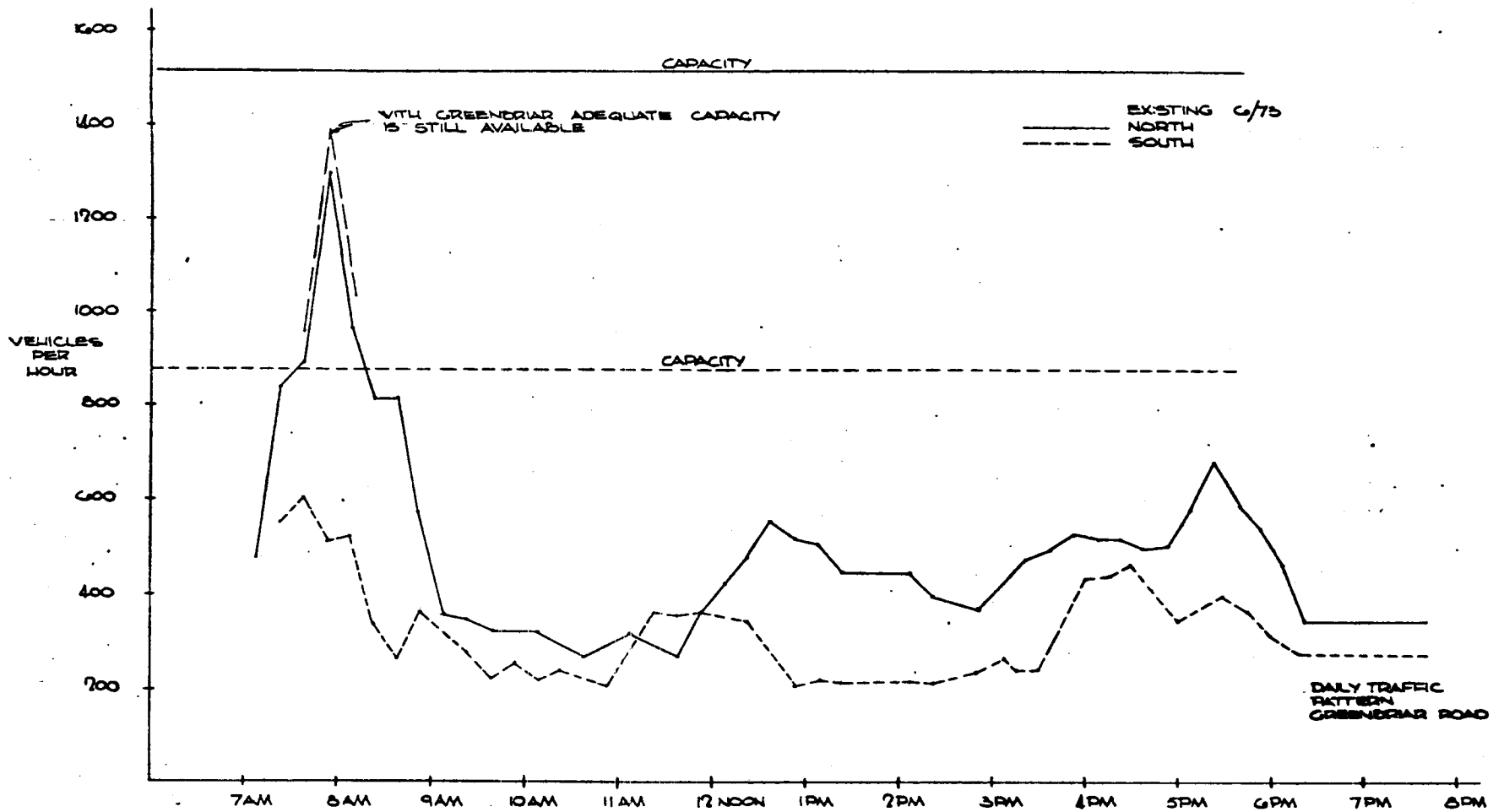

NASA PROJECT - GREENBRIAR
PROJECT NO. 101873
FIGURE: 9

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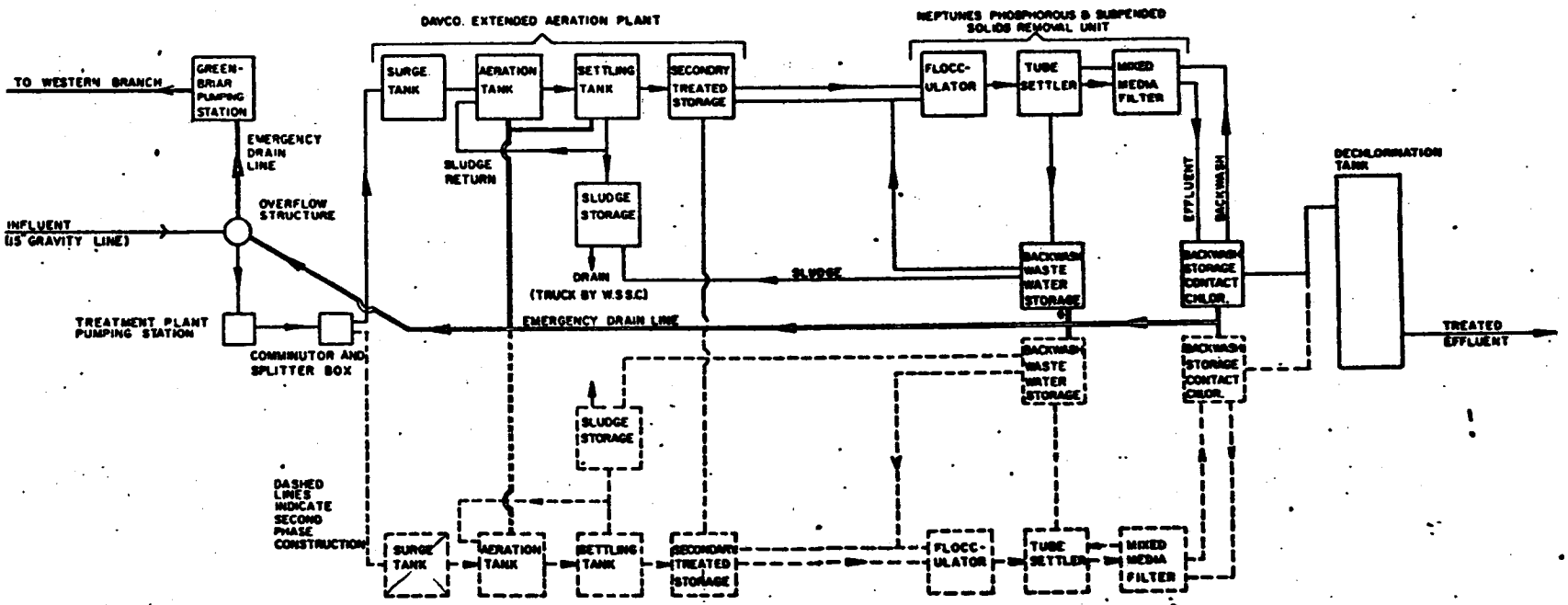

PROCESS FLOW DIAGRAM - FIGURE 2.

NASA PROJECT - GREENBRIAR
PROJECT NO. - 101675

ENVIRO/EARTH Lab.

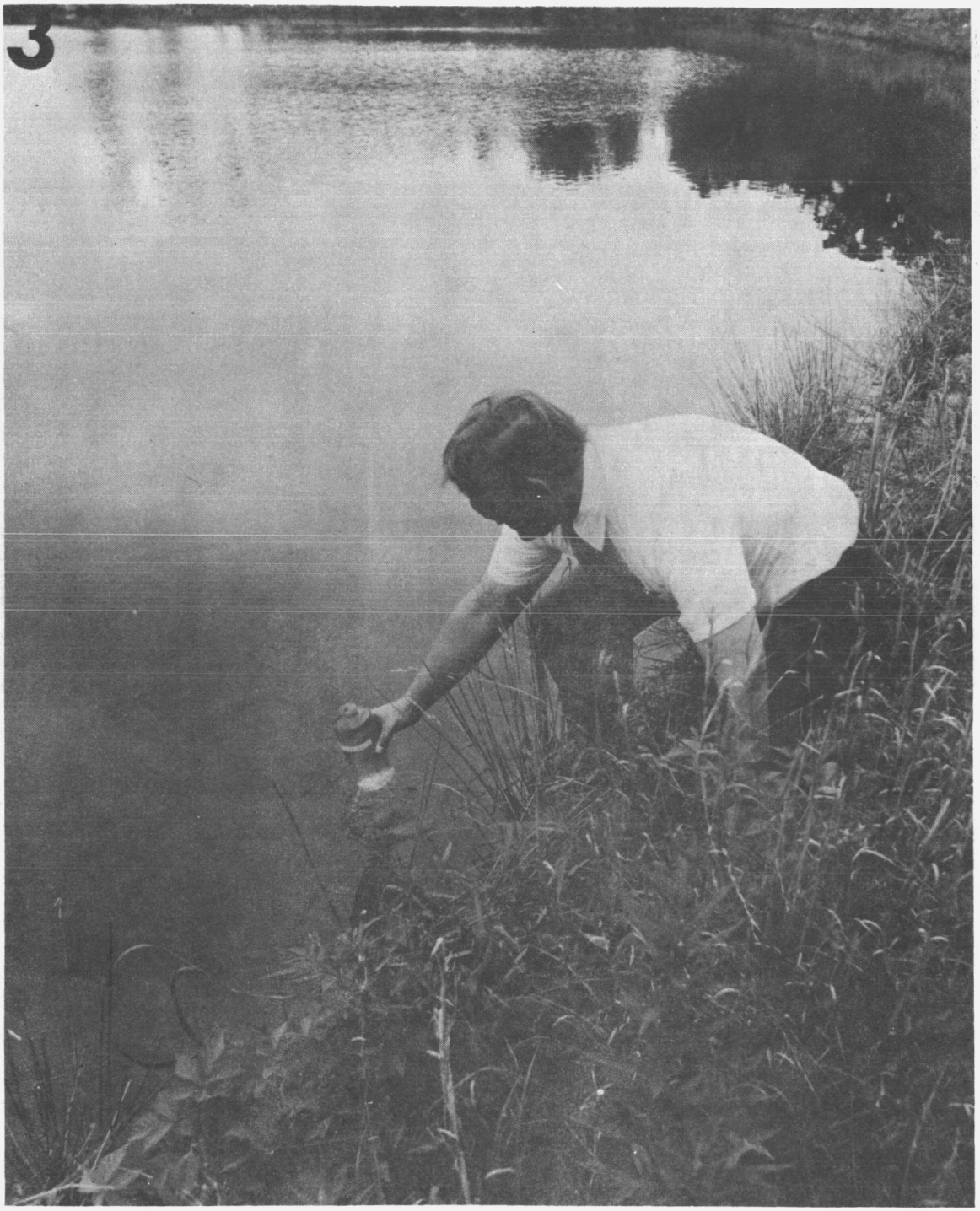

Fig. A-1 "Sampling of surface water to determine its chemical quality."

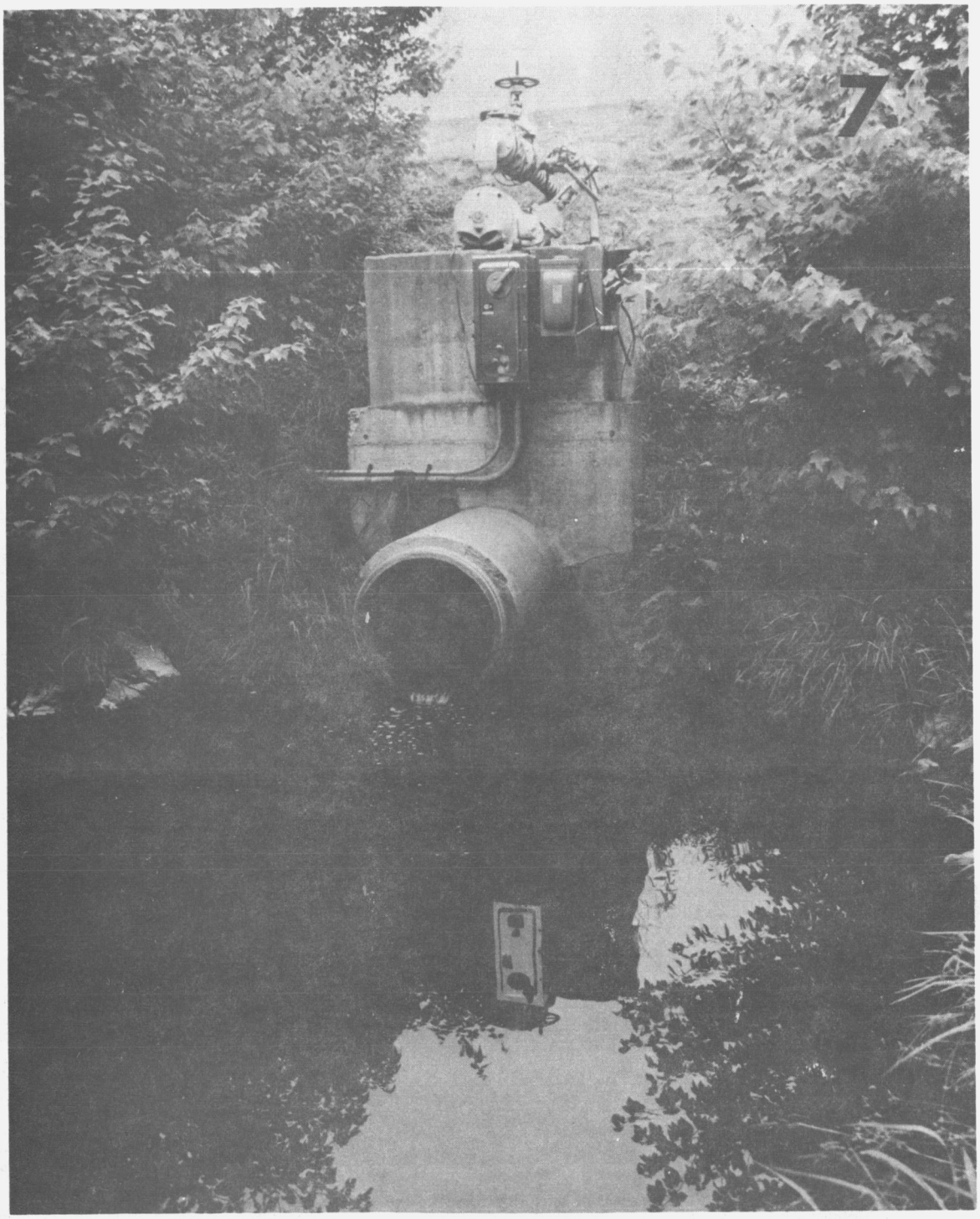

Fig. A-2 "Stream outflow from GSFC pond"

Fig. A-3 "Stream is choked with vascular plants below GSFC pond"

Fig. A-4 "High nutrients and static flow promote eutrophic conditions"

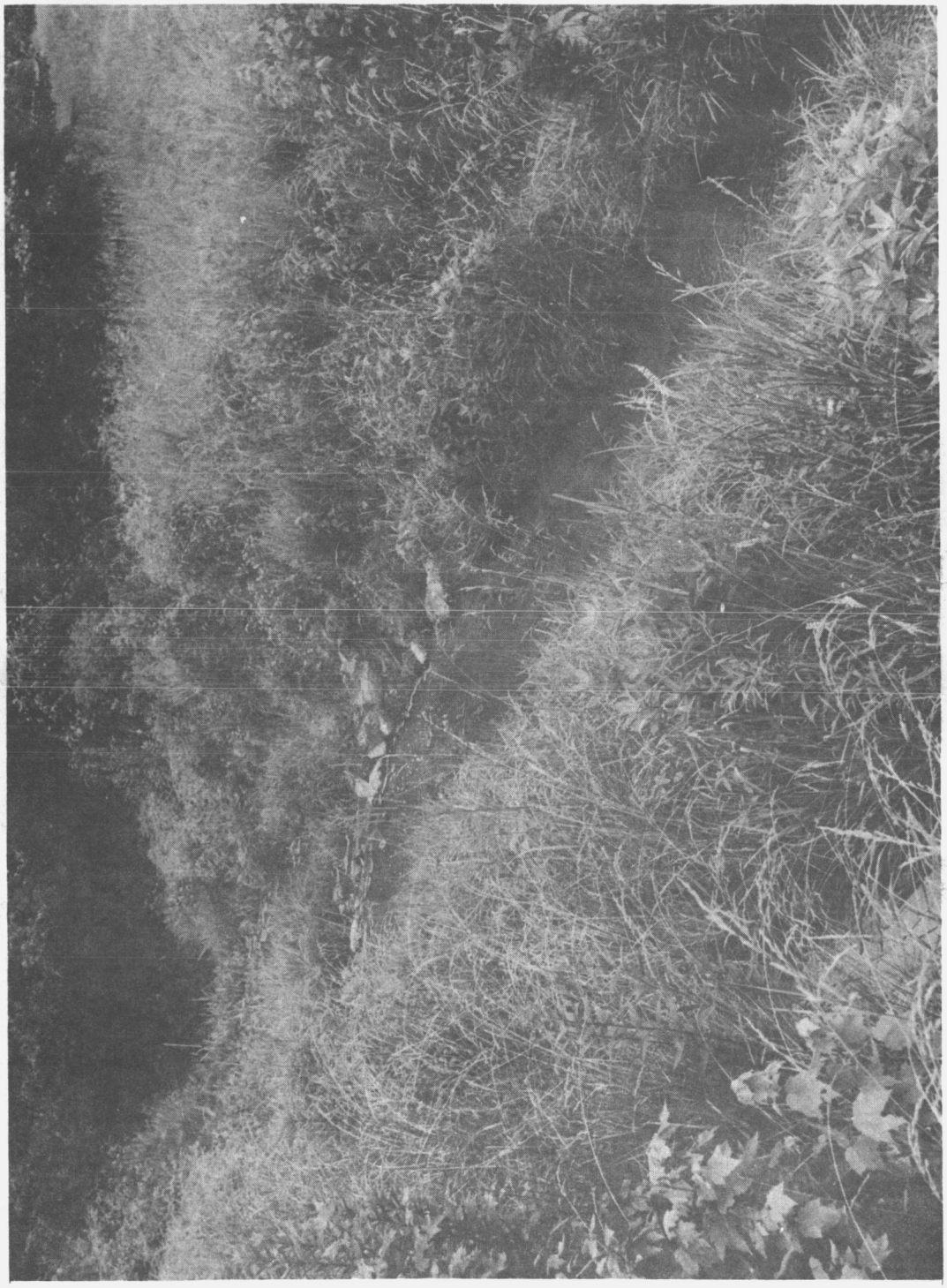

Fig. A-5 "Flow after confluence of both forks is minimal and could cease during summer months"

Fig. A-6 "Culvert beneath the Baltimore-Washington Parkway is heavily silted and choked with plants"

