301(h) MODIFIED PERMIT APPLICATION

AGANA

SEWAGE TREATMENT PLANT

Rec'd L Lee
JUL 10 2000

GUAM WATERWORKS AUTHORITY
Government of Guam
Post Office Box 3010, Agana, Guam 96932
Phone: (671)479-7823 Fax: (671)479-7879

JUN 3 0 2000

Norman L. Lovelace
Manager, Pacific Insular Area Programs
U.S. Environmental Protection Agency
Pacific Insular Areas Program
75 Hawthorne Street (CMD-5)
San Francisco, CA 94105

Re: Revised NPDES Permit Application for the Agana Wastewater Treatment Plant

Dear Norman,

Enclosed is GWA's revised NPDES permit application for the Agana Wastewater Treatment Plant. The information provided on the application is the latest regarding the operation, maintenance, and scheduled improvements for the plant. While we have basically completed all of the pertinent sections of the application, we acknowledge and have made note of the one section left incomplete. GWA is presently in the process of conducting a Priority Pollutant Scan for the Agana WWTP and will forward the results as soon as they are made available.

According to GMP Associates Inc. (consultant for the design and construction of the outfall extensions), they received approval (May 12, 2000) from the Army Corps of Engineers for the test boring of the Agana and Northern District reef lines. GMP and its subcontractor have recently mobilized to and have begun work on the Northern District reef line. Although work has already begun at the Northern District reef site, GMP is still in the process of preparing the construction schedules for both the Agana and Northern District WWTPs outfall extensions. Rather than wait for the schedules, GWA has decided to submit its NPDES application for the Agana WWTP and will forward the construction schedules as soon as they become available.

Submission of the receiving water quality and biological monitoring information requested on the outfall extensions i.e. baseline monitoring, effluent quality data, etc., will commence as soon as the outfall site locations have been established. GWA will keep you updated on the status of the exploratory test boring and subsequent matters surrounding the outfall extension.

Please advise me if additional information is needed to complete the application process. I can be reached at (671) 479-7823, fax (671) 479-7879 or e-mail at hjjohn@ite.net.

Sincerely,

Herbert J. Johnston
General Manager

REVISED

NPDES 301(h) MODIFIED
PERMIT APPLICATION

AGANA
SEWAGE TREATMENT PLANT

REVISED SECTION

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SIGNITORY & CERTIFICATION STATMENT

GUAM WATERWORKS AUTHORITY
Aturidat Kinalamten Hanon Guahan
Government of Guam
P.O. Box 3010, Agana, Guam 96932
Phone: (671) 479-7823 • Fax: (671) 479-7879

I certify that I am the General Manager (Acting) of the Guam Waterworks Authority having responsibility for the overall operations of the Authority.

****

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for the knowing violations.

May 26, 2000

NPDES Application
Public Agency

Herbert J. Johnston
General Manager
May 26, 2000
Guam Waterworks Authority
(671) 479-7823

2

NPDES FORM 1 & FORM 2A

Please print or type in the unshaded areas only
(fill—in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved. OMB No. 2040-0086.

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F GU0020087 D

LABEL ITEMS

- II. EPA I.D. NUMBER
- III. FACILITY NAME
- V. FACILITY MAILING ADDRESS
- VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill—in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill—in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold—faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a discharge to waters of the U.S.? (FORM 2A)	X		X
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X	
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)		X	
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP AGANA SEWAGE TREATMENT PLANT

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
2 REYES, EDWARD, WASTEWATER MANAGER	671 479 7823

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX	B. CITY OR TOWN	C. STATE	D. ZIP CODE
3 P.O. Box 3010	4 HAGATNA	GU	96932

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER	B. COUNTY NAME
5 MARINE DRIVE, ROUTE 1	

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6 HAGATNA	GU	96932	

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII. SIC CODES (4-digit, in order of priority)

A. FIRST	B. SECOND
4941 (specify) WATER SUPPLY	4952 (specify) SEWAGE
C. THIRD	**D. FOURTH**
(specify)	(specify)

VIII. OPERATOR INFORMATION

A. NAME

GUAM WATERWORKS AUTHORITY

B. Is the name listed in Item VIII-A also the owner? ☒ YES ☐ NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL; S = STATE; P = PRIVATE; M = PUBLIC (other than federal or state); O = OTHER (specify)

M (specify)

D. PHONE (area code & no.)

A 671 479 7823

E. STREET OR P.O. BOX

P.O. Box 3010

F. CITY OR TOWN	G. STATE	H. ZIP CODE
HAGATNA	GU	96932

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)
9 N	9 P
B. UIC (Underground Injection of Fluids)	**E. OTHER (specify)**
9 U	9 GU0020087 (specify) OCEAN OUTFALL
C. RCRA (Hazardous Wastes)	**E. OTHER (specify)**
R	9 (specify)

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

1. Production and distribution of municipal potable water

2. Collection and treatment of municipal wastewater

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the 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.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
Herbert J. Johnston General Manager, Acting		6-30-00

COMMENTS FOR OFFICIAL USE ONLY

C

EPA Form 3510-1 (8-90)

FACILITY NAME AND PERMIT NUMBER:

AGANA WWTP GU0020087

Form Approved 1/14/99
OMB Number 2040-0086

FORM 2A NPDES

NPDES FORM 2A APPLICATION OVERVIEW

APPLICATION OVERVIEW

Form 2A has been developed in a modular format and consists of a "Basic Application Information" packet and a "Supplemental Application Information" packet. The Basic Application Information packet is divided into two parts. All applicants must complete Parts A and C. Applicants with a design flow greater than or equal to 0.1 mgd must also complete Part B. Some applicants must also complete the Supplemental Application Information packet. The following items explain which parts of Form 2A you must complete.

BASIC APPLICATION INFORMATION:

A. **Basic Application Information for all Applicants.** All applicants must complete questions A.1 through A.8. A treatment works that discharges effluent to surface waters of the United States must also answer questions A.9 through A.12.

B. **Additional Application Information for Applicants with a Design Flow ≥ 0.1 mgd.** All treatment works that have design flows greater than or equal to 0.1 million gallons per day must complete questions B.1 through B.6.

C. **Certification.** All applicants must complete Part C (Certification).

SUPPLEMENTAL APPLICATION INFORMATION:

D. **Expanded Effluent Testing Data.** A treatment works that discharges effluent to surface waters of the United States and meets one or more of the following criteria must complete Part D (Expanded Effluent Testing Data):

1. Has a design flow rate greater than or equal to 1 mgd,
2. Is required to have a pretreatment program (or has one in place), or
3. Is otherwise required by the permitting authority to provide the information.

E. **Toxicity Testing Data.** A treatment works that meets one or more of the following criteria must complete Part E (Toxicity Testing Data):

1. Has a design flow rate greater than or equal to 1 mgd,
2. Is required to have a pretreatment program (or has one in place), or
3. Is otherwise required by the permitting authority to submit results of toxicity testing.

F. **Industrial User Discharges and RCRA/CERCLA Wastes.** A treatment works that accepts process wastewater from any significant industrial users (SIUs) or receives RCRA or CERCLA wastes must complete Part F (Industrial User Discharges and RCRA/CERCLA Wastes). SIUs are defined as:

1. All industrial users subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations (CFR) 403.6 and 40 CFR Chapter I, Subchapter N (see instructions); and
2. Any other industrial user that:
   a. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions); or
   b. Contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the treatment plant; or
   c. Is designated as an SIU by the control authority.

G. **Combined Sewer Systems.** A treatment works that has a combined sewer system must complete Part G (Combined Sewer Systems).

ALL APPLICANTS MUST COMPLETE PART C (CERTIFICATION)

FACILITY NAME AND PERMIT NUMBER:

AGANA WWTP GU0020087

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OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART A. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS:

All treatment works must complete questions A.1 through A.8 of this Basic Application Information packet.

A.1. Facility Information.

Facility name: AGANA WASTEWATER TREATMENT PLANT

Mailing Address: P.O.BOX 3010
HAGATNA, GUAM 96932

Contact person: HERBERT J. JOHNSTON

Title: GENERAL MANAGER, ACTING

Telephone number: 671-479-7823

Facility Address (not P.O. Box): MARINE DRIVE, ROUTE 1
HAGATNA, GUAM 96932

A.2. Applicant Information. If the applicant is different from the above, provide the following:

Applicant name:

Mailing Address:

Contact person:

Title:

Telephone number:

Is the applicant the owner or operator (or both) of the treatment works?

X owner X operator

Indicate whether correspondence regarding this permit should be directed to the facility or the applicant.

___ facility X applicant

A.3. Existing Environmental Permits. Provide the permit number of any existing environmental permits that have been issued to the treatment works (include state-issued permits).

NPDES GU0020087 PSD

UIC Other

RCRA Other

A.4. Collection System Information. Provide information on municipalities and areas served by the facility. Provide the name and population of each entity and, if known, provide information on the type of collection system (combined vs. separate) and its ownership (municipal, private, etc.).

Name	Population Served	Type of Collection System	Ownership
Asan, Piti, Yona	7,965	Separate	Public
Central Guam, Tamuning	62,180	Separate	Public
Military	12,700	Separate	Public
Total population served	82,645		

A.5. Indian Country.

a. Is the treatment works located in Indian Country?

_____ Yes X No

b. Does the treatment works discharge to a receiving water that is either in Indian Countryor that is upstream from (and eventually flows through) Indian Country?

_____ Yes X No

A.6. Flow. Indicate the design flow rate of the treatment plant (i.e., the wastewater flow rate that the plant was built to handle). Also provide the average daily flow rate and maximum daily flow rate for each of the last three years. Each year's data must be based on a 12-month time period with the 12th month of "this year" occurring no more than three months prior to this application submittal.

a. Design flow rate 17.0 mgd

	Two Years Ago	Last Year	This Year	
b. Annual average daily flow rate	8.13	8.15	9.34	mgd
c. Maximum daily flow rate	9.61	9.06	11.04	mgd

A.7. Collection System. Indicate the type(s) of collection system(s) used by the treatment plant. Check all that apply. Also estimate the percent contribution (by miles) of each.

X	Separate sanitary sewer	100 %
N/A	Combined storm and sanitary sewer	_____ %

A.8. Discharges and Other Disposal Methods.

a. Does the treatment works discharge effluent to waters ofthe U.S.? X Yes _____ No

If yes, list how many of each of the following types of discharge points the treatment works uses:

i. Discharges of treated effluent 1

ii. Discharges of untreated or partially treated effluent N/A

iii. Combined sewer overflow points N/A

iv. Constructed emergency overflows (prior to theheadworks) N/A

v. Other N/A _____

b. Does the treatment works discharge effluent to basins, ponds, or other surfaceimpoundments that do not have outlets for discharge to waters of the U.S.? _____ Yes X No

If yes, provide the following for each surface impoundment:

Location: _____

Annual average daily volume discharged to surface impoundment(s) _____ mgd

Is discharge _____ continuous or _____ intermittent?

c. Does the treatment works land-apply treated wastewater? _____ Yes X No

If yes, provide the following for each land application site:

Location: _____

Number of acres: _____

Annual average daily volume applied to site: _____ Mgd

Is land application _____ continuous or _____ intermittent?

d. Does the treatment works discharge or transport treated or untreated wastewater to another treatment works? _____ Yes X No

If yes, describe the mean(s) by which the wastewater from the treatment works is discharged or transported to the other treatment works (e.g., tank truck, pipe).

If transport is by a party other than the applicant, provide:

Transporter name: N/A

Mailing Address:

Contact person:

Title:

Telephone number:

For each treatment works that receives this discharge, provide the following:

Name: N/A

Mailing Address:

Contact person:

Title:

Telephone number:

If known, provide the NPDES permit number of the treatment works that receives this discharge.

Provide the average daily flow rate from the treatment works into the receiving facility. _____ mgd

e. Does the treatment works discharge or dispose of its wastewater in a manner not included in A.8.a through A.8.d above (e.g., underground percolation, well injection)? _____ Yes X No

If yes, provide the following for each disposal method:

Description of method (including location and size of site(s) if applicable):

Annual daily volume disposed of by this method:

Is disposal through this method _____ continuous or _____ intermittent?

FACILITY NAME AND PERMIT NUMBER:

AGANA WWTP GU0020087

Form Approved 1/14/99
OMB Number 2040-0086

WASTEWATER DISCHARGES:

If you answered "yes" to question A.8.a, complete questions A.9 through A.12 **once for each outfall** (including bypass points) through which effluent is discharged. Do not include information on combined sewer overflows in this section. **If you answered "no" to question A.8.a**, go to Part B, "Additional Application Information for Applicants with a Design Flow Greater than or Equal to 0.1mgd."

A.9. Description of Outfall.

a. Outfall number: 001

b. Location: HAGATNA (City or town, if applicable); 96932 (Zip Code); GUAM (County); (State)

13DEG.29MIN.3.3SEC. (Latitude); 144DEG.44MIN.37.1SEC. (Longitude)

c. Distance from shore (if applicable): 2,875 ft.

d. Depth below surface (if applicable): 85 ft.

e. Average daily flow rate: 8.92 mgd

f. Does this outfall have either an intermittent or a periodic discharge? ____ Yes X No (go to A.9.g.)

If yes, provide the following information:

Number of times per year discharge occurs: ____

Average duration of each discharge: ____

Average flow per discharge: ____ mgd

Months in which discharge occurs: ____

g. Is outfall equipped with a diffuser? X Yes ____ No

A.10. Description of Receiving Waters.

a. Name of receiving water: PHILIPPINE SEA

b. Name of watershed (if known): N/A

United States Soil Conservation Service 14-digit watershed code (if known): ____

c. Name of State Management/River Basin (if known): N/A

United States Geological Survey 8-digit hydrologic cataloging unit code (if known): ____

d. Critical low flow of receiving stream (if applicable):
acute N/A cfs chronic N/A cfs

e. Total hardness of receiving stream at critical low flow (if applicable): N/A mg/l of $CaCO_3$

FACILITY NAME AND PERMIT NUMBER:

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A.11. Description of Treatment.

a. What levels of treatment are provided? Check all that apply.

X Primary _____ Secondary

_____ Advanced _____ Other. Describe: _____

b. Indicate the following removal rates (as applicable):

Design BOD_5 removal or Design $CBOD_5$ removal	25.40	%
Design SS removal	40-60	%
Design P removal	Not given	%
Design N removal	Not given	%
Other N/A		%

c. What type of disinfection is used for the effluent from this outfall? If disinfection varies by season, please describe.

Chlorine; but no longer in use. No disinfection performed at this plant.

If disinfection is by chlorination, is dechlorination used for this outfall? _____ Yes X No

d. Does the treatment plant have post aeration? _____ Yes X No

A.12. Effluent Testing Information. All Applicants that discharge to waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three samples and must be no more than four and one-half years apart.

Outfall number: 001

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	Value	Units	Value	Units	Number of Samples
pH (Minimum)	7.01	s.u.			
pH (Maximum)	7.44	s.u.			
Flow Rate	11.5	mgd	8.39	mgd	365
Temperature (Winter)	N/S		N/S		
Temperature (Summer)	N/S		N/S		

* For pH please report a minimum and a maximum daily value

POLLUTANT		MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML / MDL
		Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NONCONVENTIONAL COMPOUNDS.								
BIOCHEMICAL OXYGEN DEMAND (Report one)	BOD-5	122	mg/L	101	mg/L	52	Standard	
	CBOD-5	N/S		N/S				
FECAL COLIFORM		N/S		N/S				
TOTAL SUSPENDED SOLIDS (TSS)		94.67	mg/L	58.33	mg/L	52	Standard	

END OF PART A.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

AGANA WWTP GU0020087

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BASIC APPLICATION INFORMATION

PART B. ADDITIONAL APPLICATION INFORMATION FOR APPLICANTS WITH A DESIGN FLOW GREATER THAN OR EQUAL TO 0.1 MGD (100,000 gallons per day).

All applicants with a design flow rate ≥ 0.1 mgd must answer questions B.1 through B.6. All others go to Part C (Certification).

B.1. Inflow and Infiltration. Estimate the average number of gallons per day that flow into the treatment works from inflow and/or infiltration.

N/A gpd

Briefly explain any steps underway or planned to minimize inflow and infiltration.

_____

_____

B.2. Topographic Map. Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information. (You may submit more than one map if one map does not show the entire area.)

a. The area surrounding the treatment plant, including all unit processes.

b. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.

c. Each well where wastewater from the treatment plant is injected underground.

d. Wells, springs, other surface water bodies, and drinking water wells that are: 1) within 1/4 mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.

e. Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed.

f. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, and/or disposed.

B.3. Process Flow Diagram or Schematic. Provide a diagram showing the processes of the treatment plant, including all bypass piping and all backup power sources or redundancy in the system. Also provide a water balance showing all treatment units, including disinfection (e.g, chlorination and dechlorination). The water balance must show daily average flow rates at influent and discharge points and approximate daily flow rates between treatment units. Include a brief narrative description of the diagram.

B.4. Operation/Maintenance Performed by Contractor(s).

Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of a contractor? ____Yes X No

If yes, list the name, address, telephone number, and status of each contractor and describe the contractor's responsibilities (attach additional pages if necessary).

Name: _____

Mailing Address: _____

_____

Telephone Number: _____

Responsibilities of Contractor: _____

B.5. Scheduled Improvements and Schedules of Implementation. Provide information on any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses to question B.5 for each. (If none, go to question B.6.)

a. List the outfall number (assigned in question A.9) for each outfall that is covered by this implementation schedule.

001

b. Indicate whether the planned improvements or implementation schedule are required by local, State, or Federal agencies.

____Yes X No

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c If the answer to B.5.b is "Yes," briefly describe, including new maximum daily inflow rate (if applicable).

N/A

d. Provide dates imposed by any compliance schedule or any actual dates ofcompletion for the implementation steps listed below, as applicable. For improvements planned independently of local, State, or Federal agencies, indicate planned or actual completion dates, as applicable. Indicate dates as accurately as possible.

Implementation Stage	Schedule MM/DD/YYYY	Actual Completion MM/DD/YYYY
– Begin construction	10/30/2002	__/__/____
– End construction	10/30/2003	__/__/____
– Begin discharge	12/31/2003	__/__/____
– Attain operational level	01/30/2004	__/__/____

e. Have appropriate permits/clearances concerning other Federal/State requirements been obtained? X Yes ___No

Describe briefly: Permits for test drilling approved.(May 12, 2000)
Permit application for constrction to be submitted.

B.6. EFFLUENT TESTING DATA (GREATER THAN O.1 MGD ONLY).

Applicants that discharge to waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods foranalytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three pollutant scans and must be no more than four and one-half years old.

Outfall Number: 001

POLLUTANT	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML / MDL
	Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NONCONVENTIONAL COMPOUNDS.							
AMMONIA (as N)	N/A						
CHLORINE (TOTAL RESIDUAL, TRC)	N/A						
DISSOLVED OXYGEN	N/A						
TOTAL KJELDAHL NITROGEN (TKN)	N/A						
NITRATE PLUS NITRITE NITROGEN	N/A						
OIL and GREASE	N/A						
PHOSPHORUS (Total)	N/A						
TOTAL DISSOLVED SOLIDS (TDS)	N/A						
OTHER							

END OF PART B.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

* Priority Pollutant Scan in progress; results will be forwarded upon receipt.

Estimated date: October 2000

FACILITY NAME AND PERMIT NUMBER:

AGANA WWTP GU0020087

Form Approved 1/14/99
OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART C. CERTIFICATION

All applicants must complete the Certification Section. Refer to instructions to determine who is an officer for the purposes of this certification. All applicants must complete all applicable sections of Form 2A, as explained in the Application Overview. Indicate below which parts of Form 2A you have completed and are submitting. By signing this certification statement, applicants confirm that they have reviewed Form 2A and have completed all sections that apply to the facility for which this application is submitted.

Indicate which parts of Form 2A you have completed and are submitting:

X Basic Application Information packet

Supplemental Application Information packet:

* _____ Part D (Expanded Effluent Testing Data)

* _____ Part E (Toxicity Testing: Biomonitoring Data)

_____ Part F (Industrial User Discharges and RCRA/CERCLA Wastes)

_____ Part G (Combined Sewer Systems)

ALL APPLICANTS MUST COMPLETE THE FOLLOWING CERTIFICATION.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and official title: Herbert J. Johnston, General Manager, Acting

Signature: HJJ

Telephone number: 671-479-7823

Date signed: 6-30-00

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

SEND COMPLETED FORMS TO:

* Parts "D" and "E" will be sent as soon as possible. Estimated: October 2000

FACILITY NAME AND PERMIT NUMBER:

AGANA WWTP GU0020087

Form Approved 1/14/99
OMB Number 2040-0086

SUPPLEMENTAL APPLICATION INFORMATION

PART D. EXPANDED EFFLUENT TESTING DATA

Refer to the directions on the cover page to determine whether this section applies to the treatment works.

Effluent Testing: 1.0 mgd and Pretreatment Treatment Works. If the treatment works has a design flow greater than or equal to 1.0mgd or it has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then provide effluent testing data for the following pollutants. Provide the indicated effluent testing information and any other information required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analyses conducted using 40 CFR Part 136 methods. In addition, these data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods foranalytes not addressed by 40 CFR Part 136. Indicate in the blank rows provided below any data you may have on pollutants not specifically listed in this form. At a minimum,effluent testing data must be based on at least three pollutant scans and must be no more than four and one-half years old.

Outfall number: _____ (Complete once for eachoutfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS, AND HARDNESS.											
ANTIMONY											
ARSENIC											
BERYLLIUM											
CADMIUM											
CHROMIUM											
COPPER											
LEAD											
MERCURY											
NICKEL											
SELENIUM											
SILVER											
THALLIUM											
ZINC											
CYANIDE											
TOTAL PHENOLIC COMPOUNDS											
HARDNESS (AS $CaCO_3$)											
Use this space (or a separate sheet) to provide information on other metals requested by the permit writer.											

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Outfall number: _____ (Complete once for eachoutfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
VOLATILE ORGANIC COMPOUNDS.											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMOFORM											
CARBON TETRACHLORIDE											
CLOROBENZENE											
CHLORODIBROMO-METHANE											
CHLOROETHANE											
2-CHLORO-ETHYLVINYL ETHER											
CHLOROFORM											
DICHLOROBROMO-METHANE											
1,1-DICHLOROETHANE											
1,2-DICHLOROETHANE											
TRANS-1,2-DICHLORO-ETHYLENE											
1,1-DICHLOROETHYLENE											
1,2-DICHLOROPROPANE											
1,3-DICHLORO-PROPYLENE											
ETHYLBENZENE											
METHYL BROMIDE											
METHYL CHLORIDE											
METHYLENE CHLORIDE											
1,2,2-TETRACHLORO-ETHANE											
TETRACHLORO-ETHYLENE											
TOLUENE											

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Outfall number: _____ (Complete once for eachoutfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
1,1,1-TRICHLOROETHANE											
1,1,2-TRICHLOROETHANE											
TRICHLORETHYLENE											
VINYL CHLORIDE											
Use this space (or a separate sheet) to provide information on other volatile organic compounds requested by the permit writer.											
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL											
2-CHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
4,6-DINITRO-O-CRESOL											
2,4-DINITROPHENOL											
2-NITROPHENOL											
4-NITROPHENOL											
PENTACHLOROPHENOL											
PHENOL											
2,4,6-TRICHLOROPHENOL											
Use this space (or a separate sheet) to provide information on other acid-extractable compounds requested by the permit writer.											
BASE-NEUTRAL COMPOUNDS.											
ACENAPHTHENE											
ACENAPHTHYLENE											
ANTHRACENE											
BENZIDINE											
BENZO(A)ANTHRACENE											

BENZO(A)PYRENE											

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Outfall number: _____ (Complete once for eachoutfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
3,4 BENZO-FLUORANTHENE											
BENZO(GHI)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS (2-CHLOROETHOXY) METHANE											
BIS (2-CHLOROETHYL)-ETHER											
BIS (2-CHLOROISO-PROPYL) ETHER											
BIS (2-ETHYLHEXYL) PHTHALATE											
4-BROMOPHENYL PHENYL ETHER											
BUTYL BENZYL PHTHALATE											
2-CHLORONAPHTHALENE											
4-CHLORPHENYL PHENYL ETHER											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIBENZO(A,H) ANTHRACENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
3,3-DICHLOROBENZIDINE											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
2,4-DINITROTOLUENE											
2,6-DINITROTOLUENE											

1,2-DIPHENYLHYDRAZINE											

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Outfall number: _____ (Complete once for eachoutfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLO-PENTADIENE											
HEXACHLOROETHANE											
INDENO(1,2,3-CD)PYRENE											
ISOPHORONE											
NAPHTHALENE											
NITROBENZENE											
N-NITROSODI-N-PROPYLAMINE											
N-NITROSODI- METHYLAMINE											
N-NITROSODI-PHENYLAMINE											
PHENANTHRENE											
PYRENE											
1,2,4-TRICHLOROBENZENE											

Use this space (or a separate sheet) to provide information on other base-neutral compounds requested by the permit writer.

Use this space (or a separate sheet) to provide information on other pollutants (e.g., pesticides) requested by the permit writer.

END OF PART D.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

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SUPPLEMENTAL APPLICATION INFORMATION

PART E. TOXICITY TESTING DATA

POTWs meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points: 1) POTWs with a design flow rate greater than or equal to 1.0mgd; 2) POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403), or 3) POTWs required by the permitting authority to submit data for these parameters.

- At a minimum, these results must include quarterly testing for a 12-month period within the past 1 year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute and/or chronic toxicity, depending on the range of receiving water dilution. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- In addition, submit the results of any other whole effluent toxicity tests from the past four and one-half years. If a whole effluent toxicity test conducted during the past four and one-half years revealed toxicity, provide any information on the cause of the toxicity or any results of a toxicity reduction evaluation, if one was conducted.
- If you have already submitted any of the information requested in Part E, you need not submit it again. Rather, provide the information requested in question E.4 for previously submitted information. If EPA methods were not used, report the reasons for using alternate methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E.

If no biomonitoring data is required, do not complete Part E. Refer to the Application Overview for directions on which other sections of the form to complete.

E.1. Required Tests.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years.

____chronic ____acute

E.2. Individual Test Data. Complete the following chart for each whole effluent toxicity test conducted in the last four and one-half years. Allow one column per test (where each species constitutes a test). Copy this page if more than three tests are being reported.

Test number:_____ Test number:_____ Test number:_____

a. Test information.

Test species & test method number			
Age at initiation of test			
Outfall number			
Dates sample collected			
Date test started			
Duration			

b. Give toxicity test methods followed.

Manual title			
Edition number and year of publication			
Page number(s)			

c. Give the sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used.

24-Hour composite			
Grab			

d. Indicate where the sample was taken in relation to disinfection. (Check all that apply for each)

Before disinfection			
After disinfection			
After dechlorination			

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	Test number:_____	Test number:_____	Test number:_____
e. Describe the point in the treatment process at which the sample was collected.			
Sample was collected:			
f. For each test, include whether the test was intended to assess chronic toxicity, acute toxicity, or both.			
Chronic toxicity			
Acute toxicity			
g. Provide the type of test performed.			
Static			
Static-renewal			
Flow-through			
h. Source of dilution water. If laboratory water, specify type; if receiving water, specify source.			
Laboratory water			
Receiving water			
i. Type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh water			
Salt water			
j. Give the percentage effluent used for all concentrations in the test series.			
k. Parameters measured during the test. (State whether parameter meets test method specifications)			
pH			
Salinity			
Temperature			
Ammonia			
Dissolved oxygen			
l. Test Results.			
Acute:			
Percent survival in 100% effluent	%	%	%
LC_{50}			
95% C.I.	%	%	%
Control percent survival	%	%	%
Other (describe)			

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Chronic:			
NOEC	%	%	%
IC_{25}	%	%	%
Control percent survival	%	%	%
Other (describe)			

m. Quality Control/Quality Assurance.			
Is reference toxicant data available?			
Was reference toxicant test within acceptable bounds?			
What date was reference toxicant test run (MM/DD/YYYY)?			
Other (describe)			

E.3. Toxicity Reduction Evaluation. Is the treatment works involved in a Toxicity Reduction Evaluation?

____Yes____No If yes, describe: _____

_____

_____

E.4. Summary of Submitted Biomonitoring Test Information. If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date submitted: _____ (MM/DD/YYYY)

Summary of results: (see instructions)

_____

_____

END OF PART E.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE.

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SUPPLEMENTAL APPLICATION INFORMATION

PART F. INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

All treatment works receiving discharges from significant industrial users or which receive RCRA, CERCLA, or other remedial wastes must complete Part F.

GENERAL INFORMATION:

F.1. Pretreatment Program. Does the treatment works have, or is it subject to, an approved pretreatment program?

____Yes ____No

F.2. Number of Significant Industrial Users (SIUs) and Categorical Industrial Users (CIUs). Provide the number of each of the following types of industrial users that discharge to the treatment works.

a. Number of non-categorical SIUs. _____

b. Number of CIUs. _____

SIGNIFICANT INDUSTRIAL USER INFORMATION:

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, copy questions F.3 through F.8 and provide the information requested for each SIU.

F.3. Significant Industrial User Information. Provide the name and address of each SIU discharging to the treatment works. Submit additional pages as necessary.

Name: _____

Mailing Address: _____

_____

Not Applicable

F.4. Industrial Processes. Describe all of the industrial processes that affect or contribute to theSIU's discharge.

_____

F.5. Principal Product(s) and Raw Material(s). Describe all of the principal processes and raw materials that affect or contribute to theSIU's discharge.

Principal product(s): _____

Raw material(s): _____

F.6. Flow Rate.

a. Process wastewater flow rate. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day (gpd) and whether the discharge is continuous or intermittent.

_____ gpd (_____continuous or _____intermittent)

b. Non-process wastewater flow rate. Indicate the average daily volume of non-process wastewater flow discharged into the collection system in gallons per day (gpd) and whether the discharge is continuous or intermittent.

_____ gpd (_____continuous or _____intermittent)

F.7. Pretreatment Standards. Indicate whether the SIU is subject to the following:

a. Local limits ____Yes ____No

b. Categorical pretreatment standards ____Yes ____No

If subject to categorical pretreatment standards, which category and subcategory?

_____

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F.8. Problems at the Treatment Works Attributed to Waste Discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

____Yes ____No If yes, describe each episode.

RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE:

F.9. RCRA Waste. Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail, or dedicated pipe?
____Yes ___No (go to F.12.)

F.10. Waste Transport. Method by which RCRA waste is received (check all that apply):

_____Truck _____Rail _____Dedicated Pipe

F.11. Waste Description. Give EPA hazardous waste number and amount (volume or mass, specify units).

EPA Hazardous Waste Number	Amount	Units

CERCLA (SUPERFUND) WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER, AND OTHER REMEDIAL ACTIVITY WASTEWATER:

F.12. Remediation Waste. Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?

____Yes (complete F.13 through F.15.) ____No

Provide a list of sites and the requested information (F.13 - F.15.) for each current and future site.

NOT APPLICABLE

F.13. Waste Origin. Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).

F.14. Pollutants. List the hazardous constituents that are received (or are expected to be received). Include data on volume and concentration, if known. (Attach additional sheets if necessary).

F.15. Waste Treatment.

a. Is this waste treated (or will it be treated) prior to entering the treatment works?

____Yes ____No

If yes, describe the treatment (provide information about the removal efficiency):

b. Is the discharge (or will the discharge be) continuous or intermittent?

____Continuous ____Intermittent If intermittent, describe discharge schedule

END OF PART F.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

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SUPPLEMENTAL APPLICATION INFORMATION

PART G. COMBINED SEWER SYSTEMS

If the treatment works has a combined sewer system, complete Part G.

G.1. System Map. Provide a map indicating the following: (may be included with Basic Application Information)

a. All CSO discharge points.

b. Sensitive use areas potentially affected by CSOs (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems, and outstanding natural resource waters).

c. Waters that support threatened and endangered species potentially affected by CSOs.

G.2. System Diagram. Provide a diagram, either in the map provided in G.1. or on a separate drawing, of the combined sewer collection system that includes the following information:

a. Locations of major sewer trunk lines, both combined and separate sanitary.

b. Locations of points where separate sanitary sewers feed into the combined sewer system.

c. Locations of in-line and off-line storage structures.

d. Locations of flow-regulating devices.

e. Locations of pump stations.

CSO OUTFALLS:

Complete questions G.3 through G.6 once for each CSO discharge point.

G.3. Description of Outfall.

a. Outfall number _____

b. Location

_____
(City or town, if applicable) (Zip Code)

_____
(County) (State)

_____
(Latitude) (Longitude)

c. Distance from shore (if applicable) _____ ft.

d. Depth below surface (if applicable) _____ ft.

e. Which of the following were monitored during the last year for this CSO?

____Rainfall ____CSO pollutant concentrations ____CSO frequency

____CSO flow volume ____Receiving water quality

f. How many storm events were monitored during the last year? _____

NOT APPLICABLE

G.4. CSO Events.

a. Give the number of CSO events in the last year.

_____ events (___ actual or ___ approx.)

b. Give the average duration per CSO event.

_____ hours (____ actual or ____ approx.)

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c. Give the average volume per CSO event.

_____ million gallons (_____ actual or _____ approx.)

d. Give the minimum rainfall that caused a CSO event in the last year.

_____ inches of rainfall

G.5. Description of Receiving Waters.

a. Name of receiving water: _____

b. Name of watershed/river/stream system: _____

United States Soil Conservation Service 14-digit watershed code (if known): _____

c. Name of State Management/River Basin: _____

United States Geological Survey 8-digit hydrologic cataloging unit code (if known): _____

NOT APPLICABLE

G.6. CSO Operations.

Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shell fish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable State water quality standard).

_____

_____

END OF PART G.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE.

Additional information, if provided, will appear on the following pages.

3

Description of Treatment/Outfall System

(Drawing)

DRAWING

4

Summary Attachment

Summary Attachment for Revised 301 (h) Applications for Agana and Northern District WWTP's

Dissolved Oxygen

Dissolved oxygen (DO) profile surveys for both the Agana and Northern District offshore sites were initiated by Noda and Associates on Nov. 6, 1998 and continued until Nov. 14, 1998. The data shows that dissolved oxygen profiles range throughout the water columns from about 105% to 95% at Agana and about 100% to 96% at the Northern District offshore site. These results were expected as historic DO data showed concentrations near 100% saturation (See Appendix A).

Salinity

Salinity-temperature-depth (STD) profiles were also obtained between Nov. 6, 1998 and Nov. 14, 1998. From this information, density profile data were calculated. In general, the data obtained during the November 1998 field program indicates that the water column at both sites are essentially of uniform density to the 70 meter depth, which was the maximum extent of the profiling. This is a usual situation in Pacific water where the upper mixed layer is usually of the order of 100 meters from the surface. If the density profile data from the Agana and Northern District sites are overlaid together, the data are very similar, which would be expected due to the relatively close proximity between the two sites. Historic reports illustrate similar data that enforces the STD study (See Appendix B).

