AD/A-003 212

WATER POLLUTION SURVEY, MOODY AIR FORCE BASE, GEORGIA

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November 1974

UNCLASSIFIED
Security Classification

AD/A-003212

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*
USAF Environmental Health Laboratory
Kelly AFB, Texas 78241

2a. REPORT SECURITY CLASSIFICATION
UNCLASSIFIED

2b. GROUP

3. REPORT TITLE
WATER POLLUTION SURVEY - MOODY AFB, GEORGIA

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

5. AUTHOR(S) *(First name, middle initial, last name)*
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1Lt, USAF, BSC

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1974	121	3

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO.	EHL(K) 74-27
c.	9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*
d.	

10. DISTRIBUTION STATEMENT
Approved for public release and sale; distribution unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY

13. ABSTRACT

This report contains results of a wastewater survey of Moody AFB GA planned by a bioenvironmental engineer of the USAF Environmental Health Laboratory, Kelly AFB TX and conducted by personnel of Moody AFB. Analysis of the Moody sewage treatment plant operating logs for the period January-November 1973 is also included. The Moody AFB sewage treatment plant is a well-run low-rate trickling filter plant, designed for 0.75 MGD. The plant provides excellent secondary treatment to 0.393 MGD of medium strength sewage. The effluent is chlorinated before discharge to Beatty Creek. Some industrial wastewaters identified in the report are discharged directly to the storm sewer system. Connection of these waste streams to the sanitary system should be completed by the end of FY 75 or the beginning of FY 76. The base has received its final NPDES permit. The sewage treatment plant can comply with the interim discharge requirements of the permit, but it will require modifications to meet the final limits that will apply beginning on 1 July 1977. A stream dissolved oxygen survey is recommended to gather data to determine the effect of the base's discharge on the receiving waters. A sampling protocol is included with the report to supplement sewage treatment plant monitoring requirements with base-wide surveillance of all discharged storm waters.

DD FORM 1 NOV 68 1473

UNCLASSIFIED
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Water Quality Standards						
Sanitary Sewage						
Industrial Wastewater						
Trickling Filters						
Water Monitoring Program						

USAF ENVIRONMENTAL HEALTH LABORATORY (AFLC)

UNITED STATES AIR FORCE

KELLY AFB, TEXAS 78241

WATER POLLUTION SURVEY

Moody AFB GA
EHL(K) 74-27
November 1974

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This report contains results of a wastewater survey of Moody AFB GA planned by a bioenvironmental engineer of the USAF Environmental Health Laboratory, Kelly AFB TX and conducted by personnel of Moody AFB. Analysis of the Moody sewage treatment plant operating logs for the period January-November 1973 is also included.

The Moody AFB sewage treatment plant is a well-run low-rate trickling filter plant, designed for 0.75 MGD. The plant provides excellent secondary treatment to 0.393 MGD of medium strength sewage. The effluent is chlorinated before discharge to Beatty Creek. Some industrial wastewaters identified in the report are discharged directly to the storm sewer system. Connection of these waste streams to the sanitary system should be completed by the end of FY 75 or the beginning of FY 76.

The base has received its final NPDES permit. The sewage treatment plant can comply with the interim discharge requirements of the permit, but it will require modifications to meet the final limits that will apply beginning on 1 July 1977. A stream dissolved oxygen survey is recommended to gather data to determine the effect of the base's discharge on the receiving waters. A sampling protocol is included with the report to supplement sewage treatment plant monitoring requirements with base-wide surveillance of all discharged storm waters.

II. INTRODUCTION

A. Purpose

The USAF Environmental Health Laboratory, Kelly AFB TX was requested in October 1971 to conduct an on-site survey of the sewage treatment plant system, storm drainage system, and plant operators' laboratory procedures. This technical report presents the results of a water sampling program conducted at Moody AFB during September-October 1972 plus statistical analysis of the Water Pollution Control Utility Log (AF Forms 1462, 1463) of the Moody sewage treatment plant for the period January-November 1973. Objectives of this report are as follows:

1. Determine the composition and quantity of domestic and industrial wastewaters generated by base activities.

2. Determine the effectiveness of existing treatment facilities.

B. Historical Background

1. In October 1971, the Commander, Moody Air Force Base requested an on-site survey of the base sewage treatment plant system, storm drainage system and plant operator's laboratory procedures. In October 1971, HQ ATC requested HQ AFLC to authorize the USAF Environmental Health Laboratory, Kelly (EHL/K) to conduct the survey. This request was approved (see Appendix A).

2. In December 1971, two EHL/K representatives conducted a preliminary survey of water pollution abatement activities. A trip report written after this trip contained suggestions for improvement of the plant operator's laboratory procedures. This report is included as Appendix E.

3. In February 1972, an Operations Plan was written by Capt. Charles W. Bullock and published by EHL/K. In accordance with the plan, personnel of Moody AFB would use equipment loaned by EHL/K to conduct a comprehensive sampling program.

4. Between 27 September and 7 October 1972, personnel of Moody AFB conducted the sampling program outlined in the Operations Plan. These samples were submitted to EHL/K for chemical analysis and engineering interpretation.

5. In March 1974, a statistical analysis was performed on the Moody STP's Water Pollution Control Utility Logs (AF Forms 1462, 1463) for the period January-November 1973.

III. DISCUSSION

A. Base Description

1. Moody AFB is located in South-Central Georgia, approximately 9 miles northeast of Valdosta on Georgia Highway 125.

2. Weather

Moody is surrounded by low flat coastal plains and its proximity to the Atlantic Ocean and Gulf of Mexico produces a humid, relatively mild climate. The average summer maximum temperature is 93 degrees. Minimum readings average 72 degrees in the summer and 46 degrees in the winter. Rainfall averages 48-50 inches annually.

3. Hydrology

The southern part of the base drains to Mission Lake. From this area water flows eastward into Grand Bay Swamp, along with water from the eastern and northern areas of the base. Grand Bay swamp drains to Grand Bay Creek and finally to the Alapaha River. The northwestern part of the base drains westward to Beatty Creek and from there through Cat Creek to the Withlacoochee River.

4. Water Supply

Base water comes from eight deep wells, three of which are for drinking. Water from these three wells is chlorinated and fluoride is added. Of the remaining five wells, one is for air-conditioning cooling water, another is for golf course irrigation, a third for jet engine test stand cooling, the fourth is for domestic purposes at the Mission Lake recreation area on base, and the last is not in use at present.

5. Base Mission

Moody AFB is the home of the 38th Flying Training Wing, with a mission of undergraduate pilot training. Both the T-37 and the T-38 aircraft are used for the training. The base supports these planes with routine field maintenance.

6. Base Population

There are approximately 2500 military assigned to Moody AFB, plus approximately 550 civilian employees. Dormitory facilities are available for 651 unaccompanied personnel. On base family housing consists of 306 units, plus 49 trailer units. The equivalent base population is 2688 (see Appendix C).

7. Sanitary Sewage Treatment

Approximately 0.393 MGD of sanitary sewage is treated by a secondary sewage treatment plant having a design capacity of 0.750 MGD. This corresponds to 146 gallons of wastewater/population equivalent. The treated effluent is discharged directly to Beatty Creek.

B. Sanitary Wastewater Sources and Treatment

1. Source of Wastewater

Domestic wastewaters from almost all on-base duty areas and all on-base housing areas are collected and treated at the base secondary sewage treatment plant. This plant also treats wastewater from the corrosion control facility, Bldg 717.

2. Description of Sewage Treatment Plant (STP)

The sewage treatment plant consists of primary and secondary clarifiers, two standard rate trickling filters, an unheated but internally circulated anaerobic digester, two sludge drying beds, chlorinator and chlorine contact tank, and Parshall flume flow measuring device on the discharge line from the plant. A simplified diagram of the plant is presented in Figure 1.

3. Receiving Waters

The plant outfall flows into Beatty Creek which reportedly originates from springs under the base's runway 18L and 18R. Beatty Creek flows for three miles into Cat Creek and thence into the Withlacoochee River. The river and all of its tributaries are classified by the State of Georgia for fishing and propagation of fish. The minimum flow in Beatty Creek over a ten period is zero (seven day ten year minimum).

4. Flow Rate and Collection System Integrity

The average flow rate of wastewater during the period January-November 1973 is given in Table 1. This value was determined from the STP's operating logs for that period. The flow rate was measured by the Parshall flume located on the effluent line leaving the STP. The data showed much variability, as depicted in Figure 2. Part of this fluctuation may be attributed to operating problems encountered with the flowmeter. The STP superintendent indicated that on several occasions the meter dial numbers stuck and required lubrication. At other times orifices on the meter plugged up and caused errors in the reading. These errors were assumed to be randomly distributed. The average flows in Table 1 are presented for three different conditions of rainfall: no rain, more than 0.2 inch of rain, and more than 1 inch of rain. These data indicate that rainfall produces greater wastewater flows, but that the higher flows do not normally exceed the design capacity of the plant.

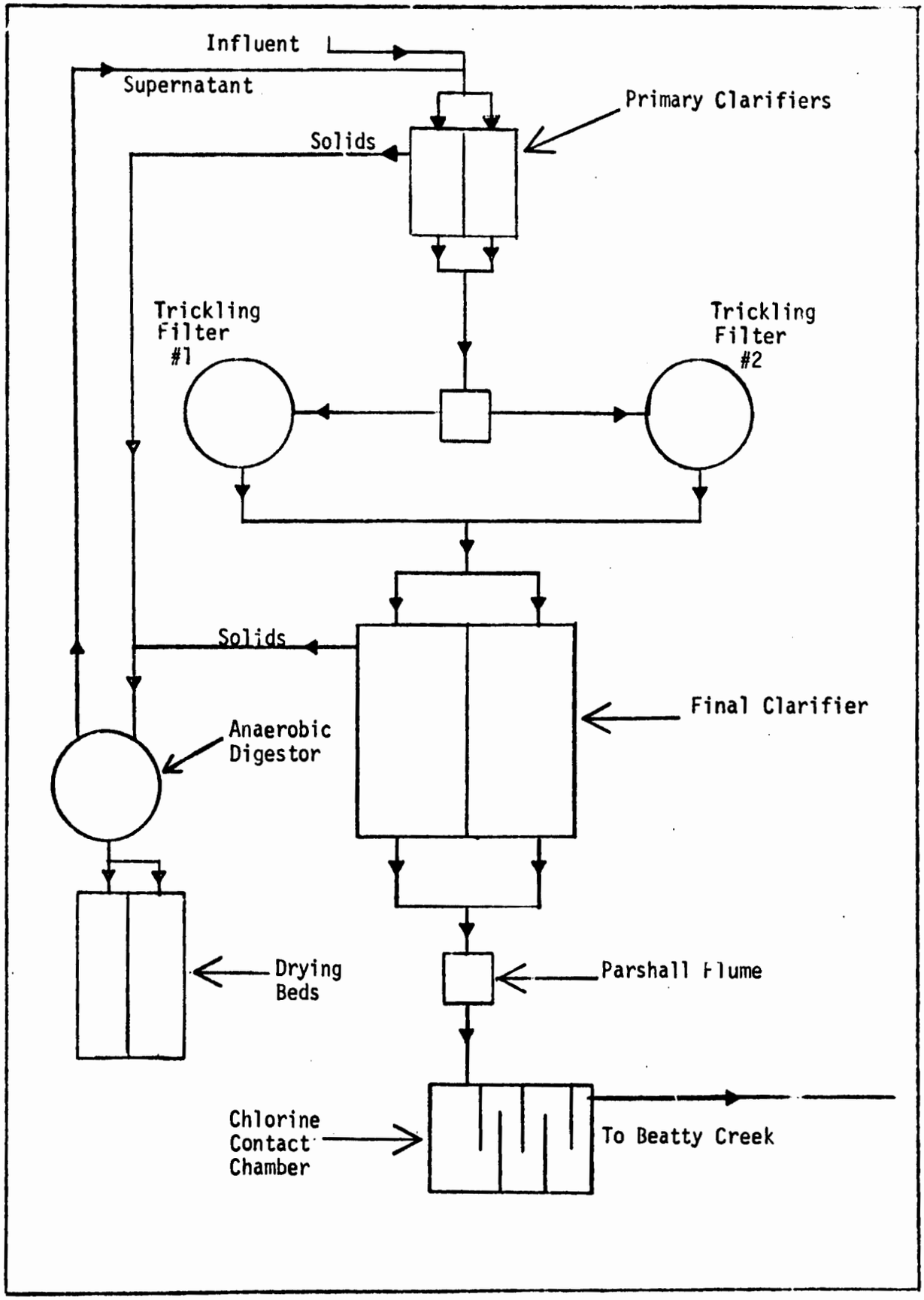


FIGURE 1 SIMPLIFIED PLANT LAYOUT - SANITARY SEWAGE TREATMENT PLANT MOODY AFB GA

TABLE 1

FLOWRATE IN MGD
JAN - NOV 1973
Moody AFB, GA

	PERCENTILE RANGE (10-90)	MEAN (MGD)	95% CONFIDENCE LIMITS OF MEAN	NUMBER OF DAYS
All Days	0.160-0.640	0.393	0.384-0.411	335
All Dry Days*	0.160-0.580	0.375	0.351-0.399	211
All Wet Days**	0.160-0.720	0.441	0.394-0.488	57
All Extreme Wet Days***	0.400-0.720	0.555	0.505-0.605	31

*Days on which there was no significant rainfall either on that day or the previous day.

**Days on which the rainfall was significant; i.e., rainfall greater than 0.2 inch plus the following day.

***Days on which the rainfall exceeded 1 inch, plus the following day.

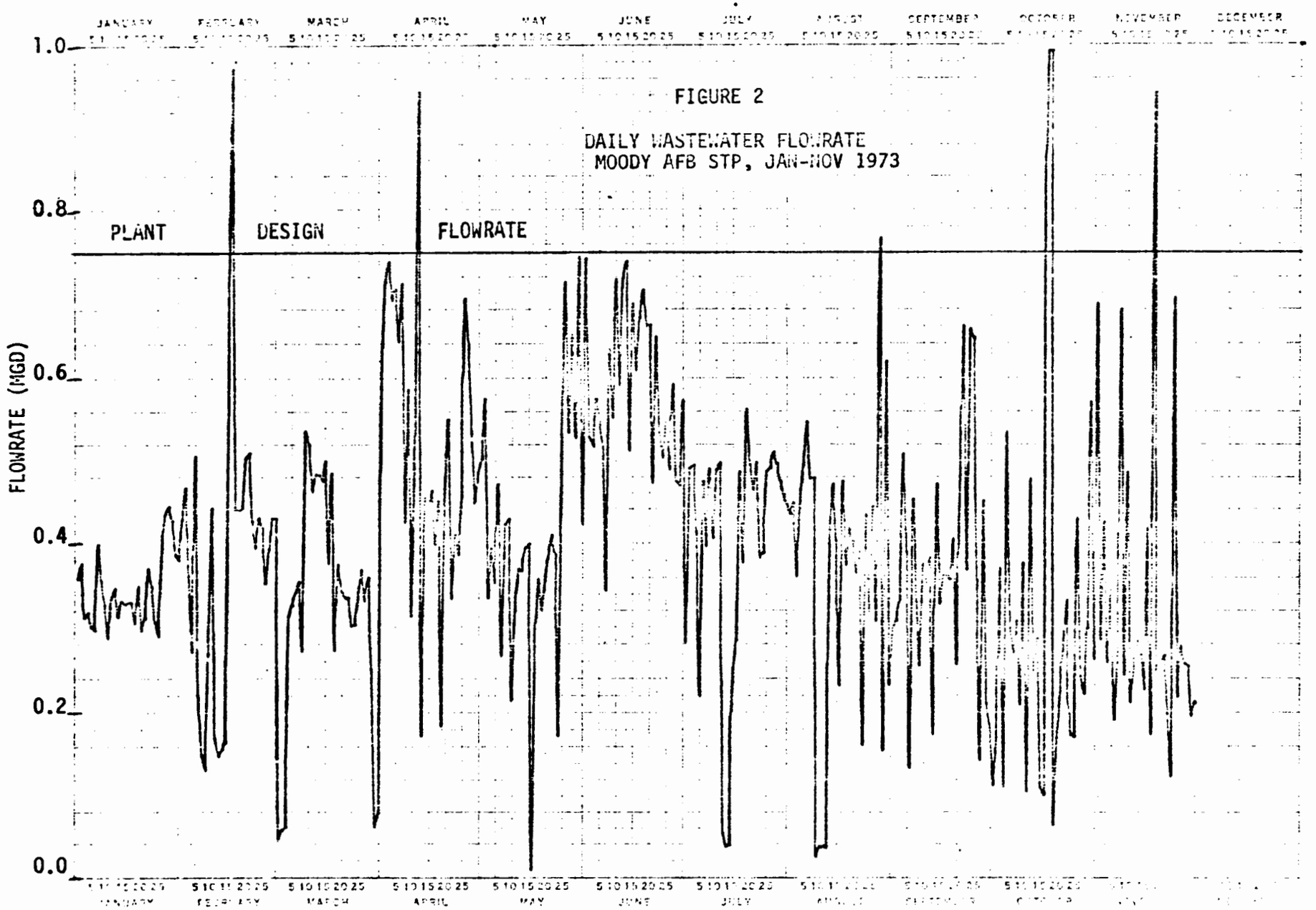


FIGURE 2
DAILY WASTEWATER FLOWRATE
MOODY AFB STP, JAN-NOV 1973
PLANT DESIGN FLOWRATE
FLOWRATE (MGD)
1.0
0.8
0.6
0.4
0.2
0.0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER

5. Composition of Raw Wastewater

The composition of the raw wastewater is presented in Tables 2 and 3. Table 2 contains a summary of the data taken during the sampling program conducted by Moody AFB personnel between 27 September and 7 October 1972. Table 3 is based on the analysis of the AF Forms 1462 and 1463 from the Moody AFB STP for the period January-November 1973. The composition values are typical of an average strength domestic wastewater.

6. Primary Treatment

The primary clarifiers are designed for an overflow rate of 600 gal/sq ft/day, and are operated at an average overflow rate of 315 gal/sq ft/day based on the average flow from January to November 1973. The reduction of BOD_5, suspended solids and settleable solids in the primary clarifier is presented in Table 4. These data support a conclusion that the primary clarifier is removing normal amounts of BOD_5 and settleable solids, but only 41% of the suspended solids instead of an anticipated 60%.

7. Secondary Treatment

a. Operation of the Trickling Filters

The two trickling filters together would receive 3.25 mgad at the design flow rate of 0.750 MGD. At the average flowrate of January-November 1973, the hydraulic loading was 1.71 mgad. The average BOD_5 applied loading on the filters for the same time period was 7.0 lb BOD_5 applied/1000 ft^3 bed volume/day. These values are within the operating range suggested by Fair, Geyer, and Okun[1] for a low-rate trickling filter. Table 4 presents data on the reduction of BOD_5 and suspended solids by the trickling filter. On the average, 48% of the BOD_5 and 45% of the suspended solids entering the Moody STP is removed by the trickling filters. This corresponds to a 78% removal of BOD and a 76% removal of suspended solids across the trickling filters. There is no recycle of trickling filter effluent practiced at the plant.

b. Operation of the Final Clarifier

The final clarifiers are designed for an overflow rate of 937 gal/sq ft/day and a weir rate of 6098 gal/ft/day. This is within the design range suggested by the Ten State Standards[2] for a low rate trickling filter plant. At the average flow, January-November 1973, the overflow rate is 491 gal/sq ft/day and the weir rate is 3195 gal/ft/day. Table 4 shows that the clarifiers removed 30% of the BOD_5 and 35% of the suspended solids that were in the effluent of the trickling filter, or 4% and 5% respectively of the plant influent BOD_5 and suspended solids.

[1] Fair, Geyer and Okun; Water Purification and Wastewater Treatment and Disposal, 1968.

[2] As quoted in MOP #8 Sewage Treatment Plant Design, Water Pollution Control Federation, Washington DC 1967.