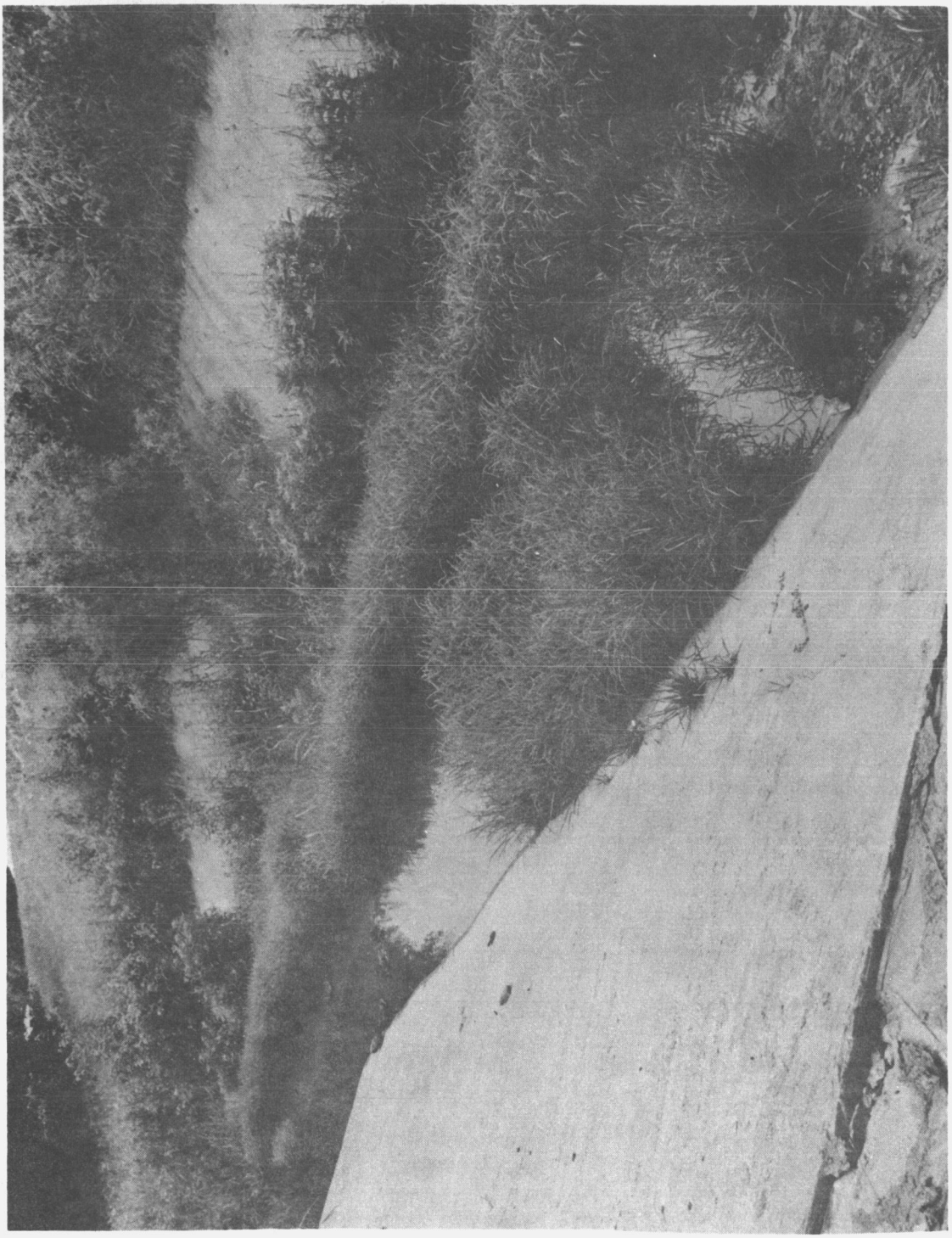

Fig. A-7 "Below the [illegible] lined to [illegible] region"

Fig. A-8 "The large impervious area reduces the natural precipitation infiltration which further

Fig. A-9 "The Branch of Beaver Dam Creek originating from Greenbrier bog; static pools, with only intermitted flow"

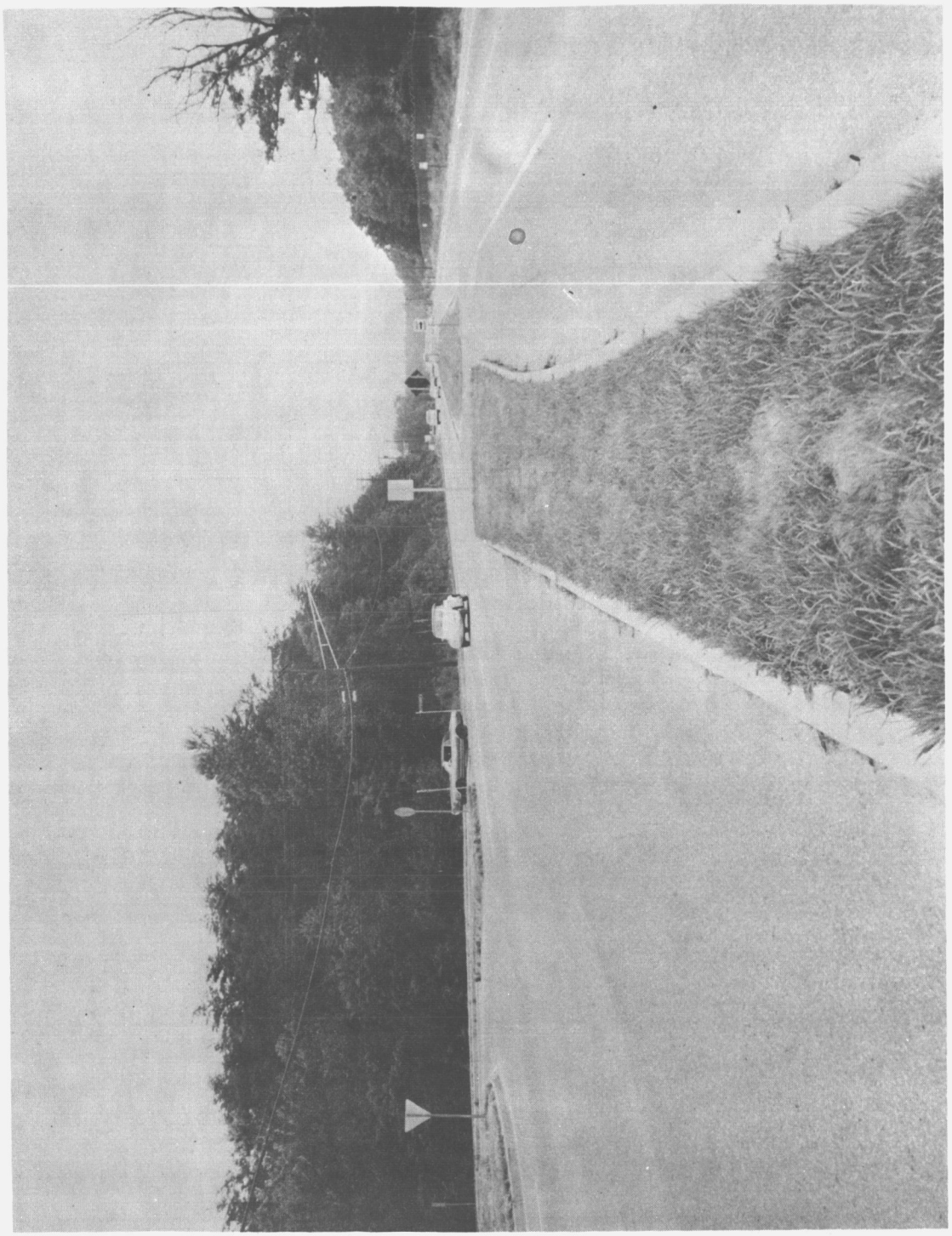

Fig. A-10 "Turn on Cicero Road may be needed
by the increased traffic from Greenriar"

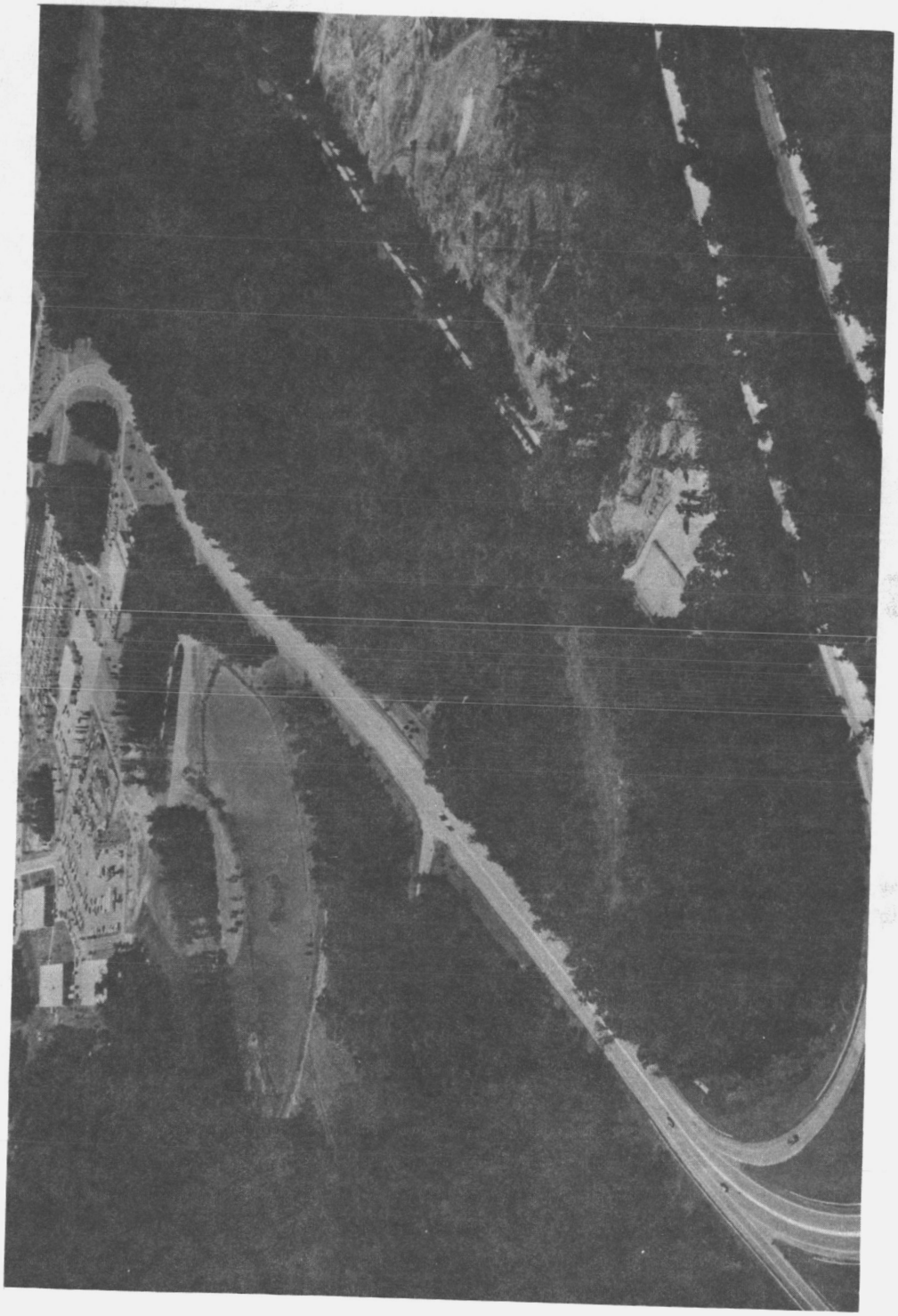

Fig. A-11

Fig. A-12

EXHIBIT 24

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

REPLY TO
ATTN OF:

File No. 1363
July 26, 1973

Richard Schifter, Esq.
Fried, Frank, Harris, Shriver & Kampelman
Suite 1000, The Watergate 600
600 New Hampshire Avenue, N.W.
Washington, D.C. 20037

Subject: Goddard Space Flight Center Easement

Dear Mr. Schifter:

We have considered your request of March 14, 1973, for an easement across Goddard Space Flight Center. The easement would be for an outfall line from your client's sewage treatment plant which would support the proposed Greenbriar development on Glendale Road adjacent to the western boundary of Goddard Space Flight Center.

We have analysed your request from the standpoint of its impact on Center operations and in the light of our responsibilities under the environmental protection laws of the United States. We have also considered the views of several environmental groups and others opposing grant of the easement.

We have determined that the easement cannot be granted at this time for the following reasons:

1. The information submitted does not demonstrate with finality whether the proposed plant, and particularly its effluent, complies with the requirements and standards of state and local laws. For example, there is nothing from the state authority to indicate whether the effluent meets or is required to meet the Maryland Revised Water Quality Standards, which have recently been approved by the Environmental Protection Agency and which have been imposed subsequent to existing state approvals of your project.

2. EPA has advised that a discharge of this nature requires a permit under Section 402 of the Federal Water Pollution Control Act as amended (Public Law 92-500, October 18, 1972). Such permit has not been obtained.

3. We are not satisfied that the plant would not cause noxious odors, particularly to Goddard Space Flight Center. While you state that only carbon dioxide and water will be given off, it appears that the process using sulphur dioxide for dechlorination as well as the aerobic process used for the open settling and storage tanks could present significant odor problems. We are also concerned with the aesthetic appearance of your proposed treatment plant, particularly since we have plans for the construction of a Visitors Center in close proximity thereto.

We would be willing to reevaluate your request at a later date should we receive information indicating that you are able to satisfy the objections noted. However, before we could reach a final decision to grant this easement, and in order to reach a responsible decision in the light of all relevant interests, we would obtain the views of other Government agencies and the public through the preparation and filing of an environmental impact statement in accordance with established procedures under the National Environmental Policy Act and the Council on Environmental Quality Guidelines.

Sincerely,

Samuel W. Keller
Director of Administration
and Management

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Councilman, Fourth District
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Mr. Royal D. Breashears
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Mr. Lance Lessler, Chairman
Prince George's Environment Coalition
4909 Lincoln Street
Beltsville, Maryland

Mr. Thomas X. White, Chairman
Greenbelt Save Our Community Committee
8 Woodland Way
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The Hon. Richard Pilski
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Chief, Planning and Zoning
Maryland-National Capital Park & Planning Commission
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Regional Administrative Officer
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Office of Facilities Engineering

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Office of Chief Counsel

EXHIBIT 25

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(STRASSER, SPIEGELBERG, FRIED, FRANK & KAMPELMAN)
SUITE 1000, THE WATERGATE 600
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, D.C. 20037
(202) 965-9400
CABLE "STERIC WASHINGTON"
TELEX 440335

FELIX S. COHEN (1932-1953)

MAX M. KAMPELMAN
ARTHUR LAZARUS, JR.
RICHARD SCHIFTER
DANIEL M. SINGER
MILTON EISENBERG
JOEL R. FEIDELMAN
RICHARD B. BERRYMAN
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WILLIAM JOSEPHSON
PATRICIA ROBERTS HARRIS
STEPHEN P. GOLDMAN
S. BOBO DEAN
MATTHEW S. WATSON
JAMES B. BLINKOFF
STEVEN D. NEWBURG-RINN
SAMUEL H. WEISSBARD
KENNETH S. KRAMER
FRANCIS J. O'TOOLE
DAVID L. SCULL

HAROLD P. GREEN
COUNSEL

FRIED, FRANK, HARRIS
SHRIVER & JACOBSON
120 BROADWAY
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(212) 964-8500
TELEX: 620223

1 THROGMORTON AVENUE
LONDON, EC2N 2JT, ENGLAND
(01) 588-0667
TELEX: 887606

August 24, 1973

Mr. James F. Mills, Chief
Facilities Engineering Division
Code 270
Goddard Space Flight Center
Greenbelt Road
Greenbelt, Maryland 20771

Re: Greenbriar Treatment Plant

Dear Mr. Mills:

At the meeting with your staff on August 16, 1973, we identified ten points concerning the Greenbriar Project on which you wanted further information. That information is herewith supplied, as follows:

(1) Specifications on SO_2 feed equipment and solution strength. -- See Item No. 1 of attached letter from Ben Dyer Associates, marked Enclosure 1, and supporting documents, marked Enclosure 2.

(2) Amount and disposition of sludge. -- See Item No. 5 of Enclosure 1.

(3) Composition of mixed-media filter. -- See Item No. 2 of Enclosure 1 and supporting documents, marked Enclosure 3.

(4) Noise insulation. -- Through oversight, Ben Dyer Associates omitted discussion of the noise insulation problem in their letter to me. They have authorized me to add the following observations on that issue:

Sound is produced by (a) the pump, and (b) the stand-by generator. -- (a) As the pumping equipment for the Plant will be below ground level, it will not result in any noticeable increase in the sound level existing at the site at this time. (b) Sound emissions from the stand-by generator will be reduced by a muffler provided for in par. 18.20(g) of the Specifications (Enclosure 6, p. 18-11), as follows:

> "Provide a critical sound rated silencer with a drain valve. The silencer shall have the lowest sound rating available for the engine."

Furthermore, the inside surface of the walls and ceiling of the generator building are to be lined with insulation in accordance with par. 7.12 of the Specifications (Enclosure 6, p. 7-02), which provides:

> "Insulation shall be fiberglass blanket type insulation 1-1/2 inch thick with 4 mil white vinyl face."

(5) Soil erosion plan. -- See Item No. 3 of Enclosure 1 and supporting documents, marked Enclosure 4.

(6) Do sewers go through a sand and gravel pit? -- See Item No. 4 of Enclosure 1.

(7) Plans on tertiary phase. -- Rather than limiting ourselves to the tertiary phase, we are submitting complete plans and specifications, marked Enclosures 5 and 6.

(8) Plans for staging use of Treatment Plant. -- See Enclosure 7.

(9) Expectation as to completion of new Western Branch Plant. -- See Enclosure 7.

Because of the concern which your Agency has expressed concerning the possible relationship of the Greenbriar Treatment Plant to the NASA Visitors' Center, I want to point out that there does not appear a likelihood that these facilities will ever co-exist. The Visitors' Center, I assume, will not be built until the sewer moratorium has been lifted. The lifting of the moratorium, on the other hand, will result in the immediate dismantling of the Greenbriar Treatment Plant.

(10) Details on emergency tie-in to public sewer system. -- See Item No. 6 of Enclosure 1 and supporting documents, marked Enclosures 8 and 9.

If you have any further questions on the foregoing matters or on any other related issue, please be sure to let me know.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Enclosures
HAND-DELIVERED

EXHIBIT 26

2405

ENVIRO/EARTH Ltd.

environmental & earth science services

400 Market Street East, Phila., Pa. 19106 (215) 928-0855

September 18, 1973

Mr. J. F. Mills (Code 270)
Chief, Facilities Engineering
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, Maryland 20771

Dear Mr. Mills:

As per your request, I am submitting the answers to the questions raised by GSPC/NASA. The answers are as stated by Greenbriar representatives in our meeting of August 16, 1973 in your office and by a letter from Attorney Shifter dated August 24, 1973 and addressed to GSFC/NASA.

1. The method of ultimate sludge disposal must be answered. The point of disposal, including a thorough evaluation of any landfill used to dispose of the sludge should be evaluated.

Answer:

The sludge volumes and a breakdown by chemical and biological origin is given. However, the quantities appear to be very low and in addition, the point of ultimate disposal is not given. Only a WSSC plant is stated as the recipient. No schedule of the disposal time and frequency are given. No statement on whether a landfill will be used is given. This question is not answered satisfactorily.

2. Details of the tertiary flocculation and settling chamber should be given. The amount of sludge and the method of disposal should also be stated.

Answer:

The construction details were given for the tertiary unit. However, the amount of sludge, its chemical characteristics and method of disposal were not satisfactorily answered. Sludge volumes from the chemical and biological portions of the plant were not separated.

3. All construction should be done at one time. The phased development does not allow for flexibility in operating the plant. The size plant for each phase should be carefully enumerated and the time schedule for plant construction must be meshed with other apartment construction and occupancy. The entire basis of design is vague and, in parts, contradictive.

Answer:

It was stated that the phase development would depend upon the final completion date for the West Branch Plant renovations. It is hoped by Greenbriar that phase II will not have to be constructed. (GSFC must be very careful about this construction since Greenbriar will be reluctant to build a plant for 3 or 6 months. A connection limitation should be predetermined and closely adhered thereto.) The first stage will be 0.200 mgd which will be when the population reaches 2500 persons based on 80 gallons per capita.

4. The concept of chlorination/dechlorination should be investigated further. Advantages of the proposed system and its effect on the stream biota should be studied in greater detail.

Answer:

Greenbriar has not investigated the downstream effect on Beaver Dam Creek. Dr. Cookson did state that he expected no problem because Beaver Dam Creek is grossly contaminated. The creek is highly contaminated as verified by GFSC tests and Cookson is probably correct for the short term effect. However, when the quality of the stream is improved, the potential effect should still be determined.

5. Greenbriar does not meet the minimum standards for discharge to Beaver Dam Creek. The plant lacks nitrogen removal and sufficient phosphorus removal.

