Impacts of Discharge

on

Recreational Activities

III.E. ***<u>Impacts of Discharge on Recreational Activities</u>***

III.E.1. Describe the existing or potential recreational activities likely to be affected by the modified discharge(s) beyond the zone of initial dilution.

Fishing (shoreline: scuba, spear, net, rod and reel. Offshore: Boat; trolling and bottom fishing, scuba), swimming, snorkeling and diving.

III. E.2 What are the existing and potential impacts of the modified discharge(s) on recreational activities? Your answer should include, but not be limited to, a discussion of fecal coliform bacteria.

The results obtained from the biological and water quality monitoring the receiving waters indicate that the only potential impact on recreational activities would be from potential pathogens associated with the occurrence of high numbers of the indicator bacterial, fecal coliform. There have been no reports of illness resulting from recreational use of waters in the vicinity of the outfall

As previously stated, GWA has requested Letters of Determination from the Bureau of Planning, Department of Agriculture and Guam Environmental Protection Agency (See *State and Federal Laws*, Section II.D.4 of application questionnaire). Upon receipt of their letters, GWA will immediately forward their responses to your office. GWA is confident that the Letters of Determination from these agencies will show that no impact, i.e. no reported incidences of illness attributed to swimming in or consuming fish from the discharge area exist.

III.E.3. Are there any Federal, State, or local restrictions on recreational activities in the vicinity of the modified discharge(s). If yes, describe the restrictions and provide citations to available references.

Yes. Because of damage from Super typhoon Paka the Northern District treatment plant was with out power. Therefor untreated wastewater was been discharged. GEPA posted warnings to the public, not swim or fish in the waters in the vicinity of the outfall. See section III.D. for news paper clippings on these warnings.

III.E.4. If such restrictions exist, would such restrictions be lifted or modified if you were discharging a secondary treatment effluent

No these restrictions are only temporary.

Establishment of a Monitoring Program

III.F ***Establishment of a Monitoring Program***

III.F.1. Describe the biological, water quality and effluent monitoring programs which you propose to meet the criteria of 40 CFR 125.63. Only those scientific investigations that are necessary to study the effects of the proposed discharge should be included in the scope of the 301(h) monitoring program.

This section is divided into several parts. The first addresses the monitoring program of the existing outfall, both biological and water quality monitoring. The second addresses the monitoring of plant effluent. The third part addresses the baseline monitoring for the proposed outfall extensions. Once the location of the proposed extended outfalls is finalized new locations for the water quality and biological monitoring will be established. Water quality monitoring will include stations upcurrent and down current of the outfall, either side of the ZID (zone of initial dilution) and control stations at least 1000m upcurrent of the new outfall. Water quality stations will also include shoreline stations. The biological monitoring will be similar to what is outlined below, but will depend on final placement of the outfall. GWA will then work with EPA to design an appropriate biological monitoring plan. A proposed Quarterly Monitoring Program for the existing outfalls, and the proposed scope of work to obtain information needed to support the extension of the Agana WWTP and Northern District WWTP ocean outfalls, was faxed to USEPA September 9, 1997. They are described below. Also attached is the response letter from USEPA (dated: September 23, 1997).

1) QUARTERLY BIOLOGICAL MONITORING OF THE EXISTING GWA OCEAN OUTFALLS.

BIOLOGICAL MONITORING

Based on Design of 301(h) Monitoring Program for Municipal Wastewater Discharges to Marine Waters, EPA 430/9-82-010, November 1982 and Framework for 301(h) Monitoring Programs, EPA430/09-88-002, September 1987.

General Requirements

1) Conduct periodic surveys of biological communities most likely to be affected by the discharge and communities at reference sites.
2) Provide data to evaluate the impact of the discharge on marine biota.
3) Describe sampling and analytical techniques, sampling locations and schedules.
4) Surveys are to be conducted within the zone of initial dilution (ZID), and at a reference area unaffected by the discharge.

The monitoring objectives are translated into a series of testable hypotheses. These hypotheses focus the monitoring activities so that the studies are conducted efficiently and results are useful for evaluating statistically significant differences between areas. In most cases, multiple testable hypotheses will be required. One example of such a null hypothesis is that the abundance of corals does not differ between a sampling station within the ZID and a reference station.

Biomonitoring Techniques.

There are several technique use to obtain representative data on surface cover and species composition. I recommend using one of the below, or ideally a combination of both. A total of 20 replicates should be sampled at each station

1) Photograph permanently marked quadrats along 50 m transect, that runs parallel to shore, at each station. Photographs of at least $0.5m^2$ of the bottom should be taken at intervals along the transect. An underwater camera mounted on a rigid frame should be used. Each photograph should contain a small slate indicating the station, date, and position of the photograph along the line. To ensure that the same quadrat is photographed each quarter drive or cement stakes to the reef indicating at least two corners of each frame. Photographs should be developed as slides. These slides should be projected onto a grid having the same dimensions of the original quadrate, and the percent cover of living coral species, coralline algae, macro algae, turf algae, bare substrata and other organisms should be estimated.
2) Point quadrat sampling at each station, using a $0.5m^2$ quadrat that is subdivided by 4 evenly spaced lines in both directions, giving 16 intersecting points. Record what lies below each intersecting point for each replicate sample. Replicates should be randomly sampled.

Station Locations.

There should be at least two survey stations, one with in the ZID, and one at a reference site that is located in the opposite direction to the current. The selection of control or reference stations is important as all assessments of impacts will rely on comparisons made with the data from these locations. The stations should be located out side the traceable wastefield and not be affected by the wastewater discharge or other discharges. The monitoring stations for each discharge need to be at the same depth and approximately the same distance from shore.

Describe Community Structure.

Conduct at least quarterly surveys of the benthic flora and fauna each station.

- Percent coverage of the area should be quantified by breaking the cover down into six groups:
  - coral
  - macro algae
  - turf algae
  - coralline algae
  - bare substrate (dead coral, rubble, sand)
  - other (macro invertebrates, any foreign objects or material)

Note predominant species. Photographs of permanently marked quadrates are useful.

- Fish surveys should be conducted using timed visual counts at least by family categories. Several timed counts should be conducted at each site location. Reference depth, location and time period of each survey. From these counts provide a fish list.

Reports.

Compile quarterly reports the that discuss such aspects as station locations, sampling procedures, processing and analytical methods. Each report should include copies of field collection logs and laboratory sample counting forms. Data provided should include the actual numbers of each species or groups counted in each sample, and the calculated areal or volumetric abundance of each taxon. Sufficient detail should be provided to allow for verification of analyses conducted as part of the monitoring program, or for further analysis of the submitted data. Include data from each survey and analysis comparing the potentially impacted site(s) with the reference site(s). Provide an annual report that reviews all previous data, describe any naturally occurring phenomenon and conclusions as to the impact of the discharges on the surrounding community. Presentation of study results should include general characterization of the biological

communities sampled. Emphasis should be placed upon descriptions of spatial and temporal trends in community structure and function. Specific comparisons should be conducted for all biological criteria contained in the 301(h) regulations, (eg. ZID boundary vs reference communities).

WATER QUALITY MONITORING

GWA staff has been conducting water quality monitoring for the Northern District WWTP receiving water in accordance with the NPDES permit No. GU0020141. See attachment 1. indicating parameters to be measured and frequency of monitoring. A map of the site locations can be found in section II.B, figure 4. This monitoring program will continue as is until advised otherwise by EPA.

2) INFLUENT AND EFFLUENT MONITORING

Monitoring is conducted by GWA staff in accordance with NPDES permit requirements (Permit No. GU0020141). Monitoring parameters, limits and frequencies are outlined in attachment 2. Monitoring results are submitted to USEPA a via routine quarterly compliance report known as the Discharge Monitoring Report (DMR). The DMR summarizes the quality and/or quantity of the discharge, and compares sampling results to the discharge limitations authorized by the NPDES permit.

Toxic pollutant scans are included in this application and will be conducted annually or as otherwise stipulated in the permit.

3) PROPOSED SCOPE OF WORK FOR SUPPORT FOR OCEAN OUTFALL EXTENSIONS

The following is the *proposed scope of work* to obtain information needed to support extending the sewage outfalls for the Agana and Northern District WWTPs and their corresponding 301(h) applications due April 4, 1998.

1. Bathymetery of seafloor, from the reef crest out to the area surrounding the proposed outfall diffusers.

2. Hydrodynamic studies at the proposed outfall sites, in the nearfields and farfields to determine current and wind regimes, as well as stratification depths at each location.
These studies should include:
- current meter mooring
- dye and drogue releases
- continuous temperature-salinity-dissolved oxygen profiles

3. Baseline monitoring. This should include water quality data, community structure: quantitative information on the benthic flora and fauna, and sediment quality in the area of the proposed discharges.

a. *Water quality*. Collect quarterly data for at least four locations equally spaced around each of the proposed diffuser sites. (surface, mid and bottom depths).

these surveys must include:

- site location, and sample depth
- microbiology (fecal coliform / 100 ml)
- pH
- orthophosphate
- nitrate-nitrogen
- dissolved oxygen
- salinity
- total filterable suspended solids
- turbidity
- temperature
- oil & petroleum products

b. *Community structure.* Conduct quarterly survey of the benthic flora and fauna of the area of the proposed discharges that *quantify* coral, algae, macroinvertebrate and fish communities as follows:

- Provide a species list of flora and fauna, indicating abundance, (*i.e. rare, common, abundant etc.)* identifying predominant species.
- Percent coverage of the area should be quantified by breaking the type of cover down into six groups:
  - coral
  - macro algae
  - turf algae
  - coralline algae
  - bare substrate (dead coral, rubble, sand)
  - other (macro invertebrates, any foreign objects or material)
- Fish surveys done using timed visual counts at least by family categories, for at least four locations equally spaced around each of the proposed diffuser sites. Reference: depth, location and time period of each survey. Compile a report that includes the data from each survey, and a fish species list.

c. *Sediment samples.* Uniform, replicate grabs at four sites equally spaced surrounding each of the proposed diffuser sites should be obtained for analysis of :

- grain size
- total organic carbon
- total Kjeldahl nitrogen
- total phosphorus
- total sulfide
- priority pollutants
- infauna

See *Procedures for Handling and Chemical Analysis of Sediment and Water Samples,* EPA/CE-81-1 and see protocol in EPA's guidance document *Quality Assurance and Quality Control (QA/QC) for 301(h) Monitoring Programs: Guidance on Field and Laboratory Methods.*

Because of the deep depths, diving these sites may not be feasible and surveys may need to be done using remote equipment. All site and sample locations, depths, dates of collection, and methodology needs to be recorded. It is important that the data gathered be quantitative. The monitoring surveys 3a, 3b and 3c will need to be conducted again at a later date, after the outfalls have been constructed and are discharging.

III. F.2. Describe the sampling techniques, schedules, and locations, analytical techniques, quality control and verification procedures to be used.

Influent and effluent sample are obtained weekly by WWTP operators using composite and discrete sampling methods outlined in the NPDES permit. Characteristics investigated are: flow (mgd), BOD, suspended solids, settleable solids, pH, and oil and grease. Analysis is run in accordance with the Standard Methods for the Examination of Water and Wastewater. The forms used to record the influent and effluent characteristics are attached, along with a description of the sampling points. The GWA laboratory participates in the USEPA annual laboratory performance evaluation, and runs standard and checks along with routing samples. GWA will work with EPA to establish a split sampling and/or oversite plan to ensure the quality of the sample analysis.

III.F.3. Describe the personnel and financial resources available to implement the monitoring programs upon issuance of a modified permit and to carry it out for the life of the modified permit.

The monitoring program is implemented by GWA's Laboratory Support Services staff. GWA has an annual budget for the activities of these personnel and the laboratory facilities to conduct their work. The agency has its own boat, a 23-foot Sea Ox, which is used for the receiving water quality and biological monitoring. Other essential equipment owned by the laboratory include, but is not limited to, various meters (DO, pH, salinity), BOD incubators, Van Dorn samplers, muffle furnace, drying ovens, dessicators, and SCUBA equipment.

Adequate staffing is a dilemma. However, effective time management practices allow laboratory personnel to conduct the required monitoring activities for both water and wastewater systems. The laboratory personnel include a chemist, a biologist, a laboratory technician supervisor, and four laboratory technicians. Three of the laboratory personnel are certified divers and the technicians are certified as water treatment operators and/or water distribution operators. The agency is in the process of acquiring another biologist and an additional technician in order to meet the demanding biological monitoring requirements.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

SEP 23 1997

Richard A. Quintanilla
General Manager
Guam Waterworks Authority
P.O. Box 3010
Agana, Guam 96910

Re: Agana and N. District STP

Dear Mr. Quintanilla:

This is in regards to your letter dated September 9, 1997, transmitting Guam Waterworks Authority's (GWA) draft Scope of Work for the Baseline Surveys to support the proposed extension of the Agana and Northern District Sewage Treatment Plants (STP) ocean outfalls.

We approve of the approach of the proposed Scope of Work for the Baseline Surveys relating to the proposed ocean outfall extensions. The Scope of Work appears comprehensive and should provide the necessary information to support GWA's proposed placement of both the Agana and Northern District's ocean outfalls as we discussed in our letter dated June 18, 1997.

We would also like to mention that we have received a fax copy of the proposed Scope of Work for Quarterly Biomonitoring of the existing Agana, Northern District and Agat STPs from Ms. Joanne Boyd, Biologist, GWA Monitoring Services Laboratory, dated September 10, 1997. Ms. Boyd has also put together a comprehensive proposed Scope of Work for quarterly biomonitoring. Although we have indicated to GWA the need for re-establishing biological monitoring at the existing outfalls in accordance with NPDES permit requirements we hereby request that GWA perform a statistical analysis using the existing biological data collected in place of developing and implementing the proposed biological monitoring plan at this time. GWA's statistical analysis of the existing biological data shall be submitted as part of the reapplications for the Agana and Northern District STPs. The analysis should look into whether the biological data shows a significant change or impact over time.

With respect to monitoring at the existing ocean outfalls receiving water quality monitoring at all three respective outfalls shall be continued, as required, at this time. We will be available to further discuss and comment on monitoring plan specifics once we know actual ocean outfall locations and other area characteristics.

With regard to the Agat STP we need to receive an official response from GWA regarding the type of NPDES permit renewal GWA will be seeking for the facility. GWA needs to clearly indicate if they will be pursuing a NPDES permit renewal for meeting secondary treatment requirements or applying for a waiver from meeting secondary treatment requirements under Section 301(h) of the Clean Water Act. Failure to respond in a timely and appropriate manner will result in us taking further actions and may result in us initiating actions similar to those taken with the Agana and Northern District 301(h) NPDES permit renewals.

If you have any further comments regarding this matter, please contact Mike Lee at (415) 744-1484 or Lily Lee at (415) 744-1592.

Sincerely,

Simon Mendoza for

Norman L. Lovelace
Program Manager
Pacific Insular Area Program

cc: T. Quan, GWA
H. Johnston, GWA
J. Boyd, GWA
J. Salas, GEPA
N. Custodio, GEPA

Effects of Discharge

in

Other Point and Non-Point Sources

III.G ***<u>Effect of Discharge on Other Point and Nonpoint Sources</u>***

III.G.1. Does (will) your modified discharge(s) cause additional treatment or control requirements for any other point or nonpoint pollution source(s)?

There are no other pollution discharges within GWAs current outfall impact area or the proposed outfall extension discharge impact area.

III.G.2. Provide the determination required by 40 CFR 125.64(b) or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

As previously stated, GWA has requested Letters of Determination from the Bureau of Planning, Department of Agriculture and Guam Environmental Protection Agency (See *State and Federal Laws*, Section II.4.D. of application questionnaire). Upon receipt of their letters, GWA will immediately forward their responses to your office.

Toxics Control Program

and

Urban Area Pretreatment Program

III. H. <u>Toxics Control Program and Urban Area Pretreatment Program [40 CFR 125.65 and 125.66]</u>

III.H.1. a. Do you have any known or susupected industrial sources of toxic pollutants or pesticides?

Guam has very little or no heavy industry and we have no suspected industrial sources of toxic pollutants or pesticides. However, we are waiting on responses from the industrial user surveys that were sent out on March 27, 1998. GWA remains optimistic that the resulting survey summary along with the *Priority Pollutant Scan* results will demonstrate concurrence with the previous statement.

b. If no, provide the certification required by 40 CFR 125.66(c)(2) for large discharges.

Must certify this fact based on the results of an industrial waste survey

c. Provide the results of wet and dry weather effluent analysis for toxic pollutants and pesticides as required by 40 CFR 125.66(a)(1).

Twenty four hour composite effluent samples were taken at the Northern District Wastewater Treatment Plant starting on the 8 th day of March, 1998, and Agana Wastewater Treatment Plant starting on the 9 th day of March, 1998. Samples have been sent off island for analysis at the Montgomery Watson Laboratories, and results are expected back mid April. These will be forwarded to you once received.

d. Provide analysis of known or suspected industrial sources of toxic pollutants and pesticides identified in 1(c) above in accordance with 40 CFR 125.66(b).

Pending results of effluent analysis for toxic pollutants and pesticides.

III.H.2. a. Are there any known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides from your modified discharge?

b. If no provide the certification required by 40 CFR 125.66(d)(2) together with available supporting data.

c. If yes, provide a schedule for the development and implementation of nonindustrial toxics control programs to meet the requirements of 40 CFR 125.66(d)(3).

d. Provide a schedule for the development and implementation of nonindustrial toxics control programs to meet the requirements of 40 CFR 125.66(d)(3).

Nonindustrial source control program. (1) The applicant shall submit a proposed public education program designed to minimize the entrance of nonindustrial toxic pollutants and

pesticides into its POTW(s) which shall be implemented no later than 18 months after the issuance of a 301(h) modified permit.

(3)The applicants nonindustrial source control programs under paragraph (d)(2) of this section shall include the following schedules which are to be implemented no later than 18 months after the issuance of a 301(h) modified permit:
(i) A schedule of activities for identifying nonindustrial sources of toxic pollutants and pesticides; and
(ii) A schedule for the development and implementation of control programs, to extent practicable, for nonindustrial sources of toxic pollutants and pesticides.

III.H.3. Describe the public education program you propose to minimize the entrance of nonindustrial toxic pollutants and pesticides into your treatment system [40 CFR 125.66(d)(1)]

applicants for reissued 301(h) modified permits must have a public education program in place. Newspaper articles, poster, or radio and television announcements to increase public awareness of the need for proper disposal of waste oils, solvents, herbicides, pesticides and other substances that contain toxic pollutants.

The following schedule is GWA's plan of action to increase public awareness:

Action	Date
Mail out industrial user survey	Mar, 1998
Compile and analysis survey results	May, 1998
Publish results and their impacts in the local newspaper (PDN)	Jun, 1998
Investigate and identify significant toxic pollutant contributors	Jul, 1998
Establish programs i.e., posters, newspaper articles, radio/TV, etc. to advise public on proper disposal	Sep, 1998
Periodically publish or use electronic media to maintain public awareness previously established	Quarterly commencing December 1998

III.H.4. Do you have an approved industrial pretreatment program (40 CFR 125.66(c)(1)?

No. Have no known or suspected industrial sources of toxic pollutants. This status may change upon receipt of the user survey and toxic pollutant analysis.

a. If yes, provide the date of EPA approval.

b. If no, and if required by 40 CFR Part 403 to have an industrial pretreatment program, provide a proposed schedule for development and implementation of your industrial pretreatment program to meet the requirements of 40 CFR Part 403.

May not be needed

III.H.5. Urban area pretreatment requirement [40 CFR 125.65]
Discharges serving a population of 50,000 or greater must respond.

a. Provide data on all toxic pollutants introduced into the treatment works from industrial sources (categorical and noncategorical).

b. Note whether applicable pretreatment requirements are in effect for each toxic pollutant. Are industrial sources introducing such toxic pollutants in compliance with all of their pretreatment requirements? Are the pretreatment requirements being enforced? [40 CFR 125.65(b)(2)]

c. If applicable pretreatment requirements do not exist for each toxic pollutant in the POTW effluent introduced by industrial sources,

- ***provide a description and a schedule for your development and implementation of applicable pretreatment requirements [40 CFR 125.65(c)], or***

- ***describe how you propose to demonstrate secondary removal equivalency for each of those toxic pollutants, including a schedule for compliance, by using a secondary treatment pilot plant. [40 CFR 125.65(d)].***

Dependant on industrial user survey and toxic pollutant analysis. Used to characterize industrial sources by type, and types and concentrations of toxic pollutants in discharges, and flow into the plant.

Review and Analysis

Past Biological Monitoring Data

Northern District WWTP Outfall

REVIEW AND ANALYSIS OF PAST BIOLOGICAL MONITORING DATA FOR THE NORTHERN DISTRICT WASTEWATER TREATMENT PLANT OUTFALL, GUAM.

by

JOANNE BOYD,

BIOLOGIST III,

GUAM WATERWORKS AUTHORITY

JANUARY 1998

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INTRODUCTION

The Northern District Wastewater Treatment Plant discharges primary treated effluent through an ocean outfall into the coastal waters beyond the reef, on the leeward side of Guam at Tanguisson Pt. The outfall is located at latitude 13°33' 7.36", longitude 144°48' 24.03", and consists of twenty three (23) diffusers spaced along a 129 m length of pipe. The diffusers run parallel to the shore, at a depth of 18.29 m (60 ft) and are approximately 300 m from the shoreline.

Jones and Randall, 1973 conducted a preliminary reef survey for the Northern District Sewage System before the existing outfall was constructed. They noted that the submarine terrace where the current outfall is located was fairly uniform and that former coral growth was extensively developed on the terrace prior to the 1968-1969 Acanthaster planci infestation, which killed 90% to 99% of the living corals. Coral recolonization was starting to take place, but at a slow rate, and the percent coverage by living coral was 2% to 10%.

GWA contracted the University of Guam (UOG), Marine Laboratory, to conduct the Biological Monitoring of the three WWTP ocean outfalls, including the Northern District outfall. Surveys were conducted quarterly, with quarterly reports and yearly summaries submitted to GWA (then PUAG). Surveys were conducted from August 1989 until September 1994.

The data provided in the UOG Marine Laboratory quarterly reports were reviewed and analyzed by the GWA biologist. Regression analysis was performed to test if there was any significant change in percent coverage of each of six benthic categories or in fish species diversity over the 5 year survey period.

METHODS

Qualitative observations were made to determine the benthic composition and fish diversity in the area. Benthic cover was surveyed along three 10 m transects that ran parallel to shore and were permanently marked for long term monitoring. The first transect was located immediately at the diffusers (0 m) and the other two at 20 m and 50 m distances from the diffusers towards the shore (Figure 1). The transects were therefore at progressively shallower depths. However, the individual transect depths are unknown. The types of benthic cover were recorded along each transect using the chain-link transect method. The types of substrate were later grouped into 6 categories to facilitate data analysis, and percent cover was estimated. These groups are;

1) BARE: bare substrate is non-living surface which can either be attached or loose. This category includes sand, gravel, cobble, dead coral, and limestone pavement.
2) TURF: any substrate type which is covered by an unidentified turf algae. Turf algae are <1 cm in height.
3) MACRO ALGAE: any large fleshy algae (>1 cm). Includes chlorophytes, phaeopytes, fleshy rhodophytes and blue-greens.
4) CORALS: living corals of any taxonomic group
5) CORALLINES: coralline algae.
6) OTHERS: other live sessile organisms: sponges, ascidians, vermetid molluscs, etc.

Fish surveys were done by a diver who swam the 50 meter line connecting each of the three transects and recorded the species types. The number of fish in each species were not recorded. The reports did not state whether the fish observations were restricted to a certain distance either side of the 50 m line or whether it was a timed observation.

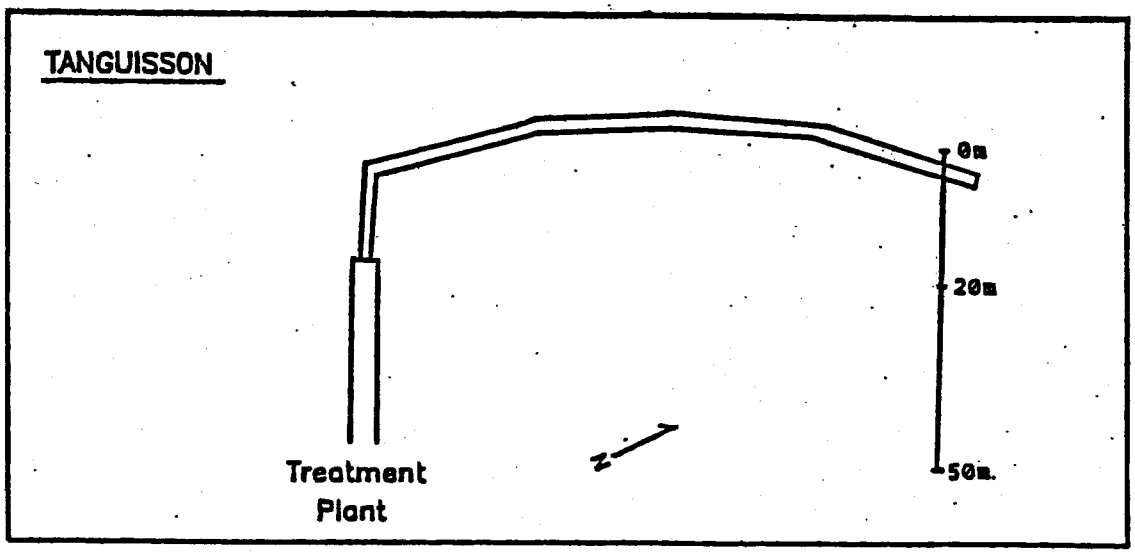

Figure 1. Location of the Biological Monitoring Transects. Sample stations located at 0, 20, and 50 meters.

RESULTS

In the first biological monitoring report, March 1990, which included results from August 1989 and November 1989 surveys, the Tanguisson study area was reported to have a high percent of coral cover. The 20 m and 50 m transects crossed portions of a well established colony of Porites lutea, a massive polymorphic species, with the majority of the remaining area being dominated by turf algae. The 0 m transect had little live coral cover and was dominated by turf algae. They concluded that macro-invertebrates were less abundant but more varied at the Tanguisson and Agana outfall sites than at the Agat outfall site. This larger diversity was attributed to the presence of deep water/low energy habitat species. Invertebrates commonly found in the area are seacucumber Holothuria atra, H. noblis, Stichopus chlorotus, and Bohadschia argus. The Asteroidea included Linka laevigata, L. guildingi, Culcita novaeguinea, and Acanthaster planci. Also present was the gastropod Trochus niloticus and the soft corals Sinularia spp. and Sacophyton spp. Species of fish found at Tanguisson were representative of these coral habitats. Large schools of herbivores (Acantruridae) and filter feeding or planktivorous fishes (i.e. Kyposidae) were often seen directly in the plume.

The results of percent cover by each of the six categories, August 1989 to September 1994, are summarized in Table 1, along with the numbers of recorded fish and invertebrate species. The highest percent cover is bolded. The list of recorded benthic species and their percent cover for each survey date are given in the appendix.

Results from the surveys indicate that the benthic cover along the 0 m transect (Fig. 2) was predominated by bare substrate on 10 of 17 sample dates, and turf algae on 7 of 17 dates. In general turf algae predominated up until mid 1991, after which bare substrate became the most predominant

Table 1. Survey of Benthic Community (percent cover) at three transect locations, including fish and invertebrate counts across the transects at the Northern District WWTP Outfall.

	BENTHIC COVER					
Date	Bare	Turf Algae	Macro Algae	Corals Live	Coralline Algae	Other
0 m						
8/25/89	13.1	75.1	1.7	4.7	5.5	0.0
11/14/89	10.0	81.0	3.1	3.9	2.0	0.0
4/2/90	8.3	83.4	4.6	4.3	0.0	0.0
6/13/90	11.7	79.5	4.6	4.3	0.0	0.0
9/24/90	23.4	72.3	0.0	3.5	0.0	0.8
12/11/90	23.4	72.2	0.5	3.6	0.0	0.0
5/20/91	92.1	4.6	0.0	1.3	1.7	0.4
7/27/91	10.6	74.6	0.8	7.8	6.2	0.0
12/27/91	68.9	26.6	3.9	0.5	0.0	0.0
3/19/92	76.3	11.6	11.8	0.3	0.0	0.0
8/6/92	52.4	42.2	4.5	0.7	0.0	0.0
12/4/92	82.5	14.6	0.3	2.2	0.5	0.0
3/30/93	79.7	8.3	2.7	8.3	0.9	0.0
8/17/93	83.4	7.0	1.7	5.8	2.1	0.0
1/10/94	71.3	10.8	0.6	16.4	0.9	0.0
5/27/94	86.1	5.8	0.0	7.8	0.3	0.0
8/28/94	47.1	14.7	0.5	32.2	5.5	0.0
20 m						
8/25/89	7.5	38.2	3.7	42.0	7.2	1.5
11/14/89	4.9	50.5	1.3	31.1	10.0	2.2
4/2/90	5.2	59.8	2.0	32.0	1.2	0.0
6/13/90	0.0	67.8	0.9	31.3	0.0	0.0
9/24/90	0.0	49.2	0.0	50.8	0.0	0.0
12/11/90	35.7	3.8	2.9	31.2	0.0	0.1
5/20/91	22.2	34.0	6.2	34.3	3.3	0.1
7/27/91	0.3	32.5	3.9	62.6	0.0	0.7
12/27/91	16.4	73.8	4.5	5.3	0.0	0.0
3/19/92	64.6	4.2	8.2	23.0	0.0	0.0
8/6/92	28.0	15.1	6.8	39.3	9.4	1.0
12/4/92	14.5	50.3	10.4	21.9	2.2	0.6
3/30/93	4.3	40.0	3.0	49.4	2.2	1.0
8/17/93	68.0	1.6	3.0	18.3	9.1	0.0
1/10/94	52.5	15.7	4.8	20.8	5.3	0.9
5/27/94	20.0	62.0	3.9	1.6	3.0	3.0
8/28/94	23.8	7.8	1.0	61.4	6.0	0.0
50 m						
8/25/89	9.0	46.5	2.5	37.4	4.1	0.7
11/14/89	8.8	63.4	0.4	28.4	0.0	0.0
4/2/90	20.4	45.3	2.9	29.6	1.8	0.0
6/13/90	15.2	44.2	5.4	35.2	0.0	0.0
9/24/90	13.4	37.9	0.3	48.2	0.0	2.3
12/11/90	4.2	39.7	1.2	47.5	0.0	0.0
5/20/91	8.5	39.4	1.8	48.0	0.8	1.6
7/27/91	5.3	60.1	1.7	19.7	8.9	4.3
12/27/91	6.6	70.7	1.3	21.4	0.0	0.0
3/19/92	6.3	60.3	5.9	25.8	1.7	0.0
8/6/92	16.3	53.4	1.3	21.6	5.9	1.1
12/4/92	80.9	8.8	1.0	9.0	0.1	0.2
3/30/93	68.7	1.3	0.0	30.0	0.0	0.0
8/17/93	74.4	5.5	4.4	13.9	1.8	0.0
1/10/94	68.8	1.3	8.9	20.5	0.5	0.0
5/27/94	72.3	1.6	4.1	22.0	0.0	0.0
8/28/94	43.4	15.0	0.1	40.5	1.0	0.0

	SPECIES NUMBER	
Date	Fish	Invertebrates
8/25/89	44	2
4/2/90	38	10
6/13/90	41	
9/24/90	48	4
12/11/90	44	4
5/20/91	65	8
7/27/91	67	10
12/27/91	89	6
3/19/92	56	8
8/6/92	55	9
12/4/92	51	8
3/30/93	43	10
8/17/93	49	10
1/10/94	42	10
5/27/94	36	10
8/28/94	42	9