TABLE 2

AVERAGE COMPOSITION OF RAW WASTEWATER
MOODY AFB GA STP*

	Chemical/Physical Data (mg/l unless noted)	Average	Average Loading (lbs/day)
GENERAL	Dissolved O_2	<0.0	
	Temperature ^oC	27.	
	pH (units)	7.2	
	BOD_5	121.	369.
	COD	209.	637.
	Total Organic Carbon	54.	164.
	Oils/Greases (by IR)	20.9	64.
	Surfactants, MBAS (as LAS)	14.1	43.
	Total Kjeldahl Nitrogen (as N)	22.8	71.
RADICALS	Ammonia, NH_3 (as N)	19.2	60.
	Cyanide, CN	<0.01	<0.031
	Nitrate, NO_3 (as N)	0.3	<0.82
	Nitrite, NO_2 (as N)	<0.005	<0.017
	Phenolics, C_6H_5OH	0.011	0.035
	Phosphate, Total-PO_4 (as P)	8.0	25.2
METALS/IONS	Aluminum	0.20	0.61
	Cadmium	<0.01	<0.03
	Chloride	27.4	87.
	Chromium, Hexavalent	<0.05	<0.15
	Chromium, Total	<0.05	<0.15
	Copper	0.05	0.14
	Iron	0.22	0.69
	Lead	<0.05	<0.15
	Manganese	<0.05	<0.15
	Mercury	<0.005	<0.014
	Nickel	<0.05	<0.15
	Silver	<0.01	0.031
	Zinc	0.09	0.27

*Data based on results of Sampling Program, 27 September - 7 October 1972. For more detailed results, see Appendix G.

TABLE 3

COMPOSITION OF RAW WASTEWATER ENTERING MOODY AFB STP
FROM AF FMS 1463
Jan-Nov 1973

	10-90 PERCENTILE RANGE	MEAN	95% CONFIDENCE LIMITS OF MEAN	NUMBER OF DAYS CONSIDERED
BOD_5, mg/l	198-294	244	238-250	98
Suspended Solids, mg/l	192-304	252	243-261	98
Settleable Solids, ml/l	5.0-10.3	7.9	7.7-8.1	335
pH, Units	6.8-7.2	-	-	335

TABLE 4

STP AVERAGE PERFORMANCE
FROM AF FMS 1463
JAN-NOV 1973
MOODY AFB GA

	INFLUENT	EFFLUENT	% REDUCTION IN TREATMENT UNIT 10-90 PERCENTILE	% REDUCTION IN TREATMENT UNIT MEAN	% REDUCTION IN TREATMENT UNIT 95% CONFIDENCE LIMIT OF MEAN	MEAN % REMOVAL OF RAW INFLUENT
PRIMARY CLARIFIER						
BOD_5	244	151	26-46	38	36-39	38
Suspended Solids	252	148	34-48	41	40-42	41
Settleable Solids	7.9	0.2	96-100	98	97-98	98
TRICKLING FILTER						
BOD_5	151	33	72-84	78	77-79	48
Suspended Solids	148	35	68-82	76	75-77	45
FINAL CLARIFIER						
BOD_5	33	23	16-42	30	28-32	4
Suspended Solids	35	22	16-58	35	33-38	5

BOD_5 and suspended solids are in mg/l. Settleable solids are in ml/l.

c. Overall Secondary Treatment Performance

The trickling filters and final clarifier combined remove 85% of both the BOD_5 and the suspended solids treated by the two units. This unit removal corresponds to 52% removal of the total influent BOD_5 and 50% removal of the total influent suspended solids.

8. Final Effluent

The average composition of the final effluent is displayed in Table 5. The STP achieves better than 90% reduction of both BOD_5 and suspended solids. This performance exceeds the current EPA standards for secondary treatment (85% removal of BOD_5 and suspended solids).

9. Chlorination

Chlorination is currently being performed in a baffled chlorination tank with a residence time of 26 minutes at the design flowrate and 49 minutes at the average flowrate January-November 1973. This is an adequate time for chlorine contact, and exceeds the minimum time of 15 minutes recommended in the WPCF MOP #8. Treatment plant operating logs for October and November 1973 indicate that the chlorine residual in the effluent was between 0.8 and 1.0 mg/l by the ortho tolidine test. Current chlorination practice recommends the use of the amperometric technique for determining chlorine residual[3]. The equipment required is expensive ($400) but the results are more accurate, and consistently higher (by 2-5 mg/l) than the orthotolidine test. Good control of the chlorination process is essential both for disinfection of the effluent stream and protection of biological life in Beatty Creek, since excessive chlorination can harm the native aquatic life.

10. Sludge Disposal

Waste sludge is pumped to a 28,600 cu. ft. unheated anaerobic digester. This capacity corresponds to 10.6 cu. ft./capita based on the equivalent base population of 2,688 (Nov 1973). The Ten-State Standard for a low rate trickling filter plant is 6-8 cu ft/capita for a northern climate. Less capacity would be required in the warmer southern climate, so the digester is adequately sized. Digested sludge flows by gravity to two sand drying beds. The dried sludge is collected and spread on the grassy areas near the runways to condition and improve the soil.

C. Industrial Wastewater Sources and Treatment

1. Industrial Wastewater Sources

An industrial waste source survey of Moody AFB was conducted by Moody Environmental Health personnel during February 1974. The results

[3]White, G.C.; Handbook of Chlorination, Van Nostrand Reinhold Company, New York, 1972.

TABLE 5

COMPOSITION OF FINAL EFFLUENT, MOODY AFB STP
January-November 1973

	NUMBER OF DAYS CONSIDERED	10-90 PERCENTILE RANGE	MEAN	95% CONFIDENCE LIMITS ON MEAN	% REDUCTION
BOD_5	98	18-30	23.4	23-24	90.4%
Suspended Solids	98	16-32	22.4	21-24	91.4%
Settleable Solids	335	-	Trace	-	~100%
Total PO_4 As P	10	-	6.7*	-	16.3%*
NH_4 As N	10	-	1.09*	-	94%*

Concentrations are in mg/l, except for settleable solids which are in ml/l.

*Based on data from sampling during 27 September - 7 October 1972.

are included as Appendix D of this report. The survey indicated that many industrial wastewaters flowed untreated into open or covered storm sewers which drained into the branches and mill races around the base. Identified pollution sources are listed in Table 6. Notable exceptions to the untreated discharge of waste were found in:

a. Corrosion control facility (Bldg 717) which discharged to the sanitary system.

b. Film processing agencies which sent process "fixer" solution to redistribution/marketing (R/M) for silver recovery.

c. Jet engine test stand (Bldg 1700) and vehicular maintenance activities, both of which sent collected oils and hydraulic fluids to R/M.

d. Motor pool and field maintenance battery shops, which neutralized battery acids before discharging them to storm drains.

2. Industrial Waste Discharge

Figure 3 depicts nineteen separate storm sewer outfalls from the base, excluding the housing area. During the preliminary survey in December 1971, four outfalls appeared to carry most of the industrial waste loads. These are noted in Figure 3 as sites R-2, R-3, R-5 and R-6. In the survey conducted by Moody personnel (27 Sep - 7 Oct 1972) two additional drainage locations were sampled, R-1, on the line draining the car wash area, and R-4, the overflow from Mission Lake. Average results of the survey are presented in Table 7. Station R-1 had elevated surfactants and BOD_5, probably from the car wash area. Station R-2 had high concentrations of pollutants typical of shop discharges. Station R-3 had high surfactants. Station R-4 at the discharge end of Mission Lake revealed that some treatment for the surfactant discharges is provided by the lake. Station R-5 is typical of clean storm water. Analysis of samples from Station R-6, the headwaters of Beatty Creek, indicates that dissolved iron enters the stream from its underground sources.

3. Correction of Industrial Wastewater Discharge

Since the industrial waste source survey of February 1974, plans have been prepared to eliminate the discharge of pollutants to the storm sewer system. Specific alterations are included in Table 6. The net effect of these changes will be to connect the industrial waste discharges to the sanitary system for treatment before discharge. The biological processes of the STP should be able to remove most of the organic components of the industrial waste without any ill effect on the trickling filters. Some of the metal ions will be used in biological growth while the remainder will be adequately diluted by the much larger sanitary sewage flow, 0.015 MGD Vs. 0.393 MGD, or an average dilution of 1 to 26. The projects to eliminate dis-

TABLE 6
IDENTIFIED INDUSTRIAL WASTEWATER SOURCES
Moody AFB GA

Source of Discharge	Plan for Elimination
1. Aircraft Washrack, Bldg 754 2. Aircraft Parts Maintenance, Bldg 758 3. Aircraft Paint Hanger, Bldg 717 4. Auto Hobby Shop, Bldg 841 5. Auto Washrack, Bldg 973 6. Fire Truck Wash Area, Bldg 621 7. POL Storage Area, Bldg 722	Connect each discharge to the sanitary sewer system through its own oil/water/solids separator. The oil and solids will be removed on a routine basis.
8. Base Exchange Service Station, Bldg 943	Contain discharge in a storage tank, which will be pumped out by a disposal contractor.
9. Boiler Blowdown, Bldg 900	Connect discharge from existing separator to the sanitary sewer system.

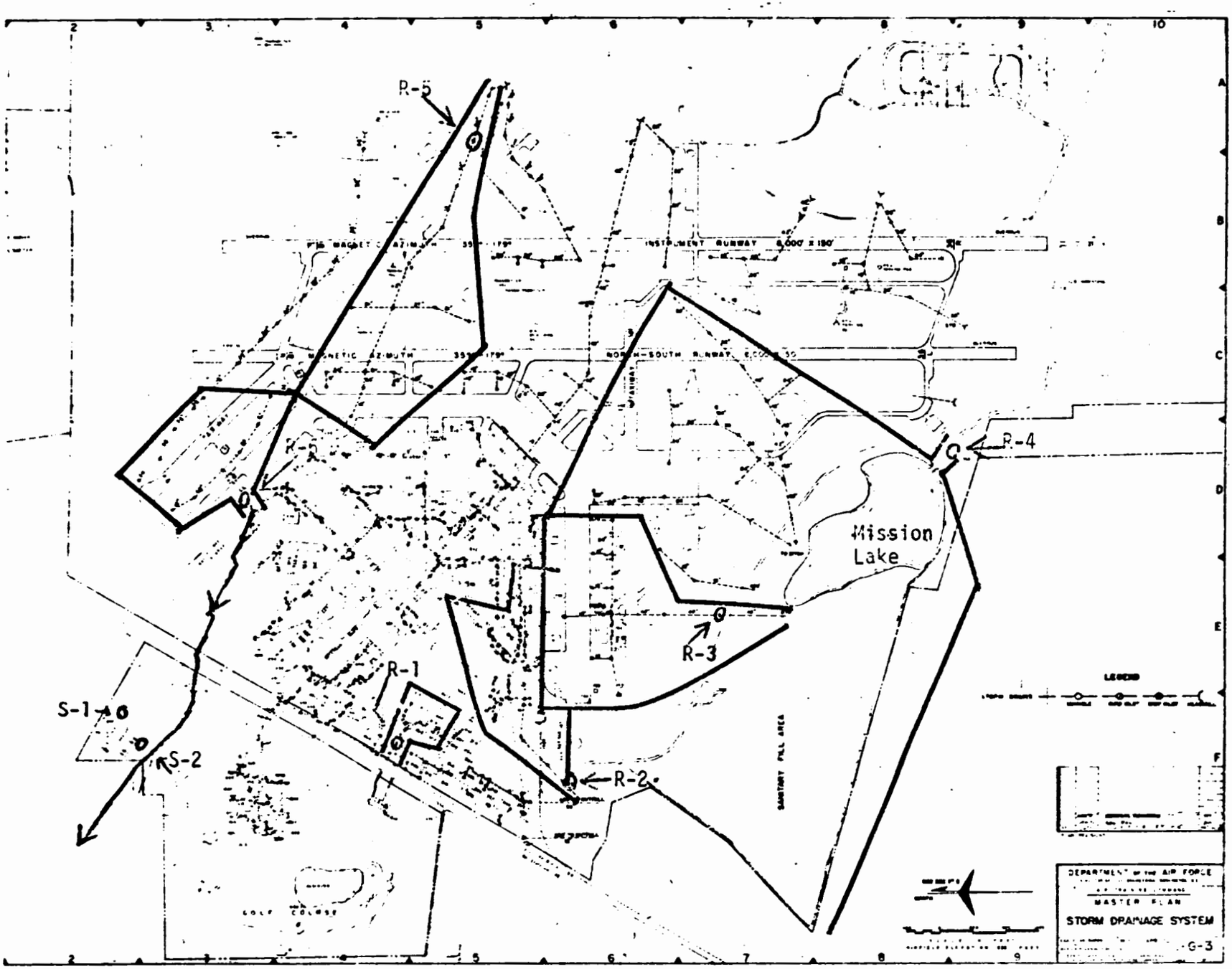


FIGURE 3 STORM DRAINAGE SYSTEM, MOODY AFB GA

Table 7
Average Storm Sewer Discharge Composition
27 Sep-7 Oct 1972
Moody AFB GA

	Chemical/Physical Data (mg/l unless noted)	Sampling Station					
		R1	R2	R3	R4	R5	R6
GENERAL	Dissolved O_2	4.4	<0.0	5.8	3.3	5.3	5.3
	Temperature ^oC	26.	26.	26.	27.	25.	25.
	pH (units)	7.4	6.1	6.0	6.7	6.4	6.5
	Flow (GD)	5133.	8326.	2244.	No Flow	No Flow	3843.
	BOD_5	42.	275.	<12.	<12.	<12.	<12.
	COD	170.	706.	20.	46.	21.	11.
	Total Organic Carbon	34.	180.	5.	12.	6.	2.
	Oils/Greases (by IR)	3.9	8.1	0.8	1.3	0.6	0.8
	Surfactants, MBAS (as LAS)	13.7	4.0	4.3	0.3	0.5	0.3
	Total Kjeldahl Nitrogen (as N)	1.10	8.56	0.65	1.18	0.39	1.05
RADICALS	Ammonia, NH_3 (as N)	0.40	4.90	0.12	0.27	0.09	0.81
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01
	Nitrate, NO_3 (as N)	<0.2	0.3	<0.2	<0.2	0.64	0.42
	Nitrite, NO_2 (as N)	<0.005	<0.005	<0.005	<0.005	<0.005	0.014
	Phenolics, C_6H_5OH		0.109	<0.006	<0.005	0.006	0.004
	Phosphate, Total-PO_4 (as P)	2.5	6.1	0.3	0.1	<0.1	0.1
METAL/IONS	Aluminum	0.41	0.74	0.13	0.14	0.15	0.1
	Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Chloride				21.	14.	20.
	Chromium, Hexavalent	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Chromium, Total	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Copper	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Iron	0.49	3.86	0.17	0.58	0.10	2.45
	Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Manganese	<0.05	0.13	<0.05	0.09	<0.05	<0.05
	Mercury	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Nickel	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Zinc	0.06	<0.05	<0.05	<0.05	<0.05	<0.05

charge of untreated industiral waste to the storm drainage system should be completed as soon as possible. In addition to connection of certain drains to the sanitary collection system, procedures should be instituted to prevent the introduction of solid industrial materials into water solution and/or suspension.

D. National Pollutant Discharge Elimination System (NPDES) Permit

1. Permit Development

Moody AFB has been granted an NPDES permit, #GA0020001, to discharge water from the STP to Beatty Creek and thence to the Withlacoochee River. A copy of this permit is included as Appendix H of this report. Table 8 indicates the current average STP effluent composition and the limitations required by the NPDES permit for both an interim period, until 30 June 1977, and a final period beginning on 1 July 1977 and lasting to the expiration date of the permit, 30 June 1979. The interim limits are base on secondary sewage treatment standards. The final effluent limitations placed on the discharge by the permit are based on the classification of the river and all of its tributaries for fishing and propagation of warm water fish. The main objective of the permit discharge limitations is to avoid the lowering of the dissolved oxygen at any point in the stream below a minimum of 4.0 mg/l. The Moody STP discharge contains three components which affect the dissolved oxygen of the receiving stream, namely BOD_5, ammonia nitrogen, and dissolved oxygen. The Region IV of the U.S. EPA at Atlanta, Georgia used a computer program based on the "Manhatten Model" of the Streeter-Phelps dissolved oxygen sag equation to determine effluent limitations for these three components. The program indicated that the accepted normal EPA effluent values of 30 mg/l BOD_5, 13-18 mg/l ammonia nitrogen, and no minimum effluent dissolved oxygen would not be adequate to avoid a downstream dissolved oxygen deficiency during the most stringest case of a seven day 10 year minimun flow of zero in the receiving stream and a discharge from the Moody STP at the plant's design capacity of 0.750 MGD. These stringent conditions are equivalent to requiring that the plant effluent itself support the propagation of fish. Several other combinations of effluent limitations were tried in the computer program before the values listed in Table 8 for BOD_5, ammonia nitrogen, and effluent dissolved oxygen (Final Limits) were found to maintain the required dissolved oxygen at all points of Beatty Creek. This combination of effluent restrictions is not the only one that would satisfy the stream dissolved oxygen requirement. For example the effluent ammonia nitrogen level could be raised but this would require either a corresponding decrease in the effluent BOD_5 concentration or an increase in the effluent dissolved oxygen concentration or a combination of the two to preserve the minimum stream dissolved oxygen standard.

2. Permit Compliance

Comparison of the values indicates that the Moody STP is presently meeting all the interim limits on both a concentration and a weight

TABLE 8

COMPARISON OF MOODY STP DISCHARGE
WITH NPDES PERMIT LIMITS

	PRESENT PLANT EFFLUENT*	INTERIM LIMITS** UNTIL 30 JUN 77	FINAL LIMITS** 1 JUL 77 30 JUN 79
Flow, MGD	0.393	0.750	0.750
Concentration			
BOD_5, mg/l	23.4	30.	15.
Ammonia Nitrogen, mg N/l	1.09†	-	2.0
Dissolved Oxygen, mg/l	-	-	6.0
Suspended Solids, mg/l	22.4	30.	30.
pH Range: Minimum	6.8	6.0	6.0
Maximum	7.2	9.0	9.0
Fecal Coliform, counts/100 ml ††	-	200	200
Mass Loading			
BOD_5, lb/day	76.8	188	93
Ammonia Nitrogen, lb N/day	3.58	-	12.5
Suspended Solids, lb/day	73.5	188	188

*Average Based on AF Fms 1462 and 1463, January-November 1973

**Monthly Average

†Average Based on Survey Data, 27 September - 7 October 1972

††Monthly Geometric Mean

of pollutant basis. The plant does not presently meet the final concentration limits for BOD_5, and may not meet the concentration limits for ammonia nitrogen and dissolved oxygen, since there is no treatment unit at the plant specifically designed for control of these latter two parameters. The final weight of pollutant limits for both BOD_5 and ammonia nitrogen are readily met by the plant discharge. This achievement can be attributed to the fact the the average plant flowrate is only 0.393 MGD, or 52% of the design flowrate of 0.750 MGD.

3. Suggested Modifications to Assure Compliance

The Moody STP is a well-run secondary treatment plant that already achieves over 90% reduction of both BOD_5 and suspended solids. Further removals of BOD_5 and ammonia, and addition of dissolved oxygen to meet the 1 July 1977 final limits of the permit will not be possible with the present facility. The plant will require upgrading by chemical addition to the existing clarifiers and/or an additional treatment unit (tertiary treatment) to further treat the effluent from the final clarifier. There are many possible processes that could be used to remove BOD_5 and ammonia, and add dissolved oxygen, e.g., aeration, foam flotation, ultrafiltration, etc. Pilot plant studies with the Moody effluent will be required to determine the most suitable processes. The goal should be to choose a single process, either one that will enable the plant to meet all of the 1977 limits, or one that will achieve an excellent level of one of the parameters in the effluent, i.e. very low BOD_5, very low ammonia or very high dissolved oxygen. Then the final limits of the permit could be made less stringent for the other two parameters in light of the interrelated effect of the three parameters on the dissolved oxygen in the receiving stream.

4. Documentation of Stream Conditions

The final effluent limits contained in the Moody NPDES permit are based on a computer projection of the effect of discharge of the full design flowrate of the STP, 0.750 MGD, on the receiving waters. Since the plant is normally operated at an average flowrate of 0.393 MGD, the projection may not be entirely valid. A stream dissolved oxygen survey would document the effects of the STP discharge on the receiving waters, and should be accomplished before any plant modifications are planned or started.

E. Monitoring Program

A recommended monitoring program for the storm and t ted sanitary discharges of Moody AFB is included with this report as Appendix F. Quarterly sampling for the first two years followed by semi-annual (Spring and Fall) sampling should be adequate to both detect any unusual discharges from the base and to build up a history of good performance. This sampling program is in addition to the monitoring program required by the base's NPDES permit.

IV. CONCLUSIONS

1. The Moody AFB STP is a well run low-rate trickling filter plant, achieving over 90% reduction of BOD_5 and 91% reduction of suspended solids.

2. The plant should meet the interim provisions of the NPDES permit which are based on secondary treatment requirements. In addition, the plant should have little problem meeting the 1 July 77 final limits in term of total lbs/day since the plant is being operated at 52 percent of design flow while the discharge limitations are based on the full design flow of 0.750 MGD. Additional facilities for BOD_5 removal, ammonia-nitrogen removal and dissolved oxygen augmentation will be required to meet the final concentration limits specified in the NPDES permit.