Currents

A 6-day mooring study was conducted by Noda and Associates in both Agana and Northern Districts. Two current meters were deployed on November 7, 1998, one of which was placed at the 205-foot contour in Agana District located at 13-29.09N Latitude and 144-44.65E Longitude. This meter was set at a sensor depth of 108 feet (33 meters) and at a bottom depth of 200 feet (61 meters). Magnetic declination was set at 1.8 degrees. At the nominal depth of 108 feet of water the sensor moved toward the southwest-southeast at a mean speed of 0.2 feet per second (0.06 m/s). The speed varied from 0.0 to 0.8 foot per second (0.2 m/s).

The second current meter position was set at the 195-foot contour in Northern District located at 13-33.13N Latitude and 144-48.26E Longitude. The nominal depth was located 89 feet (27 meters) deep with a bottom depth of 190 feet (58 meters). Magnetic declination was also set at 1.8 degrees. At a depth of 89 feet of water the meter sensor moved northeasterly-south at a mean speed of 0.3 feet per second (0.08 m/s). Speeds ranged between 0.0 to 1.1 feet per second (0.3 m/s) (See Appendix C). Both meters were retrieved on November 13, 1998.

Waves

Wave and wave climate at the Agana and Northern districts have been addressed by Noda and Associates (See Appendix D). Profiles of typical wind and deepwater wave conditions to be

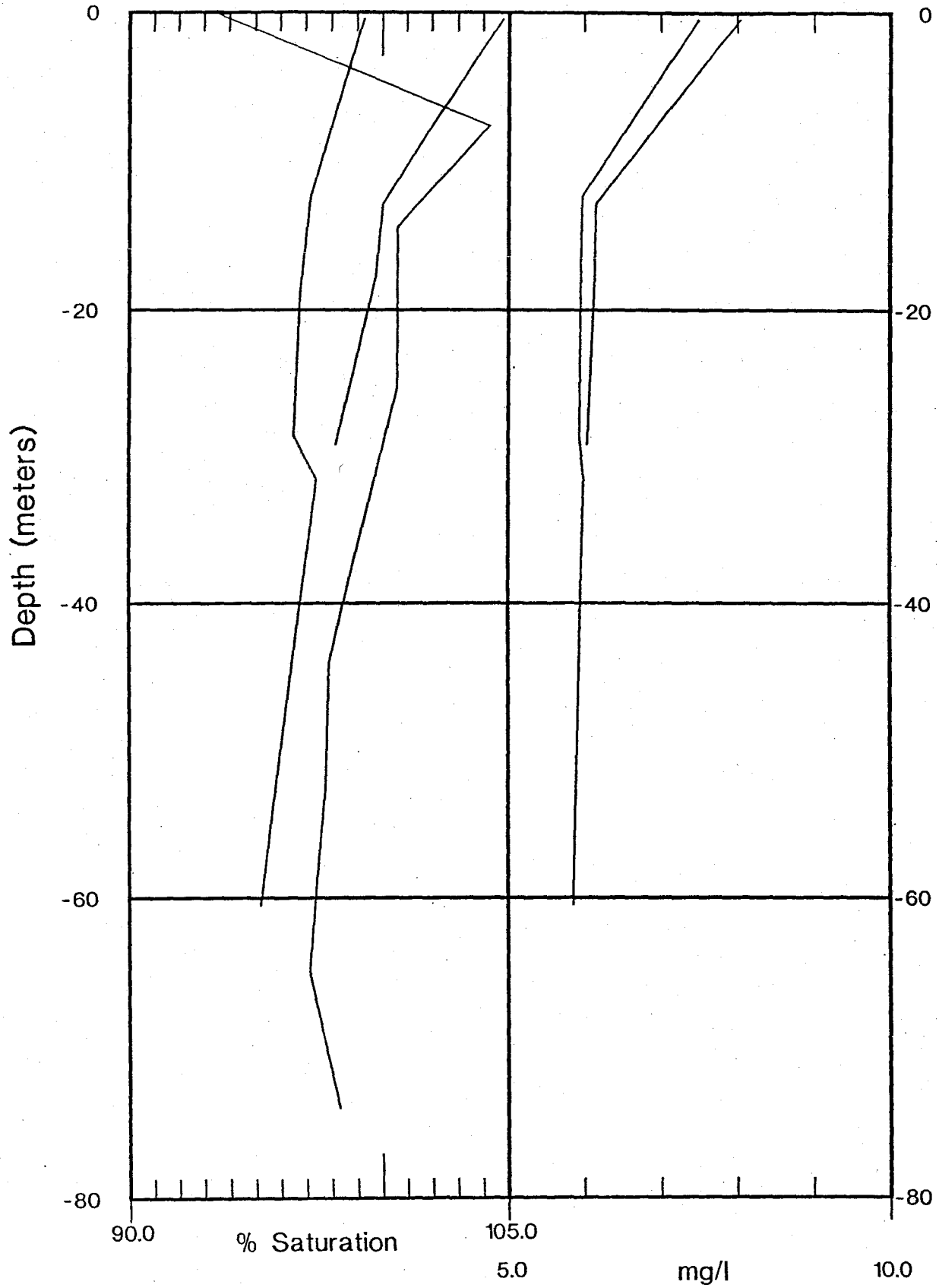
expected at the site was developed from data contained in the Summary of Synoptic Meteorological Observations (SSMO). Preliminary evaluations of monthly typical historic wave conditions at the Agana and Northern District outfall locations showed that May and possibly June are the months with the lowest frequency of wave occurrence. Percent occurrence of wave activity increase significantly in July and continues to increase towards the end of the year.

All major tropical cyclone evens from 1946-1997 which have significantly affected Guam were computer simulated using a moving hurricane model which has been calibrated and verified for Pacific hurricanes and typhoons. The model generates graphical displays of the two-dimensional surface wind field, wave field and wave period fields as well as tabular outputs for a cross-section passing through the maximum winds. The maximum offshore wave conditions were determined from a hindcast analysis of Typhoon Paka 1997. Maximum wave-induced velocity and accelerations as a function of a water depth were developed using Dean's Stream Function Theory for nonlinear waves.

In additon, a wave refraction analysis was performed for each site. A computer wave refraction analysis was performed for periods ranging from 8-16 seconds, and for all possible wave directions. The wave refraction coefficient K_r was determined for each wave period and for various wave approach directions. The refraction model grid area is shown in Appendix D. The bathymetric grid consisted of 15 points in the north-south direction and 28 points in the east-west direction, with a grid size of 250 feet. The refraction analysis was perfomed for the proposed offshore diffuser in Agana at a water depth of approximately 200 feet. The analysis shows that waves approaching from about 350°T through 20°T undergo little or no refraction effects since these waves approach perpendicular to the offshore bottom contours. The refraction analysis was perfomed for the proposed offshore diffuser in Northern District at a water depth of approximately 190 feet. The analysis shows that waves approaching from about 270°T undergo little or no refraction effects since these waves approach perpendicular to the offshore bottom contours. Appendix D includes figures that show the variation of refraction coefficient as a function of deepwater approach direction, for wave periods from 10 to 16 seconds.

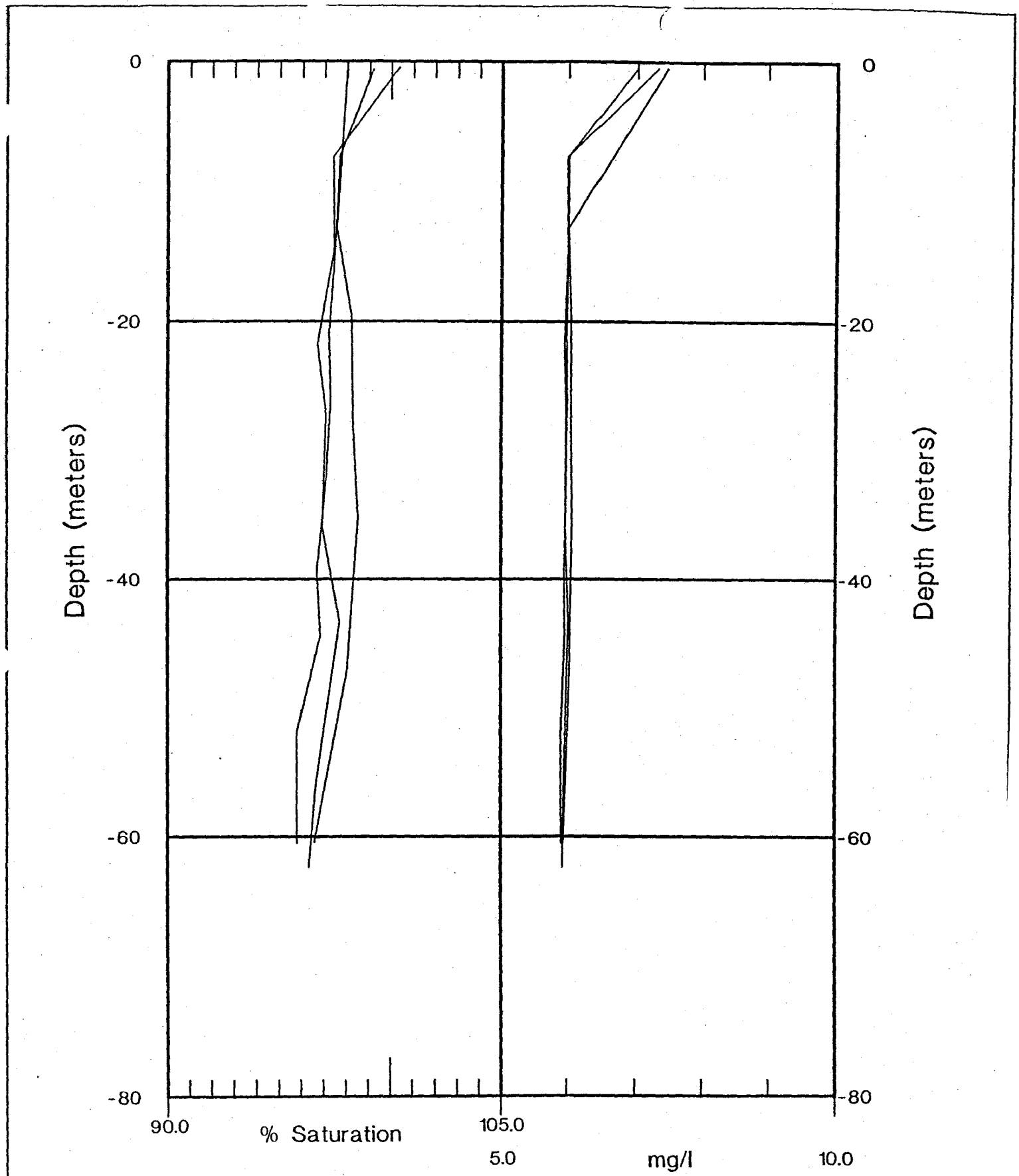
APPENDIX A:

DISSOLVED OXYGEN PROFILES



DISSOLVED OXYGEN

Edward K. Noda and Associates, Inc.	AGANA SEWAGE TREATMENT PLANT OUTFALL EXTENSION	Agana STP Dissolved Oxygen Profiles Measured During Nov. 6-13, 1998	FIGURE



DISSOLVED OXYGEN

Edward K. Noda and Associates, Inc.	NORTHERN DISTRICT SEWAGE TREATMENT PLANT OUTFALL EXTENSION	Northern District STP Dissolved Oxygen Profiles Measured During Nov. 6-13, 1998	FIGURE

APPENDIX B:

SALINITY-TEMPERATURE-DEPTH PROFILES

AGANA WWTP DISSOLVED OXYGEN(DO) PROFILE DATA OBTAINED
DURING NOV. 6-13, 1998 BY EDWARD K. NODA AND ASSOCIATES, INC.
(Lat. and Long. in WGS 83)

MONTH	DAY	YEAR	DEPTH (meters)	DO Pct Sat	DO mg/l	TEMP (C)	Cond mS/cm	Turb NTUs	pH	ORP mV	Lat.	Long.
11	6	98	0.10	93.5	0.00	30.33	0.71	3	7.10	290	13 29 14.72N	144 44 41.14E
11	6	98	7.62	104.2	0.00	29.18	1.18	0	8.23	348	13 29 14.72N	144 44 41.14E
11	6	98	14.36	100.6	0.00	29.12	1.10	0	8.24	333	13 29 14.72N	144 44 41.14E
11	6	98	25.30	100.6	0.00	29.09	1.10	0	8.25	327	13 29 14.72N	144 44 41.14E
11	6	98	37.72	98.8	0.00	28.80	1.02	0	8.25	324	13 29 14.72N	144 44 41.14E
11	6	98	44.12	97.9	0.00	28.76	1.06	0	8.25	323	13 29 14.72N	144 44 41.14E
11	6	98	52.68	97.8	0.00	28.69	1.10	0	8.25	322	13 29 14.72N	144 44 41.14E
11	6	98	58.33	97.5	0.00	28.69	1.10	0	8.25	321	13 29 14.72N	144 44 41.14E
11	6	98	64.96	97.1	0.00	28.64	0.78	0	8.25	321	13 29 14.72N	144 44 41.14E
11	6	98	74.13	98.3	0.00	28.29	1.05	0	8.25	320	13 29 14.72N	144 44 41.14E
11	12	98	0.40	104.8	8.04	28.36	0.00	0	7.94	252	13 29 14.19N	144 44 43.04E
11	12	98	12.81	100.0	6.15	29.08	2.76	0	8.16	208	13 29 14.19N	144 44 43.04E
11	12	98	17.84	99.7	6.13	29.07	2.73	0	8.17	213	13 29 14.19N	144 44 43.04E
11	12	98	29.24	98.2	6.04	29.06	2.78	0	8.17	234	13 29 14.19N	144 44 43.04E
11	13	98	0.41	99.3	7.50	28.36	4.92	10	7.86	283	13 29 13.51N	144 44 54.85E
11	13	98	12.30	97.2	5.98	29.07	2.80	0	8.18	247	13 29 13.51N	144 44 54.85E
11	13	98	18.96	96.8	5.95	29.05	2.79	0	8.18	251	13 29 13.51N	144 44 54.85E
11	13	98	28.59	96.5	5.94	29.05	2.80	0	8.18	254	13 29 13.51N	144 44 54.85E
11	13	98	31.59	97.4	5.99	29.05	2.80	0	8.18	258	13 29 13.51N	144 44 54.85E
11	13	98	60.55	95.2	5.86	29.04	2.80	0	8.18	266	13 29 13.51N	144 44 54.85E

AGA WWTP DIFFUSER SITE DENSITY DATA

MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
1	0	1.02140	28.8	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX
1	3	1.02150	28.5	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX
1	0	1.02137	28.9	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX1
1	3	1.02150	28.5	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX1
1	6	1.02154	28.4	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX1
1	0	1.02137	28.9	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX2
1	3	1.02150	28.5	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX2
1	6	1.02154	28.4	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX2
1	0	1.02154	28.4	34.0	7	86	Gov. of Guam, Water Quality Data	AGMX
1	10	1.02154	28.4	34.0	7	86	Gov. of Guam, Water Quality Data	AGMX
1	20	1.02191	28.4	34.5	7	86	Gov. of Guam, Water Quality Data	AGMX
2	0	1.02215	26.5	34.0	4	82	Gov. of Guam, Water Quality Data	AGMX
2	3	1.02290	26.5	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX
2	6	1.02296	26.3	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX
2	0	1.02218	26.4	34.0	4	82	Gov. of Guam, Water Quality Data	AGMX1
2	3	1.02293	26.4	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX1
2	6	1.02293	26.4	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX1
2	0	1.02293	26.4	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX2
2	3	1.02293	26.4	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX2
2	6	1.02221	26.3	34.0	4	82	Gov. of Guam, Water Quality Data	AGMX2
2	0	1.02290	26.5	35.0	1	83	Gov. of Guam, Water Quality Data	AGMX
2	3	1.02290	26.5	35.0	1	83	Gov. of Guam, Water Quality Data	AGMX
2	6	1.02290	26.5	35.0	1	83	Gov. of Guam, Water Quality Data	AGMX
3	0	1.02183	27.5	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX
3	3	1.02023	27.8	32.0	5	81	Gov. of Guam, Water Quality Data	AGMX
3	6	1.02020	27.9	32.0	5	81	Gov. of Guam, Water Quality Data	AGMX
3	0	1.02180	27.6	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX2
3	3	1.02186	27.4	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX2
3	6	1.02196	27.1	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX2
3	0	1.02167	28.0	34.0	4	82	Gov. of Guam, Water Quality Data	AGMX
3	3	1.02248	27.8	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX
3	6	1.02173	27.8	34.0	4	82	Gov. of Guam, Water Quality Data	AGMX
3	0	1.02235	28.2	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX1
3	3	1.02258	27.5	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX1
3	6	1.02258	27.5	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX1
3	0	1.02242	28.0	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX2
3	3	1.02245	27.9	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX2
3	6	1.02252	27.7	35.0	4	82	Gov. of Guam, Water Quality Data	AGMX2
3	0	1.02274	27.0	35.0	1	83	Gov. of Guam, Water Quality Data	AGMX
3	3	1.02281	26.8	35.0	1	83	Gov. of Guam, Water Quality Data	AGMX
3	6	1.02281	26.8	35.0	1	83	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02180	27.6	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
4	3	1.02258	27.5	35.0	8	81	Gov. of Guam, Water Quality Data	AGMX
4	6	1.02258	27.5	35.0	8	81	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02183	27.5	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX1
4	3	1.02183	27.5	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX1
4	6	1.02274	27.0	35.0	8	81	Gov. of Guam, Water Quality Data	AGMX1
4	0	1.02177	27.7	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2

MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
4	3	1.02258	27.5	35.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
4	6	1.02274	27.0	35.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
4	0	1.02242	28.0	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX
4	3	1.02248	27.8	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX
4	6	1.02258	27.5	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02170	27.9	34.0	13	82	Gov. of Guam, Water Quality Data	AGMX1
4	3	1.02255	27.6	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX1
4	6	1.02255	27.6	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX1
4	0	1.02248	27.8	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX2
4	3	1.02255	27.6	35.0	13	82	Gov. of Guam, Water Quality Data	AGMX2
4	6	1.02180	27.6	34.0	13	82	Gov. of Guam, Water Quality Data	AGMX2
4	0	1.02281	26.8	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX1
4	3	1.02281	26.8	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX1
4	6	1.02281	26.8	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX1
4	0	1.02281	26.8	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX2
4	3	1.02281	26.8	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX2
4	6	1.02281	26.8	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX2
4	0	1.02258	27.5	35.0	4	85	Gov. of Guam, Water Quality Data	AGMX
4	10	1.02258	27.5	35.0	4	85	Gov. of Guam, Water Quality Data	AGMX
4	20	1.02258	27.5	35.0	4	85	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02185	28.6	34.5	3	86	Gov. of Guam, Water Quality Data	AGMX
4	10	1.02171	29.0	34.5	3	86	Gov. of Guam, Water Quality Data	AGMX
4	20	1.02171	29.0	34.5	3	86	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02175	28.9	34.5	3	86	Gov. of Guam, Water Quality Data	AGMX1
4	10	1.02175	28.9	34.5	3	86	Gov. of Guam, Water Quality Data	AGMX1
4	20	1.02175	28.9	34.5	3	86	Gov. of Guam, Water Quality Data	AGMX1
4	0	1.02212	28.9	35.0	3	86	Gov. of Guam, Water Quality Data	AGMX2
4	10	1.02212	28.9	35.0	3	86	Gov. of Guam, Water Quality Data	AGMX2
4	20	1.02212	28.9	35.0	3	86	Gov. of Guam, Water Quality Data	AGMX2
4	0	1.02173	27.8	34.0	9	87	Gov. of Guam, Water Quality Data	AGMX
4	10	1.02167	28.0	34.0	9	87	Gov. of Guam, Water Quality Data	AGMX
4	20	1.02167	28.0	34.0	9	87	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02000	28.5	32.0	6	89	Gov. of Guam, Water Quality Data	AGMX
4	10	1.02225	28.5	35.0	6	89	Gov. of Guam, Water Quality Data	AGMX
4	20	1.02225	28.5	35.0	6	89	Gov. of Guam, Water Quality Data	AGMX
4	0	1.02225	28.5	35.0	6	89	Gov. of Guam, Water Quality Data	AGMX1
4	10	1.02225	28.5	35.0	6	89	Gov. of Guam, Water Quality Data	AGMX1
4	20	1.02225	28.5	35.0	6	89	Gov. of Guam, Water Quality Data	AGMX1
4	0	1.02155	27.2	33.5	25	89	Matson, A.E. (1990)	E
4	5	1.02151	27.1	33.4	25	89	Matson, A.E. (1990)	E
4	10	1.02136	27.1	33.2	25	89	Matson, A.E. (1990)	E
4	0	1.02169	27.0	33.6	25	89	Matson, A.E. (1990)	F
4	5	1.02161	27.0	33.5	25	89	Matson, A.E. (1990)	F
4	10	1.02157	26.9	33.4	25	89	Matson, A.E. (1990)	F
4	0	1.02183	27.5	34.0	5	90	Gov. of Guam, Water Quality Data	AGMX
4	10	1.02183	27.5	34.0	5	90	Gov. of Guam, Water Quality Data	AGMX
4	20	1.02183	27.5	34.0	5	90	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02160	28.2	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX
5	3	1.02167	28.0	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX
5	6	1.02167	28.0	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX

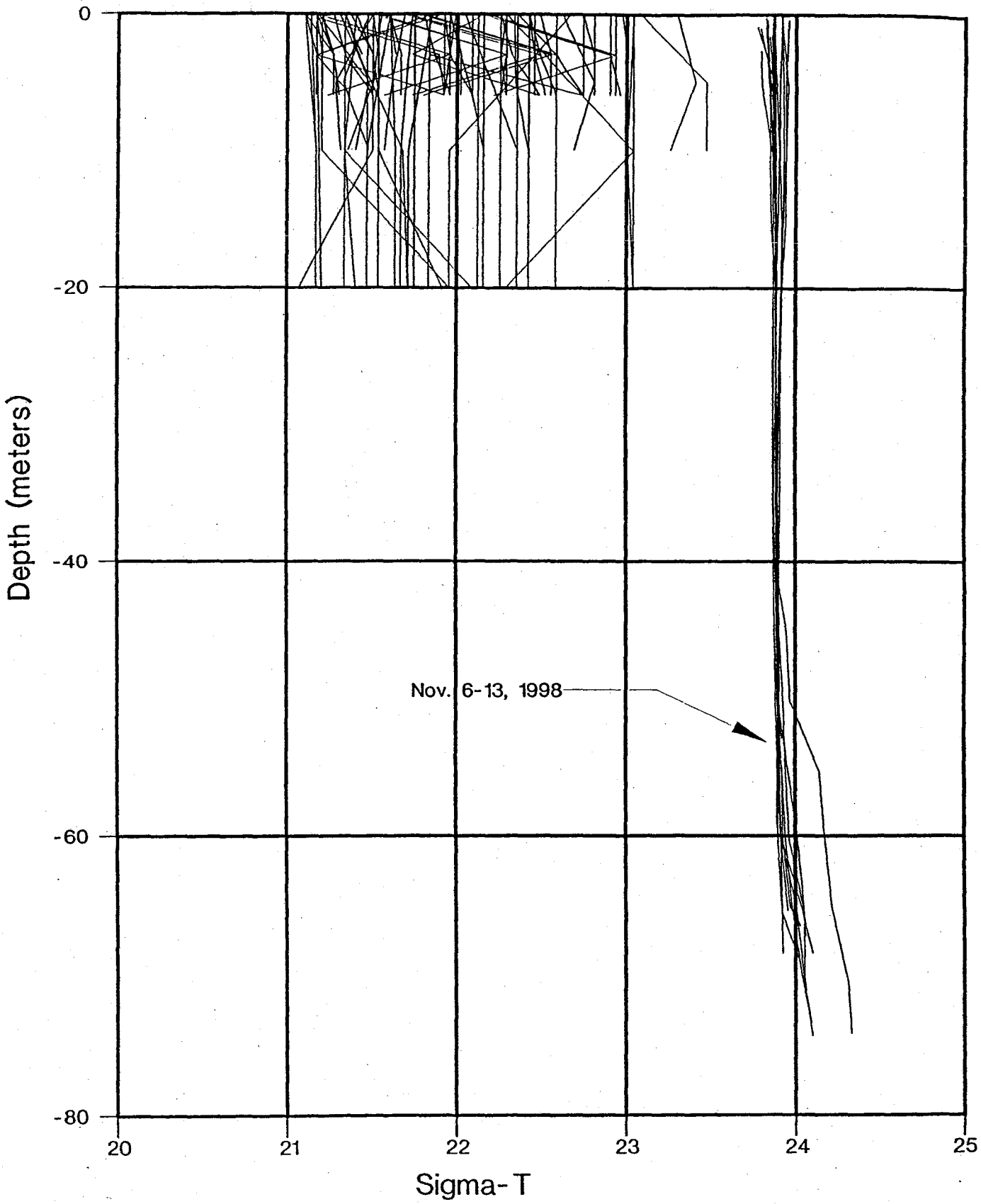
MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
5	0	1.02160	28.2	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX1
5	3	1.02164	28.1	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX1
5	0	1.02225	28.5	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX
5	3	1.02232	28.3	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX
5	6	1.02248	27.8	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02274	27.0	35.0	5	83	Gov. of Guam, Water Quality Data	AGMX
5	3	1.02274	27.0	35.0	5	83	Gov. of Guam, Water Quality Data	AGMX
5	6	1.02274	27.0	35.0	5	83	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02242	28.0	35.0	9	85	Gov. of Guam, Water Quality Data	AGMX
5	10	1.02242	28.0	35.0	9	85	Gov. of Guam, Water Quality Data	AGMX
5	20	1.02242	28.0	35.0	9	85	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02204	28.0	34.5	1	86	Gov. of Guam, Water Quality Data	AGMX
5	10	1.02235	28.2	35.0	1	86	Gov. of Guam, Water Quality Data	AGMX
5	20	1.02235	28.2	35.0	1	86	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02229	28.4	35.0	4	89	Gov. of Guam, Water Quality Data	AGMX
5	10	1.02304	28.4	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX
5	20	1.02229	28.4	35.0	4	89	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02304	28.4	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX1
5	10	1.02301	28.5	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX1
5	20	1.02304	28.4	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX1
5	0	1.02304	28.4	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX2
5	10	1.02304	28.4	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX2
5	20	1.02304	28.4	36.0	4	89	Gov. of Guam, Water Quality Data	AGMX2
5	0	1.02160	28.2	34.0	3	90	Gov. of Guam, Water Quality Data	AGMX
5	10	1.02164	28.1	34.0	3	90	Gov. of Guam, Water Quality Data	AGMX
5	20	1.02164	28.1	34.0	3	90	Gov. of Guam, Water Quality Data	AGMX
5	0	1.02154	28.4	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX
5	10	1.02154	28.4	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX
5	20	1.02154	28.4	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX
5	0	1.02160	28.2	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX1
5	10	1.02147	28.6	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX1
5	0	1.02140	28.8	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX2
5	10	1.02134	29.0	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX2
5	20	1.02140	28.8	34.0	21	97	Gov. of Guam, Water Drogue Study	AGMX2
6	0	1.02154	28.4	34.0	4	81	Gov. of Guam, Water Quality Data	AGMX
6	3	1.02229	28.4	35.0	4	81	Gov. of Guam, Water Quality Data	AGMX
6	6	1.02225	28.5	35.0	4	81	Gov. of Guam, Water Quality Data	AGMX
6	0	1.02150	28.5	34.0	4	81	Gov. of Guam, Water Quality Data	AGMX1
6	3	1.02154	28.4	34.0	4	81	Gov. of Guam, Water Quality Data	AGMX1
6	6	1.02154	28.4	34.0	4	81	Gov. of Guam, Water Quality Data	AGMX1
6	0	1.02150	28.5	34.0	4	81	Gov. of Guam, Water Quality Data	AGMX2
6	3	1.02229	28.4	35.0	4	81	Gov. of Guam, Water Quality Data	AGMX2
6	6	1.02157	28.3	34.0	4	81	Gov. of Guam, Water Quality Data	AGMX2
6	0	1.02242	28.0	35.0	8	82	Gov. of Guam, Water Quality Data	AGMX
6	3	1.02242	28.0	35.0	8	82	Gov. of Guam, Water Quality Data	AGMX
6	6	1.02242	28.0	35.0	8	82	Gov. of Guam, Water Quality Data	AGMX
6	0	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX
6	3	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX
6	6	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX
6	0	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX1

MONTH	DEPTH (meters)	DENSITY gm/cm^3	tP C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
6	3	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX1
6	6	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX1
6	0	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX2
6	3	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX2
6	6	1.02245	27.9	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX2
6	0	1.02267	29.5	36.0	12	86	Gov. of Guam, Water Quality Data	AGMX
6	10	1.02195	29.4	35.0	12	86	Gov. of Guam, Water Quality Data	AGMX
6	20	1.02195	29.4	35.0	12	86	Gov. of Guam, Water Quality Data	AGMX
6	0	1.02235	28.2	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX
6	10	1.02235	28.2	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX
6	20	1.02235	28.2	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX
6	0	1.02330	27.6	36.0	13	89	Matson, A.E. (1990)	E
6	5	1.02341	27.5	36.1	13	89	Matson, A.E. (1990)	E
6	10	1.02326	27.5	35.9	13	89	Matson, A.E. (1990)	E
6	0	1.02309	27.8	35.8	13	89	Matson, A.E. (1990)	F
6	5	1.02347	27.3	36.1	13	89	Matson, A.E. (1990)	F
6	10	1.02347	27.3	36.1	13	89	Matson, A.E. (1990)	F
7	0	1.02185	29.7	35.0	9	81	Gov. of Guam, Water Quality Data	AGMX
7	3	1.02117	29.5	34.0	9	81	Gov. of Guam, Water Quality Data	AGMX
7	6	1.02192	29.5	35.0	9	81	Gov. of Guam, Water Quality Data	AGMX
7	0	1.02192	29.5	35.0	9	81	Gov. of Guam, Water Quality Data	AGMX1
7	3	1.02117	29.5	34.0	9	81	Gov. of Guam, Water Quality Data	AGMX1
7	0	1.02110	29.7	34.0	9	81	Gov. of Guam, Water Quality Data	AGMX2
7	3	1.02189	29.6	35.0	9	81	Gov. of Guam, Water Quality Data	AGMX2
7	6	1.02192	29.5	35.0	9	81	Gov. of Guam, Water Quality Data	AGMX2
7	0	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX
7	3	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX
7	6	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX
7	0	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX1
7	3	1.02225	28.5	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX1
7	6	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX1
7	0	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX2
7	3	1.02225	28.5	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX2
7	6	1.02229	28.4	35.0	6	82	Gov. of Guam, Water Quality Data	AGMX2
7	0	1.02225	28.5	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX
7	3	1.02225	28.5	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX
7	6	1.02225	28.5	35.0	7	83	Gov. of Guam, Water Quality Data	AGMX
8	0	1.02117	29.5	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX
8	3	1.02120	29.4	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX
8	6	1.02120	29.4	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX
8	0	1.02117	29.5	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX1
8	3	1.02120	29.4	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX1
8	0	1.02117	29.5	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX2
8	3	1.02195	29.4	35.0	6	81	Gov. of Guam, Water Quality Data	AGMX2
8	6	1.02124	29.3	34.0	6	81	Gov. of Guam, Water Quality Data	AGMX2
8	0	1.02297	28.6	36.0	5	82	Gov. of Guam, Water Quality Data	AGMX
8	3	1.02301	28.5	36.0	5	82	Gov. of Guam, Water Quality Data	AGMX
8	6	1.02301	28.5	36.0	5	82	Gov. of Guam, Water Quality Data	AGMX
8	0	1.02199	29.3	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX
8	3	1.02195	29.4	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX

MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
8	6	1.02209	29.0	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX
8	0	1.02199	29.3	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX1
8	3	1.02202	29.2	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX1
8	6	1.02209	29.0	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX1
8	0	1.02195	29.4	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX2
8	3	1.02202	29.2	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX2
8	6	1.02202	29.2	35.0	2	83	Gov. of Guam, Water Quality Data	AGMX2
8	0	1.02192	29.5	35.0	7	84	Gov. of Guam, Water Quality Data	AGMX
8	3	1.02195	29.4	35.0	7	84	Gov. of Guam, Water Quality Data	AGMX
8	6	1.02195	29.4	35.0	7	84	Gov. of Guam, Water Quality Data	AGMX
8	0	1.02130	29.1	34.0	5	86	Gov. of Guam, Water Quality Data	AGMX
8	10	1.02168	29.1	34.5	5	86	Gov. of Guam, Water Quality Data	AGMX
8	20	1.02171	29.0	34.5	5	86	Gov. of Guam, Water Quality Data	AGMX
8	10	1.02209	29.0	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX
8	20	1.02134	29.0	34.0	4	87	Gov. of Guam, Water Quality Data	AGMX
8	10	1.02209	29.0	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX1
8	20	1.02182	29.8	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX1
8	0	1.02134	29.0	34.0	4	87	Gov. of Guam, Water Quality Data	AGMX2
8	10	1.02134	29.0	34.0	4	87	Gov. of Guam, Water Quality Data	AGMX2
8	20	1.02209	29.0	35.0	4	87	Gov. of Guam, Water Quality Data	AGMX2
8	0	1.01954	29.9	32.0	31	98	Gov. of Guam, Water Drogue Study	AGMX
8	10	1.01961	29.7	32.0	31	98	Gov. of Guam, Water Drogue Study	AGMX
8	20	1.02114	29.6	34.0	31	98	Gov. of Guam, Water Drogue Study	AGMX
8	0	1.01957	29.8	32.0	31	98	Gov. of Guam, Water Drogue Study	AGMX1
8	10	1.02107	29.8	34.0	31	98	Gov. of Guam, Water Drogue Study	AGMX1
8	0	1.01855	30.6	31.0	31	98	Gov. of Guam, Water Drogue Study	AGMX2
8	5	1.01944	30.2	32.0	31	98	Gov. of Guam, Water Drogue Study	AGMX2
8	10	1.01957	29.8	32.0	31	98	Gov. of Guam, Water Drogue Study	AGMX2
9	0	1.02117	29.5	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
9	3	1.02127	29.2	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
9	6	1.02130	29.1	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
9	0	1.02120	29.4	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX1
9	2	1.02124	29.3	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX1
9	3	1.02127	29.2	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX1
9	0	1.02120	29.4	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
9	3	1.02127	29.2	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
9	6	1.02130	29.1	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
9	0	1.02225	28.5	35.0	9	82	Gov. of Guam, Water Quality Data	AGMX
9	3	1.02225	28.5	35.0	9	82	Gov. of Guam, Water Quality Data	AGMX
9	6	1.02225	28.5	35.0	9	82	Gov. of Guam, Water Quality Data	AGMX
9	0	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX
9	3	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX
9	6	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX
9	0	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX1
9	3	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX1
9	6	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX1
9	0	1.02195	29.4	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX2
9	3	1.02195	29.4	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX2
9	6	1.02192	29.5	35.0	6	83	Gov. of Guam, Water Quality Data	AGMX2

MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
9	0	1.02114	29.6	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX
9	10	1.02117	29.5	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX
9	20	1.02117	29.5	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX
9	0	1.02117	29.5	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX1
9	20	1.02120	29.4	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX1
9	0	1.02110	29.7	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX2
9	10	1.02117	29.5	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX2
9	20	1.02117	29.5	34.0	5	85	Gov. of Guam, Water Quality Data	AGMX2
9	0	1.02234	29.6	35.6	21	89	Matson, A.E. (1990)	E
9	5	1.02234	29.8	35.7	21	89	Matson, A.E. (1990)	E
9	10	1.02242	29.8	35.8	21	89	Matson, A.E. (1990)	E
9	0	1.02262	29.2	35.8	21	89	Matson, A.E. (1990)	F
9	5	1.02281	29.1	36.0	21	89	Matson, A.E. (1990)	F
9	10	1.02269	29.0	35.8	21	89	Matson, A.E. (1990)	F
10	0	1.02110	29.7	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
10	3	1.02127	29.2	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
10	6	1.02127	29.2	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX
10	0	1.02110	29.7	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
10	3	1.02117	29.5	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
10	6	1.02117	29.5	34.0	8	81	Gov. of Guam, Water Quality Data	AGMX2
10	3	1.02117	29.5	34.0	9	81	Gov. of Guam, Water Quality Data	AGMX1
10	6	1.02117	29.5	34.0	9	81	Gov. of Guam, Water Quality Data	AGMX1
10	0	1.02229	28.4	35.0	26	82	Gov. of Guam, Water Quality Data	AGMX
10	3	1.02229	28.4	35.0	26	82	Gov. of Guam, Water Quality Data	AGMX
10	6	1.02229	28.4	35.0	26	82	Gov. of Guam, Water Quality Data	AGMX
10	0	1.02225	28.5	35.0	7	86	Gov. of Guam, Water Quality Data	AGMX
10	10	1.02225	28.5	35.0	7	86	Gov. of Guam, Water Quality Data	AGMX
10	20	1.02225	28.5	35.0	7	86	Gov. of Guam, Water Quality Data	AGMX
10	0	1.02120	29.4	34.0	6	87	Gov. of Guam, Water Quality Data	AGMX
10	10	1.02120	29.4	34.0	6	87	Gov. of Guam, Water Quality Data	AGMX
10	20	1.02195	29.4	35.0	6	87	Gov. of Guam, Water Quality Data	AGMX
11	0	1.02134	29.0	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX
11	6	1.02150	28.5	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX
11	0	1.02134	29.0	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX1
11	3	1.02144	28.7	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX1
11	0	1.02127	29.2	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX2
11	3	1.02134	29.0	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX2
11	6	1.02150	28.5	34.0	5	81	Gov. of Guam, Water Quality Data	AGMX2
11	0	1.02215	28.8	35.0	10	86	Gov. of Guam, Water Quality Data	AGMX
11	10	1.02215	28.8	35.0	10	86	Gov. of Guam, Water Quality Data	AGMX
11	20	1.02215	28.8	35.0	10	86	Gov. of Guam, Water Quality Data	AGMX
11	0	1.02134	29.0	34.0	9	89	Gov. of Guam, Water Quality Data	AGMX
11	10	1.02134	29.0	34.0	9	89	Gov. of Guam, Water Quality Data	AGMX
11	20	1.02134	29.0	34.0	9	89	Gov. of Guam, Water Quality Data	AGMX
12	0	1.02117	29.5	34.0	3	81	Gov. of Guam, Water Quality Data	AGMX
12	3	1.02117	29.5	34.0	3	81	Gov. of Guam, Water Quality Data	AGMX
12	6	1.02137	28.9	34.0	3	81	Gov. of Guam, Water Quality Data	AGMX
12	0	1.02215	28.8	35.0	7	82	Gov. of Guam, Water Quality Data	AGMX
12	3	1.02173	27.8	34.0	7	82	Gov. of Guam, Water Quality Data	AGMX
12	6	1.02248	27.8	35.0	7	82	Gov. of Guam, Water Quality Data	AGMX

MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
12	0	1.02209	29.0	35.0	5	83	Gov. of Guam, Water Quality Data	AGMX
12	3	1.02209	29.0	35.0	5	83	Gov. of Guam, Water Quality Data	AGMX
12	6	1.02209	29.0	35.0	5	83	Gov. of Guam, Water Quality Data	AGMX
12	10	1.02215	28.8	35.0	3	87	Gov. of Guam, Water Quality Data	AGMX
12	20	1.02215	28.8	35.0	3	87	Gov. of Guam, Water Quality Data	AGMX
12	0	1.02150	28.5	34.0	7	89	Gov. of Guam, Water Quality Data	AGMX
12	10	1.02150	28.5	34.0	7	89	Gov. of Guam, Water Quality Data	AGMX
12	20	1.02107	29.8	34.0	7	89	Gov. of Guam, Water Quality Data	AGMX
12	0	1.02147	28.6	34.0	7	89	Gov. of Guam, Water Quality Data	AGMX1
12	20	1.02147	28.6	34.0	7	89	Gov. of Guam, Water Quality Data	AGMX1
12	0	1.02118	31.0	34.7	12	89	Matson, A.E. (1990)	D
12	5	1.02148	31.0	35.1	12	89	Matson, A.E. (1990)	D
12	10	1.02140	31.0	35.0	12	89	Matson, A.E. (1990)	D
12	0	1.02148	31.0	35.1	12	89	Matson, A.E. (1990)	E
12	5	1.02133	31.0	34.9	12	89	Matson, A.E. (1990)	E
12	10	1.02148	31.0	35.1	12	89	Matson, A.E. (1990)	E
12	0	1.02150	30.5	34.9	12	89	Matson, A.E. (1990)	F
12	5	1.02128	30.7	34.7	12	89	Matson, A.E. (1990)	F
12	10	1.02131	30.4	34.6	12	89	Matson, A.E. (1990)	F



Edward K. Noda and Associates, Inc.	AGANA SEWAGE TREATMENT PLANT OUTFALL EXTENSION	Agana STP Historic Sigma-T Profiles	FIGURE

AGANA WW. DENSITY PROFILE DATA OBTAINED DURING NOV. 6-13, 1998 BY EDWARD K. NODA AND ASSOCIATES, INC. (Lat. and Long. in WGS 83)

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	Lat.	Long.
11	6	98	0.07	1.02392	29.34	37.62	13 29 15.10N	144 44 40.14E
11	6	98	5.04	1.02391	29.19	37.53	13 29 15.10N	144 44 40.14E
11	6	98	10.42	1.02391	29.15	37.52	13 29 15.10N	144 44 40.14E
11	6	98	15.30	1.02392	29.14	37.53	13 29 15.10N	144 44 40.14E
11	6	98	20.44	1.02391	29.13	37.52	13 29 15.10N	144 44 40.14E
11	6	98	25.22	1.02391	29.13	37.51	13 29 15.10N	144 44 40.14E
11	6	98	30.20	1.02390	29.12	37.49	13 29 15.10N	144 44 40.14E
11	6	98	35.19	1.02390	29.11	37.48	13 29 15.10N	144 44 40.14E
11	6	98	40.37	1.02389	29.10	37.47	13 29 15.10N	144 44 40.14E
11	6	98	45.23	1.02395	28.83	37.43	13 29 15.10N	144 44 40.14E
11	6	98	50.22	1.02397	28.59	37.35	13 29 15.10N	144 44 40.14E
11	6	98	55.31	1.02414	28.35	37.47	13 29 15.10N	144 44 40.14E
11	6	98	60.10	1.02417	28.21	37.45	13 29 15.10N	144 44 40.14E
11	6	98	65.30	1.02422	28.05	37.44	13 29 15.10N	144 44 40.14E
11	6	98	70.60	1.02431	27.87	37.49	13 29 15.10N	144 44 40.14E
11	6	98	74.26	1.02433	27.82	37.49	13 29 15.10N	144 44 40.14E
11	8	98	0.07	1.02392	29.05	37.48	13 29 11.05N	144 44 48.75E
11	8	98	5.35	1.02393	29.05	37.50	13 29 11.05N	144 44 48.75E
11	8	98	10.48	1.02393	29.05	37.51	13 29 11.05N	144 44 48.75E
11	8	98	15.56	1.02392	29.05	37.50	13 29 11.05N	144 44 48.75E
11	8	98	20.75	1.02392	29.05	37.49	13 29 11.05N	144 44 48.75E
11	8	98	25.22	1.02391	29.04	37.48	13 29 11.05N	144 44 48.75E
11	8	98	30.20	1.02391	29.03	37.47	13 29 11.05N	144 44 48.75E
11	8	98	35.09	1.02391	29.03	37.47	13 29 11.05N	144 44 48.75E
11	8	98	40.68	1.02391	29.02	37.46	13 29 11.05N	144 44 48.75E
11	8	98	45.54	1.02390	29.02	37.45	13 29 11.05N	144 44 48.75E
11	8	98	50.55	1.02390	29.02	37.44	13 29 11.05N	144 44 48.75E
11	8	98	55.41	1.02389	29.02	37.44	13 29 11.05N	144 44 48.75E
11	8	98	59.17	1.02389	29.02	37.44	13 29 11.05N	144 44 48.75E
11	8	98	0.07	1.02387	29.06	37.42	13 29 13.07N	144 44 45.08E
11	8	98	5.55	1.02388	29.04	37.43	13 29 13.07N	144 44 45.08E
11	8	98	10.12	1.02388	29.04	37.43	13 29 13.07N	144 44 45.08E
11	8	98	15.30	1.02388	29.04	37.43	13 29 13.07N	144 44 45.08E
11	8	98	20.48	1.02388	29.04	37.43	13 29 13.07N	144 44 45.08E
11	8	98	25.45	1.02389	29.04	37.44	13 29 13.07N	144 44 45.08E
11	8	98	30.38	1.02389	29.04	37.44	13 29 13.07N	144 44 45.08E
11	8	98	35.36	1.02389	29.03	37.44	13 29 13.07N	144 44 45.08E
11	8	98	40.15	1.02389	29.03	37.44	13 29 13.07N	144 44 45.08E
11	8	98	45.54	1.02389	29.02	37.44	13 29 13.07N	144 44 45.08E
11	8	98	50.12	1.02390	29.01	37.44	13 29 13.07N	144 44 45.08E
11	8	98	55.41	1.02391	28.99	37.44	13 29 13.07N	144 44 45.08E
11	8	98	60.09	1.02392	28.79	37.37	13 29 13.07N	144 44 45.08E
11	8	98	65.09	1.02403	28.63	37.45	13 29 13.07N	144 44 45.08E
11	8	98	68.55	1.02410	28.57	37.52	13 29 13.07N	144 44 45.08E
11	8	98	0.07	1.02388	29.06	37.43	13 29 13.80N	144 44 43.87E
11	8	98	5.25	1.02388	29.05	37.43	13 29 13.80N	144 44 43.87E
11	8	98	10.48	1.02388	29.04	37.43	13 29 13.80N	144 44 43.87E
11	8	98	15.06	1.02388	29.04	37.43	13 29 13.80N	144 44 43.87E
11	8	98	20.24	1.02389	29.04	37.44	13 29 13.80N	144 44 43.87E
11	8	98	25.35	1.02389	29.04	37.44	13 29 13.80N	144 44 43.87E
11	8	98	30.20	1.02389	29.04	37.45	13 29 13.80N	144 44 43.87E
11	8	98	35.09	1.02389	29.03	37.44	13 29 13.80N	144 44 43.87E
11	8	98	40.57	1.02389	29.03	37.44	13 29 13.80N	144 44 43.87E

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	Lat.	Long.
11	8	98	45.26	1.02390	29.03	37.45	13 29 13.80N	144 44 43.87E
11	8	98	50.53	1.02390	29.03	37.45	13 29 13.80N	144 44 43.87E
11	8	98	55.21	1.02389	29.03	37.45	13 29 13.80N	144 44 43.87E
11	8	98	60.61	1.02390	29.02	37.45	13 29 13.80N	144 44 43.87E
11	8	98	65.60	1.02392	28.89	37.42	13 29 13.80N	144 44 43.87E
11	8	98	68.86	1.02402	28.72	37.47	13 29 13.80N	144 44 43.87E
11	9	98	0.07	1.02387	29.08	37.44	13 29 12.76N	144 44 53.96E
11	9	98	5.25	1.02389	29.13	37.48	13 29 12.76N	144 44 53.96E
11	9	98	10.02	1.02390	29.12	37.50	13 29 12.76N	144 44 53.96E
11	9	98	15.16	1.02390	29.11	37.48	13 29 12.76N	144 44 53.96E
11	9	98	20.14	1.02389	29.11	37.48	13 29 12.76N	144 44 53.96E
11	9	98	25.12	1.02389	29.11	37.47	13 29 12.76N	144 44 53.96E
11	9	98	30.20	1.02388	29.11	37.46	13 29 12.76N	144 44 53.96E
11	9	98	35.29	1.02387	29.09	37.45	13 29 12.76N	144 44 53.96E
11	9	98	40.17	1.02388	29.08	37.45	13 29 12.76N	144 44 53.96E
11	9	98	45.03	1.02389	29.05	37.45	13 29 12.76N	144 44 53.96E
11	9	98	50.33	1.02390	28.99	37.44	13 29 12.76N	144 44 53.96E
11	9	98	55.21	1.02396	28.86	37.45	13 29 12.76N	144 44 53.96E
11	9	98	60.29	1.02401	28.71	37.46	13 29 12.76N	144 44 53.96E
11	9	98	65.28	1.02405	28.60	37.46	13 29 12.76N	144 44 53.96E
11	9	98	70.19	1.02405	28.59	37.46	13 29 12.76N	144 44 53.96E
11	9	98	71.71	1.02406	28.57	37.47	13 29 12.76N	144 44 53.96E
11	9	98	0.21	1.02382	29.10	37.38	13 29 13.18N	144 44 53.95E
11	9	98	5.04	1.02385	29.13	37.43	13 29 13.18N	144 44 53.95E
11	9	98	10.22	1.02386	29.12	37.44	13 29 13.18N	144 44 53.95E
11	9	98	15.40	1.02387	29.12	37.45	13 29 13.18N	144 44 53.95E
11	9	98	20.14	1.02387	29.11	37.45	13 29 13.18N	144 44 53.95E
11	9	98	25.12	1.02387	29.11	37.45	13 29 13.18N	144 44 53.95E
11	9	98	30.10	1.02387	29.11	37.44	13 29 13.18N	144 44 53.95E
11	9	98	35.19	1.02387	29.11	37.45	13 29 13.18N	144 44 53.95E
11	9	98	40.15	1.02387	29.09	37.44	13 29 13.18N	144 44 53.95E
11	9	98	45.13	1.02388	29.07	37.45	13 29 13.18N	144 44 53.95E
11	9	98	50.02	1.02389	29.04	37.45	13 29 13.18N	144 44 53.95E
11	9	98	55.31	1.02392	28.96	37.45	13 29 13.18N	144 44 53.95E
11	9	98	60.20	1.02394	28.90	37.45	13 29 13.18N	144 44 53.95E
11	9	98	65.39	1.02398	28.76	37.44	13 29 13.18N	144 44 53.95E
11	9	98	70.09	1.02404	28.64	37.46	13 29 13.18N	144 44 53.95E
11	9	98	72.12	1.02407	28.58	37.48	13 29 13.18N	144 44 53.95E
11	9	98	0.57	1.02383	29.10	37.38	13 29 13.60N	144 44 53.91E
11	9	98	5.14	1.02385	29.13	37.43	13 29 13.60N	144 44 53.91E
11	9	98	10.32	1.02386	29.12	37.45	13 29 13.60N	144 44 53.91E
11	9	98	15.16	1.02387	29.12	37.45	13 29 13.60N	144 44 53.91E
11	9	98	20.07	1.02387	29.11	37.45	13 29 13.60N	144 44 53.91E
11	9	98	25.02	1.02387	29.11	37.45	13 29 13.60N	144 44 53.91E
11	9	98	30.20	1.02387	29.11	37.45	13 29 13.60N	144 44 53.91E
11	9	98	35.39	1.02387	29.10	37.45	13 29 13.60N	144 44 53.91E
11	9	98	40.05	1.02387	29.09	37.44	13 29 13.60N	144 44 53.91E
11	9	98	45.23	1.02387	29.09	37.45	13 29 13.60N	144 44 53.91E
11	9	98	50.02	1.02388	29.07	37.45	13 29 13.60N	144 44 53.91E
11	9	98	55.21	1.02390	29.03	37.45	13 29 13.60N	144 44 53.91E
11	9	98	60.00	1.02391	28.98	37.45	13 29 13.60N	144 44 53.91E
11	9	98	65.30	1.02401	28.71	37.45	13 29 13.60N	144 44 53.91E
11	9	98	70.28	1.02405	28.61	37.47	13 29 13.60N	144 44 53.91E
11	9	98	74.46	1.02410	28.50	37.49	13 29 13.60N	144 44 53.91E
11	11	98	1.58	1.02384	29.11	37.41	13 29 10.91N	144 44 43.57E
11	11	98	5.11	1.02386	29.09	37.43	13 29 10.91N	144 44 43.57E
11	11	98	10.02	1.02388	29.05	37.44	13 29 10.91N	144 44 43.57E

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	c.	Long.
11	11	98	15.36	1.02389	29.03	37.44	13 29 10.91N	144 44 43.57E
11	11	98	20.17	1.02389	29.03	37.44	13 29 10.91N	144 44 43.57E
11	11	98	25.32	1.02389	29.03	37.44	13 29 10.91N	144 44 43.57E
11	11	98	30.20	1.02389	29.02	37.44	13 29 10.91N	144 44 43.57E
11	11	98	35.06	1.02389	29.02	37.44	13 29 10.91N	144 44 43.57E
11	11	98	40.25	1.02390	29.01	37.44	13 29 10.91N	144 44 43.57E
11	11	98	45.13	1.02390	29.01	37.44	13 29 10.91N	144 44 43.57E
11	11	98	50.02	1.02390	29.00	37.44	13 29 10.91N	144 44 43.57E
11	11	98	55.11	1.02391	28.99	37.45	13 29 10.91N	144 44 43.57E
11	11	98	56.43	1.02391	28.98	37.45	13 29 10.91N	144 44 43.57E
11	11	98	2.63	1.02379	29.21	37.39	13 29 11.82N	144 44 47.62E
11	11	98	5.25	1.02380	29.20	37.40	13 29 11.82N	144 44 47.62E
11	11	98	10.42	1.02386	29.09	37.43	13 29 11.82N	144 44 47.62E
11	11	98	15.06	1.02388	29.06	37.44	13 29 11.82N	144 44 47.62E
11	11	98	20.44	1.02389	29.04	37.44	13 29 11.82N	144 44 47.62E
11	11	98	25.12	1.02389	29.04	37.44	13 29 11.82N	144 44 47.62E
11	11	98	30.20	1.02389	29.03	37.44	13 29 11.82N	144 44 47.62E
11	11	98	35.19	1.02389	29.03	37.44	13 29 11.82N	144 44 47.62E
11	11	98	40.27	1.02389	29.02	37.44	13 29 11.82N	144 44 47.62E
11	11	98	45.36	1.02391	28.99	37.44	13 29 11.82N	144 44 47.62E
11	11	98	50.04	1.02391	28.98	37.44	13 29 11.82N	144 44 47.62E
11	11	98	55.21	1.02391	28.98	37.44	13 29 11.82N	144 44 47.62E
11	11	98	60.10	1.02391	28.97	37.45	13 29 11.82N	144 44 47.62E
11	11	98	65.28	1.02392	28.96	37.45	13 29 11.82N	144 44 47.62E
11	11	98	0.37	1.02396	29.12	37.57	13 29 12.41N	144 44 47.94E
11	11	98	5.04	1.02394	29.09	37.53	13 29 12.41N	144 44 47.94E
11	11	98	10.18	1.02394	29.06	37.52	13 29 12.41N	144 44 47.94E
11	11	98	15.30	1.02394	29.05	37.52	13 29 12.41N	144 44 47.94E
11	11	98	20.04	1.02392	29.05	37.49	13 29 12.41N	144 44 47.94E
11	11	98	25.32	1.02391	29.04	37.47	13 29 12.41N	144 44 47.94E
11	11	98	30.00	1.02391	29.04	37.47	13 29 12.41N	144 44 47.94E
11	11	98	35.16	1.02390	29.03	37.45	13 29 12.41N	144 44 47.94E
11	11	98	40.17	1.02390	29.00	37.45	13 29 12.41N	144 44 47.94E
11	11	98	45.23	1.02391	28.99	37.45	13 29 12.41N	144 44 47.94E
11	11	98	50.02	1.02393	28.95	37.45	13 29 12.41N	144 44 47.94E
11	11	98	55.31	1.02394	28.90	37.45	13 29 12.41N	144 44 47.94E
11	11	98	60.31	1.02396	28.84	37.45	13 29 12.41N	144 44 47.94E
11	11	98	65.08	1.02404	28.62	37.46	13 29 12.41N	144 44 47.94E
11	11	98	67.33	1.02406	28.56	37.46	13 29 12.41N	144 44 47.94E
11	11	98	0.98	1.02379	29.26	37.41	13 29 12.56N	144 44 50.47E
11	11	98	5.35	1.02386	29.10	37.43	13 29 12.56N	144 44 50.47E
11	11	98	10.02	1.02388	29.07	37.45	13 29 12.56N	144 44 50.47E
11	11	98	15.30	1.02389	29.05	37.45	13 29 12.56N	144 44 50.47E
11	11	98	20.14	1.02389	29.05	37.44	13 29 12.56N	144 44 50.47E
11	11	98	25.32	1.02389	29.04	37.44	13 29 12.56N	144 44 50.47E
11	11	98	30.00	1.02389	29.04	37.44	13 29 12.56N	144 44 50.47E
11	11	98	35.29	1.02389	29.02	37.44	13 29 12.56N	144 44 50.47E
11	11	98	40.27	1.02389	29.01	37.44	13 29 12.56N	144 44 50.47E
11	11	98	45.03	1.02390	29.01	37.44	13 29 12.56N	144 44 50.47E
11	11	98	50.33	1.02390	29.00	37.44	13 29 12.56N	144 44 50.47E
11	11	98	55.21	1.02390	28.99	37.44	13 29 12.56N	144 44 50.47E
11	11	98	60.09	1.02392	28.97	37.45	13 29 12.56N	144 44 50.47E
11	11	98	65.20	1.02392	28.95	37.45	13 29 12.56N	144 44 50.47E
11	11	98	68.55	1.02393	28.95	37.45	13 29 12.56N	144 44 50.47E
11	11	98	0.82	1.02382	29.13	37.40	13 29 12.62N	144 44 42.69E
11	11	98	5.25	1.02384	29.13	37.42	13 29 12.62N	144 44 42.69E
11	11	98	10.18	1.02387	29.06	37.43	13 29 12.62N	144 44 42.69E

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	Lat.	Long.
11	11	98	15.26	1.02388	29.05	37.43	13 29 12.62N	144 44 42.69E
11	11	98	20.38	1.02388	29.05	37.44	13 29 12.62N	144 44 42.69E
11	11	98	25.35	1.02388	29.05	37.44	13 29 12.62N	144 44 42.69E
11	11	98	30.20	1.02389	29.04	37.44	13 29 12.62N	144 44 42.69E
11	11	98	35.26	1.02388	29.04	37.44	13 29 12.62N	144 44 42.69E
11	11	98	40.27	1.02389	29.03	37.44	13 29 12.62N	144 44 42.69E
11	11	98	45.13	1.02389	29.03	37.44	13 29 12.62N	144 44 42.69E
11	11	98	50.02	1.02390	29.01	37.44	13 29 12.62N	144 44 42.69E
11	11	98	55.01	1.02392	28.96	37.45	13 29 12.62N	144 44 42.69E
11	11	98	60.20	1.02393	28.94	37.45	13 29 12.62N	144 44 42.69E
11	11	98	65.20	1.02397	28.84	37.46	13 29 12.62N	144 44 42.69E
11	11	98	66.61	1.02403	28.76	37.51	13 29 12.62N	144 44 42.69E
11	11	98	0.37	1.02383	29.15	37.42	13 29 12.85N	144 44 39.03E
11	11	98	5.35	1.02385	29.14	37.43	13 29 12.85N	144 44 39.03E
11	11	98	10.28	1.02385	29.13	37.43	13 29 12.85N	144 44 39.03E
11	11	98	15.20	1.02385	29.10	37.42	13 29 12.85N	144 44 39.03E
11	11	98	20.14	1.02388	29.05	37.44	13 29 12.85N	144 44 39.03E
11	11	98	25.32	1.02389	29.05	37.44	13 29 12.85N	144 44 39.03E
11	11	98	30.20	1.02389	29.04	37.44	13 29 12.85N	144 44 39.03E
11	11	98	35.06	1.02389	29.03	37.44	13 29 12.85N	144 44 39.03E
11	11	98	40.35	1.02389	29.03	37.44	13 29 12.85N	144 44 39.03E
11	11	98	45.03	1.02389	29.03	37.44	13 29 12.85N	144 44 39.03E
11	11	98	50.33	1.02390	29.00	37.44	13 29 12.85N	144 44 39.03E
11	11	98	55.01	1.02391	28.98	37.44	13 29 12.85N	144 44 39.03E
11	11	98	60.10	1.02392	28.96	37.44	13 29 12.85N	144 44 39.03E
11	11	98	65.49	1.02396	28.88	37.46	13 29 12.85N	144 44 39.03E
11	12	98	0.57	1.02392	29.13	37.52	13 29 13.57N	144 44 36.20E
11	12	98	5.35	1.02395	29.06	37.54	13 29 13.57N	144 44 36.20E
11	12	98	10.12	1.02394	29.04	37.52	13 29 13.57N	144 44 36.20E
11	12	98	15.06	1.02393	29.04	37.49	13 29 13.57N	144 44 36.20E
11	12	98	20.24	1.02391	29.03	37.47	13 29 13.57N	144 44 36.20E
11	12	98	25.22	1.02390	29.03	37.46	13 29 13.57N	144 44 36.20E
11	12	98	30.00	1.02390	29.02	37.45	13 29 13.57N	144 44 36.20E
11	12	98	35.19	1.02389	29.02	37.44	13 29 13.57N	144 44 36.20E
11	12	98	40.05	1.02389	29.02	37.44	13 29 13.57N	144 44 36.20E
11	12	98	45.16	1.02389	29.02	37.44	13 29 13.57N	144 44 36.20E
11	12	98	46.88	1.02389	29.02	37.44	13 29 13.57N	144 44 36.20E
11	12	98	0.88	1.02377	29.20	37.36	13 29 15.53N	144 44 43.73E
11	12	98	5.45	1.02388	29.05	37.43	13 29 15.53N	144 44 43.73E
11	12	98	10.42	1.02388	29.04	37.43	13 29 15.53N	144 44 43.73E
11	12	98	15.50	1.02388	29.03	37.44	13 29 15.53N	144 44 43.73E
11	12	98	20.17	1.02389	29.03	37.44	13 29 15.53N	144 44 43.73E
11	12	98	25.25	1.02389	29.03	37.44	13 29 15.53N	144 44 43.73E
11	12	98	30.20	1.02389	29.02	37.44	13 29 15.53N	144 44 43.73E
11	12	98	35.16	1.02389	29.01	37.43	13 29 15.53N	144 44 43.73E
11	12	98	40.07	1.02389	29.01	37.43	13 29 15.53N	144 44 43.73E
11	12	98	45.23	1.02390	29.00	37.44	13 29 15.53N	144 44 43.73E
11	12	98	50.12	1.02390	29.01	37.44	13 29 15.53N	144 44 43.73E
11	12	98	53.06	1.02392	28.96	37.45	13 29 15.53N	144 44 43.73E
11	13	98	0.57	1.02386	29.02	37.40	13 29 13.51N	144 44 54.85E
11	13	98	5.04	1.02387	29.01	37.40	13 29 13.51N	144 44 54.85E
11	13	98	10.18	1.02388	28.99	37.40	13 29 13.51N	144 44 54.85E
11	13	98	15.36	1.02388	28.97	37.40	13 29 13.51N	144 44 54.85E
11	13	98	20.04	1.02388	28.98	37.41	13 29 13.51N	144 44 54.85E
11	13	98	25.12	1.02389	29.00	37.43	13 29 13.51N	144 44 54.85E
11	13	98	30.10	1.02389	29.00	37.43	13 29 13.51N	144 44 54.85E
11	13	98	35.39	1.02389	29.00	37.43	13 29 13.51N	144 44 54.85E

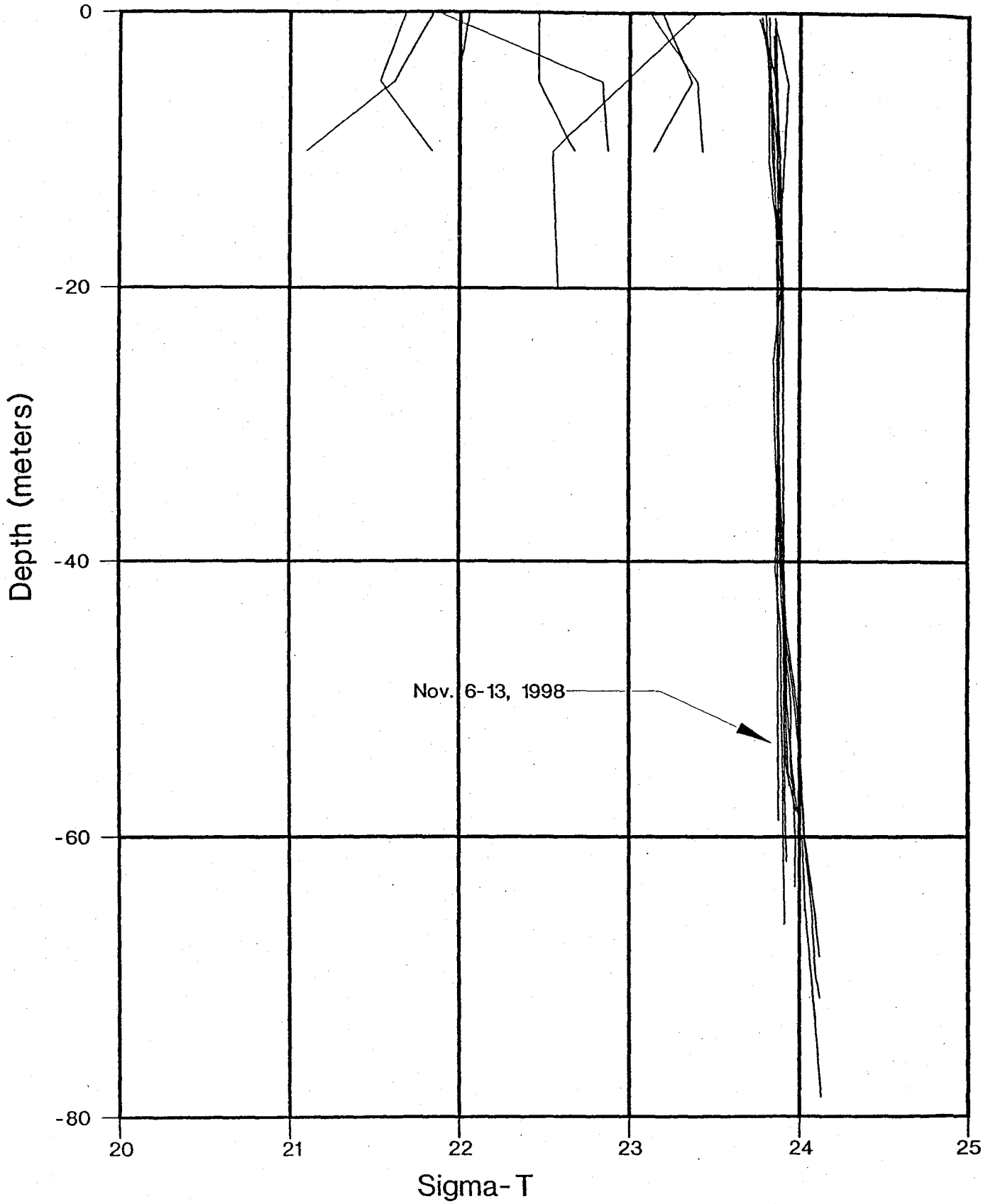
MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	Lat.	Long.
11	13	98	40.17	1.02389	29.01	37.43	13 29 13.51N	144 44 54.85E
11	13	98	43.21	1.02389	29.01	37.43	13 29 13.51N	144 44 54.85E
11	13	98	1.48	1.02386	29.02	37.39	13 29 13.60N	144 44 50.56E
11	13	98	5.14	1.02386	29.01	37.40	13 29 13.60N	144 44 50.56E
11	13	98	10.12	1.02387	28.99	37.39	13 29 13.60N	144 44 50.56E
11	13	98	15.20	1.02388	28.98	37.40	13 29 13.60N	144 44 50.56E
11	13	98	20.14	1.02388	28.99	37.41	13 29 13.60N	144 44 50.56E
11	13	98	25.12	1.02389	29.01	37.43	13 29 13.60N	144 44 50.56E
11	13	98	30.00	1.02389	29.01	37.44	13 29 13.60N	144 44 50.56E
11	13	98	35.09	1.02389	29.01	37.44	13 29 13.60N	144 44 50.56E
11	13	98	40.07	1.02389	29.02	37.44	13 29 13.60N	144 44 50.56E
11	13	98	44.73	1.02389	29.01	37.44	13 29 13.60N	144 44 50.56E

NORTHERN DISTRICT ... SSOLVED OXYGEN(DO) PROFIL... DATA OBTAINED DURING NOV. 12-13, 1998 BY EDWARD K. NODA AND ASSOCIATES, INC.
(Lat. and Long. in WGS 83)

MONTH	DAY	YEAR	DEPTH (meters)	DO Pct Sat	DO mg/l	TEMP (C)	Cond mS/cm	Turb NTUs	pH	ORP mV	Lat.	Long.
11	12	98	0.57	99.2	6.99	28.53	3.06	5	8.11	252	13 33 31.90N	144 48 15.78E
11	12	98	7.33	97.7	6.00	29.13	2.70	0	8.19	246	13 33 31.90N	144 48 15.78E
11	12	98	14.42	97.5	6.00	29.09	2.80	0	8.20	246	13 33 31.90N	144 48 15.78E
11	12	98	20.88	97.2	5.98	29.07	2.78	0	8.20	245	13 33 31.90N	144 48 15.78E
11	12	98	26.17	97.3	5.99	29.04	2.80	0	8.20	245	13 33 31.90N	144 48 15.78E
11	12	98	32.10	97.1	5.97	29.03	2.80	0	8.20	244	13 33 31.90N	144 48 15.78E
11	12	98	39.35	96.7	5.95	29.03	2.80	0	8.20	244	13 33 31.90N	144 48 15.78E
11	12	98	44.30	96.9	5.96	29.02	2.80	0	8.20	243	13 33 31.90N	144 48 15.78E
11	12	98	51.93	95.8	5.91	28.91	2.80	0	8.20	244	13 33 31.90N	144 48 15.78E
11	12	98	60.56	95.8	5.91	28.90	2.80	0	8.19	245	13 33 31.90N	144 48 15.78E
11	12	98	0.43	100.4	7.32	28.28	5.06	7	7.71	276	13 33 8.45N	144 48 27.14E
11	12	98	7.36	97.4	5.98	29.13	2.75	0	8.19	240	13 33 8.45N	144 48 27.14E
11	12	98	14.53	97.4	5.99	29.09	2.74	0	8.19	240	13 33 8.45N	144 48 27.14E
11	12	98	21.70	96.7	5.95	29.08	2.78	0	8.19	240	13 33 8.45N	144 48 27.14E
11	12	98	27.14	97.1	5.97	29.07	2.79	0	8.19	239	13 33 8.45N	144 48 27.14E
11	12	98	35.90	96.9	5.96	29.06	2.79	0	8.19	238	13 33 8.45N	144 48 27.14E
11	12	98	43.27	97.7	6.01	29.05	2.80	0	8.19	237	13 33 8.45N	144 48 27.14E
11	12	98	56.10	96.7	5.95	29.03	2.80	0	8.18	238	13 33 8.45N	144 48 27.14E
11	12	98	62.43	96.3	5.93	28.98	2.80	0	8.17	240	13 33 8.45N	144 48 27.14E
11	13	98	0.43	98.0	7.46	27.25	8.21	39	7.89	253	13 33 22.88N	144 48 11.38E
11	13	98	12.80	97.6	6.00	29.06	2.80	0	8.16	238	13 33 22.88N	144 48 11.38E
11	13	98	19.65	98.2	6.04	29.05	2.80	0	8.16	241	13 33 22.88N	144 48 11.38E
11	13	98	27.81	98.3	6.04	29.06	2.80	0	8.15	246	13 33 22.88N	144 48 11.38E
11	13	98	35.24	98.5	6.06	29.05	2.80	0	8.15	251	13 33 22.88N	144 48 11.38E
11	13	98	46.98	98.1	6.03	29.03	2.80	0	8.14	256	13 33 22.88N	144 48 11.38E
11	13	98	60.52	96.6	5.95	28.99	2.80	0	8.13	265	13 33 22.88N	144 48 11.38E

NORTHERN DISTRICT WWTP DIFFUSER SITE DENSITY DATA

MONTH	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	DAY	YEAR	DATA SOURCE	STATION
4	0	1.02205	26.8	34.0	25	89	Matson, A. E. (1990)	E
4	5	1.02199	27.0	34.0	25	89	Matson, A. E. (1990)	E
4	10	1.02199	27.0	34.0	25	89	Matson, A. E. (1990)	E
4	0	1.02340	27.3	36.0	6	98	Gov. of Guam, Water Quality Data	TANG
4	10	1.02255	27.6	35.0	6	98	Gov. of Guam, Water Quality Data	TANG
4	20	1.02258	27.5	35.0	6	98	Gov. of Guam, Water Quality Data	TANG
4	10	1.02173	27.8	34.0	27	98	Gov. of Guam, Water Quality Data	TANG
4	20	1.02167	28.0	34.0	27	98	Gov. of Guam, Water Quality Data	TANG
6	0	1.02312	27.7	35.8	13	89	Matson, A. E. (1990)	D
6	5	1.02340	27.3	36.0	13	89	Matson, A. E. (1990)	D
6	10	1.02343	27.2	36.0	13	89	Matson, A. E. (1990)	D
6	0	1.02319	27.7	35.9	13	89	Matson, A. E. (1990)	E
6	5	1.02337	27.4	36.0	13	89	Matson, A. E. (1990)	E
6	10	1.02314	27.4	35.7	13	89	Matson, A. E. (1990)	E
9	0	1.02186	29.9	35.1	21	89	Matson, A. E. (1990)	D
9	5	1.02284	29.0	36.0	21	89	Matson, A. E. (1990)	D
9	10	1.02287	28.9	36.0	21	89	Matson, A. E. (1990)	D
9	0	1.02246	29.0	35.5	21	89	Matson, A. E. (1990)	E
9	5	1.02246	29.0	35.5	21	89	Matson, A. E. (1990)	E
9	10	1.02268	28.8	35.7	21	89	Matson, A. E. (1990)	E
12	0	1.02169	30.4	35.1	12	89	Matson, A. E. (1990)	C
12	5	1.02154	30.4	34.9	12	89	Matson, A. E. (1990)	C
12	10	1.02184	30.4	35.3	12	89	Matson, A. E. (1990)	C
12	0	1.02140	30.8	34.9	12	89	Matson, A. E. (1990)	D
12	5	1.02138	30.2	34.6	12	89	Matson, A. E. (1990)	D
12	10	1.02056	30.2	33.5	12	89	Matson, A. E. (1990)	D
12	0	1.02184	29.5	34.9	12	89	Matson, A. E. (1990)	E
12	5	1.02162	29.5	34.6	12	89	Matson, A. E. (1990)	E
12	10	1.02109	29.5	33.9	12	89	Matson, A. E. (1990)	E



Edward K. Noda and Associates, Inc.	NORTHERN DISTRICT SEWAGE TREATMENT	Northern District STP Historic Sigma-T Profiles	FIGURE

NORTHERN DISTRIC WWTP DENSITY PROFILE DATA BTAINED DURING NOV. 6-13, 1998 BY EDWARD K. NODA AND ASSOCIATES, INC.