Answer:

The question of stream standards was addressed for both nitrogen and phosphorus. Dr. Cookson attempted to explain why nitrogen removal is not needed. The explanation was not satisfactory since it assumed that nitrogen removal is only required for direct discharge to the estuary. Phosphorus removal of 1.5 mg'l. can be achieved according to records from Landover Mall. The 96 percent figure may be difficult to achieve since the 1.5 mg'l. design parameter appears low. Discussion occurred on the method

of measuring, either as phosphate or as phosphorus. Perhaps an answer (in writing) from the State of Maryland could explain why Greenbriar does not need nitrogen removal and the upgraded USDA plant does need this nitrogen removal.

6. The dissolved oxygen requirement can't be achieved by the proposed plant. An additional aeration step is needed after dechlorination.

Answer:

Dr. Cookson stated the the plant has a five foot,free fall which will aerate the effluent so that it can meet the requirements. There is a good possibility that the aeration requirement will be met with the free fall.

7. Odors and excess SO_2 could effect the GSFC facility, especially at the following buildings: 11,21 and 18,19,20.

Answer:

Odors from excess sulfur dioxide will not be a consideration because of the type of feeder. Details of the solution feeder were provided. Odor from other sources (Question 16) was not considered. The Greenbriar personnel stated that odor would be controlled by proper operation. The sludge storage could cause some odor and this possibility will be minimized by proper operation. If the operation is not acceptably, GSFC will move unpleasant odors frequently.

8. The development will increase the runoff, soil erosion and increase the size of the stream channel. A better erosion control plan should be provided.

Answer:

A copy of the complete soil erosion plan has been submitted by Ben Dyer Associates. However, the extent of its scope is too broad, and I have not had a chance to completely evaluate it. In addition, I do not know whether it meets Article 22, entitled "Grading, Drainage and Erosion Control" of the Prince Georges County Building Code. Since the development has a building permit it can be assumed that the conditions of Article 22 are met. There is nothing in the erosion plan to predict stream channel enlargement. This portion of the question was not answered.

9. A complete environmental impact statement should be submitted to NASA/GSFC before final approval of the right-of-way.

Answer:

Completion of a complete environmental impact statement by Greenbriar was discussed. Attorney Shifter stated that his clients had prepared a statement. However, he did agree that aspects of social, political and economic interaction were not provided. He intimated that if pressured, a complete statement would be provided. Greenbriar has not prepared a complete statement at this time.

10. Beaver Dam, the receiving stream, has a low flow and the amount of dilution will be small to none. The flow is probably intermittent and ceases during the summer months.

Answer:

Dr. Cookson agreed that the flow of Beaver Dam Creek is minimal during periods of low flow. He also stated that since the State of Maryland had approved the discharge, no other alternatives would be considered. Cookson did say that the stream at the point of discharge did dry up during low flow periods. This is in disagreement with the findings of the State of Maryland, Department of Health and Mental Hygiene. Resolution with the State on low flow should be attempted.

11. No construction should be allowed on the old sand and gravel pit unless precautions are taken to assure structural stability.

Answer:

The engineer Ben Dyer Associates states that the sewer will not be built in the sand and gravel pit, hence no settling and excessive infiltration will occur. However, the plant by pass and force main to the west Branch Plant appear to go through the sand and gravel pit. No special precautions or construction techniques are anticipated. This could have long term effects by causing excessive leakage.

12. The cost of the plant will be a minimum of $400,000 and is planned to be used only two years. Future use and possible incorporation as a permanent facility should be explored with Prince Georges County.

Answer:

Cost of the Greenbriar plant will be expensive. However, Attorney Shifter contends that the plant will be temporary and abandoned. If the plant will be incorporated into future WSSC plans, the impetitus must come from WSSC. When Greenbriar is abandoned, it will be abandoned at one time. No information on how the plant will be dismantled was provided.

13. Alternatives to discharge of waste to Beaver Dam Creek should be explored. In particular spray irrigation should be investigated.

Answer:

Greenbriar did not consider any alternatives other than discharge of treated effluent to Beaver Dam Creek. Greenbriar will not consider any other alternative.

14. The effluent of the Greenbriar plant should be continuously monitored by placing a dissolved oxygen meter on the effluent. When the DO drops below 4.0 mg/l an alarm should ring at GSFC and all discharge cease.

Answer:

Instrumentation and remote monitoring are not planned for dissolved oxygen in the effluent. If GSFC requires such monitoring, Greenbriar will comply. The fact that there is some question as to whether the plant can achieve the 5.0 mg/l dissolved oxygen level, means that the DO meter must be required.

15. A schedule of how the plant will be phased out by WSSC should be submitted. Are all units to be abandoned at one time? How will the plant be dismantled?

Answer:

Greenbriar stated that on the day the upgraded Western Branch Plant is ready to accept the waste, the temporary plant will be abandoned. No information was provided on

how the sludge was to be removed. Dismantling of the plant will depend upon whether the owner can find a buyer for the used facility.

16. Methods of odor control from the sludge holding tanks and setting tanks should be explored in detail.

Answer:

Greenbriar states that no odor will result. All odor will be eliminated by good operation. Greenbriar has not done any additional study nor developed any contingency plans if odors do result.

17. Estimate the increased noise levels from the operation of the Greenbriar Treatment plant. Descrive in detail construction methods which will be employed to prevent sound levels above existing background from being measured at GSFC.

Answer:

The question of noise is still not answered. The fact that a muffler is placed on the emergency generator is not a sufficient answer. From personal observations, I have seen similar installations where the generator is extremely noisy and bothersome. Some noise frequency readings and decibel estimates should be made.

In addition to these questions, at the August 16, 1973 meeting several additional questions were raised. Only 2 of these questions (no. 1 and 3) are not part of the original 17 submitted. The answers to those two questions are as follows:

No. 1. Describe the sulfur dioxide feeder and give its specifications.

Answer:

The specifications for the sulfur dioxide were given in the standard specifications which were attached. The spec. are given as Enclosure 6 in Attorney Shifter's letter. The solution feeder for sulfur dioxide will minimize the escape of odor to the atmosphere.

Mr. J.F. Mills (Code 270)
GSFC

September 18, 1973

No. 3 Provide information on the design of the mixed media filter.

Answer:

Detailed specifications on the mixed media filter were given. The filter appears to be a standard unit and should serve its intended function.

If you have any questions, please contact me.

Sincerely,

ENVIRO/EARTH

R.J. Schoenberger

Dr. R.J. Schoenberger, P.E.

RJS/ld

EXHIBIT 27

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

September 28, 1973

Re: WSSC - Greenbriar Temporary STP Permit Application No. MD 0021008

Mr. R. J. McCaffery
Chief, Technical Services
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. McCaffery:

It is my understanding that your Agency has a right-of-way request under consideration in connection with a proposed temporary sewage treatment plant for the Greenbriar Development at Greenbelt, Maryland. This Agency is concerned that the environmental consequences be carefully weighed before approval of the proposal.

A copy of the Enviro/Earth, Ltd. Greenbriar evaluation, dated July 23, 1973, which was prepared for your Agency, was made available for our review. We concur in the evaluation and further request that alternative sites for the treatment facility be considered. One alternative which we think may be feasible is the construction of the Greenbriar plant at the site of the existing Western Branch Regional Wastewater Disposal Plant.

As you are aware, we are currently reviewing an application for a NPDES discharge permit for the temporary Greenbriar treatment plant. The attached letter, addressed to the Washington Suburban Sanitary Commission, will serve to advise you of our position on the matter. As you can see, if the requested alternative can be implemented, the need for NASA right-of-way would be eliminated. For this reason, we will keep you advised of the status of the project. If the NASA/Goddard Space Flight Center right-of-way is pursued, an Environmental Impact Statement will be required. In that event we would be pleased to cooperate with you in preparation of the EIS material.

Sincerely yours,

Joseph A. Galda

Joseph A. Galda
Acting Chief
Municipal Evaluation Branch

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

September 28, 1973

Re: WSSC - Greenbriar Temporary
STP Permit Application No.
MD 0021008

Dr. Floyd D. Peterson, Commissioner
Washington Suburban Sanitary Commission
4017 Hamilton Street
Hyattsville, Maryland 20781

Dear Dr. Peterson:

Several matters relating to the proposed Greenbriar temporary sewage disposal facilities, included in the referenced permit application, must be resolved before processing can proceed. These are a critical evaluation of the need to construct the temporary treatment plant on the Greenbriar site, and an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) if an acceptable alternative cannot be developed.

If you wish to pursue the construction of a temporary sewage treatment plant in the Greenbriar Development, it will be necessary for the NASA/Goddard Space Flight Center to grant a right-of-way across its property for the outfall sewer to reach the stated point of discharge. It has been brought to our attention that NASA is committed to the preparation of an Environmental Impact Statement, in accordance with NEPA, prior to making the right-of-way available. In this case, the NPDES discharge permit cannot be processed until the impact statement is complete since granting the permit might be prejudicial to the NEPA evaluation. Additionally, the NEPA evaluation might well disclose pertinent information useful in the permit evaluation.

Information supplied to date has not satisfactorily demonstrated that the temporary sewage treatment plant must be constructed in the Greenbriar Development. The one alternative which may be feasible would be the construction of the temporary treatment plant on the site of the existing Western Branch treatment plant in a manner similar to the Largo temporary treatment plant. The Largo decision was such a sound one from the standpoint of economics, operations, and environmental effects, that we

strongly endorse a similar course be followed in solving the Greenbriar discharge siting problem. The principal reasons requiring additional serious consideration of this alternative are:

1. There is sufficient land available at the Western Branch plant.

2. An immediate connection is planned to the Western Branch collection system.

3. It is possible that initial development flows may be accommodated at the Western Branch plant while the Greenbriar temporary plant is constructed at that site thus avoiding service delays. This may also provide time to resolve legal problems related to amending the County sewer plan and avoid impact statement and permit processing delays.

4. Eliminate concerns for possible plant upsets and provide a more desirable point of discharge. The need for breakpoint chlorination and dechlorination would be eliminated.

5. Provide an aesthetically desirable site and perhaps improve the aesthetics of the housing development.

6. Eliminate the handling of toxic chemicals in the residential area.

7. Immediately accessible to existing lab facilities and operations staff at the Western Branch treatment plant resulting in more economical and efficient operations.

8. If the existing Western Branch outfall is utilized, a discharge permit is not required specifically for the temporary facility.

From virtually every aspect, the Western Branch - Largo type alternative is an attractive and seemingly rationale approach to sewage disposal for Greenbriar. For this reason we urge its serious consideration. In order to finalize a solution to this matter, I would like to meet with representatives of your office and the appropriate State officials to explore how we might implement the above alternative or resolve problems by discussing other alternatives. Following your receipt of this letter, I will arrange for a meeting by telephone contacts with the parties involved in order to expedite a solution to this matter.

Your careful consideration in regard to this urgent matter will be appreciated.

Sincerely yours,

Daniel J. Snyder, III
Regional Administrator

EXHIBIT 28

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October 4, 1973

Mr. Samuel W. Keller
Director of Administration
and Management
Code 200
Goddard Space Flight Center
Greenbelt, Maryland 20771

Re: Goddard Space Flight
Center Easement
File No. 1363

Dear Mr. Keller:

I am addressing this letter to you with further reference to the request of Greenbriar Associates for an easement to WSSC for an outfall line serving the proposed Greenbriar Treatment Plant.

In light of the recent publicity on this subject, you may want to be advised as to the present status of the project. Briefly, the various interested government agencies have taken the following positions:

(1) The Maryland Department of Natural Resources, which has to issue a discharge permit, has announced that it will make an effort to persuade the Environmental Protection Agency to join it in the issuance of a permit and, if that fails, will issue the permit unilaterally.

(2) The Maryland Department of Health and Mental Hygiene has informed us that once the Department of Natural Resources has issued its discharge permit, and if our plant meets the effluent criteria set by the discharge permit (which we know we shall do), the Health Department will sign the construction permit.

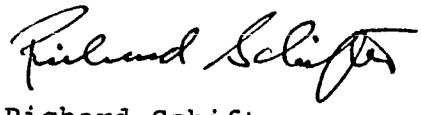
(3) EPA has not as yet taken action because one of its staff members would like the Greenbriar project to be served by a new facility on the Western Branch Treatment Plant site rather than by an on-site facility. The Maryland Secretary of Natural Resources has publicly stated that in making this suggestion, EPA is reaching beyond its area of responsibility. We agree and hold further to the view that the alternative suggested by EPA is legally and practically infeasible. A letter from me to the EPA Regional Director, explaining the infeasibility of this suggestion, is enclosed herewith. I am also enclosing a copy of a letter from our office to the Maryland Department of Natural Resources, explaining that as a matter of law the EPA permit will not be required until January 1, 1975.

We now have good reason to believe that the permits which the project needs at this time, those of the Departments of Natural Resources and of Health will be issued during the month of November. The first units of the Greenbriar project itself will be ready for occupancy in January 1974.

In view of the fact that all relevant data are now in your possession and to avoid a situation in which completed housing units stand empty, I do hope it will now be possible for you to take the necessary steps which would lead to the granting of the easement.

If there are any questions on any aspect of this matter, please let me know.

Sincerely yours,



Richard Schifter

RS:mc
cc: Saul Cohen, Esquire

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September 28, 1973

Warren Rich, Esquire
Legal Department
Department of Natural Resources
Tawes State Office Building
Annapolis, Maryland 21401

RE: NPDES Permit Application
NO. DP-74-495

Dear Mr. Rich:

I would like to take this opportunity to comment upon a legal point which I have discussed with you several times in connection with my request that the Maryland Department of Natural Resources hold a separate Public Hearing on NPDES Permit Application No. DP-74-495 rather than a joint hearing with the United States Environmental Protection Agency. As you know, I base this request in part on language which appears in Section 402(k) of the Federal Water Pollution Control Act Amendments of 1972, which provides as follows:

> Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 301, 306 or 402 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application.

If the Greenbriar Sewage Treatment Plant is covered by this provision, then the Department of Natural Resources'

insistence that a joint hearing be held on Application No. DP-74-495 has no basis. The stated rationale for joint hearings is that a discharger needs both a state and federal NPDES permit, and that procedures under Maryland law must therefore be closely harmonized with procedures under federal law in order to avoid a needless expenditure of state resources. But, if the Greenbriar Sewage Treatment Plant does not need a federal NPDES permit in the first instance, then the rationale for a joint hearing on Application No. DP-74-495 collapses completely.

You have responded to this line of reasoning by expressing your considerable doubts that Congress intended Section 402(k) to apply to discharges other than those in existence at the time the FWPCA was passed. For the reasons set forth below I must respectfully submit that neither the language in the provision itself nor the legislative history of the FWPCA will support such an interpretation.

Nothing on the face of Section 402(k) indicates that the sentence which is the subject of our discussion should be restricted to discharges in existence at the time Congress enacted the FWPCA. In its entirety Section 402(k) reads as follows:

> Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 309, and 505 of this title, with sections 301, 302, 306, 307, and 403 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 301, 306, or 402 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date of enactment which source is not subject to section 407 of this title, the discharge by

> such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

The second sentence in this provision contains no language that explicitly limits its scope to existing discharges. But more important, if the second sentence is so limited, then the third sentence becomes totally redundant. On its face the third sentence appears clearly intended to cover discharges which existed at the time Congress passed the FWPCA. Thus, if all provisions, including the second sentence, in Section 402(k) are to have meaning, then the scope of the second sentence should not be restricted to existing discharges.

Nor does the legislative history of Section 402(k) provide any support for the argument that the second sentence should be restricted to existing discharges. The Conference Committee which considered the FWPCA interpreted Section 402(k) in the following manner:

> Subsection (l) [of H.R. 11896], which is relettered as (k), is amended to provide that until December 31, 1974, in any case where a permit for discharge has been applied for but final administrative disposition has not been made, such discharge shall not be a violation of section 301, 306, or 402 of this Act or of section 13 of the Act of March 3, 1899, unless the administrator or other plaintiff proves that final administrative disposition has not been made because of failure of the applicant to furnish information reasonably required or requested in order to process the application.

Conf. Rpt. No. 92-1236, 92d Cong., 2d Sess. (1972), quoted in U.S. Code Cong. & Adm. News, 92d Cong., 2d Sess. 3817-18 (1972). Congress expressed no intent in this passage to limit Section 402(k) to existing discharges.

Furthermore, the legislative history of Section 402(l) of H.R. 11896, from which Section 402(k) of the FWPCA derives, vitiates completely any suggestion that Congress intended to cover only existing discharges. Section 402(l) of H.R. 11896 contains the following provisions:

> (l) Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, 316, and 403, except any standard imposed under section 307 for a toxic pollutant injurious to human health. Until January 1, 1976, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, and such discharge is not in violation of any applicable water quality standard under subsections (a) and (b) of section 303 of this Act, and is not in violation of any applicable regulation under section 316 of this Act, such discharge shall not be a violation of (1) this Act (other than an order under section 504), or (2) section 13 of the Act of March 3, 1899, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application.

Quoted in Congressional Record, March 28, 1972, at H. 2605.

Like Section 402(k) of the FWPCA, this provision contains no language limiting its coverage to existing discharges. Nor does the House Report on H.R. 11896 intimate that any such restriction was intended:

> Subsection (l) further provides that until January 1, 1976, in any case where a permit for discharge has been applied for pursuant to section 402, but final administrative disposition of the application has not been made, and the discharge is not in violation of any applicable water quality standards under subsections (a) and (b) of section 303, and any applicable

> regulation under section 316, the discharge shall not be in violation of this Act or the Refuse Act of 1899, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the applicant's failure to furnish information reasonably required or requested in order to process the application.

H.R. Rpt. No. 92-911, 92 Cong., 2d Sess. 128 (1972).

Finally, floor debate on H.R. 11896 in the House of Representatives clearly indicates that Congress did not intend to restrict the coverage of Section 402(l) to existing discharges. During consideration of the bill, Congressman Reuss offered an amendment to H.R. 11896 which would have deleted Section 402(l).[1] The Congressman explained the reasoning behind his proposed deletion in the following manner:

> The committee bill also gives immunity from prosecution under the Refuse Act and this bill until 1976 to all pollutors who apply for discharge permits. We say that there is no justification for granting such immunity. President Nixon granted no such immunity in the Refuse Act permit regulations for the mere filing of a permit application. We should do likewise.

Congressional Record, March 28, 1972, at H. 2635.

Congressman Roe and Congressman Harsha spoke in opposition to the Congressman Reuss' proposed amendment. Congressman Roe offered the following comment:

> One final point I would make is that the purpose of subsection (d) [sic] in section 402 which would be deleted by the amendment is to protect from harassment an applicant for a permit who has done everything he can possibly do, has furnished all the information he has been asked for, and, most importantly, is complying with all the applicable water quality standards.

1/ The amendment was defeated by a vote of 251 to 154.

Congressional Record, March 28, 1972, at H. 2636.

Congressman Harsha urged the rejection of Congressman Reuss' proposed amendment on the following grounds:

> Mr. Chairman, I would like to call the attention of my colleagues to the last part of the amendment the gentleman offered. We are merely trying to prevent a discharger who is meeting the water quality standards and who has made a valid application for a permit from being prosecuted where he is meeting the water quality standards and otherwise not violating the laws. There are 25,000 permits on the books now. Conceivably there will be 30,000 in the future. Time does not permit the handling or processing of those permits immediately. Obviously it will take some time. As long as the applicant has done nothing to delay or impede the issuing of that permit, he should not be prosecuted because the Federal Government or the State is dilatory or cannot get to the job of processing his application.

Congressional Record, March 28, 1972, at H. 2637.

The statements made during the course of this debate lead to the following conclusions. In no instance did any of the participants intimate explicitly or implicitly that the immunity from prosecution created by Section 402(l) was restricted to existing discharges. Congressman Reuss alleged that Section 402(l) created a broad category of discharges which would be immune from prosecution for violation of the Act. Congressman Roe and Congressman Harsha accepted the allegation as true, but defended the provision as a necessary one in light of the time it would take to process all the permits which would be required by the Act. Furthermore, Congressman Harsha makes specific reference to the fact that "[c]onceivably there will be 30,000 [permits] in the future." This allusion to future permits belies the argument that Congress intended to restrict Section 402(l), and therefore Section 402(k), to discharges in existence at the time the FWPCA was passed.