3. Several sources of industrial waste discharge to the storm sewer system have been identified. Current planning is to install oil/water/solids separators and pipes to connect these streams to the sanitary system.

V. RECOMMENDATIONS

1. An effort should be made to reduce or eliminate the amount of solid industrial material that can get into water and become a water pollution problem.

2. Those industrial wastes which by their very nature are liquid and for which there is no market for recovery, recycle or separate disposal should be transported to the sanitary sewage treatment plant for treatment before discharge, if such treatment is compatible with good operation of the treatment plant.

3. The identified industrial waste streams that are currently discharging to storm sewers should be connected to the sanitary sewer system as rapidly as possible.

4. A stream dissolved oxygen survey of Beatty Creek should be conducted to determine the effect of the Moody STP effluent on the stream and verify the EPA permit requirements for 1977. This survey should be scheduled to follow completion of the project to connect the identified industrial waste streams to the sanitary treatment system.

5. An amperometric titration unit should be procured and used to determine the chlorine residual in the effluent from the STP.

6. The monitoring program of Appendix F should be conducted quarterly for two years, and then semi-annually thereafter.

APPENDIX A

Authorization For Survey

DEPARTMENT OF THE AIR FORCE
HQ. 3550th PILOT TRAINING WING (ATC)
MOODY AIR FORCE BASE, GEORGIA 31601

REPLY TO ATTN OF: DEMC/Lt Stauffer/3722 7 October 1971

SUBJECT: Survey of Sewage Treatment Plant and Storm Drainage System

TO: ATC/DEMU/Mr. Banowsky

1. Request that a Environmental Health Lab Team be provided to survey the sewage treatment plant system, storm drainage system and plant operators lab procedures at Moody AFB. Survey results would be used to determine whether or not the sewage treatment plant is adequate to handle an additional load, and the chemicals contained therein, from the aircraft washracks and the vehicle washracks.

2. The present sewage treatment plant is designed for handling .750 MGD.

3. Two hundred additional MFH units are being constructed. The anticipated date for full occupancy is 1 September 1972.

4. Copies of the analysis performed on the grab samples taken from the storm drainage system and a map of the system showing the locations where the samples were taken are attached for your review and comments.

FOR THE COMMANDER

WILLIAM D. THOMPSON, Major, USAF
Base Civil Engineer

2 Atch
1. Analysis
2. Map

Prepare the Man

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR TRAINING COMMAND
RANDOLPH AIR FORCE BASE, TEXAS 78148

18 OCT 1971

REPLY TO ATTN OF: DEMU

SUBJECT: Environmental Survey

TO: SG

1. Moody AFB has requested that their sewage treatment and storm drainage systems be surveyed in the attached letter to DEMU, dated 7 Oct 71.

2. This request is in accordance with AFR 161-22.

1 Atch
Moody/DEMC Ltr, 7 Oct 71

Donald J. Newlin

DONALD J. NEWLIN, Lt Col, USAF
Chief, Utilities Division
Dir, Ops & Maint, DCS/CE

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR TRAINING COMMAND
RANDOLPH AIR FORCE BASE, TEXAS 78148

19 OCT 1971

REPLY TO ATTN OF: SGPAAP

SUBJECT: Environmental Pollution Survey

TO: AFLC/SGPE
Wright-Patterson AFB, OH 45433

Request personnel from the USAF Environmental Health Laboratory at Kelly AFB, Texas, accomplish an environmental pollution survey at Moody AFB, Georgia (see attachments 1 & 2).

FOR THE COMMANDER

DOYCE B. DEES, JR., Colonel, USAF, MC
Assistant Surgeon

2 Atch
1. ATC/DEMU Ltr, 18 Oct 1971
2. Moody/DEMC Ltr, 7 Oct 1971 w/ atch

Info Cy: ATC/DEMU w/o atch

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

REPLY TO ATTN OF: SGP

21 Oct 1971

SUBJECT: Environmental Pollution Survey

TO: USAFETRL, Kelly/CC

The attached request is forwarded for your action.

FOR THE COMMANDER

HAROLD W. DIETZ, Colonel, USAF, MC
Deputy Surgeon

1 Atch
ATC/SGPAAP ltr, 19 Oct 71,
w/2 atch

Cy to:
ATC/SGPAAP/DEMU

APPENDIX B

WATER USE CLASSIFICATIONS

AND

WATER QUALITY CRITERIA

FOR THE

STATE of GEORGIA

Department of Natural Resources
Environmental Protection Division

Region IV, May, 1974

Atlanta, Georgia

TABLE OF CONTENTS

AUGUST 1972

RULES
OF
STATE WATER QUALITY CONTROL BOARD

CHAPTER 730-3
WATER USE CLASSIFICATIONS AND
WATER QUALITY STANDARDS *

TABLE OF CONTENTS

730-3-.01 PURPOSE - *The establishment of water quality standards.*

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.02 WATER QUALITY ENHANCEMENT - The purposes and intent of the Board in establishing Water Quality Standards are to provide enhancement of water quality and prevention of pollution; to protect the public health or welfare in accordance with the public interest for drinking water supplies, conservation of fish, game and other beneficial aquatic life, and agricultural, industrial, recreational, and other beneficial uses.

Those waters in the State whose existing quality is better than the minimum levels established in standards on the date standards become effective will be maintained at high quality; with the Board having the power to authorize new developments, when it has been affirmatively demonstrated to the Board that a change is justifiable to provide necessary social or economic development; and provided further that the level of treatment required is the highest and best practicable under existing technology to protect existing beneficial water uses.

In applying these policies and requirements, the State of Georgia will recognize and protect the interest of the Federal Govern-

* *APPLICABLE TO INTRASTATE AND INTERSTATE WATERS OF GEORGIA*

ment in interstate (including coastal and estuarine) waters. Toward this end the Board will consult and cooperate with the Environmental Protection Agency on all matters affecting the Federal interest.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.03 DEFINITIONS - All terms used in this rule shall be interpreted in accordance with definitions as set forth in the Act and as otherwise herein defined.

(1) "Reasonable and necessary uses" means drinking water supplies, conservation of fish, game and other aquatic life, agricultural, industrial, recreational, and other legitimate uses.

(2) "Shellfish" refers to clams, oysters, scallops, mussels, and other mollusks.

(3) "Intake temperature" is the natural or background temperature of a particular waterbody unaffected by any man-made discharge or thermal input.

(4) "Coastal waters" are those littoral recreational waters on the ocean side of the Georgia coast.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.04 WATER USE CLASSIFICATIONS - Water use classifications for which the criteria of this rule are applicable are as follows:

(1) Drinking Water Supplies
(2) Recreation
(3) Fishing, propagation of Fish, Shellfish, Game and Other Aquatic Life
(4) Agricultural
(5) Industrial
(6) Navigation
(7) Wild River
(8) Scenic River
(9) Urban Stream

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.05 GENERAL CRITERIA FOR ALL WATERS - The following criteria are deemed to be necessary and applicable to all waters of the State:

(1) All waters shall be free from materials associated with municipal or domestic sewage, industrial waste or any other waste which will settle to form sludge deposits that become putrescent, unsightly or otherwise objectionable.

(2) All waters shall be free from oil, scum and floating debris associated with municipal or domestic sewage, industrial waste or other discharges in amounts sufficient to be unsightly or to interfere with legitimate water uses.

(3) All waters shall be free from material related to municipal,

industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

(4) All waters shall be free from toxic, corrosive, acidic and caustic substances discharged from municipalities, industries or other sources in amounts, concentrations or combinations which are harmful to humans, animals or aquatic life.

(5) Applicable State and Federal requirements and regulations for the discharge of radioactive substances shall be met at all times.

(6) No man-made physical or other alteration of stream beds that may violate established water quality standards, or reduce the waste assimilative capacity of the streams, will be permitted without the express approval of this Board.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.06 SPECIFIC CRITERIA FOR CLASSIFIED WATER USAGE - The following criteria are deemed necessary and shall be required for the specific water usage as shown:

(1) Drinking Water Supplies -

(a) Those waters approved by the Georgia Department of Public Health and requiring only approved disinfection and meeting the requirements of the latest edition of "Public Health Service Drinking Water Standards"; or waters approved by the Georgia Department of Public Health for human consumption and food-processing or for any other use requiring water of a lower quality.

1. Bacteria: Fecal coliform not to exceed a geometric mean of 50 per 100 ml based on at least four samples taken over a 30-day period and not to exceed 200 per 100 ml in more than five percent of the samples in any 90-day period.

2. Floating solids, settleable solids, sludge deposits or any taste, odor or color producing substances: None associated with any waste discharge.

3. Sewage, industrial or other wastes: None.

(b) Those raw water supplies requiring approved treatment to meet the requirements of the Georgia Department of Public Health and the latest edition of "Public Health Service Drinking Water Standards" or which are approved by the Georgia Department of Public Health for human consumption and food-processing; or for any other use requiring water of a lower quality.

1. Bacteria: Fecal coliform not to exceed a geometric mean of 1,000 per 100 ml based on at least four samples taken over a 30-day period and not exceed a maximum of 4,000 per 100 ml.

2. Dissolved Oxygen: A daily average of 6.0 mg/l and no less than 5.0 mg/l at all times for waters designated as trout streams by the State Game and Fish Commission. A daily average of 5.0 mg/l and no less than 4.0 mg/l at all times for waters supporting warm water species of fish.

3. pH: Within the range of 6.0 - 8.5.

4. No material or substance in such concentration that, after treatment, would exceed the requirements of the Georgia Department of Public Health and the latest edition of "Public Health Service Drinking Water Standards."

5. Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F. In streams designated as trout or smallmouth bass waters by the State Game and Fish Commission, there shall be no elevation or depression of natural stream temperatures.

(2) Recreation -

General recreational activities such as water skiing, boating, and swimming, or for any other use requiring water of a lower quality. These criteria are not to be interpreted as condoning water contact sports in proximity to sewage or industrial waste discharges regardless of treatment requirements.

(a) Bacteria: Fecal Coliform not to exceed a geometric mean of:

(1) Coastal Waters - 100 per 100 ml
(2) All other recreational waters - 200 per 100 ml
(3) Should water quality and sanitary studies show natural fecal coliform levels exceed 200/100 ml (geometric mean) occasionally in high quality recreational waters, then the allowable geometric mean fecal coliform level shall not exceed 300 per 100 ml in lakes and reservoirs and 500 per 100 ml in free flowing fresh water streams.

The geometric mean will be used as the method of criteria expression. This technique will be applied to no less than four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours.

(b) Dissolved Oxygen: A daily average of 6.0 mg/l and no less than 5.0 mg/l at all times for waters designated as trout streams by the State Game and Fish Commission. A daily average of 5.0 mg/l and no less than 4.0 mg/l at all times for waters supporting warm water species of fish.

(c) pH: Within the range of 6.0 - 8.5.

(d) Toxic Wastes, Other Deleterious Materials: None in concentrations that would harm man, fish and game or other beneficial aquatic life.

(e) Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F. In streams designated as trout or smallmouth bass waters by the State Game and Fish Commission, there shall be no elevation or depression of natural stream temperatures.

(3) Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life; or for any other use requiring water of a lower quality.

(a) Dissolved Oxygen: A daily average of 6.0 mg/l and no less than 5.0 mg/l at all times for waters designated as trout streams by the State Game and Fish Commission. A daily average of 5.0 mg/l and no less than 4.0 mg/l at all times for waters supporting warm water species of fish.

(b) pH: Within the range of 6.0 - 8.5.

(c) Bacteria: Fecal Coliform not to exceed a geometric mean of 1,000 per 100 ml based on at least four samples taken over a 30-day period and not exceed a maximum of 4,000 per 100 ml.

(d) Bacteria: (Applicable only to waters designated as approved shellfish harvesting waters by the appropriate State agencies) The requirements will be consistent with those established by the State and Federal agencies responsible for the National Shellfish Sanitation Program.

(e) Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F. In streams designated as trout or smallmouth bass waters by the State Game and Fish Commission, there shall be no elevation or depression of natural stream temperatures.

(f) Toxic Wastes, Other Deleterious Materials: None in concentrations that would harm man, fish and game or other beneficial aquatic life.

(4) Agricultural -

For general agricultural uses such as stock watering and irrigating; or for any other use requiring water of a lower quality.

(a) Bacteria: Fecal coliform not to exceed a geometric mean of 5,000 per 100 ml based on at least four samples taken over a 30-day period.

(b) Dissolved Oxygen: No less than 3.0 mg/l at any time.

(c) pH: Within the range of 6.0 - 8.5.

(d) Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F. In streams designated as trout or smallmouth bass waters by the State Game and Fish Commission, there shall be no elevation or depression of natural stream temperatures.

(e) Toxic Substances, Other Deleterious Materials: None in concentrations that would interfere with or adversely affect uses for general agricultural purposes or would prevent fish survival.

(5) Industrial -

For processing and cooling water with or without special treatment; or for any other use requiring water of a lower quality.

(a) Dissolved Oxygen: No less than 3.0 mg/l at any time

(b) pH: Within the range of 6.0 - 8.5.

(c) Toxic Substances, Other Deleterious Materials: None in concentrations that would prevent fish survival or interfere with legitimate and beneficial industrial uses.

(d) Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F. In streams designated as trout or smallmouth bass waters by the State Game and Fish Commission, there shall be no elevation or depression of natural stream temperatures.

(6) Navigation -

To provide for commercial ship traffic and protection of seamen or crews.

(a) Bacteria: Fecal coliform not to exceed a geometric mean of 5,000 per 100 ml based on at least four samples taken over a 30-day period.

(b) Dissolved Oxygen: No less than 3.0 mg/l at any time.

(c) pH: Within the range of 6.0 - 8.5.

(d) Toxic Substances, Other Deleterious Materials: None in concentrations that would damage vessels, prevent fish survival or otherwise interfere with commercial navigation.

(e) Temperature: Not to exceed 90°F. At no time in the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F. In streams designated as trout or smallmouth bass waters by the State Game and Fish Commission, there shall be no elevation or depression of natural stream temperatures.

(7) Wild River -

This classification will be applicable to any waters of the State when so designated by an authorized State or Federal Agency and will be effective simultaneously with that Agency's proper designation.

For all waters designated as "Wild River", there shall be no alteration of natural water quality from any source.

(8) Scenic River -

This classification will be applicable to any waters of the State when so designated by an authorized State or Federal Agency and will be effective simultaneously with that Agency's proper designation.

For all waters designated as "Scenic River", there shall be no alteration of natural water quality from any source.

(9) Urban Stream -

This classification is applicable to streams in highly developed urban areas.

(a) All conditions specified under "GENERAL CRITERIA FOR ALL WATERS" (730-3-.05) will apply, and in addition, the waters so classified are to be aesthetically compatible to adjacent areas.

(b) Bacteria: Fecal coliform not to exceed a geometric mean of 2,000 per 100 ml based on at least four samples taken over a 30-day period and not to exceed a maximum of 5,000 per 100 ml.

(c) pH: Within the range of 6.0 - 8.5.

(d) Dissolved Oxygen: No less than 3.0 mg/l at any time.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.07 NATURAL WATER QUALITY - It is recognized that certain natural waters of the State may have a quality that will not be within the general or specific requirements contained herein.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.08 TREATMENT REQUIREMENTS - Not withstanding the above criteria, the requirements of the Board relating to secondary or equivalent treatment for all waste shall prevail. The adoption of these criteria shall in no way preempt the treatment requirements.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.09 STREAMFLOWS - Specific criteria or standards set for the various parameters apply to all flows on regulated streams. On unregulated streams, they shall apply to all streamflows equal to or exceeding the 7-day, 10-year minimum flow.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.10 MIXING ZONE - Effluents released to streams or impounded waters shall be fully and homogeneously dispersed and mixed insofar as practical with the main flow or water body by appropriate methods at the discharge point. Use of a reasonable and limited mixing zone may be permitted on receipt of satisfactory evidence that such a zone is necessary and that it will not create an objectionable or damaging pollution condition.

Authority: Ga. Laws 1964, p. 416, as amended.

730-3-.11 EFFECTIVE DATE - This Chapter shall become effective on

_____

Authority: Ga. Laws 1964, p. 416, as amended.

CLASSIFICATIONS FOR WATERS

IN THE STATE OF GEORGIA

JOE D. TANNER
Commissioner

R. S. HOWARD, JR.
Division Director

Department of Natural Resources
ENVIRONMENTAL PROTECTION DIVISION
47 TRINITY AVENUE, S.W.
ATLANTA, GEORGIA 30334

January 8, 1974

PROPOSED ADDITIONAL
CLASSIFICATIONS FOR THE WATERS
OF THE STATE OF GEORGIA

Stream Categories

Streams and stream reaches not listed below for specific classifications, either existing or proposed, will fit into the following categorical classifications:

A. Streams and stream reaches which are not shown on the Georgia Department of Transportation's official county maps are not classified unless they receive a wastewater discharge. In that case, they are classified as fishing.

B. Streams and stream reaches which are shown as naturally intermittent, ephemeral or a combination thereof on the Georgia Department of Transportation's official county maps or which can be documented as being intermittent by records of the United States Geological Survey are not classified unless they receive a wastewater discharge. In that case, they are classified as fishing.

C. Stream channels, drainage ditches and canals which are naturally intermittent, ephemeral or a combination thereof are not classified.

D. Streams and stream reaches not specifically classified below (existing or proposed) and not categorically classified above (A, B, or C) are classified as fishing.

CLASSIFICATIONS FOR THE WATERS
OF THE STATE OF GEORGIA

May, 1974

SAVANNAH RIVER BASIN		CLASSIFICATION
Savannah River	Georgia-North Carolina State Line to Clark Hill Dam (Mile 238)	Recreation
Savannah River	Clark Hill Dam (Mile 238) to Augusta, 13th Street Bridge	Drinking Water
Savannah River	Augusta, 13th Street Bridge to U.S. Hwy. 301 Bridge (Mile 129)	Fishing
Butler Creek (and its tributaries)	Headwaters in Augusta to confluence with Savannah River	Urban
Cason's Dead River (and its tributaries)	Headwaters in Augusta to confluence with Savannah River	Urban
Savannah River	U.S. Hwy. 301 Bridge (Mile 129) to U.S. Hwy. 17 Bridge (Mile 22)	Drinking Water
Savannah River	U.S. Hwy. 17 Bridge (Mile 22) to Field's Cut (Mile 5)	Industrial Navigation
Savannah River	Field's Cut (Mile 5) to Fort Pulaski (Mile 0)	Fishing
Savannah River	Fort Pulaski (Mile 0) to Open Sea and all littoral waters of Tybee Island	Recreation

OGEECHEE RIVER BASIN		CLASSIFICATION
Ogeechee River	Headwaters to U.S. Hwy. 80 Bridge	Fishing
Ogeechee River	U.S. Hwy. 80 Bridge to U.S. Hwy. 17 Bridge	Fishing

Ogeechee River	U.S. Hwy. 17 Bridge to Open Sea and littoral waters of Skidaway, Ossabaw, Sapelo and St. Catherines Islands	Recreation
Little Ogeechee River	Headwaters to U.S. Hwy. 80 Bridge	Fishing
Little Ogeechee River	U.S. Hwy. 80 Bridge to South End of White Bluff Road near Carmelite Monastery	Fishing
Little Ogeechee River	South End of White Bluff Road near Carmelite Monastery to Open Sea and littoral waters of Skidaway and Ossabaw Islands	Recreation

OCONEE RIVER BASIN		CLASSIFICATION
Middle Oconee River	Headwaters to Georgia Hwy. 82	Fishing
Middle Oconee River	Georgia Hwy. 82 to U.S. Hwy.78	Drinking Water
Middle Oconee River	U.S. Hwy. 78 to confluence with North Oconee River	Fishing
North Oconee River	Headwaters to State Route 2434	Fishing
North Oconee River	State Route 2434 to Athens Water Intake	Drinking Water
North Oconee River	Athens Water Intake to confluence with Middle Oconee River	Fishing
Trail Creek	Headwaters in Athens to confluence with N.Oconee River	Urban
Oconee River	From confluence of North and Middle Oconee Rivers to Georgia Highway 16	Fishing
Oconee River	Georgia Highway 16 to Sinclair Dam	Recreation

Oconee River	Sinclair Dam to Georgia Hwy.22	Drinking Water
Oconee River	Georgia Hwy. 22 to Georgia Highway 57	Fishing
Oconee River	Georgia Hwy. 57 to U.S Hwy.80	Drinking Water
Oconee River	U.S. Hwy.80 to confluence with Ocmulgee River	Fishing