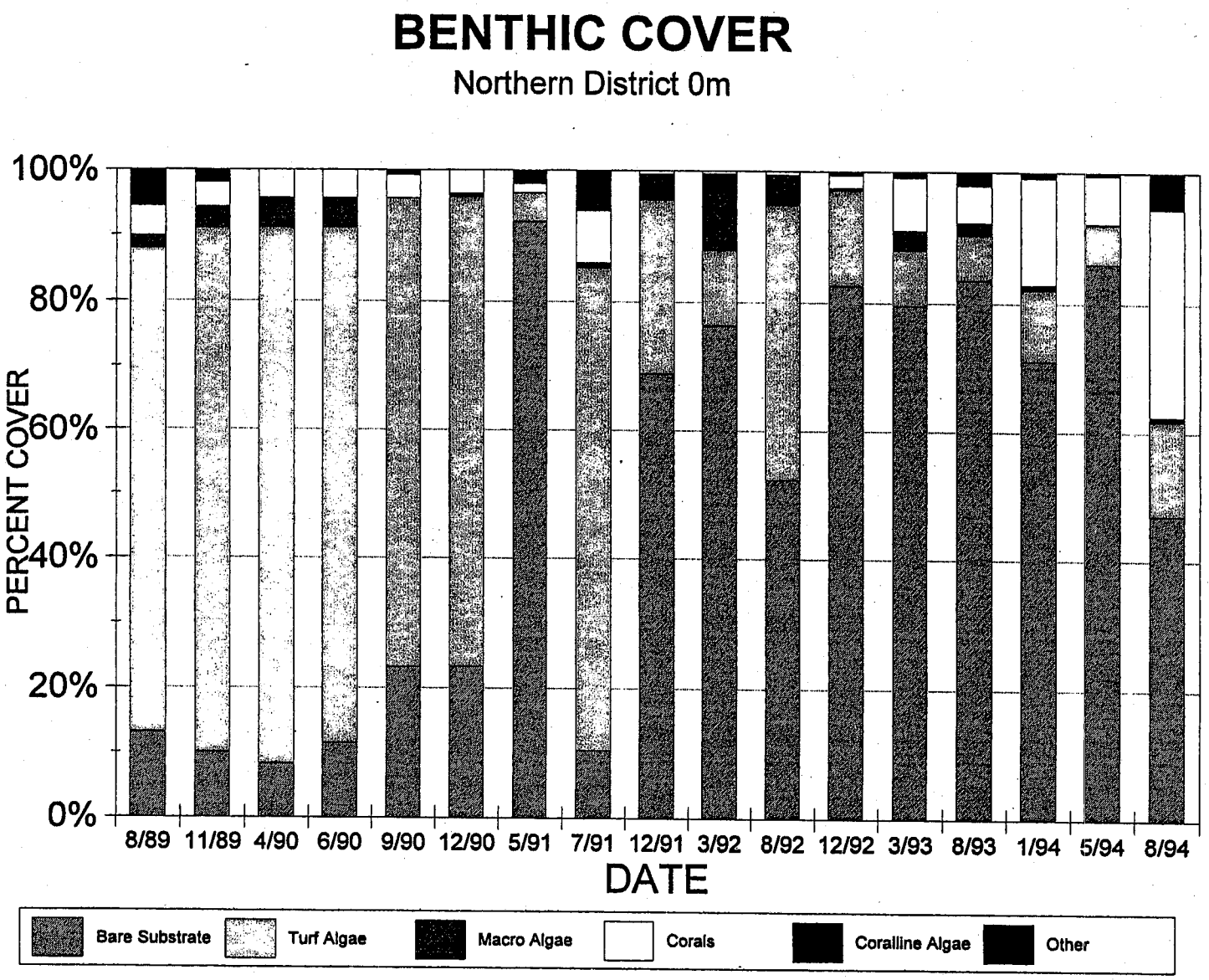

Figure 2. Benthic cover along the 0 meter transect.

cover. The 20 m transect (Fig. 3) had a very different benthic composition from that of the 0 m transect. Cover was predominated by three categories, live coral on 7 of 17 survey dates, turf algae on 6 of 17 dates and bare substrate on 4 of 17 dates. Percent cover by each of the two most predominant groups was similar and there did not appear to be a large shift from one predominant cover to another as seen in the 0 m transect. The percentage cover by live coral was in general quite high ranging from approximately 20 to 60 percent, except for two occasions when it was recorded at less than 6 percent. Turf algae ranged from 1.6 to 74 percent, and had a cover of greater than 15 percent 13 of 17 survey dates. Bare substrate had greater than 15 percent cover on 9 of 17 survey dates. The 50 m transect (Fig. 4) had similar benthic cover to the 20 m transect, in that it was predominated by the same three benthic groups, turf algae (8 out of 17 dates), bare substrate (6 out of 17 dates) and coral (3 out of 17 dates). In general, the benthic cover was equally predominated by live coral and turf algae, together making up greater than 75 percent of the cover. However, from the December 1992 survey until the last survey in August of 1994 the predominant cover was bare substrate, ranging from 40 to 80 percent. Live coral cover remained fairly constant around 20 to 50 percent, turf algae decreased after December 1992, from an average of 51 percent to an average of 6 percent. For all of the transects macro algae, coralline algae and other cover, each made up only a small percentage of the total benthic cover (average <5 percent)

Not all of the changes in percent cover for each of the categories were significant. The results of the regression analysis are summarized in Table 2. Significant changes (**S**) are at the 95% confidence level. There was a significant increase in percent coverage by bare substrate over the 5 year period along all three of the transects. There was also a significant increase in percent cover of live coral along the 0 m transect and a significant reduction in the percent cover of turf algae along

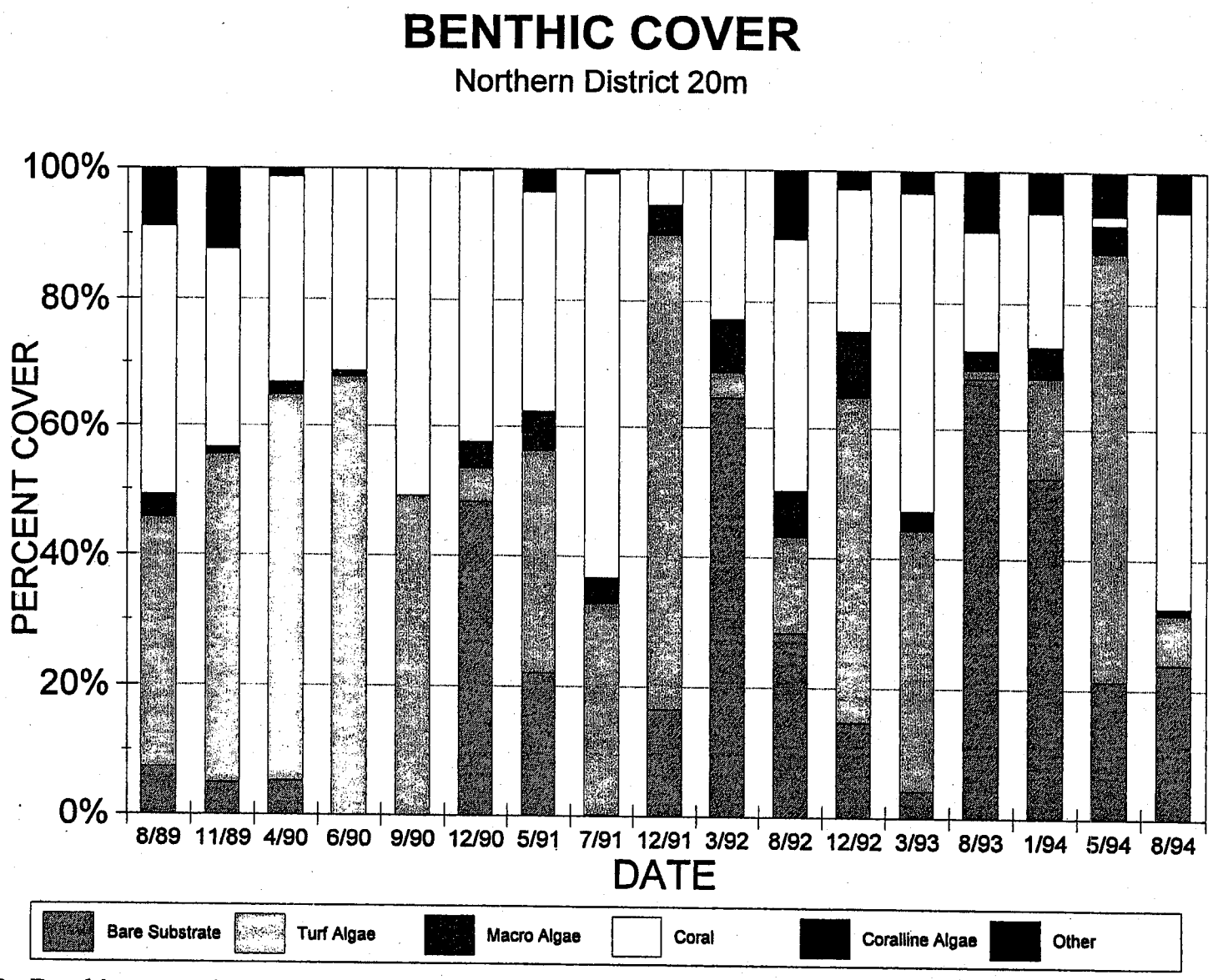

Figure 3. Benthic cover along the 20 meter transect.

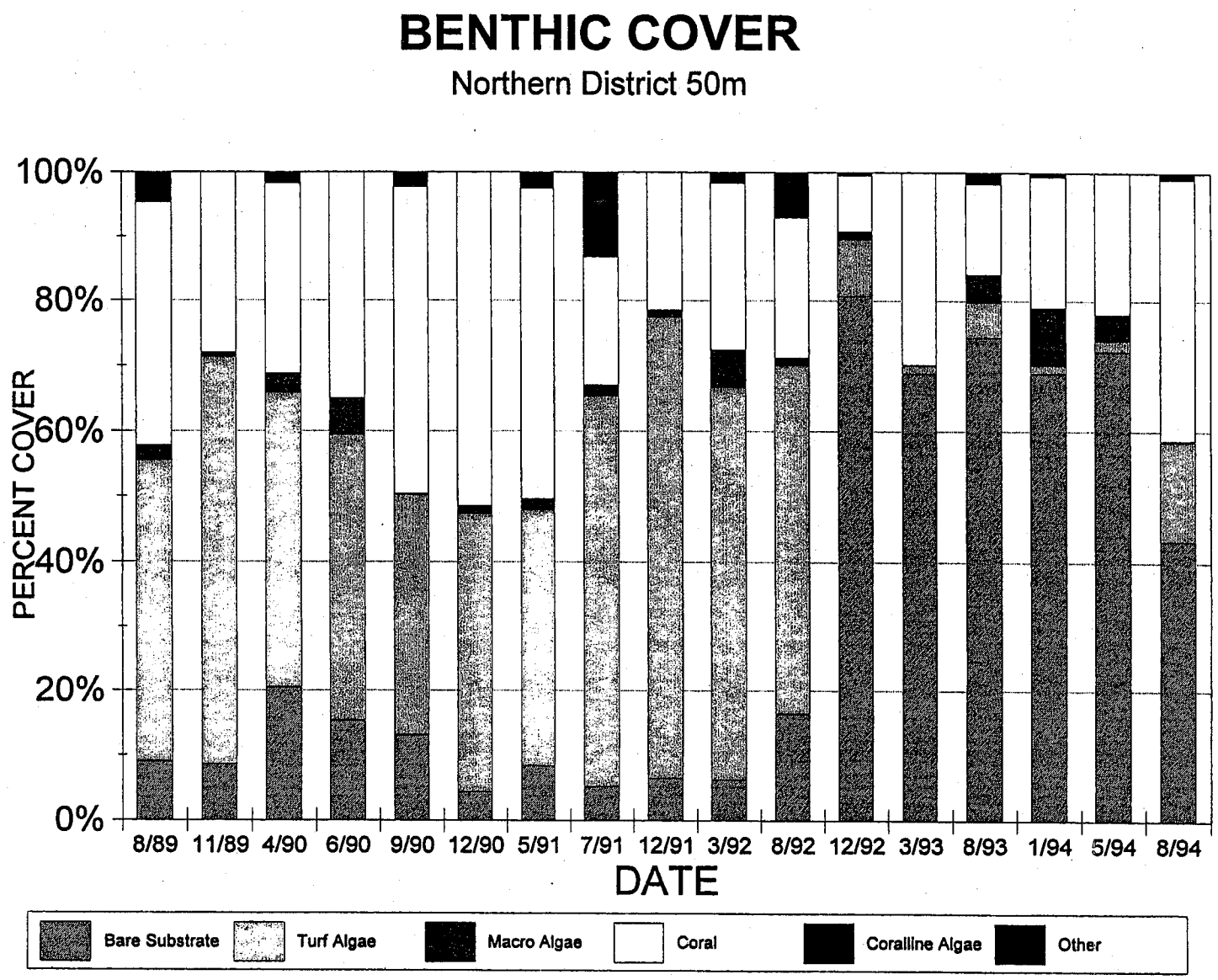

Figure 4. Benthic cover along the 50 meter transect.

Table 2. Regression analysis results for Northern District. Significance of change in % cover of the six benthic categories over the 61 months that the area was surveyed.

Transect	Bare	Turf Algae	Macro Algae	Coral	Coralline	Other
0 m	+s	-s	-	+s	+	-
ts	4.072	5.805	-0.699	2.653	0.047	-0.995
20 m	+s	-	+	-	+	+
ts	2.23	-1.52	1.02	-0.72	0.65	0.4
50 m	+s	-s	+	-	-	-
ts	3.361	-3.842	0.854	-1.78	-0.434	-0.903

ts 0.05[15] =2.131
s = significant at 95%
+ = positive regression
- = negative regression

the 0 m and 50 m transects. All other changes in percent cover were determined to be non-significant. A significant increase in the percent cover by bare substrate can be seen in Figure 5. The percent coverage by turf algae is seen to decrease along all of the transects, but was only significant for the 0 m and 50 m transects (Fig. 6) and coincided with the increase in bare substrate. The changes in percent cover for macro algae increased along the 20 m and 50 m transects and decreased along the 0 m transect, but these changes were not significant (Fig. 7). There was a non significant decrease of macro algae cover along the 0 m transect. Coral cover significantly increased along the 0 m transect. However, the percentage of coral cover along the 0 m transect was considerably lower than that of the 20 m and 50 m transects. Coral cover along the 20 m and 50 m transects had an overall non-significant decrease. The highest percent cover by coral for all transects was recorded on the last survey date, September 1994 (Fig. 8). The percent cover by coralline algae did not change significantly for any of the transects (Fig. 9), and there was also no significant changes in other cover (Fig. 10).

A fish species list arranged by Family is given in Table 3. The shaded boxes represent the presence of that species when the survey was conducted. There was no significant change in fish species diversity over the 5 year period that biological monitoring was conducted,. The number of species present in each trophic level remained relatively consistent through out this period and are representative of other coral reef fish communities around Guam (personal communication, Dr. Steven Amesbury, Prof. Ichthyology, UOG Marine Laboratory).

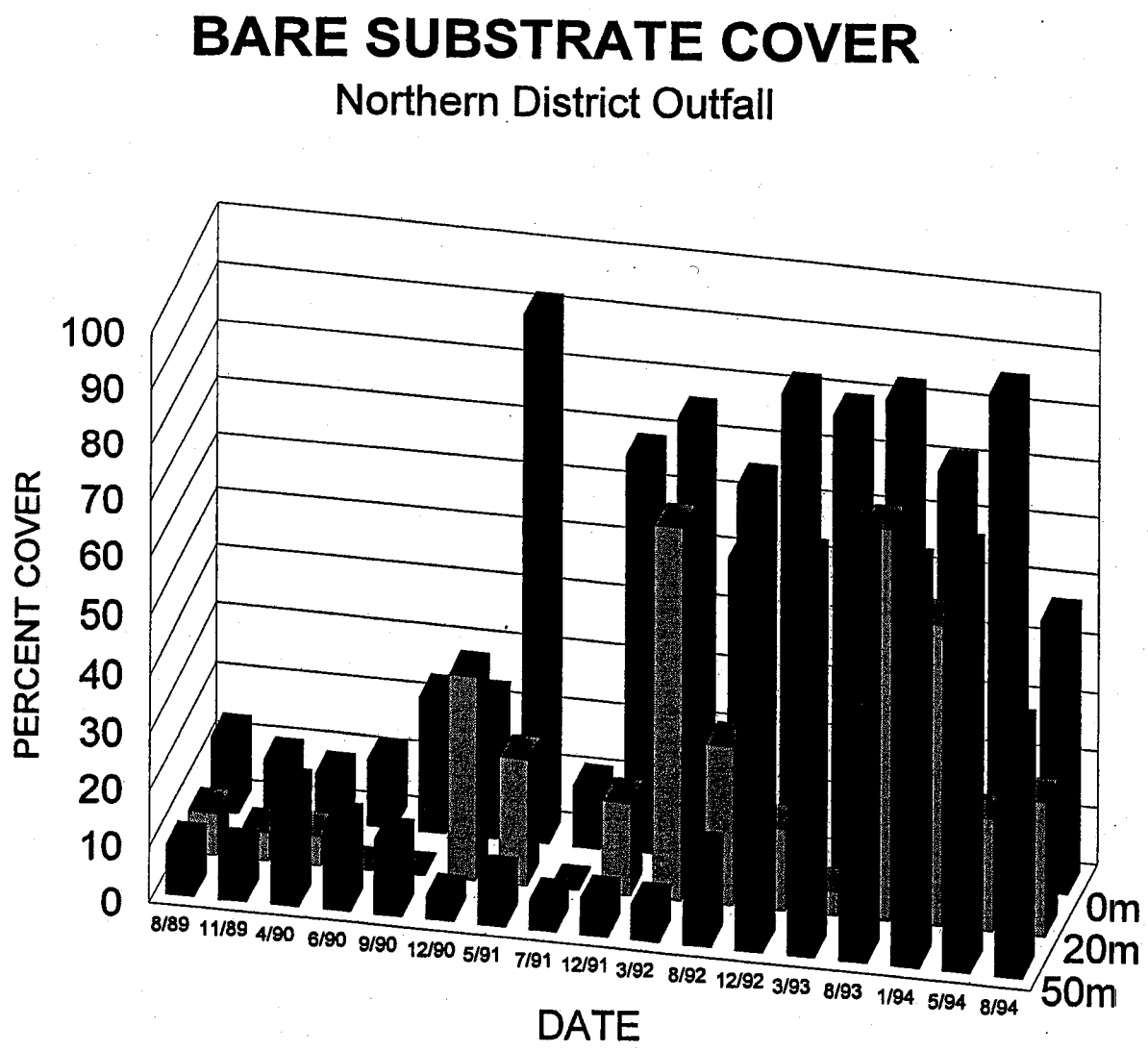

Figure 5. Bare substrate cover along the 0, 20 and 50m transects

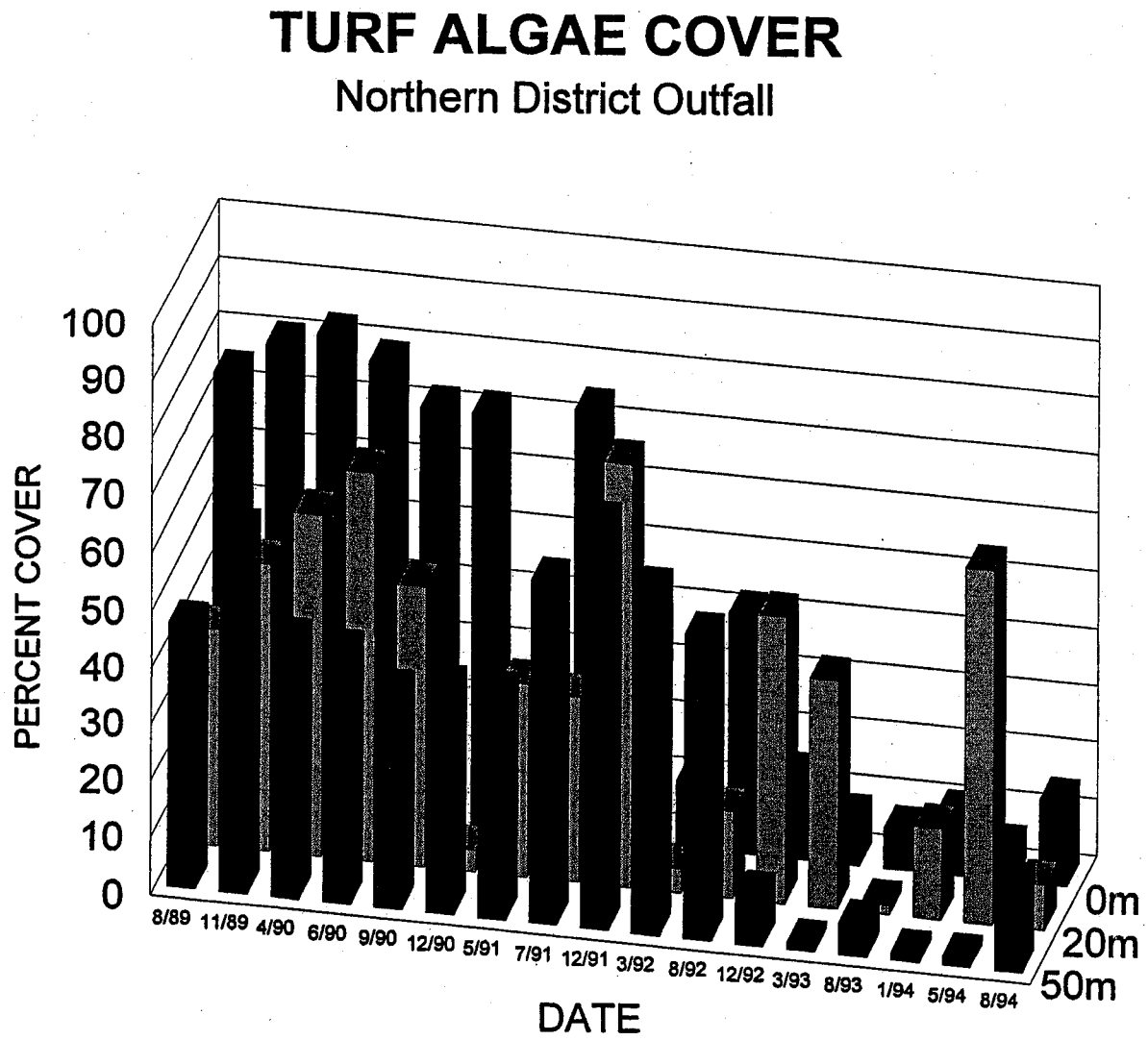

Figure 6. Turf Algae substrate cover along the 0, 20 and 50m transects

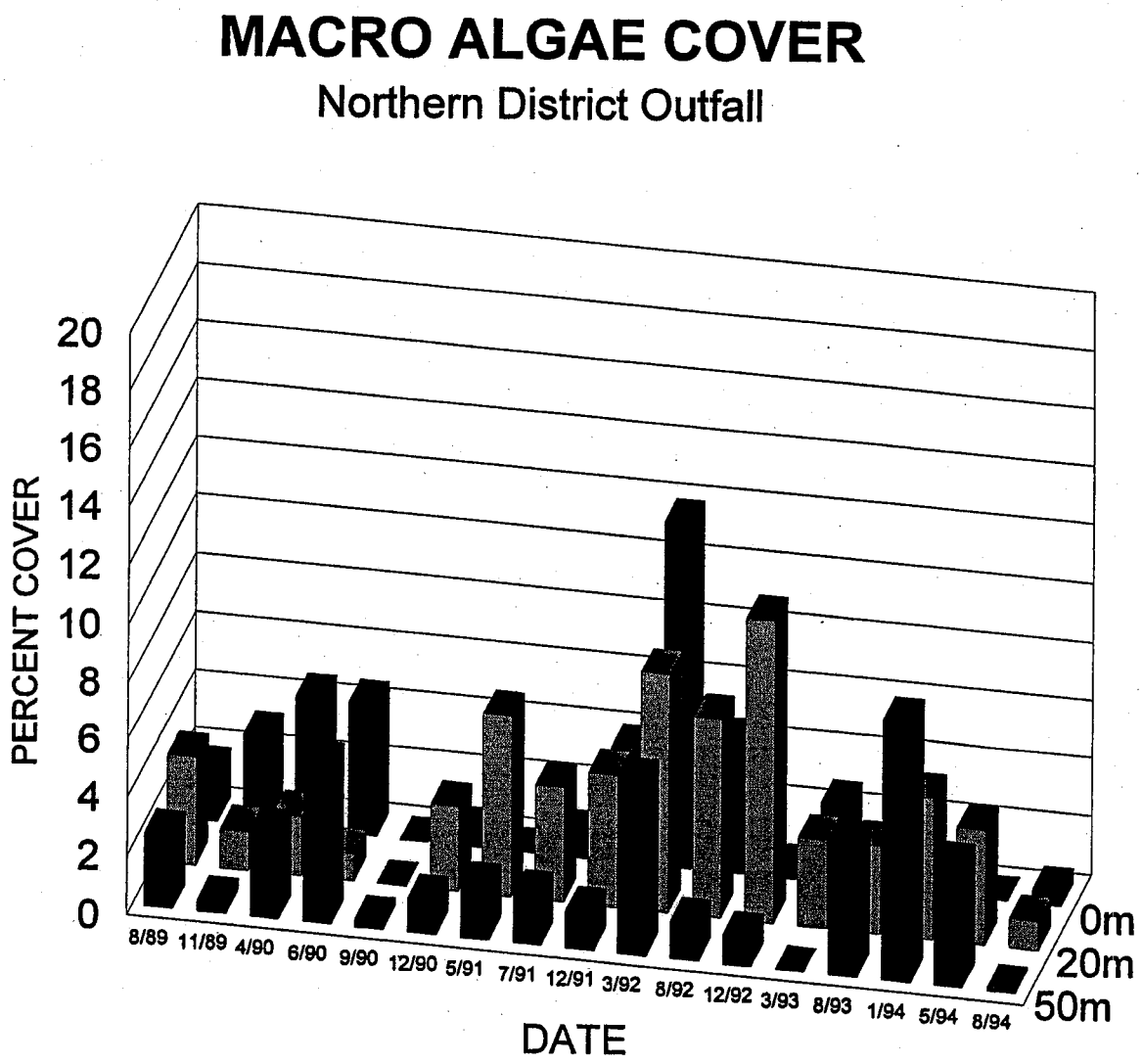

Figure 7. Macro Algae substrate cover along the 0, 20 and 50m transects

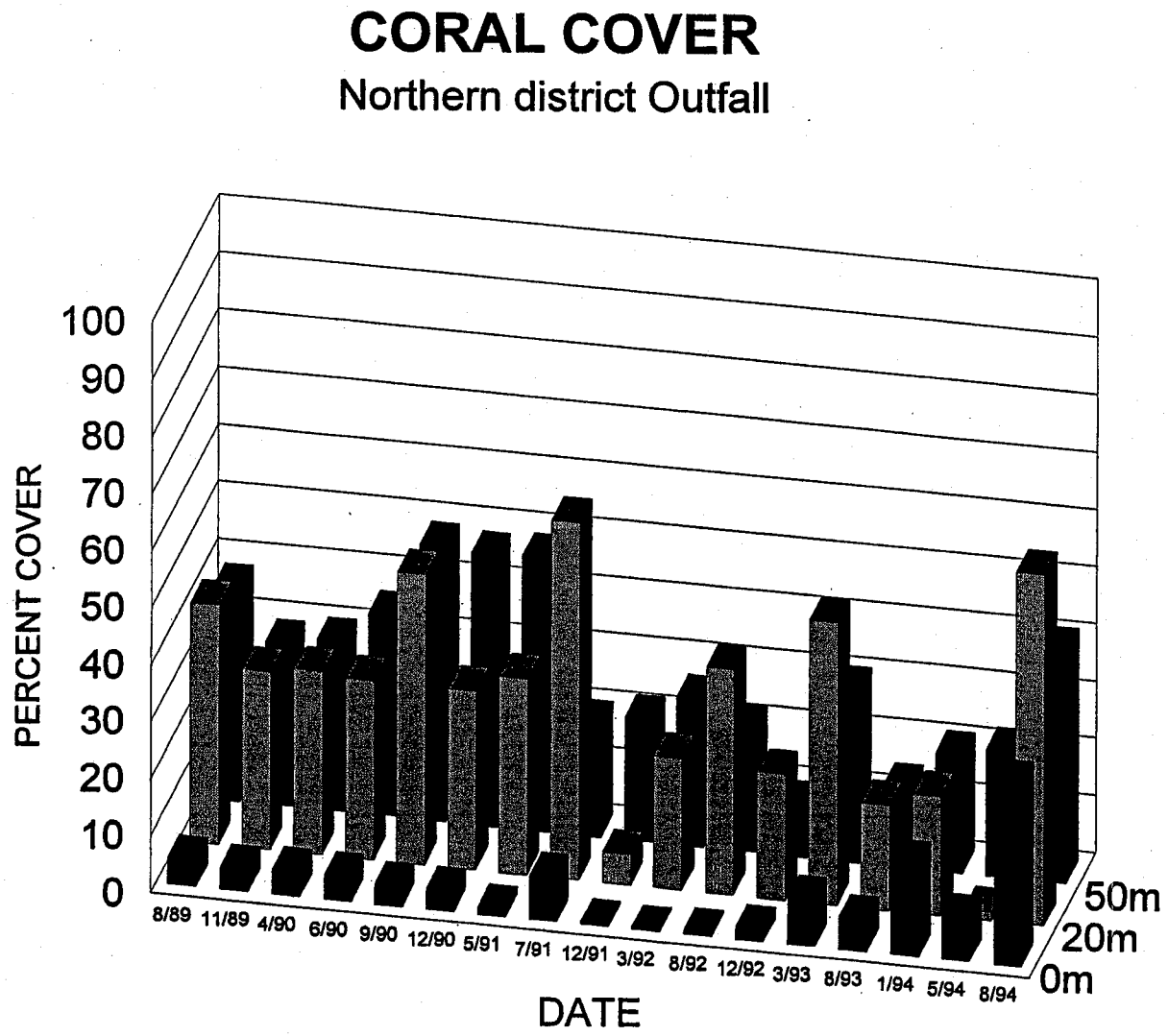

Figure 8. Coral cover along the 0, 20 and 50m transects

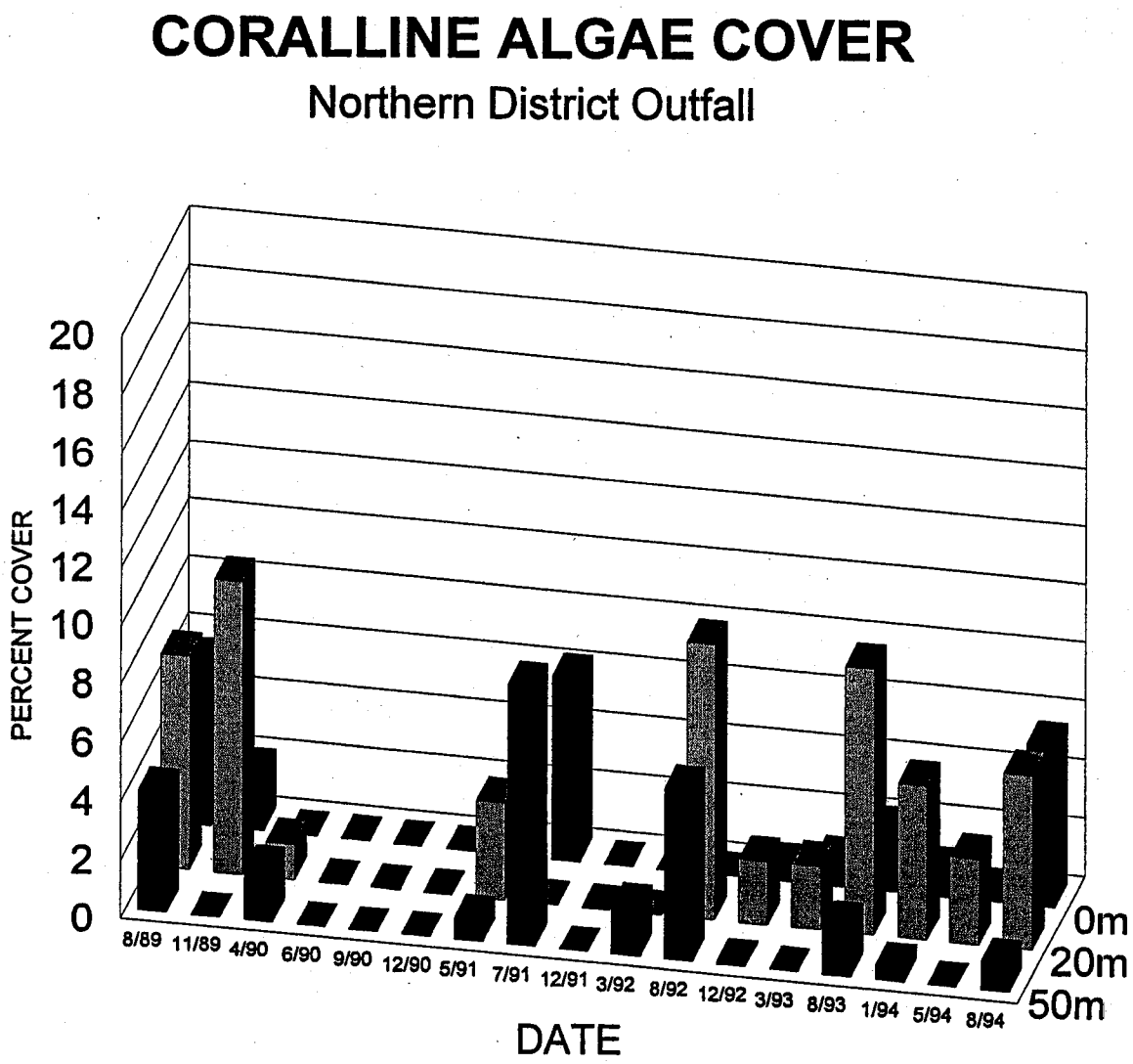

Figure 9. Coralline Algae subsrate cover along the 0, 20 and 50m transects

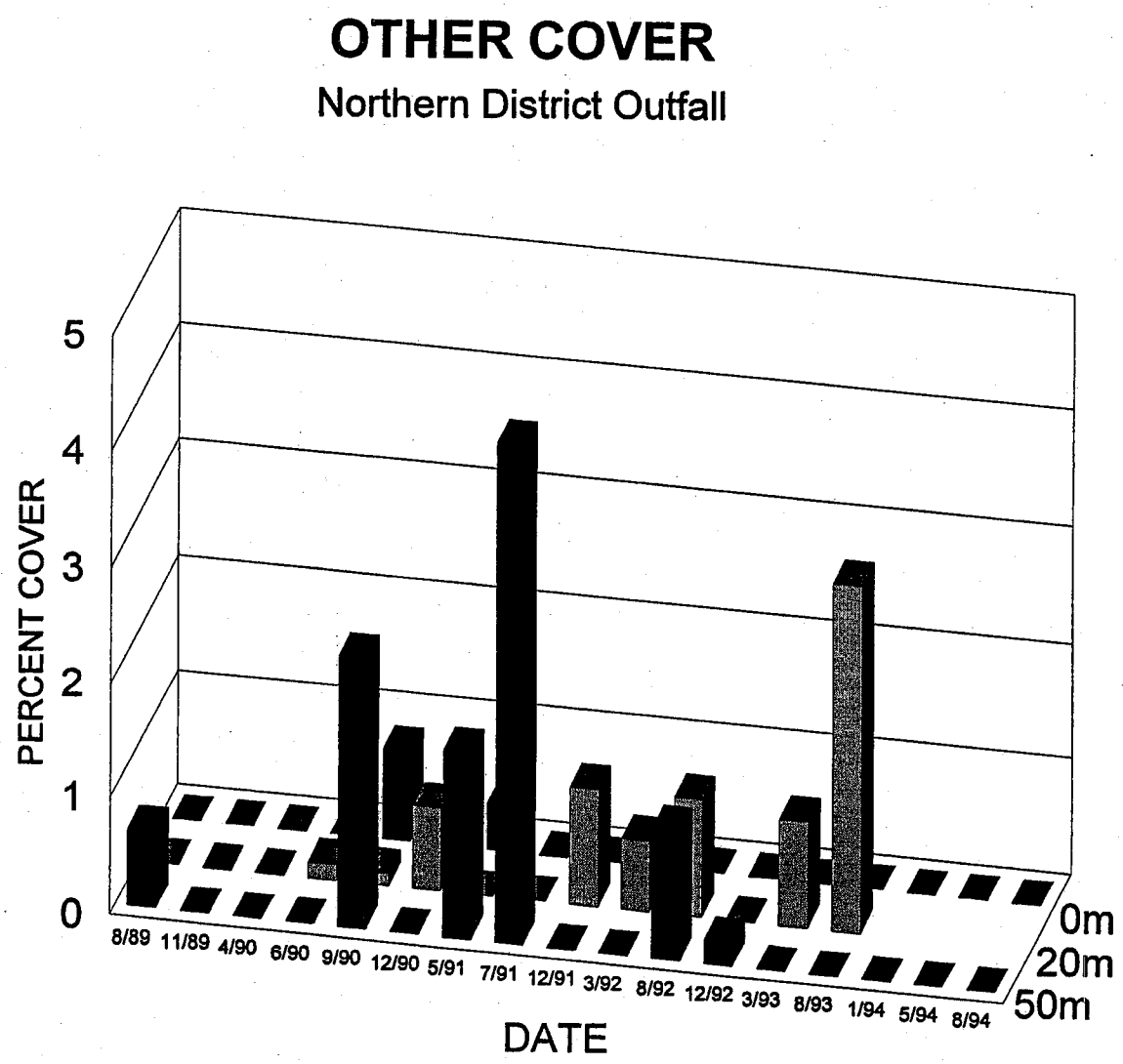

Figure 10. Other subsrate cover along the 0, 20 and 50m transects

Table 3. Northern District Outfall Fish Species.