Moreover, if, as Congressman Harsha contends, the purpose of Section 402(l) is to protect dischargers against dilatory action on the part of government agencies, then it makes little sense to limit this protection to those who had the good fortune of discharging at the time Congress passed the FWPCA. Those who began discharging after the Act was passed are by no means immune to dilatory governmental action.

In light of all the reasons developed above, I must reiterate my belief that Congress did not intend to limit Section 402(k) to discharges in existence at the time the FWPCA was passed. Furthermore, Greenbriar Associates has met all the conditions established by Section 402(k). It has filed an application for a federal NPDES permit, and has consistently provided the EPA with all information requested. The Greenbriar Sewage Treatment Plant would therefore be entitled, as a matter of law, to discharge without a federal NPDES permit until December 31, 1974.

If the Greenbriar Sewage Treatment Plant does not need a federal NPDES permit at this time in order to discharge, then your stated rationale for holding joint hearings no longer applies. The state of Maryland runs no risk of needlessly expending its time and money by scheduling a separate Public Hearing on Application No. DP-74-495. I therefore respectfully urge that the Department of Natural Resources take immediate steps to hold such a hearing.

Sincerely yours,

W. Richard West, Jr.

cc: Herbert Sachs
The Honorable James Coulter

WRW/tjm

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September 21, 1973

Mr. Daniel J. Snyder III
Acting Director
Environmental Protection Agency
Sixth and Walnut Streets
Philadelphia, Pennsylvania

Dear Mr. Snyder:

This letter is addressed to you with reference to the application of the Washington Suburban Sanitary Commission ("WSSC"), dated May 24, 1973 for a discharge permit for the Greenbriar Sewage Treatment Plant in Prince George's County, Maryland. So as to remove any doubt that my client, Greenbriar Associates, is a party in interest in this matter, Greenbriar Associates is, under separate cover, transmitting to you its own application for a permit. I hereby request that that application be consolidated with the application of WSSC. The relationship between the two applicants is the following: the Treatment Plant will stand on land of Greenbriar Associates, will serve a development built by Greenbriar Associates, but will be operated by WSSC. The cost of construction and operation will be borne by Greenbriar Associates.

From my conversations with your staff I gather that there is no doubt about the high quality of treatment which the Greenbriar Plant will provide. That high quality is indeed reflected in the following table which compares the standards of EPA and the Maryland Water Resources Administration with the expected quality of the Greenbriar effluent.

	EPA 1/	WRA - Class I waters 2/	Greenbriar
BOD_5	not to exceed 10 mg/l	-	not to exceed 3.9 mg/l
suspended solids	not to exceed 10 mg/l	-	not to exceed 1.9 mg/l
phosphorus	not to exceed 4 mg/l	-	not to exceed 1.0 mg/l

	EPA[1]	WRA - Class I waters [2]	Greenbriar
coliforms	-	not to exceed 200/-100 ml	not to exceed 2/100 ml
dissolved oxygen	-	not less than 4.0 mg/l	not less than 5.0 mg/l
pH	-	6.5 - 8.5	6.5 - 7.2
turbidity	-	in receiving water not to exceed 50 JTU as a monthly average and not to exceed 150 JTU at any time	less than 1 JTU
viruses	-	-	1 PFU/10 gal. (essentially 100% removal)

The only question which, I understand, has been posed by your office is whether the Greenbriar project would be served better if WSSC were to place an interim plant at its site near the Western Branch Treatment Plant and, at that point, take out of the public sewer system for treatment an amount equal to the amount of waste-water which the Greenbriar project would place in the system.

With regard to this suggested alternative, please be advised as follows:

(1) Greenbriar Associates filed its application with the Maryland Department of Health and Mental Hygiene ("DHMH") for approval of an on-site treatment plant in March 1971. Action by DHMH on that application was deferred until the Prince George's County Council, through adoption of an amendment to its County's Ten-Year Water and Sewerage Plan, approved the point of discharge. This occurred on November 29, 1972, when the County Council passed a series of amendments, constituting its annual revision of the Ten-Year Plan in accordance with Art. 43 Md. An. Code §387C. One of the amendments

1/ As set forth in the document entitled "Region III EPA Policy Statement, Interim Treatment Facilities, Washington, D. C. Metropolitan Area."

2/ As set forth in the Rules and Regulations, State of Maryland Water Resources Administration, Reg. 08.05.04.03.

authorized the Greenbriar point of discharge. The 1972 annual revision of the Plan was approved by DHMH in February 1973.

(2) Following approval of the revision of the Ten-Year Plan, DHMH addressed to the engineers for Greenbriar Associates a letter notifying them of the water quality standards which the proposed plant must meet and informing them further that they may now "proceed with the preparation of final plans and specifications...." That letter, dated March 2, 1973, is attached hereto as Exhibit 1.

(3) Under the practices and procedures of DHMH, the March 2, 1973 letter constituted approval in principle of the Greenbriar Treatment Plant. From then on it was understood to be a matter of technical detail to have the plans and specifications prepared in accordance with the requirements of the engineering staff of DHMH and have them submitted for final approval.

(4) Greenbriar Associates, acting in reliance on the March 2, 1973 letter from DHMH, instructed its engineers to prepare plans and specifications for the plant in accordance with all applicable requirements. Furthermore, once these plans were in the form which was understood to be acceptable to the engineers of DHMH and WSSC, Greenbriar Associates, because of the urgency in getting the plant built and knowing of the lead time required here, began to place orders for the required equipment.

It follows from the foregoing that

A. The location of the Greenbriar Treatment Plant has been determined by the Prince George's County Council, which acted under the authority vested in it by the laws of the State of Maryland.

B. The Greenbriar Treatment Plant application was filed long prior to the effective date of Public Law 92-500, and the critical actions of the Prince George's County Council and DHMH took place prior to the implementation of that law by appropriate regulations.

(5) As my previous submissions to your office show, the quality of the effluent from the Greenbriar Treatment Plant meets United States Public Health Service standards for drinking water and is purer than the water of the receiving stream. In the unlikely event that the Greenbriar Plant and all its failsafe devices malfunction, the effluent will be discharged into the public sewer system.

(6) Having solved the long-term sewage treatment problem in the Western Branch Basin by providing for the construction of a new 30 mgd treatment plant (see my letter to Dr. Morris of your office, dated September 15, 1973), WSSC cannot be expected to use any public funds to provide additional interim treatment in the Western Branch Basin by locating publicly-financed interim treatment facilities at the site of the Western Branch plant.

(7) The same small opposition group which has protested against the Greenbriar Treatment Plant also protested against the Prince George's County Sports Arena and the arrangements for an interim sewage treatment plant at Western Branch, serving the Arena.

It follows from the foregoing that

C. No advantage from a health, ecological or planning point of view can be attained by relocating the treatment plant at this late date, nor is it likely that such relocation will satisfy the small opposition group.

(8) The provision in the 1972 revision of the Ten-Year Plan which authorizes construction of an interim plant next to the Western Branch Treatment Plant explicitly limits that interim plant to serve only the Largo Sports Arena. (Exhibit 2). It would thus require an amendment to the Ten-Year Plan if the interim plant were to be expanded to serve Greenbriar as well. This would consume a substantial amount of time and would surely delay construction of the Plant beyond the day when its services will be required to allow occupancy of the Greenbriar project.

(9) As was pointed out above (item (6)), WSSC cannot be expected to provide additional interim facilities in the Western Branch Basin at public expense. If such facilities are to be provided, they can only be provided at private expense. Yet, the available land at the Western Branch Plant site is public land, owned by WSSC. May WSSC, a public body, lease its property to a developer for the purpose of constructing a treatment plant for private, residential use? The applicable basic principle of law provides as follows:

> "The power to lease corporate property may be, and often is, conferred by express statutory provisions. Sometimes the power to lease is inferred from the right to contract and to hold, manage and control realty for public use. But, ordinarily, a municipality cannot, by lease or license permit its property acquired or held for public use, to be wholly or partly diverted to a possession or use exclusively private, without specific legislative authority." [Emphasis added.] E. McQuillin, Municipal Corporations, §28.42 (3rd ed. 1966).

WSSC was created by the General Assembly of the State of Maryland. Its operations are governed by the statutes codified in the Washington Suburban Sanitary District Code. There is no provision anywhere in that Code allowing WSSC to divert any of its land for purely private use.

It follows from the foregoing that

D. No additional interim treatment facility on the Western Branch Treatment Plant site can be built without express authorization by the Prince George's County Government through amendment to the County's Ten-Year Water and Sewerage Plan.

E. WSSC cannot be expected to expend public funds on such an interim treatment plant and no privately-financed structure could be built without express statutory authorization.

(10) We are advised by the engineers for Greenbriar Associates that a minimum of six to eight weeks would be required to re-engineer the Western Branch site for the Plant. Another eighteen to twenty-three weeks would be required to complete the interim facility at Western Branch. These delays, standing alone, would be so great as to undo the very purpose of the Plant: to provide an interim solution to the Greenbriar sewage treatment problem until the permanent plant is in place. If added to the time it would take to obtain legal authorization, it is obvious that the interim facility would not be ready much sooner than the permanent facility.

It follows from the foregoing that

F. The delays which a shift at this late date to the Western Branch site would engender eliminates this option as a realistic alternative to construction of the Plant on the Greenbriar site. The result would be complete housing units standing empty for a year and other units left incomplete because of the financial collapse of the project.

The foregoing analysis, I submit, demonstrates conclusively that the proposed alternative considered by your office is simply not workable. For all the reasons stated in this communication and in earlier communications to your office, I request most respectfully that your office proceed immediately to act on the WSSC application of May 24, 1973, by initiating the process which will lead to the issuance of a discharge permit under the provisions of Section 402 of Pub. L. 92-500. The need for prompt action by your office is underlined by the fact that the Maryland Secretary of Health and Mental Hygiene is withholding a construction permit for the Greenbriar Plant until you have acted on the discharge permit application.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Enclosures

cc: Mr. Mark W. Suffern
Mr. Robert V. Zener
Dr. Floyd Peterson
Mr. James A. Stapp
Hon. Richard Pilski

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
ENVIRONMENTAL HEALTH ADMINISTRATION
610 N. HOWARD STREET • BALTIMORE, MARYLAND 21201

Neil Solomon, M.D. Ph.D. Secretary

March 2, 1973

Mr. David Murray, P.E.
Ben Dyer Associates, Inc.
4705 Queensbury Road
Riverdale, Maryland 20840

Re: Greenbriar Apartments
Wastewater Treatment Facility
Prince George's County

Dear Mr. Murray:

We have reviewed your application for a wastewater treatment facility to discharge into an unnamed tributary of Beaver Dam Creek in Prince George's County near Greenbelt. You may proceed with the preparation of final plans and specifications which will meet the following effluent requirements:

Average Daily Flow	Not to exceed 0.325 mgd
BOD_5	Not to exceed 5 mg/l
Suspended Solids	Not to exceed 15 mg/l
pH	6.0 to 8.0
Dissolved Oxygen	Not less than 5.0 mg/l
Phosphate	Not to exceed 1.5 mg/l as P

Treatment shall also include disinfection of the effluent. Disinfection shall be by break-point chlorination as required by the County Council. Dechlorination before discharge shall also be required.

Sufficient space shall be available at the site to add additional advanced waste treatment if it should become necessary in the future. The effluent shall be conveyed by pipeline to a point on the stream where free flow prevails.

It should be noted that before a construction permit can be issued for this project, the requirements of the Prince George's County Ten Year Water and Sewerage Plan shall be met.

Very truly yours,

Earl S. Quance, P.E.
Public Health Engineer
Division of Water and Sewerage

E-806

Exhibit 2

1973 PROJECT 57.13, LARGO SPORTS ARENA-TEMPORARY STP

This project is new to the program and is planned to serve the Largo Sports Arena. The temporary plant is to be constructed by the Park and Planning Commission at the Western Branch STP, the site to be made available by the WSSC. The specific design and cost estimates are currently being prepared. The plant is to be operated and maintained by the WSSC.

EXHIBIT 29

MEMORANDUM FOR THE RECORD September 25, 1973

Subject: Trip Report - Survey of Wyoming, Michigan Sewage Treatment Plant - September 10 & 11, 1973

A visit was made to Grand Rapids, Michigan to conduct a survey of a sewage treatment plant located in Wyoming, Michigan. GSFC was advised that the plant was similar to that to be constructed at the Greenbriar Apartment Project. Mr. Richard Joshlin, Project Engineer from Ben Dyer Associates, designer of Greenbriar sewage treatment plant, accompanied me on the survey.

Upon arrival, we contacted Mr. Paul Spelman, Project Director for the City of Grand Rapids Sewage Treatment Facilities. Mr. Spelman advised that the City of Grand Rapids was awarded a grant of $2 million by the Environmental Protection Agency to investigate various methods of "disinfecting" sewage effluent; these methods are (1) bromine chloride, (2) ozonation, and (3) chlorination and subsequent dechlorination using sulfur dioxide.

Mr. Spelman explained the studies which are underway at the Wyoming and Grandville plants. The Wyoming Plant processes 10 million gallons of sewage per day, 65% of this is classified as industrial waste. The Grandville Plant treats considerably less sewage, one and one-half million gallons per day; this sewage contains approximately 15% industrial waste.

The overall treatment given the sewage at these locations is less sophisticated than that proposed for the Greenbriar Plant. At the Wyoming Plant, treatment is mainly primary in nature that is the sewage is separated into the solid and liquid phases. At the Grandville Plant the sewage does undergo secondary treatment (breakdown of solids by activated sludge). In both plants the phosphorus is precipitated out using ferric chloride and a polymer. Separation of the two phases is achieved in settling tanks by decanting of the liquid phase. The solid phase or sludge is then processed through a rotary vacuum filter where the moisture content is reduced to 70%. The sludge is then incinerated and reduced to inert ash. The liquid effluent is then run through trickling filters containing activated charcoal and then discharged into the Grand River which is a substantial waterway with what appears to be adequate stream characteristics.

Each of the plants are conducting parallel studies on the effects of various methods of treatment to destroy micro-organisms prior to discharge into the Grand River. The study consists of processing four streams of effluent through the laboratories and three of the streams subjected to the aforementioned processes and one stream is not subjected to any process and is used as a "control" for the experiment; 50,000 gallons are processed through each stream in each plant.

Following this processing a portion of the effluent in various dilutions is diverted into troughs containing various types of indigenous aquatic life. Observations of the biota are made and data is recorded.

Mr. Spelman was very enthusiastic about the chlorine and ozone methods and advised that both methods are highly effective in destruction of the pathogenic micro-organisms. Since the purpose of the trip was to observe the chlorine/sulfur dioxide method of disinfection, special attention was given to this method of disinfection. Both gases are used in small quantities and are introduced in closed systems within the process. Gases were being introduced at the time of the survey; chemical odors were not detectable.

Several visits were made to confirm Mr. Spelman's statement that no complaints have been lodged against the plants. One of these visits was with Mr. Russel Blake, Environmental Analyst with the City of Grand Rapids Environmental Protection Department. Mr. Blake advised that there have been no complaints registered for odors coming from the Wyoming Treatment Plant over the past three years; however, there have been several complaints regarding particulate matters resulting from the incineration of the sludge. Mr. Blake advised that his organization is responsible for monitoring environmental conditions in the area.

Mr. Roger Conner, Acting Director of the West Michigan Environmental Action Council was also contacted. Mr. Conner advised that his organization had no knowledge of any problems connected with the sewage treatment plants.

As a result of this survey, the following observations are submitted:

1. Neither plant surveyed appeared to be as advanced in treatment as the Greenbriar Plant. The Wyoming plant did not utilize activated sludge for the breakdown of solids.

2. Both plants have laboratories set up to evaluate various methods of disinfection including the chlorination method to be used at the Greenbriar Plant.

3. The chlorination lines when surveyed did not yield detectable odors of either chlorine or sulfur dioxide used for dechlorination. Both gases are mixed with the effluent in closed stages of the system, after which the effluent flows into large open tanks prior to discharge. No chemical odors were detectable.

4. The streams used in the studies represent a flow of approximately one fifth to one sixth of that anticipated for Greenbriar.

In conclusion it appears that the use of the chlorination method for disinfection followed by sulfur dioxide for dechlorination should present no odor problem since both gases are introduced in closed protions of the process. Since the Greenbriar Sewage Treatment Plant will use the same method of disinfection, the Greenbriar disinfection process should not generate any chemical odors which would prove obnoxious or toxic.

Joseph M. Dalton, Jr.

JMD/vmv

cc: Mr. Keller - 200
Mr. McCaffery - 200
Mr. Coski - 271
Saul Cohen - 203

EXHIBIT 30

MEMORANDUM FOR THE RECORD

September 27, 1973

Subject: Survey of Landover Mall Sewage Treatment Plant

A visit was made to the Landover Mall Sewage Treatment Plant on September 19, 1973. Mr. Richard Joshlin of Ben Dyer Associates, designers of the Greenbriar Sewage Treatment Plant accompanied me. The Landover Plant and the proposed Greenbriar Plant are basically of similar design with the exception being that the Landover Plant does not dechlorinate in its process; whereas it is planned to dechlorinate at the Greenbriar Plant using sulfur dioxide.

Mr. Richard Rau, Plant Engineer (776-6818) who is an employee of the Washington Suburban Sanitary Commission, was contacted. Mr. Rau is in charge of the Landover Plant and two others. A complete tour of the plant was made with particular attention given to odors and noise. At the time of the survey atmospheric conditions were ideal with a wind coming from the southwest. Only a slight odor of sewage was detectable intermittently on the catwalk over the compartmentalized, open secondary treatment plant. The tertiary treatment process was contained in a separate building. The tertiary treatment consisted of the use of aluminum sulphate (alum) as a flocculent and agent for phosphorous removal clarification, and adjustment of PH (acid-alkaline) using sodium carbonate (soda ash) was then accomplished. From the tertiary process the effluent is filtered through multi-media filter and then chlorinated using chlorine. Approximately 8 pounds of chlorine are used daily to disinfect effluent from 100,000 gallons of raw sewage. NOTE: Because of loading, Plant operates 12 hours each day. Beakers containing raw sewage, secondary sewage, and fully treated effluent were drawn. It was impossible to differentiate between the treated effluent and drinking water. Rau advised that weekly samples are taken at one point upstream and several points downstream; samples are then analyzed by an independent laboratory. To date all samples have met State of Maryland standards.

Mr. Rau indicated that there were complaints of odors and noise by nearby residents; however these complaints were made when the plant first began operating, and he felt unjustified.

At the time of the visit noise, arising from the aerators (2) was in evidence. Rau indicated that W.S.S.C.'s safety engineer had taken noise reading inside the building housing the aerators and came up with readings over 100 decibels (ear protection is required). Outside the building the sound from the aerators seemed no more a problem than the ambients sounds such as traffic etc. Greenbriar's aerators are to be quieter since the aerators are centrifugal (as per Joshlin)

I did detect odors downwind of the open secondary treatment tank; however these odors were diluted beyond 50 feet.

The chlorination process was a closed system as proposed for Greenbriar. The chlorine was not detectable at a position over the tanks which were housed in a separate cubicle with an outside entrance.

Joseph M. Dalton, Jr.

Joseph M. Dalton, Jr.

JMD/vmv

cc: Mr. Keller - 200
Mr. McCaffery - 200
Mr. Coski - 271
Saul Cohen - 203

H Mills

EXHIBIT 31 a

OFFICE OF THE SECRETARY
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
301 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201 • Area Code 301 • 383-3010

Neil Solomon, M.D., Ph.D., Secretary

October 11, 1973

Mr. R. J. McCaffery
Chief, Technical Services
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dear Mr. McCaffery:

This is in reply to your letters to me of June 29, 1973 and August 1, 1973 concerning the proposed Greenbriar Apartments Wastewater Treatment Facility. This project has received considerable review by our office. Our position at this point in time is that no construction permit has been issued, nor will one be issued until a discharge permit has been received by this Department from the Water Resources Administration of the Maryland Department of Natural Resources. It is my understanding that the Environmental Protection Agency is awaiting completion of this environmental impact statement before acting on their discharge permit.