UPPER OCMULGEE RIVER BASIN		CLASSIFICATION
South River	Headwaters to Georgia Hwy. 81	Urban
Intrenchment Creek	Headwaters in Atlanta to confluence with South River	Urban
Shoal Creek	Headwaters in DeKalb County to confluence with South River	Urban
Conley Creek	Headwaters near Atlanta Army Depot to confluence with South River	Urban
Doolittle Creek	Headwaters to DeKalb County to confluence with South River	Urban
Snapfinger Creek	Headwaters in Dekalb County to confluence with South River	Urban
South River	Georgia Highway 81 to Georgia Highway 36	Fishing
Yellow River	Headwaters to Georgia Hwy. 124	Fishing
Yellow River	Georgia Hwy. 124 to Porterdale Water Intake	Drinking Water
Yellow River	Porterdale Water Intake to Georgia Highway 36	Fishing

Alcovy River	Headwaters to Georgia Hwy. 138	Fishing
Alcovy River	Georgia Hwy. 138 to Covington Water Intake	Drinking Water
Alcovy River	Covington Water Intake to Newton Factory Road Bridge	Fishing
Jackson Lake	From South River at Highway 36 From Yellow River at Highway 36 From Alcovy River at Newton Factory Road Bridge to Lloyd Shoals Dam	Recreation

LOWER OCMULGEE RIVER BASIN		CLASSIFICATION
Ocmulgee River	Lloyd Shoals Dam to Georgia Highway 18	Fishing
Towaliga River	Headwaters to Georgia Hwy. 36	Drinking Water
Towaliga River	Georgia Highway 36 to High Falls Dam	Recreation
Ocmulgee River	Georgia Highway 18 to Macon Water Intake	Drinking Water
Ocmulgee River	Macon Water Intake to Georgia Highway 96	Industrial
Walnut Creek	Macon City limits to confluence with Ocmulgee River	Urban
Cabin Creek	Headwaters in Griffin to Parham Road	Urban
Tobesofkee Creek	Lake Tobesofkee	Recreation
Tobesofkee Creek	Tobesofkee Dam to confluence with Ocmulgee River	Urban
Ocmulgee River	Georgia Hwy. 96 to confluence with Oconee River	Fishing

ALTAMAHA RIVER BASIN		CLASSIFICATION
Altamaha River	Confluence of Oconee and Ocmulgee Rivers to U.S. Hwy. 301	Fishing
Altamaha River	U.S. Hwy. 301 to Altamaha Sound	Fishing
	All littoral waters on the ocean side of St. Simons, Sea, and Sapelo Islands	Recreation
Ohoopee River	Headwaters to confluence with Altamaha River	Fishing
Mackay River	Confluence with Altamaha River to St. Simons Sound	Fishing
[illegible] River	Northern confluence with Mackay River to Southern confluence with Mackay River	Fishing
[illegible]derica River	Northern confluence with Mackay River to Southern confluence with Mackay River	Fishing

SATILLA RIVER BASIN		CLASSIFICATION
Satilla River	Headwaters to Seaboard Coast Line Railroad	Fishing
Satilla River	Seaboard Coast Line Railroad to St. Andrews Sound	Fishing
Kettle Creek	Headwaters at Waycross to confluence with Satilla River	Urban
City Creek	Headwaters at Waycross to confluence with Satilla River	Urban

Twenty-Mile Creek	Georgia Highway 353 near Douglas to confluence with Seventeen-Mile Creek	Urban
Little Satilla River	Seaboard Coast Line Railroad to St. Andrews Sound	Fishing
East River	South End to West End	Navigation
Turtle and Brunswick Rivers	Headwaters to St. Simons Sound	Fishing
	All littoral waters on ocean side of Cumberland and Jekyll Islands	Recreation

ST. MARYS RIVER BASIN		CLASSIFICATION
St. Marys River	Headwaters to Cumberland Sound	Fishing
North River	Headwaters to confluence with St. Marys River	Industrial
	All littoral waters on ocean side of Cumberland Island	Recreation

SUWANNEE RIVER BASIN		CLASSIFICATION
Suwannee River	Headwaters to Georgia-Florida State Line	Fishing
Alapaha River	Headwaters to Georgia-Florida State Line	Fishing
Withlacoochee River (Withlacoochee Creek)	Headwaters to Georgia-Florida State Line	Fishing

OCHLOCKNEE RIVER BASIN		CLASSIFICATION
Ochlocknee River	Headwaters to Georgia-Florida State Line	Fishing
Oguina Creek (and its tributaries)	Headwaters in Thomasville to confluence with Ochlocknee River	Urban

Parkers Mill Creek	Headwaters in Cairo to confluence with Tired Creek	Urban
Aucilla River (including Aucilla Creek)	Headwaters to Georgia-Florida State Line	Fishing

FLINT RIVER BASIN		CLASSIFICATION
Flint River	Headwaters to Georgia Hwy. 54	Industrial
Sullivan Creek	Headwaters in College Park to confluence with Flint River	Urban
Mud Creek	Headwaters in Hapeville to confluence with Flint River	Urban
Flint River	Georgia Hwy. 54 to S1061, Woolsey Road	Fishing
Flint River	S1061, Woolsey Road to Georgia Highway 16	Drinking Water
Flint River	Georgia Highway 16 to Georgia Highway 27	Fishing
Flint River	Georgia Highway 27 to Albany to Georgia Power Company Dam at Lake Worth, Albany	Recreation
Flint River	Georgia Power Company Dam at Lake Worth, Albany to Bainbridge, U.S. Hwy. 84 Bridge	Fishing
Flint River	Bainbridge, U.S. Hwy. 84 Bridge to Jim Woodruff Dam, Lake Seminole	Recreation

CHATTAHOOCHEE RIVER BASIN		CLASSIFICATION
Chattahoochee River	Headwaters to Buford Dam	Recreation
Flat Creek	Headwaters in Gainesville to Chattahoochee River	Urban
Chattahoochee River	Buford Dam to Atlanta (Peachtree Creek)	Drinking Water & Recreation
Chattahoochee River	Atlanta (Peachtree Creek) to Cedar Creek	Industrial
Sope Creek	Headwaters in Marietta to Chattahoochee River	Urban
Rottenwood Creek	Headwaters in Marietta to Chattahoochee River	Urban
Nickajack Creek	Headwaters in Marietta to Chattahoochee River	Urban
Peachtree Creek (and its tributaries)	Headwaters to Chattahoochee River	Urban
Proctor Creek	Headwaters in Atlanta to Chattahoochee River	Urban
Sandy Creek	Headwaters in Atlanta to Chattahoochee River	Urban
Utoy Creek	Headwaters in East Point to Chattahoochee River	Urban
Olley Creek	Headwaters in Marietta to Sweetwater Creek	Urban
Chattachoochee River	Cedar Creek to Franklin, Georgia (U.S. Hwy. 27)	Fishing
Chattahoochee River	U.S. Hwy. 27 Bridge at Franklin, Georgia, to West Point Dam	Recreation
Chattahoochee River	West Point Dam to West Point Mfg. Company Water Intake	Drinking Water

Chattahoochee River	West Point Mfg. Company Water Intake to Osanippa Creek	Fishing
Chattahoochee River	Osanippa Creek to Columbus, Georgia (14th Street Bridge)	Recreation & Drinking Water
Chattahoochee River	Columbus, Georgia (14th Street Bridge) to Cowikee Creek	Fishing
Chattahoochee River	Cowikee Creek to Great Southern Division of Great Northern Paper Company	Recreation
Chattahoochee River	Great Southern Division of Great Northern Paper Company to Georgia Highway 91 (Neal's Landing)	Fishing
Chattahoochee River	Georgia Highway 91 (Neal's Landing) to Jim Woodruff Dam	Recreation

TALLAPOOSA RIVER BASIN		CLASSIFICATION
Tallapoosa River	Headwaters to Georgia Highway 100	Drinking Water
Tallapoosa River	Georgia Highway 100 to Georgia-Alabama State Line	Fishing
Little Tallapoosa River	Headwaters to SCS Dam No. 36 (Carrollton Raw Water Intake)	Drinking Water
Little Tallapoosa River	SCS Dam No. 36 (Carrollton Raw Water Intake) to Georgia-Alabama State Line	Fishing

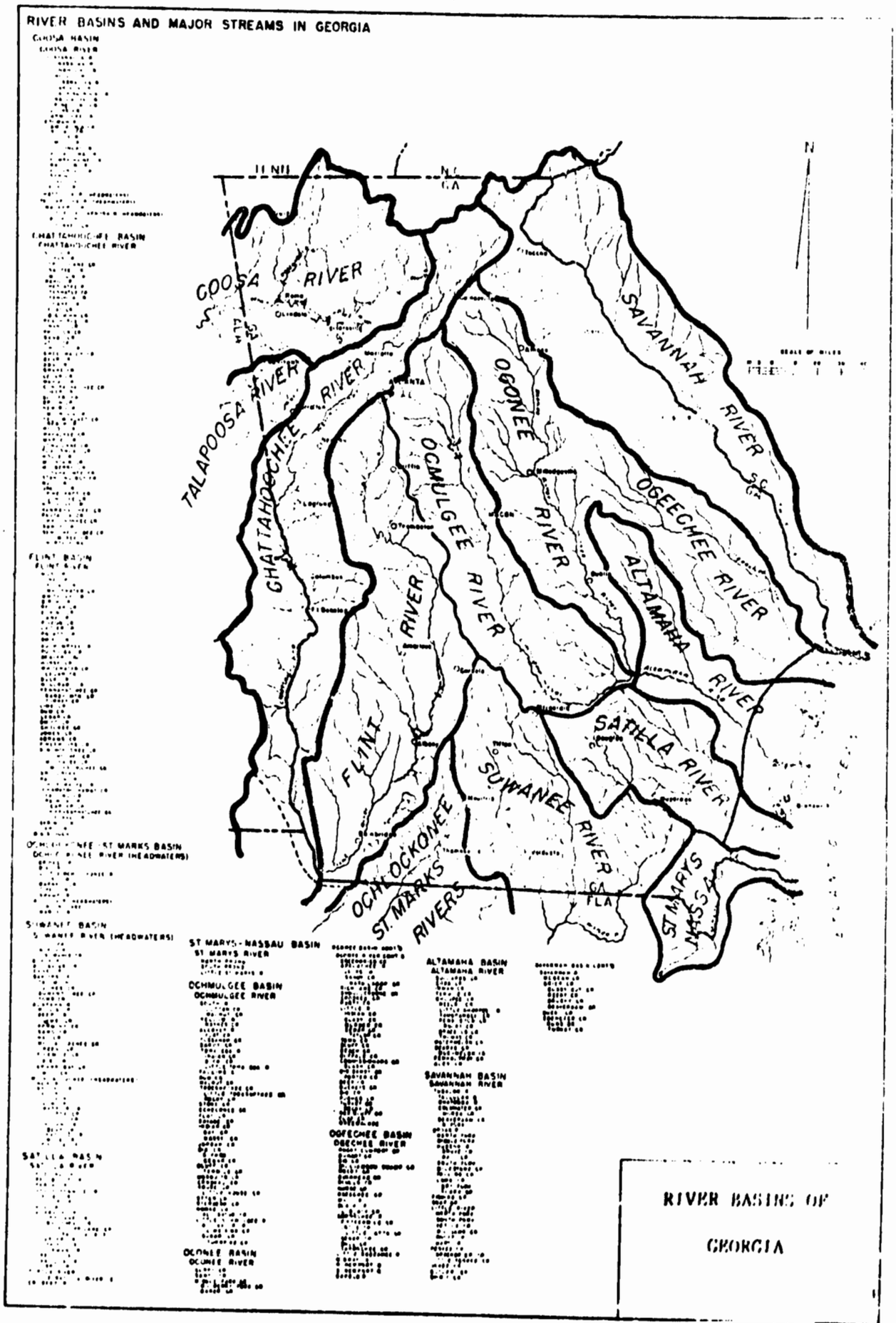
COOSA RIVER BASIN		CLASSIFICATION
Conasauga River	Georgia Highway 2 to Dalton Water Intake	Drinking Water
Conasauga River	Dalton Water Intake to confluence with Coosawattee River	Fishing

Mill Creek	Headwaters to Dalton Water Supply	Drinking Water
Mill Creek	Dalton Water Supply to confluence with Coahulla Creek	Urban
Drowning Bear Creek	From confluence with Tar Creek in Dalton to Conasauga River	Urban
Ellijay River	Headwaters to Ellijay Water Intake	Drinking Water
Ellijay River	Ellijay Water Intake to confluence with Cartecay River	Fishing
Cartecay River	Headwaters to Ellijay Water Intake	Drinking Water
Cartecay River	Ellijay Water Intake to confluence with Ellijay River	Fishing
Coosawattee River	From confluence of Ellijay and Cartecay Rivers to confluence with Mountaintown Creek	Fishing
Coosawattee River	Confluence of Mountaintown Creek to Carters Dam	Recreation
Coosawattee River	Carters Dam to confluence with Conasauga River	Fishing
Oostanaula River	Confluence of Conasauga and Coosawattee Rivers to Calhoun Water Intake	Drinking Water
Oostanaula River	Calhoun Water Intake to confluence with Armuchee Creek	Fishing
Oostanaula River	Confluence with Armuchee Creek to Rome Water Intake	Drinking Water
Oostanaula River	Rome Water Intake to confluence with Etowah River	Fishing

Etowah River	Headwaters to State Route 2551	Fishing
Etowah River	State Route 2551 to Canton Water Intake	Drinking Water
Etowah River	Canton Water Intake to Georgia Highway 20	Fishing
Etowah River	Georgia Highway 20 to Allatoona Dam	Recreation & Drinking Water
Etowah River	Allatoona Dam to Cartersville Water Intake	Drinking Water
Etowah River	Cartersville Water Intake to confluence with Oostanaula River	Fishing
Silver Creek	Headwaters to confluence with Etowah River near Rome	Urban
Coosa River	Rome-confluence of Oostanaula and Etowah Rivers to Georgia-Alabama State Line	Fishing
Coosa River	Alabama State Line	Recreation
Chattooga River	Headwaters to Georgia-Alabama State Line	Fishing
City Creek	Headwaters to confluence with Chattooga Creek at LaFayette	Urban

TENNESSEE RIVER BASIN		CLASSIFICATION
Little Tennessee River	Headwaters to Georgia-North Carolina State Line	Fishing
Hiawassee River (including Lake Chatuge)	Headwaters to Georgia-North Carolina State Line	Recreation

Nottely River	Headwaters to Georgia-North Carolina State Line	Recreation
Toccoa River (including Blue Ridge Lake)	Headwaters to Georgia-Tennessee State Line	Recreation
South Chickamauga Creek	Headwaters to Georgia-Tennessee State Line	Fishing
West Chickamauga Creek	Headwaters to Georgia-Tennessee State Line	Fishing
Spring Creek	Headwaters to Georgia-Tennessee State Line	Fishing
Dry Creek	Headwaters to Georgia-Tennessee State Line	Fishing
Chattanooga Creek	Headwaters to Georgia-Tennessee State Line	Fishing
Lookout Creek	Headwaters to Georgia-Tennessee State Line	Fishing



APPENDIX C
EQUIVALENT BASE POPULATION

The equivalent base population is an attempt to relate the number of people either assigned, working or living at a base to the equivalent population a city of full-time residents would have. The equivalency is based on two assumptions.

1. A military workday of 8 hours = 1/3 day/capita.

2. An average base housing population of 4 (1 military + 3 dependents).

Table C-1 contains the development of the equivalent base population.

TABLE C-1
EQUIVALENT BASE POPULATION
Moody AFB, GA

	NUMBER 30 Nov 1973	EQUIV. FACTOR	EQUIVALENT POPULATION
Military Personnel Assigned	2503	1/3	834
Foreign Military Personnel	20	1/3	7
Civilian Employees	555	1/3	185
BOQ Occupancy	176	2/3	117
Enlisted Quarters Occupancy	313	2/3	209
Housing Units	306	2/3 + 3	1122
Trailer Units	49	2/3 + 3	180
VOQ/TAQ	11*	1	11
Guest Housing Occupancy	23*	1	23
Equivalent Base Population			2688

*Average Occupancy 1 - 30 November 1973.

Appendix D

INDUSTRIAL WASTE SOURCE SURVEY AND INVENTORY

The Military Public Health Section, USAF Hospital, Moody AFB GA, conducted a base-wide industrial waste source survey on 7 Feb 1974 and compiled an inventory of industrial chemical usage by building number, using activity, and disposal method. These data are presented numerically by building number in Table D-1.

TABLE D-1 INDUSTRIAL WASTE SOURCE SURVEY AND INVENTORY

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
133	TRCO Photo Lab Capt Baker 3345 Dewain Fletcher 3589	Photo Film Processing	GAF - Hyphinol GAF - Vividol GAF - Surfix Acetic Acid Anscochrome Color Processing Chemicals	4.1 25 25 16.6 1.6	None None None None None	Discharge down sanitary sewer	S-1
658	CMS T-37B Post Dock Capt Haran MSGT Charles 3304	Wash and Clean T-37B A/C	A/C Cleaning Compound 6850-935-0995	55	None	Used on ramp and drained to storm sewer (no separators)	R5
			Trichloroethylene 6810-551-1487	110	None	Sprayed on A/C and allowed to evaporate	Unk
702	FMS NDI Capt Miller MSGT Ray 3881	Non-Destructive Inspection	Developer 6750-165-7133	41.6	None	Dumped into storm drain	R-3
			Developer 6850-782-2718	8.3	8.3	Collected in drums and sent to R/M	R/M
			Emulsifier 6850-782-2737	4.1	4.1		

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
702 (cont'd)			Fixer Solution 6750-L-000038-3001	41.6	None	Dumped into storm drain	R-3
			Penetrant 6850-782-2736	4.1	4.1	Collected in drums and sent to R/M	R/M
			Methyl Iso Butyl Ketone 6810-286-3785	5	5		
			PD-680 9140-261-7453	4.1	None	Lost only by evaporation	Unk
717	FMS Corrosion Control Capt Miller Mr. Roberts 3770	Strip, Repaint and treat A/C	Methyl ethyl ketone 6810-223-9069	440	None	Sent through strainer and settling tank, and pumped into sanitary sewer	S-1
			Toluene 6810-290-0048	20	None		
			Remover 8010-926-1489	330	None		
			Remover 8010-943-2137	110	None		
			Thinner 8010-527-2896	110	110	Collected in drums and sent to R/M	R/M
			Naptha 6810-223-9069	5	5		

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
T-37 Wash Rack Behind 754	OMS Washrack Capt Miller SSgt Pope 3775	Wash and Corrosion Treat T-37 A/C	Alkaline Soap	110	None	Used on ramp and drained through storm sewer to Mission Lake	R-3
			Pasagell 6850-L0000833001	2	None		
			Cleaning Compound Mil Spec C-38334 6850-527-2426	80	None		
T-38 Wash Rack Behind 754	OMS Capt Ledbetter SSgt Garriet 3336	Wash T-38 A/C	Soap Solvent Mil Spec C-25769 1 part soap to 3 part water 3-4 A/C washed per day	55	None	Used on ramp and drained through storm sewer to Mission Lake	R-3
755	AGE Maint. Capt Miller TSgt Lott 3273	Cleaning of AGE Equipment	Cleaning Solution POL 6850-637-6135	55	None	Drained through storm sewer to Mission Lake	R-3

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
753	FMS Cleaning Plant Capt Miller MSgt Mullen 3284	Cleaning A/C Metal Parts	Alkaline Cleaner Compound (corrosion remover) 6850-550-5565	800	None	Contained in tank. Rinse tank overflow drained through storm sewer to Mission Lake	R-3
			Carbon remover PC 111 6850-281-3042	110	110	Collected in drums and sent to R/M Rinse tank overflow drained through storm sewer to Mission Lake	R/M
			Dry Cleaning Solvent PD 680 6850-285-8011	55	None	Drained through storm sewer to Mission Lake after the solvent becomes contaminated	R-3
			Paint Stripper Mil Spec T 5555	55	None	Lost in parts rinse tank which is drained through storm sewer to Mission Lake	R-3
			Potassium Permanganate	None	None	In tank, not discharged	No
			Sodium Carbonate 6810-237-2906	None	None		
			Sodium Hydroxide 6810-174-6581	None	None		
			Trichloroethylene 6810-270-9982	220	None	Lost only by evaporation	Unk