shaded boxes represent that species were present

Fiscal Year	1990				1991				1992				1993				1994				Tota
quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	n/16
Acanthuridae (surgeonfishes) subfamily Acanthurinae (Surgeonfishes)																					
Acanthurus blochii						ns					ns				ns				ns		11
Acanthurus lineatus						ns					ns				ns				ns		1
Acanthurus nigricans						ns					ns				ns				ns		16
Acanthurus nigrofuscus						ns					ns				ns				ns		13
Acanthurus pyroferus						ns					ns				ns				ns		12
Acanthurus xanthopterus						ns					ns				ns				ns		3
Ctenochaetus binotatus						ns					ns				ns				ns		4
Ctenochaetus hawaiiensis						ns					ns				ns				ns		2
Ctenochaetus striatus						ns					ns				ns				ns		6
Zebrasoma flavescens						ns					ns				ns				ns		11
Zebrasoma scopas						ns					ns				ns				ns		3
Zebrasoma veliferum						ns					ns				ns				ns		1
Acanthuridae (Unicornfishes) subfamily Nasinae (Unicornfishes)																					
Naso annulatus						ns					ns				ns				ns		1
Naso lituratus						ns					ns				ns				ns		16
Naso hexacanthus						ns					ns				ns				ns		1
Naso tuberosus						ns					ns				ns				ns		6
Naso vlamingii						ns					ns				ns				ns		1
Aulostomidae (Trumpetfishes)																					
Aulostomus chinensis						ns					ns				ns				ns		1
Balistidae (Triggerfishes)																					
Balistapus undulatus						ns					ns				ns				ns		13
Balistidae sp.						ns					ns				ns				ns		1
Balistoides virdescens						ns					ns				ns				ns		4
Melichthys vidua						ns					ns				ns				ns		4
Melichythys niger						ns					ns				ns				ns		9
Odonus niger						ns					ns				ns				ns		6
Rhinecanthus rectangulus						ns					ns				ns				ns		1
Sufflamen bursa						ns					ns				ns				ns		10
Blenniidae (Blennies)																					
Meiacantus atrodorsalis						ns					ns				ns				ns		9
Caesionidae (Fusiliers)																					
Caesio carulaureus						ns					ns				ns				ns		2
Carangidae (Jacks; Trevallys)																					
Caranx melampygus						ns					ns				ns				ns		1
Gnathanodon speciosus						ns					ns				ns				ns		1
Chaetodontidae (butterflyfishes)																					
Chaetodon bennetti						ns					ns				ns				ns		10
Chaetodon citrinellus						ns					ns				ns				ns		16
Chaetodon ephippium						ns					ns				ns				ns		1
Chaetodon lunula						ns					ns				ns				ns		11
Chaetodon mertensii						ns					ns				ns				ns		11
Chaetodon ornatissimus						ns					ns				ns				ns		6
Chaetodon punctatofasciatus						ns					ns				ns				ns		1
Chaetodon reticulatus						ns					ns				ns				ns		8
Chaetodon trifasciatus						ns					ns				ns				ns		11
Chaetodon ulietensis						ns					ns				ns				ns		2
Chaetodon unimaculatus						ns					ns				ns				ns		2
Forcipiger flavissimus						ns					ns				ns				ns		2
Hemitauricthys polylepis						ns					ns				ns				ns		4
Heniochus acuminatus						ns					ns				ns				ns		1
Heniochus chrysostomus						ns					ns				ns				ns		5
Heniochus singularis						ns					ns				ns				ns		1
Cirrhitidae (Hawkfish)																					
Cirrhitichthys falco						ns					ns				ns				ns		5
Paracirrhites arcatus						ns					ns				ns				ns		2
Paracirrhitus forsteri						ns					ns				ns				ns		11
Gobiidae (Gobies)																					
Amblygobius sp.						ns					ns				ns				ns		1
Valenciennea strigatus						ns					ns				ns				ns		2
Haemulidae (Sweetlips and Grunts)																					
Scolopsis lineatus						ns					ns				ns				ns		1
Holocentridae subfamily Myripristinae (Solderfishes)																					
Myripristis spp.						ns					ns				ns				ns		1
Holocentridae subfamily Holocentrinae (Squirrelfishes)																					

Table 3. Northern District Outfall Fish Species.

shaded boxes represent that species were present

Fiscal Year	1990				1991				1992				1993				1994				Tota
quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	n/16
Sargocentron sp.						ns					ns				ns				ns		2
Labridae (Wrasses)																					
Anampses twisti						ns					ns				ns				ns		1
Bodianus axillaris						ns					ns				ns				ns		12
Bodianus mesothorax						ns					ns				ns				ns		1
Cheilinus bimaculatus						ns					ns				ns				ns		5
Cheilinus chlorourus						ns					ns				ns				ns		3
Cheilinus fasciatus						ns					ns				ns				ns		11
Cheilinus orientalis						ns					ns				ns				ns		2
Cheilinus oxycephalus						ns					ns				ns				ns		11
Cheilinius undulatus						ns					ns				ns				ns		7
Cheilinus unifasciatus						ns					ns				ns				ns		5
Cheilio inermis						ns					ns				ns				ns		1
Cirrhilabrus sp.						ns					ns				ns				ns		5
Coris aygula						ns					ns				ns				ns		2
Coris gaimard						ns					ns				ns				ns		14
Epinephelus sp.						ns					ns				ns				ns		1
Epibulus insidiator						ns					ns				ns				ns		2
Epiephelus merra						ns					ns				ns				ns		1
Gomphosus varius						ns					ns				ns				ns		11
Halichoeres biocellatus						ns					ns				ns				ns		1
Halichoeres hortulanus						ns					ns				ns				ns		14
Halichoeres margaritaceus						ns					ns				ns				ns		11
Halichoeres marginatus						ns					ns				ns				ns		2
Halichoeres trimaculatus						ns					ns				ns				ns		1
Hemigymnus melapterus						ns					ns				ns				ns		11
Hologymnosus annulatus						ns					ns				ns				ns		1
Labrichthys unilineatus						ns					ns				ns				ns		4
Labroides dimidiatus						ns					ns				ns				ns		12
Macropharyngogon meleagris						ns					ns				ns				ns		3
Navoculichthys taeniourus						ns					ns				ns				ns		3
Stethojulis bandanensis						ns					ns				ns				ns		1
Stethojulis strigiventor						ns					ns				ns				ns		11
Thalassoma hardwickii						ns					ns				ns				ns		11
Thalassoma lutescens						ns					ns				ns				ns		15
Thalassoma purpureum						ns					ns				ns				ns		1
Thalassoma quinquevittatum						ns					ns				ns				ns		1
Thallasoma lunare						ns					ns				ns				ns		2
Lethrinidae (Emperors)																					
Gnathodentex aureolineatus						ns					ns				ns				ns		2
Lethrinus harak						ns					ns				ns				ns		1
Lethrinus xanthochilus						ns					ns				ns				ns		4
Monotaxis grandoculus						ns					ns				ns				ns		4
Lutjanidae (Snappers)																					
Aphareus furca						ns					ns				ns				ns		3
Lutjanus bohar						ns					ns				ns				ns		1
Macolor niger						ns					ns				ns				ns		9
Malcolor macularis						ns					ns				ns				ns		1
Microdesmidae (Dartfishes)																					
Nemateleotris magnifica						ns					ns				ns				ns		3
Ptereleotris evides						ns					ns				ns				ns		12
Ptereleotris zebra						ns					ns				ns				ns		7
Mugilidae (Mullets)																					
Parupeneus barberinus						ns					ns				ns				ns		3
Parupeneus multifasciatus						ns					ns				ns				ns		12
Mullidae (Goatfishes)																					
Parapeneus bifasciatus						ns					ns				ns				ns		1
Muraenidae (Moray eels)																					
Gymnothorax meleagris						ns					ns				ns				ns		1
Ostraciidae (Trunkfish)																					
Ostracion meleagris						ns					ns				ns				ns		2
Pinguipedidae (Sandperches)																					
Parapercis clatherata						ns					ns				ns				ns		9
Parapercis millipunctata						ns					ns				ns				ns		1
Pomacanthidae (Angelfishes)																					
Centropyge flavissimus						ns					ns				ns				ns		13

Table 3. Northern District Outfall Fish Species.

shaded boxes represent that species were present

Fiscal Year	1990				1991				1992				1993				1994				Tota
quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	n/16
Centropyge shepardi						ns					ns				ns				ns		5
Pygoplites diacantus						ns					ns				ns				ns		3
Pomacentridae (Damselfishes) subfamily Amphiprioninae (Anemonefishes)																					
Amphiprion chrysopterus						ns					ns				ns				ns		10
Amphiprion periderion						ns					ns				ns				ns		6
Chromis acares						ns					ns				ns				ns		1
Pomacentridae (Damselfishes) subfamily Pomacentrinae																					
Abudefduf saxatalis						ns					ns				ns				ns		2
Chryiptera traceyi						ns					ns				ns				ns		4
Chrysiptera leucopoma						ns					ns				ns				ns		1
Plectroglyhididodon leucozona						ns					ns				ns				ns		1
Plectroglyphidodon dickii						ns					ns				ns				ns		9
Plectroglyphidodon johnstonianus						ns					ns				ns				ns		2
Plectroglyphidodon lacrymatus						ns					ns				ns				ns		13
Plectroglyphidodon sp.						ns					ns				ns				ns		1
Pomacentrus amboinensis						ns					ns				ns				ns		10
Pomacentrus grammorhynchus						ns					ns				ns				ns		11
Pomacentrus vaiuli						ns					ns				ns				ns		4
Pomachromis guamensis						ns					ns				ns				ns		5
Stegastes albifasciatus						ns					ns				ns				ns		3
Scaridae (Parrotfishes)																					
Calototomus carolinus						ns					ns				ns				ns		1
Scaras altipinnus						ns					ns				ns				ns		3
Scarus frenatus						ns					ns				ns				ns		9
Scarus frontalis						ns					ns				ns				ns		1
Scarus ghobban						ns					ns				ns				ns		2
Scarus gibbus						ns					ns				ns				ns		4
Scarus globiceps						ns					ns				ns				ns		2
Scarus schlegeli						ns					ns				ns				ns		11
Scarus sordidus						ns					ns				ns				ns		16
Scorpaenidae (Scorpionfishes)																					
Scorpaenopsis verrucosa						ns									ns				ns		1
Serrandiae (Grouper)																					
Cepahlopholis argus						ns					ns				ns				ns		10
Cephalopholis urodeta						ns					ns				ns				ns		7
Variola louti						ns					ns				ns				ns		2
Siganidae (Rabbitfish)																					
Siganus aregenteus						ns					ns				ns				ns		1
Siganus spinus						ns					ns				ns				ns		1
Sphyraenidae (Barracudas)																					
Sphyraena forsteri						ns					ns				ns				ns		7
Syngnathidae subfamily Syngnathinae (Pipefishes)																					
Corythoichthys intestinalis						ns					ns				ns				ns		1
Synodontidae (Lizardfishes)																					
Saurida gracilis						ns					ns				ns				ns		1
Synodus spp.						ns					ns				ns				ns		1
Tetraodontidae (puffers)																					
Arothron nigropunctatus						ns					ns				ns				ns		1
Canthigaster solandri						ns					ns				ns				ns		14
Zanclidae (Moorish Idol)																					
Zancluls cornutus						ns					ns				ns				ns		15
total number of species	44	38	41	48	44	ns	65	67	59	56	ns	55	51	43	ns	49	42	36		42	

Number of fish species that fall under each trophic level.

Fiscal Year	1990				1991				1992				1993				1994			
quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Herbivore	12	11	15	17	16	ns	18	20	16	16	ns	15	14	14	ns	15	13	11	ns	14
Carnivore	19	16	21	20	19	ns	30	29	27	26	ns	25	22	21	ns	23	21	17	ns	19
Invertivore	18	14	21	19	19	ns	28	27	25	24	ns	23	20	20	ns	21	20	16	ns	18
Planktivore	4	3	1	4	4	ns	5	6	5	4	ns	5	5	2	ns	4	2	2	ns	2
Omnivore	4	1	2	2	2	ns	4	3	3	2	ns	2	2	2	ns	2	2	2	ns	2
Corallivore	5	7	2	5	3	ns	8	9	8	8	ns	8	8	5	ns	5	4	4	ns	4

DISCUSSION

There were significant changes in percentage of cover by three of the groups (bare substrate, turf algae and coral) at the Northern District site from August 1989 until September 1994. The final Biological Monitoring Report of Three Sewage Outfalls on Guam, (Richmond et al., 1994) states that, "at the Tanguisson site, coral cover has noticeably decreased which is a cause for concern." However, statistical analysis did not show any significant decrease in coral cover. In fact, there was a significant increase in coral cover along the 0 m transect. These results indicate that the discharge has not had a detrimental effect the percent cover by coral in the vicinity of the diffusers. There is no indication as to whether this increase in coral cover is attributed to growth of existing coral colonies or due to the presence of new coral recruits. Coral cover was reported as been 2% to 10% in 1973 by Jones and Randall and from 1989 to 1994 coral cover in the vicinity of the outfall averaged between 20 and 60%.

There was a significant increase in bare substrate along all the transects, which appears to be correlated with the decrease in turf algae cover. The decrease in turf algae is likely to be a result of either grazing pressure by herbivorous fishes, or due to natural disturbances. The presence of an outfall would tend to increase the presence of turf and macro algae rather than cause a decrease in its cover, because of the possible increases in nutrients.

There were several Typhoons during the period that biological monitoring was conducted. Typhoons cause a physical assault on coral reefs from wave action, sediment laden runoff and a disruption in water quality. The monitoring reports from UOG have made no mention of these occurrences or what changes in percent cover may have resulted from them. A list of the typhoons, the month and year in which they occurred are given in Table 4. When comparing the changes in

Table 4. Typhoons within 100 miles of Guam from 1980 until 1993.

Typhoon Name	Month	Year	Maximum Intensity
Andy	April	1989	155 mph
Koryn	January	1990	75 mph
Russ	December	1990	140 mph
Yuri	November	1991	175 mph
Omar	August	1992	120 mph
Brian	October	1992	75 mph
Elsie	November	1992	105 mph
Hunt	November	1992	75 mph
Gay	November	1992	100 mph

source: National Weather Service, Tiyan, Guam.

percent cover of the six benthic categories after the occurrence of a single, or series of typhoons, it is possible to correlate some of these changes with the typhoons. Most obvious are the large increases in the percentage of bare substrate, and a reduction in the percentage of coral cover after typhoons have occured. Also, the reduction in turf algae after the series of 1992 typhoons, may be a result of typhoons cleaning out large portions of algae and grazing pressure keeping it at low levels. The same trends occured at the Agana Bay Outfall sites, which tends to support the hypothesis that these changes in benthic cover were as a result of natural disturbances rather than the discharge itself.. However, caution must be taken in making any assumptions as to how the typhoons, and grazing pressures have effected the benthic community in the area of the outfall, as there was no data from non impacted control sites with which to make a comparison.

Water quality monitoring of the receiving waters conducted on a quarterly basis since 1989 has not indicated that the discharge has had a detrimental impact on the quality of the receiving waters. The water quality parameters monitored include; pH, salinity, temperature, turbidity, dissolved oxygen, and fecal coliform. In general the results are within an acceptable range when compared to the control site, with the exception of the indicator bacteria fecal coliform, which was often elevated in the discharge area. There has been no reported incidences of mass fish or invertebrate mortalities, disease in organisms or any other adverse biological impacts related to the discharge.

In general results from both the water quality and biological monitoring have not indicated that there has been any adverse effects on the coral reef environment from the discharge at Tanguisson. The increase in the percentage of benthic cover by coral and the results of the fish surveys are positive signs of reef health. The increase in bare substrate occurred at both the Tanguisson and Agana sites, and is likely to be as a result of natural disturbances rather than the discharge itself.

REFERENCES

Jones, R. S. and R. H. Randall. 1973. A Preliminary Marine Survey for the Northern District Sewage System. University of Guam, Marine Laboratory Environmental Survey Report No. 8.

Richmond, R.; F. Rivera and Y. Golbuu. 1994. Biological Monitoring Report of Three Sewage Outfalls on Guam: A Discussion of Results of the Monitoring Program Since 1990, and Recommendations for Action.

APPENDIX

Appendix.
Species list and percent cover along the 0 meter transect at Northern District Outfall

SPECIES OR GROUP																
	8/25/89	11/14/89	4/2/90	6/13/90	9/24/90	12/11/90	8/27/91	12/26/91	3/19/92	8/6/92	12/4/92	3/30/93	8/17/93	1/10/94	5/27/94	8/28/94
Dictiota	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0	0
Favid	0	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthastrea	0	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0	0
Coscinarea columna	0.26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pavona varians	0	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0	0
Stylocoeonella sp	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0	0	0
Leptoria	0	0	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0
Halymenia	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0	0
Scolymia sp.	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0
zooanthid	0	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0
Pocillopora	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0
Chrysophyceae	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleiastrea	0	0	0	0.65	0	0	0	0	0	0	0	0	0	0	0	0
Schizotrix sp.	0.39	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0	0
Milliopora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liagora	0	0	0.78	0	0	0	0	0	0	0	0	0	0	0.78	0	0
Asytreopora	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0
Red tuff	0	0	0	1.04	0	0	0	0	0	0	0	0	0	0.13	0	0.39
Garcillaria	0	0	0	0	0	0	0.26	0	0.79	0	0	0	0	0	0	0
Neomeris sp.	0	0	0	0	0	0	0.13	0.53	0	0.52	0	0	0	0	0	0
Blue green micro algae	0	1.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fungia	0	0	0	0	0	0.78	0	0	0.26	0	0	0	0	0.26	0	0.39
Sinulara	0	0	0	0	1.95	0	0	0	0	0	0	0	0	0	0	0
Goniastrea sp.	0	0	0.26	0	0	0	0	0	0	0	0	0.39	0.52	0.26	0	0.78
Cyptastrea	0	0	0	0	1.04	0	0	0	0	0	0	1.56	0	0	0	0
Halimeda discoidea	1.32	0.56	0.91	0	0	0	0	0	0	0	0	0	0	0	0	0
Favities sp.	0	0	0	0	0	0	0.13	0	0	0	0	0	0	2.47	0.39	0
Montipora	0	0	0	0	0	0	0	0.53	0	0.26	0	0.26	0.26	0	0	1.95
Leptastrea	0	0	0	0	0	0	0	0	0	0.52	1.00	1.95	1.04	1.95	3.12	0.52
Favia sp.	0	0	0	0.26	0	0.26	0	0	0	0	1.00	1.30	2.08	0.91	2.21	2.99
Halimeda opuntia	0	0.84	0.91	2.6	0	0.52	0.53	2.10	1.84	0.65	0.08	0	1.17	0.52	0	0.52
Porites sp.	0	0	3.77	0.91	0.65	0	0	0	0	0	0	2.86	0.26		1.04	2.99
Porites lutea	3.16	2.67	0	0	8.18	0.39	0	0	0	0	0	0	0	0	0	0
Galaxaura sp.	0	0.14	1.04	0	0	0	0	0.13	9.21	3.38	0.15	2.27	0.52	0	0	0
Coralline Algae	5.53	1.97	0	0.91	0	0	6.19	0	0	0	0.46	0.91	2.08	0.91	0.26	5.45
Porites rus	1.32	1.27	0.26	1.04	37.79	1.95	7.76	0	0	0	0.15	0	0	9.61	1.04	22.21
Turf Algae	75.14	81.02	82.86	79.48	37.92	72.21	74.60	26.57	11.58	42.21	14.63	8.31	7.01	10.78	5.84	14.68
Bare	13.10	10.02	8.32	11.69	11.30	23.38	10.40	68.96	76.32	52.46	82.52	79.74	83.38	71.30	86.10	47.14

Appendix.
Species list and percent cover along the 20 meter transect at Northern District Outfall

SPECIES OR GROUP	8/25/89	11/14/89	4/2/90	6/13/90	9/24/90	12/11/90	8/27/91	12/26/91	3/19/92	8/6/92	12/4/92	3/30/93	8/17/93	1/10/94	5/27/94	8/26/94
Polychaete	0	0	0	0	0	0.13	0	0	0	0	0	0	0	0	0	0
Asteopora	0	0	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0
Padina	0	0	0	0	0	0	0	0.26	0	0	0	0	0	0	0	0
Alveopora sp.	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0	0
Galaxea sp.	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0
Spiro branchus gigantea	0	0	0	0	0	0	0.40	0	0	0	0	0	0	0	0	0
Favid	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphiroa sp.	0	0	0.65	0	0	0	0	0	0	0	0	0	0	0	0	0
Stichopus chloronotus.	0	0	0	0	0	0	0	0	0	0	0	0	0	0.91	0	0
Garcillaria	0	0	0	0	0	0	0	0.39	0	0	0	0	0	0	0.52	0
Neomeris	0	0	0	0	0	0	0	0.66	0	0	0	0.26	0	0	0	0
Holothuria noblis	0	0	0	0	0	0	0	0	0	0	0	1.04	0	0	0	0
favities sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.04	0
Sinularia	0	0	0	0	0	0	0	0	0	1.04	0	0	0	0	0	0
Halimeda discoidea	1.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pocillopora	0	0	0	0	0	0	0	0	0	1.30	0	0	0	0	0	0
Leptastrea sp.	0	0.39	0	0.13	0	0	0	0	0	0	0	0	0	0.78	0	0
Sponge	1.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypnea sp.	0	0	0	0	0	0	1.71	0	0	0	0	0	0	0	0	0
Amphiroa Fragill	2.23	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Soft coral	0	2.24	0	0	0	0	0	0	0	0	0.62	0	0	0	0	0
Ralfsia sp.	0	0	0	0	0	0	0	0	0	0	3.47	0	0	0	0	0
Goniastrea	0	0	0	0	0	0	0	1.05	0.79	2.86	0	0	0	0	0.39	0.26
Dictiota sp.	0	0	0	0	0	0	0	0	0	2.99	0	2.86	0	0	0	0
Caulerpa	0	0	0	0	0	0.39	0	0	0	0	5.78	0	0	0	0	0
Liagora sp.	0	0	0	0	0	0	0	0	6.45	0	0	0	0	0	0	0
Favia	0	0	0	0	0	0.91	0.40	0	0	2.34	0.85	0.78	0	0	1.69	0.26
Porites sp.	0	0	3.51	2.08	0	0.39	0	0	0	0	0	0	0	0	1.30	0.39
Montipora sp.	0	0	0	0	0	0	0	0	0.79	0	0	0	0	6.75	0.65	0
Galaxaura sp.	0.26	0	0.13	0.91	0	1.17	0.53	3.16	0	0	0	0	3.51	1.69	0.52	0.65
Halimeda opuntia	0	1.32	0.13	0.13	0	0.78	1.84	0	1.71	3.90	0.15	0	0	3.12	0.65	0.39
Porites lutea	2.50	1.58	0	0	0	0	1.32	1.32	4.61	6.32	0	0.52	0	0	0	0
Coralline Algae	7.24	10	1.82	0	0	0	0	0	0	9.49	2.23	2.21	9.09	5.32	2.99	6.04
Bare	7.50	4.87	5.2	0	0	35.72	0.263	16.43	64.61	28.04	14.47	4.29	68.05	52.47	62.08	23.83
Porites rus	39.48	29.08	26.88	28.57	50.78	29.66	60.79	2.89	16.84	26.63	21.02	48.05	17.79	13.25	24.29	60.39
Turf Algae	38.16	50.53	59.75	67.79	49.22	30.78	32.49	73.83	4.21	15.19	50.34	40.00	1.56	15.71	3.90	7.79

Appendix.
Species list and percent cover along the 50 meter transect at Northern District Outfall

SPECIES OR GROUP	PERCENT COVER															
	8/25/89	11/14/89	4/2/90	6/13/90	9/24/90	12/11/90	8/27/91	12/26/91	3/19/92	8/6/92	12/4/92	3/30/93	8/17/93	1/10/94	5/27/94	8/28/94
Vermetid	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
macro algae	0	0	0	0	0	0.13	0	0	0	0	0	0	0	0	0	0
Valonia	0	0	0	0	0	0	0	0	0.13	0	0	0	0	0	0	0
Fungia sp.	0	0	0	0	0	0	0	0	0	0	0.15	0	0	0	0	0
Codium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.26	0
Cyptastrea	0	0	0	0	0	0	0	0	0	0	0	0.26	0	0	0	0
Poritid	0	0	0.26	0	0	0	0	0	0	0	0	0	0	0	0	0
Pocillopora	0	0	0	0	0	0	0	0	0	0	0	0	0	0.39	0	0
desmea	0	0	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0
Alveopora sp.	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0	0
Dictyota	0	0	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0
Neomeris sp.	0	0	0	0	0	0	0	0	0.13	0.13	0	0	0	0	0	0.13
Goniastrea pectina	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinostrephus	0	0	0	0	0	0	0	0	0	0	0	0	0	0.65	0	0
Schizotrix mexica	0	0	0.91	0	0	0	0	0	0	0	0	0	0	0	0	0
Goniastrea edwards	0	0	0.39	0	0.52	0	0	0	0	0	0	0	0	0	0	0
Stylophora	0	0	0	0	0	0	0	0	0.92	0	0	0	0	0	0	0
Sponge	0.26	0	0	0	0.78	0	0	0	0	0	0	0	0	0	0	0
Montipora	0	0	0	0	0	0.13	1.32	0	0	0	0	0	0	0	0	0
Garcillaria	0	0	0	0	0	0	1.45	0	0	0	0	0	0	0	0	0
Stichopus chloronotus.	0.26	0	0	0	0	0	0	0	0	1.17	0.15	0	0	0	0	0
Platygyra sp.	0	0	0	0	0	0	0	0	0	0.65	0	0	0.65	0	0.39	0
Jania sp.	0	0	0	0	0	0	0	0	1.71	0	0	0	0	0	0	0
Pavona	0	0	0	0	0	0	0	0	1.84	0	0	0	0	0	0	0
Favites	0	0	0	0	0	0.39	0.66	0	0	0.65	0	0	0	0.52	0.26	0
Amphiroa Fragill	2.37	0	0.26	0	0	0	0	0	0	0	0	0	0	0	0	0
Favid	2.64	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astreopora	0	0	0	0	0	0	0	0	0	0.39	0	0	0.91	0.52	0	1.30
Halimeda sp	0.13	0	0.65	0.26	0	0.39	0.26	1.05	0	0.52	0	0	0	0.26	0	0
Favia	0	0	0	0	0	0.13	0.26	0.13	0	2.60	0	0	0	0	0	0.52
Soft coral	0	0	0	0	0	0	4.34	0	0	0	0	0	0	0	0	0
Lutea	0	0	5.32	0	0	0	0	0	0	0	0	0	0	0	0	0
Goniastrea sp.	0.92	0.66	0	0	0	0	0	0	0.92	3.77	0	0.65	0	0	0	0
Leptastrea	0	0	0.26	0	0	0	0	0	0	0	0.15	0.39	1.56	0.91	3.79	0
Galaxea sp.	0	0	0	3.64	0	0	0	0	0	0.26	0	8.57	4.42	0	0	0
Porites sp.	0	1.45	2.6	4.68	0	6.1	0	0	0	0	0	0	0	0	0	2.08
Porites lutea	5.53	1.32	0	0	0	0	0	0	0.79	0	0	3.51	4.94	5.19	1.95	0
Galaxaura sp.	0	0.26	1.04	0.26	0	0	0	0.26	3.95	0.71	0.62	0	0	8.05	3.77	4.68
Coralline Algae	4.08	0	1.82	0	0	0	8.95	0	1.71	5.98	0.23	0	1.82	0.52	0	1.04
Porites rus	28.29	25	20	30.52	2.99	40.78	17.37	21.25	21.32	13.37	8.86	16.62	5.84	12.86	15.45	31.04
Bare	8.95	8.81	20.39	15.2	23.38	4.16	5.26	6.55	6.32	16.37	80.98	68.70	74.42	68.83	72.32	43.38
Turf Algae	46.45	63.42	45.33	44.16	72.34	39.52	60.13	70.75	60.27	53.43	8.86	1.30	5.45	1.30	1.56	14.94

APPENDIX A

Guam Civilian Population
Projections by Area and
Military water consumption
for sewage billing

POPULATION AND VITAL STATISTICS

TABLE PO 1
POPULATION AND HOUSING BY ELECTION DISTRICTS

Election Districts	POPULATION 1990	1980	1970	Percentage change 1980-1990	1970-1980	HOUSING UNITS 1990	1980	1970	Percentage change 1980-1990	1970-1980
GUAM	133,152	105,979	84,996	25.6	24.7	35,223	28,249	16,680	24.7	69.4
Agana	1,139	896	2,119	27.1	-57.7	416	384	515	8.3	-25.4
Agana Heights	3,646	3,284	3,156	11.0	4.1	1,008	971	669	3.8	45.1
Agat	4,960	3,999	4,308	24.0	-7.2	1,300	990	819	31.3	20.9
Asan	2,070	2,034	2,629	1.8	-22.6	620	589	581	5.3	1.4
Barrigada	8,846	7,756	6,356	14.1	22.0	2,140	1,930	1,307	10.9	47.7
Chalan Pago-Ordot	4,451	3,120	2,931	42.7	6.4	1,047	738	526	41.9	40.3
Dededo	31,728	23,644	10,780	34.2	119.3	7,541	5,558	2,295	35.7	142.2
Inarajan	2,469	2,059	1,897	19.9	8.5	553	455	321	21.5	41.7
Mangilao	10,483	6,840	3,228	53.3	111.9	2,699	2,067	740	30.6	179.3
Merizo	1,742	1,663	1,529	4.8	8.8	469	398	271	17.8	46.9
Mongmong-Toto-Maite	5,845	5,245	6,057	11.4	-13.4	1,742	1,490	896	16.9	66.3
Piti	1,827	2,866	1,284	-36.3	123.2	554	503	239	10.1	110.5
Santa Rita	11,857	9,183	8,109	29.1	13.2	2,343	2,253	1,610	4.0	39.9
Sinajana	2,658	2,485	3,506	7.0	-29.1	712	619	680	15.0	-9.0
Talofofo	2,310	2,006	1,935	15.2	3.7	548	445	350	23.1	27.1
Tamuning	16,673	13,580	10,218	22.8	32.9	6,296	4,788	2,208	31.5	116.8
Umatac	897	732	813	22.5	-10.0	188	147	130	27.9	13.1
Yigo	14,213	10,359	11,542	37.2	-10.2	3,686	2,898	2,056	27.2	41.0
Yona	5,338	4,228	2,599	26.3	62.7	1,361	1,028	467	32.7	119.7

Note: Includes non-immigrant aliens and members of the U.S. Armed Forces and their dependents living on post.
Source: U.S. Bureau of the Census; Department of Commerce, Government of Guam.