I am enclosing, for your information, a copy of a letter we sent to the applicant on March 2, 1973, pointing out the required effluent restrictions which applied at that time. In our opinion these are still appropriate until other effluent limitations may be established in the respective discharge permits referred to above.

Further, it is our understanding that the proposed discharge at the present time would run approximately 150 feet across this property and discharge to a tributary of Beaver Dam Creek which runs parallel to the access road toward Goddard Space Center. I am including for your information copies of the correspondence we have received from the Water Resources Administration that pertain to the flow in the proposed receiving stream. We have observed that the flow in the receiving stream is very slow, however, the proposed discharge would change this and

provide a steady flow in the stream. The impact on the stream water quality in our opinion has been determined by the Water Resources Administration to be consistent with water quality standards.

It is our conclusion that if the conditions stipulated in the Prince George's County Ten-Year Water and Sewerage Plan are met and if the plant is operated in accordance with its design, public health should not be in danger as a result of this discharge.

If you or others on your staff care to visit our office to review our files on this project, we would be happy to make them available to you and to also make a staff member available to you to assist you in that review.

Sincerely yours,

Neil Solomon, M.D., Ph.D.
Secretary of Health and Mental Hygiene

NS:bb
Enclosure
cc: Dr. Perry Stearns
Mr. James B. Coulter

Jensen
Greenbrier
P.H.E.

March 2, 1973

Mr. David Parker, P.E.
Rep Ryer Associates, Inc.
[illegible] Chesapeake Road
Riverdale, Maryland 20840

Re: Greenbrier Apartments
Wastewater Treatment Facility
Prince George's County

Dear Mr. Parker:

We have reviewed your application for a wastewater treatment facility to discharge into an unnamed tributary of Beaver Dam Creek in Prince George's County near Greenbelt. You may proceed with the preparation of final plans and specifications which will meet the following effluent requirements:

Average Daily Flow	Not to exceed 0.375 mgd
BOD	Not to exceed 5 mg/l
Suspended Solids	Not to exceed 15 mg/l
pH	6.0 to 8.5
Dissolved Oxygen	Not less than 5.0 mg/l
Phosphate	Not to exceed 1.5 mg/l as P

Treatment shall also include disinfection of the effluent. Disinfection shall be by break-point chlorination as required by the County Council. Dechlorination before discharge shall also be required.

Sufficient space shall be available at the site to add additional advanced waste treatment if it should become necessary in the future. The effluent shall be conveyed by pipeline to a point on the stream where free flow prevails.

It should be noted that before a construction permit can be issued for this project, the requirements of the Prince George's County Ten Year Water and Sewerage Plan shall be met.

Very truly yours,

Earl S. Cosner, P.E.
Public Health Engineer
Division of Water and Sewerage

HERBERT M. SACH
ADMINISTRATOR

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES ADMINISTRATION
STATE OFFICE BUILDING
ANNAPOLIS, MARYLAND 21401

February 23, 1973

DIVISION OF
WATER & SEWERAGE
MAR 2 1973
ANSWERED

Mr. W. McLean Bingley, Chief
Division of Water and Sewerage
Department of Health & Mental Hygiene
Environmental Health Administration
610 North Howard Street
Baltimore, Maryland 21201

RE: Point of Discharge Evaluation
for Greenbriar Apartments
Prince George's County, Md.

Dear Mr. Bingley:

We have reviewed the revised Application for Wastewater Treatment Facility for Greenbriar Apartments, Prince George's County.

It is our conclusion that the proposed discharge will not result in violation of State's water quality standards in the receiving stream, provided that the discharge and the effluent characteristics as specified in Application For Wastewater Treatment Facility submitted on December 22, 1972 be met.

If you have any further questions, please do not hesitate to contact us.

Very truly yours,

Michael L. Rodevick

Michael L. Rodevick, P. E., Chief
Water Quality Permits Section
Water Resources Administration

MLR:sdm

E-818

10. Description of springs, surface water withdrawals, etc. that might significantly affect the low flow conditions: None

11. Persons Contacted: Lee Northing, Prince George's County Health Dept., Bureau of Environmental Health; Richard Jarshlin, Ben Dyer Associates

Mr. Plendak, City of Greenbelt

12. Other Remarks: Stream flow can be low in summer months but otherwise appears to be perennial

13. Date Inspection Was Made: April 11, 1971

14. Report Completed By: Shin-Chang Huang

POINT OF DISCHARGE
SITE INSPECTION REPORT FORM

1. Community, Municipality or Organization to be served: Greenbriar Apartments

2. County: Prince George's

3. Major Drainage Basin: Beaver Dam Creek

4. Name of Receiving Stream: Unnamed tributary to Beaver Dam Creek

5. Description of Discharge Site:

6. Location I. D. (River Mile, etc.):

7. Description of Receiving Stream (Check Appropriate Items):

Tidal		Turbid	X
Non-tidal	X	Clear	
Intermittant		Color	
Perennial	X	Rocky Bottom	
Rapid		Smooth Bottom	X
Slow	X	Algae	
Sluggish		Aquatic Plants	

8. Description of Land Use in the Watershed Area: Rural

9. Description of known or potential sources of pollution in the watershed area and within the sewerage service area:

Runoff from the abandoned Greenbelt Sanitary Land Fill approximately 1500 feet down stream from the proposed point of discharge.

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
ENVIRONMENTAL HEALTH ADMINISTRATION
DIVISION OF WATER AND SEWERAGE
610 North Howard Street
Baltimore, Maryland 21201

APPLICATION FOR WASTEWATER TREATMENT FACILITY

A. NAME AND LOCATION OF FACILITY

1. Name and character of Community or Project Greenbriar

   County: Prince George's Nearest major community: Greenbelt

2. The location of the proposed plant site, point of discharge and area served shown on a full 7.5 minute quadrangle topographic map, such as those printed by the U. S. Geological Survey. See Item F.

3. Name and address of:

   a. Property Owner: Rozansky & Kay Construction Co.
   Suite 21, 501 Slaters Lane
   Alexandria, Virginia 22314

   b. Developer: "

   c. Agency responsible for operation and maintenance of proposed facility: Washington Suburban Sanitary Commission

   d. Engineer: Ben Dyer Associates, Inc.
   4705 Queensbury Road
   Riverdale, Maryland 20840

B. RECEIVING STREAM CHARACTERISTICS

1. a. Name of Receiving Stream: Unnamed tributary of Beaver Dam Creek.

   b. Name of major drainage basin: Indian Creek/Paint Branch/Anacostia/Potomac Riv

2. Is plant located in 50-year flood plain? Yes ____ No X

3. Area of Watershed above proposed discharge point: 0.7 square miles.

4. Water Quality Standard: Refer to Water Resources Regulation 4.8:

   Item No. 89 Water Paint Branch & Tributaries

   Zone Headwaters to confluence with Northwest Branch

   Water uses C

   Water uses to be protected III Water Contact Recreation
   IV Propagation of Fish, other aquatic life and wildlife
   V Agricultural Water Supply

5. The location of other wastes reaching the receiving stream within five miles above and five miles below the proposed discharge point must be shown on the map required in Item A2. This must include all waste discharges known to the applicant including liquid wastes from industrial or commercial operations. Attach complete information. If none, so state.

C. EXISTING WASTEWATER FACILITIES

	Present Flow	Design Flow	Design Flow
Domestic:	Avg. _____ mgd	Avg. _____ mgd	Peak daily _____ mgd
Industrial:	Avg. _____ mgd	Avg. _____ mgd	Peak daily _____ mgd
Total:	Avg. _____ mgd	Avg. _____ mgd	Peak daily _____ mgd

To be completed only when there is an existing sewage plant and this if for the expansion of the existing facilities.

D. EXPECTED WASTE CHARACTERISTICS

1. Design Waste Volume - Design Calculations must be attached, including industrial wastes by industry.

Domestic:	Avg. 0.325 mgd	Peak daily flow 0.455 mgd
Industrial:	Avg. 0 mgd	Peak daily flow 0 mgd
Total:	Avg. 0.325 mgd	Peak daily flow 0.455 mgd

2. Type of Waste: Sanitary X Industrial _____ Commercial _____

   a. Characteristics of Industrial Waste:

   b. Type of Industrial Waste pretreatment for each industry prior to discharge to sewers:

3. Design Population: 4,056 Design year: 1975

4. Estimated wastewater production per capita per day: 80 gpcd, total includir infiltratior

5. Chemical characteristics of raw waste (Design Waste Volume)

BOD-5:	375 mg/l	pH:	7.0
BOD-5:	1015 lbs/day	Temperature:	65° F
SS:	300 mg/l	Other (Specify):	
SS:	815 lbs/day		

6. Chemical characteristics of treated waste (Design Waste Volume)

BOD-5: 3-5 mg/l
BOD-5: 3-5 lbs/day
SS: 5-15 mg/l
SS: 5-16 lbs/day

pH: 6.0 - 7.0
Temperature: 65° F.
Other (Specify) :

If Phosphate and Nitrogen removal are to be provided, give quality of effluent as follows:

Phosphate: 0.5 - 1.5 mg/l (P) Removal 90 to 95 %
Total Kjeldahl Nitrogen: mg/l (N) Removal %
$(NO_3 + NO_2)$: mg/l (N) Removal %

7. What is the basis for the values given in Items 5 and 6?
Attach information supporting these values - for example, are they actual values or estimated, plant effectiveness is based on what data, etc? Raw values based on normal domestic sewage estimates. Treated values based on experience at Landover Mall Treatment Plant.

E. PROPOSED WASTEWATER TREATMENT FACILITY DESIGN

1. Temporary or Permanent Facility: If temporary, attach evidence as to reason for determining it to temporary. How long will temporary situation last?
Temporary, refer to supporing data, enclosed.

2. Type of Treatment:

Show the schematic flow diagram indicating major treatment units and the anticipated BOD-5 and SS removal in the corresponding units.

See enclosure.

3. Sludge Treatment and Disposal:

See enclosure.

F. INSTRUCTIONS

The applicant shall submit his proposal to the Governing Body of the County and request a letter, addressed to the Division of Water and Sewerage, stating that the proposal is contained in the County Comprehensive Water and Sewerage Plan as an approved site for a wastewater treatment plant or a statement that the Plan will be considered for amendment if this application can be approved by the Division. This letter shall be attached to the application. The applicant shall include evidence with this application that comments have been requested of and received from the County Health Officer, Planning and Zoning Commission, and the County Agency having responsibility for sewerage (Sanitary or Metropolitan Commission or Department of Public Works). Item 3C must be supported by a letter from the agency agreeing to maintain and operate the facility.

Four copies of this application must be sent to the Division with an original and three copies of a 7.5 minute quadrangle map showing the data requested in Item A2. Additional data supporting this application must also be submitted in quadruplicate.

No application will be reviewed until the above actions have been completed.

APPLICATION completed by:

NAME David F. Murray, P. E. DATE 12/22/72 PHONE 779-8500

ADDRESS c/o Ben Dyer Associates, Inc., 4705 Queensbury Road

Riverdale, Maryland 20840

6/1/72

Exhibit 31 b

STATE OF MARYLAND

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

Permit No: 74-DIP-065

Effective Date: January 17, 1974

Expiration Date: July 1, 1975

Pursuant to the provisions of Article 96A of the Annotated Code of Maryland (1964 Replacement, as amended), subtitle "Pollution Abatement" (Article 96A"), the Water Resources Administration hereinafter referred to as "the Administration" hereby authorizes

GREENBRIAR SEWAGE TREATMENT PLANT

to discharge from a facility located at

Greenbriar Sewage Treatment Plant
Greenbelt, Maryland

to an unnamed tributary of Beaverdam Creek

in accordance with the following general and special conditions:

General Conditions

1. All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil and/or criminal penalties as provided for in Section 20A of Article 96A of the Annotated Code of Maryland. [Article - Natural Resources, Section 8 - 1416 (1973 Volume) effective January 1, 1974]. Facility modifications, additions, and/or expansions that increase the plant capacity must be reported to the permitting authority and this permit then modified or re-issued to reflect such changes. Any change in the facility discharge, including any new significant industrial discharge or significant changes in the quality of existing industrial discharges to the treatment system that will result in new or increased discharges of pollutants must be reported to the permitting authority. Modifications to the permit may then be made to reflect any necessary changes in permit conditions, including any necessary effluent limitations for any pollutants not identified and limited herein. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

   (a) Violation of any terms or conditions of this permit;

   (b) Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or,

   (c) A change in any condition that requires either temporary interruption or elimination of the permitted discharge.

3. Notwithstanding 2 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 27(a) of Article 96A of the Annotated Code of Maryland for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee shall be so notified.

4. The permittee shall allow the Director of the Water Resources Administration and/or their authorized representatives, upon the presentation of credentials:

   (a) To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditons of this permit;

   (b) To have access to any copy at reasonable times any records required to be kept under the terms and conditions of this permit;

   (c) To inspect at reasonable times any monitoring equipment or monitoring method required in this permit; or,

   (d) To sample at reasonable times any discharges of pollutants.

5. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringment of Federal, State or local laws or regulations.

6. This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any navigable waters.

7. The specific effluent limitations and other pollution controls applicable to discharge permitted herein are set forth below in the special conditions. Also set forth below are self-monitoring and reporting requirements. Unless otherwise specified, the permittee shall submit duplicate original copies of all reports to the Water Resources Administration and Department of Health and Mental Hygiene of the State of Maryland. Except for data determined to be confidential under Regulation 03.05.04.08 Section V, all such reports shall be available for public inspection

at the offices of the Water Resources Administration and Department of Health and Mental Hygiene. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 28A of Article 96A of the Annotated Code of Maryland.

Special Conditions

1. Effluent Limitations

The effluent limitations are effective according to the compliance schedule date of meeting these limitations:

A. The monthly average quantity of effluent discharged from the wastewater treatment facility shall not exceed 0.325 million gallons per day (mgd).

B. The quality of effluent discharge by the facility shall be limited at all times as follows:

Parameter	Minimum	Average	Maximum
BOD_5*	-----	3.0 mg/l	5.0 mg/l
Suspended Solids	-----	-----	2.0 mg/l
Total Coliform (MF Technique)**	-----	-----	1/Liter
Total Residual Chlorine*** (Amperometric Titration)	-----	-----	0.02 mg/l
Dissolved Oxygen	5.0 mg/l	-----	-----
pH	6.0	-----	7.5
Total Phosphorus (as P)	-----	0.3 mg/l	0.5 mg/l

* Split sample with BOD_5 for Total Oxygen Demand Analysis and report.

** If analysis for total coliform results in a value exceeding 1/Liter, then sampling and analysis for this parameter shall be repeated immediately. If results of the second analysis again indicate a value exceeding 1/Liter, then the virus analysis shall be made to ascertain whether or not virus inactivation has been achieved.

It is most important that sterile techniques be observed during collection and sampling for determinations of total coliform and virus.

*** Weight loss scales and automatic alarm systems must be installed for the chlorine and sulfur dioxide cylinders to insure proper functioning of the chlorination and dechlorination processes. In addition to these automated monitoring and alarm procedures, the owner/operator of these facilities must at all times properly instruct operators of the treatment systems to manually check the chlorination and dechlorination equipment and facilities.

2. Schedule of Compliance

The permittee shall achieve compliance with the effluent limitations specified above at the time of occupancy and use of sanitary facilities of the apartment complex which the treatment facility is to serve.

3. Facility Operation and Quality Control

All waste collection, control, treatment and disposal facilities shall be operated in a manner consistent with the following:

(a) At all times, all facilities shall be operated as efficiently as possible in a manner which will minimize upsets and discharges of excessive pollutants.

(b) The permittee shall provide an adequate operating staff which is thoroughly trained, properly instructed, and duly qualified to carry out the operation, maintenance and testing functions required to insure compliance with the conditions of this permit.

4. Self-Monitoring and Reporting Requirements

A. The permittee shall effectively monitor the operation and efficiency of all treatment and control facilities and the quantity and quality of the treated discharge. Such monitoring shall include determinations for the parameters for which effluent limitations have been specified, as well as other determinations and activities which assure continuous satisfactory operation of the system. Monitoring data required by this permit shall be summarized on an average monthly basis. Reports of these monthly values are to be submitted monthly. Monthly reports will be required beginning on the first day of each month. A discharge Monitoring Report Form (EPA Form 3320-1), properly completed and signed, must be submitted within 15 days after the end of each monthly report period to the following address:

Water Resources Administration
Enforcement Section
Tawes State Office Building
Annapolis, Maryland 21401 and

Department of Health and Mental Hygiene
Division of Water and Sewerage
610 N. Howard Street
Baltimore, Maryland 21201

The Data collected and submitted shall include the following parameters and testing frequencies:

Parameter	Frequency	Type of Sample
Total Flow (mgd)	Continuous	----------
BOD_5 (mg/l)	Daily	24 hr. Composite
Suspended Solids (mg/l)	Daily	24 hr. Composite
Total Coliform	Daily	Grab
Virus	Any time that two (2) successive total coliform determinations exceed 1/Liter	Grab
pH	Continuous	----------
Total Residual Chlorine	Daily	Grab
Dissolved Oxygen	Daily	Grab
Total Phosphorus	Daily	24 hr. Composite

All samples shall be taken during normal operating hours. The effluent BOD_5 sample shall be collected at a location immediately preceding disinfection. All other samples shall be collected at or as near as possible to the point of discharge.

B. The minimum and maximum values called for on EPA Form 3320-1 shall represent the results of a 24-hour day. Whereas the average values represent the monthly average.

C. Sampling and Analysis Methods

The analytical and sampling methods used shall conform to the lastest edition of the reference methods listed below. (These are interim references to be replaced by Section 304(g) guidelines when available). However, different but equivalent methods are allowable if they received the prior written approval of the Water Resources Administration.

1. Standard Methods for the Examination of Water and Wastewaters, 13th Edition, 1971, American Public Health Association, New York, New York 10019.

2. A.S.T.M. Standards, Part 23, Water; Atmospheric Analysis, 1972, American Society for Testing and Materials, Philadelphia, Pa. 19103

3. Methods for Chemical Analysis of Water and Wastes, April 1971, Environmental Protection Agency, Water Quality Office, Analytical Quality Control Laboratory, 1014 Broadway, Cincinnati, Ohio 45202

4. Federal Register, Volume 38 No. 199 "Guidelines, Establishing Test Procedures for Analysis of Pollutants" Environmental Protection Agency, October 16, 1973.

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to insure accuracy of measurements.

5. Recording

The permittee shall record for all samples the date and time of sampling, the sampling method used, the date analyses were performed, the identity of the analyst, and the results of all required analyses and measurements.

All sampling and analytical records mentioned in the preceding paragraph shall be retained for a minimum of three years. The permittee shall also retain all original recordings from any continuous monitoring instrumentation, and any calibration and maintenance records, for a minimum of three years. These periods will be extended during the course of any resolved litigation, or when so requested by the Water Resources Administration.

6. Non-compliance with Effluent Limitation

A. If for any reason the permittee does not comply with or will be unable to comply with any effluent limitation specified in this permit, the permittee shall immediately notify the Water Resources Administration or his designee by telephone at 301-267-5551 and provide the Water Resources Administration with the following information in writing within five days of such notification:

1. A description of the non-complying discharge including its impact upon the receiving waters.

2. Cause of non-compliance.

3. Anticipated time the condition of non-compliance is expected to continue or if such condition has been corrected, the duration of the period of non-compliance.

4. Steps taken by the permittee to reduce and eliminate the non-complying discharge.

5. Steps to be taken by the permittee to prevent recurrence of the condition of non-compliance.

B. Permittee shall take all reasonable steps to minimize any adverse impact to waters of the State resulting from non-compliance with any effluent limitation specified in this permit. The permittee should also provide accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge.

C. Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for non-compliance, whether or not such non-compliance is due to factors beyond his control, such as equipment breakdown, electric power failure, accident, or natural disaster.

D. There will be no bypass directly to the waters of the State.

7. Solids Disposal

Collected screenings, slurries, sludges, and other solids shall be disposed of in such a manner as to prevent entry of those wastes (or runoff from the wastes) into the waters of the State.