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
758	FMS Access. Repair Lt Watson MSgt Cannington 3640	Repair Accessory A/C Parts	Calibration Fluid 6850-264-2771	20	None	All wastes go through storm drain to Mission Lake	R-3
			Carbon Remover PC 111 6850-281-3042	20			
			Trichloroethylene 6810-184-4800	20			
			PD 680 6550-637-6135	20	20	Collected in drums and sent to R/M	R/M
769	Refueling Maint. Capt Blair Jimmy Sammers 3260 3528	Perform Periodic Maintenance on refueling vehicles	Oil and JP4	30	None	Used fuel and oil are collected in a holding tank any water is separated out by an oil/water separator and drained to Mission Lake. The fuel and oil are removed periodically by tank truck	R-3
785	FMS Battery Shop Capt Baker TSgt Cairns	Rebuilding A/C and AGE Batteries	Potassium Hydroxide 6810-281-2029			Old battery cells are occasionally drained. The liquid is neutralized and sent through the storm sewer to Mission Lake.	R-3

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
785	FMS Electric Shop Capt Miller TSgt Tucker 3745	Repair A/C Electrical Equipment	Potassium Hydroxide	2.5	None	Drained to gravel seepage pit	Pit
785	FMS Hydraulic Shop Capt Miller MSgt Pittman 3355	Maintenance and repair of T-37 and T-38 Pneumatic and Hydraulic Systems	Hydraulic Fluid Mil Spec H-5606 9150-252-6383		All	Collected in drums and sent to R/M	R/M
			PD680 6850-637-6135	55	55		
900	Med Gp X-Ray Dr. Brown TSgt McLaughlin 3295	Black/White Film Processing	Fixer Solution	70	70	Sent to R/M for silver recovery	R/M
			Other processing Chemicals	70	None	Discharged to sanitary sewer	S-1
903	Battery Shop MSgt Strickland	Vehicle Battery Repair	Battery Acids and Washings	15	None	Acid is neutralized and discharged to storm sewer	R-1

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS Nomenclature FSN	Est. Use Rate (gal/Mo.) Used	Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
925 976 977	ABGp Vehicle Main. Lt Col Dellord MSgt Strickland 3582	Base Vehicle Maintenance and repair	Oil	55	5	Collected in drums and sent to R/M	R/M
			Hydraulic Fluid	15	15		
CE Wash rack South of 926 behind 973	CE O&M Maj Will Mr Spells 3849	Wash CE and other vehicles	General purpose Cleaner Continental Chem Corp 7930-515-2477 2-5 oz/Gal of water	351 gal in 9000 gal of water	None	Drains through soil to Mission Lake	R-2
943	AAFES BX Service Station Mr. Peterson 3451	Routine maintenance for motorized vehicles and gasoline supply for on base vehciles	Gasoline (Amoco) and oils along with grease, lubricants, hydraulic fluids	500	500	All waste petroleum products are collected in a 1000 gal tank. The tank is pumped out by a private refinery.	None

TABLE D-1 (cont'd)

Bldg No.	Squadron Section OIC/NCOIC Phone No.	Description of Operation(s)	INDUSTRIAL CHEMICALS: Nomenclature FSN	Est. Use Rate (gal/Mo.): Used	Est. Use Rate (gal/Mo.): Collect.	Disposal Methods (Incld. discharge point & estimated dilution waters.)	Disposed To:
973	ABGp Operations Mr Pike Mr Smith 3461	Base and Public Vehicle Washing	General purpose Detergent 7930-515-2477 2-5 oz/Gal of water	1500 in 45,000 gal of water	None	Discharged to storm drain	R-1
1700 1701 1703	TMS Jet Engine Test Stand Mr Cartee 3620	Testing Jet Engines	Spilled JP4 and Class 3100 chemical cleaners	55	55	Collected in drums and sent to R/M Washdown runoff flows into swamp	R/M

APPENDIX E

Trip Report

REPLY TO ATTN OF: CC

12 January 1972

SUBJECT: Trip Report - Special Project 71-51, Moody AFB GA

TO: Commander, USAF Env Health Lab/CC, Kelly AFB TX 78241
AFLC/SGPE, Wright-Patterson AFB OH 45433
IN TURN

1. Place visited: Moody AFB GA.

2. Inclusive dates: 5-10 December 1971.

3. Persons making trip: Capt Charles W. Bullock and Capt Edward E. LeFebvre.

4. Primary mode of transportation: Commercial air.

5. Purpose of trip:

a. To conduct a preliminary survey of water pollution abatement activities at Moody AFB GA.

b. To determine the need for and method of accomplishing a comprehensive evaluation of the base's watewaters and their treatment.

6. Persons contacted:

Maj William D. Thompson, Base Civil Engineer
*Maj Kenneth Will, Chief of Operations and Maintenance, Civil Engineering
Maj Alfred Watson, Hospital Commander
*Lt Don Stauffer, Civil Engineering Environmental Protection Coordinator
SMSgt Don R. Thomas, NCOIC, Vehicle Maintenance
MSgt Don Hancock, NCOIC FMS Accessory Repair Section
*TSgt Thomas Knowlton, NCOIC Military Public Health
TSgt David Zimmerman, NCOIC Corrosion Control
TSgt G. N. Draper, NCOIC NDI Lab
SSgt William Garren, NCOIC FMS Cleaning Shop
*Mr Ilbert Brayshaw, GS-13, Associate Base Civil Engineer
*Mr. Fred Flateau, GS-12, Chief Engineer
*Mr. Edgar Hull, GS-8, TRCO, Water and Sewage
Mr. Garland Stone, Foreman for Water and Sewage Treatment Contractors
Mr. C. E. Stalvey, Redistribution and Marketing

*Attended briefing of preliminary survey findings, 9 December 1971.

7. Findings and Observations:

a. Domestic wastewater sources and treatment:

(1) Domestic wastewaters from almost all on-base duty areas and all on-base housing areas are collected and treated at the base secondary sewage treatment plant.

(2) The treatment plant consists of primary and secondary clarifiers two standard rate trickling filters, an unheated but internally circulated anaerobic digestor, two sludge drying beds, chlorinator and chlorine contact tank, and parshall flume flow measurement device.

(3) The plant outfall flows into Beatty Branch which reportedly originates from springs under the base's runway 18L and 18R. Beatty Branch flows into Cat Creek and thence into the Withlachoochee River.

(4) A survey of the plant and a cursory review of its past year's operating logs indicated that the plant is providing exceptionally good secondary treatment. The plant's hydraulic design capacity of 0.75 million gallons per day (MGD) is only loaded between 0.3 and 0.4 MGD. Five-day biochemical oxygen demand (BOD_5) removal efficiencies through the plant usually exceed 90%. Aquatic life in Beatty Branch appeared normal and no obvious pollution was observed in the branch near the plant outfall.

(5) Considerable evidence of recent "in-house" efforts existed to show a progressive rehabilitive program for the entire treatment plant system (see Atch 1). These actions were exemplary, sorely needed, and should continue to receive full support. The most important of these projects to be completed are the:

(a) Repair of the primary and secondary clarifier appertenances before the new housing units' waste begins to arrive at the plant.

(b) Repair of the plant's post chlorination unit which alledgedly has not operated since 1961.

(c) Installation of a new flow measurement recorder on the plant's parshall flume. Plant flow measurements have not been made for an extended period and have been estimated to average 70% of the base's daily potable water consumption.

(6) The laboratory equipment is inadequate for doing all the tests

needed to properly evaluate the plant's operation. The most immediate needs for laboratory equipment are listed in Paragraph 8 below. Excellent efforts have been made to do many analyses with the laboratory equipment currently available.

(7) Three of the plant operators are currently licensed sewage plant operators in Georgia. However, it is highly desirable that one operator receive more intensive, short course training in sewage chemistry and laboratory techniques and equipment. Recommendations for training and references are given in Paragraph 8 below.

(8) During the survey, data were collected to evaluate the sewage plant's:

(a) Past operational efficiency.

(b) Capability to effectively treat incremental increases in loadings which would come from projected base housing projects.

b. Industrial wastewater sources and treatment:

(1) Many industrial wastewaters flow untreated into open or covered storm sewers which drain into branches/mill races around the base. Notable exceptions to these untreated discharges were: corrosion control facility (Bldg 717) discharges to sanitary sewer, film processing agencies send processor "fixer" solutions to redistribution/marketing (R/M) for silver recovery, jet engine test stand (Bldg 1700) and vehicular maintenance activities send collected oils and hydraulic fluids to R/M, and the base motor pool and field maintenance battery shops neutralize their battery acids before discharging them to storm drains.

(2) Tab G-3, Base Master Plan, depicted nineteen separate storm sewer outfalls from the base, excluding the housing area. As observed during the survey, four outfalls appeared to carry most of the industrial waste loads. Past records estimated these industrial waste discharges at 0.05 to 0.07 MGD. However, the wastes through these outfalls have never been qualitatively or quantitatively evaluated except for grabbing samples to indicate the:

(a) Sources of elevated lead concentrations in some fish taken from Mission Lake (1970).

(b) Chemical pollutants possibly present in the base's storm sewers & outfalls and run-off drainage areas (1971).

(3) Many of the industrial shops were visited and data were taken on their chemical inventory, usage rates, process uses of the chemicals, and discharge points of these chemicals. A format for tabulating this information was outlined. The usefulness of such a format in monitoring pollution sources was discussed with Military Public Health personnel.

(4) Of the four storm sewers having industrial waste loads, two flow south into a branch which has been dammed downstream to form on-base Mission Lake. The lake's discharge flows off-base and ultimately reaches Grand Bay Creek and the Alapaha River. Although aquatic life in the lake appeared normal, surfactant suds were observed on the shoreline and some oil deposits were in the lake's discharge channel. Effectively, Mission Lake should be considered as an oxidation treatment pond for whatever industrial wastes enter it. The lake's effectiveness for such treatment is unknown as is the quality and quantity of its influent and effluent waters.

8. Recommendations and Conclusions:

a. An excellent "in-house" rehabilitation of the sewage treatment system is in progress. Accomplishment of those items in the order listed in Paragraph 7a(5) is most important. Until the flow detector/recorder is installed, the plant's flow during the day should be estimated by measuring the water level through the parshall flume. The procedure for doing this was discussed during the survey.

b. The base sewage treatment laboratory equipment listed in Atch B should be procured as quickly as possible. Although some items are cited from commercial catalogues, they or their equivalents should be obtained through medical or non-medical FSN supply channels if available.

c. Information of recommended short course sewage chemistry training could be obtained from:

(1) Environmental Protection Agency, 4676 Columbia Parkway, Cincinnati, OH 45226.

(2) Environmental Engineering Sciences, University of Florida, Gainesville, FL 32601.

d. The following useful references should be obtained and utilized in sewage testing and treatment plant operation:

(1) Standard Methods for The Examination of Water and Wastewater, 14th Edition (1971), American Public Health Association, 1740 Broadway, New York, NY 10019. Cost: $22.50.

(2) Operation of Wastewater Treatment Plants, Manual of Practice No. 11, Water Pollution Control Federation, 3900 Wisconsin Ave, Washington, DC 20016. Cost: $3.00.

(3) Anaerobic Sludge Digestion, Manual of Practice No. 16, same publisher as (2) above. Cost: $2.50.

e. The industrial waste source inventory data available should be expanded and tabulated into the format discussed during the survey. This should be accomplished prior to complete sampling of the storm sewers carrying industrial wastes.

f. Chemical pollutants and flows of industrial wastes in four storm sewers, the car wash area near the base motor pool, and Mission Lake's effluent should be determined. A forthcoming "operations plan" will be published by this office to outline equipment supplied by this Laboratory and procedures to be used by Moody AFB personnel to collect needed field data and samples. An on-site Environmental Health Laboratory team to evaluate these industrial wastes is not considered necessary.

g. After all these data have been evaluated, a comprehensive technical report will evaluate Moody AFB's water pollution abatement activities and any additional wastewater treatment needs necessary to meet pollution control criteria.

Charles W. Bullock

CHARLES W. BULLOCK, CAPT, USAF, BSC
Bioenvironmental Engineer

2 Atch
a/s

Cy to: Base Civ Engr, &
Base Med Svcs Officer,
Moody AFB GA 31602
USAF Env Health Lab/CC
McClellan AFB CA 95652

"IN-HOUSE" TREATMENT PLANT SYSTEM REHABILITATION/ALTERATION

Action/Item	Status
1. Overhaul golf course lift stations 2 pumps, increase impellar diameters from 11 to 12 inches.	Recently completed.
2. Clean out plant outfall and fill-in/compact area around the outfall line to Beatty Branch.	" "
3. Replace and grade sand in sludge drying beds.	" "
4. Removal of trees whose leaves were falling into and interfering with plant operations.	" "
5. Repair all external lighting on plant grounds.	" "
6. Install gate to plant entrance	" "
7. Throughly clean main lift station and wet well on base.	" "
8. Overhaul the three 3650 gpm pumps in the main lift station.	" "
9. Clean out and install two 50 gph acid pumps in corrosion control's waste collection tank.	" "
10. Replace mercury amalgam seals on trickling filter rotary arms with rosin seals.	Materials on hand, to be completed in January 1972.
11. Repair comminutor at main lift station on base.	In progress.
12. Repair/replace pumping controls at main lift station on base.	To be completed early in 1972.
13. Repair primary clarifier's influent and by-pass gates, skimmer chains and flats, skimmer motor drive and reduction gears, effluent valving. Completely clean primary clarifiers and seal them as necessary.	Materials due in December 1971 and completed by summer 1972.

ATCH 1

Action/Item	Status
14. Modify primary clarifier's oil/grease skimmer collection boxes.	To be completed by summer 1972.
15. Install chlorinator and flow recorder with controls in Control House.	Equipment due in February 1972 and work completed by August 1972.
16. Replace recirculating pumps to increase capacity to 100% recirculation from secondary clarifier.	To be done during 1972.
17. Overhaul the single lift pump in the trailer park lift station and provide back up by installing another pump of equal capacity.	To be done during 1972.
18. Prepare to replace golf course lift station pumps if increasing impellar diameter does not handle new housing load.	Contingency planning.
19. Install comminutors at trailer park and golf course lift stations.	In planning.
20. Refurbish Control/Laboratory Building: lower ceiling, improve lighting system, install lockers, and repair showers.	In planning.
21. Fence entire treatment plant grounds to keep out children from the nearby base trailer park.	In planning.

RECOMMENDED SEWAGE TREATMENT LABORATORY EQUIPMENT/SUPPLIES

Item/Description	Estimated Cost
1. Ainsworth Type 23N Balance, Scientific Products Catalogue #A1497-2. Availability of equal FSN item unknown. Need one.	$530.00
2. Muffle Furnace, Stepless control, Type 1300, Thermolyne, Scientific Products Catalogue #F8510-1. Availability of equal FSN item unknown. Need one.	$98.00
3. Pipets, automatic, with selector collors, 2ml capacity, Curtin Products Catalogue #192-294. Need case of 6. Availability of equal FSN item unknown.	$37.20 (box of 6)
4. Holder, m[illegible] porous bacterial filtering disk, uses 47mm diameter filtering paper, FSN 6640-299-8691. Also obtain 47mm diameter filter paper, Whatman 41 type, low ash content; see Millipore Filter Corporation's Catalogue.	Unknown
5. Dish, moisture determination, 60mm diameter, with lift tab, flat bottom, aluminum. FSN 6640-938-5615.	Unknown
6. Filler, pipet, 3 ball valve type. FSN 6640-889-1712. Need 6.	Unknown
7. Expendable needs for Beckman Model "G" ph meter:	
a. One each: caromel electrode FSN 6630-431-4760 and glass electrode FSN 6630-431-4770.	$30.00 each
b. Batteries see meter parts listed under meter FSN 6630-431-4750.	Unknown
Operation's instruction manual. Request from manufacturer.	Probably Free
Buffer pH7 for calibrating meter. Order from chemical supply firm (need several pints)	$7.00/pint
Electrolyte for glass electrolyte:	Unknown
Saturated potassium chloride (KCl) solution. Order from manufacturer or chemical supply firm (need one bottle)	

ATCH 2

APPENDIX F

Water Pollution Surveillance Sampling Program

I. PURPOSE AND OBJECTIVES OF PROGRAM

A. Purpose: The purpose of this program is to provide minimal, routine sampling of sewage plant operations, the base's major storm drainage ditches, Mission Lake's outfall, the golf course reservoir, and Grassy Pond.

B. Objectives: Sampling data and analyses will chemically and physically characterize these waters in order to attain the following objectives:

1. Determine sewage plant compliance with current performance specifications.

2. Evaluate any future needs to modify sewage plant operations and/or performance specifications.

3. Evaluate storm drainage ditch water quality, identify any industrial wastes in the storm drainage ditches and Mission Lake, and evaluate any effects of industrial waste loadings.

4. Advise of any industrial waste treatment needs.

5. Monitor the water quality in the golf course reservoir and Grassy Pond.

6. Provide baseline data for continued water pollution control and abatement programs on Moody AFB GA.

II. SCOPE AND DESIGN OF PROGRAM

A. Scope: The scope of this program involves doing the following at ten sampling stations:

1. Measuring flow rates from the sewage treatment plant and estimating water flow levels in the storm drainage ditches and Mission Lake's outfall.

2. Testing the temperature, pH, dissolved oxygen (D.O.), five-day biochemical oxygen demand (BOD_5), and total suspended solids on applicable grab and composited samples from all sampling stations. Testing for total chlorine residual on all grab samples collected from Station S-2.

3. Collecting, compositing, preserving, and sending composited

samples to EHL(K) for analysis.

4. Recording field data, compiling these data with EHL(K) analytical results, and maintaining these data in a historical record.

5. Resampling any station when:

a. Routine sampling analyses are abnormal,

b. Industrial waste discharges are evident, or

c. Aquatic flora or fauna appear affected.

B. Design:

1. Ten minimal, routine sampling stations are defined and described in Table F-1 .

2. Table F-2 lists the physical and chemical data to be obtained at each sampling station.

3. Minimal, routine sampling frequency should be once in the spring and fall and preferably during the same months each year.

a. For Stations S-1, S-2, and R-1 through R-6, the sampling day should be on a Friday when the following conditions are met:

(1) Rainfall during the preceding seven days has been negligible, and

(2) All sewage plant processes have been operating normally during the previous month.

b. For Stations R-7 and R-8, the sampling day could be any weekday when rainfall during the preceding seven days has been negligible.

III. SAMPLING PROGRAM PROCEDURES

A. Measurement or Estimate of Flows:

1. Station S-1: Flows cannot be measured at this station but will be assumed equal to those measured at Station S-2.

2. Station S-2: Flow measurements will be recorded on the sewage plant Parshall flume's instantaneous and accumulative recorder.

3. Stations R-1 through R-6: Flows will be estimated based on the ditches' and lake outfall's flow conditions of: high, normal, low, or no flow.

Table F-1: Water Pollution Surveillance Sampling Stations - Moody AFB

Station Number*	Grid Coordinates	Code Type of Sample**	Description of Station Location
S-1	4G(1)	BJ	Basin at head of primary clarifiers in sewage treatment plant.
S-2	3A(1)	BT	End of sewage plant's discharge culvert or at beginning of outfall ditch.
R-1	4F(2)	BT	Manhole between Bldg 907 and 908 (Line contains runoff and industrial wastes from motor pool area and open car wash facility.)
R-2	6F(2)	BT + BQ	Culvert southwest side of Burma Road (Line contains runoff and industrial wastes from maintenance and POL activities along Robbins Road.)
R-3	6E(2)	BT + BQ	Buried 42" storm sewer line; use manhole just north of Burma Road. (Line contains runoff and industrial wastes from FMS activities and aircraft washings.)
R-4	8D(2)	AS	Discharge outlet at Mission Lake's retaining wall.
R-5	5A(2)	BQ	30 or 42" storm sewer line+; use manhole just west of Burma Road. (Line contains runoff and industrial wastes from flight line activities and aircraft washrack near Bldg 658.)
R-6	3D(2)	BQ	Culvert east of Clark St. (Line contains headwaters of Beatty Branch and possibly some industrial runoff.)
R-7	4G(2)	AJ,AK,AE	Golf Course Reservoir. Sample from around the perimeter. (Reservoir contains raw well water, golf course and base housing area runoff.)
R-8	none(3)	AJ + AK	Off-base base recreational area, Grassy Pond. Sample from around the pond's perimeter. (Pond contains runoff from recreational area and natural woodland drainage as well as ground waters.)

* The alphabetical part of the station number denotes the type of station. S-Sewage domestic, R-Runoff storm and industrial. The numerical part of the station number denotes how many station types are to be sampled and are numbered counter-clockwise from the base's main gate. Except for stations R-7 and R-8 which have been added to this program, station numbers and location are the same as used in "Wastewater Pollution Survey Operations Plan, Moody AFB," published by USAF EHL(K), Kelly AFB TX (February 1972).