TABLE PO 2

POPULATION PROJECTIONS BY ELECTION DISTRICT
(Based on percentage distribution and annual rate of increase)

Election Districts	Percent Distribution 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GUAM	1.00000	136,228	139,371	142,589	145,881	149,249	152,695	156,220	159,827	163,517	167,292
Agana	0.00855	1,165	1,192	1,220	1,248	1,277	1,306	1,336	1,367	1,399	1,431
Agana Heights	0.02738	3,730	3,816	3,904	3,995	4,087	4,181	4,278	4,378	4,477	4,581
Agat	0.03725	5,075	5,192	5,312	5,434	5,560	5,688	5,819	5,954	6,091	6,232
Asan	0.01555	2,118	2,167	2,217	2,268	2,320	2,374	2,429	2,485	2,542	2,601
Barrigada	0.06644	9,050	9,259	9,473	9,692	9,915	10,144	10,378	10,618	10,863	11,114
Chalan Pago/Ordot	0.03343	4,554	4,659	4,768	4,876	4,989	5,104	5,222	5,343	5,466	5,592
Dededo	0.23828	32,461	33,210	33,977	34,761	35,564	36,385	37,225	38,084	38,964	39,863
Inarajan	0.01854	2,526	2,584	2,644	2,705	2,768	2,831	2,897	2,964	3,032	3,102
Mangilao	0.07873	10,725	10,973	11,226	11,485	11,750	12,022	12,299	12,583	12,874	13,171
Merizo	0.01308	1,782	1,823	1,865	1,908	1,953	1,998	2,044	2,091	2,139	2,188
Mongmong/Toto/Maite	0.04390	5,980	6,118	6,259	6,404	6,552	6,703	6,858	7,016	7,178	7,344
Piti	0.01863	2,537	2,596	2,656	2,717	2,780	2,844	2,910	2,977	3,046	3,116
Santa Rita	0.08414	11,463	11,727	11,998	12,275	12,558	12,848	13,145	13,449	13,759	14,077
Sinajana	0.01996	2,719	2,782	2,846	2,912	2,979	3,048	3,118	3,190	3,264	3,339
Talofofo	0.01735	2,363	2,418	2,474	2,531	2,589	2,649	2,710	2,773	2,837	2,902
Tamuning	0.12522	17,058	17,452	17,855	18,278	18,689	19,120	19,562	20,013	20,475	20,948
Umatac	0.00674	918	939	961	983	1,005	1,029	1,052	1,077	1,102	1,127
Yigo	0.10674	14,541	14,877	15,220	15,572	15,931	16,299	16,675	17,060	17,454	17,857
Yona	0.04009	5,461	5,587	5,716	5,848	5,983	6,122	6,263	6,407	6,555	6,707

Note: These projections assumed no in or out migration, that the rate of growth for the island remained constant, and that the proportion of the total population residing in each election district remained constant.
Source: Census and Population Division, Department of Commerce, Government of Guam.

PHYSICAL INDICATORS

TABLE PH1
METERED WATER CONSUMPTION
(Millions of Gallons)

Fiscal Year	Total	Residential	Commercial & Government	Agriculture & Irrigation
1987	5,275	3,409	1,579	287
1988	7,748	5,089	2,354	305
1989	5,307	3,619	1,490	198
1990	5,804	3,923	1,731	150
1991	6,301	4,372	1,740	189
1992	6,988	4,651	2,099	238
1993	6,924	4,579	2,001	344
1994	7,106	4,725	2,107	274
1995	7,525	4,609	2,292	424
1996	13,954	7,633	5,361	960

Source: Public Utility Agency of Guam, Government of Guam.

TABLE PH2

WATER METERS IN SERVICE

Fiscal Year	Total	Residential	Commercial & Government	Agriculture & Irrigation
1987	23,857	21,581	1,513	763
1988	24,751	22,463	1,575	713
1989	27,704	25,394	1,833	477
1990	29,806	27,318	2,003	485
1991	30,151	27,594	2,005	552
1992	30,791	28,155	2,087	549
1993	32,397	29,588	2,202	607
1994	33,042	30,098	2,303	641
1995	33,271	30,300	2,304	667
1996	34,804	31,725	2,456	623

Source: Public Utility Agency of Guam, Government of Guam.

TABLE PH3

WATER REVENUES
(THOUSANDS OF DOLLARS)

Fiscal Year	Total	Residential	Commercial & Government	Agriculture & Irrigation
1987	6,353	4,286	1,959	108
1988	6,633	4,448	2,097	88
1989	6,302	4,345	1,877	80
1990	7,147	5,064	2,024	59
1991	7,775	5,580	2,121	74
1992	8,517	5,886	2,540	91
1993	8,874	5,827	2,529	118
1994	8,841	5,953	2,788	100
1995	9,610	N/A	N/A	N/A
1996	30,432	16,741	13,274	417

N/A = Not Available. PUAG did not provide breakdown details.
Source: Public Utility Agency of Guam, Government of Guam.

DEPARTMENT OF THE NAVY
U.S. NAVY PUBLIC WORKS CENTER
PSC 455, BOX 198
FPO AP 96540-2937

IN REPLY REFER TO:
7000
Ser 152.22/760
March 4, 1998

Chief Officer
Guam Waterworks Authority
P.O. Box 3010
Agana, Guam 96910

Gentlemen:

We are forwarding the enclosed water tally for February 1998 for sewage billing per Contract No. 62766-72-C-0044.

The following water consumption for the sewage billing is based on meter readings from January 23, 1998 to February 23, 1998.

LINE NOS.	LOCATION	METER NO.	K/GAL USED TO NEAREST K
12	ADELUP RESERVOIR NIMITZ HILL	128057	6,904
19A-2	TIYAN CARETAKER SITE OFFICE	NONE	3
32	NRMC ROUTE #7 (PUAG)	1227131	9,360
32	NRMC Fire Department	8969915	10
36	TIYAN DPI	31950832	2,103
36	PWC HSG FAA NCS	15487926	11
26	N C T A M S	VARIOUS	26,825
		TOTAL	45,216

Sincerely,

R. S. WRIGHT
Acting Comptroller
By direction of the
Commanding Officer

Encl:
(1) Water Tally

"SAFETY FIRST"

Rec'd: 03/09/98

TABLE PU3

ACTIVE DUTY MILITARY, MILITARY DEPENDENTS, AND OTHER CIVILIANS
BY ELECTION DISTRICT: 1990

		Military Dependents					Military Dependents(%)			
Election District	Total	Active Duty Military	Of Active Duty Member*	Other Dependent	Other Civilians	Total	Active Duty Military	Of Active Duty Military	Other Dependent	Other Civilians
GUAM	133,152	11,952	12,149	3,049	106,002	100.00	8.98	9.12	2.29	79.61
Agana	1,139	20	14	31	1,074	100.00	1.76	1.23	2.72	94.29
Agana Heights	3,646	222	178	103	3,145	100.00	6.09	4.83	2.83	86.26
Agat	4,960	93	143	127	4,597	100.00	1.88	2.88	2.56	92.68
Asan	2,070	177	279	87	1,527	100.00	8.55	13.48	4.20	73.77
Barrigada	8,846	1,160	679	170	6,837	100.00	13.11	7.68	1.92	77.29
Chalan Pago/Ordot	4,451	21	64	154	4,212	100.00	0.47	1.44	3.46	94.63
Dededo	31,728	1,704	2,328	658	27,038	100.00	5.37	7.34	2.07	85.22
Inarajan	2,469	7	32	94	2,336	100.00	0.28	1.30	3.81	94.61
Mangilao	10,483	390	688	246	9,159	100.00	3.72	6.56	2.35	87.37
Merizo	1,742	2	31	75	1,634	100.00	0.11	1.78	4.31	93.80
Mongmong/Toto/Maite	5,845	235	297	110	5,203	100.00	4.02	5.08	1.88	89.02
Piti	1,827	214	33	105	1,475	100.00	11.71	1.81	5.75	80.73
Santa Rita	11,857	4,488	3,379	208	3,784	100.00	37.83	28.50	1.75	31.91
Sinajana	2,658	20	50	90	2,498	100.00	0.75	1.88	3.39	93.98
Talofofo	2,310	18	38	83	2,171	100.00	0.78	1.65	3.59	93.98
Tamuning	16,673	425	300	177	15,771	100.00	2.55	1.80	1.06	94.59
Umatac	897	5	28	45	821	100.00	1.56	2.90	5.02	91.53
Yigo	14,213	2,704	3,455	284	7,770	100.00	19.02	24.31	2.00	54.67
Yona	5,338	49	137	202	4,950	100.00	0.92	2.57	3.78	92.73

Note: "Other Dependents" are dependents of retired members of the Armed Forces of the United States, or of active-duty or retired members of the full-time National Guard or Armed Forces Reserve. "Other Civilians" are those who are not active-duty members of the Armed Forces, National Guard or Reserve. "Active-duty" does not include active-duty in the military reserves or National Guard for the 4-6 months of initial training or yearly summer camp.
* "Of active duty member" - either former or retired active duty member.
Source: U.S. Bureau of the Census 1990 CPH-6-G"Social; Economic and Housing Characteristics: Guam".

TABLE PU4

MILITARY EXPENDITURES
(Fiscal Year)

Expenditures	1994	1995	1996
Military Pay	$249,282,602	$350,000,000	$222,535,000
Civilian Pay	189,847,009	20,473,309	147,355,000
Military Construction	188,690,853	124,753,417	109,817,000
Petroleum Products Purchases	0	0	0
Other Purchases	106,459,657	314,520,840	N/A
Total Spending	734,280,121	809,747,566	479,707 P
Total Witholding Taxes	$47,273,204	$44,080,000	N/A

P = Preliminary.
Source: Commander Naval Forces Marianas; U.S. Department of Commerce, Economics and Statistical Administration, Bureau of the Census.

APPENDIX B

Discharge Monitoring Reports

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: NORTHERN DISTRICT SEWAGE TREATMENT PLANT
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-000
Expires 3-31-88

PERMIT NUMBER (5-16)	DISCHARGE NUMBER (17-19)
GU0020141	001

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	12	1	TO	97	12	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER (32-37)		QUANTITY OF LOADING (40-43) AVERAGE	(44-47) MAXIMUM	UNIT	QUALITY OF CONCENTRATION (48-51) MINIMUM	(52-55) AVERAGE	(56-61) MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-68)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.3	7.0	mgd				mgd	13	25/31	cont.
	PERMIT REQUIREMENT		8.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	ns	ns	lb/d	ns	ns	ns	mg/l		0/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	ns	ns	lb/d	ns	ns	ns	mg/l	ns	0/30	Comp
	PERMIT REQUIREMENT	4254	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	ns	ns	lb/d	ns	ns	ns	mg/l		0/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	ns	ns	lb/d	ns	ns	ns	mg/l	ns	0/30	Comp
	PERMIT REQUIREMENT	2504	5005			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.3	0.6	0.9	ml/l	0	2/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	2394	2394	lb/d	41.0	41.0	41.0	mg/l		1/31	Disc
	PERMIT REQUIREMENT									1/31	DISC
pH	SAMPLE MEASUREMENT				7.3	7.3	7.4		0	2/31	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 309. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

(REFERENCE ALL ATTACHMENTS HERE)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 671, NUMBER 479-7944

DATE: MO. DAY YR.

COMMENT AND EXPLANATION OF ANY VIOLATIONS

Violations: Max flow exceed on 13 of the 25 dates read. No suspended solids or BOD results for the month. No samples after the 16th because of problems after Supertyphoon Paka passed over the island.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE USED UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-60 WHICH MAY NOT BE USED)

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: NORTHERN DISTRICT SEWAGE TREATMENT PLANT
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM
DISCHARGE MONITORING REPORT (DMR) (NPDES)

Form Approved
OMB No. 2040-008
Expires 3-31-88

(1-14) GU0020141 — PERMIT NUMBER

(17-19) 001 — DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	11	1	TO	97	11	30
	(15-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER (32-37)		(9 CARD ONLY) (46-53) QUANTITY OF LOADING (54-61) AVERAGE	MAXIMUM	UNIT	(4 CARD ONLY) (38-45) QUALITY OF CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-69)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.3	6.7	mgd				mgd	28	28/30	cont.
	PERMIT REQUIREMENT		6.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	7270	8289	lb/d	117	136	148	mg/l		4/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	3961	5029	lb/d	64	74	90	mg/l	0	4/30	Comp
	PERMIT REQUIREMENT	4256	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	6328	8223	lb/d	85	119	157	mg/l		4/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	4752	6370	lb/d	44	89	114	mg/l	6	4/30	Comp
	PERMIT REQUIREMENT	2504	5008			90	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.1	0.3	0.4	ml/l	0	4/30	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	473	473	lb/d	9.0	9.0	9.0	mg/l		1/30	Disc
	PERMIT REQUIREMENT									1/31	DISC
pH	SAMPLE MEASUREMENT				7.3	7.4	7.5		0	4/30	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 4 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 671 — NUMBER 479-7944

DATE: YEAR — MO. — DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Violations: Max flow was greater than 6.0 mgd on all dates
Suspended soilids monthly average concentration and loading exceeded by 39 mg/L and 2248 lbs/day. The maximum concentration and loading were exceeded on the 4th by 14 mg/L and 1362 lbs/day and on the 25th by 4 mg/L and 456 lbs/day.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE USED UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)

PERMITTEE NAME ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: NORTHERN DISTRICT SEWAGE TREATMENT PLANT
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-000
Expires 3-31-88

PERMIT NUMBER	DISCHARGE NUMBER
GU0020141	001

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	10	1	TO	97	10	31

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER		QUANTITY OF LOADING AVERAGE	MAXIMUM	UNIT	QUALITY OF CONCENTRATION MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
FLOW	SAMPLE MEASUREMENT	6.2	7.0	mgd				mgd	28	31/31	cont.
	PERMIT REQUIREMENT		6.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	6593	8328	lb/d	87	125	154	mg/l		3/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	5020	6234	lb/d	76	95	115	mg/l		3/31	Comp
	PERMIT REQUIREMENT	4256	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	5738	7822	lb/d	63	110	155	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	4947	9215	lb/d	44	95	174	mg/l	6	4/31	Comp
	PERMIT REQUIREMENT	2504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.1	0.7	2.0	ml/l	0	4/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	450	450	lb/d	9.0	9.0	9.0	mg/l		1/31	Disc
	PERMIT REQUIREMENT									1/31	DISC.
pH	SAMPLE MEASUREMENT				7.3	7.4	7.7		0	4/31	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1318. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: 671 479-7640
AREA CODE NUMBER

DATE

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Violations: Max flow was greater than 6.0 mgd on all except 3 days.
Suspended soilids monthly average concentration and loading exceeded by 45 mg/L and 2443 lbs/day. The maximum concentration and loading were exceeded on the 7th by 14 mg/L and 763 lbs/day and on the 21st by 74 mg/L and 4207 lbs/day. The monthly average BOD concentration and loading were exceeded by 10 mg/L and 764 lbs/day

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3310-1 (rev. 10-79) PREVIOUS EDITION TO BE (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)
UNTIL SUPPLY IS EXHAUSTED

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: NORTHERN DISTRICT SEWAGE TREATMENT PLANT
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-0004
Expires 3-31-88

PERMIT NUMBER	DISCHARGE NUMBER
GU0020141	001

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	9	1	TO	97	9	30

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER		QUANTITY OF LOADING AVERAGE	QUANTITY OF LOADING MAXIMUM	UNIT	QUALITY OF CONCENTRATION MINIMUM	QUALITY OF CONCENTRATION AVERAGE	QUALITY OF CONCENTRATION MAXIMUM	UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
FLOW	SAMPLE MEASUREMENT	6.1	6.4	mgd				mgd	3	5/30	cont.
	PERMIT REQUIREMENT		6.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	5982	8248	lb/d	47	118	165	mg/l		4/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	4277	4823	lb/d	74	84	91	mg/l	1	4/30	Comp
	PERMIT REQUIREMENT	4256	8517			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	6248	9441	lb/d	56	124	189	mg/l		4/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	3511	7006	lb/d	32	70	140	mg/l	4	4/30	Comp
	PERMIT REQUIREMENT	2504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.0	0.6	1.5	ml/l	0	4/30	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	445	445	lb/d	8.9	8.9	8.9	mg/l		4/30	Disc
	PERMIT REQUIREMENT									1/31	DISC
pH	SAMPLE MEASUREMENT				7.3	7.5	7.8		0	4/30	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

NOV 28 1997

TELEPHONE: AREA CODE 671, NUMBER 479-7044

DATE

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Daily maximum flow >6.0 mgd on three sample dates. Suspended solids exceeded the daily maximum concentration and loading on the 2nd, and the monthly average. BOD loading exceeded the monthly average.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-48 WHICH MAY NOT BE USED)

PERMITEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: NORTHERN DISTRICT SEWAGE TREATMENT PLANT
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-0090
Expires 3-31-00

PERMIT NUMBER	DISCHARGE NUMBER
GU0020141	001

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	8	1	TO	97	8	31

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER		QUANTITY OF LOADING AVERAGE	QUANTITY OF LOADING MAXIMUM	UNIT	QUALITY OF CONCENTRATION MINIMUM	QUALITY OF CONCENTRATION AVERAGE	QUALITY OF CONCENTRATION MAXIMUM	UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
FLOW	SAMPLE MEASUREMENT	6.2	6.8	mgd				mgd	3	4/31	cont.
	PERMIT REQUIREMENT		8.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	7600	9320	lb/d	103	147	177	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	5127	5517	lb/d	83	99	105	mg/l	0	4/31	Comp
	PERMIT REQUIREMENT	4710	8512			45	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	10987	16580	lb/d	118	213	316	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	10396	17024	lb/d	120	201	324	mg/l	8	4/31	Comp
	PERMIT REQUIREMENT	4684	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.0	4.1	12.0	ml/l	0	4/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	1496	1496	lb/d	29.9	29.9	29.9	mg/l		1/31	Disc
	PERMIT REQUIREMENT									1/1	DISC.
pH	SAMPLE MEASUREMENT				7.3	7.4	7.5		0	4/31	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: (671) 479-7844

DATE: NOV 28 1997

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Violations: Maximum flow. Suspended solids monthly average concentration by 151 mg/l and loading by 7892 lbs/day. S.S. daily maximum concentration and loading was exceeded on all sample dates. BOD monthly average concentration by 14 mg/l and loading by 871 lbs/day. Settleable Solids monthly average by 3.1 ml/l, and the daily maximum on 2 sample dates.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (Rev. 10-79) PREVIOUS EDITION TO BE USED UNTIL SUPPLY IS EXHAUSTED

(REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: NORTHERN DISTRICT SEWAGE TREATMENT PLANT
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-000
Expires 3-31-88

(2-16)	(17-19)
GU0020141	001
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	7	1	TO	97	7	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER (32-37)		QUANTITY OF LOADING (0 CARD ONLY) (46-53) AVERAGE	(54-61) MAXIMUM	UNIT	QUALITY OF CONCENTRATION (4 CARD ONLY) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-67)	SAMPLE TYPE (68-70)
FLOW	SAMPLE MEASUREMENT	6.1	6.7	mgd				mgd	3	4/31	cont.
	PERMIT REQUIREMENT		6.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	11035	14465	lb/d	162	215	280	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	4216	6308	lb/d	48	85	122	mg/l	0	4/31	Comp
	PERMIT REQUIREMENT	4256	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	14133	24917	lb/d	148	278	482	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	7568	12420	lb/d	28	157	292	mg/l	8	4/31	Comp
	PERMIT REQUIREMENT	2504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.3	0.9	2.0	ml/l	0	4/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	3023	3023	lb/d	54.1	54.1	54.1	mg/l		1/31	Disc
	PERMIT REQUIREMENT									1/31	DISC.
pH	SAMPLE MEASUREMENT				7.2	7.3	7.4		0	4/31	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO 10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 4 MONTHS AND 4 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE 671 479-7944
AREA CODE NUMBER

DATE
NOV 28 1997
Date Mo. Day

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Violations: Maximum flow. Suspended solids monthly average concentration by 107 mg/l and loading by 5064 lbs/day. The S.S. daily maximum concentration and loading was exceeded on 3 sample dates.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE USED UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM 1-40 WHICH MAY NOT BE USED)

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: Northern District Sewer Treatment Plant
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-080
Expires 3-31-88

PERMIT NUMBER	DISCHARGE NUMBER
GU0020141	001

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	6	1	TO	97	6	30

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS F

PARAMETER		QUANTITY OF LOADING AVERAGE	QUANTITY OF LOADING MAXIMUM	UNIT	QUALITY OF CONCENTRATION MINIMUM	QUALITY OF CONCENTRATION AVERAGE	QUALITY OF CONCENTRATION MAXIMUM	UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
FLOW	SAMPLE MEASUREMENT	6.5	6.9	mgd				mgd	0	4/30	cont.
	PERMIT REQUIREMENT		12.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	8178	10378	lb/d	115	146	180	mg/l		3/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	5562	5835	lb/d	94	100	106	mg/l	7	3/30	Comp
	PERMIT REQUIREMENT	4768	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	7343	8123	lb/d	112	132	150	mg/l		3/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	14280	31705	lb/d	88	259	576	mg/l	2	3/30	Comp
	PERMIT REQUIREMENT	3504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.8	5.4	10.0	ml/l	2	2/30	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	672	672	lb/d	13.2	13.2	13.2	mg/l		1/30	Disc
	PERMIT REQUIREMENT									1/31	DISC.
pH	SAMPLE MEASUREMENT				7.2	7.4	7.4		0	3/30	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 671, NUMBER 475-7844

DATE: YR MO DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

No samples collected on the 3 June due to emergency at pump station, and shortage of personnel. June 19, no grab samples taken by the operators. Therefore pH done from composite sample. The setileable solids were not run from the composite sample.

Suspended solids monthly average concentraion and loading were exceeded by 209 mg/l and 11776 lbs/day. The daily max concentration was exceeded by 476 mg/l on th 19th and 12 mg/l on the 24 th. The suspended solids daily maximum loading was exceeded on all sample dates; 56 lbs/day on the 10 th, 26697 lbs/day on the 19 th and 1064 lbs/day on the 24 th.

The BOD monthly average concentration and loading were exceeded by 15 mg/l and 1306 lbs/day. The daily max was not exceeded.

Settleable solids monthly average was exceeded by 4.4 ml/l, and the daily maximum was exceeded by 8.0 ml/l on the 10 th.

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: Northern District Sewer Treatment Plant
LOCATION:Dededo, Guam

NATIONAL POLLUTANT DISHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-000
Expires 3-31-88

(1-16) GU0020141 — PERMIT NUMBER

(17-19) 001 — DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	5	1	TO	97	5	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTUCTIONS BEFORE COMPLETING THIS

PARAMETER (32-37)		QUANTITY OF LOADING (4 CARD ONLY) (46-53) AVERAGE	(54-61) MAXIMUM	UNIT	QUALITY OF CONCENTRATION (4 CARD ONLY) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.4	6.7	mgd				mgd	3	4/31	cont.
	PERMIT REQUIREMENT		8.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	12206	16122	lb/d	124	231	297	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	5620	6405	lb/d	90	105	120	mg/l	2	4/31	Comp
	PERMIT REQUIREMENT	4256	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	7805	10975	lb/d	93	147	206	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	5070	9287	lb/d	42	95	174	mg/l	5	4/31	Comp
	PERMIT REQUIREMENT	2504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.1	0.4	0.7	ml/l	0	4/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	537	537	lb/d	9.9	9.9	9.9	mg/l		1/30	Disc
	PERMIT REQUIREMENT									1/31	DISC.
pH	SAMPLE MEASUREMENT				7.3	7.4	7.4		0	4/31	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO 10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 671, NUMBER 479-7844

DATE: YEAR, MO., DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(REFERENCE ALL ATTACHMENTS HERE)*

Maximum flow was exceeded on three of the four sample dates.
Suspeneded solids monthly average concentration and loading was exceeded. The daily maximum concentration was exceeded on the 27 th, and the daily maximum loading was exceeded on the 13th and 27th. The BOD monthly average loading and concentration was exceeded.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)

PERMITTEE NAME/ADDRESS (INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: Guam Waterworks Authority
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: Northern District Sewer Treatment Plant
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-006
Expires 3-31-88

(1-16) GU0020141 — PERMIT NUMBER

(17-19) 001 — DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	4	1	TO	97	4	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS

PARAMETER (33-37)		(3 CARD ONLY) QUANTITY OF LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNIT	(4 CARD ONLY) QUALITY OF CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.2	6.3	mgd				mgd	3	4/30	cont.
	PERMIT REQUIREMENT		5.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	7757	10265	lb/d	127	150	195	mg/l		4/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	3735	5149	lb/d	60	72	98	mg/l	0	4/30	Comp
	PERMIT REQUIREMENT	4755	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	7129	9339	lb/d	112	137	178	mg/l		4/30	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	2625	3678	lb/d	8	51	70	mg/l	2	4/30	Comp
	PERMIT REQUIREMENT	2504	3005			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.1	1.8	4.0	ml/l	2	4/30	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	468	468	lb/d	8.9	8.9	8.9	mg/l		1/30	Disc
	PERMIT REQUIREMENT									1/31	DISC.
pH	SAMPLE MEASUREMENT				7.2	7.3	7.4		0	4/30	Disc
	PERMIT REQUIREMENT				7.0		9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
GENERAL MANAGER, GWA
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 671, NUMBER 479-7844

DATE: YEAR, MO., DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Typhoon condition 2 on the 16th and laboratory closed until the 18th. Because of this no samples were to be run for that week.
Monthly average for suspended solids conc (mg/l) and loading (lbs/d) were exceeded. The monthly average and daily maximum were exceeded for settleable solids.

Explaination of exceedences are attached to the Northern District DMRs, page 20 of 20

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE USED UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-60 WHICH MAY NOT BE USED)

PERMITEE NAME/ADDRESS (INCL
FACILITY NAME/LOCATION IF DI... ...NT)

NAME: Public Utility Agency of Guam
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: Northern District Sewer Treatment Plant
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DIS... ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-000
Expires 3-31-88

(2-16)	(17-19)
GU0020141	001
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	3	1	TO	97	3	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTUCTIONS BEFORE COMPLETING THIS F

PARAMETER (32-37)		QUANTITY OF LOADING (3 CARD ONLY) (46-53) AVERAGE	(54-61) MAXIMUM	UNIT	QUALITY OF CONCENTRATION (4 CARD ONLY) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.3	6.5	mgd				mgd	4	4/31	cont.
	PERMIT REQUIREMENT		12.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	6257	7573	lb/d	96	118	140	mg/l		2/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	3165	3177	lb/d	59	60	61	mg/l	0	2/31	Comp
	PERMIT REQUIREMENT	4255	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	6670	12463	lb/d	87	126	230	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	5614	10950	lb/d	70	106	202	mg/l	1	4/31	Comp
	PERMIT REQUIREMENT	2504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT			ml/l	0.8	2.5	5.0	ml/l	2	4/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	737	737	lb/d	13.8	13.8	13.8	mg/l		1/31	Disc
	PERMIT REQUIREMENT									1/31	DISC
pH	SAMPLE MEASUREMENT				7.3	7.5	7.8		0	4/31	Disc
	PERMIT REQUIREMENT					7.0	9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
CHIEF OFFICER, PUAG
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION. I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION. INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO 10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE
671 479-7844
AREA CODE NUMBER

DATE
year mo. day

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Settleable solids daily max exceeded on the 4th and 11th causing the monthly average to be exceeded. Suspended solids monthly avg conc. and avg. loading (il/d) were exvceeded.
The daily max was also exceeded for both concentration and load on the 4th.
We had problems in the analysis of B.O.D for the 11th and 18th , and could not use the results because of high blanks.
The digesters are under repair, and because of this the clarifiers are over loaded. Other corrective matters will be made available upon transferring or utilizing secondary clarification.

EPA Form 3320-1 (rev. 10/79) PREVIOUS EDITION TO BE UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)

PERMITTEE NAME/ADDRESS
FACILITY NAME/LOCATION (STREET)

NATIONAL POLLUTANT DISCHARGE ELLIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-000
Expires 3-31-88

NAME: Public Utility Agency of Guam
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: Northern District Sewer Treatment Plant
LOCATION: Dededo, Guam

(2-16)	(17-19)
GU0020141	001
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	2	1	TO	97	2	28
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTUCTIONS BEFORE COMPLETING THIS

PARAMETER (32-37)		QUANTITY OF LOADING (3 CARD ONLY) (46-53) AVERAGE	(54-61) MAXIMUM	UNIT	QUALITY OF CONCENTRATION (4 CARD ONLY) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.3	6.5	mgd				mgd			cont.
	PERMIT REQUIREMENT		6.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	9107	9837	lb/d	142	173	187	mg/l		4/28	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	5048	5446		90	96	103	mg/l	1	4/28	Comp
	PERMIT REQUIREMENT	4256	8512			85	170			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	8153	11429	lb/d	119	155	221	mg/l		4/28	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	7596	8687		128	144	168	mg/l	4	4/28	Comp
	PERMIT REQUIREMENT	2504	5008			50	100			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT				0.5	2.0	4.0	ml/l	1	4/28	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	422	422	lb/d	7.9	7.9	7.9	mg/l		1/28	Disc
	PERMIT REQUIREMENT									1/31	DISC.
pH	SAMPLE MEASUREMENT				7.5	7.6	7.9			4/28	Disc
	PERMIT REQUIREMENT					7.0	9.0			1/7	DISC.

NAME/TITTLE PRINCIPAL EXECUTIVE OFFICER
RICHARD A. QUINTANILLA
CHIEF OFFICER, PUAG
TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE
671 479-7844
AREA CODE NUMBER

DATE
year mo. day

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)

Maximum flow in exceeded. The average and maximum loadings and concentrations for suspended solids were exceeded on all sampling dates.
BOD average loading and concentrations were exceeded. The maximum settleable solids was exceeded on 2/4/97 and the allowable average was exceeded.
The digesters are under repair, and because of this the clarifiers are over loaded.

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM Y-40 WHICH MAY NOT BE USED)

DISTRIBUTED AT GOVERNMENT OF GUAM EXPEN

(REPRODUCED AT GOVERNMENT OF GUAM EXPENSE)

NAME: Public Utility Agency of Guam
ADDRESS: P.O. BOX. 3010
AGANA, GUAM 96932
FACILITY: Northern District Sewer Treatment Plant
LOCATION: Dededo, Guam

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
DISCHARGE MONITORING REPORT (DMR) (NPDES)

Form Appr
OMB No. 20-
Expires 3-31-88

PERMIT NUMBER (1-16)	DISCHARGE NUMBER (17-19)
GU0020141	001

MONITORING PERIOD	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	97	1	1	TO	97	1	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS

PARAMETER (33-37)		QUANTITY OF LOADING (3 CARD ONLY) (40-53) AVERAGE	MAXIMUM (54-61)	UNIT	QUALITY OF CONCENTRATION (4 CARD ONLY) (38-45) MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	6.5	7.4	mgd				mgd	5		cont.
	PERMIT REQUIREMENT		6.0								CONT.
INFLUENT BOD	SAMPLE MEASUREMENT	11850	17633	lb/d	141.0	214.9	285.5	mg/l		5/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT BOD	SAMPLE MEASUREMENT	6312	7321		102.0	115.8	141.5	mg/l	1	5/31	Comp
	PERMIT REQUIREMENT	4256	8512			85.0	170.0			1/7	COMP.
INFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	7629	10114	lb/d	68.4	137.8	192.4	mg/l		4/31	Comp
	PERMIT REQUIREMENT										
EFFLUENT SUSPENDED SOLIDS	SAMPLE MEASUREMENT	6630	10094		74.0	121.5	192.0	mg/l	6	4/31	Comp
	PERMIT REQUIREMENT	2504	5008			50.0	100.0			1/7	COMP.
SETTLEABLE SOLIDS	SAMPLE MEASUREMENT				0.5	3.3	5.0	ml/l	4	5/31	Disc
	PERMIT REQUIREMENT					1.0	2.0			1/7	DISC.
OIL & GREASE	SAMPLE MEASUREMENT	412	412	lb/d	7.6	7.6	7.6	mg/l		1/31	Disc
	PERMIT REQUIREMENT									1/31	DISC
pH	SAMPLE MEASUREMENT				7.3	7.5	7.7		0	5/31	Disc
	PERMIT REQUIREMENT					7.0	9.0			1/7	DISC.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

RICHARD A. QUINTANILLA
CHIEF OFFICER, PUAG

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO $10,000 AND/OR MAXIMUM IMPRISONMENT BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 671, NUMBER 479-7844

DATE: year month day

COMMENT AND EXPLANATION OF ANY VIOLATIONS (REFERENCE ALL ATTACHMENTS HERE)
Maximum flow exceeded on all 5 sample dates
suspended solids daily max (mg/L) and daily max loading (lb/day) exceeded Jan 10 & 15.
suspended solids monthly average (mg/L) and monthly average loading (lb/day) exceeded.
Settleable solids daily max exceeded Jan 2, 10, 15, & 29. as well as the monthly average.
BOD monthly average (mg/L), monthly average loading L(lb/day) exceeded

EPA Form 3320-1 (rev. 10-79) PREVIOUS EDITION TO BE UNTIL SUPPLY IS EXHAUSTED (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)

APPENDIX C

Revised Guam Water Quality Standards

GUAM ENVIRONMENTAL PROTECTION AGENCY

REVISED GUAM WATER QUALITY STANDARDS

"ALL LIVING THINGS OF THE EARTH ARE ONE "

HARMON PLAZA COMPLEX UNIT D-107
130 ROJAS ST.
HARMON, GUAM 96911

72-0135

REVISED GUAM WATER QUALITY STANDARDS

ADOPTED: JULY 18, 1987
ADOPTED: JANUARY 2, 1992

ANTONIO T. LIZAMA
Board Chairman

ATTESTED TO:
SANDRA L. CRISOSTOMO
Board Secretary

APPROVED:

ELIZABETH BARRETT-ANDERSON
Attorney General

DATE: 1-22-92

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STATEMENT OF POLICY

It shall be the public policy of the Territory of Guam to:

1. conserve, protect, maintain, and improve the quality of the Guam's waters for (drinking and food processing) human consumption, for the growth and propagation of aquatic life, for marine research and for the preservation of coral reefs and wilderness areas, and for domestic, agricultural, commercial, industrial, recreational and other legitimate uses;

2. provide that no pollutant discharged into any water, unless (a) the discharge first receives processing which will remove all harmful products or provide the control technology necessary to protect the designated beneficial uses of waters; (b) the discharge meets the effluent limitations established for that discharge; and (c) best management practices are applied to all non-point sources; and

3. provide for the prevention, abatement and control of new and existing water pollution sources including non-point sources.