8. Toxic Discharges

Toxic discharges are prohibited, that is, discharges of substances like ammonia, heavy metals, and other substances in concentrations which are or may be toxic to aquatic life in the receiving waters.

9. This State NPDES Permit is issued to the Washington Suburban Sanitary Commission, 4017 Hamilton Street, Hyattsville, Maryland 20781 This permit is contingent upon ownership and operation of this facility by the applicant.

By authority of _____
Director, Water Resources Administration Date

Permittee hereby accepts the terms and conditions of this permit.

Washington Suburban Sanitary Commission _____ 1/10/74
(Permittee) (Date)

By: James A. Stapp, Director of Design and Construction
Per Resolution No. 74-173
Adopted 1-9-74 (copy attached)

_____ 1/10/74
(Witness) (Date)

Exhibit 31c

RESOLUTION NO. 74-173

Adopted: January 9, 1974

Subject: A RESOLUTION concerning the Greenbriar Temporary Sewage Treatment Plant Permit.

WHEREAS, Greenbriar Associates desires to construct a Temporary Sewage Treatment Plant to serve apartment units in the Greenbriar Apartment Project; and

WHEREAS, upon completion of the construction of said treatment plant, the Washington Suburban Sanitary Commission shall thereafter operate said plant; and

WHEREAS, the Maryland Water Resources Administration has released a "Notice of Issuance" of NPDES Permit #74-DIP-065 for the Greenbriar Temporary Sewage Treatment Plant and has transmitted said Permit to the Washington Suburban Sanitary Commission; and

WHEREAS, the Permit provides for the Washington Suburban Sanitary Commission, as Permittee, to sign the Permit to indicate that it "accepts the terms and conditions of the Permit"; and

WHEREAS, this Commission (the WSSC) has been advised by its Legal Office that the acceptance of the Permit does not obligate the Commission to operate the Greenbriar Temporary Sewage Treatment Plant when fully constructed unless and until the Commission is satisfied that the operation of the said plant may be accomplished in accordance with the terms and conditions of the NPDES Permit #74-DIP-065; and

WHEREAS, Greenbriar Associates has, by letter of December 19, 1973, advised the Commission that it "will not regard any action of the Commission in accepting the aforesaid Permit as constituting a commitment to operate the Greenbriar Treatment Plant and will not assert any such claims in any litigation against the Washington Suburban Sanitary Commission"; and further, Greenbriar Associates

understands it must reach an agreement with the Commission, the purpose of which is to satisfy the Commission that the plant has the ability to operate and function in accordance with the terms and conditions of the aforesaid Permit, and that upon execution of said Agreement, the Commission shall thereafter operate said plant; and

WHEREAS, it appears to the Commission that the operation of the Greenbriar Temporary Sewage Treatment Plant within the parameters specified in NPDES Permit #74-DIP-065 may be difficult due to the stringent conditions enumerated in said Permit and the novelty of the plant design features; it being recognized by the Commission and Greenbriar Associates that neither party is presently aware of any treatment plant in the United States that is capable of performing in accordance with the stringent conditions outlined in NPDES Permit #74-DIP-065; and

WHEREAS, in the circumstances, the Commission is not now in a position to determine that the said plant will operate satisfactorily until such time as it can be demonstrated that the plant is capable of operating sufficiently to produce the quality of effluent to satisfy the NPDES Permit conditions.

NOW, THEREFORE, BE IT RESOLVED, this 9th day of January, 1974, by the Washington Suburban Sanitary Commission, that the Commission shall not accept the responsibility for the operation of the Greenbriar Temporary Sewage Treatment Plant until such time as the Commission is satisfied that the said plant is capable of operating pursuant to the conditions of NPDES Permit #74-DIP-065 so as to produce an effluent to meet said standards, and that it is understood that the acceptance of the said Permit shall be subject to the parameters of this Resolution.

AND, BE IT FURTHER RESOLVED, that Greenbriar Associates and the Commission are to enter into an Agreement the effect of which is to satisfy the Commission that the Temporary Sewage Treatment Plant shall be capable of meeting all of the conditions outlined in the said Permit and that such Agreement shall be executed prior to the time the Commission assumes the operation of said plant.

AND, BE IT FURTHER RESOLVED, that the Commission recognizes that it has a responsibility to protect the health, welfare and safety of the residents in the area to be served by the said treatment plant, and that the acceptance of the said Permit and the ultimate operation of said Sewage Treatment Plant is conditioned upon the Commission fulfilling its statutory responsibility as aforesaid.

AND, BE IT FURTHER RESOLVED, that the Director of Design and Construction is authorized to note acceptance of the Permit under and subject to the provisions of this Resolution, with his signatory acceptance on the Permit instrument to specifically refer to this Resolution, and to subjoin a copy of this Resolution to the instrument and transmit the same to the Water Resources Administration and State Department of Health and Mental Hygiene.

A True Copy.

ATTEST:

John T. Bonifant - Secretary

Exhibit 31d

State of Maryland

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

ENVIRONMENTAL HEALTH ADMINISTRATION BALTIMORE, MD. 21201

SEWERAGE PERMIT

No. 74-25-0036

Date January 23, 1974

This is to certify that the Greenbriar Associates is permitted to construct a temporary sewage treatment plant together with all appurtenances, in the Greenbriar Apartments complex, east of Baltimore-Washington Parkway and north of Greenbelt Road, Berwyn Election District No. 21, Prince George's County in accordance with application from Ben Dyer Associates, Inc. dated January 18, 1974 and plans and specifications received by the Department of Health and Mental Hygiene on January 18, 1974, entitled in part:

Greenbriar Sewage Treatment Plant
Sheet No.'s 1 to 30 of 30
Approved by the Washington Suburban
Sanitary Commission on July 12, 1973

and

Specifications

and

Addendum No. 1

THIS PERMIT IS ISSUED SUBJECT TO ALL OF THE FOLLOWING PROVISIONS AND CONDITIONS HEREINAFTER SET FORTH:

1. This permit does not certify to the structural adequacy of the various structures involved.
2. This permit becomes null and void three years from the date of issue, if not specifically extended, unless the work herein approved shall have been completed and placed in operation on or before said date.
3. This permit is not transferable.

DHMH-001

11

4. This permit is issued on the basis of the following design criteria presented in the approved construction plans and specifications and required by the State NPDES Permit No. 74-DIP-065:

a. Average daily flow - monthly basis - not to exceed 0.200 mgd.
b. The quality of effluent discharge by the facility shall be limited at all times as follows:

Parameter	Minimum	Average	Maximum
BOD_5	-------	3.0 mg/l	5.0 mg/l
Suspended Solids	-------	--------	2.0 mg/l
Total Coliform (MF Technique)**	-------	--------	1/Liter
Total Residual Chlorine (Amperometric Titration)	-------	--------	0.02 mg/l
Dissolved Oxygen	5.0 mg/l	--------	---------
pH	6.0	--------	7.5
Total Phosphorus (as P)	--------	0.3 mg/l	0.5 mg/l

* Split sample with BOD_5 for Total Oxygen Demand Analysis and report.

** If analysis for total coliform results in a value exceeding 1/Liter, then sampling and analysis for this parameter shall be repeated immediately. If results of the second analysis again indicate a value exceeding 1/Liter, then the virus analysis shall be made to ascertain whether or not virus inactivation has been achieved.

If the use and operation of the facilities covered by this permit become prejudicial to the public health or public sanitary interests or the Water Quality Standards become endangered or violated, the Department of Health and Mental Hygiene (hereinafter called the Department) may take, or require, such corrective action as is consistent and appropriate with the law.

5. In accordance with the Regulations issued under Section 406A, Article 43, of the Annotated Code of Maryland, the sewerage facility covered by this Permit is classified as ---C----.

6. Upon the approval of the construction plans and specifications and the issuance of a permit by the Department, it is and shall remain the sole and continued responsibility of the WSSC, their authorized agents or representatives, to own, construct, operate and continuously maintain in a satisfactory manner at all times the total facility in compliance with the laws, rules, regulations and requirements of the State of Maryland.

7. The Department in issuing this permit has relied upon the statements and representations made and presented by the Owner and its authorized agents or representatives.

8. If any changes, additions, or deletions are necessary at any time, new or revised plans and specifications must be submitted, and a new permit, after review, may be required of the Department before the construction of such major changes, additions, or deletions. After completion of the work a certified copy of the plans in full, showing the work as built, shall be filed with the Department for permanent record.

9. The Owner shall employ certified plant personnel and shall be responsible for the submission to the Department of monthly plant operating reports in the form approved by the Department.

10. Upon completion of the facilities, the Owner shall submit in writing a statement certifying that the facilities have been constructed in accordance with approved plans and specifications. The Owner shall further furnish at least ten (10) days notice to the Department indicating the date when the facility covered by this permit is expected to be placed into operation.

11. The Owner shall immediately notify the Department whenever a discharge of untreated or partially treated sewage has occurred and shall, within 24 hours of such discharge, furnish to the Department such information as to the cause, frequency, quality, duration and volume of such discharge. Further, the Owner shall, as soon as possible but no later than 30 days thereafter, submit to the Department a plan and a time schedule for the elimination and prevention of future discharges of untreated or partially treated sewage.

12. This wastewater treatment plant may not be placed into operation until the outfall pipe as shown on Sheet No. 29 of 30 is complete to the point of discharge indicated thereon.

As witness the signatures of authorized officials of the Department of Health and Mental Hygiene.

Howard G. Chaney

Director, Environmental Health Administration

Chief, Division of Water and Sewerage

Exhibit 32

FRIED, FRANK, HARRIS, SHRIVER & KAMPELMAN
(STRASSER, SPIEGELBERG, FRIED, FRANK & KAMPELMAN)
SUITE 1000, THE WATERGATE 600
600 NEW HAMPSHIRE AVENUE, N.W.
WASHINGTON, D.C. 20037
(202) 965-9400
CABLE "STERIC WASHINGTON"
TELEX 440356

September 21, 1973

BY HAND

Mr. Saul Cohen
Office of Chief Counsel
Building 8, Room 535
National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Re: Greenbriar

Dear Mr. Cohen:

I am enclosing, for your consideration, six copies of a draft Environmental Impact Statement ("EIS") which considers the environmental issues presented by the application of our client, Greenbriar Associates, for an easement across 150 feet of land within the Goddard Space Flight Center. Also enclosed is a list of interested persons to whom you may wish to consider circulating the draft EIS issued by NASA. This draft is submitted in accordance with §1500.7(c) of the Rules and Regulations of the Council on Environmental Quality (as published in the Federal Register on August 1, 1973). I am available to respond to any questions you may have or to provide such additional information as you may require.

Let me take this opportunity to respond, finally, to the questions raised by Mr. Keller in his letter to Mr. Schifter of July 26 in the order then presented.

1. The proposed plant and its effluent will comply with the requirements and standards of applicable federal, state and local law as is discussed in greater detail in the draft EIS. See, pages 7 - 12. A permit from the Maryland Department of Health and Mental Hygiene will be required prior to construction of the plant. An application is pending, but the Department has thus far taken the position (which we do not accept) that it would not grant the permit until EPA has issued a discharge license. EPA has indicated that it may not issue the discharge permit until the easement has been granted. To date, the only problem raised by EPA in its consideration of the Greenbriar STP concerns the location of the plant. In that connection, I am enclosing a copy of a letter, dated September 21, 1973, from Mr. Schifter to Mr. Daniel J. Snyder, III, of EPA's Philadelphia Regional Office explaining why it is not feasible to locate the interim facility at the site of the Western Branch plant. This issue is discussed in the draft EIS at pages 28-30. Also enclosed is a copy of the EPA discharge standards as reflected in "Region III EPA Policy Statement, Interim Treatment Facilities, Washington, D.C. Metropolitan Area" and of the applicable regulations of the State of Maryland Water Resources Administration, Reg. 08.05.04.03. These requirements are set out on the table at page 10 of the draft EIS.

2. As mentione d above, an EPA permit will be required in order to discharge the effluent produced by the Greenbriar sewage treatment plant into the stream within the Goddard Space Flight Center. Similar permission must be obtained from the Water Resources Administration of the State of Maryland.

3. As is explained in detail in the enclosed draft (at pages 15-18), the plant will not cause

noxious odors. We understand that officials of NASA have inspected plants employing the processes to be used at the Greenbriar STP and are satisfied as to the absence of noxious odor, but if there are any further questions, we shall be pleased to respond. The question of aesthetic appearance is treated in the draft EIS (at page 18). The developer has been required to post a bond with the Washington Suburban Sanitary Commission to assure that the plant will be dismantled as soon as it is possible to hook up to the public sewer system. Our clients are prepared, if necessary, to include NASA in these arrangements.

In furnishing this draft EIS, we wish to point out that we are in no way conceding that an EIS is required under the provisions of the National Environmental Policy Act of 1969, 42 U.S.C. §4332(a)(C) and the appropriate NASA regulations, 14 C.F.R. §1204.11. As we have previously explained in detail, it is our view that the requested easement does not constitute a major federal action having a significant effect on the human environment, so that NASA is not required thereunder to circulate an EIS prior to taking the action in question. We understand that you have not accepted this position, and we are, therefore, solely in the interest of expediting the pending application for the easement, submitting the enclosed draft. In that connection, and in view of the facts discussed in detail in the enclosed draft, it is respectfully requested that NASA prepare and circulate its draft EIS in the manner provided in the regulations of the Council on Environmental Quality at the earliest possible date.

Thank you for your consideration.

Sincerely,

David E. Birenbaum

Enclosures
DEB/lls

cc: Mr. James F. Mills

ENVIRONMENTAL IMPACT STATEMENT

of

GREENBRIAR APARTMENTS

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1 DESCRIPTION OF RIGHT OF WAY and Diagram of Easement prepared by Ben Dyer Associates, Inc. and Area Maps of site

2 REPORT ON THE USE OF TEMPORARY WASTEWATER TREATMENT PLANTS: STANDARDS AND PROCEDURES FOR ELIMINATION OF HEALTH HAZARDS by John T. Cookson, Jr., Ph.D., Environmental Health Engineer

3 EVALUATION OF BREAKPOINT CHLORINATION AND DECHLORINATION ON EFFLUENT AND SALT CONTENT by John T. Cookson, Jr., Ph.D.

4a Letter of August 5, 1973 to Mr. Frank O'Toole from John T. Cookson, Jr., Ph.D.

4b Letter of September 18, 1973 to Mr. David Birenbaum from John T. Cookson, Jr., Ph.D.

5 Letter of September 20, 1973 to Mr. David E. Birenbaum from Mr. Richard S. Joshlin of Ben Dyer Associates, Inc.

6 SUMMARY STATEMENT ON THE GREENBRIAR WASTEWATER TREATMENT PLANT by John T. Cookson, Jr., Ph.D.

7 TRAFFIC IMPACT STUDY by Hunnicutt and Neale, Parking and Transportation Consultants

8 Letter of September 12, 1973 from Potomac Electric Power Company to Mr. George Brugger regarding the availability of electric service to project

9 EFFECT OF THE GREENBRIAR DEVELOPMENT ON REVENUES AND EXPENDITURES OF THE CITY OF GREENBELT AT CURRENT TAX RATES AND LEVELS OF SERVICE by Robert R. Nathan Associates, Inc.

SUMMARY SHEET FOR ENVIRONMENTAL
IMPACT STATEMENT

Greenbelt, Maryland

(x) Draft

( ) Final

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

Administrative Action (x)

Legislative Action ( )

For further information, contact:

SUMMARY

The proposed federal action is the grant of a temporary easement across federal property for the outfall line of an advanced sewage treatment plant. The purpose is to make possible the occupancy of 1,193 apartments to be built on the adjoining land, served by an on-site sewage treatment plant. The sewer hook-up moratorium in the Western Branch Basin, which will last until early 1975, has prevented the developer from using public sewer service. As soon as the moratorium is lifted, the on-site treatment plant will be dismantled and the apartment project connected to the public sewer system.

The temporary easement will have no long-term environmental impact, because the plant will be dismantled when the public sewer connection becomes available. The interim treatment plant will produce an effluent which normally will be of drinking water quality and will not give rise to any impacts detrimental to the environment. The secondary impacts — which derive from the housing development rather than the sewage treatment plant — are limited to those which are caused by permitting occupancy prior to the lifting of the sewer moratorium and are expected to be inconsequential.

Possible adverse impacts of Greenbriar have been examined by responsible agencies and officials who determined that they are acceptable from the point of view of planning, the environment, and the burden on municipal services.

The major alternative considered was to take no action. This would have little or no beneficial impact, would work a hardship on the developer, would delay a project which has been authorized by all local government agencies having jurisdiction over the matter, keep the housing off the market for more than a year, deny employment in the construction industry at a time when that industry, as a result of the sewer moratorium, is facing a sharp decline, and cause the project, on which construction

has begun and has progressed significantly, to deteriorate while the lifting of the sewer moratorium is awaited. Other alternatives reviewed include connection to the public sewer system, which is ruled out by the moratorium, and locating the interim facility at the Western Branch plant, which appears to be infeasible.

Comments have been solicited from:

ENVIRONMENTAL IMPACT STATEMENT

I. INTRODUCTION

The Greenbriar Apartment Development ("Greenbriar"), comprising 1,193 garden apartments, is under construction on an undeveloped 80 acre tract of land* in Greenbelt, Maryland, contiguous to the Goddard Space Flight Center ("GSFC") of the National Aeronautics and Space Administration("NASA") and east of the Baltimore-Washington Parkway. The development is being built by Greenbriar Associates, will be financed privately, and has been approved, after extensive consideration (see, 4 - 7 and 20, infra) by the local authorities concerned.

The sole Federal action involved (and the reason for this Environmental Impact Statement) arises out of the developer's request that NASA grant to the Washington Suburban Sanitary Commission ("WSSC") a temporary easement across 150 feet of land for the purpose of laying an eight-inch cast iron pipe, at a depth of approximately three feet, from the Greenbriar property line to a free-flowing stream within the GSFC.** This right-of-way

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* In its undeveloped state, the vegetation within Greenbriar tract — composed of sandy clay soil with some pockets of gravel — was limited to evergreen tree thickets and deciduous tree stands, each comprising approximately one-third of the land area. The balance of the tract was an open area in which top soil was exposed to the elements causing erosion.

** The complete legal description, and a diagram of the easement and a map of the area are attached as Exhibit 1.

will permit effluent from an on-site temporary wastewater treatment plant ("Greenbriar STP"), which will be built on the Greenbriar site, to be discharged into the stream. It will be a temporary facility, terminating operation early in 1975 when a new Western Branch Treatment Plant is expected to be completed.* At that point, Greenbriar will hook up to the public sewage system, the plant will be dismantled, and the easement will then terminate. The on-site treatment plant is required in order to permit occupancy pending completion of the new Western Branch project.

The primary environmental impacts considered by this statement concern the operation of the Greenbriar STP. Inasmuch as the housing development has been approved by all concerned local authorities (see 20, infra) and, except for the sewer moratorium currently in effect, occupancy would have commenced in December of 1973, the only secondary impacts which can be said to have been caused by the federal action requested (the granting of the easement)

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* The first phase of the Western Branch Sewage Treatment Plant is scheduled to commence operation in February, 1975. Plans and specifications were approved in 1972 and funding arrangements were completed by June, 1973. The WSSC advertised for bids in mid-June and selected and approved the lowest bidder on August 15, 1973. This bidder has been approved by the Maryland State Department of Health and Mental Hygiene and by the Philadelphia Regional Office of the Environmental Protection Agency. Construction is expected to commence in the near future.

are those which would not have occurred had occupancy been postponed until 1975 (when the availability of the public sewer system will eliminate the need for such federal action). Accordingly, our assessment of the secondary environmental impacts will focus on those attending the acceleration of occupancy, rather than the construction of Greenbriar itself.