** EHL(K) code to be used to identify sample source and use of the water. Also see Table F-11, this appendix.

(1) As indicated on "Piping Layout Sewage Treatment Plant," dated 20 Jan 1966.

(2) Refer to page 1 of 1, Tab G-3, "Base Master Plan" dated 1 Apr 1970 and last revised Nov 1971.

(3) Refer to Base Civil Engineer Drawing, "Grassy Pond Annex," dated 14 Sep 1967.

+ Tab G-3 Master Plan shows a 42" line flowing into a 30" line. This appears to be an error in the drawing and thus the line size must be verified by base personnel.

Table F-2: Physical and Chemical Data From Sampling Stations - Moody AFB GA

To Be Analyzed By:	Data Item	Grab Measurement (g), Grab Sample (G), Composite Manually (Cp in plastic container and Cg in glass container), Estimated (E).* S-1	S-2	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	Compositing Container	Volume of Composited Sample to be Analyzed	EHLK Analyses Grouping	Preservative to be added to Group's sample
Moody AFB	Field Data: Flow		G	E	E	E	E	E	E			N/A			
	Temp(°)	G	G	G	G	G	G	G	G	G	G	N/A			
	pH	G	G	G	G	G	G	G	G	G	G	N/A			
	DO	G	G	G	G	G	G	G	G	G	G	N/A			
	TCR**		G									N/A			
	BOD_5	GCp	GCP	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	Plastic			
	SS***	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	Plastic			
	Fecal Coli.		GCp									Plastic			
EHLK	EHLK Data: COD	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp				
	TOC	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	Plastic	250	A	0.5 ml conc. H_2SO_4 per 250 ml bottle
	MBAS	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp				
	CN	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp			Plastic	250	B	2 NaOH pellets per bottle
	Metals†	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp			Plastic	250	C	1.5 ml conc. HNO_3 per 250 ml bottle
	Total P	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp				
	Total N	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	Plastic	1000	D	40 mg of mercuric chloride per liter bottle
	NH_3-N	GCp	GCp		GCp										
	NO_3-N	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp				
	Phenol	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp			Plastic	250	E	1 drop of methyl orange, H_3PO_4, & 2 ml $CuSO_4$ Sol'n.
	Chlorides	GCp	GCp				GCp	GCp	GCp						
	Turbidity	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	Plastic	250	F	None
	Color	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp	GCp				
	Oils/ Grease	GCg	GCg	GCg	GCg	GCg	GCg	GCg	GCg	GCg	GCg	Glass	1000	G	2 ml conc. H_2SO_4 per liter
EHLK	Pesti-cides						GCg		GCg	GCg	GCg	Glass	1000	H	None

* Estimated flow measurement based on ditch/lake outfall flow conditions: high, normal, low, no flow.

** Total chlorine residual.

*** Suspended Solids (total)

† Metals to be analyzed for: Cr^{+6}, Cr^{total}, Cu, Fe, Pb, Mn, Hg, Ni, Ag, Zn, Cd

+ Pesticides analyses to be specified by trade name by the base. Pesticide samples should be collected by GCg at the sampling station(s).

4. Stations R-7 and R-8: Normally these water bodies have no outfall flows which can be measured or estimated.

B. Collection and Analyses of Samples:

1. All grab and manually composited samples except those for oils/greases and any pesticides should be taken from:

a. Station S-1: The distribution box just upstream of the primary clarifiers.

b. Station S-2: The end of the sewage plant's discharge culvert where the flow discharges into the outfall ditch.

c. Stations R-1 through R-6: Where the water's depth permits collection several inches below the water's surface without disturbing the sediments.

d. Stations R-7 and R-8: Collect each of the day's four samples from points equally spaced around the perimeter of the water body. Take sample from boat or shoreline severalinches below the water's surface without disturbing any sediments.

2. All grab samples to be manually composited samples for oils/grease and any pesticides analyses should be taken from the water's surface.

3. Field data measurements of temperature, pH, dissolved oxygen (D.O.), and total chlorine residual listed in Table F-2 will be determined on manually collected grab samples. Each of these grab measurements will be taken at the times given in the field data worksheets (Tables F-3, F-4, and F-5). These measurements will be recorded onto these worksheets.

a. Temperature will be measured with a standard mercury immersion thermometer in either ^{o}F or ^{o}C.

b. The pH should be measured on-site as quickly as possible after collecting the sample. Measure pH's with a pH meter which is continuously maintained in calibration against a pH buffer of 7.0.

c. D.O. samples must be collected by slowly submerging a BOT bottle into the water and filling it without any air entrapment. Using the azide modification method for D.O., add the 2 ml each of manganese sulfate solution and alkali-iodide-azide reagent to the sample, re-stopper and vigorously shake contents. Keep the sample out of sunlight until returning it to a laboratory for analysis. (See analysis procedure in either 12th or 13th edition of Standard Methods for the Examination of Water and Wastewater.)

Table F-3: Field Data Worksheet for Station S-1 and S-2 - Moody AFB GA
(Circle the station used on this sheet)

Day of Week _____ Date _____ Precipitation During Previous Week _____ inches

Time of Day (Hr ± 30 min)	Grab Samples for Measurement of				Flow Volumes at			Volume of Flow Proportioned Grab Sample to be Analyzed for	
	Temp (°)	pH	D.O. (ml of Titrant)	Tot. Chlorine Resid. (S-2 only)	Times (hrs)	Meter Readings	Difference (MG) of Readings	All But Oil/Grease and/or Pesticides	Oil/Grease and/or Pesticides Only
07 _ _					0000 07_ _				
10 _ _					07_ _ 10_ _				
13 _ _					10_ _ 13_ _				
15 _ _					13_ _ 15_ _				
18 _ _					15_ _ 18_ _				
21 _ _					18_ _ 21_ _				
24 _ _					21_ _ 24_ _				
Ave Values					Total Daily Flow (MG)			Approximate Total Composite Volume (ml)	

Day's Composited Sample Split for EHIK Analyses Groupings of:	Moody AFB Sample Number
A	
B	
C	
D	
E	
F	
G	
H	

Remarks:
1. Describe plant operating conditions during previous month:

2. Other:

Average post chlorination feed rate during sampling day: _____ lbs/million gallons of sewage flow

Table F-4: Field Data Worksheet for Stations R-1, R-2, R-3, R-4, R-5 or R-6 - Moody AFB GA
(Circle the Station used on this sheet)

Day of Week_____Date_____Precipitation During Previous Week_____inches

Time of Day (Hr ± 30 min)	Grab samples for measurement of: Temp (°)	pH	D.O. (ml of Titrant)	Estimate of Station's Flow Conditions*	Time Since Previous Sample: Time (Hr)	Difference (hrs)	Volume of Grab Sample to be Analysed for: All But Oil/Grease & Pesticides (ml)	Oil/Grease & Pesticides only (ml)
08 _ _					0000 / 08 _ _			
11 _ _					08 _ _ / 11 _ _			
14 _ _					11 _ _ / 14 _ _			
16 _ _					14 _ _ / 16 _ _			
Ave Values								

Day's Composite Split for EHL/K Analyses Group	Moody AFB Sample Number
A	
B	
C	
D	
E	
F	
G	
H	

Remarks:
1. Describe conditions of flora/fauna in the stream/ditch/lake as well as other observations.

2. Other:

*Based on flow conditions of: high, normal, low, no flow

Table F-5: Field Data Worksheet for Stations R-7 and R-8 - Moody AFB GA
(Circle the station used on this sheet)

Day of Week_____ Date_____ Precipitation During Previous Week _____ inches

Time of Day (Hr ± 30 min)	Grab Samples for Measurement of: Temp (°)	pH	D.O. (ml of Titrant)	Perimeter Location of Sample: N, S, E, W*	Volume of Grab Sample Collected for Analysis of: All But Oil/Grease and Pesticides (ml)	Oil/Grease and Pesticides only (ml)
08 _ _						
11 _ _						
14 _ _						
16 _ _						
Ave Values						

Day's Composite Split for EHA Analyses Group	Moody AFB Sample Numer
A	
B	
C	
D	
E	
F	
G	
H	

Remarks:
1. Describe conditions of flora/fauna in the water body as well as any other observations.

2. Other:

*Enter directional location of sample collection point around the water body's perimeter.

d. Total chlorine residuals at Station S-2 should be measured on-site as quickly as possible afer collecting the grab sample. Testing procedures should be by the OTA, color comparator method given in 12th or 13th edition of Standard Methods.

4. Field data measurements of BOD_5, total suspended solids, and fecal coliform (Station S-2 only) will be analyzed on the day's composited sample for a given station. Samples should be prepared from the well-mixed contents of the glass "compositing" jugs.

a. BOD_5:

(1) BOD_5's are to be analyzed using unseeded dilution water per the procedures in Standard Methods, 12th or 13th edition.

(2) Dilutions of a composited sample into 300 ml BOD_5 bottles should be as follows:

(a) Station S-1: Two dilutions of 10 ml and two dilutions of 5 ml.

(b) Station S-2: Two dilutions of 50 ml.

(c) Stations R-1 through R-8: Single dilutions of 10 ml, 20 ml, and 100 ml.

(3) BOD_5 worksheets, Tables F-6 and F-7 , should be used in setting up and recording each station's BOD_5 analyses.

b. Total Suspended Solids (TSS):

(1) These solids should be determined per the membrane glass fiber filter method described in Standard Methods, 13th edition, pp. 537-538.

(2) TSS worksheet , Table F-8, should be used to set up, record, and analyze each station's TSS.

c. Fecal Coliform:

(1) Bacterial analyses of fecal coliform from Station S-2 should be analyzed per the membrane filter procedure, 13th edition of Standard Methods.

(2) Worksheets for this analysis have not been prepared because calculations and sample sizes are highly variable and must be determined in the field. After the desired sample volume has been determined, triplicate analyses of that volume is recommended with the reported results being the triplicates average number of fecal coliforms/100 ml of sample.

Table F-6: BOD_5 Worksheet Stations S-1 and S-2 - Moody AFB GA

Date Grabs Collected and Composited_____
Date BOD_5's Prepared_____
Date BOD_5's Analyzed_____

NOTE: DILUTION WATER CONTAINS NO SEED

Blanks		Bottle No.	ml of Titrant	Average ml of Titrant
100% Aerated Dilution H_2O @	15 min			
	15 min			
	5 day			
	5 day			
Net Change of Blanks →				

Samples @ 5 day	Bottle No.	ml of Titrant	Ave. ml of Titrant	Ave 5-day Blank Minus Samples Ave Titrant*	Multi Factor	BOD_5 of each Dilution (mg/l)	Ave. BOD_5 of Dilutions (mg/l)
S-1 @ 5.0 ml					60		
S-1 @ 5.0 ml							
S-1 @ 10.0 ml					30		
S-1 @ 10.0 ml							
S-2 @ 50 ml					6		
S-2 @ 50 ml							

*Calculate only when samples average titrant is greater than 1 ml, and is 2 ml less than Average 15-minute Blank.

Table F-7. BOD_5 Worksheet Stations R-1 through R-8 - Moody AFB GA

Date Grabs Collected and Composited ________________________________

Date BOD_5's Prepared ____________________ Analyzed ____________________

Blanks		Bottle No.	ml of Titrant	Average ml of Titrant
100% Aerated Dilution H_2O @	15 min			
	15 min			
	5 day			
	5 day			
Net Change of Blanks →				

Sta. No.	Dilutions ml/300 ml	Bottle No.	ml of Titrant	Ave ml Titrant	Ave 5-day Blank Minus Sample Ave Titrant*	Multi Factor	BOD_5 (mg/l)	Ave. BOD_5 (mg/l)
	10					30		
	10							
	20					15		
	20							
	100					3		
	100							
	10					30		
	10							
	20					15		
	20							
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	20							
	100					3		
	100							
	10					30		
	10							
	20					15		
	20							
	100					3		
	100							

*Calculate only when samples average titrant is greater than 1 ml, and is 2 ml less than average 15-minute blank.

Table F-8: Total Suspended Solids Worksheet -- All Stations

Date Grab Samples Collected and Composited ____________________

Date TSS Analyzed ____________________

Station No.	Dried Weight (gms) of	Multi Factor = (1000) (1000) / Sample Volume (ml) Filtered	TSS (mg/l)
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	
	Paper + Solids ______ Paper ______ Difference ______	(1000)(1000) / ______ = ______	

5. Any grab samples which are to be composited should:

a. Be collected at the same time that flows are recorded/estimated and when other grab measurements are taken at the station. (See data worksheets, Tables F-3, F-4 and F-5).

b. Be of the following volumes:

(1) Stations S-1 and S-2. Determine the total flow (MG) from the plant's flow totalizer since the previous sampling and use Figure F-1 to determine each grab sample's volume. Note that:

(a) The day's first sample at 0800 hours must be proportioned to the day's flow since 0000 hours.

(b) These stations' composited samples will be for a 24-hour period.

(c) The composited samples' volume may be 1 gallon (± 500 ml) depending on plant flow rates at time of sample collection.

(2) Stations R-1 through R-6: Record the station's flow condition and hours since previous sampling. Use Figure F-2 to determine each grab sample's volume. If the station is not flowing, grab 946 ml of sample during each of the four visits to the station. Note that:

(a) The day's first sample volume at 0800 hours should be for an 8-hour time period.

(b) These station's composited samples will be for a 16-hour period.

(c) Each station's composited sample volume should be approximately one gallon even though the stations flow rates may differ significantly.

(3) Stations R-7 and R-8: Since there is normally no flow at these stations, grab 946 ml of sample during each of the day's four visits to the station. Note that these stations' daily composite samples consist of four grab samples of equal volume and should total about one gallon in the plastic compositing container and one gallon in the glass compositing container.

c. Be dumped into the station's compositing containers. These containers should be kept in an unlighted 35°F refrigerator when not at the stations collecting the samples.

6. At the end of the sampling day or the following morning, the compositing containers should be well shaken and:

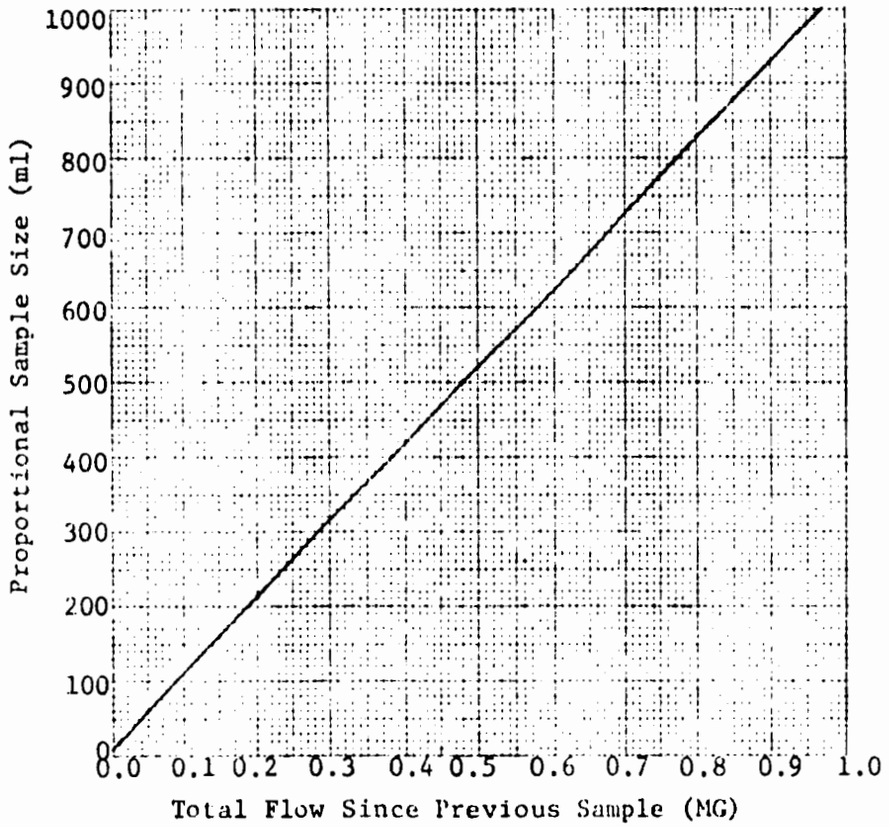

Figure F-1: **Relationship of Flow to Sample Size at Sewage Treatment Plant -- Moody AFB, GA**

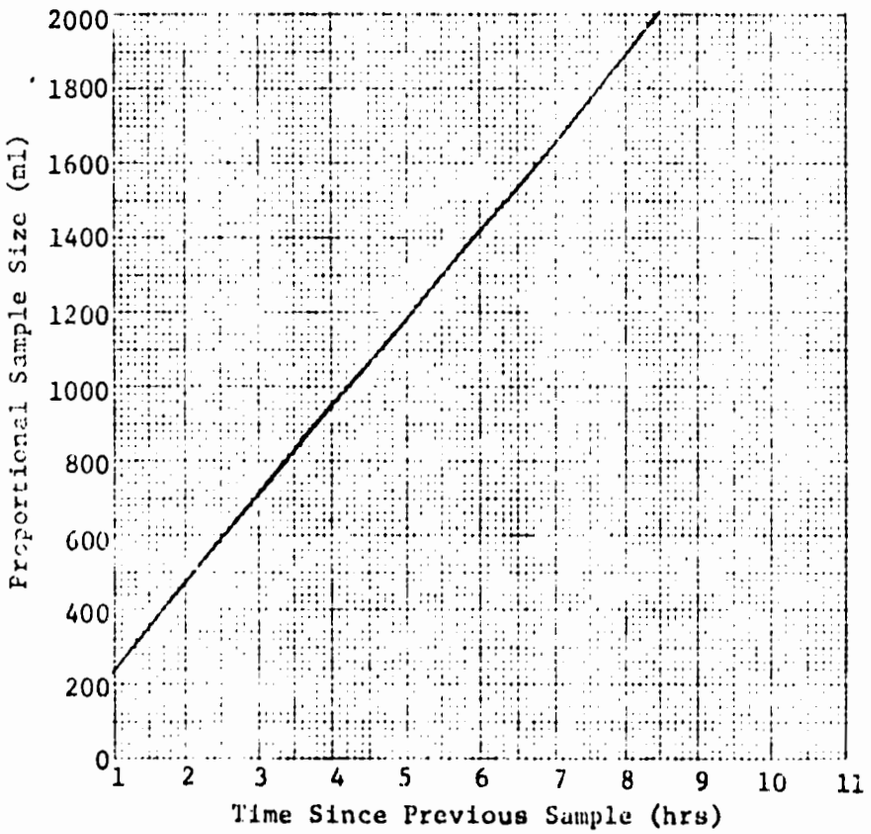

Figure F-2: **Relationship of Sampling Interval to Sample Size in Drainage Ditches/Lake Outfall -- Moody AFB, GA.**

a. Used to prepare each station's BOD_5 and total suspended solids samples.

b. Used to prepare Station S-2's fecal coliform samples.

c. Split into the separate containers which will contain the appropriate preservatives.

(1) Properly label each of these containers with its "base sample number". Recommend these sample numbers be determined as in the example below:

S-1 - 73 - S - A
[1] [2] [3] [4]

[1] Denotes the sampling station.

[2] Denotes the year of sampling.

[3] Denotes "S" for spring sampling or "F" for fall sampling.

[4] Denotes the EHL(K) analyses grouping and defines which analyses will be done on the sample as well as the sample's preservation.

(2) Record the base sample number on its station's data worksheet. (See Tables F-3, F-4 and F-5).

(3) Prepare a sample's analysis request form for each sample container to be sent to EHL(K). A recommended form is given as Table F-9.

(4) Pack and ship the prepared samples and paperwork to EHL(K) as quickly as possible.

IV. PROGRAM RESPONSBILITIES AND COORDINATION

A. USAF Environmental Health Laboratory-Kelly AFB

1. Provide any telephonic consult needed in conducting this program.

2. Analyze the samples submitted and comment on any abnormal results.

B. Moody AFB. Suggested responsibilities for various base offices are:

1. Civil Engineering:

Table F-9: Sample Analysis Request Form

SEMI-ANNUAL WATER POLLUTION SURVEY ANALYSES REQUEST

From: Military Public Health USAF Hospital Moody AFB GA, 31601	To: USAF Environ Health Lab/CC Kelly AFB TX 78241
Date Mailed to EHL(K): _____	Date Received at EHL(K): _____
Base Sample No: _____ Sample Code Type*: _____	EHL(K) Sample Control No: _____

Check Approp. Box	To Be Analyzed For Group	Sample Preserved with Reagent Grade	Checked Group Sample To Be Analyzed for Circled Item
	A	0.5 ml conc H_2SO_4 per 250 ml Plastic Bottle	COD_____ TOC_____ MBAS_____
	B	2 NaOH Pellets per 250 ml Plastic Bottle	CN_____
	C	1.5 ml conc HNO_3 per 250 ml Plastic Bottle	Metals**_____
	D	40 mg mercuric chloride per 1000 ml Plastic Bottle	Total P _____, Total N_____ NH_3-N _____, NO_3-N_____
	E	5 drops methyl orange, H_3PO_4, & 5 ml $CuSO_4$ sol'n per 1000 ml Plastic Bottle	Phenols _____
	F	Nothing per 250 ml Plastic Bottle	Chlorides _____ Turbidity_____ Color _____
	G	2 ml conc H_2SO_4 per 1000 ml Glass Bottle	Oils/Grease _____
	H	Nothing per 1000 ml Glass Bottle	Pesticides_____ Specify by Trade Name:_____

*Determine from Table F-1 or Table F-10.