4. maintain and improve the chemical, physical, and biological integrity of wetlands water quality as necessary to meet the Clean Water Act Section 101 (a), and to protect wetlands.

5. provide protection from point or non-point source discharges to wetlands in the same way as other surface waters.

6. provide protection from point and non-point discharges, including discharges from ponding basins and via sinkholes to groundwater.

Further, under the terms of the U.S. Water Pollution Control Act 92-500 as amended by all Public Laws through 1986:

1. it is the territorial goal that the discharge of pollutants into all territorial waters be eliminated;

2. it is the territorial goal that a water quality guideline be established and enforced, which

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provide for the protection and propagation of fish, shellfish and other aquatic and marine life, and provide for safe public recreation in and on the water;

3. it is the territorial policy that the discharge of pollutants in harmful or hazardous amounts be prohibited; and

4. it is the territorial goal to eliminate all point source discharges to certain near-shore waters.

To assist in obtaining these goals, all discharges including non-point sources will be controlled (permitted) either through the National Pollutant Discharge Elimination System (NPDES) or through the Guam Environmental Protection Agency's local permit program.

Therefore, pursuant to the authority contained in the Guam Water Pollution Control Act (Section 47104 and 47108 of Chapter 47, Title 10 of the Guam Code Annotated), which authorized the formulation of standards of water purity and classification of waters according to their most beneficial uses, the Guam Environmental Protection Agency hereby adopts the following standards of water quality for Guam.

Waters whose existing quality is better than the established standards will be maintained at the same high quality.

Waters whose existing quality is less than the established standards for their use due to the presence of substances, conditions, or combinations thereof attributable to domestic, commercial and industrial discharges or agricultural, construction and other land-use practices, shall be improved to comply with the established standards. However, in such cases where the natural conditions are of lower quality than criteria assigned, the natural conditions shall constitute the water quality criteria. Water quality criteria in boundary areas shall be established so that the most stringent standard applies. When more than one set of Water Quality criteria apply, including overlap of category designations or at a boundary water between two categories, then the more stringent standard shall prevail.

The Administrator of the Guam Environmental Protection Agency may allow a lowering of water quality, only if it has been demonstrated to the Administrator with an Environmental Impact Statement (EIS) pursuant to the requirement of

Executive Order 90-10 (Appendix H) that a lowering of the water quality is the only alternative and is necessary as a result of essential social needs. It must also be demonstrated with the EIS that the lowered water quality will not interfere with or become injurious to any aquatic life or uses made of or potentially possible in the affected waters. A public hearing shall be conducted to give residents of the territory, primarily those residing in the affected area, opportunity to review and comment on the EIS.

All industrial, public or private projects or developments will be required, as part of the initial project design, to make provisions for the pollutant removal or control technology necessary to protect the designated use of receiving waters or maintain the existing high quality of the receiving waters.

Point Source discharges through storm drainage except for storm water is prohibited by these standards.

The purpose of these Water Quality Standards is to prevent degradation of water resources resulting from pollution sources. An Environmental Protection Plan (EPP) will be prepared by all developers, contractors, and others prior to construction initiation to ensure that water resources will not be degraded. This EPP will be submitted to the Guam Environmental Protection Agency for approval. Failure to comply with the EPP will result in a Stop Work Order and other actions, as deemed necessary, until compliance is achieved.

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SECTION I

CATEGORIES OF WATERS

The following categories of water established under these standards relate to the different liquid components of the hydrologic cycle. All categories of water (Marine, Surface and Groundwater) are referenced on the Water Classification Map. Scaled down copies of these maps are included in these standards enabling readers to understand their relative position, application and use.

A. MARINE WATERS

This category includes all coastal waters off-shore from the mean high water mark, including estuarine waters, lagoons and bays, brackish areas, wetlands and other special aquatic sites, and other inland waters that are subject to ebb and flow of the tides. Refer to Water Classification Map.

CATEGORY M-1 EXCELLENT

Waters in this category must be of high enough quality to ensure preservation and protection of marine life, including corals and reef dwelling organisms, fish and related fisheries resources, and enable the pursuit of marine scientific research as well as aesthetic enjoyment. This category of water shall remain substantially free from pollution attributed to domestic, commercial and industrial discharges, shipping and boating, or agriculture, construction and other activities which can reduce the waters' quality. Furthermore, there shall be no zones of mixing within this category water.

CATEGORY M-2 GOOD

Water in this category must be of sufficient quality to allow for the propagation and survival of marine organisms, particularly shellfish, corals and other reef related resources. Other important and intended uses include mariculture activities, aesthetic enjoyment and compatible recreation inclusive of whole body contact and related activities.

CATEGORY M-3 FAIR

Water in this category is intended for general, commercial and industrial use. Specific intended uses include the following: shipping, boating and berthing, industrial cooling water, marinas, while allowing for protection of aquatic life, aesthetic enjoyment and compatible recreation with limited body contact.

B. GROUNDWATER

This major type of water encompasses all subsurface water and includes basal and parabasal water, perched water, all water below the groundwater table, water percolating through the unsaturated zone (Vadose Water), all saline waters below and along the perimeter of the basal fresh water body (freshwater lens), and water on the surface that has been collected with the specific intent of recharging or disposing of that water to the subsurface by means of injection, infiltration, percolation or other means. The Northern Guam Water lens which is the Principal Source Aquifer and any other groundwater resource as they are identified shall continue to receive protection under Guam's groundwater regulations.

CATEGORY G-1 RESOURCE ZONE

The primary use of groundwater within this zone is for drinking (human consumption) and this use must be protected. Virtually all water of the saturated zone of Guam is included. Specifically it includes all water occurring in the saturated zone below the groundwater table, all vadose water occurring in an unsaturated zone extending 100 feet (30.5 m) above any water table, or within 20 feet of the ground surface above all fresh groundwater bodies, all water of the basal and parabasal freshwater bodies, and all water of and below the freshwater/salt-water transition zone beneath the basal water body (Examples, Wells A-1, A-2, A-3, MJ1, & MJ5).

Because any water discharges within this zone will (by definition) be tributary to groundwater bodies which are actual or potential sources of fresh, potable water, no pollutant discharges to the ground-water within this zone will be allowed.

CATEGORY G-2 RECHARGE ZONE

Water within this zone is tributary to, replenishes, and recharges the Category G-1 groundwater and must be of drinking water quality before it enters the Resource Zone. All water discharges within the Recharge Zone must receive treatment to the degree necessary to protect the underlying Category G-1 groundwater from any contamination.

Category G-2 is divided into two distinct sub-categories based upon the boundaries of the Groundwater Management Protection Zone (GWMPZ).

Category G-2a exists within the GWMPZ and extends from the ground surface to the top of the G-1 zone.

Category G-2b exists only outside the GWMPZ and includes all waters which are collected and recharged or disposed of within a zone which is bounded above by G-3 and below by G-1. Vertically, this zone extends 20 feet below the ground surface to the upper surface of the Category G-1 waters. Input to ground water within this zone occurs primarily through storm water injection wells.

It is recognized that water within this zone will percolate through soil/rock media before reaching the Resource Zone. In this way it may undergo some degree of natural treatment consisting of filtration and subsequent purification. However, the degree of treatment is not easily demonstrated. Thus, due to the need to protect G-1 waters and considering the difficulty in tracing pollutants reaching the G-1 zone to a particular source, discharge limitations have been established to regulate discharges to the G-2a and G-2b zone. All discharges must meet the discharge limitations established in Table III (Appendix "J).

All discharges within this zone may be required by the Agency to obtain discharge permits under these standards.

CATEGORY G-3 BUFFER ZONE

Category G-3 exists only outside the GWMPZ and includes all waters which are collected and disposed of or recharged at or near the existing groundwater supply. Vertically, the zone for this category extends from the surface to 20 feet (6 m) below the surface. Disposal methods which may result in discharges to groundwater within this zone include, but are not limited to, ponding basins, rapid infiltration, slow rate land treatment, surface or spray irrigation and all subsurface discharges (seepage, leaching).

For reasons similar to those discussed for Category G-2a and Category G-2b, discharge limitations for G-3 are also established in Table III (Appendix J). Discharges equal to or less than 3,000 gallons per day (gpd) within the G-3 zone are designated by G-3a. Water quality criteria for all discharges within zone G-3 which are greater than 3,000 gpd are designated G-3b. This differentiation in criteria addresses the fact that minor discharges typified by small scattered individual dwelling units probably have less adverse impact on underlying groundwater than major point source discharges and thus are allowed less restrictive water quality limits (i.e. equivalent to primary treatment).

All discharges within this zone may be required by the Agency to obtain discharge permits under these standards.

C. SURFACE WATERS

This Category includes all of surface fresh-water and includes, (1) waters that flow continuously over land surfaces in a defined channel or bed, such as streams and rivers, (2) standing water in basins such as lakes, wetlands, marshes, swamps, ponds, sinkholes, impoundments, and reservoirs either natural or man-made and (3) all waters flowing over the land as runoff, or as runoff confined to channels with intermittent flow. Refer to the Water Classification Map. Waters under these category are those waters which are collected with specific intent of disposal by recharging them into the ground (i.e.,ponding basin).

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Category S-1 HIGH

Surface waters in this category is used for drinking water resources, conservation of wilderness areas, propagation and preservation of aquatic life and aesthetic enjoyment. It is the objective of these standards that these waters shall be kept free of substances or pollutants from domestic, commercial and industrial discharges, or agricultural activities, construction or other land-use practices that may impact water quality. No pollutant discharges will be permitted into S-1 waters via discharge or as a result of land uses adjacent to S-1 waters. Mixing zones will not be allowed within the boundaries of Category S-1.

Category S-2 MEDIUM

Surface water in this category is used for recreational purposes including water contact recreation, for use as potable water supply after adequate treatment is provided, and propagation and preservation of aquatic wildlife and aesthetic enjoyment.

Category S-3 LOW

Surface water in this category is primarily used for commercial, agricultural and industrial activities. Aesthetic enjoyment and compatible recreation are acceptable in this zone, as well as maintenance of aquatic life. Compatible recreation may include limited body contact activities. All discharges within this zone which are not required to have construction and/or discharge permits under existing regulations may be required by this Agency to obtain such permits under these regulations.

SECTION II

WATER QUALITY CRITERIA

A. GENERAL CRITERIA APPLICABLE TO ALL TERRITORIAL WATERS

All waters shall meet generally accepted aesthetic qualifications, shall be capable of supporting desirable aquatic life, and shall be free from substances, conditions or combinations thereof attributable to domestic, commercial and industrial discharges or agricultural, construction and land-use practices or other human activities that:

1. cause visible floating materials, debris, oils, grease, scum, foam, or other floating matter which degrades water quality or use;

2. produce visible turbidity, settle to form deposits or otherwise adversely affect aquatic life;

3. produce objectionable color, odor, or taste, directly or by chemical or biological action;

4. injure or are toxic or harmful to humans, animals, plants or aquatic life; and

5. induce the growth of undesirable aquatic life.

Analytical testing methods for these criteria shall be in accordance with the most recent editions of Standard Methods for the Examination of Water and Wastewater (APHA, AWWA, WPCF), Methods for Chemical Analysis of Water and Wastes (U.S. Environmental Protection Agency), and other methods acceptable to GEPA and possessing adequate procedural precision and accuracy.

Effects of high temperature, biocide, pathogenic organisms, toxic, corrosive, or other deleterious substances at levels or combinations sufficient to be toxic or harmful to human, animal, plant or aquatic life or in amounts sufficient to interfere with any beneficial use of the water, shall be evaluated as a minimum, by use of a 96-hour bioassay as described in the most recent edition of the EPA Manual or ASTM. Survival of test organisms shall not be less than that of controls which utilize appropriate water. Failure to determine presence

of toxic substances by this method shall not preclude determination of excessive levels of toxic substances on the basis of other criteria or methods.

B. SPECIFIC NUMERICAL WATER QUALITY CRITERIA

1. Microbiological Requirements

	Applicable to	
Concentrations of total coliform bacteria at any point shall not be increased from natural conditions at any time.	M-1	S-1
The fecal coliform bacteria count shall not exceed an arithmetic mean of 70 per 100 ml during any 30-day period nor shall any sample exceed 400 per 100 ml at any time.	M-2	S-2
The fecal coliform bacteria count shall not exceed an arithmetic mean of 200 per 100 ml during any 30-day period nor shall any sample exceed 400 per 100 ml at any time.	M-3	S-3

To determine compliance with the above microbiological requirements where a "30-day period" is specified, a minimum of four samples shall be collected at approximately equal intervals.

NOTE: Where shellfish are collected for human consumption, the microbiological standard for M-1 waters shall apply.

2. pH

The ambient pH of fresh and estuarine waters and wetlands ranges from 6.5-8.5 and 7.0-9.0 for marine waters. Variations of more than 0.5 pH units from ambient shall not be allowed	M-1 M-2 M-3	S-1 S-2 S-3

except due to natural causes.

3. Nutrients

Phosphorus:	Applicable to	
Orthophosphate (PO_4-P) shall not exceed 0.025 mg/l	M-1	S-1
Orthophosphate (PO_4-P) shall not exceed 0.05 mg/l	M-2	S-2
Orthophosphate (PO_4-P) shall not exceed 0.10 mg/l	M-3	S-3
Nitrogen:		
Nitrate-nitrogen (NO_3-N) shall not exceed 0.10 mg/l	M-1	S-1
Nitrate-nitrogen (NO_3-N) shall not exceed 0.20 mg/l	M-2	S-2
Nitrate-nitrogen (NO_3-N) shall not exceed 0.50 mg/l	M-3	S-3

Guam's groundwater has nitrate-nitrogen concentrations up to 5 mg/l. It is the intent of these standards to require secondary wastewater treatment. Treatment in excess of secondary treatment may be required and reviewed on a case by case basis. Levels of nutrients in receiving waters will be used as a guide in determining if treatment in excess of secondary treatment is required. Point source discharges will be regulated by permits specifying effluent standards and operational requirements.

Activities which may result in non-point discharges of nutrients shall be conducted in accordance with the best management practices reasonably determined by the Agency to be necessary to preclude or minimize such discharges of nutrients,

not to allow levels beyond those explicitly stated above.

In all cases, discharges containing nutrients, primarily nitrogen and/or phosphorous shall be treated to the extent necessary to prevent damage to coral reefs or growth of aquatic species which create a public nuisance or interfere with beneficial uses as defined in Section I.

4. Dissolved Oxygen — Applicable to

Concentrations of dissolved oxygen shall not be decreased below 75 percent saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

All waters of the Territory

Table I. Saturation D.O.

Freshwater		Marine Water and Wetlands			
Sat.	75% Sat.	Temp.	Salinity	Sat.	75% Sat.
mg/l	mg/l	C	ppt	mg/l	mg/l
7.6	5.6	30	32	6.2	4.6
8.2	6.2	26	32	6.7	5.0

5. Salinity

Marine-Waters: No alterations of the marine environment shall occur that would alter the salinity of marine or estuarine waters more than +10% of the ambient conditions, except when due to natural conditions.

All Marine (M-1, M-2, M-3), Estuarine Waters and Wetlands of the Territory.

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Fresh-Water: The maximum allowable amount of chlorides and sulfates shall be 250 mg/l, and the total dissolved solids shall not exceed 500 mg/l or 133% of the ambient condition. The salinity of fresh-water sources and wetlands shall not be increased more than 20% above ambient by discharges of saline water.		S-1 S-2 S-3
6. Total Filterable Suspended Solids	Applicable to	
Concentrations of suspended matter at any point shall not be increased from ambient conditions at any time, and should not exceed 5 mg/l except when due to natural conditions.	M-1	S-1
Concentrations of suspended matter at any point shall not be increased more than 10% from ambient at any time, and should not exceed 20 mg/l except when due to natural conditions.	M-2	S-2
Concentrations of suspended matter at any point shall not be increased more than 25% from ambient at any time, and should not exceed 40 mg/l except when due to natural conditions.	M-3	S-3
7. Turbidity		
Turbidity at any point, as measured by nephelometric turbidity units (NTU), shall not exceed 0.5 NTU over ambient conditions except when due to natural conditions.	M-1	S-1
Turbidity values (NTU) at any	M-2	S-2

Reduced at Government Expense

point shall not exceed 1.0 NTU over ambient conditions except when due to natural conditions.	M-3	S-3
Since debris, rapidly settling particles and true color give low readings when using Nephelometric methods in making turbidity determinations and one or more of these conditions may exist in marine and surface water, secchi disc determinations will be used when these conditions exist. Secchi disc visibility shall not decrease by more than 5 meters from ambient conditions except when due to natural conditions.		
8. Radioactive Materials		
Discharges of radioactive materials at any level into any waters of the territory is strictly prohibited.	All Waters of the Territory	
9. Temperature		
Water temperature shall not be changed more than 1.0 degree centigrade (1.8 degree fahrenheit) from ambient conditions.	All Waters of the Territory	
10. Concentrations of Oil or Petroleum Products. Those that exceed the limits described below are unacceptable.	M-1 M-2 M-3	S-1 S-2 S-3
a) Detectable as a visible film, or sheen, or results in visible discoloration of the surface with a corresponding oil or petroleum product odor; or		
b) causes damage to fish, invertebrates or objectionable degradation of drinking water quality; or		
c) forms an oil deposit on the shores or bottom of the receiving body of water.		

11. Pesticides

Concentrations of pesticides shall not exceed one percent of the 24-hour LC50 value determined using the receiving water in question and the most sensitive species of aquatic organisms affected.

Where the concentration based on the LC50 data exceeds the recommended maximum concentrations, the maximum concentrations shall constitute the criteria.

For the listing of all pesticides (Organochlorides, Organophosphates, Carbamates, Herbicides, Fungicides, Defolliants, and Botanicals) please refer to the U.S. Water Quality Criteria "Blue Book."

Note:

The setting or publishing of maximum concentrations (limits) for specific pesticides and other toxics should in no way be construed as official approval or authorization for their use where such use is contrary to U.S. Environmental Protection Agency or other Federal or local regulations.

12. Toxic Substances

In order to provide maximum protection for the propagation of fish and wildlife, concentrations of toxic substances (persistent or non-persistent, cumulative or non-comulative); (a) shall not exceed 5 percent (0.05) of the 96-hour LC50 at any time or place, nor should the 24-hour average concentration exceed one percent (0.01) of the 96-hour LC50 or, (b) shall not exceed levels calculated by multiplying the appropriate application factor by the 96-hour LC50 values determined by using the most sensitive species of aquatic organism affected. Whichever value (a or b) is less shall be the maximum allowable concentration, unless this value exceeds the Maximum Numerical Limit, then the numerical limit shall constitute the maximum allowable concentration.

Criteria for the 126 Section 307 (A) Toxic Pollutants, listed by the U.S. Environmental Protection Agency, to which this standard applies, are incorporated by reference into the Guam Water Quality Standards. A list of some of the Toxic Pollutants is given in Appendix A. Absence from this list does not mean a substance is non-toxic, as it may be added later. All effluents containing materials attributable to the activities of man shall be considered harmful and not permissible until acceptable bioassay tests have shown otherwise. At the request of the Administrator, it is the obligation of the person producing the effluent to demonstrate that it is harmless.

In addition, effluent limits based upon acute and/or chronic toxicity tests of effluents may be prescribed by the Administrator. As a minimum, compliance with the standard as stated in the previous sentence shall be evaluated with a 96-hour bioassay or short-term method for estimating chronic toxicity. References for these methods are: EPA/600/4-89/011 Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, March, 1989; or EPA/600/4-85/013 Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, Cincinnati, Ohio, EMSL, March, 1985; or EPA/600/4-87/028 Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Cincinnati, Ohio, EMSL, May 1988. Numerical receiving water limits including EPA's Section 304(a) criteria for Section 307(a) toxic pollutants (Appendix A) as cited at 53 FR 177 and summarized in EPA 440/5-86-001 Quality Criteria for Water 1986, Washington D.C., OWRS, May 1, 1986, as amended by Update #1, September 16, 1986, and Update #2, May 1, 1987 ("Quality Criteria for Water") will apply. The numeric water quality standards from this reference are those for the parameters that are the Section 307 (a) priority pollutants (Appendix A). These standards are intended to protect both aquatic life and human health. For protection of aquatic life, they are maximum levels not to be exceeded and GEPA will utilize the national criteria guidance four-day average concentration limits or 24-hour average

limits, whichever is most current, as standards. For protection of human health in fresh surface waters, the GEPA will apply the national criteria guidance for ingestion through water and contaminated aquatic organisms as 30-day average limits. For other territorial waters, the GEPA will apply the national criteria guidance for ingestion through contaminated aquatic organisms alone as 30-day average limits. For those priority pollutants that are carcinogens, the 10 to the minus sixth power risk level will be used (10^{-6}).

In addition to the 126 listed toxics, Table II shows the maximum allowable concentrations and application factors for additional toxic substances.

TABLE II. ADDITIONAL TOXIC POLLUTANTS NOT INCLUDED IN APPENDIX A.

* Substance	Maximum Numerical Limit		Application Factors
	Marine Water	Fresh Water	
Aluminum	0.20 mg/l	1.0 mg/l	0.01
Ammonia	0.02 mg/l		0.05
Barium	0.50 mg/l		0.05
Boron	5.00 mg/l		0.10
Bromine (free	0.10 mg/l		-
as Bromate)	100.00 mg/l		-
Chlorine (Total Residual)	0.00 mg/l	0.01 mg/l	0.1
Fluoride	1.50 mg/l	0.80 mg/l	0.1
Iron	0.05 mg/l	3.00 mg/l	-
Manganese	0.02 mg/l		0.2
Molybdenum	-		0.0
Sulfide	0.005 mg/l		0.1 (Applicable to 20-day LC data)
TBT	(See Appendix I)		
Uranium	0.00 mg/l		0.01
Vanadium	-		0.05

* Total amounts in indicated chemical state of form.

1 Greater concentrations of Chlorine may be used to treat a source of drinking water in order to meet the requirements of Subsection II.B.1 of these standards.

2 Naturally occurring Uranium has been reported in concentrations of 0.003 mg/l (seawater) and 0.00004 mg/l (river water)

Note: Whenever natural concentrations of any toxic substance or element occur and exceed the limits established in these standards, this greater concentration shall constitute the limit, provide that this natural concentration was not directly affected by man-induced causes.

SECTION III

EFFLUENT LIMITATIONS

A. GENERAL CRITERIA

The Agency reserves the right to amend or extend the following criteria as improved standard methods are developed or revisions consistent with the enhancement of water quality are justified:

1. All sewage shall be treated to the degree required by the Agency to achieve standards of water quality prior to being discharged to the waters of the Territory. Industrial waters and other wastes shall also be treated to the degree required by the Agency.

2. Dilution of the effluent from any source as a sole means of treatment is not acceptable as a method of treatment of wastes in order to meet the standards set forth in this Section. Rather, it shall be the obligation of any person discharging pollutants of any kind to the waters of the Territory to provide the best pollutant removal or control consistent with technological feasibility, economic reasonableness, and sound engineering judgement. In making a determination as to what degree of treatment is the best pollutant removal or control within the meaning of this paragraph, any person shall consider the following:

   a) the degree of waste reduction that can be achieved by process change, improved house-keeping and recovery of individual waste components for reuse; and

   b) whether individual process wastewater streams should be segregated or combined.

3. Measurement of pollutant concentrations to determine compliance with the effluent limitations shall be made by the discharger at the point immediately following the final treatment process and before mixing with other waters. Points of measurement shall be designated by the Agency in an individual permit, after consideration of the elements contained in this section. If necessary, the concentrations so

measured shall be recomputed to exclude the effect of any dilution that is improper under this standard.

4. Every person discharging effluent to the waters of the Territory shall submit operating reports to the Agency at a frequency to be determined by the Agency. Such reports shall contain information of those physical, chemical and bacteriological parameters which shall be specified by the Agency; and any additional information the Agency may reasonably require.

5. In addition to other requirements no effluent shall, alone, or in combination with other sources, cause a violation of any applicable Water Quality Standard. If the Agency finds that a discharge which complies with treatment requirements under the Authority of Section III-A of these standards would cause or is causing a violation of Water Quality Standards, the Administrator shall take appropriate action under Section 47109 of the Water Pollution Control Act to require the discharge to meet whatever effluent limits are necessary to ensure compliance with the Water Quality Standards. When such a violation is caused by the cumulative effect of more than one source, several sources may be joined in a schedule of compliance. Measures necessary for effluent reductions will be determined on the basis of technical feasibility, economic reasonableness, and fairness to all dischargers.

6. Any existing point source discharges to near shore waters of M-1 and M-2 classifications as of the effective date of these standards shall submit to the Administrator for approval a plan and schedule for elimination of the discharge to near shore waters by December 31, 1998. Any such plan shall consider all alternate disposal options and give preferential consideration to eliminating all point source discharges to the waters of the Territory. After approval of the plan by the Administrator, the Administrator shall not certify compliance with these standards to the USEPA in connection with issuance or reissuance of a NPDES permit for the discharge unless the permit includes the aforementioned plan and schedule.

7. The Administrator shall not certify compliance with these standards to the USEPA in connection with issuance of a NPDES permit for a new discharge to near shore waters.

B. MIXING ZONES IN RECEIVING WATERS

Whenever a mixing zone is allowed by the Agency for the mixture of an effluent with its receiving waters, the zone in which mixing occurs will not adversely affect the designated uses of the receiving waters. If mixing zones are used, Water Quality Standards for a receiving water must be met at every point at the boundaries of the designated mixing zone. The following criteria apply to all mixing zones:

1. Whenever mixing zones are allowed, zones of passage, i.e., continuous water routes of the volume, area, and quality necessary to allow passage of free-swimming and drifting organisms with no significant effects produced on their populations, shall be provided.

2. Where two or more mixing zones are in close proximity, they shall be so defined that a continuous zone of passage for aquatic life is available.

3. Biologically important areas, including spawning and nursery areas, shall be protected.

4. No criteria shall be set aside in the mixing zone which shall cause conditions in the mixing zone to become lethal to aquatic life and wildlife which may enter the zone or become injurious to human health in the event of a temporary exposure.

5. The area or volume of an individual mixing zone shall be limited to an area or volume that will minimize impacts on uses.

6, The discharge shall not violate the basic standards applicable to all waters (Section II A and Section III E) nor shall it unreasonably interfere with any actual or probable use of the water within the mixing zone.

7. For those water quality criteria eligible for a mixing zone, alternate limits will be established if

the limits in II-B are to be revised in the zone of mixing.

8. Mixing Zones may be allowed on a case by case basis upon approval of an Environmental Impact Statement.

C. MIXING ZONES FOR NON-THERMAL DISCHARGES

Non-thermal discharges shall be permitted by the National Pollutant Discharge Elimination System (NPDES) permit process. Mixing zone for non-thermal discharge may be granted only after careful analysis of the nature of the effluent and a thorough study to assess the consequences of the effluent upon the environment. Mixing zones for non-thermal discharges shall be based on the following models, taking into consideration the criteria in Section III(B) above.

1. Mixing Zones for Non-thermal Discharges

For non-thermal discharges into streams and rivers, the mixing zone, at the point of discharge, is limited to 25% of the cross sectional area of the stream at the minimum flow at which the appropriate Water Quality Standard can be met by thorough mixing of the effluent with the receiving waters.

The length of the mixing zone shall extend downstream no more that 5 times the natural width of the stream at the point of discharge at the minimum flow condition.

The applicable water quality standard must be achieved at all points outside the mixing zone.

Mixing zones will not be permitted in standing bodies of water.

2. Mixing Zones for Non-thermal Discharges into Coastal Waters.

For non-thermal discharges to coastal waters, the mixing zone shall be equal in depth to the depth of the water over the diffuser, in width to twice the depth of the water plus the width of the diffuser, and in length to twice the depth of the water plus the length of the diffuser, with the diffuser geographically centered within the mixing zone.

All discharges to marine waters will comply with the ocean discharge Criteria promulgated under Section 403 (6) (c) of the Federal Clean Water Act.

D. MIXING ZONES FOR THERMAL DISCHARGES

Thermal discharges pertain to effluent water with a temperature component either above or below ambient conditions of the receiving body of water. All thermal discharges, existing or proposed, into receiving bodies of water located on M-2 and M-3 shall be subject to criteria established in Section 316 (a) of the Federal Water Pollution Control Act (FWPCA), Public Law 95-217. Thermal discharges shall be subject to the National Pollutant Discharge Elimination System (NPDES) permit process. Mixing zone for thermal discharge may be granted only after careful analysis of the nature of the effluent and a thorough study to assess the consequences of the effluent upon the environment.

1. All above-Ambient Discharges:

a) Shall conform to a zone of mixing defined for that particular discharge on a case-by-case basis. This zone of mixing shall be defined by the following references or other references depicting appropriate thermal mixing zone models.

- EPA/505/2-90-001, PB91-127415, March 1991 Technical Support Document For Water Quality-based Toxic Control.

And take into consideration the following criteria:

- Time of exposure
- Temperature of effluent
- Depth of discharge
- Type of environment
- Volume of discharge
- Mass of pollutant rate of critical materials
- Aesthetics and the assessment of damage to

biota on the population basis.

Final authority in defining a zone of mixing rests with the GEPA.

b) Shall not increase the temperature of the receiving body of water to cause substantial damage or harm to the flora and fauna or interfere with the beneficial uses assigned therein.

c) Shall comply with all other water quality criteria as defined in these standards, and specific criteria established in the discharge permit.

d) These zones of mixing shall be monitored by the discharger on a regular schedule established by the NPDES Permit, to ensure compliance with established criteria.

e) If the Agency, pursuant to notice and opportunity for public hearings, finds evidence that a discharge has caused substantial damage, it may require conversion of such discharge to an approved alternative method. In making such a determination, the Agency may consider:

(1) The nature and extent of damage to the environment.

(2) Projected lifetime of discharge.

(3) Adverse economic and environmental impacts, marine and terrestrial, resulting from such conversion.

(4) All available data, reports, surveys and projects related to the discharge.

(5) Such other factors which may prove to be appropriate.

2. Above-Ambient Discharges in Existence Prior to Approval of These Standards.

a) Shall be given special attention when defining a zone of mixing. All criteria established for part D-1 above, shall apply with special emphasis on specific criteria listed in part D-1a.

b) Description of mixing zones for Tanguisson and Piti/Cabras Power Plants.

(1) Tanguisson Power Plant Zone of Mixing

The zone of mixing for the Tanguisson Power Plant is defined as a rectangle of approximately 10,000 sq. m. with the following reference points.

Northern boundary - North side of intake channel

South boundary - 1969 ft (600 m) south of intake channel

Eastern boundary - Shoreline at mean high tide

Western boundary - 591 ft (180 m) off-shore to a depth beyond the reef margin of about one meter which is the top of the zone of passage.

(2) Piti/Cabras Zone of Mixing

The zone of mixing for the Piti/Cabras Power Plants combined is the Piti Channel, from the power plants to a distance 300 feet back from where the channel joins the harbor proper and from there to a depth of about one meter or 3.28 feet to a line from the GORCO Pier and the Navy Fuel Pier on Dry Dock Island.

(3) Below-Ambient Discharges.

All below-ambient discharges shall follow the same guidelines set down for thermal discharges and be evaluated on a case-by-case basis.