II. DIRECT ENVIRONMENTAL IMPACTS

A. Approval by Local, State and Federal Authorities

The on-site treatment plant which the developer proposes to construct is designed to produce an essentially virus-free effluent which normally will be of drinking water quality and invariably will surpass all applicable standards. It is to be built in compliance with standards established by the State of Maryland and the WSSC. The latter will operate the plant at the expense of the developer and under the general supervision of the Environmental Health Administration of the Maryland State Department of Health and Mental Hygiene. The plant will not commence operation until it has received a discharge permit from the Environmental Protection Agency and the Maryland Water Resources Administration. The latter two agencies will determine the quality standards which the effluent must meet.

The location of the Greenbriar STP within the Greenbriar tract was authorized in the 1972 Annual Revision of the Prince Geoerge's County Ten-Year Water and Sewerage Plan, adopted by the Prince George's County Council on November 29, 1972 and approved by the State Department of Health and Mental Hygiene in February of 1973.

Although health matters are a responsibility of the State and do not normally arise in the context of the

Ten Year Plan, the unique character of interim treatment facilities (the Prince George's County Council has, to date, approved very few such plants) caused the County to impose the following conditions (in addition to those required by the state) relating to health, as well as the environment, applicable to the operation of the proposed on-site plant. Thus:

a. the plant must incorporate the advanced treatment process proposed by Dr. John T. Cookson, Jr.,* the developer's technical consultant, as described in his Report on the Use of Temporary Wastewater Treatment Plants: Standards and Procedures for Elimination of Health Hazards, a copy of which is attached as Exhibit 2;

b. there may be no mechanism which would allow untreated sewage to by-pass the plant in times of overload;

c. excess chlorine must be removed from the effluent after contact time adequate to

---

* Dr. John T. Cookson, Jr., Associate Professor in the Department of Civil Engineering of the University of Maryland and Director of the University's Environmental Health, Science and Engineering Training Program, has served as technical consultant to Greenbriar Associates.

effect disinfection has elapsed;

d. virus sampling of the effluent must be done on a routine basis, at least monthly, by a competent laboratory, at the owner's expense;

e. multi-media filters of the type used at a similar plant located at Lake Tahoe are required to be installed;

f. there must be a meter to record constantly the flow of sewage into the plant;

g. a pre-set limit to the number of connections allowed and strict adherence to this limit must be established;

h. a large surge tank must be utilized in order to equalize the flow into the plant, so that peak hours and low usage period flows are equalized;

i. a recycling capability must be included, so that if any unit of the plant falls below the expected standard of treatment, the sewage can be sent back through the plant to insure proper treatment;

j. a double, completely independent, power supply must be included;

k. the plant must be run by WSSC, using a trained and experienced maintenance crew;

l. the method of sludge disposal must be clearly outlined;

m. the plant must be closed as soon as public sewage facilities become available;

n. the effluent must be enclosed in a pipe to a point in the stream where there is a continous year-round flow of water;

o. an emergency connection with the WSSC community sewer system must be built so that if a problem developed at the plant, sewage could be discharged into the system instead of directly into the receiving stream; and

p. the sewage effluent must be treated with breakpoint chlorination to inactivate viruses with subsequent dechlorination to meet State water quality standards.*

The developer is committed to compliance with these conditions, and WSSC will not commence operations unless these conditions have been met.

B. Removal Effectiveness of the Sewage Treatment Plant

The Greenbriar STP is to operate as follows. Raw sewage will flow into a wet well from which it is pumped to a secondary unit. The secondary unit will be a

---

* This process is described in the memorandum "An Evaluation of Breakpoint Chlorination and Dechlorination on Effluent and Salt Content," prepared by Dr. Cookson. A copy is attached as Exhibit 3.

standard, extended aeration treatment plant which provides for biological oxidation. The plant will be equipped with a surge tank and an effluent holding tank to equalize the flows into the plant and the advanced treatment unit. From the secondary unit, the flow will be directed to the advanced units, which will provide for phosphorus removal by means of precipitation and flocculation using alum,polymer and soda ash. The flow then goes to the tube settler and mixed media filter and is thereafter pumped into the chlorine contact tank where it is retained for a period of one hour. Prior to discharge into the stream, the effluent is dechlorinated using sulphur dioxide. The plant will be equipped with complete recycling capabilities which enable the effluent to be recycled from any of the processes back to the front end of the plant. There will be no by-pass mechanism to discharge sewage into the stream. Rather the plant will include an emergency connection to the WSSC system so that, in case of emergency, any overflow may be pumped into the public sewage system. The sequences described above and their virus removal efficiency are diagramed in Figure (1) below.

FIGURE (1)

Diagram of Greenbriar STP Processes and Virus Removal Effectiveness by Sequence

		Likely Virus Removal in Percent	
		Individual Process	Total
	Raw Sewage		
Biological Process	Activated Sludge With Nitrification	(50)	(50)
	Sedimentation	(0)	(50)
	← Alum, Polymer and Soda Ash		
Physical-Chemical-Processes	Phosphate Precipitation	(95)	(97.5)
	Filtration	(50)	(98.75)
	Chlorination to Breakpoint	(100)	(100)
	Dechlorination and pH Adjustment		
	Effluent		

Employing these processes, the Greenbriar STP, as shown by the following table, will attain levels of treatment exceeding requirements set by the EPA and the State of Maryland.

Parameters	EPA	State of Maryland Water Resources Administration Class I Waters	Greenbriar Minimum Quality Levels*	Percent Removal
BOD_5	not to exceed 10 mg/l	-	not to exceed 3.9 mg/l	98.5%
suspended solids	not to exceed 10 mg/l	-	not to exceed 1.9 mg/l	99.2%
phosphorus as P	not to exceed 4 mg/l	-	not to exceed 1.0 mg/l	93-95%
total Nitrogen as N	-	-	not to exceed 15 mg/l	25%
coliforms	-	not to exceed 200/ 100 ml	not to exceed 2/100 ml	
dissolved oxygen	-	not less than 4.0 mg/l	not less than 5.0 mg/l	
pH	-	6.5 - 8.5	6.5 - 7.2	
turbidity	-	in receiving water not to exceed 50 JTU as a monthly average and not to exceed 150 JTU at any time	less than 1 JTU	
viruses	-	-	1 PFU/10 gal.	99.99%

* This data is derived from tests run on the effluent produced by the Landover Mall sewage treatment plant, which the Greenbriar plant has followed, with the addition of some improvements. See the letters of Dr. Cookson, dated August 5, 1973 and September 18, 1973, copies of which are attached as Exhibit 4a and 4 b, respectively. As pointed out by Dr. Cookson in Exhibit 4b, the minimum quality levels specified in the table will be achieved constantly. Normally, however, the Greenbriar STP will satisfy the higher — drinking water quality — standards as described in Exhibit 4a. The EPA standards are set forth in "Region III, EPA Policy Statement, Interim Treatment Facilities, Washington, D.C. Metropolitan Areas." The WRA requirements are reflected in its Rules and Regulations at Reg. .08.05164.03.

The Greenbriar STP will receive only domestic waste, the composition of which does not include the heavy metals and phenols frequently found in municipal systems. More particularly, the effluent will not contain any substances in toxic concentrations. As the following chart illustrates, the substances contained in the effluent will be of a quantity no greater than found in the drinking water which supplies the apartment, except for aluminum:*

Substance	Effluent Quantity
Ammonia	zero
Cyanide*	essentially zero
Aluminum	3 - 5 mg/l
Cadmium*	essentially zero
Chromium**	essentially zero
Copper**	essentially zero
Lead**	essentially zero
Mercury**	essentially zero
Nickel**	essentially zero
Selenium**	essentially zero
Zinc**	essentially zero
Phenol**	essentially zero

* See Exhibit 4a.

** Trace amounts as found in the drinking water which supplies the apartment complex may be present. For all practical purposes, these would be considered as zero in the effluent. See Exhibit 4a.

Aluminum, the only substance discharged in higher concentrations than the incoming water, results from the phosphate precipitation process and is not considered toxic. Virus removal will be completed by breakpoint chlorination. The result will be an essentially virus-free effluent.

C. Long Term Impact of Flow of Effluent

The proposed action will have no long term impact on the stream. As mentioned above, the Greenbriar STP will be operated only until completion of the first phase of the new Western Branch STP (scheduled to occur in February, 1975) which will provide capacity sufficient to process waste from Greenbriar.*

The WSSC permit requires that the interim treatment plant be dismantled when public sewer service becomes available. Thus, the Greenbriar STP will not continue

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* The first phase of the new plant is to be completed within 450 days of commencement and will increase the treatment capacity of the Western Branch plant by 15 mgd. The Director of Planning of the WSSC projects that the second phase should be completed not more than six months thereafter. It will increase capacity to 30 mgd. The present flow at Western Branch is approximately 6 mgd. As of September 1, 1972, all then pending applications for public sewerage in the Western Branch Basin which had not yet generated any flow totaled 6,160,317 gd. This figure includes Greenbriar. It is conceivable that upon completion of the Western Branch plant addition some wastewater which is now diverted elsewhere may be transferred to treatment at the Western Branch plant, but the total amount so transferred is not likely to exceed 3 mgd. It follows that the first phase of the Western Branch addition will permit all applications pending on September 1, 1972 for public sewer service in the Western Branch Basin, including Greenbriar, to be honored.

to discharge effluent into the stream beyond a relatively brief period.

D. Impact on the Stream

There is no danger of cultural eutrophication of the stream caused by the effluent discharged by the Greenbriar STP. Algae, which deprives water of oxygen, will not grow without the presence of both phosphorus and nitrogen.* The predicted level of phosphorus in the effluent of 0.8 mg/l - 1 mg/l (lower than the EPA-mandated limit of 4 mg/l) should be below the limit required for increased algae growth.** Inasmuch as the effluent flow will be nearly continuous and will enter a free-flowing stream, rather than a lake or estuary, stagnation would not occur. Since the effluent will normally be of a higher (meeting drinking water standards) quality than the stream, degradation of the water cannot take place.

Assuming "normal" activity in the stream, the flow is estimated to be 1 to 1.5 cubic feet per second, so that the depth at the point of discharge of the effluent will be 0.50 ft. When the first stage (see E below) is operating at capacity, the effluent will flow at the rate of .466 cfs, changing the depth to 0.65 ft. When the

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* Since nitrogen removal is not essential to prevent cultural eutrophication, neither the State of Maryland nor the EPA at present requires its removal. The amount to be produced by the Greenbriar STP (80 lbs per day) is considered too small to cause harmful effects, in any case.

** The natural level of phosphorous in the stream is 0.4 - 1.0 mg/l.

second stage is operating at capacity, the rate of effluent flow will be .892 cfs, and the depth at the point of discharge will be .74 ft. The change in the depth at the discharge point from 0.50 to 0.74 ft. at maximum utilization of the plant does not represent a sufficient alteration to cause the stream to overflow its banks, cut a wider channel or endanger the roots of trees.* Nor will the salt content and pH level be high enough to represent a danger to plant or aquatic life.

E. Capacity of Greenbriar STP

The proposed Greenbriar STP will be built in two stages, the first of which will have a capacity of 200,000 gallons/day (gd), and the second, a capacity of 125,000 gd. To determine capacity, each apartment unit was assigned a flow figure of 340 gd, less 20 percent for watersaving devices, which resulted in 272 gd per unit.

The developers of Greenbriar expect to complete the 1,193 units in increments of fifty units per month. Assuming that the first increment is completed and occupied during December 1973, and that this pattern obtains in following months, the projected flow figures will be as follows:

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* See letter dated September 20, 1973, from Richard Joshlin of Ben Dyer Associates, Inc., the Greenbriar design engineers, attached as Exhibit 5.

1/1/1974	13,600
2/1	27,200
3/1	40,800
4/1	54,400
5/1	68,000
6/1	81,600
7/1	65,200
8/1	108,800
9/1	122,400
10/1	136,000
11/1	149,600
12/1	163,200
1/1/1975	196,800
2/1	190,400
3/1	204,000

As these statistics indicate, the first stage of the Greenbriar STP will be capable of treating all flows generated by occupants up to February 1, 1975. The WSSC will monitor flows at the plant closely, and the availability of treatment capacity will govern the issuance of occupancy permits. The second stage will be built in June, 1974 only if progress on the Western Branch plant fails to meet present expectations which are that adequate capacity will be available in February, 1975.

F. Sludge Disposal

The Greenbriar STP will produce 700 gallons per day of sludge at maximum utilization — this relatively large amount (in relation to the size of the plant) is caused by the phosphorus removal processes provided. The sludge will be of two types: biological and chemical.

Both types will be pumped to a 77,917 gallon sludge holding tank and held in aerobic condition until removal. The WSSC, which uses trucks having a holding capacity of 10,000 - 13,000 gallons, will remove the sludge to an existing disposal facility — requiring less than two trips per week.

G. Odor

There will be no wind-blown odor emanating from the sewage treatment plant. As Dr. Cookson explained:

> "Odor production in wastewater treatment plants results from septic sewage and biological processes which utilize anaerobic organisms. At Greenbriar, the sewer lines are very short compared to municipal systems. Therefore, the sewage will not become septic before reaching the treatment plant. Once in the treatment plant, all biological processes are aerobic systems. Odors are only produced by processes using fermentation or anaerobic respiration. It is for this reason that the Greenbriar Plant will not use the common anaerobic digestors for sludge stabilization. Sludge stabilization will occur under aeration, a process called aerobic digestion. Sludge storage tanks will also receive continuous aeration to prevent septic odor-producing conditions. No sludge will be disposed of at the Greenbriar site. Thus, there is no process in the Plant that will produce odorous gases."*

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* The passage quoted above appears in A Summary Statement on the Greenbriar Wastewater Plant, by Dr. Cookson (at 3-4) a copy of which is attached as Exhibit 6. Dr. Cookson went on to point out that:

"There have been some questions on the SO_2 dechlorination unit and the possibility of odor production. First, it should be noted that no chlorine or sulfur dioxide gases will be discharged to the atmosphere. All chlorine will be converted to water solution species. Sulfur dioxide will be added to the sewage for dechlorination as chemically illustrated below: (continued on next page)

There is an auxiliary blower to oxygenate the sewage, and a stand-by generator, as safety devices which would prevent the sewage from becoming septic should the blower or power supply fail. The surge and holding tanks will be capable of taking sewage flushed to the plant during any emergency repairs.

(continued from previous page)

$$2\,HOCl + SO_2 \longrightarrow 2H^+ + 2Cl^- + SO_4^=$$

free chlorine	sulfur dioxide	hydrogen ions	chloride salt	sulfate salt

As this reaction illustrates, no odor or gas will be produced. The byproducts from the reduction of hypochlorous acid are the salts of chloride and sulfate and hydrogen ions. Sulfate ions, a salt, will not cause any odors and sulfide, which leads to odorous hydrogen sulfide gas, cannot be produced by the dechlorination process. As the equation illustrates, chlorine oxidizes the sulfur atom in sulfur dioxide to the sulfate ion. Sulfide can only be produced by the reduction of sulfur dioxide and this is chemically impossible in an effluent containining hypochlorous acid. The sulfur atom is oxidized rather than reduced. This process is frequently used for dechlorination. Pilot plant studies were conducted on sewage effluent from advanced wastewater treatment plants for determining dose requirements, contact times and effluent quality after dechlorination. These tests were performed for Ben Dyer Associates, Inc., design engineers for the Greenbriar Plant, and at no time was any trace of odor present from the dechlorination process.

The application of chlorine and sulfur dioxide gases to the effluent will be automatic. In view of the variable flow rates and chlorine demand, an automatic control based on flow and chlorine residual will be used to control chlorine dosage. A chlorine residual analyzer will be used to pace the SO_2 solution feeder. Thus, accurate and automatic control will be provided on each dosing unit."

H. Aesthetics

The Greenbriar STP appears unobjectionable on aesthetic grounds. Three sides of the plant will be completely screened by trees and low shrubs. The open side will face the apartments and will not be so covered, because the existing trees on that side of the facility could not be preserved. It is not possible to plant new trees which could grow high enough to make an effective screen within the maximum anticipated life-time of the plant. The ground will be sodded and seeded. A chain link fence will be erected to prevent entry by people or pets. The plant itself will consist of blue metal buildings. The tanks will be steel.

I. Noise

The Greenbriar STP will generate little if any noise during normal operations. The back-up engine and fan (required to cool the engine), however, will produce some noise during the necessarily limited and infrequent periods when they may be in use — the 30 minute exercise period each week and any emergency break-down in the Potomac Electric Power Company's delivery system.

The sound will be produced by the stand-by generator,* which will be equipped with a critical sound

* The system includes a pump, which will be below the ground and, therefore, will not produce any noticeable increase in the existing sound level.

rated muffler which, as required by the specifications, is to have the lowest sound rating available for the engine. The inside surface of the walls and ceiling of the generator building are to be lined with figerglass, blanket-type insulation. This system was specified by the WSSC and is of the type commonly used in institutions requiring an emergency power supply and low noise levels, such as hospitals.

The generator will burn diesel fuel number 1 or 2, both of which meet or exceed the emission standards established for diesel engines in trucks and will produce no visible emissions. In light of the fact that the generator will operate infrequently, any air pollution which it may cause will be minimal.

III. INDIRECT OR SECONDARY IMPACTS

A. Approval by Local Authorities

Greenbriar conforms to the Master Plan and is in accordance with the zoning requirements of Prince George's County. Because of a request by the developer for a special exception to the bedroom percentage ordinance applicable in Prince George's County (which allowed for more two and three-bedroom apartments than is normally permitted), Greenbriar was given unusally extensive and detailed consideration by the County Council. The Council held public hearings, during which testimony was received on all aspects of the project, including secondary environmental impacts. The special exception application was granted.

In view of these approvals, Greenbriar could be constructed and occupied as soon as public sewerage were available, whether or not the federal action requested is granted. The secondary environmental impacts which stem from the issuance of the proposed easement are, therefore, limited to those which would not occur were the project to be delayed.* These are analyzed below.

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* In this connection, it should be noted that Greenbriar will be completed in stages of 50 units per month, so that an average of less than half of the planned units will be occupied during the period in question.

B. Traffic

In compliance with applicable zoning requirements, Greenbriar will provide 2,020 parking spaces, an average of 1.69 per residential unit. The construction of 1,193 residential units on a previously uninhabited tract of land, of course, will increase the traffic on surrounding roads. The traffic implications of Greenbriar were considered by the Prince George's County Council, which determined that the existing road system was adequate to absorb the influx.*

There is no reason to believe that such adverse traffic effects as Greenbriar may produce would be reduced or otherwise moderated by postponing occupancy until 1975. There are no improvements to the affected road system scheduled to become operative in the next several years. On the other hand, the I-95 highway has improved traffic conditions on the Baltimore-Washington Parkway, thus alleviating the problem of access to and from the highway at the GSFC exit, a matter of concern to NASA. Specifically, traffic counts made by the Highway Administration of the State of Maryland for 1971-1973 show that the number of cars using the Baltimore-Washington

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* Attached as Exhibit 7 is a copy of the traffic study prepared by Hunnicutt & Neale, which was submitted to the Council.

Parkway (north of Glendale Road) has declined from 52,500 (the figure considered by the Council in connection with the Special Exception hearings of July, 1971) to 37,000 in 1972.

C. Recreation

Greenbriar will offer recreation facilities sufficient for all of its residents. Specifically, Greenbriar will provide 70 percent open space, a community center with swimming pools and an in-door recreational area. Out-door recreation for volleyball, tennis and softball will be included. In addition, the developer will contribute $43,000 and a five-acre tract of land for park development by local authorities.

D. Impact on Public Services

1. Schools

Since the Prince George's County School system operates under a court order requiring busing of children throughout the County in order to achieve racial balance, the ability of the school system to absorb the school children living at Greenbriar must be determined by reference to the capacity of the system at large, rather than any particular school. The table set out below demonstrates that the county school system has capacity sufficient for this purpose.

	Greenbriar Children*	Excess School Capacity as of September, 1973**
Elementary (K - 6)	288	2,743
Secondary (10 - 12)	182	3,195

The school authorities project continuing decreases in enrollment over the next few years, following the pattern of recent years.

2. Power

The Potomac Electric Power Company has adequate facilities to serve Greenbriar commencing November 1, 1973. A copy of PEPCO's letter of September 12, 1973 confirming this is attached as Exhibit 8.