(Lat. and Long. in WGS 83)

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	Lat.	Long.
11	6	98	0.17	1.02380	29.21	37.40	13 32 45.88N	144 48 9.72E
11	6	98	5.25	1.02381	29.18	37.41	13 32 45.88N	144 48 9.72E
11	6	98	10.62	1.02382	29.16	37.40	13 32 45.88N	144 48 9.72E
11	6	98	15.50	1.02386	29.08	37.42	13 32 45.88N	144 48 9.72E
11	6	98	20.04	1.02388	29.06	37.44	13 32 45.88N	144 48 9.72E
11	6	98	25.22	1.02385	29.12	37.42	13 32 45.88N	144 48 9.72E
11	6	98	30.41	1.02385	29.08	37.41	13 32 45.88N	144 48 9.72E
11	6	98	35.59	1.02387	29.09	37.44	13 32 45.88N	144 48 9.72E
11	6	98	40.65	1.02386	29.05	37.41	13 32 45.88N	144 48 9.72E
11	6	98	45.13	1.02389	29.01	37.43	13 32 45.88N	144 48 9.72E
11	6	98	50.02	1.02389	29.01	37.43	13 32 45.88N	144 48 9.72E
11	6	98	55.52	1.02390	28.99	37.43	13 32 45.88N	144 48 9.72E
11	6	98	60.31	1.02390	28.97	37.43	13 32 45.88N	144 48 9.72E
11	6	98	65.09	1.02391	28.96	37.44	13 32 45.88N	144 48 9.72E
11	6	98	66.42	1.02391	28.97	37.44	13 32 45.88N	144 48 9.72E
11	8	98	0.92	1.02378	29.21	37.38	13 33 13.58N	144 48 23.23E
11	8	98	5.55	1.02387	29.10	37.44	13 33 13.58N	144 48 23.23E
11	8	98	10.02	1.02387	29.09	37.44	13 33 13.58N	144 48 23.23E
11	8	98	15.36	1.02387	29.08	37.44	13 33 13.58N	144 48 23.23E
11	8	98	20.27	1.02387	29.08	37.44	13 33 13.58N	144 48 23.23E
11	8	98	25.32	1.02387	29.09	37.45	13 33 13.58N	144 48 23.23E
11	8	98	30.20	1.02387	29.10	37.45	13 33 13.58N	144 48 23.23E
11	8	98	35.59	1.02387	29.10	37.44	13 33 13.58N	144 48 23.23E
11	8	98	40.37	1.02387	29.09	37.44	13 33 13.58N	144 48 23.23E
11	8	98	45.03	1.02387	29.08	37.44	13 33 13.58N	144 48 23.23E
11	8	98	50.43	1.02387	29.08	37.44	13 33 13.58N	144 48 23.23E
11	8	98	55.52	1.02387	29.08	37.44	13 33 13.58N	144 48 23.23E
11	8	98	56.02	1.02387	29.08	37.44	13 33 13.58N	144 48 23.23E
11	8	98	0.37	1.02376	29.23	37.35	13 33 14.45N	144 48 22.43E
11	8	98	5.45	1.02386	29.10	37.44	13 33 14.45N	144 48 22.43E
11	8	98	10.79	1.02386	29.09	37.43	13 33 14.45N	144 48 22.43E
11	8	98	15.10	1.02387	29.08	37.43	13 33 14.45N	144 48 22.43E
11	8	98	20.34	1.02387	29.08	37.44	13 33 14.45N	144 48 22.43E
11	8	98	25.42	1.02387	29.08	37.44	13 33 14.45N	144 48 22.43E
11	8	98	30.41	1.02387	29.10	37.45	13 33 14.45N	144 48 22.43E
11	8	98	35.16	1.02387	29.10	37.45	13 33 14.45N	144 48 22.43E
11	8	98	40.57	1.02387	29.10	37.45	13 33 14.45N	144 48 22.43E
11	8	98	45.26	1.02387	29.10	37.45	13 33 14.45N	144 48 22.43E
11	8	98	50.33	1.02387	29.08	37.44	13 33 14.45N	144 48 22.43E
11	8	98	55.53	1.02388	29.08	37.44	13 33 14.45N	144 48 22.43E
11	8	98	58.87	1.02387	29.08	37.44	13 33 14.45N	144 48 22.43E
11	9	98	0.27	1.02377	29.06	37.30	13 33 16.16N	144 48 20.25E
11	9	98	5.25	1.02383	29.09	37.38	13 33 16.16N	144 48 20.25E
11	9	98	10.02	1.02385	29.09	37.41	13 33 16.16N	144 48 20.25E
11	9	98	15.10	1.02386	29.08	37.42	13 33 16.16N	144 48 20.25E
11	9	98	20.04	1.02386	29.08	37.43	13 33 16.16N	144 48 20.25E
11	9	98	25.22	1.02387	29.08	37.43	13 33 16.16N	144 48 20.25E
11	9	98	30.20	1.02387	29.08	37.44	13 33 16.16N	144 48 20.25E
11	9	98	35.06	1.02387	29.05	37.43	13 33 16.16N	144 48 20.25E
11	9	98	40.27	1.02389	29.02	37.44	13 33 16.16N	144 48 20.25E
11	9	98	45.26	1.02393	28.91	37.44	13 33 16.16N	144 48 20.25E
11	9	98	50.14	1.02398	28.78	37.45	13 33 16.16N	144 48 20.25E

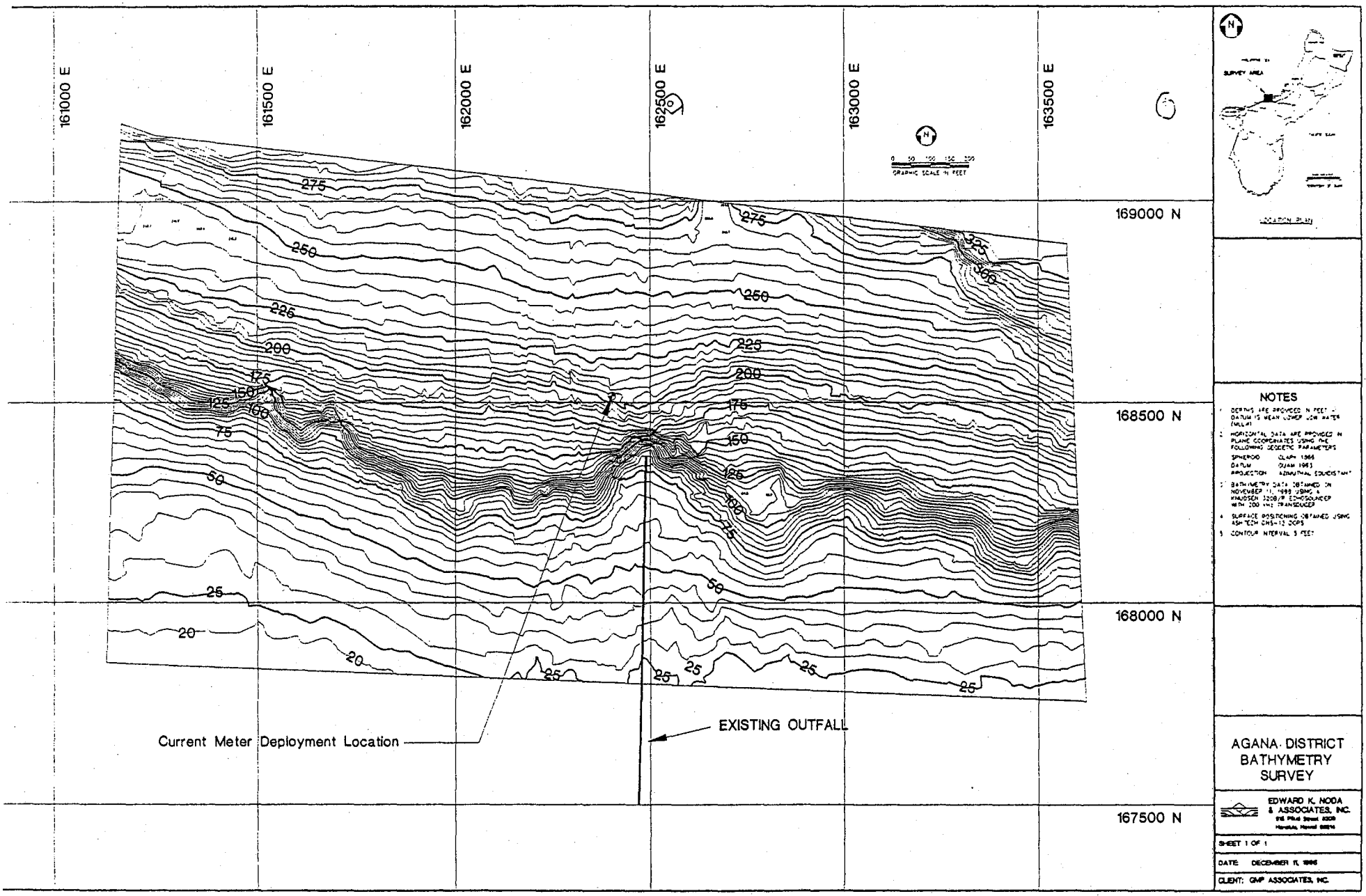
MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00		Long.
11	9	98	55.11	1.02401	28.70	37.45	13 33 16.16N	144 48 20.25E
11	9	98	60.10	1.02403	28.65	37.46	13 33 16.16N	144 48 20.25E
11	9	98	65.39	1.02409	28.50	37.47	13 33 16.16N	144 48 20.25E
11	9	98	68.65	1.02412	28.47	37.49	13 33 16.16N	144 48 20.25E
11	9	98	0.57	1.02386	29.10	37.43	13 33 16.48N	144 48 19.88E
11	9	98	5.04	1.02386	29.09	37.43	13 33 16.48N	144 48 19.88E
11	9	98	10.28	1.02387	29.09	37.43	13 33 16.48N	144 48 19.88E
11	9	98	15.30	1.02387	29.08	37.43	13 33 16.48N	144 48 19.88E
11	9	98	20.44	1.02387	29.08	37.44	13 33 16.48N	144 48 19.88E
11	9	98	25.32	1.02387	29.08	37.44	13 33 16.48N	144 48 19.88E
11	9	98	30.30	1.02387	29.08	37.44	13 33 16.48N	144 48 19.88E
11	9	98	35.19	1.02388	29.06	37.44	13 33 16.48N	144 48 19.88E
11	9	98	40.25	1.02389	29.02	37.44	13 33 16.48N	144 48 19.88E
11	9	98	45.26	1.02392	28.93	37.43	13 33 16.48N	144 48 19.88E
11	9	98	50.14	1.02397	28.85	37.46	13 33 16.48N	144 48 19.88E
11	9	98	55.01	1.02400	28.71	37.45	13 33 16.48N	144 48 19.88E
11	9	98	60.31	1.02403	28.67	37.46	13 33 16.48N	144 48 19.88E
11	9	98	65.20	1.02407	28.52	37.46	13 33 16.48N	144 48 19.88E
11	9	98	70.09	1.02409	28.48	37.47	13 33 16.48N	144 48 19.88E
11	9	98	71.61	1.02412	28.47	37.50	13 33 16.48N	144 48 19.88E
11	9	98	1.42	1.02386	29.09	37.43	13 33 16.70N	144 48 18.98E
11	9	98	5.25	1.02386	29.09	37.43	13 33 16.70N	144 48 18.98E
11	9	98	10.28	1.02387	29.09	37.44	13 33 16.70N	144 48 18.98E
11	9	98	15.20	1.02387	29.08	37.44	13 33 16.70N	144 48 18.98E
11	9	98	20.14	1.02387	29.08	37.44	13 33 16.70N	144 48 18.98E
11	9	98	25.22	1.02387	29.08	37.44	13 33 16.70N	144 48 18.98E
11	9	98	30.20	1.02387	29.08	37.44	13 33 16.70N	144 48 18.98E
11	9	98	35.19	1.02388	29.05	37.44	13 33 16.70N	144 48 18.98E
11	9	98	40.15	1.02390	29.01	37.44	13 33 16.70N	144 48 18.98E
11	9	98	45.16	1.02391	28.98	37.45	13 33 16.70N	144 48 18.98E
11	9	98	50.12	1.02395	28.88	37.45	13 33 16.70N	144 48 18.98E
11	9	98	55.31	1.02395	28.85	37.44	13 33 16.70N	144 48 18.98E
11	9	98	60.31	1.02402	28.69	37.46	13 33 16.70N	144 48 18.98E
11	9	98	65.18	1.02403	28.64	37.45	13 33 16.70N	144 48 18.98E
11	9	98	70.09	1.02407	28.52	37.45	13 33 16.70N	144 48 18.98E
11	9	98	75.28	1.02411	28.45	37.47	13 33 16.70N	144 48 18.98E
11	9	98	78.64	1.02413	28.41	37.48	13 33 16.70N	144 48 18.98E
11	10	98	0.47	1.02380	29.16	37.38	13 33 3.73N	144 48 15.88E
11	10	98	5.25	1.02382	29.16	37.41	13 33 3.73N	144 48 15.88E
11	10	98	10.28	1.02384	29.12	37.41	13 33 3.73N	144 48 15.88E
11	10	98	15.20	1.02386	29.09	37.44	13 33 3.73N	144 48 15.88E
11	10	98	20.24	1.02387	29.09	37.44	13 33 3.73N	144 48 15.88E
11	10	98	25.25	1.02387	29.08	37.44	13 33 3.73N	144 48 15.88E
11	10	98	30.00	1.02387	29.08	37.44	13 33 3.73N	144 48 15.88E
11	10	98	35.09	1.02388	29.07	37.44	13 33 3.73N	144 48 15.88E
11	10	98	40.05	1.02388	29.05	37.44	13 33 3.73N	144 48 15.88E
11	10	98	45.16	1.02390	29.01	37.45	13 33 3.73N	144 48 15.88E
11	10	98	50.24	1.02391	29.01	37.45	13 33 3.73N	144 48 15.88E
11	10	98	55.01	1.02392	28.97	37.45	13 33 3.73N	144 48 15.88E
11	10	98	58.26	1.02398	28.87	37.49	13 33 3.73N	144 48 15.88E
11	10	98	0.57	1.02385	29.28	37.50	13 33 7.57N	144 48 16.14E
11	10	98	5.14	1.02393	29.11	37.53	13 33 7.57N	144 48 16.14E
11	10	98	10.22	1.02391	29.11	37.50	13 33 7.57N	144 48 16.14E
11	10	98	15.30	1.02389	29.11	37.47	13 33 7.57N	144 48 16.14E
11	10	98	20.27	1.02389	29.09	37.46	13 33 7.57N	144 48 16.14E
11	10	98	25.32	1.02388	29.08	37.45	13 33 7.57N	144 48 16.14E
11	10	98	30.10	1.02388	29.06	37.44	13 33 7.57N	144 48 16.14E

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00	Lat.	Long.
11	10	98	35.06	1.02389	29.03	37.44	13 33 7.57N	144 48 16.14E
11	10	98	40.17	1.02390	28.99	37.44	13 33 7.57N	144 48 16.14E
11	10	98	45.16	1.02392	28.95	37.45	13 33 7.57N	144 48 16.14E
11	10	98	50.22	1.02393	28.93	37.45	13 33 7.57N	144 48 16.14E
11	10	98	55.11	1.02395	28.86	37.45	13 33 7.57N	144 48 16.14E
11	10	98	60.10	1.02397	28.81	37.45	13 33 7.57N	144 48 16.14E
11	10	98	63.66	1.02397	28.81	37.45	13 33 7.57N	144 48 16.14E
11	12	98	1.58	1.02384	29.10	37.41	13 33 27.54N	144 48 8.97E
11	12	98	5.14	1.02385	29.09	37.41	13 33 27.54N	144 48 8.97E
11	12	98	10.12	1.02388	29.06	37.44	13 33 27.54N	144 48 8.97E
11	12	98	15.10	1.02388	29.04	37.44	13 33 27.54N	144 48 8.97E
11	12	98	20.34	1.02389	29.02	37.44	13 33 27.54N	144 48 8.97E
11	12	98	25.12	1.02390	29.01	37.45	13 33 27.54N	144 48 8.97E
11	12	98	30.10	1.02391	29.00	37.45	13 33 27.54N	144 48 8.97E
11	12	98	35.29	1.02391	28.99	37.45	13 33 27.54N	144 48 8.97E
11	12	98	40.05	1.02391	28.99	37.45	13 33 27.54N	144 48 8.97E
11	12	98	45.05	1.02391	28.98	37.45	13 33 27.54N	144 48 8.97E
11	12	98	50.33	1.02392	28.97	37.45	13 33 27.54N	144 48 8.97E
11	12	98	55.21	1.02393	28.93	37.45	13 33 27.54N	144 48 8.97E
11	12	98	56.65	1.02397	28.89	37.48	13 33 27.54N	144 48 8.97E
11	12	98	0.27	1.02382	29.09	37.37	13 33 32.24N	144 48 14.25E
11	12	98	5.14	1.02383	29.09	37.38	13 33 32.24N	144 48 14.25E
11	12	98	10.32	1.02387	29.06	37.42	13 33 32.24N	144 48 14.25E
11	12	98	15.10	1.02387	29.04	37.43	13 33 32.24N	144 48 14.25E
11	12	98	20.14	1.02389	29.02	37.44	13 33 32.24N	144 48 14.25E
11	12	98	25.15	1.02390	29.00	37.44	13 33 32.24N	144 48 14.25E
11	12	98	30.00	1.02390	29.00	37.44	13 33 32.24N	144 48 14.25E
11	12	98	35.19	1.02391	28.99	37.44	13 33 32.24N	144 48 14.25E
11	12	98	40.27	1.02391	28.98	37.45	13 33 32.24N	144 48 14.25E
11	12	98	45.16	1.02392	28.96	37.45	13 33 32.24N	144 48 14.25E
11	12	98	50.33	1.02393	28.94	37.45	13 33 32.24N	144 48 14.25E
11	12	98	55.01	1.02396	28.86	37.45	13 33 32.24N	144 48 14.25E
11	12	98	57.95	1.02398	28.82	37.47	13 33 32.24N	144 48 14.25E
11	12	98	0.31	1.02385	29.11	37.42	13 33 7.58N	144 48 3.04E
11	12	98	5.35	1.02386	29.09	37.43	13 33 7.58N	144 48 3.04E
11	12	98	10.12	1.02388	29.05	37.44	13 33 7.58N	144 48 3.04E
11	12	98	15.26	1.02389	29.03	37.44	13 33 7.58N	144 48 3.04E
11	12	98	20.24	1.02390	29.02	37.45	13 33 7.58N	144 48 3.04E
11	12	98	25.02	1.02391	29.01	37.45	13 33 7.58N	144 48 3.04E
11	12	98	30.30	1.02391	29.01	37.45	13 33 7.58N	144 48 3.04E
11	12	98	35.19	1.02390	29.01	37.45	13 33 7.58N	144 48 3.04E
11	12	98	40.17	1.02391	29.00	37.45	13 33 7.58N	144 48 3.04E
11	12	98	45.13	1.02391	28.99	37.45	13 33 7.58N	144 48 3.04E
11	12	98	50.14	1.02391	28.98	37.45	13 33 7.58N	144 48 3.04E
11	12	98	55.01	1.02393	28.95	37.46	13 33 7.58N	144 48 3.04E
11	12	98	56.33	1.02394	28.95	37.46	13 33 7.58N	144 48 3.04E
11	12	98	1.08	1.02385	29.10	37.42	13 33 8.23N	144 48 3.20E
11	12	98	5.00	1.02386	29.09	37.42	13 33 8.23N	144 48 3.20E
11	12	98	10.32	1.02387	29.07	37.43	13 33 8.23N	144 48 3.20E
11	12	98	15.30	1.02389	29.03	37.44	13 33 8.23N	144 48 3.20E
11	12	98	20.17	1.02389	29.03	37.44	13 33 8.23N	144 48 3.20E
11	12	98	25.22	1.02390	29.02	37.45	13 33 8.23N	144 48 3.20E
11	12	98	30.00	1.02390	29.01	37.45	13 33 8.23N	144 48 3.20E
11	12	98	35.26	1.02390	29.01	37.45	13 33 8.23N	144 48 3.20E
11	12	98	40.15	1.02391	29.01	37.45	13 33 8.23N	144 48 3.20E
11	12	98	45.03	1.02391	29.00	37.45	13 33 8.23N	144 48 3.20E
11	12	98	50.12	1.02391	29.00	37.45	13 33 8.23N	144 48 3.20E

MONTH	DAY	YEAR	DEPTH (meters)	DENSITY gm/cm^3	TEMP (C)	SAL 0/00		Long.
11	12	98	55.21	1.02391	28.99	37.45	13 33 8.23N	144 48 3.20E
11	12	98	60.09	1.02392	28.97	37.45	13 33 8.23N	144 48 3.20E
11	12	98	61.83	1.02392	28.97	37.46	13 33 8.23N	144 48 3.20E

APPENDIX C:

CURRENT METER MOORING STUDY RESULTS



NOTES

1. DEPTHS ARE PROVIDED IN FEET. DATUM IS MEAN LOWER LOW WATER (MLLW).
2. HORIZONTAL DATA ARE PROVIDED IN PLANE COORDINATES USING THE FOLLOWING GEODETIC PARAMETERS:
   SPHEROID — CLARK 1866
   DATUM — GUAM 1963
   PROJECTION — AZIMUTHAL EQUIDISTANT
3. BATHYMETRY DATA OBTAINED ON NOVEMBER 11, 1998 USING A KNUDSEN 320B/P ECHOSOUNDER WITH 200 kHz TRANSDUCER.
4. SURFACE POSITIONING OBTAINED USING ASHTECH DNS-12 DGPS.
5. CONTOUR INTERVAL 5 FEET.

AGANA DISTRICT BATHYMETRY SURVEY

EDWARD K. NODA & ASSOCIATES, INC.
915 Pilua Street #209
Honolulu, Hawaii 96816

SHEET 1 OF 1

DATE: DECEMBER 11, 1998

CLIENT: GMP ASSOCIATES, INC.

GUAM AGANA WWTP DIFFUSER CURRENTS -- 1

CURRENT METER S/N -- 0705

METER POSITION ----- 1

DATA ACQUISITION
   DEPLOYMENT DATE(GST) - NOV. 7 ,1998
   DEPLOYMENT TIME(GST) - 1545

   RETRIEVAL DATE(GST) --- NOV. 13,1998
   RETRIEVAL TIME(GST) --- 1205

MOORING LOCATION
   LATITUDE -------- 13-29.09N
   LONGITUDE ------- 144-44.65E

SENSOR DEPTH(M) ---- 33

BOTTOM DEPTH(M) ---- 61

MAGNETIC DECLINATION(DEGREES) -- 1.8

DATA ANALYSIS
   START DATE(GST) - NOV. 7 ,1998
   START TIME(GST) - 1545

   ENDING DATE(GST) - NOV. 13,1998
   ENDING TIME(GST) - 1215

TIME INTERVAL(MIN) - 10.00

DISTRIBUTION FREQUENCY

.17 HOUR AVERAGES
DEPLOYMENT 1 METER POSITION 1
FROM 1545 7 NOV 1998 TO 1215 13 NOV 1998

DIRECTION DEGREES TRUE	33 METERS DEPTH									
0- 15	8	0	0	0	0	0	0	0	0	0
15- 30	2	0	0	0	0	0	0	0	0	0
30- 45	2	1	0	0	0	0	0	0	0	0
45- 60	3	1	0	0	0	0	0	0	0	0
60- 75	5	2	0	0	0	0	0	0	0	0
75- 90	11	10	7	3	3	0	0	0	0	0
90-105	25	48	33	17	6	0	0	0	0	0
105-120	35	46	30	1	0	0	0	0	0	0
120-135	43	24	1	0	0	0	0	0	0	0
135-150	35	5	0	0	0	0	0	0	0	0
150-165	42	2	0	0	0	0	0	0	0	0
165-180	28	1	0	0	0	0	0	0	0	0
180-195	44	0	0	0	0	0	0	0	0	0
195-210	22	0	0	0	0	0	0	0	0	0
210-225	29	3	0	0	0	0	0	0	0	0
225-240	39	8	0	0	0	0	0	0	0	0
240-255	21	41	10	0	0	0	0	0	0	0
255-270	25	42	17	8	0	0	0	0	0	0
270-285	16	13	6	1	0	0	0	0	0	0
285-300	7	3	0	0	0	0	0	0	0	0
300-315	3	0	0	0	0	0	0	0	0	0
315-330	2	0	0	0	0	0	0	0	0	0
330-345	2	0	0	0	0	0	0	0	0	0
345-360	2	0	0	0	0	0	0	0	0	0
SPEED	0	5	10	15	20	25	30	35	40	45
CM/SEC	|	|	|	|	|	|	|	|	|	|
	5	10	15	20	25	30	35	40	45	50

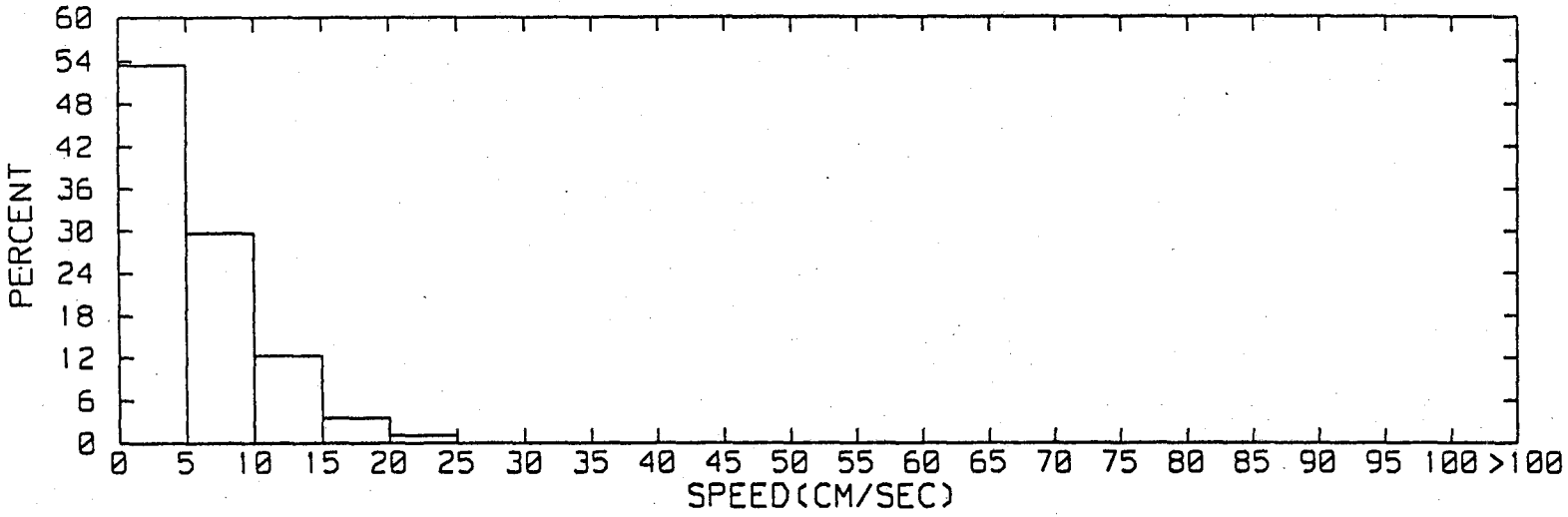
0- 15	0	0	0	0	0	0	0	0	0	0	0
15- 30	0	0	0	0	0	0	0	0	0	0	0
30- 45	0	0	0	0	0	0	0	0	0	0	0
45- 60	0	0	0	0	0	0	0	0	0	0	0
60- 75	0	0	0	0	0	0	0	0	0	0	0
75- 90	0	0	0	0	0	0	0	0	0	0	0
90-105	0	0	0	0	0	0	0	0	0	0	0
105-120	0	0	0	0	0	0	0	0	0	0	0
120-135	0	0	0	0	0	0	0	0	0	0	0
135-150	0	0	0	0	0	0	0	0	0	0	0
150-165	0	0	0	0	0	0	0	0	0	0	0
165-180	0	0	0	0	0	0	0	0	0	0	0
180-195	0	0	0	0	0	0	0	0	0	0	0
195-210	0	0	0	0	0	0	0	0	0	0	0
210-225	0	0	0	0	0	0	0	0	0	0	0
225-240	0	0	0	0	0	0	0	0	0	0	0
240-255	0	0	0	0	0	0	0	0	0	0	0
255-270	0	0	0	0	0	0	0	0	0	0	0
270-285	0	0	0	0	0	0	0	0	0	0	0
285-300	0	0	0	0	0	0	0	0	0	0	0
300-315	0	0	0	0	0	0	0	0	0	0	0
315-330	0	0	0	0	0	0	0	0	0	0	0
330-345	0	0	0	0	0	0	0	0	0	0	0
345-360	0	0	0	0	0	0	0	0	0	0	0
SPEED	50	55	60	65	70	75	80	85	90	95	
CM/SEC	|	|	|	|	|	|	|	|	|	|	>100
	55	60	65	70	75	80	85	90	95	100	

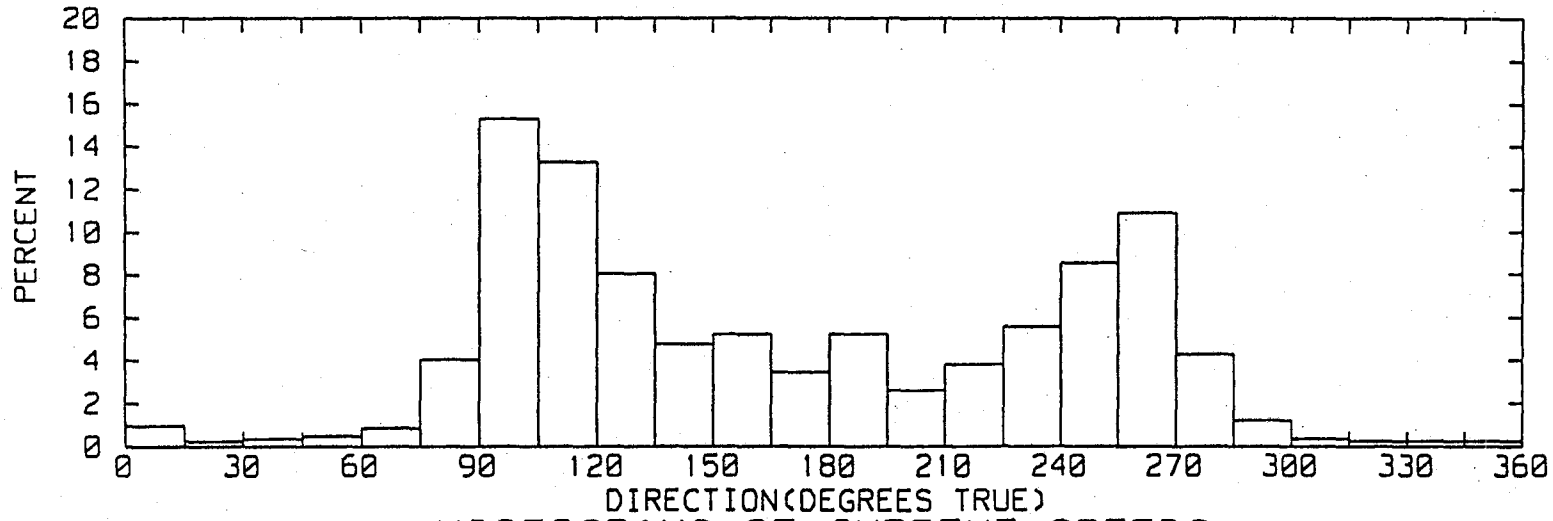
SUMMARY STATISTICS
DEPLOYMENT 1 METER POSITION 1
FROM 1545 7 NOV 1998 TO 1215 13 NOV 1998