E. PROHIBITED DISCHARGES

1. No person shall cause or permit:

a) the discharge of any wastes or wastewaters regardless of volume, unless authorized by the Administrator under Section 47106 of the Water Pollution Control Act or unless subject to control or modification required by a schedule of compliance established by the GEPA Board of Directors;

b) the discharge of any pollutant in toxic amounts, including the substances which may accumulate to toxic amounts, during the expected life of organisms in the receiving water, which are lethal to, or which produce deleterious genetic, physiological, or behavioral effects in the organisms;

c) the discharge of any radiological, chemical, biological warfare agents, or radioactive wastes and contaminated radioactive materials from research and medical facilities.

d) any discharge which would substantially impair anchorage and navigation, including any discharge which the Secretary of the Army, acting through the Corps of Engineers, finds would result in this damage;

e) any discharge which the Administrator of the United States Environmental Protection Agency has objected to in writing pursuant to any right to object provided by the Federal Water Pollution Control Act, as amended;

f) any discharge which is in conflict with an approved Territorial plan;

g) the discharge of sewage from vessels while moored, berthed or docked, or underway in waters of the Territory except through a properly functioning Coast Guard approved type II Marine Sanitation Device; and

h) any pollutant discharge into M-1, S-1, or G-1 waters as defined in Section I of these Standards.

i) any discharge of visible floating materials including scum and foam.

2. All vessels exceeding 400 gross tons which are berthed or docked in the waters of the Territory, without fully functional U.S. Coast Guard approved oil pollution prevention devices (for longer than 72 hours detention) must be completely encircled with flotation booms to contain any discharged oil. The Administrator may require any vessel, regardless of gross tonnage, operating ability, oil pollution prevention devices, duration of moorage or dockage time, to be completely encircled with floating booms if in this opinion such measures are necessary to control potential oil discharges into Territorial waters including, but not limited to, instances where excessive oil is present on the vessel's deck or in the vessel's bilges; when major machinery repairs are undertaken; or when a vessel cannot close its scuppers effectively during bunkering operations.

F. LAND DISPOSAL OF TREATED WASTEWATERS

1. Approval of land disposal of treated liquid wastewater requires that:

a) wastewaters shall be restricted to the premises of the disposal site;

b) provision shall be made by the discharger for monitoring the quality of the effluent with the exception of single family dwelling units unless there are more than five (5) units connected to a single system, or the Agency requires it after identifying a potential hazard;

c) all monitoring data and reports required under a discharge permit shall be submitted to the Agency;

d) land disposal shall not create a public health hazard, a nuisance condition or an air pollution problem;

e) these standards do not solely govern water/ wastewater to be reused to produce products which may end up in the human food chain, such as crops, animal feed or animal products. The

Agency will consider such reuse on a case-by-case basis using available guidelines on best available technology.

2. The evaluation for a permit for land treatment and/or disposal of wastewater(s) should include, but not necessarily be limited to consideration of the following items:

   a) the type of wastewater(s) proposed for disposal. (The wastewater(s) should be biologically degradable but other wastewater(s) will be considered provided it can be shown that disposal of the wastewater(s) will not adversely affect the designated use of the waters underlying or adjacent to the disposal site).

   b) the nature of the earth material(s) underlying the disposal site. (The applicant must provide positive assurance that the earth material(s) underlying the proposed disposal site will not allow movement of pollutants into underlying groundwaters so as to exceed ground water standards.)

   c) the vegetative cover of the disposal site. The selection of a vegetative cover should reflect the disposal season(s), the duration and frequency of disposal and the response of the vegetative cover to the wastewater. If the wastewater proves to be deleterious to vegetative cover, a higher degree to treatment or another means of disposal will be required.

3. Improperly and/or inadequately treated sewage shall not be allowed to accumulate on the ground surface in such a manner that it may create a health hazard and/or a nuisance condition.

4. It shall be a violation of these standards to store, dispose of, or allow to accumulate any solid waste or other deleterious material adjacent to or in the immediate vicinity of any streams, rivers, wetlands, or marine waters in a manner that such material will directly or indirectly enter such waters or wetlands. Such

material shall include, but not be limited to sewage sludge, trash, rubbish, garbage, oil, gasoline, chemicals, sawdust, accumulations of manure, and stockpiles of soil.

5. In case of accidental spills of deleterious materials, responsible persons in charge shall immediately notify the Administrator of any such spills and make every reasonable effort to contain spilled material in such a manner that it will not pollute waters of the Territory.

6. Wastewater discharged to disposal wells for underground disposal shall receive, prior to discharge, treatment necessary to protect potable water resources and any adjacent marine waters or fresh surface waters. See Table III (Appendix J).

G. EFFLUENT DISCHARGE LIMITATIONS FOR GROUNDWATER CATEGORIES G-2a, G-2b, AND G-3

Any water percolating to the groundwater table is in the state of transition from being a discharge to becoming part of a useable body of water. Because of the difficulty involved in tracing the source and eliminating pollutants after they have reached the groundwater table, limitations for discharges to G-2a, G-2b, and G-3 waters are established in Table III (Appendix J). This Table provides criteria for some common water quality parameters. The Agency will set limits for other parameters as necessary on a case-by-case basis.

The Agency may allow the application of G-3a discharge limitations to flows greater than 10,000 gallons per day if it can be shown by an engineering feasibility study that there will be no significant adverse effect on the waters of the Territory.

The Agency also reserves the right to set more stringent standards than those shown in Table III (Appendix J) if there is reason to believe that significant environmental damage will result from any discharge. Effluent limitations have not been set for G-1 waters because the Agency prohibit such discharges.

H. PETROLEUM STORAGE FACILITIES

Any storage facility containing petroleum products or hazardous substances not directly adjacent to navigable waters and below the SPCC capacity requirements of 600 gallons shall be provided with secondary containment to protect Guam's groundwater resources from potential threat to oil or hazardous substances discharges. In case of spills, the Federal Spill Prevention Control counter measure requirements shall be adhered to.

CHAPTER IV

DEFINITIONS

The following definitions are used for the purpose of clarification where such terms, phrases and words are used or implied in the text of these Water Quality Standards.

ADMINISTRATOR: Primary responsible person of the Guam Environmental Protection Agency.

ADVERSELY AFFECT: Damage to the waters of the Territory of Guam that result in, but are not limited to any of the following:

1. Substantial increase or decrease in abundance or distribution of any species or representative of the highest community development achievable in receiving waters of comparable quality.

2. A substantial decrease in abundance or diversity of indigenous species.

3. Change(s) in community structure to resemble a simpler successional stage than is natural for the locality and season in question.

4. Degradation in appearance, odor or taste of the waters.

5. Elimination of an established or potential economic or recreational use of the waters.

6. Reduction of the successful completion of life cycles of indigenous species, including those of migratory species.

7. Substantial reduction of community heterogeneity or trophic structure.

AGENCY: Guam Environmental Protection Agency (GEPA).

AMBIENT: Existing conditions in surrounding waters taking into account established human activity at that time and place (should approach natural conditions that would be present without the presence of human activities).

AMBIENT MONITORING: Monitoring within lakes, rivers, estuaries, wetlands, springs, swamps, mangroves, etc., to determine existing conditions of the natural system.

AQUIFER: A water-bearing stratum of permeable rock, sand or gravel.

BASAL GROUNDWATER: Fresh groundwater floating directly on sea water.

BEST AVAILABLE TECHNOLOGY: Subject to economic and engineering feasibility limitation, BAT should incorporate the best available current technology with a capacity up to and including no discharge of pollutants. Considerations include the age of the equipment and facilities involved; the process used; the engineering aspects of applying various types of control techniques; process changes; the cost of achieving the effluent reduction resulting from applying the technology; and non-water quality environmental impacts.

BEST MANAGEMENT PRACTICE: Application of the most current and effective techniques, methods and procedures, practices or design and performance standards for a specific purpose.

BEST POLLUTANT REMOVAL OR CONTROL: A feasible process which, as demonstrated by general use, demonstration process or pilot plants represents good engineering practice at a reasonable cost at the time a discharge permit is issued by the Agency.

BIOTA: The animal, plant and microbial life of a region.

BOUNDARY: The physical interface between adjoining discreet areas. A fine line as applied to groundwaters, but as applied to surface and marine waters the line may shift due to storm conditions, tides, water current changes and surface winds.

COASTAL WATERS: Includes near-shore, off-shore and estuary waters within the jurisdiction of the Territory of Guam.

COLIFORM BACTERIA:

a. TOTAL COLIFORM BACTERIA: All of the aerobic and facultative anaerobic gram-negative, non spore-forming, rod-shaped bacteria that ferment lactose broth with gas formation within 48 hours at 35 degrees Centigrade +/- 0.5 degrees Centigrade.

b. FECAL COLIFORM: That portion of the coliform group which is present in the gut or the feces of warm-blooded animals. It generally includes organisms capable of producing gas from lactose broth in a suitable culture medium within 24 hours at 44 degrees Centigrade +/- 0.2 degrees Centigrade. This elevated temperature will eliminate non-fecal and non-coliform organisms and selectively culture fecal coliform bacteria.

COMMUNITY: An association of living organisms in a given area or region in which the various species are more or less interdependent upon each other.

CONTROLLABLE WATER QUALITY: The aspects of water quality that can be protected or modified by human activity.

CONSERVATION: Planned management of a natural resource to prevent exploration, destruction or neglect.

CREATED WETLAND: A wetland at a site where it did not formerly occur. Created wetlands are designed to meet a variety of human benefits including, but not limited to, the treatment of water pollution discharges (e.g., municipal wastewater, storm water, etc.) and the mitigation of wetland losses permitted under Section 404 of the Clean Water Act. This term encompasses the term "constructed wetland" as used in other EPA guidance and documents. Created wetlands designed and specifically created and used solely for the purpose of wastewater treatment do not qualify as waters of the territory of Guam. The discharges from the created wetlands which do not qualify as waters of the territory must meet applicable water quality standards for the receiving waters and will be treated on a case-by-case basis.

DEVELOPMENT: Means the placement or erection of any solid material or structure, including structures on pilings; discharge or disposal of any dredged

material or of any gaseous, liquid, solid or thermal waste; grading, removing, dredging, mining or extraction of any materials; change in the density or intensity of use of land, including, but not limited to, subdivision of land and any other division of land including, lot parceling; change in the intensity of use of water, ecology related thereto or of access thereto; construction or reconstruction, demolition or alteration of the size of any structure, including any facility of any private, public or municipal utility, and the removal of significant vegetation.

DIRECT MOVEMENT: The movement of effluent through the soil and underlying rock strata in such a manner that pollutants which would adversely impact on the designated uses of the receiving water are not removed.

DISCHARGE: The direct or indirect outflow of wastewater, substance or material from any domestic, commercial, industrial, agricultural or any other source into air, land and waters of the Territory of Guam. The term "discharge" includes either the discharge of a single pollutant or the discharge of multiple pollutants.

DISCHARGER: Any person or entity that discharges any wastewater, substance or material into the waters of the Territory of Guam whether or not such substance causes pollution.

EFFLUENT: Solid, liquid or gaseous material discharged into the environment.

EFFLUENT LIMITATION: Any restriction or prohibition established under Territorial or Federal Law including, but not limited to parameters for toxic and non-toxic discharges, standards of performance for new sources, or ocean discharge criteria. The restrictions or prohibitions shall specify quantities, rates and concentrations of chemical, physical, biological and other constituents which are discharged to waters of the Territory of Guam.

EMERGENCY PLAN: The corrective procedure (SPCC) is to be followed in the case of oil or toxic substance spills, or in the case of damage caused by natural phenomena

whether on-land or off-land. This definition covers spills whether they are caused by small quantity generators, i.e., underground/above ground storage tanks, or underground/above ground fuel lines.

ENVIRONMENTAL IMPACT ASSESSMENT: A documentary evaluation of the impact upon the environment of any human activity.

ENVIRONMENTAL IMPACT STATEMENT: A documentary presentation justifying an adverse environmental impact.

ENVIRONMENTAL PROTECTION PLAN: A written document required by the Agency prior to the start of construction in which the developer/contractor describes the methods/equipment selected for use in the development, the environmental problems expected during and after development and the methods or equipment chosen to avoid, mitigate or control adverse effect on the environment.

ESTUARY: A region of interaction between near-shore waters and rivers within which tidal action and river flow bring about mixing of fresh and salt water.

FECAL COLIFORM: See "Coliform".

FWPCAA: Federal Water Pollution Control Act Amendments of 1972, as amended through 1987 (Clean Water Act).

HABITAT: The environment occupied by individuals of a particular species, population or community.

HIGHER DEGREE OF TREATMENT: Any physical, biological and/or chemical method directed at removing a specified portion of the remaining pollutants after secondary treatment.

HYDROLOGIC CYCLE: That natural system dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

INDUSTRIAL WASTE: Any discharge containing gaseous, dissolved or suspended material resulting from any process of industry, manufacturing, trade or business or from the processing of any natural resource, together with such sewage as may be present, which may pollute the waters of the territory.

LAND TREATMENT: Any treatment of wastewater which involves the use of plants, soil surface and the soil matrix for wastewater treatment, including irrigation systems, infiltration systems, overland flow systems and other systems of wastewater treatment via land application.

LETHAL CONCENTRATION - 50 PERCENT (LC50): That concentration of a toxic substance in water which for a given time period causes 50 percent of the exposed individuals of an aquatic test organism to die.

LIMITED BODY CONTACT: Any recreational or other use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal.

LINE OF MEAN HIGH WATER: The shoreline as indicated on the 1:24,000 Series (Topographic) Maps of the Island of Guam prepared by the U.S. Geological Survey.

MARINE SANITATION DEVICE: Equipment or process for installation on vessel or water craft which is designed to receive, retain, treat, or discharge sewage or other pollutants or any process to treat such sewage, or other pollutants which has received U.S. Coast Guard approval.

MIXING ZONE: The area or volume of a water body within which effluent(s) shall become physically mixed with the receiving waters through initial dilution. Initial dilution is the process through which the wastewater immediately mixes with the receiving water due to the momentum of the waste discharge and the difference in density between the discharge and the receiving water. The total area or volume of water designated as a mixing zone shall be limited to that area or volume which will not interfere with biological communities or populations of important species to a degree which is damaging to the ecosystem and which will not cause substantial damage to or impairment of designated water uses within the mixing zone or in surrounding waters. A mixing zone shall be considered designated only when approved by the Guam Environmental Agency and when concurrence of the U.S. EPA has been received.

MUNICIPAL WASTES: Water carrying human and animal wastes from homes, buildings, industrial establishments and other places either alone or in combination with industrial wastes.

NATURAL CONDITIONS: The resulting water quality in the absence of any measurable pollution effect due to human activities.

NEAR-SHORE WATERS: All coastal waters lying within a defined reef area; all coastal waters of a depth of less than ten fathoms (60 feet, 18.3 m.); and all coastal waters greater than 10 fathoms up to 1,000 feet (305 m.) off-shore where there is no defined reef area.

NEW SOURCE: Any wastewater sources, the construction of which is commenced on or after the 1968 effective date of these standards.

NPDES PERMIT: National Pollution Discharge Elimination System (permit). A federal permit used as the principal regulatory tool for reducing the quantity of pollutant discharges to the waters of the territory and for obtaining data on point source discharges.

OFF-SHORE WATERS: All coastal waters beyond the limits defined for "near-shore waters" to the Territorial Limit as recognized by International Law.

OUTFALL: The conduit from its connection to a wastewater treatment facility to its outlet through diffusers into off shore waters.

OIL SPILL PREVENTION DEVICES: Shall mean any U.S. Coast Guard approved device, such as an oil/water separator, a sludge tank (for oily deposits), a standard discharge connection or other equipment or apparatus required by the MAROL Convention of 1973/1978 for the prevention of oil pollution of vessels.

OTHER WASTE: Garbage, municipal refuse, sand, offal, oil, tar, chemicals and all other substances which may pollute the waters of the territory.

PARABASAL GROUNDWATER: Fresh groundwater hydraulically connected with basal water but lying directly on impermeable basement rock.

PASSAGEWAY: A continuous stretch where water characteristics are affected only by the environment in such a manner that the free flow or continuous drifting of biota is always possible.

PERMIT: A permit issued pursuant to Section 47106 of the Guam Water Pollution Control Act.

PERSON(S): Means any individual, firm, partnership, association or corporation, both public and private, including the agencies of the Government of Guam and of the United States of America.

POINT SOURCE: Any discernible, confined and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged. This term does not include flows from irrigated agriculture.

POLLUTANT: Any substance, refuse or waste, dredged spoils, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharge into the water and capable of polluting the waters. See Pollution.

POLLUTION: Alteration of the physical, chemical or biological and radiological properties of any waters of the Territory which adversely and unreasonably impairs the water quality of the territory or which renders said waters hazardous to human health or harmful or detrimental to the aquatic and wildlife in or about the waters or to the most beneficial uses of the waters.

POTABLE WATER RESOURCES: Waters of the Territory actually used or intended to be used for drinking water or general domestic use.

PRIMARY TREATMENT: Removal of floating or settleable solids through screening and sedimentation processes.

RESTORATION: An activity returning a wetland from a disturbed or altered condition with lesser acreage or functions to a previous condition with greater wetland acreage or functions. For example, restoration might involve the plugging of a drainage ditch to restore the hydrology to an area that was a wetland before the installation of the drainage ditch.

RECEIVING WATER(S): Water(s) of the Territory into which wastes or wastewaters are, or may be discharged.

SECONDARY TREATMENT: The following degree of pollution removal:

1. Biochemical oxygen demand (five-day)

   a) The arithmetical mean of the values for effluent samples collected in a period 30 consecutive days shall not exceed 30 mg/l.

   b) The arithmetic mean of the values for effluent samples collected in a period of seven consecutive days shall not exceed 45 mg/l.

   c) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

2. Suspended solids

   a) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 30 mg/l.

   b) The arithmetic mean of the values for effluent samples collected in a period of seven consecutive days shall not exceed 45 mg/l.

   c) The arithmetic mean of the values for effluent samples collected in a period of 30

consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected approximately the same times during the same period (85 percent removal).

3. Fecal coliform bacteria

   a) The arithmetic mean of the value for effluent samples collected in a period of 30 consecutive days shall not exceed 200 per 100 ml.

   b) The arithmetic mean of the values for effluent samples collected in a period of seven consecutive days shall not exceed 400 per 100 ml.

4. pH

   a) The effluent values for pH shall remain within the limits of 6.0 to 9.0.

SCHEDULE OF COMPLIANCE: A schedule of corrective measures and times including an enforceable sequence of actions or operations leading to compliance with any control regulation or effluent limitation in a specified time period.

SEWAGE: The water-carried waste products from the residences, public buildings, institutions or other buildings, including the excrementitious or other discharge from the bodies of human beings or animals, together with such ground water infiltration and surface water as may be present.

SPECIAL AQUATIC SITES: Sites possessing special ecological characteristics and values including wetlands, wildlife sanctuaries and refuges, mud flats, vegetated shallows, coral reefs, riffle and pool complexes.

SURFACE WATERS: Any natural or artificial water source including all streams, sinkholes, lakes, ponds, wetlands, impounding reservoirs, inland watercourses and waterways, springs, irrigation systems and all other inland water bodies or accumulated waters. For

the purpose of this regulation, the term does not include coastal waters or those subject to the ebb and flow of tides.

THERMAL DISCHARGE: Discharge of water into the environment which has temperature component either above or below the temperature of the receiving body of water.

TOXIC: Lethal, teratogenic or mutagenic, or otherwise damaging to man or other living organisms.

TRANSITION ZONE: In basal water the interface between the bottom of the freshwater lens and the underlying saltwater. Salinity is low at the top of the transition zone and increases to that of seawater at the bottom of the zone.

UPLAND: Any area that does not qualify as wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils and/or hydrologic characteristics associated with wetlands, or is defined as open waters.

WASTEWATER: Sewage, industrial waste, or other waste, excluding thermal discharge, or any combination of these, whether treated or untreated, plus any admixed land runoff.

WATER QUALITY STANDARDS: The designated water body uses or classifications and the criteria including anti-degradation provisions and provisions for implementation to protect those uses and classifications.

WATERS OF THE TERRITORY: All waters within three miles from the high waterline surrounding Guam, streams (including intermittent streams), lakes, wells, springs, wetlands, irrigation systems, marshes, watercourses, waterways, sink holes, drainage systems and other bodies of water, surface and underground, natural or artificial, publicly or privately owned.

WETLANDS: Means areas of land where the water table is at, near or above the land surface long enough each year to result in the formation of characteristically wet (hydric) soil types, and support the growth of water dependent (hydrophytic) vegetation. Wetlands include, but are not limited to, marshes, swamps, mangroves,

natural ponds, surface springs, estuaries, bogs, and other such low-lying or similar areas. Inland wetlands will include all wetlands meeting the following conditions.

1) Wetlands greater than one hectare in size with less than 0.5% (ocean derived) salinity; and

2) Palustrine, Riverine and Lacustrine wetlands with greater than 30% wetland vegetation cover.

Wetlands must meet applicable water quality standards requirements based on where it is situated in accordance with Category Classification of the Water Quality Standards.

WETLAND FUNCTIONS: The beneficial uses of wetlands which are protected by these Water Quality Standards including but not limited to groundwater recharge/discharge, floodwater retention, sediment stabilization, nutrient removal/transformation, wildlife diversity/ abundance, aquatic diversity/abundance, and recreation.

WHOLE BODY CONTACT: Any recreation or other use in which there is whole body contact with the water involving a risk sufficient to pose a significant health hazard either by contact with or ingestion of the water.

ZONE OF PASSAGE: Shall mean a continuous water route which joins segments of river, stream, reservoir, estuary, or channel above, below, or around a mixing zone without going through the mixing zone. As a minimum, no less than one-third of the cross-section of the water body shall be retained in compliance with the water quality criteria in Section II.

APPENDIX A

LIST OF THE 126* PRIORITY TOXIC POLLUTANT DESIGNATED UNDER SECTION 307(A) (1) OF THE CLEAN WATER ACT.

Acenaphthene
Acenapthylene (PAH)
Acrolein
Acrylonitrile
Aldrin
Antimony
Anthracene
Arsenic
Asbestos

1,2-Benzanthracene (PAH)
Benzene
Benzidine
Benzo (a) Pyrene (3,4-Benzo-pyrene) (PAH)
3,4-Benzofluoranthene (PAH)
Benzo (A) Fluoranthene (PAH)
1,12-Benzoperylene (PAH)
Beryllium
Bromoform (Tribromomethane)
Bromomethane (Methyl Bromide)
4-Bromophenyl Phenyl Ether
Cadmium
Carbon Tetrachloride (Tetrachloromethane)
Chlordane
Chlorobenzene (Monochloro-Benzene)
Chlorodibromomethane (Halomethane)
Chloroethane (Monochloroethane)
Chloroethyl Ether (Bis-2)
1 Chloroethoxy Methane (Bis-2)
2 ChloroethylVinyl Ether
4-Chloro-3-Methylphenol
Chloromethane (Methyl Chloride)
Chloroform (Trichloromethane)
2-Chlorophenol
Chloroisopropyl Ether (Bis-2)
2-Chloronaphthalene
4-Chlorophenylphenyl Ether
Chromium (HEX)

1,2 Dichlorobenzene
1,3 Dichlorobenzene
1,4 Dichlorobenzene
3,3 Dichlorobenzidine
Dichloroethane 1,1
Dichloroethane 1,2
1,1 Dichloroethylene
1,2-Trans-Dichloroethylene
Dichlorobromomethane (Halomethanes)
Dichloromethane (Halomethanes)
2,4-Dichlorophenol
Dichloropropane 1,2

Dichloropropene 1,3
Dieldrin
Dimethylphenol 2,4
Diethyl phthalate
Dimethyl phthalate
Dinitrotoluene 2,4
Dinitrotoluene 2,6
2,4-Dinitrophenol
Dioxin (2,3,7,8-TCDD)
Diphenylhydrazine 1,2
Alpha Endosulfan
Beta Endosulfan
Endosulfan Sulfate
Endrin
Endrin Aldehyde
Ethylbenzene
Fluorene (PAH)
Fluoranthene
Heptachlor
Heptachlor Epoxide
Hexachloroethane
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclohexane (lindane)
Hexachlorocyclohexane (Alpha)
Hexachlorocyclohexane (Beta)
Hexachlorocyclohexane (Delta)
Hexachlorocyclopentadiene

Chromium (TRI)
Chrysene (PAH)
Copper
Cyanide
4,4,-DDT
4,4,-DDE
4,4,-DDD
Dibenzo (a,h) Anthracene (PAH)
2-Nitrophenol
4-Nitrophenol
4,6-Dinitro-2-Methylphenol
Nitrosodimethylamine N
Nitrosodiphenylamine-N
Nitrosodi-n-Propylamine-N
PCB 1242
PCB 1254
PCB 1221
PCB 1232
PCB 1248
PCB 1260
PCB 1016
Phenol
Pentachlorophenol
Phenanthrene (PAH**)
Bis (2-Ethyl Hexyl) Phthalate
Butyl Benzyl Phthalate

Ideno (1,2,3-cd) Pyrene (PAH)
Isophorone
Lead

Mercury
Naphthalene
Nickel
Nitrobenzene
Di-n-Butyl Phthalate
Di-n-Octyl-Phthalate
Pyrene (PAH)
Selenium
Silver
Tetrachloroethane 1,1,2,2
Tetrachloroethylene
Thallium
Toluene
Toxaphene
1,2,4 Trichlorobenzene
Trichloroethane 1,1,1
Trichloroethane 1,1,2
Trichloroethylene
Trichlorophenol 2,4,6
Vinyl Chloride (Chloroethylene)
Zinc

Note: * Three volatile chemicals were removed from the original of 129 (44 CFR 44502, July 30,1979, as amended at 46 FR 2266, January 8, 1981, 46 FR 10724, February 4, 1981)

** (PAH) means Poly Aeromatic Hydrocarbon

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TABLE III

Limitations for Discharges to Categories G-2 and G-3

Groundwater Category	Fecal Coliform	COD (mg/1)	pH	Chlorides (mg/1)	Ortho-phosphate (PO_4-P) (mg/1)	Nitrate-Nitrogen (NO_3-N) (mg/1)	Oil and Grease (mg/1)
G-2a	20/100 m/1	20	6-10	250	10	5	0.005
G-2b	200/100 m/1	20	6-10	250	10	5	5
G-3a (<3,000 gpd)	-(2)	300	6-10	500(1)	25	30(3)	5
G-3b (>3,000 gpd)	400(4)/100 ml	50	6-10	500(1)	10	5(3)	5

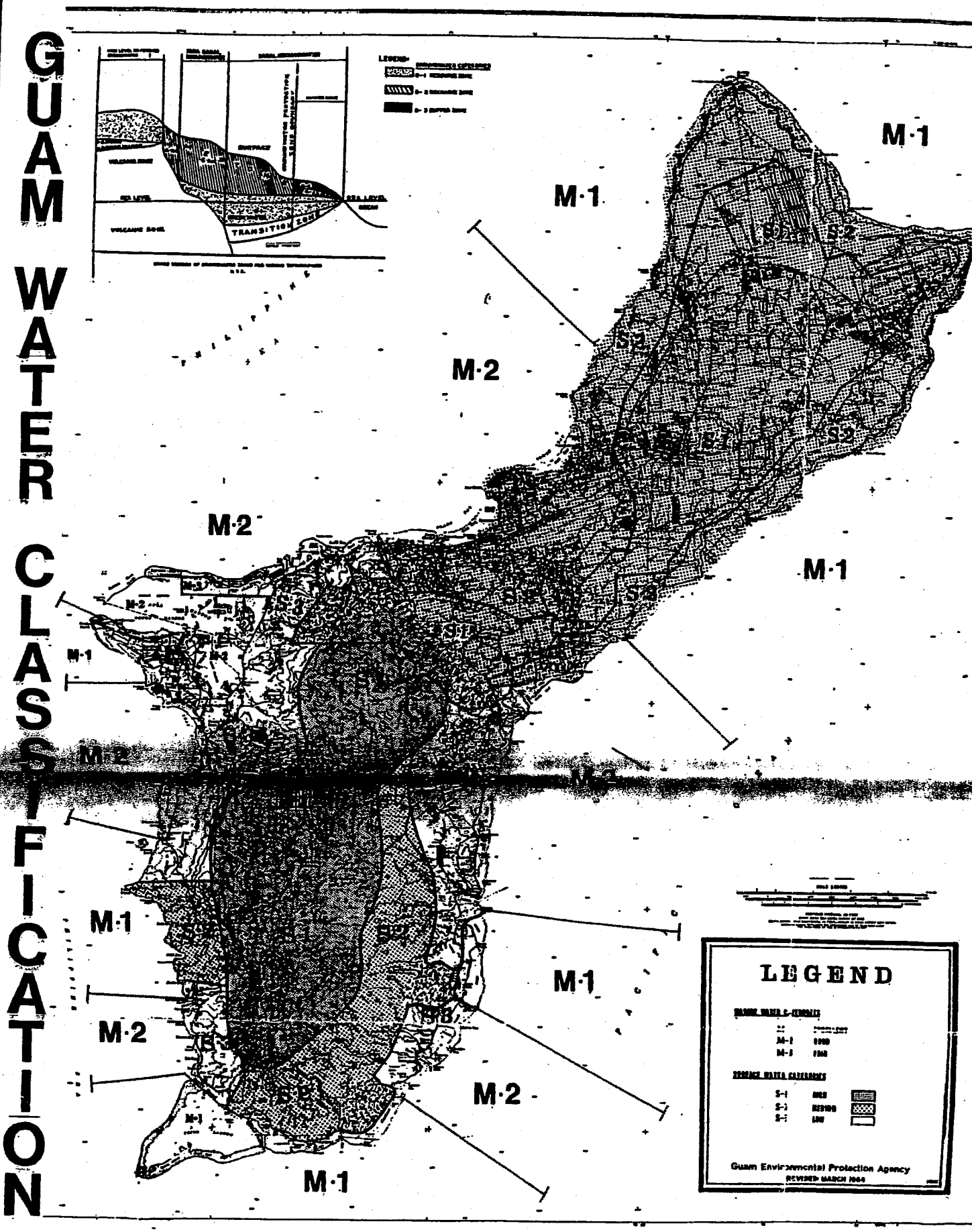
(1) outside of the Groundwater Protection Zone this limit is increased to 2000 mg/1

(2) concentrations to be established on a case-by-case basis by the Agency

(3) for animal feedlot operations higher discharge limitations may be permitted on a case-by-case basis

(4) daily average is based on a minimum of 15 samples per month

GUAM WATER CLASSIFICATION



MASTER MAP

APPENDIX D

Letters of Determination

GUAM WATERWORKS AUTHORITY

Government of Guam

Post Office Box 3010, Agana, Guam 96932

Phone: (671)479-7823 Fax: (671)479-7879

MAR 06 1998

MEMORANDUM

TO: Administrator, Bureau of Planning

FROM: General Manager

SUBJECT: Applications for Modified Permits, Pursuant to Section 301(h) of the Clean Water Act for Agana and Northern District Sewage Treatment Plants

GWA is currently compiling all the necessary documents and applicable data in which to complete it's re-application for 301(h) Modified Permits. As requested by the Application Questionnaire, the application must include *determinations* by appropriate state agencies. These letters of determination must address the sections of 40 CFR that are relevant to your Agency.

To expedite this requirement, attached are copies of: (1) your Agency's previously submitted Letter of Determination; (2) the actual Application Questionnaire sections applicable to your agency; and (3) completed portions of the 301(h) application package that will assist you in preparing your responses.

Futhermore, U.S. EPA has given GWA an absolute, non-extendable application submission date of April 03, 1998. In order to meet this deadline, we need your Letter of Determination by March 15, 1998. In this respect, GWA kindly requests that if there are any questions or concerns that you may have regarding the application, immediately contact Mr. Mark Miller, Planning Division at 479-7810.

Richard A. Quintanilla
General Manager

GUAM WATERWORKS AUTHORITY

Government of Guam

Post Office Box 3010, Agana, Guam 96932

Phone: (671)479-7823 Fax: (671)479-7879

MAR 06 1998

MEMORANDUM

TO: Administrator, Guam Environmental Protection Agency

FROM: General Manager

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Richard A. Quintanilla
General Manager

GUAM WATERWORKS AUTHORITY

Government of Guam

Post Office Box 3010, Agana, Guam 96932

Phone: (671)479-7823 Fax: (671)479-7879

MAR 06 1998

MEMORANDUM

TO: Administrator, Department of Agriculture

FROM: General Manager

SUBJECT: Applications for Modified Permits, Pursuant to Section 301(h) of the Clean Water Act for Agana and Northern District Sewage Treatment Plants

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Sincerely,

Richard A. Quintanilla
General Manager

APPENDIX E

Water Pollution Control Act

As amended by P.L. 9-212 on August 3, 1968
As amended by P.L. 10-31 on March 10, 1969
As amended by P.L. 12-191 on December 30, 1974

Public Law 9-76
Ninth Guam Legislature

(Bill 303)
July 29, 1967

AN ACT

An Act to add a new Chapter III to Title LXI, Government Code of Guam, relative to Water Pollution Control, and for other purposes.

Be it enacted by the People of the Territory of Guam:

Section 1. A new Chapter III is hereby added to Title LXI, Government Code of Guam, to read as follows:

"CHAPTER III"
Water Pollution Control

Section 57040. This Act shall be known as the Water Pollution Control Act.