**Analyses to be Done for Following Metals:

Lab Sample No.	Cd	Cr^{+6}	Cr^{tot}	Cu	Fe	Pb	Mn	Hg	Ni	Ag	Zn	

Table F-10. Coding of Water Sample Sources

SOURCE OF SAMPLE	CODE
Base Drinking Water Distribution System	AA
Boiler Water	AB
Deionized Water	AC
Distilled Water	AD
Irrigation Water	AE
Municipal Water Supply Furnished Base	AF
Industrial Process Water (Raw)	AG
Industrial Process Water (Treated)	AH
Other Treatment Process Water	AI
Raw Surface Water	AJ
Raw Ground Water	AK
Softened Water	AL
Steam Condensate	AM
Swimming Pool Water	AN
Treated Cooling Water	AO
Untreated Cooling Water	AP
Stream (Upstream of Base)	AQ
Stream Not Receiving Waste Water (Downstream of Base)	AR
Stream Receiving Waste Water (On Base)	AS
Stream Receiving Waste Water (Downstream of Base)	AT
Other Water Sample	AU
Aircraft & Ground Equipment Washrack Waste Water (Untreated)	BA
Aircraft & Ground Equipment Washrack Waste Water (After Oil Skimming)	BB
Aircraft & Ground Equipment Washrack Waste Water (After Oil Skimming & Sedimentation)	BC
Activated Sludge or Extended Aeration Activated Sludge Treatment Plant Effluent	BD
Automotive Cleaning Waste Water	BE
Battery Shop Waste Water	BF
Chemical Waste Water Treatment Plant Effluent	BG
Chemical Waste Water Treatment Plant Influent	BH
Contact Aeration Treatment Plant Effluent	BI
Domestic Sewage Treatment Plant Influent	BJ
Domestic Sewage Lagoon, Final Effluent	BK
Domestic Sewage, Primary Treatment Effluent	BL
Electroplating Waste Water	BM
Filter Backwash Water	BN
Fuel Tank Cleaning Waste Water	BO
Floor Drain Waste Water	BP
General Storm Drainage Run-Off Waste Water	BQ
Ion Exchange Resin Bed Recharge Waste Water	BR
Missile Propellant Contaminated Waste Water	BS
Other Waste Water	BT
Parts Cleaning Wash Water (Multi-Stage Washers, etc.)	BU
Paint Stripping Waste Water	BV
Photographic Waste Water	BW
POL Storage Waste Water	BX
Mixed Waste Water (Domestic & Industrial Waste)	BY

a. Collecting all prescribed data and samples from Stations S-1 and S-2.

b. Sharing sewage plant laboratory space and equipment with Military Public Health and assist them in analyzing BOD_5, total suspended solids, and fecal coliform samples.

c. Coordinating with Military Public Health personnel in accomplishing this program.

d. Providing any additional manning Military Public Health may need in collecting all data and samples from Stations R-1 through R-8.

2. Military Public Health:

a. Having this program's worksheet forms locally reproduced.

b. Collecting all prescribed data and samples from stations R-1 through R-8.

c. Coordinating with Civil Engineering in analyzing all BOD_5, total suspended solids, and fecal coliform samples.

d. Splitting the composited samples, labeling them, preparing analysis request forms, and shipping them to EHL(K) for analysis.

e. Tabulating field data and EHL(K) analyses into summary sheets for historical records and for submittal to the Base Environmental Protection Committee. Table F-11 lists all analyses recommended for each sampling station in this program. Recommend this table be locally reproduced for each station and used to summarize a given station's analyses.

f. Following-up abnormal results, resampling, and identifying pollutional sources.

3. Base Environmental Protection Committee:

a. Support this sampling program and review each station's semi-annual summary of analysis.

b. Coordinate with base agencies to control and/or adequately treat any pollutional discharges.

Table F-11: Summary of Analyses for Water Pollution Surveillance Sampling Station _____, Moody AFB, GA

	Chemical/Physical Data (mg/l unless noted)		Sampling Day and Date									
GENERAL/BACTR.	Dissolved O_2	Range										
		Average										
	Temperature (°)	Range										
		Average										
	pH	Range										
		Average										
	Total Chlorine Residual	Range										
		Average										
	Flow ( )											
	BOD_5											
	COD											
	Total Organic Carbon											
	Oils/Grease (by IR)											
	Surfactants, MBAS (as LAS)											
	Total Kjeldahl Nitrogen(as N)											
	Total Suspended Solids											
	Turbidity (units)											
	Color (units)											
	Fecal Coliform (#/100ml)											
RADICALS	Ammonia, NH_3 (as N)											
	Cyanide, CN											
	Nitrate, NO_3 (as N)											
	Phenolics, C_6H_5OH											
	Phosphate, Total-PO_4 (as P)											
METALS/IONS	Cadmium											
	Chloride											
	Chromium, Hexavalent											
	Chromium, Total											
	Copper											
	Iron											
	Lead											
	Manganese											
	Mercury											
	Nickel											
	Silver											
	Zinc											
Pesticid												

APPENDIX G

FIELD SURVEY RESULTS

The following tables present the results of a field survey conducted in accordance with the sampling program described in Appendix E. The results are for the period 27 Sep - 7 Oct 1972.

Table G-1: Data Summary for Sampling Station S-1, Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*							Values			Average Loading (lbs/day)
			Wed 27 Sep	Fri 29 Sep	Sun 1 Oct	Mon 2 Oct	Wed 4 Oct	Fri 6 Oct	Sat 7 Oct	Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	<0-2.0	<0-0.0	<0 -4.6	<0-1.5	<0-2.4	<0-0.0	<0-0.4				
		Average	<0.0	<0.0	1.0	0.2	0.6	<0.0	<0.0	4.6	<0.0	<0.0	
	Temperature °C	Range	28-29	25-29	26-28	25-27	27-28	27-28	25-27				
		Average	28.	28.	27.	26.	27.	28.	26.	29.	25.	27.	
	pH (units)	Range	6.7-7.3	6.8-7.2	6.9-7.9	7.2-7.4	7.2-7.9	7.5-7.8	6.9-7.2				
		Average	7.0	7.1	7.2	7.3	7.4	7.2	7.0	7.9	6.7	7.2	
	Flow MGD)		0.382	0.391	0.312	0.324	0.449	0.374	0.358	0.449	0.312	0.370	
	BOD_5		(*)	(*)	(*)	(*)	(*)	122.	120.	122.	120.	121.	369.
	COD		255.	223.	120.	353.	148.	142.	220.	353.	120.	209.	637.
	Total Organic Carbon		63.	53.	37.	96.	40.	41.	48.	96.	37.	54.	164.
	Oils/Greases (by IR)		(*)	30.0	23.0	17.5	18.0	13.0	23.8	30.0	13.0	20.9	64.
	Surfactants,MBAS (as LAS)		15.0	20.0	7.0	25.0	7.7	2.2	22.0	25.0	2.2	14.1	43.
	Total Kjeldahl Nitrogen(as N)		19.34	19.75	15.31	15.09	28.39	21.79	40.01	40.01	15.09	22.8	71.
RADICALS	Ammonia, NH_3 (as N)		13.92	18.0	13.20	12.40	23.4	16.8	36.6	36.6	12.4	19.2	60.
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.031
	Nitrate, NO_3 (as N)		<0.2	<0.2	0.3	0.6	<0.2	0.23	<0.2	0.6	<0.2	0.3	<0.82
	Nitrite, NO_2 (as N)		<0.005	<0.005	0.006	0.006	<0.006	<0.005	<0.005	0.006	<0.005	<0.005	<0.017
	Phenolics, C_6H_5OH		0.010	0.010	0.025	0.005	0.010	0.010	0.010	0.025	0.005	0.011	0.035
	Phosphate,Total-PO_4 (as P)		11.2	8.1	4.3	0.6	7.6	10.2	13.9	13.9	0.60	8.0	25.2
METALS/IONS	Aluminum		0.20	0.24	0.16	0.28	0.2	<0.1	0.2	0.28	<0.10	0.20	0.61
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.03
	Chloride		56.	20.	16.	20.	40.	16.	24.	56.	16.	27.4	87.
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.15
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.15
	Copper		0.06	0.06	0.05	0.04	0.04	0.03	0.04	0.06	0.03	0.05	0.14
	Iron		0.34	0.31	0.12	0.16	0.25	0.10	0.25	0.34	0.10	0.22	0.69
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.15
	Manganese		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.15
	Mercury		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	<0.005	<0.005	<0.005	<0.014
	Nickel		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.15
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	<0.01	0.031
	Zinc		0.10	0.09	0.09	0.07	0.06	<0.05	0.16	0.16	<0.05	0.09	0.27
PESTICIDES	Chlordane (µgm/l)												
	DDE (+)												
	DDD (+)												
	DDT (+)												

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

Table G-2: Data Summary for Sampling Station S-2, Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*							Values			Average Loading (lbs/day)
			Wed	Fri	Sun	Mon	Wed	Fri	Sat				
			27 Sep	29 Sep	1 Oct	2 Oct	4 Oct	6 Oct	7 Oct	Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	4.7-6.0	1.0-4.3	3.8-6.2	4.0-5.4	3.1-6.5	1.6-6.4	1.3-5.5				
		Average	5.4	2.6	5.2	4.6	4.1	4.3	3.7	6.5	1.0	4.3	
	Temperature °C	Range	27-29	25-28	25-26	25-26	24-27	25-28	25-25				
		Average	28.	27.	25.	25.	26.	26.	25.	29.	24.	26.	
	pH (units)	Range	7.0-7.3	6.9-7.4	7.2-7.4	7.2-7.3	7.0-7.5	7.2-7.8	6.7-7.3				
		Average	7.2	7.3	7.3	7.3	7.4	7.4	7.1	7.8	6.7	7.3	
	Flow (MGD)		0.382	0.391	0.312	0.324	0.449	0.347	0.358	0.449	0.312	0.370	
	BOD_5		<12.	<12.	18.	<12.	66.	<12.	<12.	66.	<12.	<20.	68.
	COD		49.	11.	22.	22.	33.	49.	71.	71.	11.	37.	114.
	Total Organic Carbon		11.	4.	7.	7.	5.	11.	14.	14.	4.	8.	26.
	Oils/Greases (by IR)		1.6	0.9	2.6	0.4	1.4	2.6	2.6	2.6	0.4	1.7	5.3
	Surfactants,MBAS (as LAS)		0.9	1.6	1.5	1.1	1.2	2.2	0.3	2.2	0.3	1.3	3.9
	Total Kjeldahl Nitrogen(as N)		1.68	4.77	2.20	1.63	2.68	5.4	1.9	5.40	1.63	2.89	9.1
RADICALS	Ammonia, NH_3 (as N)		0.096	2.59	0.62	0.38	0.98	2.83	0.10	2.83	0.10	1.09	3.5
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.031
	Nitrate, NO_3 (as N)		9.5	0.7	4.0	7.0	5.42	0.27	0.68	9.50	0.27	3.94	12.1
	Nitrite, NO_2 (as N)		0.03	0.199	0.038	0.018	0.042	0.182	0.608	0.608	0.018	0.160	0.49
	Phenolics, C_6H_5OH		0.010	0.015	<0.001	<0.001	0.005	0.005	0.010	0.015	<0.001	0.007	0.02
	Phosphate,Total-PO_4 (as P)		4.0	4.7	5.6	6.8	6.3	7.3	11.9	11.9	4.0	6.7	20.4
METALS/IONS	Aluminum		<0.10	0.14	0.10	<0.10	0.2	<0.1	<0.1	0.2	<0.10	0.1	0.38
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.031
	Chloride		16.	28.	32.	36.	28.	36.	36.	36.	16.	30.	92.
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15
	Copper		0.03	0.03	<0.02	<0.02	0.04	0.03	0.03	0.04	<0.02	0.03	0.09
	Iron		<0.10	<0.10	0.16	0.14	0.25	0.25	0.59	0.59	<0.10	0.23	0.70
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15
	Manganese		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	0.10	<0.05	0.05	0.18
	Mercury		<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.003	0.008	<0.005	<0.005	<0.016
	Nickel		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.031
	Zinc		<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.06	<0.05	<0.05	<0.16
PESTI-CIDES	Chlordane (ugm/l)												
	DDE (+)												
	DDD (+)												
	DDT (+)												

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

Table G-3: Data Summary for Sampling Station R-1, Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*							Values			Average Loading (lbs/day)
			Tue 26 Sep	Fri 29 Sep	Sat 30 Sep	Wed 4 Oct	Sat 7 Oct			Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	2.8-5.4	1.1-5.7	2.5-7.1	0.3-6.6	3.2-6.5						
		Average	3.8	4.2	5.8	3.5	4.9			7.1	4.4	4.4	
	Temperature °C	Range	26-30	25-26	26-27	23-27	23-24						
		Average	28.	26.	27.	25.	24.			30.	23.	26.	
	pH (units)	Range	7.3-7.6	7.2-7.6	7.3-7.6	7.2-7.7	7.3-7.6						
		Average	7.4	7.4	7.5	7.5	7.4			7.7	7.2	7.4	
	Flow (GD)		4359.	3948.	5576.	7960.	4071.			7960.	3948.	5183.	
	BOD_5		22.	91.	16.	30.	50.			91.	16.	42.	1.65
	COD		163.	511.	22.	109.	44.			511.	22.	170.	6.50
	Total Organic Carbon		33.	98.	6.	24.	10.			98.	6.	34.	1.33
	Oils/Greases (by IR)		(*)	1.8	3.5	5.2	4.9			5.2	1.8	3.9	0.18
	Surfactants,MBAS (as LAS)		20.	(*)	7.6	13.6	13.6			20.0	7.6	13.7	0.61
	Total Kjeldahl Nitrogen(as N)		0.03	0.87	1.36	2.08	1.18			2.08	0.03	1.10	0.054
RADICALS	Ammonia, NH_3 (as N)		0.03	0.46	0.38	0.14	0.94			0.94	0.03	0.40	0.015
	Cyanide, CN												
	Nitrate, NO_3 (as N)		<0.2	0.3	<0.2	<0.2	<0.2			0.3	<0.2	<0.2	<0.009
	Nitrite, NO_2 (as N)		0.006	<0.005	<0.005	<0.005	<0.005			0.006	<0.005	<0.005	<0.001
	Phenolics,C_6H_5OH												
	Phosphate,Total-PO_4 (as P)		1.5	1.6	1.9	<0.1	7.3			7.3	<0.1	2.5	0.090
METALS/IONS	Aluminum		0.29	0.26	0.28	0.20	1.0			1.0	0.20	0.41	0.016
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	<0.01	<0.01	<0.001
	Chloride												
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	<0.05	<0.05	<0.002
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	<0.05	<0.05	<0.002
	Copper		<0.02	<0.02	<0.02	< 0.02	<0.02			<0.02	<0.02	<0.02	<0.001
	Iron		0.10	0.44	0.31	1.29	0.30			1.29	0.10	0.49	0.026
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	<0.05	<0.05	<0.002
	Manganese		<0.05	<0.05	<0.05	0.06	<0.05			0.06	<0.05	<0.05	<0.002
	Mercury		<0.005	<0.005	<0.005	<0.005	0.008			0.008	<0.005	<0.005	<0.001
	Nickel		<0.05	0.07	<0.05	<0.05	<0.05			0.07	<0.05	<0.05	0.002
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	<0.01	<0.01	<0.001
	Zinc		0.09	<0.05	0.09	<0.05	<0.05			0.09	<0.05	0.06	<0.003
PESTI-CIDES	Chlorodane (ugm/l)												
	DDE (+)												
	DDD (+)												
	DDT (+)												

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

Table G-4: Data Summary for Sampling Station R-2 , Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)* Mon 25 Sep	Tue 26 Sep	Wed 27 Sep	Thu 28 Sep	Fri 29 Sep	Wed 4 Oct	Values Maximum	Minimum	Average	Average Loading (lbs/day)
GENERAL	Dissolved O_2	Range	<0.0	<0.0	<0.0	<0.0	<0.0	<0.0				
		Average	<0.0	<0.0	<0.0	<0.0	<0.0	<0.0	<0.0	<0.0	<0.0	
	Temperature °C	Range	24-27	26-28	25-28	24-27	24-26	23-27				
		Average	26.	27.	27.	26.	26.	25.	28.	23.	26.	
	pH (units)	Range	6.2-8.0	5.7-6.0	5.5-5.6	6.3-6.7	5.8-6.1	5.7-6.0				
		Average	7.1	5.9	5.6	6.5	6.0	5.8	8.0	5.5	6.1	
	Flow (GD)		5438.	9407.	8722.	8443.	9217.	8715.	9407.	5438.	8126.	
	BOD_5		(*)	186.	300.	255.	>320.	312	>320.	186.	275.	20.3
	COD		424.	608.	(*)	429.	999.	1071.	1071.	424.	706.	50.4
	Total Organic Carbon		87.	118.	(*)	159.	250.	285.	285.	87.	180.	12.9
	Oils/Greases (by IR)		(*)	(*)	10.0	14.4	0.7	7.1	14.4	0.7	8.1	0.58
	Surfactants,MBAS (as LAS)		0.4	4.6	(*)	5.0	6.2	3.6	6.2	0.4	4.0	0.29
	Total Kjeldahl Nitrogen(as N)		6.52	4.46	4.37	14.52	2.50	18.96	18.96	2.50	8.56	0.59
RADICALS	Ammonia, NH_3 (as N)		6.16	0.81	3.84	6.48	1.30	10.80	10.80	0.81	4.90	0.33
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
	Nitrate, NO_3 (as N)		0.5	<0.2	<0.2	0.3	<0.2	<0.2	0.5	<0.2	0.3	0.017
	Nitrite, NO_2 (as N)		<0.005	<0.005	<0.005	0.006	<0.005	<0.005	0.006	<0.005	<0.005	<0.001
	Phenolics, C_6H_5OH		0.090	0.100	0.105	0.115	0.115	0.130	0.130	0.090	0.109	0.008
	Phosphate,Total-PO_4 (as P)		9.6	11.5	4.7	< 0.1	8.1	2.6	11.5	<0.1	6.1	0.42
METALS/IONS	Aluminum		1.00	0.68	0.70	0.60	0.48	1.00	1.00	0.48	0.74	0.05
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
	Chloride											
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05	<0.05	<0.003
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.003
	Copper		0.03	<0.02	0.02	<0.02	<0.02	0.02	0.03	<0.02	<0.02	<0.001
	Iron		4.07	2.92	4.72	2.67	3.89	4.90	4.90	2.67	3.86	0.27
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.003
	Manganese		0.18	0.14	0.14	0.08	0.14	0.12	0.18	0.08	0.13	0.009
	Mercury		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001
	Nickel		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.003
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
	Zinc		0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.003
PESTICIDES	Chlorodane (ugm/l)											
	DDE (+)											
	DDD (+)											
	DDT (+)											