DIRECTION(DEGREES TRUE)	TOTAL OBSERVATIONS	PERCENT
0 TO 15	8	.95
15 TO 30	2	.24
30 TO 45	3	.36
45 TO 60	4	.47
60 TO 75	7	.83
75 TO 90	34	4.03
90 TO 105	129	15.28
105 TO 120	112	13.27
120 TO 135	68	8.06
135 TO 150	40	4.74
150 TO 165	44	5.21
165 TO 180	29	3.44
180 TO 195	44	5.21
195 TO 210	22	2.61
210 TO 225	32	3.79
225 TO 240	47	5.57
240 TO 255	72	8.53
255 TO 270	92	10.90
270 TO 285	36	4.27
285 TO 300	10	1.18
300 TO 315	3	.36
315 TO 330	2	.24
330 TO 345	2	.24
345 TO 360	2	.24

SPEED(CM/SEC)	TOTAL OBSERVATIONS	PERCENT
0.0 TO 5.0	451	53.44
5.0 TO 10.0	250	29.62
10.0 TO 15.0	104	12.32
15.0 TO 20.0	30	3.55
20.0 TO 25.0	9	1.07
25.0 TO 30.0	0	0.00
30.0 TO 35.0	0	0.00
35.0 TO 40.0	0	0.00
40.0 TO 45.0	0	0.00
45.0 TO 50.0	0	0.00
50.0 TO 55.0	0	0.00
55.0 TO 60.0	0	0.00
60.0 TO 65.0	0	0.00
65.0 TO 70.0	0	0.00
70.0 TO 75.0	0	0.00
75.0 TO 80.0	0	0.00
80.0 TO 85.0	0	0.00
85.0 TO 90.0	0	0.00
90.0 TO 95.0	0	0.00
95.0 TO 100.0	0	0.00
ABOVE 100	0	0.00

TOTAL NUMBER OF POINTS READ = 844
TOTAL NUMBER OF OBSERVATIONS USED IN THE DISTRIBUTIONS = 844
MEAN SPEED = 5.90 CM/SEC
STANDARD DEVIATION = 4.36 CM/SEC
MAXIMUM SPEED = 24.20 CM/SEC
MINIMUM SPEED = 0.00 CM/SEC
RANGE = 24.20 CM/SEC

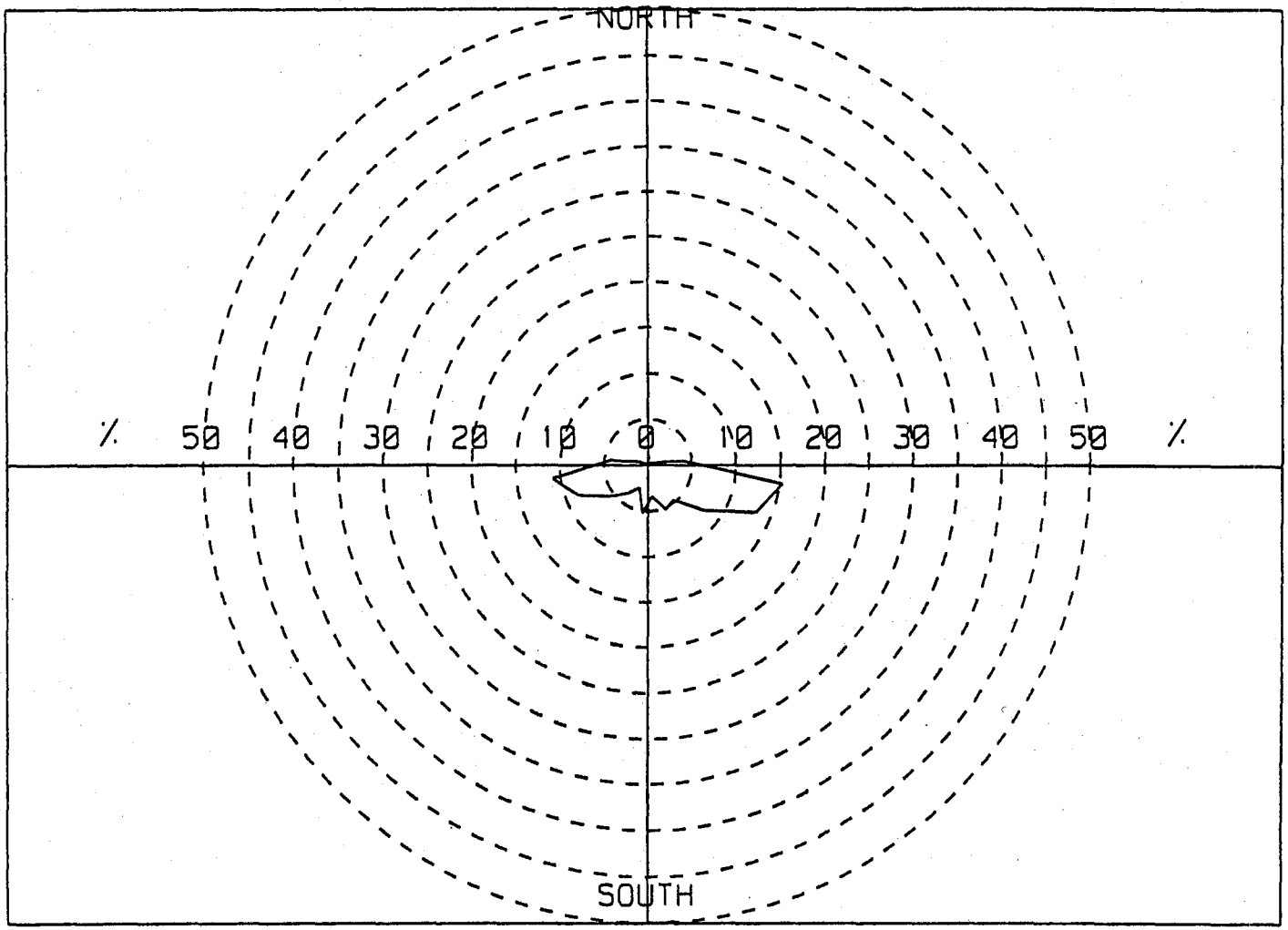




HISTOGRAMS OF CURRENT SPEEDS

(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998

LATITUDE: 13-29.09N LONGITUDE: 144-44.65E NOMINAL DEPTH(M): 33



PERCENT OCCURRENCE VS DIRECTION(DEG TRUE)

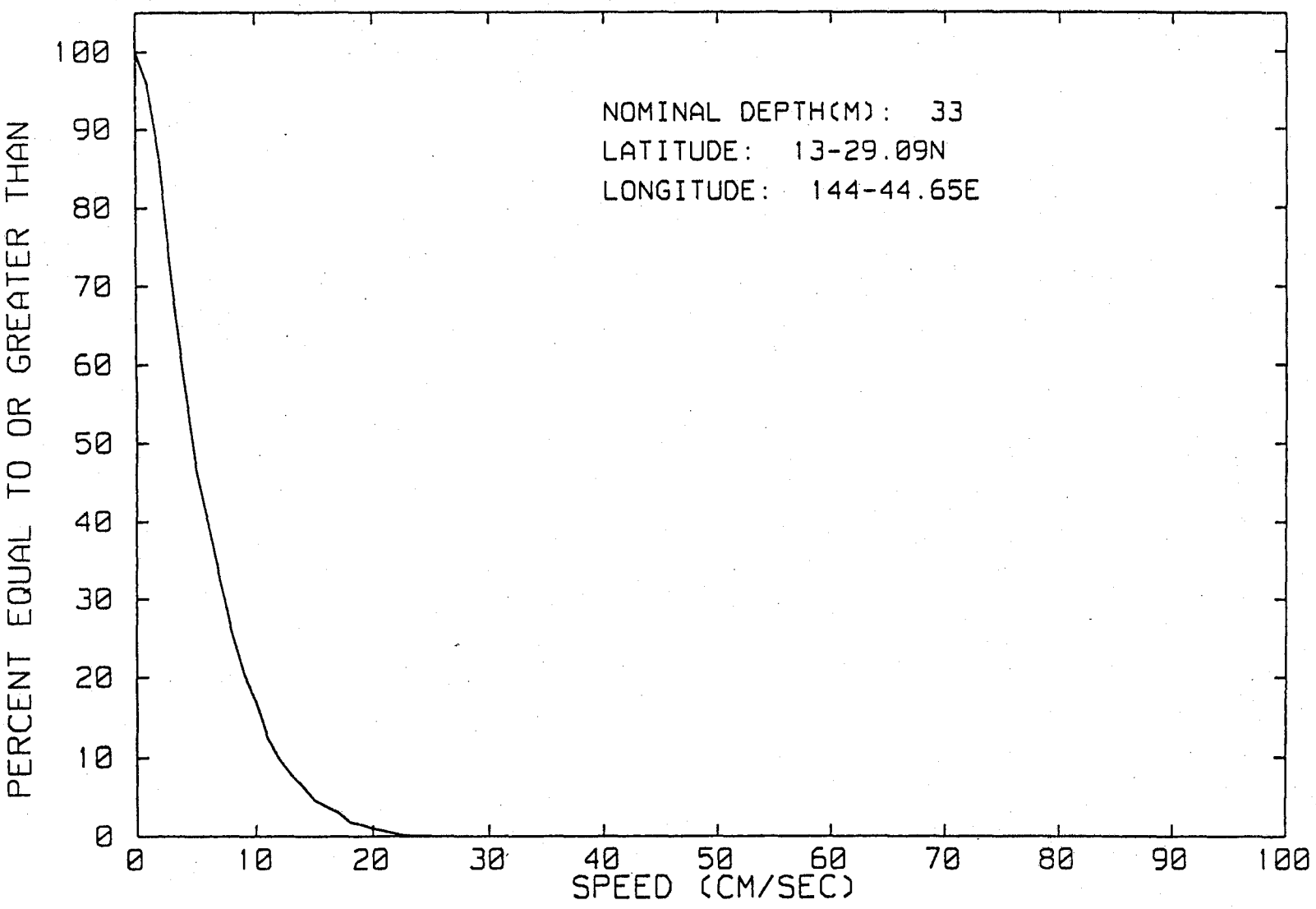
(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998

LATITUDE: 13-29.09N LONGITUDE: 144-44.65E NOMINAL DEPTH(M): 33

LATITUDE: 13-29.09N
LONGITUDE: 144-44.65E
NOMINAL DEPTH(METERS): 33
TIME SPAN(GST): 1545 NOV 7 1998 TO 1215 NOV 13 1998

CUMULATIVE OCCURENCE OF CURRENT SPEEDS

SPEED (CM/SEC)	PERCENT EQUAL TO OR GREATER THAN
0	100.000
3	70.616
6	39.929
9	20.498
12	9.834
15	4.621
18	1.896
21	.711
24	.118
27	0.000

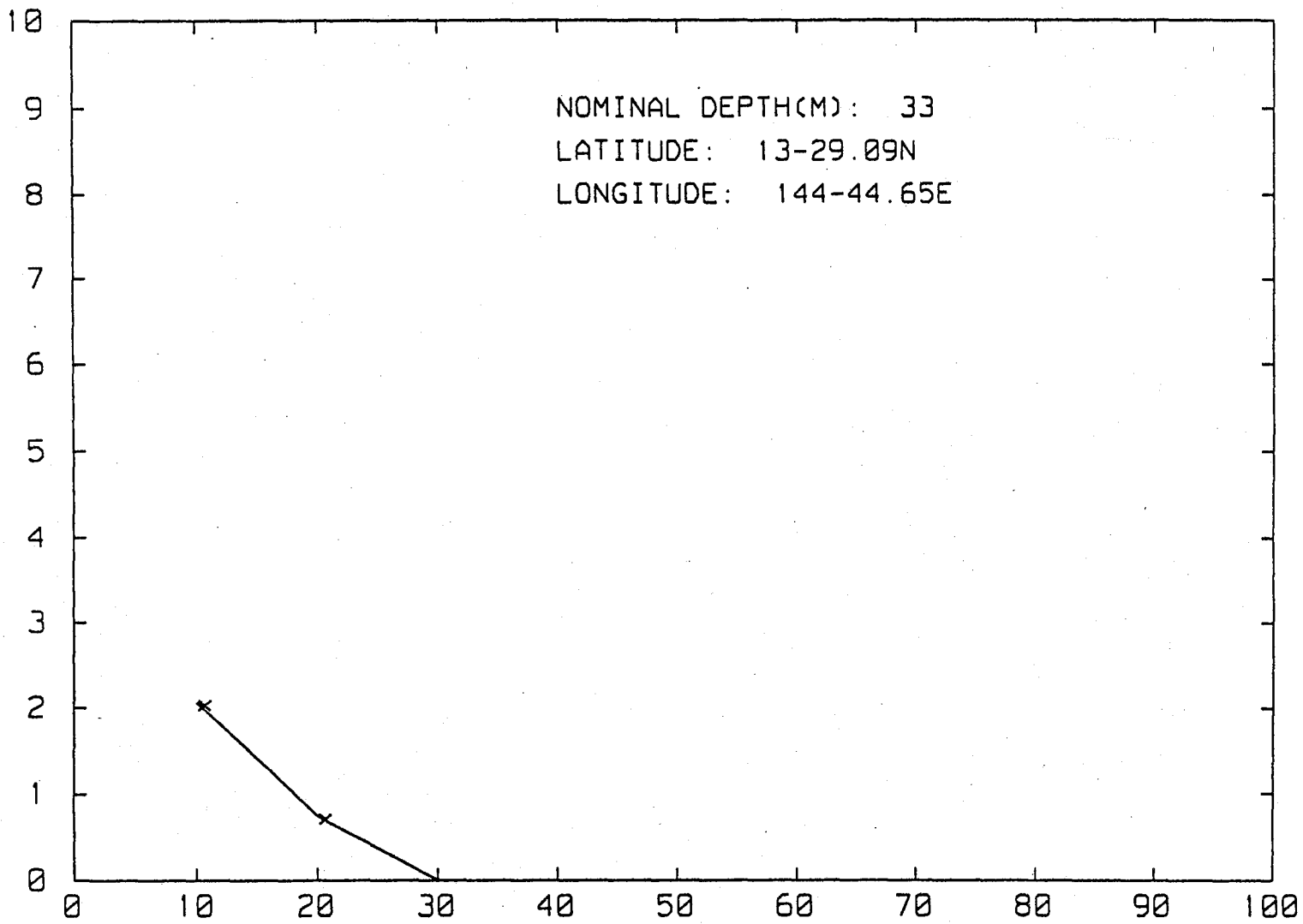


CUMULATIVE OCCURENCE OF CURRENT SPEEDS
(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998

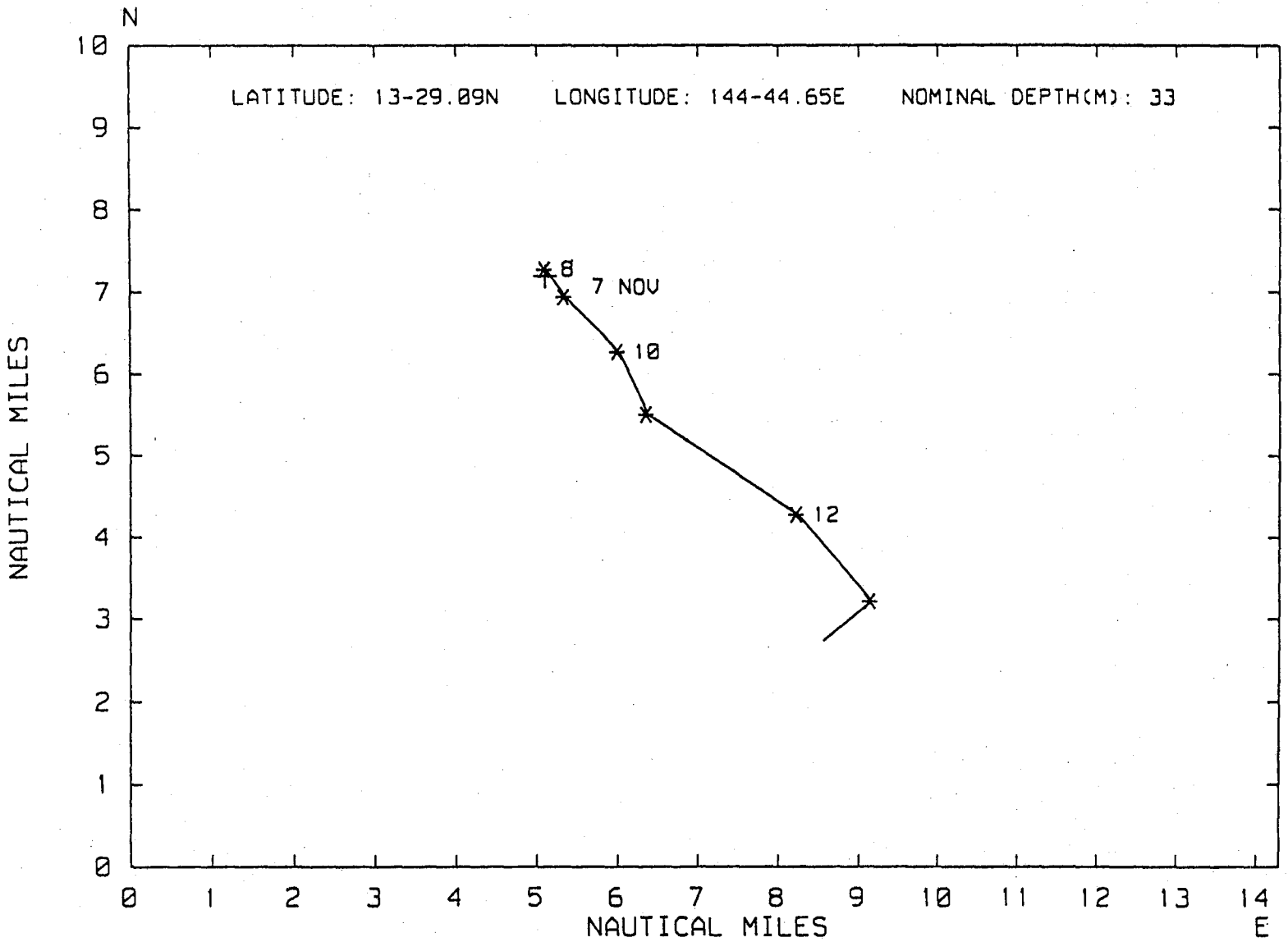
LATITUDE: 13-29.09N
LONGITUDE: 144-44.65E
NOMINAL DEPTH(METERS): 33
TIME SPAN(GST): 1545 NOV 7 1998 TO 1215 NOV 13 1998

PERSISTENCE OF CURRENT SPEEDS

SPEED (CM/SEC)	MAXIMUM DURATION (HOURS)
10	2.06
20	.74
30	0.00



PERSISTENCE OF CURRENT SPEED FROM:
(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998



PROGRESSIVE VECTOR DIAGRAM OF CURRENTS
(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998

TEMPERATURE STATISTICS

DEPLOYMENT 1 METER POSITION 1
FROM 1545 7 NOV 1998 TO 1215 13 NOV 1998

TEMPERATURE(CENTIGRADE)	TOTAL OBSERVATIONS	PERCENT
0 TO 1	0	0.00
1 TO 2	0	0.00
2 TO 3	0	0.00
3 TO 4	0	0.00
4 TO 5	0	0.00
5 TO 6	0	0.00
6 TO 7	0	0.00
7 TO 8	0	0.00
8 TO 9	0	0.00
9 TO 10	0	0.00
10 TO 11	0	0.00
11 TO 12	0	0.00
12 TO 13	0	0.00
13 TO 14	0	0.00
14 TO 15	0	0.00
15 TO 16	0	0.00
16 TO 17	0	0.00
17 TO 18	0	0.00
18 TO 19	0	0.00
19 TO 20	0	0.00
20 TO 21	0	0.00
21 TO 22	0	0.00
22 TO 23	0	0.00
23 TO 24	0	0.00
24 TO 25	0	0.00
25 TO 26	0	0.00
26 TO 27	0	0.00
27 TO 28	0	0.00
28 TO 29	0	0.00
29 TO 30	844	100.00

TOTAL NUMBER OF POINTS READ = 844
TOTAL NUMBER OF OBSERVATION USED IN THE DISTRIBUTION = 844
MEAN TEMPERATURE = 29.3 DEGREES CENTIGRADE
STANDARD DEVIATION = 0.0 DEGREES CENTIGRADE
MAXIMUM TEMPERATURE = 29.4 DEGREES CENTIGRADE
MINIMUM TEMPERATURE = 29.2 DEGREES CENTIGRADE
RANGE = .2 DEGREES CENTIGRADE

Guam Agana WWTP Diffuser Monthly Current-Temperature Statistics

DEPLOYMENT LOCATION: 1

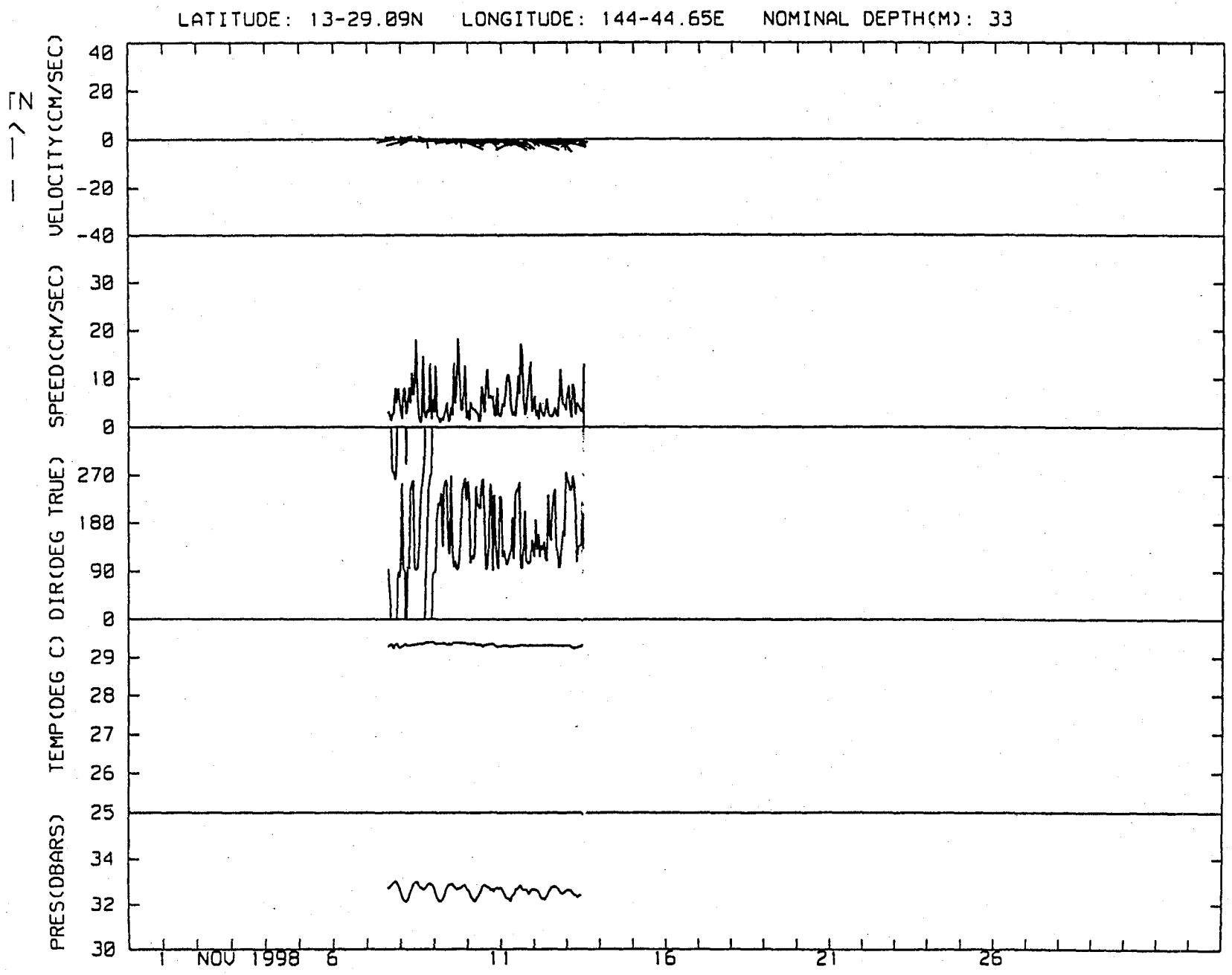
Latitude: 13-29.09N Longitude: 144-44.65E
Meter Depth(m): 33.0 Bottom Depth(m): 61.0

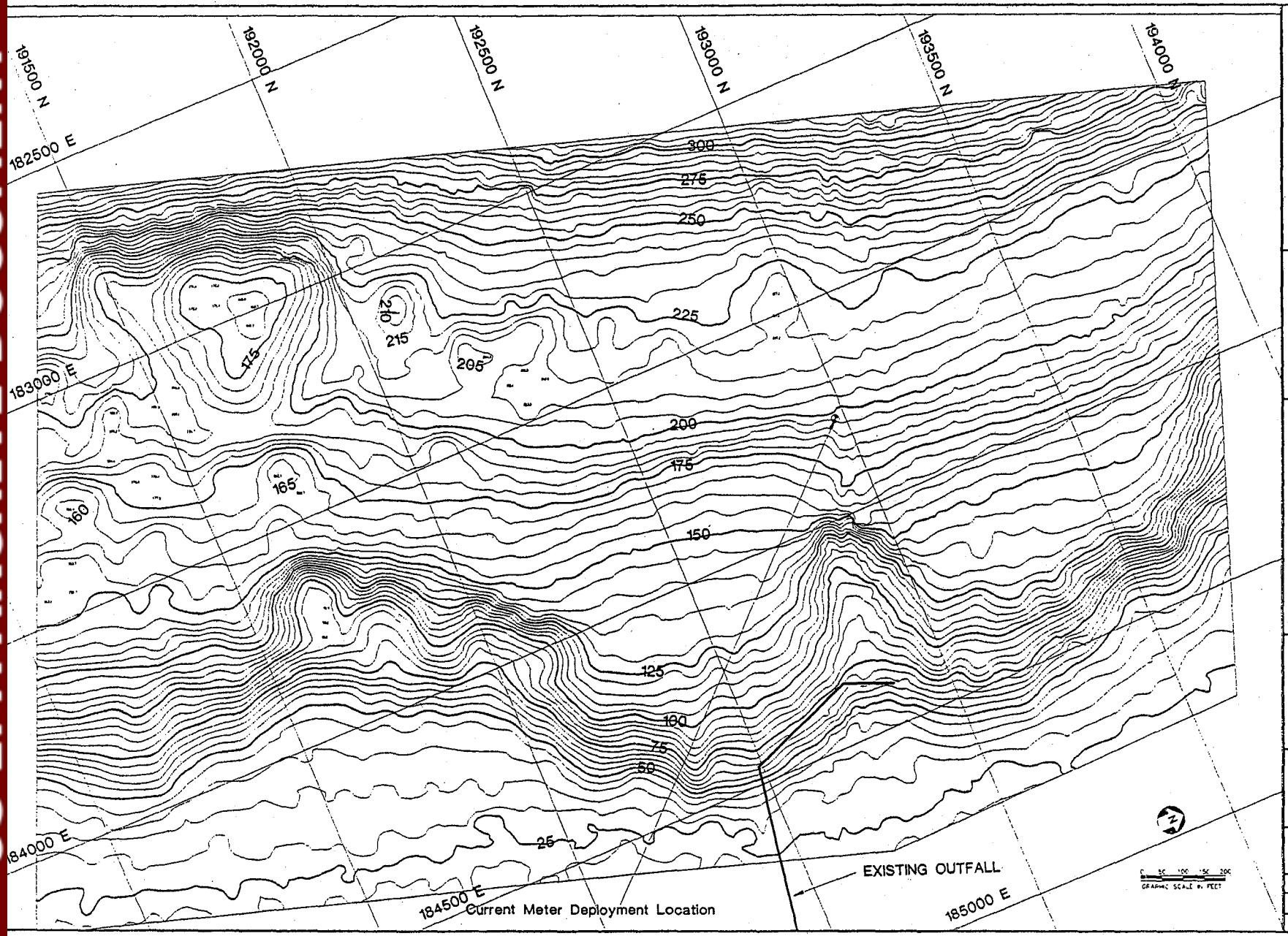
Period: NOVEMBER 1998

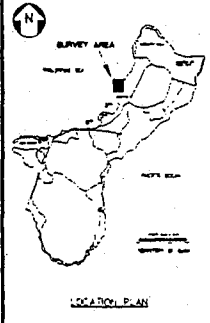
Mean Speed(cm/sec): 5.90
Maximum Speed(cm/sec): 24.20
Standard Deviation: 4.36
Average North Vector Component(cm/sec): -1.63
Average East Vector Component(cm/sec): 1.25
Resultant Magnitude(cm/sec): 2.05
Resultant Direction(°T): 143

Minimum Temperature(°C): 29.2
Maximum Temperature(°C): 29.4
Mean Temperature(°C): 29.3
Standard Deviation: 0.0

Day	Maximum Speed	Minimum Temperature	Maximum Temperature
7	17.00	29.2	29.4
8	24.20	29.2	29.4
9	20.20	29.2	29.4
10	17.00	29.3	29.4
11	22.80	29.3	29.3
12	14.90	29.3	29.3
13	14.10	29.2	29.3


LATITUDE: 13-29.09N LONGITUDE: 144-44.65E NOMINAL DEPTH(M): 33
VELOCITY(CM/SEC)
40
20
0
-20
-40
SPEED(CM/SEC)
30
20
10
0
DIR(DEG TRUE)
270
180
90
0
TEMP(DEG C)
29
28
27
26
25
PRES(DBARS)
34
32
30
1 NOV 1998
6
11
16
21
26
N





NOTES

1. DEPTHS ARE PROVIDED IN FEET - DATUM IS MEAN LOWER LOW WATER (MLLW)
2. HORIZONTAL DATA ARE PROVIDED IN PLANE COORDINATES USING THE FOLLOWING GEODETIC PARAMETERS
   - SPHEROID: CLARK 1866
   - DATUM: GUAM 1963
   - PROJECTION: AZIMUTHAL EQUIDISTANT
3. BATHYMETRY DATA OBTAINED ON NOVEMBER 10, 1998 USING A HYDROSCH 2300/P ECHOSOUNDER WITH 200 kHz TRANSDUCER
4. SURFACE POSITIONING OBTAINED USING ASHTECH DNS-12 DGPS
5. CONTOUR INTERVAL 5 FEET

NORTHERN DISTRICT BATHYMETRY SURVEY

EDWARD K. NODA & ASSOCIATES, INC.
[illegible] Pilua Street [illegible]
Honolulu, Hawaii [illegible]

SHEET 1 OF 1

DATE: DECEMBER 11, 1998

CLIENT: GMP ASSOCIATES, INC.