Section 57041. Statement of Policy. Whereas, a comprehensive program of water resource development for municipal and industrial water supply, irrigation, fish and wildlife conservation, and recreation is now in progress, and whereas, pollution of the waters of this territory may constitute a menace to public health and welfare, and may adversely affect livestock, wildlife, fish and aquatic life, and may progressively obstruct agricultural, industrial, recreational and other legitimate uses of water, it is hereby declared to be the public policy of this territory to conserve its water resources and to protect, maintain, and improve the quality and potability thereof for public water supplies, for the propagation of wildlife, fish and aquatic life, and for agricultural, industrial, recreational and other legitimate beneficial uses, to provide a comprehensive program in the public interest for the prevention, abatement and control of new or existing water pollution, to provide effective means for the carrying out and enforcement of such program, and to provide for cooperation with agencies of the Federal Government in carrying out these objectives.

Section 57042. Definitions. For the purpose of this Act, the following words and phrases shall have the meanings ascribed to them in this Section:

(a) "Sewage" means the water-carried waste products from the residences, public buildings, institutions or other buildings, including the excrementitious or other discharge from the bodies of human beings or animals, together with such ground water infiltration and surface water as may be present.

(b) "Industrial waste" means any liquid, gaseous or solid waste substances resulting from any process of industry, manufacturing, trade or business or from the development of any natural resource, together with such sewage as may be present, which may pollute the waters of the territory.

(c) "Other wastes" means garbage, municipal refuse, sand, offal, oil, tar, chemicals and all other substances which may pollute the waters of the territory.

(d) "Contamination" means an impairment of the qualities of the waters of the territory by sewage or, industrial wastes, or other wastes to a degree which creates a hazard to human health or is detrimental to the most beneficial uses of the waters.

(e) "Pollution" as used in this Act shall mean the alteration of the physical, chemical or biological properties of any waters of the territory which renders said waters harmful or detrimental for their most beneficial uses adversely and unreasonably impair the water quality of the territory, or which renders said waters hazardous to human health or harmful or detrimental for their most beneficial uses.

Where waters have been classified or standards established pursuant to this Act, any discharge which is not in accord with such classification or standards shall be deemed to be "pollution."

(f) "Sewerage system" means pipelines or conduits, pumping stations, and force mains, and all other construction, devices, and appliances appurtenant thereto, used for collecting or conducting sewage or industrial waste or other wastes to a point of ultimate disposal.

(g) "Treatment works" means any plant, disposal field, lagoon, dam, pumping station, incinerator, or other works not specifically mentioned herein, installed for the purpose of treating, stabilizing or holding sewage, industrial waste, or other wastes.

(h) "Disposal system" means a system for disposing of sewage, industrial waste or other wastes, and includes sewerage systems and treatment works.

(i) "Waters of the territory" means all shore waters surrounding Guam, streams, lakes, wells, springs, irrigation systems, marshes, watercourses, waterways, drainage systems and other bodies of water, surface and underground, natural or artificial, publicly or privately owned.

(j) "Person" means the territory of Guam or any instrumentality thereof, any municipality, political subdivision, institution, public or private corporation, partnership, individual, or other entity.

Section 57043. Powers and Duties of the Agency. The Agency is herewith authorized and directed:

(a) To study, investigate, or cause to be studied and investigated and, from time to time, determine ways and means of eliminating from all ground and surface waters of the territory, so far as practical, all substances and materials which pollute the same, and to determine

methods, as far as practical, of preventing pollution that is detrimental to the public health or the health of animals, fish, or aquatic life, or the industrial development of the territory or detrimental to the practical use of waters for recreational purposes, agricultural or industrial purpose, or obnoxious, nauseous or toxic for domestic purposes;

(b) To develop and adopt a comprehensive program for the prevention, control, and abatement of pollution of the waters of the territory and from time to time review and modify such program for the guidance of the Administrator;

(c) To recommend and encourage studies, investigations, research, demonstrations relating to water pollution and causes, prevention, control and abatement thereof as are deemed advisable and necessary and to direct the Administrator regarding any actions deemed necessary from the results of such studies, investigations, research and demonstrations in order that the Administrator may discharge his responsibilities under this Act;

(d) To formulate standards of water purity and classification of water according to the most beneficial uses of such water; in formulating such standards and classifications consideration shall be given to the economics of waste treatment and prevention;

(e) To hold hearings necessary for the proper administration of this Act; and to receive complaints and make investigations in relation thereto;

(f) To exercise all incidental powers necessary to carry out the purposes of this Act;

Section 57044. Powers and Duties of the Administrator. The Administrator shall have and may exercise the following powers and duties:

(a) To consider actions of this Agency as set forth in Section 57043 providing that the Administrator may modify such actions of the Agency only insofar as is necessary to protect human health;

(b) To accept and administer loans and grants from the Federal Government and from any other source for carrying out any of its functions;

(c) To issue, modify or revoke orders for the abatement of pollution or to require the adoption of such remedial measure, including the construction of new disposal system or treatment works or the modifications, extension or alteration of existing systems and works, as directed by the Agency;

(d) To examine and approve or disapprove all plans and specifications for the construction and operation of (1) new sewerage systems, disposal systems and treatment works, (2) extensions, modifications of or additions to new or existing sewerage systems, disposal systems or treatment works, (3) extension and modifications of or additions to factories, manufacturing establishments or business enterprises, the operation of which would cause a substantial increase in waste discharges or otherwise substantially alter the physical, chemical or biological

properties of the waters of the territory and (4) new outlets for the discharge of sewage, industrial wastes or other wastes into any sewerag system or otherwise into the water of the territory subject to the rule and regulations of the Agency;

(e) To issue, continue in effect, revoke, modify or deny permits to any person for the collection and discharge of sewage and industrial and other wastes under such conditions as the Agency may prescribe;

(f) To advise, consult and cooperate with other agencies of the territory of Guam; with the Federal Government and with affected groups, political subdivisions and industries, in the formulation of such comprehensive program;

(g) To collect and disseminate information relating to water pollution and the prevention, control and abatement thereof;

(h) To conduct as the Administrator deems necessary, studies, inve igations, research and demonstrations relating to water pollution and the causes, prevention, control and abatement thereof.

Section 57045. Pollution Unlawful: Permits.

(a) It shall be unlawful for any person to cause the pollution, as defined herein, of any waters of the territory.

(b) It shall be unlawful for any person to construct, install or operate a new sewerage system, disposal system or treatment works, extensions, modifications, or additions to new and existing sewerage systems, disposal systems, or treatment works, extensions, modifications or additions to factories, manufacturing establishments or business enterprises, the operation of which would cause a substantial increase in waste discharges to the waters of the territory or otherwise substantially alter the physical, chemical or biological properties of the waters of the territory to make or cause to be made any new outlet for the discharge of sewage, industrial waste or other wastes into any sewera system or into the waters of this territory without first securing such permit as the Administrator may require, including the submission of plans and specifications and such other information as he deems relevant in connection with the issuance of such permits.

(c) No permit shall be issued under this Section for any use in violation of water quality standards adopted under this Act.

Section 57046. Inspection and Entry. The Administrator or his duly authorized representative shall have the power to enter at reasonabl times upon any private or public property for the purpose of inspecting and investigating conditions relating to pollution of any waters of the territory.

Section 57047. Classification and Standards. In order to effectuate a comprehensive program for the prevention, abatement and control of pollution in the waters of the territory, the Agency is authorized to group such waters into classes in accordance with their present and future most beneficial uses; such classification or standards may from time to time be altered or modified. Standards of quality and purity

for each such classification shall be adopted in relation to the most beneficial use and benefit to which the waters are or may in the future be put; such standards may from time to time altered or modified.

Before streams are classified or standards established or before such standards are modified or repealed, public hearings by the Agency shall be held in connection therewith. Notice of public hearing for the consideration, adoption or amendment of the classification of waters and the standards of purity and quality thereof shall specify the water concerning which a classification is sought to be made or for which standards are sought to be adopted and the time, date and place of such hearing. Such notice is to be published at least once a week for two (2) consecutive weeks in a newspaper of general circulation and in addition shall be mailed to such other persons as the Agency has reason to believe may be directly affected by such classifications and the setti of such standards.

Section 57048. Enforcement.

(a) Whenever the Agency has reason to believe that a violation of any provision of this Act or rule or regulation pursuant thereto has occurred, it may cause written notice to be served upon the alleged violator or violators. The notice shall specify the provision of this Act or rule or regulation alleged to be violated, and the facts alleged to constitute a violation thereof, and may include an order that necessary corrective action be taken within a specified time. Any such order shall become final unless, no later than ten (10) days after the date the notice and order are served, the person or persons named therein request in writing a hearing before the Agency. Upon such request, the Agency shall hold a hearing. In lieu of an order, the Agency may require that the alleged violator or violators appear before the Agency for a hearing at a time and place specified in the notice and answer the charges complained of, or the Agency may initiate action pursuant to Section 57050 of this Act.

(b) If, after a hearing held pursuant to subsection (a) of this Section, the Agency finds that a violation or violations have occurred, it shall affirm or modify the order previously issued or issue an appropriate order or orders for the prevention, abatement or control of the pollutions involved or for the taking of such other corrective action as may be appropriate. If, after hearing on an order contained in a notice, the Agency finds that no violation has occurred or is occurring, it shall rescind the order. Any order issued as part of a notice or after hearing may prescribe the date or dates by which the violation or violations shall cease and may prescribe timetables for necessary action in preventing, abating or controlling the pollution.

(c) No later than ten (10) days after the issuance of the final order of the Agency, an appeal to the Island Court of Guam may be made against any decision of the Agency by any person who is or may be adversely affected thereby.

(d) Nothing in this Act shall prevent the Agency from making efforts to obtain voluntary compliance through warning, conference or any other appropriate means.

(e) In connection with any hearing held pursuant to this Section, the Agency, or its designate, shall have power to administer oaths, examine witnesses and the production of evidence relevant to matter involved in the hearing.

Section 57049. Emergency Procedure.

(a) Any other provisions of law to the contrary notwithstanding, if the Administrator finds that a generalized condition of pollution exi and that it creates an emergency requiring immediate action to protect the intended uses of the water as designated in the Standards of Water Quality for Waters of the Territory of Guam, or to protect human health or safety, the Administrator, with the concurrence of the Governor, shal persons causing or contributing to the pollution to reduce or discontinu immediately the pollutants, and such order shall fix a place and time, not later than twenty-four (24) hours thereafter, for a hearing to be held before the Agency. Not more than twenty-four (24) hours after the commencement of such hearing, and without adjournment thereof, the Agenc shall affirm, modify or set aside the order of the Administrator.

(b) In the absence of a generalized condition of pollution of the type referred to in subsection (a), but if the Administrator finds that pollutants from the operation of one or more polluting sources in causin imminent danger to the intended uses of the water as designated in the Standards of Water Quality for Waters of the Territory of Guam or is causing imminent danger to human health or safety, he may order the person or persons responsible for the operation or operations in questio to reduce or discontinue pollutants immediately, without regard to the provision of subsection (a) of Section 57048 of this Act. In such event, the requirements for hearing and affirmance, modification or setting asi of orders set forth in subsection (a) of Section 57049 shall apply.

Section 57050. Penalties.

(a) Any person who violates any provision of this Act, or any rule or regulation in force pursuant thereto, shall be guilty of misdemeanor and subject on account thereof to a fine of not to exceed $1,000. Each day of violation shall constitute a separate offense.

(b) Action pursuant to subsection (a) of this Section shall not be a bar to enforcement of this Act, rules and regulations in force pursuant thereto, and orders made pursuant to this Act, by injunction or other appropriate remedy, and the Agency shall have power to institute and maintain in the name of this territory any and all such enforcement proceedings. Such proceedings shall be conducted in and by the Island Court of Guam.

(c) Nothing in this Act shall be construed to abridge, limit, impair, create, enlarge or otherwise affect substantively or procedurally the right of any person to damages or other relief on account of injury to persons or property and to maintain any action or other appropriate proceeding therefor.

Section 57051. Assistance by Governmental Agencies. The services and facilities of departments, agencies and instrumentalities of the Government of Guam may be made available to the Agency in the exercise

of its functions to the extent allowed by law.

Section 2. Section 21414, Government Code of Guam, is hereby repeal

Section 3. This Act is an urgency measure.

Approved July 29, 1967

APPENDIX F

Daily and Monthly Flow Reports

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: JANUARY 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
1				1.0				0.9				5.1			
2					1.1			0.9					5.2		
3						.87		0.8						5.2	
4							1.1	WEEK							5.1
5	1.1							END	5.3						
6		.92						0.8		5.2					
7			.93					0.9			5.1				
8				.91				0.8				5.1			
9					1.0			0.9					5.1		
10						.87		0.9						5.3	
11							1.0	WEEK							5.0
12	.96							END	5.2						
13		1.1						0.8		5.0					
			1.1					0.9			5.3				
15				1.0				0.9				5.4			
16					1.1			0.9					5.2		
17						.86		0.8						5.3	
18							.83	WEEK							5.0
19	.86							END	4.9						
20		.95						0.8		5.0					
21			1.1					0.9			5.1				
22				1.4				0.9				5.3			
23					1.0			0.9					6.0		
24						1.0		0.8						5.2	
25							.99	WEEK							5.7
26	1.1							END	5.2						
27		1.1						0.9		5.2					
28			1.1					0.9			5.5				
29				1.0				0.9				5.0			
30					1.3			0.8					5.3		
31								0.8						5.2	
Daily	4.02	4.07	4.23	5.31	5.50	3.60	3.92	FLOWS	20.6	20.4	21.0	25.9	26.8	26.2	20.8
Average Daily	1.01	1.02	1.06	1.33	1.38	.90	.98		5.15	5.10	5.25				
Average Daily Flow ( ) Total Mon. Flow ( )									Average Daily Flow ( ) Total Mon. Flow (						
GRAND TOTAL FLOW of the MONTH															

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: FEBRUARY 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
1							.88	WEEK							5.0
2	.93							END	5.3						
3		1.0						0.9		5.2					
4			1.1					0.9			5.4				
5				1.1				0.9				5.4			
6					.94			0.9					5.2		
7						1.0		0.9						5.1	
8							1.0	WEEK							5.3
9	1.1							END	5.3						
10		.84						0.9		5.0					
11			1.1					0.9			5.2				
12				1.1				0.9				5.4			
13					1.1			0.9					5.2		
						1.1		0.9						5.3	
15							.92	WEEK							5.0
16	.92							END	5.1						
17		1.0						0.9		5.3					
18			.92					0.9			5.1				
19				1.0				0.8				5.3			
20					1.1			0.8					5.1		
21						.97		0.9						5.1	
22							1.1	WEEK							5.1
23	1.0							END	5.1						
24		1.0						0.9		5.1					
25			1.0					0.9			5.2				
26				.91				0.9				5.2			
27					1.0			0.9					5.3		
28						1.0		0.9						5.3	
29								WEEK							
30								END							
31															
	3.95	3.84	4.12	4.11	4.14	4.07	3.90	FLOWS	20.8	20.6	20.9	21.3	20.8	20.8	20.4
Average Daily	.98	.96	1.03	1.03	1.04	1.02	.98		5.20	5.15	5.23	5.33	5.20	5.20	5.10

Average Daily Flow ( ) Total Mon. Flow ( ) | Average Daily Flow ( ) Total Mon. Flow (

GRAND TOTAL FLOW of the MONTH

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: MARCH 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
1							.91	WEEK							5.2
2	1.0							END	5.3						
3		1.1						0.9		4.9					
4			.96					0.9			5.2				
5				1.1				0.9				5.3			
6					.93			0.9					5.0		
7						.92		0.9						5.2	
8							.93	WEEK							5.2
9	1.0							END	5.2						
10		1.1						0.8		5.3					
11			1.0					0.8			5.2				
12				1.1				0.9				5.3			
13					1.1			0.9					5.2		
						.88		0.9						5.2	
15							.94	WEEK							5.0
16	1.1							END	5.3						
17		.98						0.9		5.2					
18			.94					0.9			5.3				
19				1.2				0.9				5.3			
20					1.1			0.9					5.3		
21						1.0		0.8						5.2	
22							.94	WEEK							5.3
23	.91							END	5.3						
24		.98						0.9		5.2					
25			1.0					0.8							
26				1.0				0.9				5.2			
27					1.0			0.9					5.3		
28						.83		0.9						5.0	
29							1.0	WEEK							5.1
30	1.0							END	5.2						
31								0.8							
	5.01	4.16	3.90	4.40	4.13	3.63	4.74	FLOWS	26.3	20.6	15.7	21.1	20.8	20.6	25.8
Average Daily	1.00	1.04	0.97	1.10	1.03	0.90	0.95		5.26	5.15	5.23	5.27	5.20	5.20	5.16

Average Daily Flow ( ) Total Mon. Flow ( ) | Average Daily Flow ( ) Total Mon. Flow (

GRAND TOTAL FLOW of the MONTH

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: APRIL 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							TOTAL FLOW PER DAY	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons							DA
	SUN	MON	TUES	WED	THUR	FRI	SAT		SUN	MON	TUES	WED	THUR	FRI	SAT	
1			.92								5.3					1
2				1.1								5.3				2
3					1.0								5.2			3
4						1.0								5.3		4
5							1.0								5.1	5
6	1.0								5.3							6
7		1.0								5.2						7
8			1.0								5.3					8
9				1.0								5.3				9
10					1.0								5.1			10
11						1.0								5.3		11
12																12
13	24 hr STANDBY MANNED															13
14	BY W/W MANAGER															14
15																15
16																16
17																17
18																18
19																19
20																20
21																21
22			.98								5.2					22
23				1.5								5.4				23
24					1.5								5.2			24
25						.96								5.1		25
26							.84								4.0	26
27	.84								4.9							27
28		.85								5.1						28
29			1.1								5.2					29
30				1.1								5.3				30
31																31
Total Daily								FLOWS								Total Daily
Average Daily																Average Daily
Average Daily Flow ( ) Total Mon. Flow ( )									Average Daily Flow ( ) Total Mon. Flow ( )							
GRAND TOTAL FLOW of the MONTH																

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: MAY 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
1					1.1			0.9					5.3		
2						.92		0.9						5.3	
3							1.0	WEEK							5.2
4	1.0							END	5.1						
5		1.0						0.8		5.1					
6			.90					0.8			5.2				
7				1.2				0.9				5.5			
8					1.2			0.9					5.3		
9						1.2		0.9						5.5	
10							.97	WEEK							5.2
11	1.0							END	5.2						
12		.91						0.9		5.1					
13			.89					0.9			5.2				
[illegible]				1.1				0.9				5.3			
15					1.0			0.9					5.2		
16						.96		0.9						5.1	
17							.92	WEEK							5.2
18	1.0							END	5.3						
19		1.2						0.8		5.3					
20			1.5					0.8			5.2				
21				1.2				0.9				5.3			
22					1.0			0.9					5.3		
23						1.2		0.9						5.3	
24							1.1	WEEK							5.2
25	1.1							END	5.3						
26		.98						0.9		5.3					
27			1.1					0.9			5.3				
28				1.1				0.8							
29					1.1			0.9					5.3		
30						1.2		0.9						5.5	
31							1.1	WEEK END							5.4
Total Daily	4.10	4.09	4.36	4.60	4.30	5.48	5.08	FLOWS	20.9	20.8	20.9	16.1	21.1	26.7	26.2
Average Daily	1.02	1.02	1.09	1.15	0.86	1.09	1.01		5.22	5.20	5.22	5.36	5.22	5.34	5.24
Average Daily Flow ( ) Total Mon. Flow ( )									Average Daily Flow ( ) Total Mon. Flow (						
GRAND TOTAL FLOW of the MONTH															

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: JUNE 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
1	1.0							WEEK END	5.2						
2		.97						0.9		5.2					
3			1.1					0.9			5.4				
4				1.0				0.8				5.3			
5					1.1			0.9					5.2		
6						1.5		0.9						5.8	
7							N/A	WEEK							N/A
8	1.2							END	5.5						
9		1.1						0.9		5.4					
10			1.5					0.9			5.4				
11				.98				0.9				5.2			
12					1.1			0.9					5.3		
13						1.1		0.9						5.4	
14							1.0	WEEK							5.1
15	1.0							END	5.1						
16		1.1						0.9		5.3					
17			1.0					0.9			5.1				
18				1.1				0.8				5.4			
19					1.1			0.8					5.5		
20						1.0		0.9						5.3	
21							.88	WEEK							5.0
22	1.0							END	5.2						
23		.98						0.9		5.1					
24			.99					0.9			5.5				
25				1.1				0.9				5.3			
26					1.1			1.2					5.4		
27						1.0		0.9						5.3	
28							1.0	WEEK							5.2
29	1.0							END	5.2						
30		.95						0.9		4.8					
31															
Total Daily	6.20	5.10	4.59	4.18	4.40	4.60	2.80	FLOWS	26.2	25.8	21.4	21.1	21.4	21.8	15.3
Average Daily	1.04	1.02	1.14	1.04	1.10	1.15	0.93		5.24	5.16	5.35	5.30	5.35	5.45	5.10

Average Daily Flow ( ) Total Mon. Flow ( ) | Average Daily Flow ( ) Total Mon. Flow (

GRAND TOTAL FLOW of the MONTH

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: JULY '97

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons							
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT	
1			1.3					0.9			5.4					
2				.92				0.9				5.0				
3					1.0			0.9					5.3			
4						.96		0.9						5.2		
5							N/A	WEEK							N/A	
6	.93							END	5.2							
7		1.0						0.9		5.2						
8			1.0					0.9			5.2					
9				1.0				0.8				6.0				
10					1.2			0.9					5.6			
11						1.1		0.9						5.3		
12							1.0	WEEK							5.5	
13	1.1							END	5.3							
1		1.1						0.8		5.4						
15			1.1					0.9			5.4					
16				.99				0.9				5.3				
17					1.1			0.9					5.3			1
18						1.1		0.9						5.2		1
19							.97	WEEK							5.1	1
20	1.0							END	5.2							2
21		.97						0.9		5.2						2
22			1.0					0.9			5.2					2
23				1.1				0.7				5.4				2
24					1.1			0.9					5.3			2
25						1.2		0.8						5.3		2
26							1.0	WEEK							5.1	2
27	.99							END	5.2							2
28		1.1						0.7		5.4						2
29			.96					0.8			5.0					2
30				1.0				0.9				5.2				3
31					1.1			0.9					5.6			3
Total Daily	4.02	4.17	5.36	5.01	5.80	4.36	2.96	FLOWS	20.9	21.2	26.2	21.9	27.1	21.0	15.7	Total Daily
Average Daily	1.00	1.04	1.07	1.00	1.10	1.09	0.98		5.22	5.30	5.24	4.38	5.42	5.25	5.23	Average Daily

Average Daily Flow ( ) Total Mon. Flow ( ) | Average Daily Flow ( ) Total Mon. Flow ( )

GRAND TOTAL FLOW of the MONTH

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: AUGUST 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons							D
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT	
1						1.2		0.9						5.6		
2							1.0	WEEK-							5.2	
3	.97							END	4.8							
4		1.0						0.9		5.3						
5			1.0					0.9			5.3					
6				1.0				0.9				5.2				
7					1.1			0.8					5.3			
8						.95		0.9						5.2		
9							1.2	WEEK-							5.4	
10	1.5							END	5.4							1
11		1.0						0.9		5.3						1
12			1.0					0.8			5.5					1
13				1.6				0.9				5.6				1
14					1.1			0.9					5.5			1
15						1.1		1.0						4.9		1
16							1.2	WEEK-							5.4	1
17	.95							END	5.1							1
18		1.1						0.9		5.4						1
19			.89					0.9			5.1					1
20				1.1				0.9				5.3				2
21					1.3			0.9					5.5			2
22						1.2		0.8						5.5		2
23							1.2	WEEK-							5.3	2
24	1.3							END	5.6							2
25		.97						0.8		5.2						2
26			1.2					0.9			5.6					2
27				OUTFALL MAINBREAK								OUTFALL MAINBREAK				2
28																2
29																2
30																3
31				MAINBREAK REPAIR								MAINBREAK REPAIR				3
Total Daily	4.72	4.07	6.98	1.06	36.46 CONTINUES		4.6	FLOWS	20.9	21.2	21.5	16.1	16.3 21.2 CONTINUES		21.3	Total Daily
Average Daily	1.18	1.01	1.74				1.15		522	5.30	537				532	Average Daily
Average Daily Flow ( ) Total Mon. Flow ( )									Average Daily Flow ( ) Total Mon. Flow ( )							
GRAND TOTAL FLOW of the MONTH																

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: SEPTEMBER 1997

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
1		1.1						HL		5.2					
2			1.1					0.9			5.5				
3				.84				0.9				5.1			
4					.84			1.2					5.0		
5						.89		1.0						4.6	
6							.95	WEEK-							5.1
7	.98							END	4.9						
8		.93						0.9		4.9					
9			112					0.9			5.0				
10				1.1				0.8				5.2			
11					1.1			0.9					5.5		
12						1.2		0.9						5.4	
13							1.1	WEEK-							5.2
14	1.1							END	5.2						
15		.94						0.9		5.1					
16			1.11					0.9			5.3				
17				1.0				0.9				5.2			
18					1.0			0.8					5.3		
19						1.1		0.9						5.2	
20							1.0	WEEK-							5.1
21	1.06							END	5.0						
22		1.0						0.9		5.2					
23			.98					0.9			5.2				
24				1.1				0.9				5.2			
25					1.0			0.9					5.1		
26						1.0		0.9						5.2	
27							1.2	WEEK-							5.4
28	1.0							END	5.2						
29		1.0						0.8		5.2					
30			.95					0.9			5.1				
31															
Total Daily	106	4.97	533	404	3.94	4.19	4.25	FLOWS	20.3	25.6	26.1	20.7	20.9	20.4	20.8
Average Daily	1.02	0.99	1.06	1.01	0.98	1.04	1.06		5.07	5.12	5.22	5.17	5.22	5.10	0.25

Average Daily Flow ( ) Total Mon. Flow ( ) | Average Daily Flow ( ) Total Mon. Flow ( )

GRAND TOTAL FLOW of the MONTH

HOLIDAYS DENOTED BY *

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: OCTOBER '97

DATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							SETTLABLE SOLIDS PER DAY	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons						
	SUN	MON	TUES	WED	THUR	FRI	SAT		SUN	MON	TUES	WED	THUR	FRI	SAT
1				1.0				0.9				5.2			
2					1.0			0.9					5.2		
3						1.0		0.9						5.2	
4							1.0	WEEK-							5.2
5	1.1							END	5.2						
6		.85						0.9		5.0					
7			1.0					0.9			5.2				
8				.88				0.8				5.2			
9					1.1			0.9					5.2		
10						1.1		0.9						4.8	
11							1.0	WEEK-							5.3
12	1.0							END	5.3						
13		1.0						HOLI-DAY		5.2					
14			1.0					0.8			5.0				
15				1.2				0.8				5.4			
16					1.1			0.9					5.2		
17						1.0		0.9						5.2	
18							1.0	WEEK-							5.1
19	1.4							END	5.6						
20		1.1						0.9		5.4					
21			1.1					0.9			5.4				
22				1.1				0.8				5.4			
23					1.0			0.8					5.3		
24						1.3		0.9						5.3	
25							1.1	WEEK-							5.2
26	1.0							END	4.0						
27		1.0						0.9		5.3					
28			1.1					0.9			5.3				
29				1.0				0.9				5.0			
30					1.0			0.8					5.3		
31						1.1		0.8						5.2	
Total Days	4.5	3.95	4.2	5.18	5.2	5.5	4.1	FLOWS	20.1	20.9	20.9	26.2	26.2	25.7	20.8
Average Daily	1.13	.99	1.05	1.04	1.04	1.10	1.03		5.03	5.23	5.23	5.24	5.24	5.14	5.20

Average Daily Flow (1.05) Total Mon. Flow (32.63) | Average Daily Flow (5.19) Total Mon. Flow (160.8)

GRAND TOTAL FLOW of the MONTH 193.43

HOLIDAYS DENOTED BY *

S.C - STORM CONDITION

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: Nov. 1997

ATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							TOTAL FLOW PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons							DA
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT	
1							1.2	6.6							5.4	1
2	S.C.							N/A	S.C.							2
3		S.C.						N/A		S.C.						3
4			1.2					6.7			5.5					4
5				1.2				6.7				5.3				5
6					1.1			6.5					5.4			6
7						1.0		6.1						5.1		7
8							1.0	6.4							5.4	8
9	1.2							6.6	5.4							9
0		1.0						6.2		5.2						10
1			1.0					6.2			5.2					11
2				1.1				6.4				5.3				12
3					1.1			6.4					5.3			13
4						1.1		6.4						5.3		14
5							1.1	6.3							5.2	15
6	1.0							6.2	5.2							16
7		1.0						6.4		5.4						17
8			1.0					6.3			5.3					18
9				1.0				6.0				5.0				19
20					1.0			6.1					5.1			20
21						1.0		6.1						5.1		21
22							1.0	6.4							5.4	22
23	1.0							6.1	5.1							23
24		1.0						6.2		5.2						24
25			1.0					6.3			5.3					25
26				1.0				6.0				5.0				26
27					1.1			6.4					5.3			27
28						1.1		6.5						5.4		28
29							1.0	6.1							5.1	29
30	1.0							6.3								30
31																31
tal lly	4.2	3.0	4.2	4.3	4.1	4.2	5.3	FLOWS	21.0	15.6	21.3	20.6	21.1	20.4	26.5	Total Daily
erage ily	1.0	1.0	1.0	1.2	1.0	1.0	1.1		5.2	5.3	5.3	5.1	5.3	5.2	5.3	Averag Daily

Average Daily Flow (7.3) Total Mon. Flow (1.0) | Average Daily Flow (36.7) Total Mon. Flow (5.2)

GRAND TOTAL FLOW of the MONTH 177

HOLIDAYS DENOTED BY * 1726.9

SC - STORM CONDITION

PO - POWEROUTAGE

NR - NONE RECORDED

DAILY and MONTHLY FLOW REPORT
NORTHERN DISTRICT SEWAGE TREATMENT PLANT
FOR the MONTH OF: DECEMBER 1997

ATE	DAILY NORTHERN LINK FLOW Recorded in millions of gallons							TOTAL FLOW PER	DAILY SOUTHERN LINK FLOW Recorded in millions of gallons							D
	SUN	MON	TUES	WED	THUR	FRI	SAT	DAY	SUN	MON	TUES	WED	THUR	FRI	SAT	
1		1.0						6.3		5.3						
2			1.1					6.4			5.4					
3				.96				6.1				5.1				
4					.95			6.1					5.1			
5						1.0		6.2						5.2		
6							.87	6.1							5.2	
7	.88							5.9	5.0							
8		.92						6.0		5.1						
9			.94					6.0			5.1					
10				.97				6.0				5.0				1
11					.98			6.1					5.1			1
12						1.0		6.2						5.2		1
13							.86	5.8							4.9	1
14	.95							6.2	5.2							14
15		.97						6.1		5.1						15
16			S.C.					N.R.			S.C.					16
17				S.C.				N.R.				S.C.				17
18					S.C.			N.R.					S.C.			18
19						S.C.		N.R.						S.C.		19
20							S.C.	N.R.							S.C.	20
21	S.C.							N.R.	S.C.							21
22		.94						6.1		5.2						22
23			.87					5.8			4.9					23
24				.86				5.8				4.9				24
25					.87			5.9					5.0			25
26						.86		5.8						4.9		26
27							1.0	6.3							5.3	27
28	.88							.88	PO							28
29		.87						.87		PO						29
30			.93					.93			PO					30
31				.87				.87				PO				31
ta' l	2.71	4.70	3.84	3.66	2.80	2.86	2.73	FLOWS	10.2	20.7	15.4	15.0	15.2	15.3	15.4	Tota Daily
erage ly	.90	.94	.96	.92	.93	.95	.91		5.1	5.2	5.1	5.0	5.1	5.1	5.1	Avera Daily

Average Daily Flow (.93) Total Mon. Flow (23.3) | Average Daily Flow (5.1) Total Mon. Flow ( )

GRAND TOTAL FLOW of the MONTH

HOLIDAYS DENOTED BY *

APPENDIX G

Industrial User Survey

COMMERCIAL WASTEWATER DISCHARGE SURVEY

Completion of this questionnaire is required for all commercial wastewater dischargers. Please return the completed form to the above mailing address no later than _____ ____

PLEASE TYPE OR PRINT LEGIBLY. (NOTE: Incomplete and illegible questionnaires will be returned to you)

Should you have any questions or need assistance in competing this questionnaire, please call GWA's Wastewater Division at 647-7873 or 647-7802 between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday. Thank you for your cooperation & timely response.

1. NAME OF YOUR BUSINESS OR INDUSTRY: _____

MAILING ADDRESS: _____

CITY: _____

2. LOCATION OF YOUR BUSINESS (if different from mailing address):

_____

3. YOUR PRINCIPAL SERVICE OR PRODUCT OF BUSINESS: _____

_____

_____

STATEMENT OF RESPONSIBLE OFFICIAL: The information contained in this questionnaire is familiar to me and, to the best of my knowledge and belief, such information is true, complete, and accurate.