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* The foregoing figures are based upon the actual yield per unit at Glendale Woods, a housing development comparable to Greenbriar. Other estimates of the school population vary, but it is evident from the excess capacity figures that even allowing a substantial margin for error, the school system of Prince George's County will not be adversely impacted by Greenbriar.

** The figures in regard to capacity and enrollment (based on an unofficial count made by the school authorities) as of September 14, 1973, are as follows:

	Elementary	Secondary
Capacity	87,614	71,840
Enrollment	84,871	68,645

3. Police and Fire Services

Police service to Greenbriar will be provided by the City of Greenbelt. The addition of the Greenbriar population to the service area will require the hiring of a few additional policemen. It is anticipated that the project will generate revenues for the City of Greenbelt in excess of required additional expenditures, including those related to increasing police service, so that Greenbriar will not lead to a reduction in the quality of police service furnished to other residents of the city.*

Fire service is provided by Prince George's County — a large and sophisticated suburban community equipped to accomodate anticipated growth without strain to fire protection and the other public services which it provides.

E. Construction

Construction work is being done within the confines of the Greenbriar tract. The neighboring area

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* The effect of Greenbriar on the revenues and expenditures of the City of Greenbelt is analyzed in a report prepared by Robert R. Nathan Associates, Inc., economic consultants, at the request of Greenbriar Associates. A copy is attached as Exhibit 9.

will not be disrupted. An average of 50 to 75 workmen are on the job daily. As many trees as possible will be left in place. Those that must be removed -- largely scrub pine -- will be replaced by shrubs and trees of better quality. About $250,000 will be spent on the initial landscaping.

F. Sediment Control Plans

Silt run-off will be inhibited by two methods. One consists of a silt trap; the other of interceptor birms. The silt trap is situated at a low point in the property -- in a pond which normally would be dry. Water will run toward the trap by force of gravity. Particles of silt will be suspended in the speeding water. The trap will hold the water, allowing particles to settle to the bottom. The water will drain off the top, and the pond then will dry up completely.

Interceptor birms consist of strings of hay bales staked to the ground to slow down the water, allowing silt to settle out. These birms, which act as filters, are used close together for maximum control.

The Prince George's County Soil Conservation Service has approved the plan and conducts on-going site inspections.

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G. Noise and Air Pollution

Such noise and air pollution as may be generated by Greenbriar would not be affected by delaying occupancy pending completion of the Western Branch Plant. In any case, it is not expected that this residential development will generate noise levels other than those normally associated with garden apartments. Similarly, no significant amount of air pollution is anticipated.

H. Development of Surrounding Area

Greenbriar is not expected to spawn commercial or other development of the surrounding area. The project is served by a network of highway and other roads providing ready access to shops and other facilities in Prince George's County, Montgomery County, and the District of Columbia. The neighboring undeveloped land is zoned for residential development, exclusively, so that any commercial development would require a special exception to the existing land use policy.

I. Storm Drainage System

The storm drainage system in Greenbriar is designed in accordance with the criteria of the Washington Suburban Sanitary Commission and the Prince George's County Department of Licenses and Permits. These criteria require that all storm drainage systems be enclosed or otherwise improved if the system can be enclosed in a 72 inch pipe. This requirement has been met throughout. In addition, several detention basins have been introduced to increase the runoff caused by the proposed apartment development.

IV. ALTERNATIVES

During the course of the extended consideration given to the Greenbriar STP system by state and local authorities, along with the developer, the technical consultants and interested members of the public, a number of alternatives to the NASA easement and the proposed sewage treatment method were proposed and reviewed. The system selected is designed to meet the many performance, safety and environmental objectives sought to be accomplished by the concerned state and local authorities. The alternatives considered and the reasons for their rejection are indicated below.

A. Alternatives to NASA Easement

1. Intermittent Stream

The developer had proposed that the effluent be discharged into an intermittent stream located within the Greenbriar property (which would have eliminated the need for the requested easement). The Prince Geoerge's County Council, however, required that the effluent be discharged into a free-flowing stream. The nearest such stream is located within the NASA site.

2. Land Containment

A land containment system whereby the effluent would be connected with a sprinkler system on the

property was also evaluated. This approach was regarded as infeasible, since the quantity discharged would exceed that which could be absorbed by the land. Deep well injection, another method of land containment, was rejected because that system has not as yet been used in Maryland and is unlikely to win approval. By contrast, the system proposed for the Greenbriar STP was approved by the State and has operated at Landover Mall.

3. Postponement

The alternative of waiting for public sewage to be made available would keep 1,193 housing units off the market for the interim period, cause the developer severe financial problems and gain no discernible environmental or ecological advantages. It was therefore rejected.

4. Connection to Existing Public Sewer System

This alternative was foreclosed by the sewer moratorium presently in effect. A modification to permit Greenbriar to proceed would not be granted.

5. Locating Plant at Western Branch Site

Consideration was given to the possibility of enlarging the existing interim sewage treatment plant at the site of the Western Branch facility or building a new interim treatment plant adjacent to the Western Branch

STP. Either approach would involve processing an amount of sewage equivalent to that produced by Greenbriar through the expanded or new facility, so that Greenbriar would not represent a net addition to the amount of the sewage being treated by the existing system. Implementation of this alternative would entail approval by the Prince George's County Council through adoption of an amendment to its Ten-Year Water and Sewerage Plan. To amend the Plan, a member of the County Council must introduce the amendment, the amendment must be referred to committee, a public hearing must be scheduled and held and the full Council must then give its approval.* This process would be expected to take several months.

The engineers for Greenbriar advise that a minimum of 6 to 8 weeks would be required to re-engineer the Western Branch site and another 18 to 23 weeks would be needed to complete construction — which could commence only after a permit had been issued by the Maryland Department of Health and Mental Hygiene.

The time required to obtain the clearances mentioned above (assuming that these would be forthcoming) and to construct the plant make it unlikely that an additional interim treatment facility on the Western Branch site could commence operations before the permanent Western

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* See, generally, Charter for Prince George's County Council, Art. III, § 317.

Branch treatment plant is completed and the moratorium lifted.* This option is, therefore, not a realistic alternative to the construction of the plant on the Greenbriar site, since it would not accomplish the purpose for which the proposed plant is to be constructed — to provide an interim solution to the Greenbriar sewage treatment problem until the permanent plant is in place. Since the on-site interim treatment facility meets or exceeds all applicable health and environmental standards and is being financed by the developer and not by the public, there does not appear to be any environmental or economic concern which would justify adopting this approach in lieu of locating the plant on the Greenbriar site.

B. Alternative Advanced Sewage Treatment Methods

Only advanced sewage treatment methods are appropriate for small on-site package plants. The other methods considered are:

1. Electrodialysis

This process, which utilizes direct current to achieve separation of soluble minerals from water, was not deemed appropriate for the treatment of domestic waste

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* In addition, serious legal questions would arise in the event sewage from Greenbriar were processed at a public plant, while other developers whose applications were filed before Greenbriar's were not given such opportunity.

because of the low concentration of soluble mineral wastes. The salt content of the effluent is too low to require use of this process in order to effect its removal.

2. Carbon Adsorption

The carbon adsorption method whereby activated carbon is used to remove organic matter and viruses from wastewater was regarded as unnecessary, since the effluent produced by Greenbriar will contain organic matter in quantities less than the receiving stream.

3. Reverse Osmosis

As indicated in B.1 above, the effluent discharged following breakpoint chlorination and dechlorination treatment will contain salts in insufficient quantity (below the taste threshold) to justify processes designed to effect further removal.

C. Alternative Location of Housing

Since the Greenbriar housing project has been approved by all concerned governmental authorities and is currently under construction, the question of whether the housing should be located on a different site does not arise in connection with this Environmental Impact Statement. The federal action requested — the granting of the easement — has no bearing on the location of the housing.

V. PUBLIC RESPONSE

A. Positive

As indicated above, the Prince George's County Council approved Greenbriar by granting the special exception requested in 1971 and by authorizing the Greenbriar STP in its 1972 revision of the Ten Year Water and Sewerage Plan.

B. Opposition

Greenbriar has been opposed by the Prince George's Environment Coalition and similar groups in that county. The Coalition and other opposition witnesses have appeared at public hearings, at which their point of view has been expressed, largely focused on the efficacy of the Greenbriar STP. This statement contains information addressed to those and other concerns previously raised.

Exhibit 33

FRIED, FRANK, HARRIS, SHRIVER & KAMPELMAN
(STRASSER, SPIEGELBERG, FRIED, FRANK & KAMPELMAN)

SUITE 1000, THE WATERGATE 600
600 NEW HAMPSHIRE AVENUE, N.W.
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MAX H. KAMPELMAN
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DAVID M. SINGER
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R. CHARLES CHRISMAN
EDWARD J. EHRENHAFT
WILLIAM JOSEPHSON
THOMAS A. ROBERTS HARRIS
STEPHEN P. GOLDMAN
S. GORDON DEAN
MATTHEW S. WATSON
JAMES R. BLINKOFF
STEVEN D. NEWBURG-RINN
DANIEL H. WEISSMAN
KENNETH S. KRAMER
FRANCIS J. O'TOOLE
DAVID E. JOVLL

HAROLD A. GREEN
COUNSEL

September 21, 1973

Mr. Daniel J. Snyder III
Acting Director
Environmental Protection Agency
Sixth and Walnut Streets
Philadelphia, Pennsylvania

Dear Mr. Snyder:

This letter is addressed to you with reference to the application of the Washington Suburban Sanitary Commission ("WSSC"), dated May 24, 1973 for a discharge permit for the Greenbriar Sewage Treatment Plant in Prince George's County, Maryland. So as to remove any doubt that my client, Greenbriar Associates, is a party in interest in this matter, Greenbriar Associates is, under separate cover, transmitting to you its own application for a permit. I hereby request that that application be consolidated with the application of WSSC. The relationship between the two applicants is the following: the Treatment Plant will stand on land of Greenbriar Associates, will serve a development built by Greenbriar Associates, but will be operated by WSSC. The cost of construction and operation will be borne by Greenbriar Associates.

From my conversations with your staff I gather that there is no doubt about the high quality of treatment which the Greenbriar Plant will provide. That high quality is indeed reflected in the following table which compares the standards of EPA and the Maryland Water Resources Administration with the expected quality of the Greenbriar effluent.

	EPA 1/	WRA - Class I waters 2/	Greenbriar
BOD_5	not to exceed 10 mg/l	-	not to exceed 3.9 mg/l
suspended solids	not to exceed 10 mg/l	-	not to exceed 1.9 mg/l
phosphorus	not to exceed 4 mg/l	-	not to exceed 1.0 mg/l

	EPA[1]	WRA - Class I waters [2]	Greenbriar
coliforms	-	not to exceed 200/-100 ml	not to exceed 2/100 ml
dissolved oxygen	-	not less than 4.0 mg/l	not less than 5.0 mg/l
pH	-	6.5 - 8.5	6.5 - 7.2
turbidity	-	in receiving water not to exceed 50 JTU as a monthly average and not to exceed 150 JTU at any time	less than 1 JTU
viruses	-	-	1 PFU/10 gal. (essentially 100% removal)

The only question which, I understand, has been posed by your office is whether the Greenbriar project would be served better if WSSC were to place an interim plant at its site near the Western Branch Treatment Plant and, at that point, take out of the public sewer system for treatment an amount equal to the amount of wastewater which the Greenbriar project would place in the system.

With regard to this suggested alternative, please be advised as follows:

(1) Greenbriar Associates filed its application with the Maryland Department of Health and Mental Hygiene ("DHMH") for approval of an on-site treatment plant in March 1971. Action by DHMH on that application was deferred until the Prince George's County Council, through adoption of an amendment to its County's Ten-Year Water and Sewerage Plan, approved the point of discharge. This occurred on November 29, 1972, when the County Council passed a series of amendments, constituting its annual revision of the Ten-Year Plan in accordance with Art. 43 Md. An. Code §387C. One of the amendments

1/ As set forth in the document entitled "Region III EPA Policy Statement, Interim Treatment Facilities, Washington, D. C. Metropolitan Area."

2/ As set forth in the Rules and Regulations, State of Maryland Water Resources Administration, Reg. 08.05.04.03.

authorized the Greenbriar point of discharge. The 1972 annual revision of the Plan was approved by DHMH in February 1973.

(2) Following approval of the revision of the Ten-Year Plan, DHMH addressed to the engineers for Greenbriar Associates a letter notifying them of the water quality standards which the proposed plant must meet and informing them further that they may now "proceed with the preparation of final plans and specifications...." That letter, dated March 2, 1973, is attached hereto as Exhibit 1.

(3) Under the practices and procedures of DHMH, the March 2, 1973 letter constituted approval in principle of the Greenbriar Treatment Plant. From then on it was understood to be a matter of technical detail to have the plans and specifications prepared in accordance with the requirements of the engineering staff of DHMH and have them submitted for final approval.

(4) Greenbriar Associates, acting in reliance on the March 2, 1973 letter from DHMH, instructed its engineers to prepare plans and specifications for the plant in accordance with all applicable requirements. Furthermore, once these plans were in the form which was understood to be acceptable to the engineers of DHMH and WSSC, Greenbriar Associates, because of the urgency in getting the plant built and knowing of the lead time required here, began to place orders for the required equipment.

It follows from the foregoing that

A. <u>The location of the Greenbriar Treatment Plant has been determined by the Prince George's County Council, which acted under the authority vested in it by the laws of the State of Maryland.</u>

B. <u>The Greenbriar Treatment Plant application was filed long prior to the effective date of Public Law 92-500, and the critical actions of the Prince George's County Council and DHMH took place prior to the implementation of that law by appropriate regulations.</u>

(5) As my previous submissions to your office show, the quality of the effluent from the Greenbriar Treatment Plant meets United States Public Health Service standards for drinking water and is purer than the water of the receiving stream. In the unlikely event that the Greenbriar Plant and all its failsafe devices malfunction, the effluent will be discharged into the public sewer system.

(6) Having solved the long-term sewage treatment problem in the Western Branch Basin by providing for the construction of a new 30 mgd treatment plant (see my letter to Dr. Morris of your office, dated September 15, 1973), WSSC cannot be expected to use any public funds to provide additional interim treatment in the Western Branch Basin by locating publicly-financed interim treatment facilities at the site of the Western Branch plant.

(7) The same small opposition group which has protested against the Greenbriar Treatment Plant also protested against the Prince George's County Sports Arena and the arrangements for an interim sewage treatment plant at Western Branch, serving the Arena.

It follows from the foregoing that

C. No advantage from a health, ecological or planning point of view can be attained by relocating the treatment plant at this late date, nor is it likely that such relocation will satisfy the small opposition group.

(8) The provision in the 1972 revision of the Ten-Year Plan which authorizes construction of an interim plant next to the Western Branch Treatment Plant explicitly limits that interim plant to serve only the Largo Sports Arena. (Exhibit 2). It would thus require an amendment to the Ten-Year Plan if the interim plant were to be expanded to serve Greenbriar as well. This would consume a substantial amount of time and would surely delay construction of the Plant beyond the day when its services will be required to allow occupancy of the Greenbriar project.

(9) As was pointed out above (item (6)), WSSC cannot be expected to provide additional interim facilities in the Western Branch Basin at public expense. If such facilities are to be provided, they can only be provided at private expense. Yet, the available land at the Western Branch Plant site is public land, owned by WSSC. May WSSC, a public body, lease its property to a developer for the purpose of constructing a treatment plant for private, residential use? The applicable basic principle of law provides as follows:

> "The power to lease corporate property may be, and often is, conferred by express statutory provisions. Sometimes the power to lease is inferred from the right to contract and to hold, manage and control realty for public use. But, ordinarily, a municipality cannot, by lease or license permit its property acquired or held for public use, to be wholly or partly diverted to a possession or use exclusively private, without specific legislative authority." [Emphasis added.] E. McQuillin, Municipal Corporations, §28.42 (3rd ed. 1966).

WSSC was created by the General Assembly of the State of Maryland. Its operations are governed by the statutes codified in the Washington Suburban Sanitary District Code. There is no provision anywhere in that Code allowing WSSC to divert any of its land for purely private use.

It follows from the foregoing that

D. No additional interim treatment facility on the Western Branch Treatment Plant site can be built without express authorization by the Prince George's County Government through amendment to the County's Ten-Year Water and Sewerage Plan.

E. WSSC cannot be expected to expend public funds on such an interim treatment plant and no privately-financed structure could be built without express statutory authorization.

(9) As was pointed out above (item (6)), WSSC cannot be expected to provide additional interim facilities in the Western Branch Basin at public expense. If such facilities are to be provided, they can only be provided at private expense. Yet, the available land at the Western Branch Plant site is public land, owned by WSSC. May WSSC, a public body, lease its property to a developer for the purpose of constructing a treatment plant for private, residential use? The applicable basic principle of law provides as follows:

> "The power to lease corporate property may be, and often is, conferred by express statutory provisions. Sometimes the power to lease is inferred from the right to contract and to hold, manage and control realty for public use. But, ordinarily, a municipality cannot, by lease or license permit its property acquired or held for public use, to be wholly or partly diverted to a possession or use exclusively private, without specific legislative authority." [Emphasis added.] E. McQuillin, Municipal Corporations, §28.42 (3rd ed. 1966).

WSSC was created by the General Assembly of the State of Maryland. Its operations are governed by the statutes codified in the Washington Suburban Sanitary District Code. There is no provision anywhere in that Code allowing WSSC to divert any of its land for purely private use.

It follows from the foregoing that

D. No additional interim treatment facility on the Western Branch Treatment Plant site can be built without express authorization by the Prince George's County Government through amendment to the County's Ten-Year Water and Sewerage Plan.

E. WSSC cannot be expected to expend public funds on such an interim treatment plant and no privately-financed structure could be built without express statutory authorization.

(10) We are advised by the engineers for Greenbriar Associates that a minimum of six to eight weeks would be required to re-engineer the Western Branch site for the Plant. Another eighteen to twenty-three weeks would be required to complete the interim facility at Western Branch. These delays, standing alone, would be so great as to undo the very purpose of the Plant: to provide an interim solution to the Greenbriar sewage treatment problem until the permanent plant is in place. If added to the time it would take to obtain legal authorization, it is obvious that the interim facility would not be ready much sooner than the permanent facility.

It follows from the foregoing that

F. The delays which a shift at this late date to the Western Branch site would engender eliminates this option as a realistic alternative to construction of the Plant on the Greenbriar site. The result would be complete housing units standing empty for a year and other units left incomplete because of the financial collapse of the project.

The foregoing analysis, I submit, demonstrates conclusively that the proposed alternative considered by your office is simply not workable. For all the reasons stated in this communication and in earlier communications to your office, I request most respectfully that your office proceed immediately to act on the WSSC application of May 24, 1973, by initiating the process which will lead to the issuance of a discharge permit under the provisions of Section 402 of Pub. L. 92-500. The need for prompt action by your office is underlined by the fact that the Maryland Secretary of Health and Mental Hygiene is withholding a construction permit for the Greenbriar Plant until you have acted on the discharge permit application.

Sincerely yours,

Richard Schifter

Richard Schifter

RS/rmc
Enclosures

~~E-34~~
Exhibit 34

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

Mr. R. Tenney Johnson
General Counsel
National Aeronautics and
Space Administration
Washington, D.C. 20546

Dear Mr. Johnson:

The purpose of this letter is to appraise you of the current situation regarding the proposed WSSC - Greenbriar temporary sewage treatment plant.

The Washington Suburban Sanitary Commission's NPDES application to operate the proposed Greenbriar temporary sewage treatment plant, with effluent discharged into an unnamed tributary of the Beaverdam Creek, is now complete. Since the proposed discharge will meet the requirements of the 1972 Amendments to the Federal Water Pollution Control Act, this Agency has no recourse but to begin processing an NPDES permit pursuant to Section 402 of the Act.

The issue regarding the need for a sewer easement across NASA property is separate and apart from the NPDES permit. The decision whether or not to grant such an easement must be made by your Agency.

If you have any questions or if I can be of any further assistance to you in this matter, do not hesitate to call on me.

Sincerely yours,

Daniel J. Snyder III

Daniel J. Snyder, III
Regional Administrator