GUAM NORTHERN DISTRICT WWTP DIFFUSER -- 1

CURRENT METER S/N -- 0831

METER POSITION ----- 2

DATA ACQUISITION
   DEPLOYMENT DATE(GST) - NOV. 7 ,1998
   DEPLOYMENT TIME(GST) - 1715

   RETRIEVAL DATE(GST) --- NOV. 13,1998
   RETRIEVAL TIME(GST) --- 0935

MOORING LOCATION
   LATITUDE -------- 13-33.13N
   LONGITUDE ------- 144-48.26E

SENSOR DEPTH(M) ---- 27

BOTTOM DEPTH(M) ---- 58

MAGNETIC DECLINATION(DEGREES) -- 1.8

DATA ANALYSIS
   START DATE(GST) - NOV. 7 ,1998
   START TIME(GST) - 1715

   ENDING DATE(GST) - NOV. 13,1998
   ENDING TIME(GST) - 0935

TIME INTERVAL(MIN) - 10.00

DISTRIBUTION FREQUENCY

.17 HOUR AVERAGES
DEPLOYMENT 1 METER POSITION 2
FROM 1715 7 NOV 1998 TO 935 13 NOV 1998

DIRECTION DEGREES TRUE	27 METERS DEPTH									
0- 15	14	10	2	5	0	1	0	0	0	0
15- 30	18	46	39	34	7	4	3	0	0	0
30- 45	30	65	57	16	1	0	0	0	0	0
45- 60	39	27	6	0	0	0	0	0	0	0
60- 75	27	9	1	0	0	0	0	0	0	0
75- 90	19	2	0	0	0	0	0	0	0	0
90-105	30	5	0	0	0	0	0	0	0	0
105-120	10	8	0	0	0	0	0	0	0	0
120-135	11	4	0	0	0	0	0	0	0	0
135-150	15	11	1	0	0	0	0	0	0	0
150-165	17	13	4	0	0	0	0	0	0	0
165-180	31	24	24	1	0	0	0	0	0	0
180-195	38	24	17	7	2	0	0	0	0	0
195-210	10	4	1	0	0	0	0	0	0	0
210-225	3	3	0	0	0	0	0	0	0	0
225-240	2	1	0	0	0	0	0	0	0	0
240-255	2	0	0	0	0	0	0	0	0	0
255-270	1	0	0	0	0	0	0	0	0	0
270-285	4	0	0	0	0	0	0	0	0	0
285-300	1	0	0	0	0	0	0	0	0	0
300-315	0	0	0	0	0	0	0	0	0	0
315-330	0	1	0	0	0	0	0	0	0	0
330-345	1	0	0	0	0	0	0	0	0	0
345-360	5	1	0	0	0	0	0	0	0	0
SPEED	0	5	10	15	20	25	30	35	40	45
CM/SEC	|	|	|	|	|	|	|	|	|	|	
	5	10	15	20	25	30	35	40	45	50	

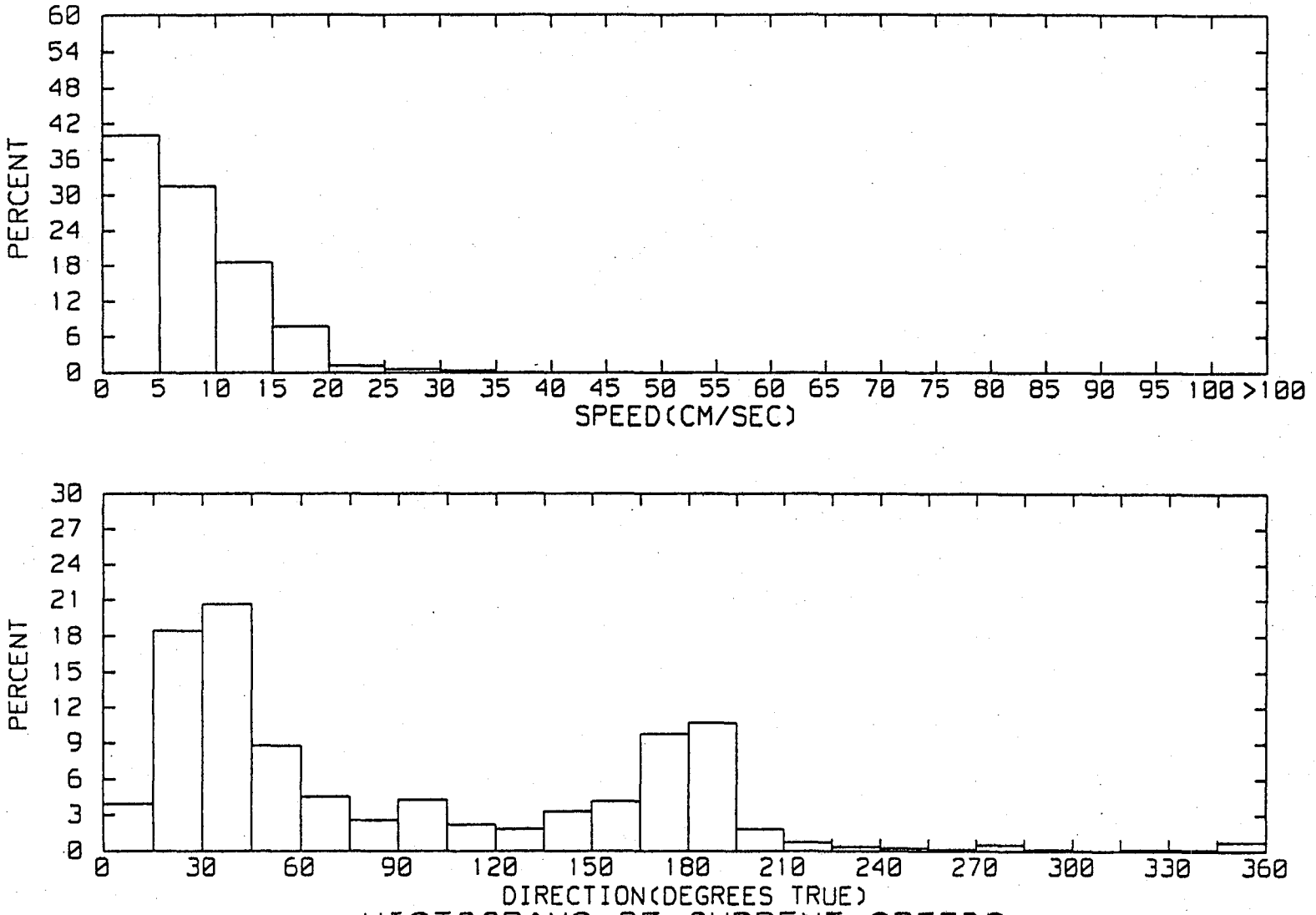
0- 15	0	0	0	0	0	0	0	0	0	0	0
15- 30	0	0	0	0	0	0	0	0	0	0	0
30- 45	0	0	0	0	0	0	0	0	0	0	0
45- 60	0	0	0	0	0	0	0	0	0	0	0
60- 75	0	0	0	0	0	0	0	0	0	0	0
75- 90	0	0	0	0	0	0	0	0	0	0	0
90-105	0	0	0	0	0	0	0	0	0	0	0
105-120	0	0	0	0	0	0	0	0	0	0	0
120-135	0	0	0	0	0	0	0	0	0	0	0
135-150	0	0	0	0	0	0	0	0	0	0	0
150-165	0	0	0	0	0	0	0	0	0	0	0
165-180	0	0	0	0	0	0	0	0	0	0	0
180-195	0	0	0	0	0	0	0	0	0	0	0
195-210	0	0	0	0	0	0	0	0	0	0	0
210-225	0	0	0	0	0	0	0	0	0	0	0
225-240	0	0	0	0	0	0	0	0	0	0	0
240-255	0	0	0	0	0	0	0	0	0	0	0
255-270	0	0	0	0	0	0	0	0	0	0	0
270-285	0	0	0	0	0	0	0	0	0	0	0
285-300	0	0	0	0	0	0	0	0	0	0	0
300-315	0	0	0	0	0	0	0	0	0	0	0
315-330	0	0	0	0	0	0	0	0	0	0	0
330-345	0	0	0	0	0	0	0	0	0	0	0
345-360	0	0	0	0	0	0	0	0	0	0	0
SPEED	50	55	60	65	70	75	80	85	90	95	
CM/SEC	|	|	|	|	|	|	|	|	|	|	>100
	55	60	65	70	75	80	85	90	95	100	

SUMMARY STATISTICS
DEPLOYMENT 1 METER POSITION 2
FROM 1715 7 NOV 1998 TO 935 13 NOV 1998

DIRECTION(DEGREES TRUE)	TOTAL OBSERVATIONS	PERCENT
0 TO 15	32	3.91
15 TO 30	151	18.44
30 TO 45	169	20.63
45 TO 60	72	8.79
60 TO 75	37	4.52
75 TO 90	21	2.56
90 TO 105	35	4.27
105 TO 120	18	2.20
120 TO 135	15	1.83
135 TO 150	27	3.30
150 TO 165	34	4.15
165 TO 180	80	9.77
180 TO 195	88	10.74
195 TO 210	15	1.83
210 TO 225	6	.73
225 TO 240	3	.37
240 TO 255	2	.24
255 TO 270	1	.12
270 TO 285	4	.49
285 TO 300	1	.12
300 TO 315	0	0.00
315 TO 330	1	.12
330 TO 345	1	.12
345 TO 360	6	.73

SPEED(CM/SEC)	TOTAL OBSERVATIONS	PERCENT
0.0 TO 5.0	328	40.05
5.0 TO 10.0	258	31.50
10.0 TO 15.0	152	18.56
15.0 TO 20.0	63	7.69
20.0 TO 25.0	10	1.22
25.0 TO 30.0	5	.61
30.0 TO 35.0	3	.37
35.0 TO 40.0	0	0.00
40.0 TO 45.0	0	0.00
45.0 TO 50.0	0	0.00
50.0 TO 55.0	0	0.00
55.0 TO 60.0	0	0.00
60.0 TO 65.0	0	0.00
65.0 TO 70.0	0	0.00
70.0 TO 75.0	0	0.00
75.0 TO 80.0	0	0.00
80.0 TO 85.0	0	0.00
85.0 TO 90.0	0	0.00
90.0 TO 95.0	0	0.00
95.0 TO 100.0	0	0.00
ABOVE 100	0	0.00

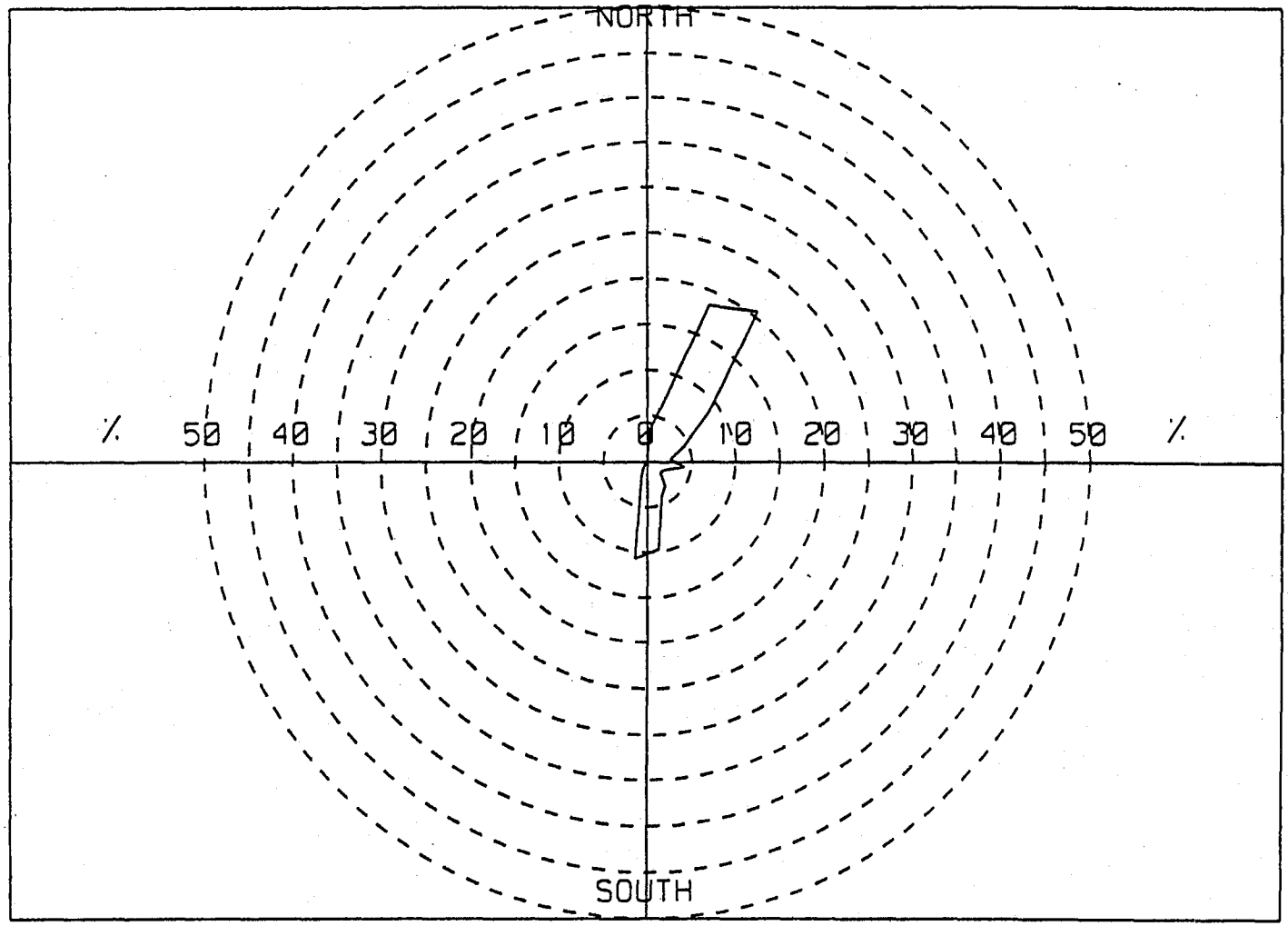
TOTAL NUMBER OF POINTS READ = 819
TOTAL NUMBER OF OBSERVATIONS USED IN THE DISTRIBUTIONS = 819
MEAN SPEED = 7.50 CM/SEC
STANDARD DEVIATION = 5.38 CM/SEC
MAXIMUM SPEED = 32.90 CM/SEC
MINIMUM SPEED = 0.00 CM/SEC
RANGE = 32.90 CM/SEC



HISTOGRAMS OF CURRENT SPEEDS

(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998

LATITUDE: 13-33.13N LONGITUDE: 144-48.26E NOMINAL DEPTH(M): 27



PERCENT OCCURRENCE VS DIRECTION(DEG TRUE)

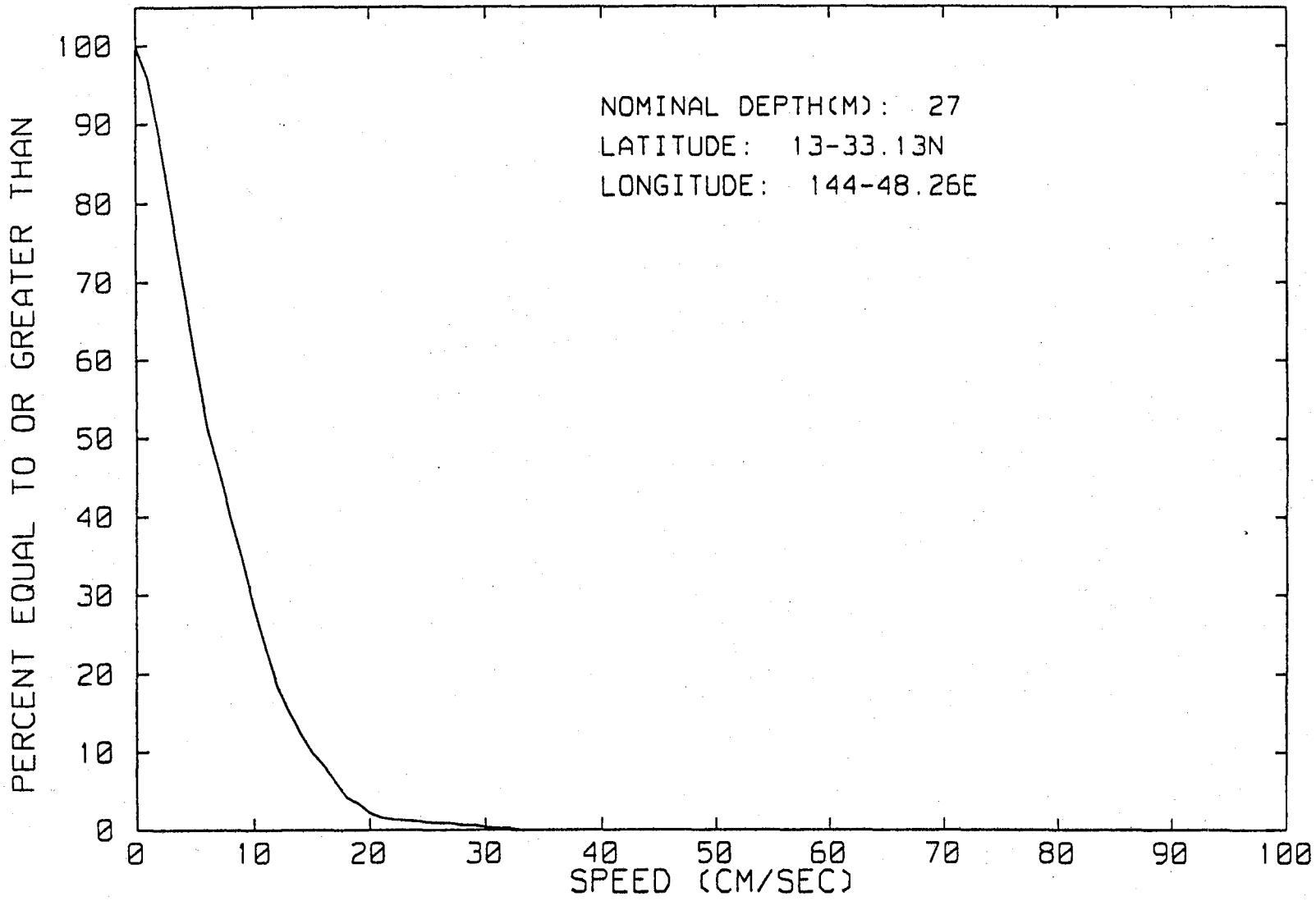
(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998

LATITUDE: 13-33.13N LONGITUDE: 144-48.26E NOMINAL DEPTH(M): 27

LATITUDE: 13-33.13N
LONGITUDE: 144-48.26E
NOMINAL DEPTH(METERS): 27
TIME SPAN(GST): 1715 NOV 7 1998 TO 0935 NOV 13 1998

CUMULATIVE OCCURENCE OF CURRENT SPEEDS

SPEED (CM/SEC)	PERCENT EQUAL TO OR GREATER THAN
0	100.000
3	78.999
6	51.282
9	34.554
12	18.437
15	9.890
18	4.151
21	1.587
24	1.099
27	.855
30	.366
33	0.000

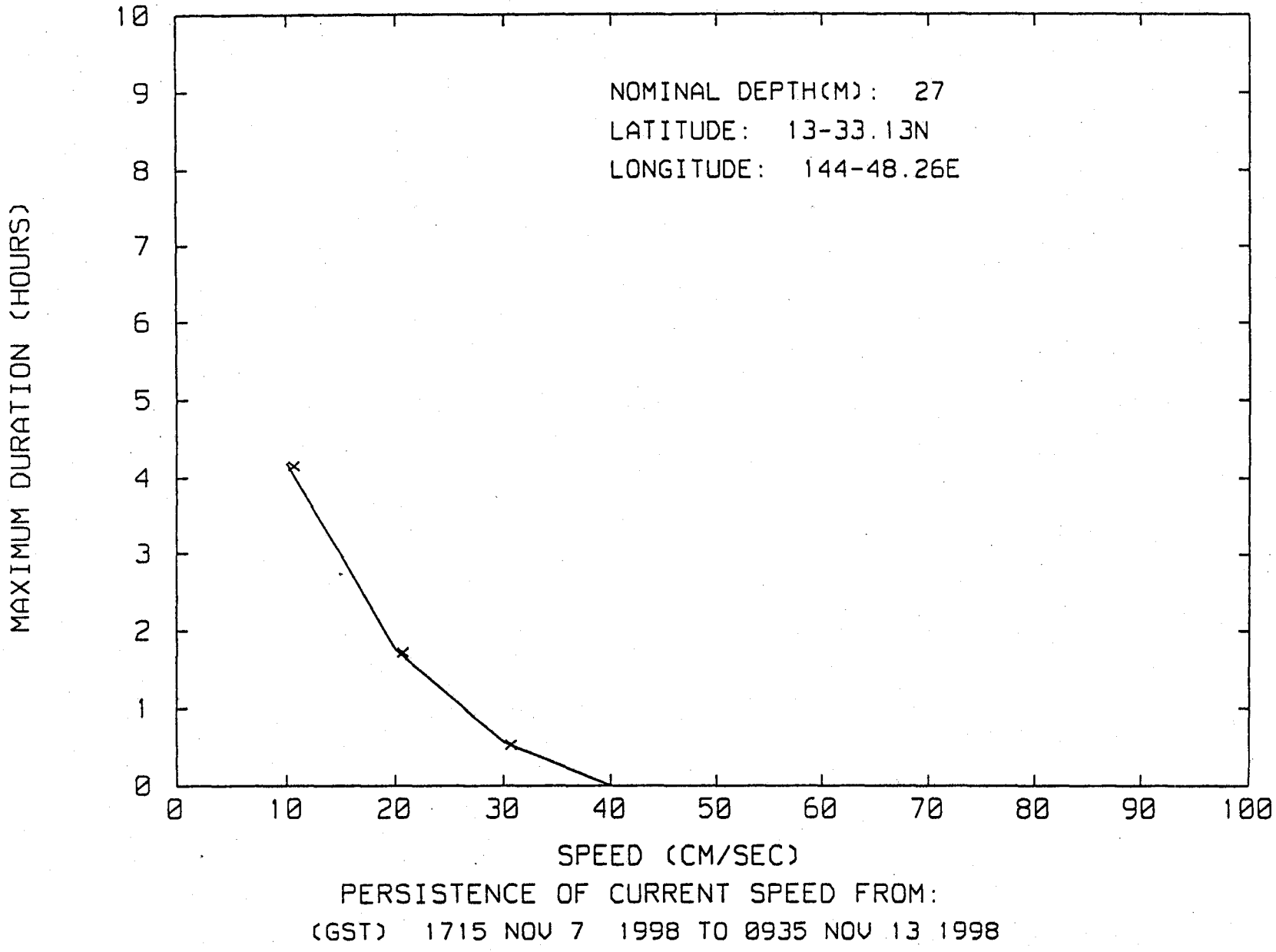


CUMULATIVE OCCURENCE OF CURRENT SPEEDS
(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998

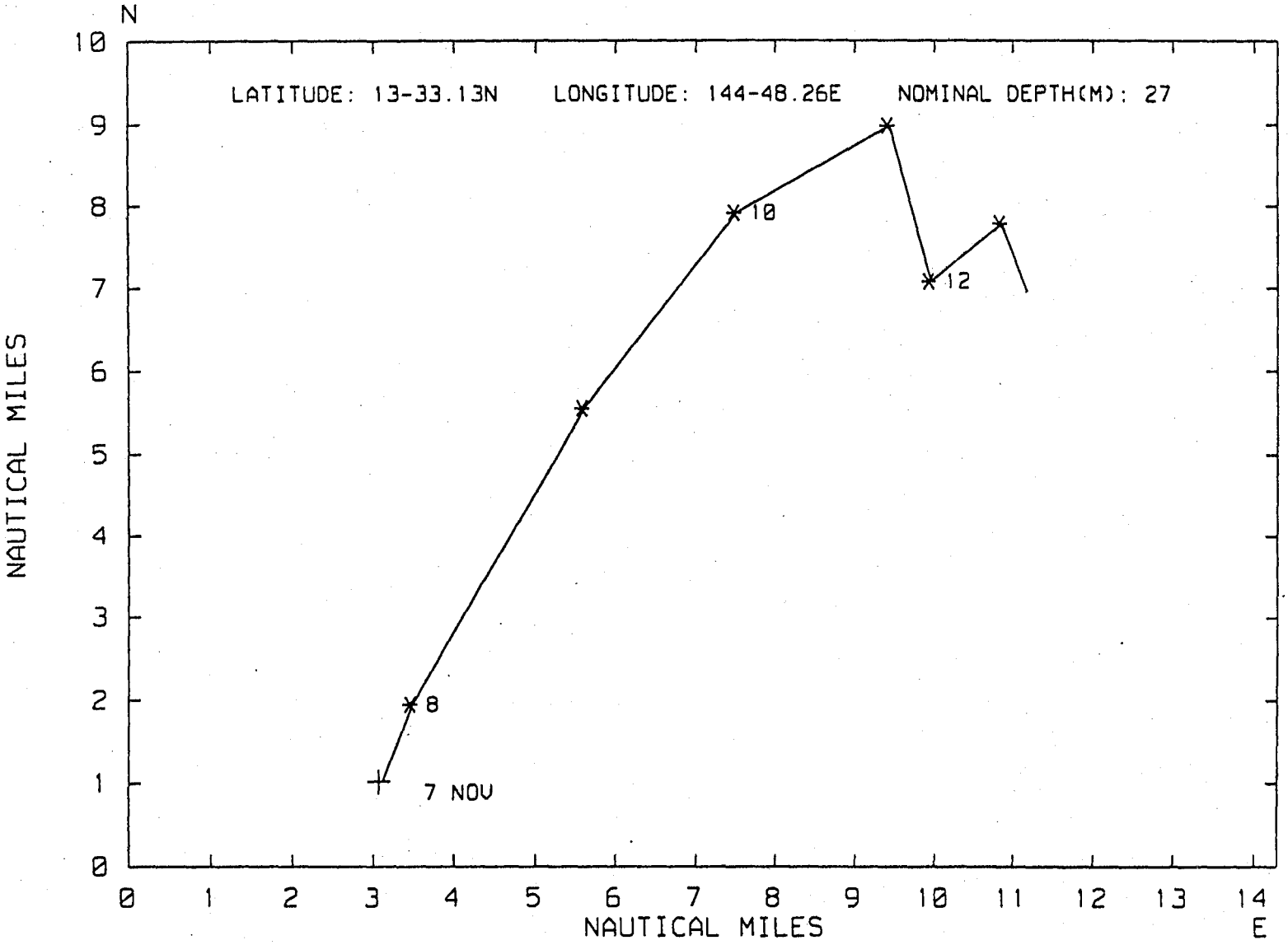
LATITUDE: 13-33.13N
LONGITUDE: 144-48.26E
NOMINAL DEPTH(METERS): 27
TIME SPAN(GST): 1715 NOV 7 1998 TO 0935 NOV 13 1998

PERSISTENCE OF CURRENT SPEEDS

SPEED (CM/SEC)	MAXIMUM DURATION (HOURS)
10	4.19
20	1.75
30	.57
40	0.00



PERSISTENCE OF CURRENT SPEED FROM:
(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998



PROGRESSIVE VECTOR DIAGRAM OF CURRENTS
(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998

TEMPERATURE STATISTICS

DEPLOYMENT 1 METER POSITION 2
FROM 1715 7 NOV 1998 TO 935 13 NOV 1998

TEMPERATURE(CENTIGRADE)	TOTAL OBSERVATIONS	PERCENT
0 TO 1	0	0.00
1 TO 2	0	0.00
2 TO 3	0	0.00
3 TO 4	0	0.00
4 TO 5	0	0.00
5 TO 6	0	0.00
6 TO 7	0	0.00
7 TO 8	0	0.00
8 TO 9	0	0.00
9 TO 10	0	0.00
10 TO 11	0	0.00
11 TO 12	0	0.00
12 TO 13	0	0.00
13 TO 14	0	0.00
14 TO 15	0	0.00
15 TO 16	0	0.00
16 TO 17	0	0.00
17 TO 18	0	0.00
18 TO 19	0	0.00
19 TO 20	0	0.00
20 TO 21	0	0.00
21 TO 22	0	0.00
22 TO 23	0	0.00
23 TO 24	0	0.00
24 TO 25	0	0.00
25 TO 26	0	0.00
26 TO 27	0	0.00
27 TO 28	0	0.00
28 TO 29	0	0.00
29 TO 30	819	100.00

TOTAL NUMBER OF POINTS READ = 819
TOTAL NUMBER OF OBSERVATION USED IN THE DISTRIBUTION = 819
MEAN TEMPERATURE = 29.2 DEGREES CENTIGRADE
STANDARD DEVIATION = 0.0 DEGREES CENTIGRADE
MAXIMUM TEMPERATURE = 29.2 DEGREES CENTIGRADE
MINIMUM TEMPERATURE = 29.0 DEGREES CENTIGRADE
RANGE = .2 DEGREES CENTIGRADE

Guam Northern District WWTP Diffuser Monthly Current-Temperature Statistics

DEPLOYMENT LOCATION: 2

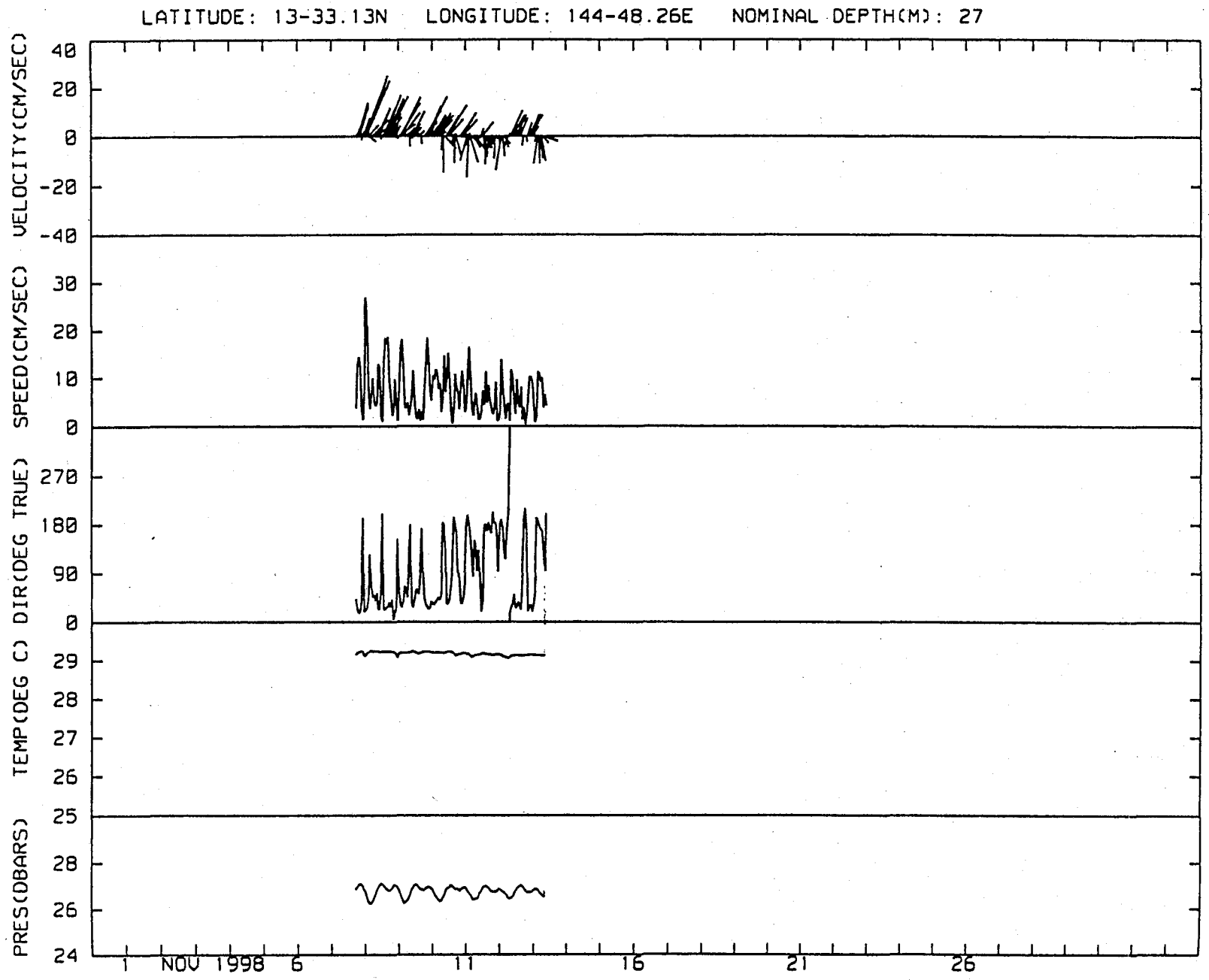
Latitude: 13-33.13N Longitude: 144-48.26E
Meter Depth(m): 27.0 Bottom Depth(m): 58.0

Period: NOVEMBER 1998

Mean Speed(cm/sec): 7.50
Maximum Speed(cm/sec): 32.90
Standard Deviation: 5.38
Average North Vector Component(cm/sec): 2.24
Average East Vector Component(cm/sec): 3.04
Resultant Magnitude(cm/sec): 3.77
Resultant Direction(°T): 54

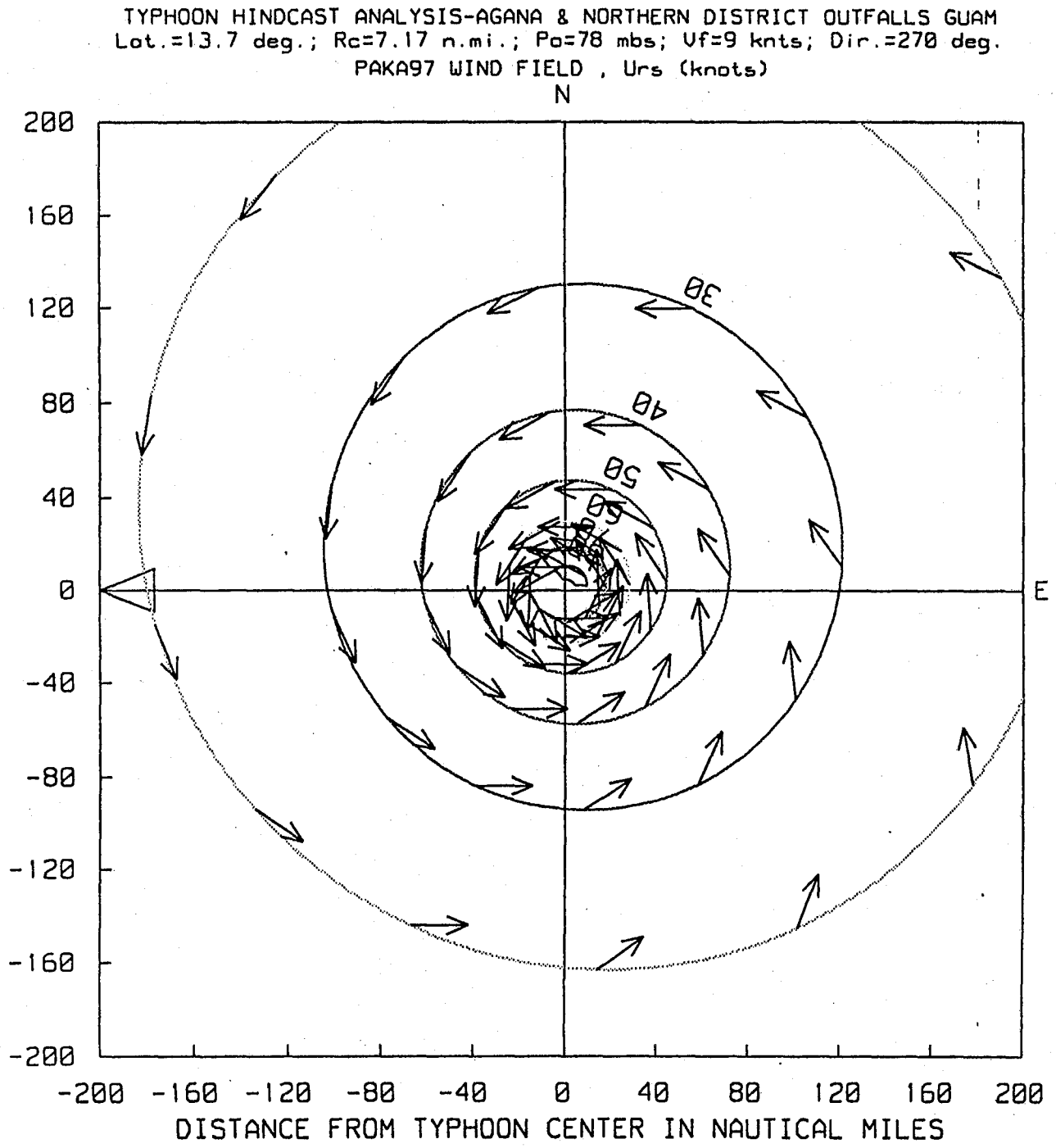
Minimum Temperature(°C): 29.0
Maximum Temperature(°C): 29.2
Mean Temperature(°C): 29.2
Standard Deviation: 0.0