SIGNATURE: _____

NAME: _____

TITLE: _____

DATE: _____

5. PERSON AND TITLE (WITHIN YOUR BUSINESS) WHO MAY BE CONTACTED CONCERNING YOUR WASTEWATER DISCHARGE INTO THE PUBLIC SEWER:

NAME: _____

TITLE: _____

TELEPHONE NUMBER: _____

6. DO YOU DISCHARGE ANY NON-DOMESTIC WASTEWATER (FROM OTHER THAN WASHROOM, TOILET, OR SHOWER) INTO THE SEWER SYSTEM?

[ ] YES [ ] NO (GO TO QUESTION #16)

7. DESCRIBE THE OPERATION(S) AT YOUR BUSINESS THAT RESULT(S) IN THE DISCHARGE TO THE SEWER OF NON-DOMESTIC WASTES. INCLUDE A DESCRIPTION OF RAW MATERIALS, CATALYSTS, OR INTERMEDIARIES, IF APPLICA BLE. DESCRIBE ANY MANUFACTURING OPERATION AT THIS LOCATION. (ATTACH ADDITIONAL SHEETS AS NECESSARY):

_____

_____

_____

_____

8. DESCRIBE ANY WATER CONDITIONING PROCESSES USED AT THIS FACILITY (SUCH AS WATER SOFTENING, RE VERSE OSMOSIS, FILTRATION):

_____

_____

_____

9. INDICATE BY CHECKMARK OPERATION SHIFTS NORMALLY WORKED EACH DAY:

SHIFT	START TIME	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1ST								
2ND								
3RD								

10. IS YOUR PRODUCTION SEASONAL? [ ] YES [ ] NO

11. CHECK THE TYPE WHICH BEST DESCRIBES YOUR WASTEWATER DISCHARGE FLOW:

[ ] CONTINUOUS

AVERAGE DAILY FLOW: _____ GALLONS PER DAY

[ ] INTERMITTENT

AVERAGE QUANTITY PER DISCHARGE: _____ GALLONS

AVERAGE NUMBER OF DISCHARGES PER DAY: _____

[ ] BATCH

AVERAGE QUANTITY PER DISCHARGE: _____ GALLONS

AVERAGE NUMBER OF DISCHARGES PER DAY: _____

12. INDICATE THE APPROXIMATE TIMES THAT DISCHARGES OCCUR:

Sun	Mon	Tue	Wed	Thu	Fri	Sat

13. DESCRIBE THE CHARACTERISTICS AND CONSTITUENTS OF YOUR WASTEWATER DISCHARGE(S). LIST THE CONCENTRATION (IN PERCENT OR MG/L) IF KNOWN:

_____

_____

_____

_____

_____

_____

_____

14. DESCRIBE ANY TREATMENT FACILITIES AT YOUR BUSINESS THAT TREATS WASTEWATER PRIOR TO DISCHARGE TO THE SEWER:

_____

_____

_____

_____

_____

_____

_____

15. INDICATE IF ANY OF THE FOLLOWING CONSTITUENTS OR SUBSTANCES IS (OR CAN BE) PRESENT IN YOUR WASTEWATER DISCHARGE AS A RESULT OF YOUR OPERATIONS BY PLACING IN FRONT OF EACH LISTED CHEMI CAL COMPOUND:

1 = YOU SUSPECT THE COMPOUND IS ABSENT
2 = YOU KNOW THE COMPOUND IS ABSENT
3 = YOU SUSPECT THE COMPOUND IS PRESENT
4 = YOU KNOW THE COMPOUND IS PRESENT:

[ ] Acenapthene
[ ] Acenapthylene (PAH)
[ ] Acrolein
[ ] Acrylonitrile
[ ] Aldrin
[ ] Antimony
[ ] Anthracene
[ ] Arsenic
[ ] Asbestos (Halomethanes)
[ ] 1,2 Benzanthracene (PAH)
[ ] Benzene
[ ] Benzidine
[ ] Benzo (A) Pyrene (3,4-Benzo-Pyrene) (PAH)
[ ] 3,4 Benzofluoranthene (PAH)
[ ] Benzo (K) Fluoranthene (PAH)
[ ] 1,12 Benzoperylene (PAH)
[ ] Beryllium
[ ] Bromoform (Tribromomethane)
[ ] Bromomethane (Methyl Bromide)
[ ] 4-Bromophenyl Phenyl Ether
[ ] Cadmium
[ ] Carbon Tetrachloride (Tetrachloromethane)
[ ] Chlordane
[ ] Chlorobenzene (Monochloro-Benzene)
[ ] Chlorodibromomethane (Halomethane)
[ ] 1,2 Dichlorobenzene
[ ] 1,3 Dichlorobenzene
[ ] 1,4 Dichlorobenzene
[ ] 3,3 Dichlorobenzidine
[ ] Dichloroethane 1,1
[ ] Dichloroethane 1,2
[ ] 1,1 Dichloroethylene
[ ] 1,2-Trans-Dichloroethylene
[ ] Dichlorobromomethane
[ ] Dichloromethane (Halomethanes)
[ ] 2,4-Dichlorophenol
[ ] Dichloropropane 1,2
[ ] Dichloropropene 1,3
[ ] Dieldrin
[ ] Dimethylphenol 2,4
[ ] Diethylphthalate
[ ] Dimethylphthalate
[ ] Dinitrotoluene 2,4
[ ] Dinitrotoluene 2,6
[ ] 2,4 Dinitrophenol
[ ] Dioxine (2,3,7,8-TCDD)
[ ] Diphenylhydrazine 1,2
[ ] Alpha Endosulfan
[ ] Beta Endosulfan
[ ] Endosulfan Sulfate
[ ] Endrin
[ ] Endrin Aldehyde
[ ] Ethylbenzene
[ ] Chlorethane (Monochloroethane)
[ ] Chlorothyl Ether (Bis-2)
[ ] 1 Chloroethoxy Methane (Bis-2)
[ ] 2 Chloroethyl Vinyl Ether
[ ] 4-Chloro-3-Methylphenol
[ ] Chloromethane (Methyl Chloride)
[ ] Chloroform Trichloromethane
[ ] 2 Chlorophenol
[ ] Chloroisopropyl Ether (Bis-2)
[ ] 2 Chloronaphthalene
[ ] 4-Chlorophenyl Ether
[ ] Chromium (HEX)
[ ] Chromium (TRI)
[ ] Oil / Grease (animal or vegetable origin)
[ ] Oil / Grease (mineral origin)
[ ] Petroleum or petroleum products
[ ] Chrysene (PAH)
[ ] Copper
[ ] pH decrease
[ ] pH increase
[ ] 4,4 DDT
[ ] 4,4 DDE
[ ] 4,4 DDD
[ ] Dibenzo (a,h) Anthracene (PAH)
[ ] 2 Nitrophenol
[ ] 4 Nitrophenol
[ ] 4, 6-Dinitro-2-Methylphenol
[ ] Nitrosodimenthylamine N
[ ] Nitrosodimenthylamine-N
[ ] Nitrosodi-N-Propylamine-N
[ ] PCB 1242
[ ] PCB 1254
[ ] PCB 1221
[ ] PCB 1232
Temperature decrease
- _____ F
Temperature increase
+ _____ F
[ ] PCB 1248
[ ] PCB 1260
[ ] PCB 1016
[ ] Fluorene (PAH)
[ ] Fluoranthene
[ ] Heptachlor
[ ] Heptachlor Epoxide
[ ] Hexachloroethane
[ ] Hexachlorobenzene
[ ] Hexachlorobutadiene
[ ] Hexachlorocyclohexane (lindane)
[ ] Hexachlorocyclohexane (Alpha)
[ ] Hexachlorocyclohexane (Beta)
[ ] Hexachlorocyclohexane (Delta)
[ ] Hexachlorocyclopentadiene
[ ] Indeno (1,2,3-cd) Pyrene (PAH)
[ ] Isophorone
[ ] Lead
[ ] Mercury
[ ] Naphthalene
[ ] Nickel
[ ] Nitrobenzene
[ ] Di-N-Butyl Phthalate
[ ] Di-N-Octyl-Phthalate
[ ] Pyrene (PAH)
[ ] Selenium
[ ] Silver
[ ] Tetracholoethane 1,1,2,2
[ ] Tetrachloroethylene
[ ] Thallium
[ ] Toluene
[ ] Toxaphene
[ ] 1,2,4 Trichlorobenzene
[ ] Trichloroethane 1,1,1
[ ] Trichloroethane 1,1,2
[ ] Trichloroethylene
[ ] Phenol
[ ] Pentachlorophenol
[ ] Phenanthrene (PAH)
[ ] Bis (2 Ethyl Hexyl)
[ ] Phthalate
[ ] Butyl Benzyl Phthalate
[ ] Trichlorophenol 2,4,6
[ ] Vinyl Chloride (Chloroethylene)
[ ] Zinc

OTHER COMPOUNDS NOT LISTED:

[ ] _____

[ ] _____

[ ] _____

[ ] _____

[ ] _____

16. **ADDITIONAL INFORMATION ON YOUR OPERATION:**

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX H

Outfall Extension - A/E

and

Construction Schedule

NORTHERN DISTRICT SEWAGE TREATMENT PLANT

OUTFALL EXTENSION

ACTION PLAN

ACTIVITY	COMPLIANCE DATE
Advertise for A/E Selection	November 3, 1997
Commence Design	February 2, 1998
Complete Design	October 2, 1998
Advertise for Construction Bids	December 14, 1998
Award Construction Contract	February 12, 1999
Commence Construction	April 8, 1999
Complete Construction	December 30, 1999

* Assuming funding is available by October 1, 1997

APPENDIX I

Memo to DPW

(WWTP refurbishment money)

GUAM WATERWORKS AUTHORITY

Government of Guam

Post Office Box 3010, Agana, Guam 96932

Phone: (671)479-7823 Fax: (671)479-7879

MEMORANDUM

TO: Director, Department of Public Works MAR 13 1998

FROM: General Manager

SUBJECT: Refurbishment of Northern District and Agana Sewage Treatment Plants

As you are aware, the Guam Waterworks Authority is in a difficult situation concerning environmental issues on both Northern District and Agana Sewage Treatment Plants. During a meeting with the USEPA and local EPA representatives, we were given a deadline of April 3, 1998 to work on baseline studies as part of our 301H application to enable us to discharge to the ocean using primary treatment for both plants.

Hence, as these projects are part of the Tumon Redevelopment Projects which falls under your department's management, we are requesting for a priority study of the existing sewage outfall to include baseline study and possible extension or replacement of the existing outfalls as part of the refurbishment as soon as possible.

Thank you very much for your cooperation. Should you have any questions or require additional information, please call Mr. Rene Alcazaren, CIP Sewer Supervisor at 479-7830.

We are looking forward to your early and favorable reply.

RICHARD A. QUINTANILLA

Tumon Bay Beautification Project
March 17, 1998
Guam Visitor's Bureau Conference Room

Agenda

I. Project Schedule Update
- 60% Submittal
- Bid Advertisement
- Bid Documents (Completion)
- Pre-Bid Conference
- Bid Opening

II Cost Esitmates
- Roadway
- Water
- Sewer
- Power
- Telephone
- Landscaping

II Construction Plan
- Beach Side⇒Cliff Side
- Traffic Flow
- Staging Area

IV Miscellaneous
- A. Meeting with Department of Agriculture
- B. Tumon Pump Station/Pump Station Site
- C. Meeting with GWA (Burt Johnson & Rene Alcazaren)
  - Northern/Agana Treatment Plant
  - Oka Point Sewer Collector Line
- D. Soils Report (Pacific Soils Engineering & Testing)
- E. Beach Access (Which sites, Design Stage)
- F. Tumon Bay Shuttle System
- G. Meeting with Land Owners
- H. Legislative Amendment

APPENDIX J

Outfall Extension - Baseline

A/E Requirements

ASSOCIATES, INC.

Facsimile Transmittal

TO:	Mike Miller	NAME:	FAX: 649-0158
FROM:	GMP Associates, Inc. GITC Building, Suite 302 590 South Marine Dr. Tamuning, Guam 96911	FROM: Dr. Peter Melnyk	Phone: (671) 647-4467 Fax: (671) 647-6471
DATE:	March 25, 1998	Project No.	No. of Pages: 9 (Including this page)
RE:	Scope of Work Design of Agana		

Please let us know if you have any questions.

SCOPE OF WORK
TASK XVI

PROJECT TITLE: **DESIGN OF AGANA AND NORTHERN DISTRICT SEWAGE TREATMENT PLANT OUTFALL EXTENSION**

I. INTENT

It is the intent of this project to provide professional survey, engineering and design services for the construction of Agana and Northern District Sewage Treatment Plant Outfall Extension. Design shall be guided by Dames & Moore report of impact assessment of non-chlorinated effluent from Agana and Northern District Wastewater Treatment plants dated December 1994 and applicable GovGuam and Federal criteria and standards. Preliminary engineering and planning to design the outfall extension shall be the basic scope of work.

II. ITEMS OF WORK

A. Oceanographic Surveys, Studies and Investigations Ocean Outfall Improvements.

1. General Requirement: The Consultant shall conduct oceanographic studies, field investigations and analyses required to support and produce the most cost-effective design of ocean outfall improvements. To this extent, the Consultant shall consider the following tasks as a basic part of his scope of work:

   a. Develop oceanographic design criteria for ocean outfall structures including, but not necessarily limited to the following:
      - Design Water Level
      - Design Wave Forces
      - Design Current Forces
      - Wave Scouring Potential
      - Typhoon Wave Verification Program

   b. Conduct ocean current and water density measurements as necessary to support the design of wastewater discharge facilities.

   c. Conduct an inspection as well as an underwater visual and photographic reconnaissance survey of the existing and proposed outfall site.

   d. Perform required hydraulic analyses and computations. Required to support the design of ocean outfall improvements.

2. Hydrographic Surveys: The Consultant shall conduct all hydrographic Surveys and mapping required for the design of ocean outfall

improvements from the reef crest out to the area surrounding the proposed outfall diffusers. All such surveys and mapping shall be accomplished under the direction and supervision of a Guam-registered Land Surveyor.

3. Subsurface Investigations and Reports - Ocean Outfall Improvements:

The Consultant shall conduct subsurface investigations such as seismic refraction surveys and soil borings and perform related analyses of results to support the design of ocean outfall improvements. The Consultant shall prepare and submit reports documenting the results and recommendations of such investigations and analyses.

4. Hydrodynamic studies at the proposed outfall sites, in the nearfields and farfields to determine current and wind regimes, as well as stratification depth at each location. These studies should include:

   a. current meter mooring
   b. dye and drogue releases
   c. continuous temperature-salinity-dissolved oxygen profiles

5. Baseline monitoring. This should include water quality data, community structure: quantitative information on the benthic flora and fauna, and sediment quality in the area of the proposed discharges.

   a. Water quality. Collect quarterly data for at least four locations equally spaced around each of the proposed diffuser sites (surface, mid and bottom depth). These surveys must include:

      - site location, and sample depth
      - microbiology (fecal coliform / 100 ml)
      - pH
      - orthophosphate
      - nitrate-nitrogen
      - dissolved oxygen
      - salinity
      - total filterable suspended solids
      - turbidity
      - temperature
      - oil & petroleum products

   b. Community structure. Conduct quarterly survey of the benthic flora and fauna at the proposed discharges that quantify coral, algae, macroinvertebrate and fish communities as follows:

      - Provide a species list of flora and fauna, indicating abundance, (i.e. rare, common, abundant etc.) identifying predominant species.

- Percent coverage of the area should be quantified by breaking the type of cover down into six groups:

  (a) coral
  (b) macro algae
  (c) turf algae
  (d) coralline algae
  (e) bare substrate (dead coral, rubble, sand)
  (f) other (macro invertebrates, any foreign objects or material)

- Fish surveys done using timed visual counts at least by family categories, for at least four locations equally spaced around each of the proposed diffuser sites. Reference: depth, location and time period of each survey. Compile a report that includes the data from each survey, and a fish species list.

c. Sediment samples. Uniform, replicate grabs at four sites equally spaced surrounding each of the proposed diffuser sites should be obtained for analysis of:

- grain size
- total organic carbon
- total Kjeldahl nitrogen
- total phosphorus
- total sulfide
- priority pollutants
- infauna
- steady sediment oxygen demand
- resuspended sediment oxygen demand

6. Because of the deep depths, diving these sites may not be feasible and surveys may need to be done using remote equipment. All site and sample locations, depths, dates of collection, and methodology needs to be recorded. It is important that the data gathered be quantitative. The monitoring surveys 5a, 5b and 5c will need to be conducted again at a later date, after the outfalls have been constructed and are discharging.

B. Outfall Design

1. Outfall Design Strategy: The outfall design strategy shall establish "whipstock-drilled outfall as the primary design objective and the design of a conventional buried, concrete-encased outfall as a secondary objective which shall be pursued should a whipstock-drilled outfall prove infeasible. Accordingly, a Whipstock-drilled outfall feasibility study along with concomitant field and geotechnical investigations shall be conducted <u>in advance of any investigation or design work which are exclusively required for a conventional outfall</u>.

2. Should whipstock drilling prove to be feasible to the satisfaction of Guam Waterworks Authority (GWA), the design of a Whipstock-drilled outfall shall be pursued as the single choice for construction.

3. Whipstock-drilled Feasibility Study: The Consultant shall evaluate the feasibility and cost-effectiveness of a "Whipstock-drilled" alternative to construction of conventional outfall improvements. The scope of this study shall involve the evaluation of the use of whipstock drilling to excavate a tunnel through the limestone formations and beneath the ocean floor through which an outfall line can be installed. The study shall include all research, site investigations and subsurface explorations as well as engineering, construct ability and construction cost analyses required to determine feasibility and cost-effectiveness.

4. The Consultant shall prepare and Submit a detailed study report acceptable to GWA which documents the procedures used and analyses performed in the investigation and evaluation of the whipstock-drilled alternative and which sets forth results, conclusions and recommendations. GWA shall decide whether the design of this alternative is to be pursued and will issue appropriate approval and direction.

5. Conventional Outfall Design: If a whipstock drilled outfall is determined to be infeasible, the Consultant shall, at the option and direction of GWA, proceed with the design of a conventional outfall.

C. Basis of Design/Report

The Consultant shall prepare an submit for approval a comprehensive report which consolidated the results of investigations and analyses, including evaluation of the feasibility of alternative improvements, and which establishes the basis for design.

D. Items of Design

The Consultant shall provide design services and prepare a construction contact package consisting of a drawings, specifications, bid documents, alternative bids, cost estimate and supporting design calculations for the following improvements:

1. Interim connection of existing Agana & Northern District to the new ocean outfall.
2. Ocean Outfall Improvements shall provide for and accommodate the continued operation of the Agana and Northern District Wastewater Treatment Plant as well as transmission of peak wastewater and storm-related flows to ultimate disposal.

E. Construction Cost Apportionment

The Consultant shall provide a breakdown of the estimated engineering and construction cost of the project. This breakdown shall be revised a necessary during the course of the planning and design effort for this project.

F. Environmental Impact Assessment (EIA)

The Consultant shall conduct all necessary environmental impact assessments and prepare suitable reports in support of the proposed ocean outfall.

G. Preparation of Construction Permit Application

The Consultant shall prepare applications for use by GWA in obtaining required permits for construction such as:

1. Army Corps of Engineers Permit
2. Territorial Seashore Protection Commission Permit

III. DESIGN CRITERIA

The design of improvements shall be accomplished in accordance with applicable criteria and standards of the following agencies:

A. Guam Waterworks Authority
B. U.S. Environmental Protection Agency
C. Army Corps of Engineers
D. Department of Public Works
E. Guam Environmental Protection Agency
F. The decision of the Contracting Officer shall prevail in the event of any conflicts or disputes regarding design criteria.

IV. REFERENCES

The Consultant shall refer primarily to the following publications for guidance on the design of the project:

A. Guam Island wide Wastewater Facilities Plan

B. GWA Standards for Sewerage System Planning, Design and Construction Materials (latest edition).

C. Dames & Moore report dated December 1994.

V. SUBMITTAL REQUIREMENTS

The Consultant shall provide project submittals of specific items according to the following schedule:

	Submittal/Item	# of Copies	Schedule (in calendar days)
A.	**30% Design**	**10 copies**	**120 days after NTP**

1. Basis for Design Report complete with results of field investigations and engineering analyses, analysis of the feasibility of alternative outfall improvements and design calculations;
2. Topographic/Hydrographic Survey Maps;
3. Subsurface/Soils Investigation Report(s);
4. 30% complete drawings showing location, size and alignment (on plan)/configuration of proposed improvements.
5. 30% complete specification;
6. Preliminary Construction Cost Estimates;
7. Preliminary Permit Applications.

B.	**60% Design**	**10 copies**	**60 days after review and approval of 30% submittal**

1. 60% complete construction drawings;
2. 60% complete construction specifications;
3. Preliminary Construction Cost Estimate;
4. Final Basis for Design Report;
5. Design Calculations;
6. Final Permit Applications.

C.	**90% Design**	**10 copies**	**30 days after review and approval of 60% submittal**

1. 90% complete construction drawings;
2. 90% complete construction specifications;
3. Preliminary Construction Contract/Bid Documents;
4. Pre-final Construction Cost Estimate

5. Preliminary Anticipated Construction Schedule;

6. Final Design Calculations.

D. **Final Submittal** **Original + 10 copies** **30 days after review and approval of 90% submittal**

1. Final construction Drawings;

2. Final Construction Specifications;

3. Final Construction contract/Bid Documents

4. Final construction Cost Estimate;

5. Anticipated Construction Schedule;

6. List of shop drawings, brochures, samples, specifications, tests, etc. which are listed in the specifications as being required to be submitted by the construction contractor.

E. **APPOINTMENT OF PROJECT MANAGER**

The Consultant shall appoint a Project Manager, subject to the approval of Guam Waterworks Authority, who shall, at all times, be knowledgeable and have the authority to make decisions, provide and receive direction and make commitments regarding matters relating to the project.

VI. DESIGN REVIEW CONFERENCES

The Consultant shall participate in a "Pre-Design" conference at GWA within 14 days of Notice to Proceed with work to discuss and confirm contractual obligations and requirements with appropriate authorities.

Informal review conferences shall be conducted once per month, or more frequently at the discretion of the Contracting officer, for the purpose of reviewing the progress of the design of the project. The Consultant shall at each conference report project design status, demonstrate accomplishments and prepare conference minutes.

A formal Design Review Conference shall be conducted no later than 21 calendar days following each submittal for appropriate authorities to provide review conferences shall be held on-island and shall be attended by the designated Project Manager and principals or key project personnel of the Prime Consultant as well as Sub-consultants. The Consultant shall prepare minutes of each review conference.

GUAM WATERWORKS AUTHORITY

P.O. BOX 3010, Agana, Guam 96932

MONITORING SERVICES LABORATORY

Main Office Dededo Lab. Phone (671) 632-9697 Fax (671-2592
Joanne Boyd, Agana Wastewater Lab. Phone / Fax (671) 472-1338

INTRAOFFICE MEMORANDUM

Date: 3/16/98
To: Mark Miller
From: Joanne Boyd, Biologist III
RE: Outfall extension A&E and 301(h) application.

I have attached a copy of the questions that I addressed in the 301(h) application. Several of these questions will need to be addressed for the outfall extensions. I think it would be a good idea if we could provide copies of these questions from the "Amended 301(h) technical support document" provided to us by USEPA. It outlines the specifics needed to answer the questions fully and to their satisfaction. By providing the A&E with copies we should be assured that all nessecary baseline information is gathered. It would be great if we could get them to answer these questions in some sort of report. Either way at least we would have all the data required to answer these questions when the time comes.

circled questions need to be addressed as part of A & G baseline report. See technical support document for 301(h) application, for specifics each question

II. B. Receiving Water Description

II.B.1. Are you applying for a modification based on a discharge into the ocean or to saline estuary?

II.B.2. Is your current discharge or modified discharge to stressed waters as defined by 40 CFR 125.58(z)?

II.B.3. Provide a description and data on the seasonal circulation patterns in the vicinity of your current or modified discharge(s).

II.B.4. Oceanographic conditions in the vicinity of the current and proposed modified discharge(s). Provide the following:

- Lowest percentile current speed
- Predominant current speed and direction during four seasons
- Periods of maximum stratification (months)
- Density profiles during periods of maximum stratification

II.B.5. Do the receiving waters for your discharge contain significant amounts of effluent previously discharged from treatment works for which you are applying for a section 301(h) modified permit?

II.B.6. Ambient water quality conditions during the period(s) of maximum stratification: at the zone of initial dilution (ZID) boundary, at other areas of potential impact and at control stations.

a. Provide profiles with depth on the following for the current discharge location and for the modified discharge location, if different from the current discharge:
   - BOD_5 (mg/L) (not measured)
   - Dissolved oxygen
   - Suspended solids (mg/L) (not measured)
   - pH
   - Temperature (°C)
   - Salinity
   - Turbidity
   - Other significant variables

c. Are there other periods when receiving water quality conditions may be more critical than period(s) of maximum stratification?

II.B.7. provide data on steady state sediment dissolved oxygen demand and oxygen demand due to resuspension of sediments in the vicinity of the discharge. (mg/L/day).

II. C. Biological Conditions

II.C.1 Provide a detailed description of representative biological communities in the vicinity of your current and modified discharge(s)

II.C.2. a. Are distinctive habitats of limited distribution (such as kelp beds or coral reef) located in areas potentially affected by the modified discharge?

II.C.3. a. Are commercial or recreational fisheries located in areas potentially affected by the discharge?

b. If yes, provide information on types, location and value of fisheries

III.A. Physical Characteristics of the Discharge

III.A.1 What is the critical initial dilution for your current and modified discharge(s) during 1) the period(s) of maximum stratification? and 2) any other critical periods(s) of discharge volume/composition, water quality, biological seasons, or oceanographic conditions?

may be able to give info on expected initial dilution based on design

III.A.2 What are the dimensions of the zone of initial dilution for your modified discharge(s)

III.A.3. What are the effects of ambient currents and stratification on dispersion and transport of the discharge plume/wastefield ?

III.A.4. only small discharges must respond

III.A.5. Sedimentation of Suspended Solids

a. What fraction of the modified discharge's suspended solids will accumulate within the vicinity of the modified discharge?

b. What are the calculated area(s) and rate(s) of sediment accumulation within the vicinity of the modified discharge(s) ($g/m^2/yr$)?

c. What is the fate of settleable solids transported beyond the calculated sediment accumulation area?

III.B. Compliance with Applicable Water Quality Standards and CWA 304(a)(1) water quality criteria [40 CFR 125.61(b) and 125.62(a)].

May be able to make predictions on these questions in this section?

III.B.1. What is the concentration of dissolved oxygen immediately following initial dilution for the period(s) of maximum stratification and any other critical periods(s) of discharge volume/composition, water quality, biological seasons, or oceanographic conditions?

III.B.2. What is the farfield dissolved oxygen depression and resulting concentration due to BOD exertion of the wastefield during period(s) of maximum stratification any other critical periods(s)?

III.B.3. What are the dissolved oxygen depressions and resulting concentration near the bottom due to steady sediment demand and resuspension of sediments?

III.B.4. What is the increase in receiving water suspended solids concentration immediately following initial dilution of the modified discharge(s)?

III.B.5. What is the change in receiving water pH immediately following initial dilution of the modified discharge(s) ?

III.B.6. Does (will) the modified discharge comply with applicable water quality standards for:
- Dissolved Oxygen?
- Suspended Solids or surrogate standards?
- pH?

III.B.7. Provide data to demonstrate that all applicable State water quality standards, and all applicable water quality criteria established under Section 304(a)(1) of the Clean Water Act for which there are no directly corresponding numerical applicable water quality standards approved by EPA, are met at and beyond the boundary of the ZID under critical environmental and treatment plant conditions in the waters surrounding or adjacent to the point at which your effluent is discharged.

III.B.8. Provide the determination required by 40 CFR 125.61(b)(2) for compliance with all applicable provisions of State law, including water quality standards or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

III. C. Impact on Public Water Supplies.

III.C.1. Is there a planned or existing public water supply (desalinization facility) intake in the vicinity of the current or modified discharge?

III.D. Biological Impact of Discharge

III.D.1. Does (will) a balanced indigenous population of shellfish, fish, and existing wildlife exist:

- Immediately beyond the ZID of the current and modified discharge(s)?

- In all other areas beyond the ZID where marine life is actually or potentially affected by the current and modified permit.

III.D.2. Have distinctive habitats of limited distribution been impacted adversely by the current discharge and will such habitats be impacted adversely by the modified discharge?

III.D.3. Have commercial or recreational fisheries been impacted adversely by the current discharge (e.g. warnings, restrictions, closures, or mass mortalities) or will they be impacted adversely by the modified discharge?

III.D.4. Does the current or modified discharge cause the following within or beyond the ZID

- Mass mortality of fishes or invertebrates due to oxygen depletion, high concentrations of toxics, or other conditions?
- An increase incidence of disease in marine organisms?
- An abnormal body burden of any toxic material in marine organisms?
- Any other extreme, adverse biological impacts?

III.E. Impacts of Discharge on Recreational Activities

III.E.1. Describe the existing or potential recreational activities likely to be affected by the modified discharge(s) beyond the zone of initial dilution.

III. E.2. What are the existing and potential impacts of the modified discharge(s) on recreational activities? Your answer should include, but not be limited to, a discussion of fecal coliform bacteria.

III.E.3. Are there any Federal, State, or local restrictions on recreational activities in the vicinity of the modified discharge(s). If yes, describe the restrictions and provide citations to available references.

III.E.4. If such restrictions exist, would such restrictions be lifted or modified if you were discharging a secondary treatment effluent

III.F Establishment of a Monitoring Program

III.F.1. Describe the biological, water quality and effluent monitoring programs which you propose to meet the criteria of 40 CFR 125.63. Only those scientific investigations that are necessary to study the effects of the proposed discharge should be included in the scope of the 301(h) monitoring program.

III.F.2. Describe the sampling techniques, schedules, and locations, analytical techniques, quality control and verification procedures to be used.

III.F.3. Describe the personnel and financial resources available to implement the monitoring programs upon issuance of a modified permit and to carry it out for the life of the modified permit.

III.G Effect of Discharge on Other Point and Nonpoint Sources

III.G.1. Does (will) your modified discharge(s) cause additional treatment or control requirements for any other point or nonpoint pollution source(s)?

III.G.2. Provide the determination required by 40 CFR 125.64(b) or, if the determination has not yet been received, a copy of a letter to the appropriate agency(s) requesting the required determination.

III. H. Toxics Control Program and Urban Area Pretreatment Program [40 CFR 125.65 and 125.66]

III.H.1. a. Do you have any known or susupected industrial sources of toxic pollutants or pesticides?

b. If no, provide the certification required by 40 CFR 125.66(c)(2) for large discharges.

c. Provide the results of wet and dry weather effluent analysis for toxic pollutants and pesticides as required by 40 CFR 125.66(a)(1).

d. Provide analysis of known or suspected industrial sources of toxic pollutants and pesticides identified in 1(c) above in accordance with 40 CFR 125.66(b).

III.H.2. a. Are there any known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides from your modified discharge?

b. If no provide the certification required by 40 CFR 125.66(d)(2) together with available supporting data.

c. If yes, provide a schedule for the development and implementation of nonindustrial toxics control programs to meet the requirements of 40 CFR 125.66(d)(3).

d. Provide a schedule for the development and implementation of nonindustrial toxics control programs to meet the requirements of 40 CFR 125.66(d)(3).

III.H.3. Describe the public education program you propose to minimize the entrance of nonindustrial toxic pollutants and pesticides into your treatment system [40 CFR 125.66(d)(1)]

III.H.4. Do you have an approved industrial pretreatment program (40 CFR 125.66(c)(1)?

a. If yes, provide the date of EPA approval.

b. If no, and if required by 40 CFR Part 403 to have an industrial pretreatment program, provide a proposed schedule for development and implementation of your industrial pretreatment program to meet the requirements of 40 CFR Part 403.

III.H.5. Urban area pretreatment requirement [40 CFR 125.65]
Discharges serving a population of 50,000 or greater must respond.

a. Provide data on all toxic pollutants introduced into the treatment works from industrial sources (categorical and noncategorical).

b. Note whether applicable pretreatment requirements are in effect for each toxic pollutant. Are industrial sources introducing such toxic pollutants in compliance with all of their pretreatment requirements? Are the pretreatment requirements being enforced? [40 CFR 125.65(b)(2)]

c. If applicable pretreatment requirements do not exist for each toxic pollutant in the POTW effluent introduced by industrial sources,
   - provide a description and a schedule for your development and implementation of applicable pretreatment requirements [40 CFR 125.65(c)], or
   - describe how you propose to demonstrate secondary removal equivalency for each of those toxic pollutants, including a schedule for compliance, by using a secondary treatment pilot plant. [40 CFR 125.65(d)].

APPENDIX K

Wastewater Treatment Plant

Pipeline Profile

DRAWINGS

APPENDIX L

Outfall Sewer and Diffuser Details

DRAWING

APPENDIX M

Sewage Reversion Project Overall
Site Plan

Site Plan Mamajanao Pump Station

Site Plan Fujita Pump Station

DRAWINGS

APPENDIX N

Plan and Profile Outfall Sewer Wastewater Treatment Plant to Sta. 24+50; Sta. 24+50 to Sta. 54+00; Sta. 54+00 to Sta. 62+25.69; Sta. 14+79 to Sta. 30+00

DRAWINGS

END OF DOCUMENT