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

Table G-5: Data Summary for Sampling Station R-3, Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*						Values			Average Loading (lbs/day)
			Mon	Tue	Wed	Thu	Fri	Wed				
			25 Sep	26 Sep	27 Sep	28 Sep	29 Sep	4 Oct	Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	3.7-6.9	4.1-6.5	3.7-8.3	4.0-7.6	2.2-6.9	3.9-8.9				
		Average	5.7	5.4	6.1	6.0	4.9	6.8	8.9	2.2	5.8	
	Temperature °C	Range	24-29	24-27	26-28	24-26	24-26	23-26				
		Average	27.	26.	27.	25.	25.	25.	29.	23.	26.	
	pH (units)	Range	6.0-6.9	5.5-5.8	5.6-5.8	5.4-6.0	5.9-6.2	6.2-6.3				
		Average	6.4	5.6	5.7	5.8	6.1	6.3	6.9	5.4	6.0	
	Flow (GD)		2565.	2144.	1874.	2243.	1540.	3100.	3100.	1540.	2244.	
	BOD_5		<12.	<12.	<12.	15.	<12.	<12.	15.	<12.	<12.	<0.23
	COD		5.	22.	27.	<5.0	43.	16.	43.	<5.	20.	0.33
	Total Organic Carbon		2.	7.	4.	1.0	9.	5.	9.	1.	5.	0.08
	Oils/Greases (by IR)		(*)	(*)	(*)	<0.3	0.8	1.2	1.2	0.3	0.8	0.02
	Surfactants,MBAS (as LAS)		3.0	1.3	0.7	0.4	20.0	0.48	20.0	0.4	4.3	0.06
	Total Kjeldahl Nitrogen(as N)		0.58	<0.01	0.54	0.51	1.15	1.1	1.15	0.01	0.65	0.01
RADICALS	Ammonia, NH_3 (as N)		<0.01	<0.01	0.04	0.17	0.38	0.12	0.38	0.01	0.12	0.002
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
	Nitrate, NO_3 (as N)		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.004
	Nitrite, NO_2 (as N)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001
	Phenolics,C_6H_5OH		0.005	<0.001	0.010	0.010	0.005	0.005	0.010	<0.001	0.006	<0.001
	Phosphate,Total-PO_4 (as P)		<0.1	1.2	<0.1	<0.1	0.3	<0.1	1.2	<0.1	0.3	0.005
METALS/IONS	Aluminum		0.10	0.18	0.12	<0.10	0.16	<0.1	0.18	<0.10	0.13	0.003
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
	Chloride											
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.001
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.001
	Copper		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.001
	Iron		0.10	0.14	0.12	<0.10	0.44	0.10	0.44	<0.10	0.17	<0.003
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.001
	Manganese		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.001
	Mercury		<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.007	<0.005	<0.005	<0.001
	Nickel		<0.05	<0.05	0.07	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.001
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
	Zinc		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.001
PESTI-CIDES	Chlordane (ugm/l)											
	DDE (+)											
	DDD (+)											
	DDT (+)											

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

\+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

Table G-6: Data Summary for Sampling Station R-4, Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*						Values			Average Loading† (lbs/day)
			Mon	Tue	Wed	Thu	Fri	Wed				
			25 Sep	26 Sep	27 Sep	28 Sep	29 Sep	4 Oct	Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	2.8-7.1	1.6-5.5	1.2-5.3	1.0-6.7	1.2-4.3	1.3-3.7				
		Average	4.4	3.6	3.7	3.0	2.8	2.5	7.1	1.0	3.3	
	Temperature °C	Range	26-30	26-31	25-31	26-31	25-30	23-28				
		Average	28.	28.	29.	28.	27.	25.	31.	23.	27.	
	pH (units,	Range	6.7-7.4	6.3-6.8	6.2-6.7	6.4-6.9	6.6-6.9	6.6-7.2				
		Average	7.0	6.5	6.4	6.6	6.8	6.9	7.4	6.7	6.7	
	Flow (GD)		No Flow	←	←	←	←	No Flow				
	BOD_5		<12.	(*)	<12.	31.	<12.	<12.	31.	<12.	<12.	
	COD		43.	49.	54.	38.	38.	55.	55.	38.	46.	
	Total Organic Carbon		10.	16.	16.	8.	8.	12.	16.	8.	12.	
	Oils/Greases (by IR)		(*)	(*)	(*)	0.6	0.6	2.6	2.6	0.6	1.3	
	Surfactants,MBAS (as LAS)		0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.3	
	Total Kjeldahl Nitrogen(as N)		1.32	0.89	0.72	0.81	0.74	2.57	2.57	0.72	1.18	
RADICALS	Ammonia, NH_3 (as N)		0.096	<0.01	0.038	0.43	0.48	0.55	0.55	<0.01	0.27	
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Nitrate, NO_3 (as N)		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
	Nitrite, NO_2 (as N)		<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	Phenolics, C_6H_5OH		<0.001	<0.001	0.005	0.010	0.005	0.005	0.010	<0.001	<0.005	
	Phosphate,Total-PO_4 (as P)		<0.1	<0.1	0.1	<0.1	<0.1	0.3	0.3	<0.1	0.1	
METALS/IONS	Aluminum		0.16	0.16	0.12	0.12	0.20	<0.10	0.20	<0.10	0.14	
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Chloride		20.	20.	20.	20.	28.	16.	28.	16.	21.	
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Copper		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
	Iron		0.50	0.38	0.50	0.85	0.63	0.64	0.85	0.38	0.58	
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Manganese		0.22	0.06	0.08	0.10	0.04	<0.05	0.22	0.04	0.09	
	Mercury		<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.007	<0.005	<0.005	
	Nickel		<0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.07	<0.05	<0.05	
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Zinc		0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	
PESTICIDES	Chlordane (ugm/l)		(*)	(*)	(*)	(*)	0.21	0.00				
	DDE (+)		(*)	(*)	(*)	(*)	7.31					
	DDD (+)		(*)	(*)	(*)	(*)	20.67					
	DDT (+)		(*)	(*)	(*)	(*)	68.47					

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

† Average loading not determined since there was no flow at this station.

Table G-7 : Data Summary for Sampling Station R-5 , Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*						Values			Average Loading† (lbs/day)
			Tue	Mon	Tue	Wed	Thu	Fri				
			26 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	4.5-5.8	4.8-6.0	5.4-6.7	5.1-7.1	4.2-4.9	5.2-4.8				
		Average	5.0	5.5	6.0	5.6	4.6	5.0	7.1	4.2	5.3	
	Temperature °C	Range	25-26	25-26	20-25	23-25	23-26	24-26				
		Average	26.	25.	23.	24.	25.	25.	26.	20.	25.	
	pH (units)	Range	5.9-6.5	6.0-6.3	6.2-6.4	6.4-6.6	6.3-6.6	6.4-6.7				
		Average	6.2	6.2	6.3	6.5	6.4	6.5	6.7	5.9	6.4	
	Flow (GD)		No Flow	-	-	-	-	No Flow				
	BOD_5		<12.	<12.	<12.	<12.	(*)	12.	12.	<12.	<12.	
	COD		33.	<5.	65.	<5.	11.	5.	65.	5.	21.	
	Total Organic Carbon		9.	1.	20.	2.	3.	<1.	20.	<1.	6.	
	Oils/Greases (by IR)		(*)	<0.3	0.4	1.0	0.5	0.8	1.0	0.3	0.6	
	Surfactants,MBAS (as LAS)		2.4	0.1	0.1	0.2	0.2	0.2	2.4	0.1	0.5	
	Total Kjeldahl Nitrogen(as N)		0.29	0.10	0.16	0.72	0.79	0.26	0.79	0.10	0.39	
RADICALS	Ammonia, NH_3 (as N)		<0.01	0.05	0.02	0.14	0.24	0.07	0.24	<0.01	0.09	
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Nitrate, NO_3 (as N)		0.7	0.3	0.6	0.72	0.72	0.81	0.81	0.30	0.64	
	Nitrite, NO_2 (as N)		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	
	Phenolics,C_6H_5OH		0.010	0.005	0.005	0.008	0.003	0.005	0.010	0.003	0.006	
	Phosphate,Total-PO_4 (as P)		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
METALS/IONS	Aluminum		0.37	0.10	0.10	0.1	<0.1	<0.1	0.37	<0.1	0.15	
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Chloride		20.	20.	12.	8.	12.	12.	20.	8.	14.	
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Copper		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
	Iron		<0.10	0.12	<0.10	0.10	0.10	<0.10	0.12	<0.10	0.10	
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Manganese		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Mercury		<0.005	<0.005	<0.005	0.005	<0.005	<0.005	0.005	<0.005	<0.005	
	Nickel		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Zinc		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
PESTICIDES	Chlordane (µgm/l)											
	DDE (+)											
	DDD (+)											
	DDT (+)											

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

† Average loading not determined since there was no flow at this station.

Table G-8: Data Summary for Sampling Station R-6, Moody AFB, GA*

	Chemical/Physical Data**(mg/l unless noted)		Sampling Day and Date (1972)*							Values			Average Loading (lbs/day)
			Tue 26 Sep	Mon 2 Oct	Tue 3 Oct	Wed 4 Oct	Thu 5 Oct	Fri 6 Oct		Maximum	Minimum	Average	
GENERAL	Dissolved O_2	Range	4.1-6.0	5.6-6.1	5.5-7.0	4.8-5.9	4.5-5.1	4.8-5.8					
		Average	4.7	5.8	6.0	5.3	4.9	5.1		7.0	4.1	5.3	
	Temperature °C	Range	25-29	25-26	21-26	23-27	22-26	23-24					
		Average	27.	26.	24.	25.	25.	24.		29.	21.	25.	
	pH (units)	Range	6.1-6.3	6.3-6.7	6.4-6.8	6.7-6.9	6.5-6.7	6.5-6.8					
		Average	6.2	6.5	6.6	6.8	6.6	6.6		6.9	6.1	6.5	
	Flow (GD)		4943.	4048.	4915.	2300.	3366.	3484.		4943.	2300.	3843.	
	BOD_5		<12.	<12.	<12.	<12.	(*)	(*)		<12.	<12.	<12.	<0.4
	COD		5.	5.	16.	5.	22.	11.		22.	5.	11.	0.34
	Total Organic Carbon		1.	1.	4.	2.	4.	2.		4.	1.	2.	0.07
	Oils/Greases (by IR)		(*)	0.6	0.6	0.8	0.9	0.9		0.9	0.6	0.8	0.02
	Surfactants,MBAS (as LAS)		0.2	0.1	0.5	0.3	0.2	0.3		0.5	0.1	0.3	0.009
	Total Kjeldahl Nitrogen(as N)		0.68	0.89	0.93	1.68	1.32	0.77		1.68	0.68	1.05	0.031
RADICALS	Ammonia, NH_3 (as N)		0.58	0.89	0.86	0.84	0.98	0.58		0.98	0.58	0.81	0.025
	Cyanide, CN		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.001
	Nitrate, NO_3 (as N)		0.5	0.5	0.4	0.50	0.27	0.36		0.50	0.27	0.42	0.014
	Nitrite, NO_2 (as N)		<0.005	0.006	0.006	0.006	0.006	0.053		0.053	<0.005	0.014	<0.001
	Phenolics, C_6H_5OH		0.010	0.005	<0.001	0.003	<0.001	0.005		0.010	<0.001	0.004	<0.001
	Phosphate,Total-PO_4 (as P)		<0.1	<0.1	<0.1	0.3	<0.1	<0.1		0.3	<0.1	0.1	<0.004
METALS/IONS	Aluminum		<0.10	<0.10	<0.10	<0.1	<0.1	0.3		0.3	<0.1	0.1	0.004
	Cadmium		<0.01	<0.01	<0.01	<0.01	<0.01	0.01		<0.01	<0.01	<0.01	<0.001
	Chloride		24.	24.	20.	16.	16.	20.		24.	16.	20.	0.66
	Chromium, Hexavalent		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.0016
	Chromium, Total		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.0016
	Copper		<0.02	<0.02	<0.02	<0.02	0.03	<0.02		0.03	<0.02	<0.02	<0.001
	Iron		3.13	2.83	1.75	2.00	2.61	2.37		3.13	1.75	2.45	0.079
	Lead		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.0016
	Manganese		0.06	<0.05	<0.05	<0.05	<0.05	<0.05		0.06	<0.05	<0.05	<0.002
	Mercury		<0.005	<0.005	<0.005	0.007	0.007	0.005		0.007	<0.005	0.005	<0.001
	Nickel		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.0016
	Silver		<0.01	<0.01	<0.01	<0.01	<0.01	0.02		0.02	<0.01	<0.01	<0.001
	Zinc		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.0016
PESTICIDES	Chlorodane (ugm/l)		(*)	0.51	0.30	0.00	0.00	0.00					+
	DDE (+)		(*)	17.50	7.10								+
	DDD (+)		(*)	16.23	9.42								+
	DDT (+)		(*)	32.97	33.25								+

NOTES: * Sampling station is identified and survey techniques are discussed in "Water Pollution Survey Operations Plan, Moody AFB,GA," Special Project 71-51, USAF Environmental Health Lab, Kelly AFB, TX 78241,(February 1972).

** The first four data were determined from grab samples during the survey day while the remaining data were analyzed on 24-hour composite samples collected proportional to flow throughout the day. All samples were properly preserved.

(*) Sample container was broken before sample could be analyzed.

+ Units are nanograms per liter.

Blank entries in column denote that such data were not required in the "Survey Plan".

† Not calculated due to limited data.

APPENDIX H

National Pollutant Discharge
Elimination System
Permit #GA0020001
Moody AFB GA

FINAL

Permit No. GA00 000 1

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et. seq; the "Act"),

Air Training Command, USAF
Moody Air Force Base

is authorized to discharge from a facility located at

9 miles north of Valdosta, Georgia

to receiving waters named

Beatty Creek

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective upon receipt.

This permit and the authorization to discharge shall expire at midnight,

June 30, 1979

Signed this 5 day of APR 1974

Original Signed By:

JACK E. RAVAN
Regional Administrator

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. The concentration of pollutants in the discharge will be limited as indicated by the table(s) labeled "Effluent Limitations." The effluent shall meet the requirements in the table or the conditions in paragraph (a) below, whichever yields the highest quality effluent.

   (a) For BOD_5 and suspended solids, the arithmetic mean of the values of the effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of values for influent samples collected at approximately the same times during the same period (85 percent removal).

   (b) Fecal coliform bacteria will be reported as the geometric mean of the values for the samples collected.

   (c) Chemical oxygen demand (COD) or total organic carbon (TOC) may be substituted for biochemical oxygen demand (BOD) when a long term BOD:COD or BOD:TOC correlation has been demonstrated.

   (d) Where daily flow measurements are required, and instantaneous flow measuring equipment is not provided, a daily average flow may be reported. This daily average flow shall be determined as the total flow measured during a period of 30 consecutive days divided by the number of days the treatment facility was in operation during that period.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning upon receipt and lasting through 6/30/77
the permittee is authorized to discharge from outfall(s) serial number(s) 001

Maximum Hydraulic Flow (24 hour average flow, averaged monthly)

Such discharges shall be limited and monitored by the permittee as specified below: 2,838.8 cu. m/day (0.750 mgd)

Parameter	Discharge Limitations				Monitoring Requirements		
	Loading kg/day(lbs/day)		Concentration Mg/l				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Biochemical Oxygen Demand (5 day)	85(188)	128(282)	30	45	once/week	composite	Influent & Effluent
Suspended Solids	85(188)	128(282)	30	45	once/week	composite	Influent & Effluent
Fecal Coliform Bacteria	____	____	____	____	once/week	grab	Effluent
pH	____	____	____	____	once/week	grab	Effluent
Flow, mgd					daily		

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The fecal coliform bacteria shall be limited to 200 and 400 counts/100 ml as a Monthly Geometric Mean and Weekly Geometric Mean respectively.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored

There shall be no discharge of floating solids or visible foam in other than trace amounts.

The effluent shall not cause a visible sheen on the receiving water.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning July 1, 1977 and lasting through 6/30/79
the permittee is authorized to discharge from outfall(s) serial number(s) 001

Maximum Hydraulic Flow (24 hour average flow, averaged monthly)

Such discharges shall be limited and monitored by the permittee as specified below: 2,838.8 cu. m/day (0.750 mgd)

Parameter	Discharge Limitations				Monitoring Requirements		
	Loading kg/day(lbs/day)		Concentration Mg/l				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Biochemical Oxygen Demand (5 day)	43(93)	N/A	15	N/A	once/weekly	composite	Influent & Effluent
Suspended Solids	85(188)	N/A	30	N/A	once/weekly	composite	Influent & Effluent
Fecal Coliform Bacteria	———	———	———	———	once/weekly	grab	Effluent
pH	———	———	———	———	once/weekly	grab	Effluent
Flow, mgd					daily		
NH_3.N	5.7(12.5)	N/A	2.0	N/A	once/weekly	composite	Effluent
D.O.	N/A	N/A	6.0	N/A	once/daily	grab	Effluent

The fecal coliform bacteria shall be limited to 200 and 400 counts/100 ml as a Monthly Geometric Mean and Weekly Geometric Mean respectively.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored

There shall be no discharge of floating solids or visible foam in other than trace amounts.

The effluent shall not cause a visible sheen on the receiving water.

P SCHEDULE OF COMPLIANCE

Not later than January 1, 1975 the permittee shall submit for approval a proposed schedule for achieving compliance with the final limitations by July 1, 1977. This schedule shall contain as a minimum the dates indicated in items a through e below and where time intervals between any two dates is greater than nine months interium progress reports shall be submitted. Upon approval by the Regional Administrator this compliance schedule shall become a part of this permit.

(a) Completion of preliminary plans - _____.
(b) Completion of final plans - _____.
(c) Contract awarded - _____.
(d) Commence construction - _____.
(e) Completion of construction - _____.
(f) Operational level attained - JULY 1 1977.

C. MONITORING AND REPORTING

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

Monitoring results obtained during the previous 3 months shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on September 28, 1974 . Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

Water Enforcement Branch
Environmental Protection Agency
Region IV
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Georgia Environmental
Protection Division
Department of Natural Resources
47 Trinity Avenue, SW
Atlanta, GA 30334

3. Definitions

a. The monthly average, other than for fecal coliform bacteria, is the arithmetic mean of all the 24-hour composite samples collected in a one-month period. The monthly average for fecal coliform bacteria is the geometric mean of samples collected in a one-month period.

b. The weekly average, other than for fecal coliform bacteria, is the arithmetic mean of all the 24-hour composite samples collected during a one-week period. The weekly average for fecal coliform bacteria is the geometric mean of samples collected in a one-week period.

4. Test Procedures

The analytical and sampling methods used shall conform to the latest 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 receive the prior written approval of the state water pollution control agency and/or the EPA Regional Administrator.

a. [illegible] Standard Methods for the Examination of Water and Wastewater 13th edition, [illegible], New York, New York [illegible].

b. [illegible] Methods for Chemical Analysis of Water and Wastes, 1971, Analytical Quality Control Laboratory, Cincinnati, Ohio [illegible], Philadelphia, Pa. 19103.

c. 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.

A twenty-four hour composite sample consists of not less than 6 effluent portions collected at regular intervals in a 24-hour period and composited according to flow. For fecal coliform bacteria, a sample consists of one effluent portion collected during a 24-hour period at peak flow conditions.

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to insure accuracy of measurements.

5. Recording of Results

For each measurement of sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Director or the Regional Administrator.

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Noncompliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Regional Administrator and the State with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing

Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where

excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall notify the permit issuing authority in writing within 72 hours of each such diversion or bypass in accordance with the procedures specified above for reporting noncompliance. The permittee shall within 30 days after such incident submit to EPA for approval a plan to prevent recurrence of such incidents.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

7. Power Failures

The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures either by means of alternate power sources, stand by generators or retention of inadequately treated effluent. Should the treatment works not include the above capabilities at time of permit issuance, the permittee must furnish within 120 days to the permitting authority, for approval, an implementation schedule for their installing.

8. Onshore or Offshore Construction

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.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Regional Administrator, and/or their authorized representatives, upon the presentations 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 conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. Transfer of Ownership or Control

In the event of any change in control or ownership or facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the State water pollution control agency.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

4. Permit Modification

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 a temporary or permanent reduction or elimination of the authorized discharge.

5. Toxic Pollutants

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. Civil and Criminal Liability

Except as provided in permit conditions on "bypassing" (Part II, A-5) and "upsets" (Part II, A-6), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

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 infringement of Federal, State or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

11. Expiration of Permit

Permittee shall not discharge after the expiration date. In order, to receive authorization to discharge beyond the expiration date, the permittee shall submit such information, forms, and fees as are required by the agency authorized to issue permits no later than 180 days prior to the expiration date.

12. Industrial Pretreatment Standards

Permittee shall require any industrial dischargers into the permitted system to meet Federal Pretreatment Standards (40 CFR, Part 128) promulgated in response to Section 307(b) of the Act. The permittee shall provide semi-annual [illegible] permittee's [illegible] pretreatment [illegible] industries [illegible] industry [illegible] [illegible] [illegible] new industrial [illegible] permittee after [illegible] discharge.

A major contributing industry is one that: (a) has a flow of 50,000 gallons or more per average work day; (b) has a flow greater than five percent of the flow carried by the municipal system receiving the waste; (c) has in its waste a toxic pollutant in toxic amounts as defined in standards issued under Section 307(a) of the Act; (d) has significant impact either singly or in combination with other contributing industries, on the treatment works or the quality of its effluent.

Any change in the definition of a major contributing industry as a result of promulgations in response to Section 307 of the Act shall become a part of this permit.