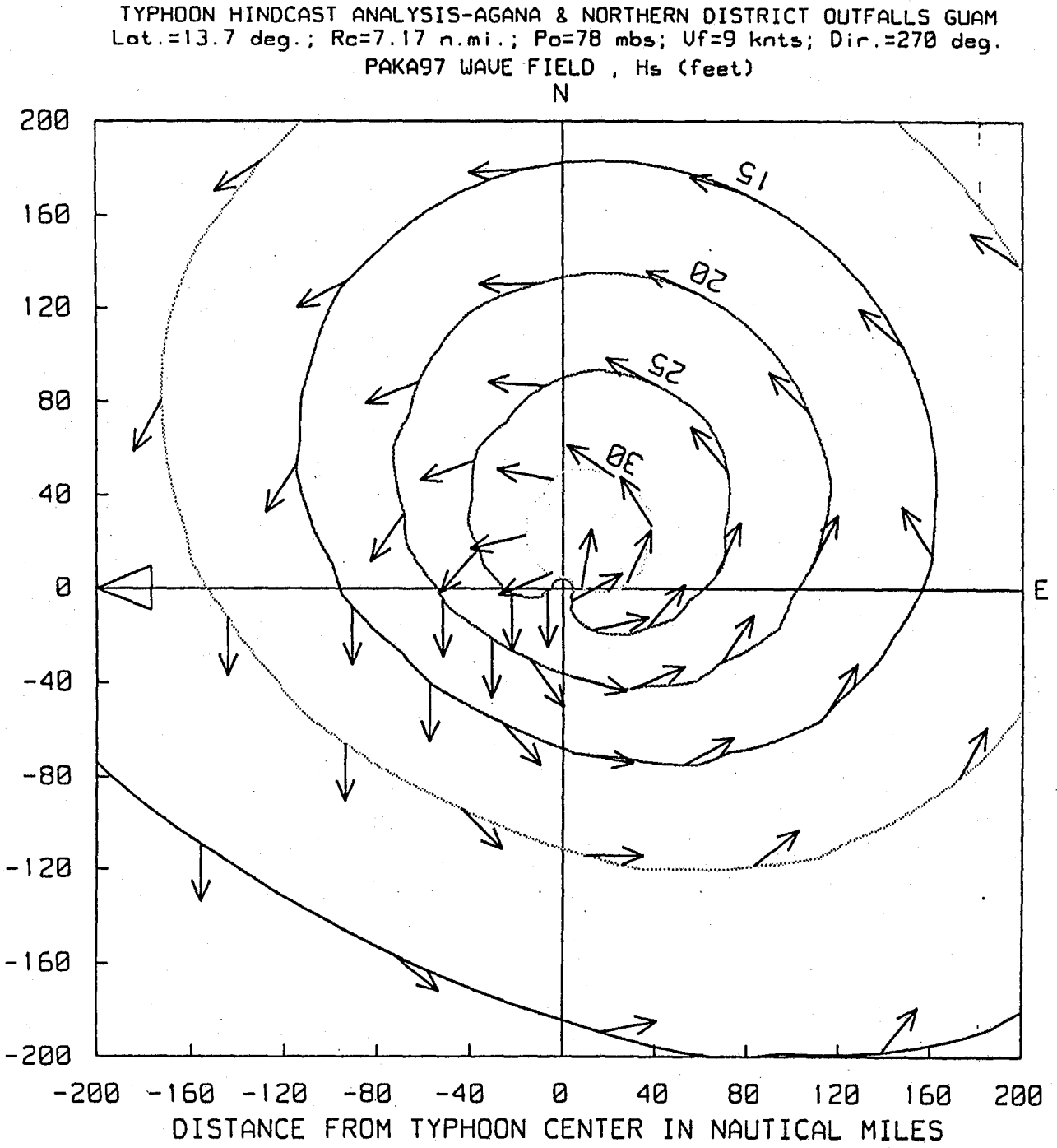
Day	Maximum Speed	Minimum Temperature	Maximum Temperature
7	16.90	29.0	29.2
8	32.90	29.0	29.2
9	22.40	29.1	29.2
10	17.80	29.1	29.2
11	21.10	29.1	29.2
12	19.00	29.1	29.2
13	15.50	29.1	29.1

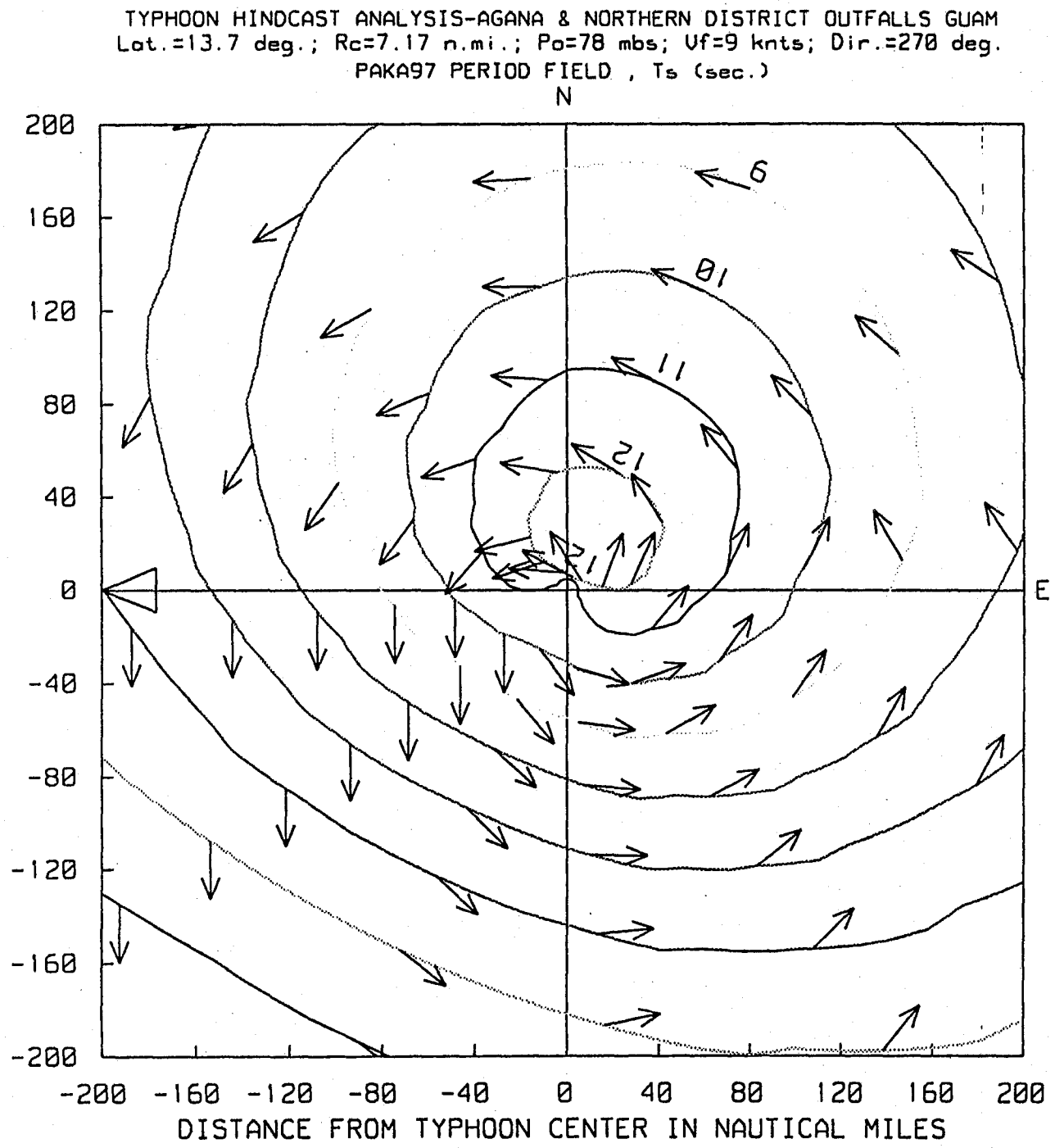


APPENDIX D:

WIND AND WAVE ANALYSIS

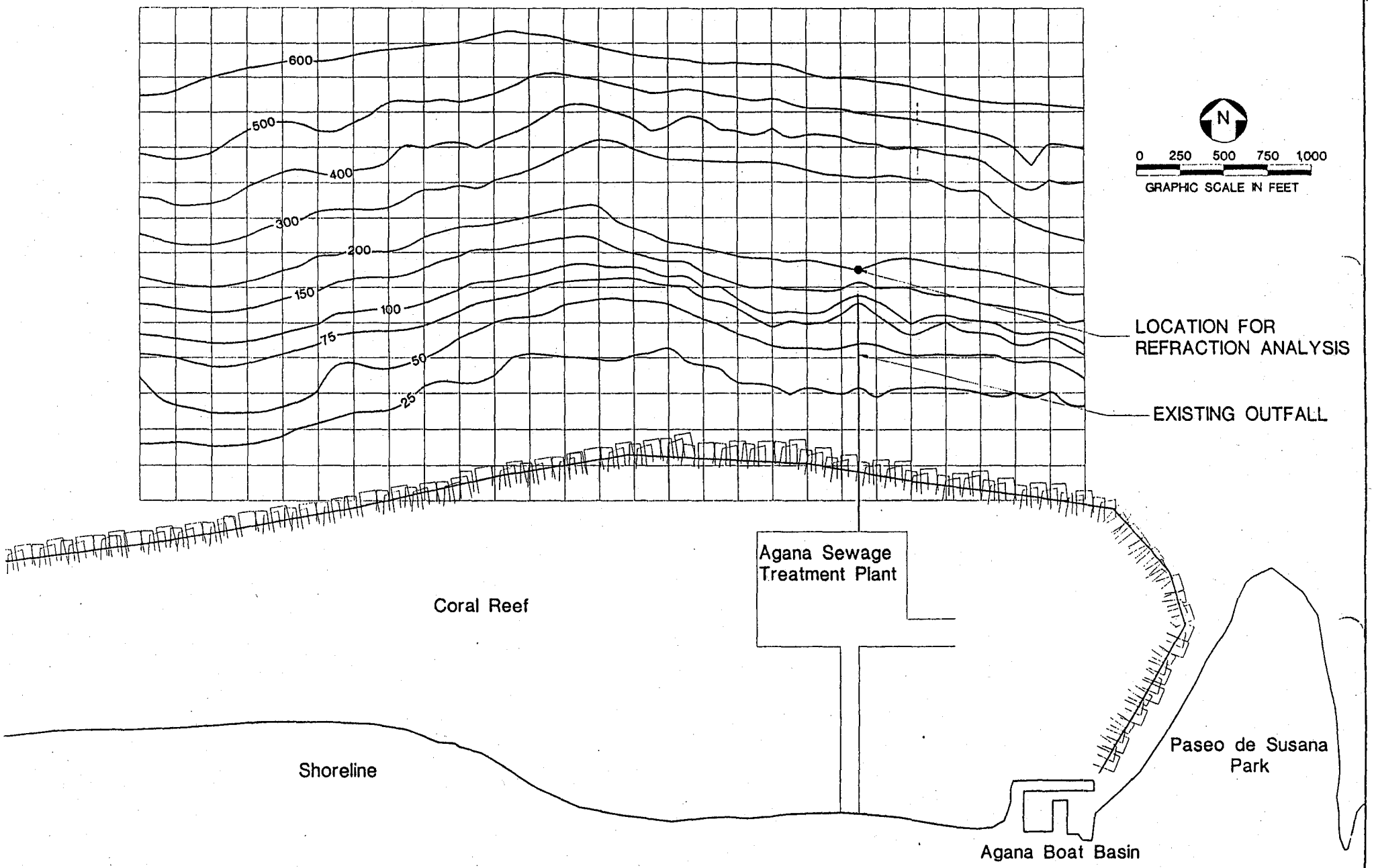




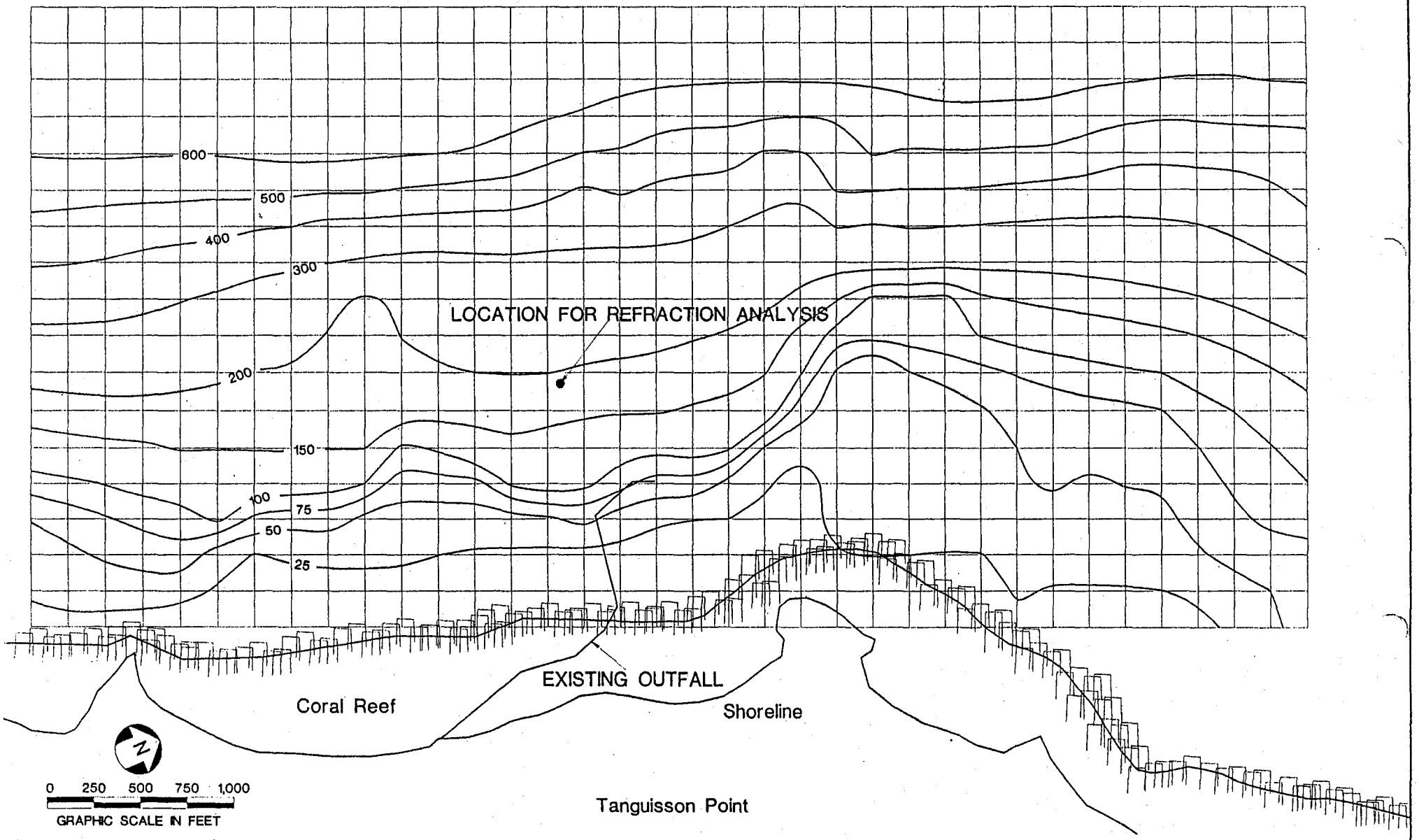


TYPHOON PAKA97
DATE: 01/08/99
Lat.= 13.7deg.; Rc= 7.17n.mi.; Po= 78mbs; Vf= 9knts; Dir.= 270deg.

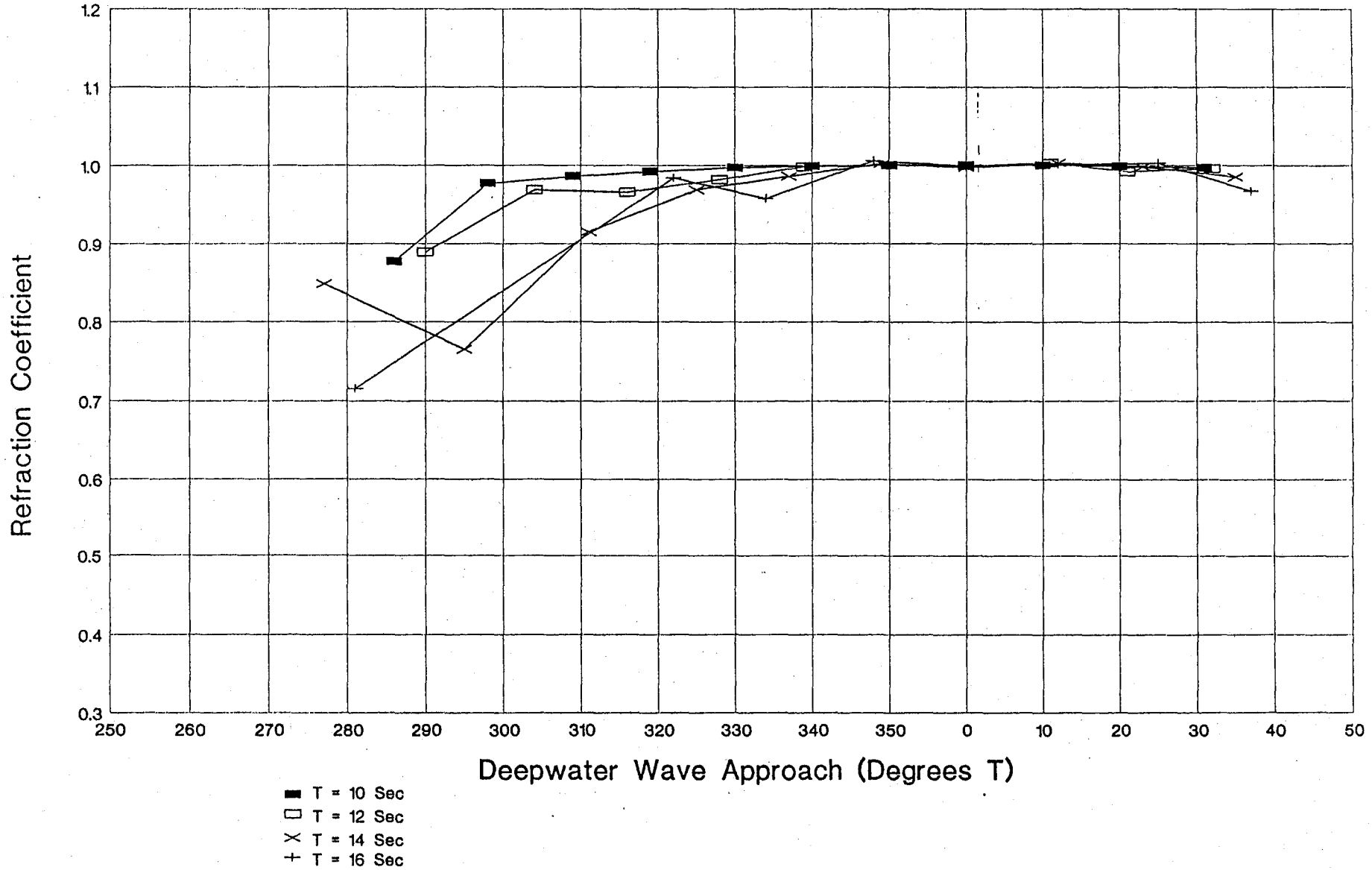
r	A0	Urs	Bu	Hs	Bh	Ts	Tf0	Tm
N.M.	DEG	KNOTS	DEG	FEET	DEG	SEC.	SEC.	SEC.
5.0	25	80.7	90.0	31.0	115.9	11.9	10.9	8.2
10.0	25	81.3	90.0	33.0	125.8	12.3	11.3	8.4
15.0	25	75.1	90.0	33.3	127.0	12.5	12.0	8.6
20.0	25	69.3	90.0	33.5	131.3	12.6	12.6	8.8
25.0	25	64.4	90.0	33.3	131.8	12.6	13.1	8.9
30.0	25	60.4	90.0	32.7	128.5	12.6	13.5	8.9
35.0	25	57.0	90.0	32.4	128.8	12.5	13.8	9.0
40.0	25	54.0	90.0	31.4	125.2	12.4	13.9	8.9
45.0	25	51.4	90.0	31.0	125.3	12.3	14.2	9.0
50.0	25	49.2	90.0	30.6	125.4	12.2	14.5	9.0
55.0	25	47.2	90.0	29.5	121.7	12.0	14.4	8.9
60.0	25	45.3	90.0	29.1	121.7	11.9	14.6	8.9
65.0	25	43.7	90.0	28.7	121.8	11.8	14.8	8.9
70.0	25	42.2	90.0	28.2	121.8	11.7	15.0	9.0
75.0	25	40.8	90.0	27.0	118.0	11.5	14.8	8.8
80.0	25	39.5	90.0	26.6	118.0	11.4	14.9	8.8
85.0	25	38.3	90.0	26.1	118.0	11.3	15.1	8.8
90.0	25	37.2	90.0	25.7	118.0	11.2	15.2	8.9
95.0	25	36.2	90.0	25.3	118.0	11.1	15.3	8.9
100.0	25	35.2	90.0	24.1	117.2	10.9	15.0	8.7
105.0	25	34.3	90.0	23.7	117.2	10.8	15.1	8.7
110.0	25	33.4	90.0	23.2	117.1	10.7	15.2	8.7
115.0	25	32.5	90.0	22.7	114.2	10.6	15.2	8.7
120.0	25	31.8	90.0	22.2	114.2	10.5	15.3	8.8
125.0	25	31.0	90.0	21.8	114.2	10.4	15.4	8.8
130.0	25	30.3	90.0	20.9	113.5	10.2	15.1	8.7
135.0	25	29.6	90.0	20.4	113.4	10.1	15.2	8.7
140.0	25	29.0	90.0	19.9	113.3	10.0	15.2	8.7
145.0	25	28.3	90.0	19.3	110.4	9.9	15.1	8.6
150.0	25	27.7	90.0	18.8	110.3	9.8	15.1	8.7
155.0	25	27.1	90.0	18.4	110.3	9.7	15.2	8.8
160.0	25	26.6	90.0	17.9	110.2	9.7	15.2	8.8
165.0	25	26.0	90.0	17.1	109.5	9.5	14.9	8.6
170.0	25	25.5	90.0	16.6	109.4	9.4	14.9	8.6
175.0	25	25.0	90.0	16.2	109.2	9.3	14.8	8.7
180.0	25	24.6	90.0	15.7	109.1	9.2	14.8	8.7
185.0	25	24.1	90.0	15.2	106.5	9.1	14.7	8.8
190.0	25	23.6	90.0	14.7	106.4	9.0	14.7	8.9
195.0	25	23.2	90.0	14.3	106.4	8.9	14.7	9.0
200.0	25	22.8	90.0	13.8	106.3	8.9	14.7	9.2
205.0	25	22.4	90.0	13.3	106.2	8.8	14.6	9.5
210.0	25	22.0	90.0	12.9	106.0	8.7	14.5	9.8
215.0	25	21.6	90.0	12.4	105.9	8.6	14.3	10.1
220.0	25	21.2	90.0	12.0	102.9	8.4	14.0	9.3
225.0	25	20.9	90.0	11.6	102.8	8.3	13.8	9.8
230.0	25	20.5	90.0	11.2	102.8	8.2	13.6	9.6
235.0	25	20.2	90.0	10.9	102.7	8.2	13.3	9.5
240.0	25	19.9	90.0	10.5	102.7	8.1	13.1	9.3
245.0	25	19.6	90.0	10.2	102.6	8.0	12.9	9.2
250.0	25	19.3	90.0	9.9	102.6	8.0	12.7	9.0
255.0	25	19.0	90.0	9.6	102.5	7.9	12.5	8.9
260.0	25	18.7	90.0	9.3	102.5	7.8	12.3	8.8
265.0	25	18.4	90.0	9.0	102.4	7.8	12.1	8.6
270.0	25	18.1	90.0	8.7	101.8	7.6	12.0	8.5
275.0	25	17.9	90.0	8.5	101.7	7.5	11.8	8.4
280.0	25	17.6	90.0	8.3	101.6	7.5	11.6	8.3
285.0	25	17.4	90.0	8.0	101.6	7.4	11.5	8.1



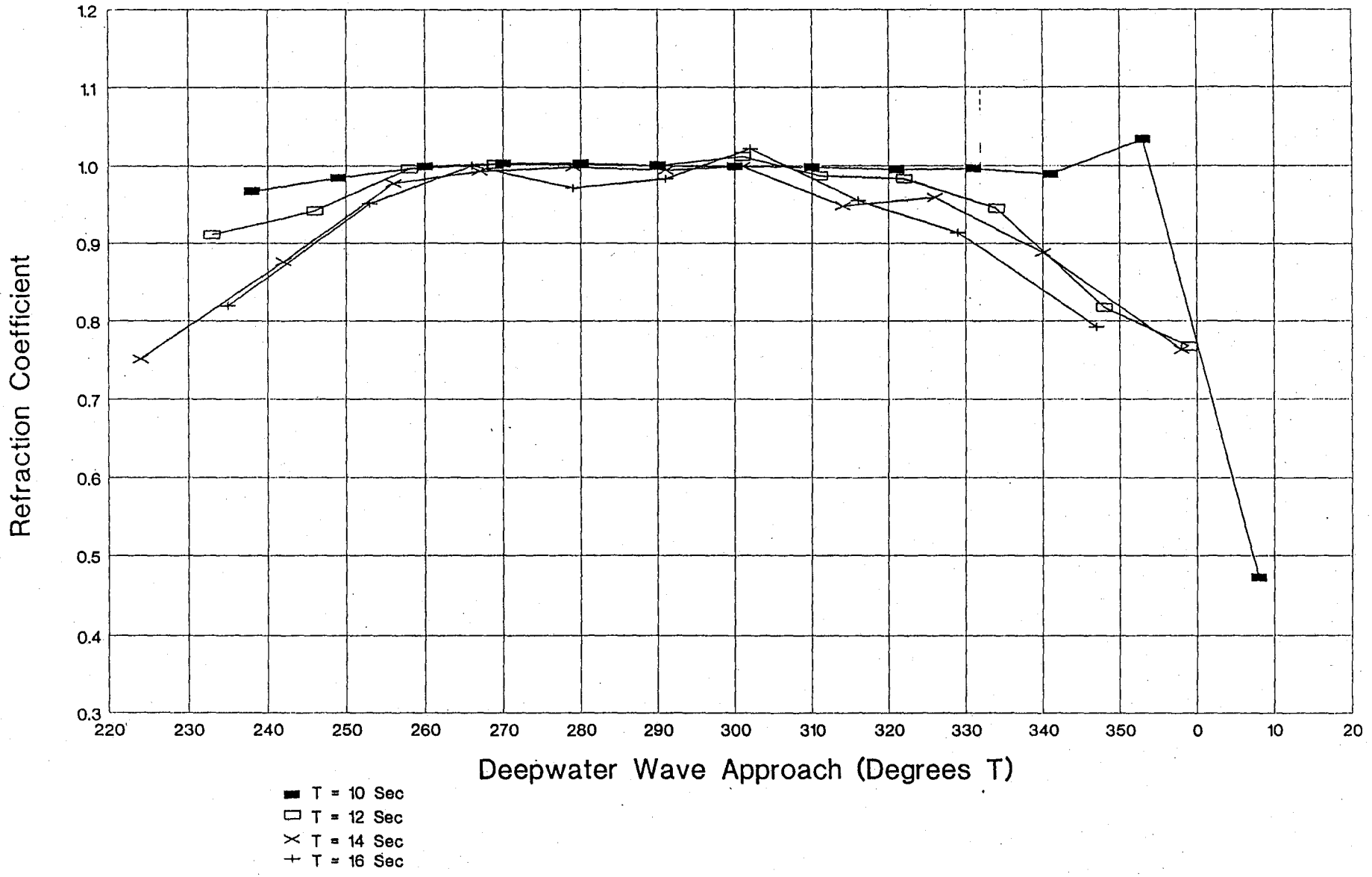
Edward K. Noda and Associates, Inc.	Agana Sewage Treatment Plant Outfall Extension	Wave Refraction Model Grid Area	FIGURE



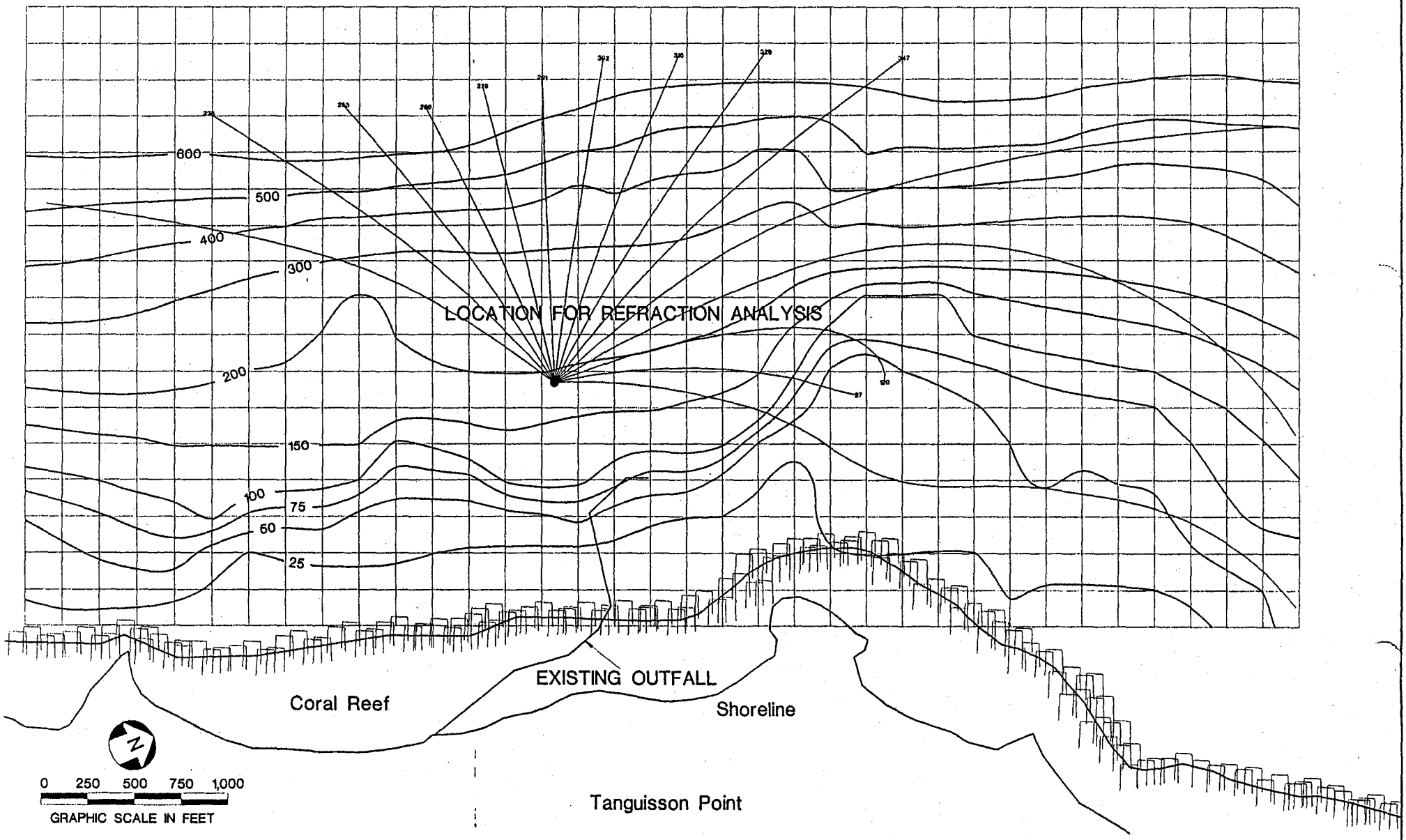
Edward K. Noda and Associates, Inc.	Northern District Sewage Treatment Plant Outfall Extension	Wave Refraction Model Grid Area	FIGURE



Edward K. Noda and Associates, Inc.	Agana Sewage Treatment Plant Outfall Extension	Wave Refraction Coefficients	FIGURE



Edward K. Noda and Associates, Inc.	Northern District Sewage Treatment Plant Outfall Extension	Wave Refraction Coefficients	FIGURE



Edward K. Noda and Associates, Inc.	Northern District Sewage Treatment Plant Outfall Extension	Wave Refraction Model Grid Area PERIOD = 16 sec Ho = 1 foot	FIGURE

NEARSHORE POINT X=249071 Y=-93861 WAVE PERIOD T=16.0
DEPTH AT X,Y =185.9 C(X,Y)= 65.8 Ldeep= 1310.7 Cdeep= 81.9
Dmin=20.0 Dmax=655.48(Dmax/Ldeep= .50) Stepsz(Ds/L)= .10 Nmax=200
Brel= .05 Hdeep= 1.00

RAY NO. 1 Theta(Degrees)=143.00
RAY NO. 2 Theta(Degrees)=133.00
RAY NO. 3 Theta(Degrees)=123.00
RAY NO. 4 Theta(Degrees)=113.00
RAY NO. 5 Theta(Degrees)=103.00
RAY NO. 6 Theta(Degrees)= 93.00
RAY NO. 7 Theta(Degrees)= 83.00
RAY NO. 8 Theta(Degrees)= 73.00
RAY NO. 9 Theta(Degrees)= 63.00
RAY NO. 10 Theta(Degrees)= 53.00
RAY NO. 11 Theta(Degrees)= 43.00
RAY NO. 12 Theta(Degrees)= 33.00
RAY NO. 13 Theta(Degrees)= 23.00
RAY NO. 14 Theta(Degrees)= 13.00
RAY NO. 15 Theta(Degrees)= 3.00

CALCULATIONS FOR RAY NO. 1

CALCULATIONS FOR RAY NO. 2

Xi=249142 Yi=-93795 Depth=196.6 Kr= .819 Ks= .913 Bo= 65.3 Bs= 97.3

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
247295	-92457	652.0	147.6	81.6	.990	1.000	.990	0.0
247405	-92527	635.0	147.5	81.6	.989	1.000	.989	0.0
247515	-92597	621.5	147.4	81.5	.988	.999	.987	0.0
247625	-92667	591.5	147.3	81.4	.985	.997	.982	0.0
247734	-92738	550.0	147.0	81.1	.980	.995	.974	0.0
247842	-92808	503.2	146.6	80.7	.973	.991	.964	0.0
247948	-92879	456.1	145.9	80.1	.964	.984	.948	0.0
248052	-92951	403.1	144.8	79.0	.951	.973	.925	0.0
248153	-93024	352.1	143.6	77.4	.939	.958	.899	0.0
248250	-93097	319.1	142.5	76.1	.930	.946	.880	0.0
248344	-93171	288.9	141.1	74.5	.923	.934	.862	0.0
248434	-93245	267.8	139.8	73.2	.919	.922	.847	0.0
248521	-93321	254.9	138.5	72.3	.917	.913	.837	0.0
248606	-93397	242.8	137.2	71.3	.915	.903	.826	0.0
248688	-93474	227.5	136.3	70.1	.914	.891	.814	0.0
248768	-93552	222.4	135.5	69.6	.913	.878	.802	0.0
248846	-93630	216.6	134.9	69.1	.913	.863	.788	0.0
248923	-93707	208.5	134.5	68.3	.913	.848	.774	0.0
248998	-93785	202.6	134.1	67.7	.913	.834	.762	0.0
249071	-93861	185.9	133.0	65.8	.914	.819	.749	0.0
249071	-93861	185.9	133.0	65.8	.914	.819	.749	0.0

DEEPWATER THETA(DEGREES TRUE) = 235.34

CALCULATIONS FOR RAY NO. 3

Xi=249132 Yi=-93822 Depth=192.0 Kr= .951 Ks= .914 Bo= 65.4 Bs= 72.3

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
247997	-92440	651.1	130.4	81.6	.990	1.000	.990	0.0
248082	-92539	625.3	130.4	81.5	.988	1.000	.988	0.0
248166	-92638	585.9	130.3	81.3	.984	1.000	.984	0.0
248250	-92737	525.4	130.1	80.9	.976	.999	.975	0.0
248332	-92835	463.2	129.7	80.2	.965	.997	.962	0.0
248412	-92933	397.5	129.0	78.9	.950	.993	.943	0.0
248489	-93029	341.2	128.0	77.0	.936	.986	.922	0.0
248562	-93125	308.0	127.2	75.5	.928	.980	.909	0.0
248633	-93220	281.0	126.1	74.0	.922	.972	.896	0.0

248701	-93315	260.9	125.3	72.7	.918	.965	.886	0.0
248766	-93408	238.4	124.6	71.0	.915	.959	.877	0.0
248830	-93500	228.7	124.3	70.2	.914	.956	.873	0.0
248892	-93592	219.0	124.0	69.3	.913	.953	.870	0.0
248953	-93683	210.9	123.8	68.5	.913	.952	.869	0.0
249013	-93773	202.9	123.5	67.7	.913	.952	.869	0.0
249071	-93861	185.9	123.0	65.8	.914	.951	.869	0.0
249071	-93861	185.9	123.0	65.8	.914	.951	.869	0.0

DEEPWATER THETA(DEGREES TRUE) = 252.51

CALCULATIONS FOR RAY NO. 4

Xi=249131 Yi=-93835 Depth=189.3 Kr=1.000 Ks= .914 Bo= 65.3 Bs= 65.3

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
248420	-92469	628.0	117.2	81.5	.988	1.000	.988	0.0
248479	-92585	601.7	117.1	81.4	.986	1.000	.986	0.0
248538	-92700	535.6	117.0	81.0	.978	1.000	.977	0.0
248596	-92815	457.8	116.8	80.1	.964	.999	.963	0.0
248653	-92927	393.5	116.3	78.7	.949	.999	.948	0.0
248707	-93038	339.7	115.6	77.0	.935	.998	.934	0.0
248758	-93147	304.1	115.0	75.3	.927	.997	.924	0.0
248807	-93254	273.2	114.3	73.5	.920	.994	.915	0.0
248854	-93359	247.4	113.8	71.7	.916	.990	.907	0.0
248899	-93462	231.2	113.5	70.4	.914	.986	.902	0.0
248943	-93564	220.6	113.4	69.4	.913	.984	.899	0.0
248987	-93665	211.5	113.2	68.6	.913	.986	.900	0.0
249030	-93764	202.9	113.3	67.7	.913	.992	.906	0.0
249071	-93861	185.9	113.0	65.8	.914	1.000	.914	0.0
249071	-93861	185.9	113.0	65.8	.914	1.000	.914	0.0

DEEPWATER THETA(DEGREES TRUE) = 265.81

CALCULATIONS FOR RAY NO. 5

Xi=249139 Yi=-93845 Depth=187.1 Kr= .971 Ks= .914 Bo= 65.3 Bs= 69.3

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
248704	-92362	638.1	104.2	81.6	.989	1.000	.989	0.0
248736	-92488	603.7	104.2	81.4	.986	1.000	.986	0.0
248768	-92614	568.9	104.2	81.3	.982	1.000	.982	0.0
248800	-92739	497.6	104.2	80.6	.972	.998	.970	0.0
248831	-92863	424.5	104.2	79.5	.956	.995	.952	0.0
248862	-92983	361.2	104.1	77.8	.941	.992	.933	0.0
248891	-93101	317.2	103.9	76.0	.930	.988	.918	0.0
248919	-93216	278.9	103.7	73.9	.921	.983	.906	0.0
248946	-93328	252.2	103.5	72.1	.917	.979	.898	0.0
248972	-93438	232.0	103.4	70.5	.914	.976	.892	0.0
248998	-93546	221.2	103.3	69.5	.913	.973	.888	0.0
249023	-93653	212.7	103.0	68.7	.913	.971	.887	0.0
249047	-93758	202.6	103.0	67.7	.913	.970	.886	0.0
249071	-93861	185.9	103.0	65.8	.914	.971	.888	0.0
249071	-93861	185.9	103.0	65.8	.914	.971	.888	0.0

DEEPWATER THETA(DEGREES TRUE) = 278.80

CALCULATIONS FOR RAY NO. 6

Xi=249138 Yi=-93857 Depth=184.7 Kr= .983 Ks= .914 Bo= 65.3 Bs= 67.5

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
249005	-92320	630.6	91.7	81.5	.989	1.000	.989	0.0
249009	-92450	587.7	91.8	81.4	.984	1.000	.984	0.0
249013	-92580	537.9	91.9	81.0	.978	1.000	.978	0.0

249018	-92708	472.3	92.0	80.3	.967	1.000	.966	0.0
249022	-92835	408.9	92.4	79.1	.953	.999	.952	0.0
249028	-92959	361.8	92.7	77.8	.941	.997	.939	0.0
249034	-93080	318.4	92.7	76.0	.930	.996	.926	0.0
249039	-93199	279.7	92.7	73.9	.921	.994	.916	0.0
249045	-93314	253.6	92.8	72.2	.917	.992	.910	0.0
249050	-93426	231.6	92.8	70.4	.914	.991	.906	0.0
249056	-93538	223.4	92.8	69.7	.913	.989	.903	0.0
249061	-93648	214.1	92.6	68.8	.913	.986	.900	0.0
249066	-93756	202.1	92.7	67.6	.913	.984	.899	0.0
249071	-93861	185.9	93.0	65.8	.914	.983	.899	0.0
249071	-93861	185.9	93.0	65.8	.914	.983	.899	0.0

DEEPWATER THETA(DEGREES TRUE) = 291.27

CALCULATIONS FOR RAY NO. 7

Xi=249133 Yi=-93869 Depth=182.7 Kr=1.022 Ks= .915 Bo= 65.3 Bs= 62.5

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
249317	-92212	633.0	80.9	81.6	.989	1.000	.989	0.0
249296	-92341	595.0	80.9	81.4	.985	1.000	.985	0.0
249276	-92469	548.0	81.0	81.1	.980	1.000	.979	0.0
249256	-92596	497.7	81.1	80.6	.972	1.000	.971	0.0
249236	-92722	434.0	81.2	79.7	.959	1.000	.959	0.0
249217	-92846	377.9	81.0	78.3	.945	1.001	.946	0.0
249197	-92968	347.5	81.0	77.3	.937	1.003	.940	0.0
249178	-93088	312.6	81.3	75.8	.929	1.005	.934	0.0
249161	-93205	275.8	81.6	73.7	.921	1.008	.928	0.0
249144	-93318	250.6	81.9	71.9	.916	1.011	.926	0.0
249129	-93430	231.1	82.2	70.4	.914	1.014	.927	0.0
249114	-93540	221.9	82.3	69.6	.913	1.017	.929	0.0
249099	-93649	214.9	82.2	68.9	.913	1.021	.932	0.0
249084	-93757	201.3	82.4	67.5	.913	1.022	.933	0.0
249071	-93861	185.9	83.0	65.8	.914	1.022	.935	0.0
249071	-93861	185.9	83.0	65.8	.914	1.022	.935	0.0

DEEPWATER THETA(DEGREES TRUE) = 302.19

CALCULATIONS FOR RAY NO. 8

Xi=249140 Yi=-93882 Depth=179.8 Kr= .955 Ks= .915 Bo= 65.3 Bs= 71.7

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
249702	-92187	621.9	66.6	81.5	.988	1.000	.988	0.0
249650	-92306	573.9	66.7	81.3	.983	1.000	.983	0.0
249599	-92425	528.6	66.8	81.0	.977	.999	.976	0.0
249549	-92544	487.6	67.2	80.5	.970	.998	.968	0.0
249499	-92662	448.5	67.6	79.9	.962	.998	.960	0.0
249452	-92780	414.3	68.2	79.3	.954	.997	.952	0.0
249406	-92896	378.2	68.8	78.3	.945	.996	.941	0.0
249362	-93011	337.5	69.3	76.9	.935	.994	.929	0.0
249320	-93124	300.1	69.8	75.1	.926	.990	.917	0.0
249280	-93234	266.6	70.5	73.1	.919	.986	.906	0.0
249243	-93342	244.1	71.1	71.4	.915	.982	.899	0.0
249207	-93448	228.7	71.5	70.2	.914	.981	.896	0.0
249171	-93554	222.7	71.5	69.6	.913	.979	.894	0.0
249137	-93658	211.5	71.6	68.6	.913	.973	.888	0.0
249103	-93761	202.9	72.1	67.7	.913	.964	.880	0.0
249071	-93861	185.9	73.0	65.8	.914	.955	.873	0.0
249071	-93861	185.9	73.0	65.8	.914	.955	.873	0.0

DEEPWATER THETA(DEGREES TRUE) = 316.45

CALCULATIONS FOR RAY NO. 9

Xi=249141 Yi=-93896 Depth=177.0 Kr= .914 Ks= .916 Bo= 65.3 Bs= 78.1

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
250165	-92154	623.9	53.9	81.5	.988	1.000	.988	0.0
250089	-92259	585.0	54.0	81.3	.984	1.000	.984	0.0
250013	-92364	542.5	54.1	81.1	.979	.998	.977	0.0
249937	-92468	499.2	54.3	80.7	.972	.996	.968	0.0
249863	-92573	452.9	54.6	80.0	.963	.992	.955	0.0
249790	-92676	413.5	55.0	79.2	.954	.988	.942	0.0
249718	-92779	382.6	55.6	78.4	.946	.984	.931	0.0
249649	-92882	360.9	56.2	77.8	.941	.981	.923	0.0
249581	-92985	340.5	56.8	77.0	.936	.976	.913	0.0
249515	-93087	310.9	57.6	75.7	.928	.969	.899	0.0
249453	-93187	276.1	58.5	73.7	.921	.961	.885	0.0
249393	-93286	253.9	59.2	72.2	.917	.955	.876	0.0
249336	-93383	234.0	60.0	70.6	.914	.950	.868	0.0
249280	-93480	226.8	60.3	70.0	.914	.946	.865	0.0
249225	-93577	221.8	60.6	69.5	.913	.941	.860	0.0
249172	-93673	210.3	61.1	68.5	.913	.934	.853	0.0
249120	-93768	201.2	61.8	67.5	.913	.925	.844	0.0
249071	-93861	185.9	63.0	65.8	.914	.914	.836	0.0
249071	-93861	185.9	63.0	65.8	.914	.914	.836	0.0

DEEPWATER THETA(DEGREES TRUE) = 329.20

CALCULATIONS FOR RAY NO. 10

Xi=249154 Yi=-93924 Depth=170.5 Kr= .792 Ks= .917 Bo= 65.3 Bs= 104.1

ORIGINAL RAY

X(ft)	Y(ft)	Depth	Theta(Deg)	Cel	Ks	Kr	Ks*Kr*H	Hb
250902	-92159	636.8	36.2	81.6	.989	1.000	.989	0.0
250797	-92236	602.9	36.3	81.4	.986	.999	.985	0.0
250692	-92313	565.3	36.5	81.2	.982	.999	.980	0.0
250588	-92390	511.8	36.7	80.8	.974	.998	.972	0.0
250485	-92467	468.2	37.1	80.3	.966	.997	.963	0.0
250385	-92544	424.3	37.8	79.5	.956	.996	.952	0.0
250286	-92622	385.7	38.5	78.5	.947	.994	.941	0.0
250189	-92700	364.9	39.1	77.9	.942	.989	.932	0.0
250093	-92779	361.7	40.0	77.8	.941	.982	.924	0.0
249999	-92860	347.9	41.2	77.3	.937	.974	.913	0.0
249907	-92941	330.8	42.3	76.6	.933	.960	.896	0.0
249818	-93024	314.0	43.4	75.8	.929	.944	.877	0.0
249732	-93107	294.5	44.6	74.8	.924	.924	.855	0.0
249649	-93191	273.7	45.9	73.6	.920	.906	.833	0.0
249570	-93275	255.9	47.0	72.3	.917	.889	.816	0.0
249493	-93358	238.1	48.1	71.0	.915	.873	.798	0.0
249419	-93442	227.6	48.7	70.1	.914	.860	.786	0.0
249346	-93526	223.3	49.1	69.7	.913	.848	.774	0.0
249273	-93610	218.5	49.6	69.2	.913	.834	.762	0.0
249203	-93694	208.1	50.5	68.2	.913	.820	.749	0.0
249136	-93778	199.2	51.6	67.3	.913	.806	.736	0.0
249071	-93861	185.9	53.0	65.8	.914	.792	.724	0.0
249071	-93861	185.9	53.0	65.8	.914	.792	.724	0.0

DEEPWATER THETA(DEGREES TRUE) = 346.84

CALCULATIONS FOR RAY NO. 11

CALCULATIONS FOR RAY NO. 12

CALCULATIONS FOR RAY NO. 13

Depth<Depth MinDEEPWATER THETA(DEGREES TRUE) = 119.78

CALCULATIONS FOR RAY NO. 14

Depth<Depth MinDEEPWATER THETA(DEGREES TRUE) = 26.53

CALCULATIONS FOR RAY NO. 15

OUTFALL CONSTRUCTION SCHEDULE

INTERIM SEWAGE SLUDGE PERMIT

APPLICATION FORM

(Includes supporting documents,reports and maps)

6

FACILITY NAME:	PERMIT NUMBER:	EPA ID NUMBER:	Form Approved OMB Number Approval Expires xx-xx-xx
AGANA Sewage Treatment Plant	GU0020087	(for official use only)	

INTERIM SEWAGE SLUDGE PERMIT APPLICATION FORM

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 8.4 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden, to: Chief, Information Policy Branch, PM-223Y, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC, 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC, 20503.

PRELIMINARY INFORMATION

This page is designed to indicate whether the applicant is to complete Part 1 or Part 2. Answer each question. Then complete Part 1 or Part 2, as indicated.

For purposes of this form, the term "you" refers to the applicant. "This facility" and "your facility" refer to the facility for which application information is submitted.

1. Is this facility required to have, or is it requesting, site-specific pollutant limits?

   ✓ Yes ___ No

2. Does this facility have a currently effective NPDES permit?

   ✓ Yes ___ No

3. Is this facility required by the permitting authority to submit a full permit application at this time?

   ✓ Yes ___ No

If the answers to the above questions are **all** no, complete Part 1 only (see instructions). If the answer to **any** of the above questions is yes, complete Part 2 rather than Part 1.

Send the completed application form to:

FACILITY NAME: AGANA STP	PERMIT NUMBER: GU0020087	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

PART 1: LIMITED BACKGROUND INFORMATION OMITTED

This part should be completed only by "sludge-only" facilities—that is, facilities that do not currently have, and are not now applying for, an NPDES permit for a direct discharge to a surface body of water. This part also does not pertain to facilities that are requesting, or that are required to have, site-specific pollutant limits in their permits.

For purposes of this form, the term "you" refers to the applicant. "This facility" and "your facility" refer to the facility for which application information is submitted.

1. **Facility Identification.**

   a. Name of facility: _____

   b. Facility contact. Name: _____
   Title: _____
   Phone: ( ) _____

   c. Facility mailing address.
   Street or P.O. Box: _____
   City or Town: _____ State: ____ Zip: _____

   d. Facility location.
   Street or Route #: _____
   County: _____
   City or Town: _____ State: ____ Zip: _____

2. **Owner/Operator Information.** OMITTED

   a. Are you the owner of this facility? ____ Yes ____ No

   If no, provide the owner's:
   Name: _____
   Phone: ( ) _____
   Street or P.O. Box: _____
   City or Town: _____ State: ____ Zip: _____

   b. Are you the operator of this facility? ____ Yes ____ No

   If no, provide the operator's:
   Name: _____
   Phone: ( ) _____
   Street or P.O. Box: _____
   City or Town: _____ State: ____ Zip: _____

   c. Indicate the type of facility:
   ____ Publicly owned treatment works (POTW)
   ____ Privately owned treatment works
   ____ Federally owned treatment works
   ____ Blending or treatment operation
   ____ Surface disposal site
   ____ Sewage sludge incinerator
   ____ Other. If other, explain: _____

3. **Sewage Sludge Amount.** Provide the total dry metric tons per 365-day period of sewage sludge handled under the following practices:

   a. Amount generated at the facility: _____
   b. Amount received from off site: _____
   c. Amount treated on site (including blending): _____
   d. Amount sold or given away in a bag or other container for application to the land:
   e. Amount of bulk sewage sludge shipped off site for treatment or for sale/give-away in a bag or other container for application to the land:
   f. Amount applied to the land in bulk form: _____
   g. Amount placed on a surface disposal site: _____
   h. Amount fired in a sewage sludge incinerator: _____
   i. Amount sent to a municipal solid waste landfill: _____
   j. Amount used or disposed by another practice: _____
   Describe: _____

FACILITY NAME:	PERMIT NUMBER:	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

4. Pollutant Concentrations. Using the table below or a separate attachment, provide existing data on the pollutant concentrations in sewage sludge from this facility. Provide all data for the last two years. If data from the last two years are unavailable, provide the most recent data.

POLLUTANT	CONCENTRATION (mg/kg dry weight)	SAMPLE TYPE	SAMPLE DATE	DETECTION LEVEL FOR ANALYSIS
Arsenic				
Cadmium				
Chromium				
Copper				
Lead				
Mercury				
Molybdenum				
Nickel				
Selenium				
Zinc				

5. Treatment Provided at Your Facility.

a. Which class of pathogen reduction does the sewage sludge meet at your facility?

____ Class A ____ Class B ____ Neither or unknown

b. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce pathogens in sewage sludge:

c. Which vector attraction reduction option is met for the sewage sludge at your facility?

____ Option 1 (Minimum 38 percent reduction in volatile solids)
____ Option 2 (Anaerobic process, with bench-scale demonstration)
____ Option 3 (Aerobic process, with bench-scale demonstration)
____ Option 4 (Specific oxygen uptake rate for aerobically digested sludge)
____ Option 5 (Aerobic processes plus raised temperature)
____ Option 6 (Raise pH to 12 and retain at 11.5)
____ Option 7 (75 percent solids with no unstabilized solids)
____ Option 8 (90 percent solids with unstabilized solids)
____ Option 9 (Injection below land surface)
____ Option 10 (Incorporation into soil within 6 hours)
____ Option 11 (Covering active sewage sludge unit daily)
____ None or unknown

d. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce vector attraction properties of sewage sludge:

FACILITY NAME:	PERMIT NUMBER:	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

6. Treatment Provided at Other Facilities. Is sewage sludge from your facility provided to another facility for treatment, distribution, use, or disposal?

____ Yes ____ No

If yes, provide the following information for the facility receiving the sewage sludge:

a. Name of facility: _____

b. Facility contact. Name: _____
Title: _____
Phone: ( ) _____

c. Facility mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

d. Facility location.
Street or Route #: _____
County: _____
City or Town: _____ State: ____ Zip: _____

e. Which activities does the receiving facility provide? (Check all that apply):
____ Treatment (e.g., blending, dewatering, composting, heat drying)
____ Sale or give-away in bag or other container
____ Land application ____ Surface disposal
____ Other (describe): ____ Incineration
_____
_____
_____

7. Use and Disposal Sites. Provide the following information for each site on which sewage sludge from this facility is used or disposed:

a. Site name or number: _____

b. Site contact. Name: _____
Title: _____
Phone: ( ) _____

c. Site location.
Street or Route #: _____
County: _____
City or Town: _____ State: ____ Zip: _____

d. Site type:
____ Agricultural ____ Lawn or home garden
____ Forest ____ Surface disposal
____ Public contact ____ Incineration
____ Reclamation ____ Other (describe):
_____
_____
_____

8. Certification. Sign the certification statement below. (Refer to instructions to determine who is an officer for purposes of this certification.)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Officer: _____
Name of Officer: _____
(typed or printed)
Official Title of Officer: _____
Telephone Number: _____
Date Signed: _____

FACILITY NAME: AGANA STP	PERMIT NUMBER: GU0020087	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

PART 2: PERMIT APPLICATION INFORMATION

Complete this part if you answered "yes" to any of the questions in the PRELIMINARY INFORMATION section (page 1). In other words, complete this part if your facility has, or is applying for, an NPDES permit or if your facility (including a "sludge-only" facility) is requesting, or is required to have, site-specific pollutant limits in its permit.

For purposes of this form, the term "you" refers to the applicant. "This facility" and "your facility" refer to the facility for which application information is submitted.

SCREENING INFORMATION — SEWAGE SLUDGE USE OR DISPOSAL INFORMATION

Part 2 is divided into six sections (A-F). Sections A and F pertain to all applicants. The applicability of Sections B, C, D, and E depends on your facility's sewage sludge use or disposal practices. The information provided on this page will indicate which sections of Part 2 to fill out.

1. All applicants must complete **Section A (General Information).**

2. Does this facility generate sewage sludge?

   ✓ Yes ____ No

   Does this facility derive a material from sewage sludge?

   ____ Yes ✓ No

   If you answered **Yes** to either, complete **Section B (Generation of a Sewage Sludge or Preparation of a Sewage Sludge or Preparation of a Sewage Sludge Product).**

3. Does this facility apply sewage sludge to the land?

   ____ Yes ✓ No

   Is sewage sludge from this facility applied to the land?

   ____ Yes ✓ No

   If you answered **Yes** to either, answer the following three questions:

   a. Does sewage sludge from this facility meet the pollutant concentrations, Class A pathogen reduction requirements, and one of vector attraction reduction options 1-8, as identified in the instructions? ____ Yes ____ No

   b. Is sewage sludge from this facility placed in a bag or other container for sale or give-away? ____ Yes ____ No

   c. Is sewage sludge from this facility sent to another facility for treatment (including blending) or placement in a bag or other container for sale or give-away? ____ Yes ____ No

   If you answered **No** to all three, complete **Section C (Land Application of Bulk Sewage Sludge).**

   If you answered **Yes** to a., b., or c., **skip Section C.**

4. Do you own or operate a surface disposal site?

   ____ Yes ✓ No

   If **Yes**, complete **Section D (Surface Disposal).**

5. Do you own or operate a sewage sludge incinerator?

   ____ Yes ✓ No

   If **Yes**, complete **Section E (Incineration).**

6. All applicants must complete **Section F (Other Information).**

FACILITY NAME: AGANA STP	PERMIT NUMBER: GU0020087	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

A.4. Indian Lands. Does any generation, treatment, storage, application to land, or disposal of sewage sludge from this facility occur on Indian lands?

____ Yes ✓ No

If yes, describe:

_____

_____

_____

A.5. Topographic Map. Provide a topographic map or maps (or other appropriate map(s) if a topographic map is unavailable) that shows the following items of information. Map(s) should include the area one mile beyond all property boundaries of the facility:

a. Location of all sewage sludge management facilities, including locations where sewage sludge is generated, treated, or disposed.

b. Location of all water bodies within one mile beyond the facility's property boundaries.

c. Location of all wells used for drinking water listed in public records or otherwise known to the applicant within 1/4 mile of the property boundaries. N/A

A.6. Hazardous Waste Characteristics. Attach the results of any testing that has been conducted in the last five years to determine whether the sewage sludge is a hazardous waste.

(See Attachments)

A.7. Pollutant Concentrations. Using the table below or a separate attachment, provide existing data on the pollutant concentrations in sewage sludge from this facility. Provide all data for the last two years. If data from the last two years are unavailable, provide the most recent data.

(See Attachments)

POLLUTANT	CONCENTRATION (mg/kg dry weight)	SAMPLE TYPE	SAMPLE DATE	DETECTION LEVEL FOR ANALYSIS
Arsenic				
Cadmium				
Chromium				
Copper				
Lead				
Mercury				
Molybdenum				
Nickel				
Selenium				
Zinc				

FACILITY NAME: AGANA STP	PERMIT NUMBER: GU0020087	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

A. GENERAL INFORMATION

All applicants must complete this section.

A.1. Facility Identification.

a. Name of facility: AGANA SEWAGE TREATMENT PLANT

b. Facility contact. Name: Michael A. Aguon
Title: Sewer Plant Superintendent
Phone: (671) 477-8472

c. Facility mailing address.
Street or P.O. Box: P.O. Box 3010
City or Town: Hagatna State: GU Zip: 96932

d. Facility location.
Street or Route #: Route 1 Marine Drive
County: Hagatna
City or Town: Hagatna State: GU Zip: 96932

e. Facility latitude: 13°29'3.3" Facility longitude: 144°44'37.1"

Method of latitude/longitude determination:
____ USGS map ____ Other (describe:)
____ Field survey

If map used, provide datum and scale:

f. Is this facility a Class I sludge management facility?
✓ Yes ____ No

g. Indicate whether this facility is currently: ✓ Active ____ Inactive
Date on which facility became active/inactive: AUG 1979

h. SIC Codes (4-digit, in descending order of priority):
Code: 4952 Specify:
Code: ____ Specify:
Code: ____ Specify:
Code: ____ Specify:

A.2. Permit Information.

a. Facility's NPDES permit number (if applicable): GU0020087

b. List, on this form or an attachment, all other Federal, State, and local permits or construction approvals received or applied for that regulate this facility's sewage sludge management practices:

Permit Number:	Type of Permit:
GEPA MOT	STATE Environmental Protection Agency

A.3. Owner/Operator Information.

a. Are you the owner of this facility? ✓ Yes ____ No
If no, provide the owner's:
Name:
Phone: ( )
Street or P.O. Box:
City or Town: State: Zip:

b. Are you the operator of this facility? ✓ Yes ____ No
If no, provide the operator's:
Name:
Phone: ( )
Street or P.O. Box:
City or Town: State: Zip:

c. Indicate the type of facility:
✓ Publicly owned treatment works (POTW)
____ Privately owned treatment works
____ Federally owned treatment works
____ Blending or treatment operation
____ Surface disposal site
____ Sewage sludge incinerator
____ Other. If other, explain:

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B. GENERATION OF SEWAGE SLUDGE OR PREPARATION OF A MATERIAL DERIVED FROM SEWAGE SLUDGE

Complete this section if your facility generates sewage sludge or derives a material from sewage sludge.

B.1. Amount Generated On Site.

Total dry metric tons per 365-day period generated at your facility: _____

B.2. Amount Received from Off Site. If your facility receives sewage sludge from another facility for treatment, use, or disposal, provide the following information for each facility from which sludge is received. If you receive sewage sludge from more than one facility, attach additional pages as necessary.

N/A

a. Name of facility: _____

b. Facility contact. Name: _____
Title: _____
Phone: ( ) _____

c. Facility mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

d. Facility location.
Street or Route #: _____
County: _____
City or Town: _____ State: ____ Zip: _____

e. Total dry metric tons per 365-day period received from this facility: _____

f. Describe, on this form or on another sheet of paper, any treatment processes known to occur at the off-site facility, including blending activities and treatment to reduce pathogens or vector attraction characteristics:

B.3. Treatment Provided at Your Facility.

a. Which class of pathogen reduction is achieved for the sewage sludge at your facility?

✓ Class A ____ Class B ____ Neither or unknown

b. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce pathogens in sewage sludge:
Aerobically Digested

c. Which vector attraction reduction option is met for the sewage sludge at your facility?

____ Option 1 (Minimum 38 percent reduction in volatile solids)
____ Option 2 (Anaerobic process, with bench-scale demonstration)
____ Option 3 (Aerobic process, with bench-scale demonstration)
____ Option 4 (Specific oxygen uptake rate for aerobically digested sludge)
____ Option 5 (Aerobic processes plus raised temperature)
____ Option 6 (Raise pH to 12 and retain at 11.5)
____ Option 7 (75 percent solids with no unstabilized solids)
✓ Option 8 (90 percent solids with unstabilized solids)
____ None or unknown

d. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce vector attraction properties of sewage sludge:
Aerobically digested then centrifuged to driest (extent possible); Then transported to municipal solid waste landfill.

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e. Describe, on this form or another sheet of paper, any other sewage sludge treatment (including blending) activities not identified in (a) - (d) above:
Centrifuged sludge cake deposited at local municipal solid waste landfill which is covered with dirt at the end of everyday.

List, on this form or an attachment, the receiving facility's NPDES permit number, as well as the numbers of all other Federal, State, and local permits that regulate the receiving facility's sewage sludge management practices:

Permit Number:	Type of Permit:

Complete Section B.4 if sewage sludge from your facility meets the pollutant concentrations in Table 3 of 40 CFR 503.13, the Class A pathogen reduction requirements in §503.32(a), and one of the vector attraction reduction requirements in §503.33(b)(1)-(8). Skip this section if sewage sludge from your facility does not meet all of these criteria.

B.4. Preparation of Sewage Sludge Meeting Pollutant Concentrations, Class A Pathogen Requirements, and One of Vector Attraction Reduction Options 1-8.

a. Total dry metric tons per 365-day period of sewage sludge subject to this section that is applied to the land: (See B.10, p. 13)

b. Is sewage sludge subject to this section placed in bags or other containers for sale or give-away?
____ Yes ✓ No

c. Is sewage sludge subject to this section provided to another facility for distribution (including placement in a bag or other container for sale or give-away)?
____ Yes ✓ No

If yes, provide the following information if available for each facility distributing this sewage sludge:

Name of facility: _____
Facility contact: Name: _____
Title: _____
Phone: ( ) _____
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

Complete Section B.5 if you place sewage sludge in a bag or other container for sale or give-away prior to land application. Skip this section if the sewage sludge is covered in Section B.4.

B.5. Sale or Give-Away in a Bag or Other Container.

a. Total dry metric tons per 365-day period of sewage sludge placed in a bag or other container at your facility for sale or give-away: _____

b. Attach, with this application, a copy of all labels or notices that accompany the sewage sludge being sold or given away in a bag or other container.

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FACILITY NA. AGANA STP	PERMIT NUMBER: GU0020087	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

Complete Section B.6 if sewage sludge from your facility is provided to another facility that provides treatment or that places the sewage sludge in a bag or other container for sale or give-away. This section does not apply to sewage sludge sent directly to a land application or surface disposal site. Skip this section if the sewage sludge is covered in Sections B.4 or B.5. If you provide sewage sludge to more than one facility, attach additional pages as necessary.

B.6. Shipment Off Site for Treatment or for Sale or Give-Away.

a. Name of receiving facility: _____

b. Facility contact. Name: _____
Title: _____
Phone: ( ) _____

c. Facility mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

d. Total dry metric tons per 365-day period of sewage sludge provided to receiving facility: _____

e. List, on this form or an attachment, the receiving facility's NPDES permit number, as well as the numbers of all other Federal, State, and local permits that regulate the receiving facility's sewage sludge management practices:

Permit Number:	Type of Permit:

f. Does the receiving facility provide additional treatment to reduce pathogens in sewage sludge from your facility? ____ Yes ____ No

Which class of pathogen reduction is achieved for the sewage sludge at the receiving facility?

____ Class A ____ Class B ____ Neither or unknown

Describe, on this form or another sheet of paper, any treatment processes used at the receiving facility to reduce pathogens in sewage sludge:

_____
_____
_____
_____

g. Does the receiving facility provide additional treatment to reduce vector attraction characteristics of the sewage sludge? ____ Yes ____ No

Which vector attraction reduction option is met for the sewage sludge at the receiving facility?

____ Option 1 (Minimum 38 percent reduction in volatile solids)
____ Option 2 (Anaerobic process, with bench-scale demonstration)
____ Option 3 (Aerobic process, with bench-scale demonstration)
____ Option 4 (Specific oxygen uptake rate for aerobically digested sludge)
____ Option 5 (Aerobic processes plus raised temperature)
____ Option 6 (Raise pH to 12 and retain at 11.5)
____ Option 7 (75 percent solids with no unstabilized solids)
____ Option 8 (90 percent solids with unstabilized solids)
____ None

Describe, on this form or another sheet of paper, any treatment processes used at the receiving facility to reduce vector attraction properties of sewage sludge:

_____
_____
_____
_____

h. Does the receiving facility provide any additional treatment (including blending) activities) not identified in (f) or (g) above? ____ Yes ____ No

If yes, describe—on this form or another sheet of paper—the treatment (including blending) activities not identified in (f) or (g) above:

_____
_____
_____
_____

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i. If you answered yes to (f), (g), or (h), attach a copy of any information you provide the receiving facility to comply with the "notice and necessary information" requirement of 40 CFR 503.12(g).

j. Does the receiving facility place sewage sludge from your facility in a bag or other container for sale or give-away? ____ Yes ____ No

If yes, provide a copy of all labels or notices that accompany the product being sold or given away.

OMITTED

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Complete Section B.7 if sewage sludge from your facility is applied to the land, unless the sewage sludge is covered in:

- **Section B.4 (it meets Table 3 pollutant concentrations, Class A pathogen requirements, and one of vector attraction reduction options 1-8); or**
- **Section B.5 (you place it in a bag or other container for sale or give-away); or**
- **Section B.6 (you send it to another facility for treatment or for sale or give-away).**

B.7. Land Application of Bulk Sewage Sludge.

a. Total dry metric tons per 365-day period of sewage sludge applied to all land application sites: _____

b. Nitrogen content in the sewage sludge that is applied to the land in bulk form, expressed as percent dry weight or mg/kg dry weight:

	Content	Units
Ammonium nitrogen:		
Nitrate nitrogen:		
Total Kjeldahl nitrogen (TKN):		

c. Do you identify all land application sites in Section C of this application?

____ Yes ____ No

If no, submit a copy of the land application plan with this application (see instructions).

d. Are any land application sites located in States other than the State where you generate sewage sludge or derive a material from sewage sludge?

____ Yes ____ No

If yes, describe—on this form or another sheet of paper—how you notify the permitting authority for the States where the land application sites are located. Provide a copy of the notification.

_____

_____

_____

_____

Complete Section B.8 if sewage sludge from your facility is placed on a surface disposal site.

B.8. Surface Disposal.

a. Total dry metric tons of sewage sludge from your facility placed on all surface disposal sites per 365-day period: _____

b. Do you own or operate all surface disposal sites to which you send sewage sludge for disposal?

____ Yes ____ No

If no, answer B.8.c - B.8.h for each surface disposal site that you do not own or operate. If you send sewage sludge to more than one such surface disposal site, attach additional pages as necessary.

c. Site name or number: _____

d. Site contact: Name: _____
Title: _____
Phone: ( ) _____
Contact is: ____ Site owner ____ Site operator

e. Site mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

f. Site location.
Street or Route #: _____
County: _____
City or Town: _____ State: ____ Zip: _____

g. Total dry metric tons of sewage sludge from your facility placed on this surface disposal site per 365-day period: _____

h. List, on this form or an attachment, the site's NPDES permit number, as well as the numbers of all other Federal, State, and local permits that regulate sewage sludge disposal at the site:

Permit Number:	Type of Permit:

FACILITY NAME:	PERMIT NUMBER:	EPA ID NUMBER:	Form Approved OMB Number Approval Expires xx-xx-xx
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Complete Section B.9 if sewage sludge from your facility is fired in a sewage sludge incinerator.

B.9. Incineration.

a. Total dry metric tons of sewage sludge from your facility fired in all sewage sludge incinerators per 365-day period: _____

b. Do you own or operate all sewage sludge incinerators in which sewage sludge from your facility is fired?

_____ Yes _____ No

If no, complete B.9.c - B.9.h for each sewage sludge incinerator that you do not own or operate. If you send sewage sludge to more than one such sewage sludge incinerator, attach additional pages as necessary.

c. Incinerator name or number: _____ OMITTED

d. Incinerator contact. Name: _____
Title: _____
Phone: ( ) _____
Contact is incinerator: _____ Owner _____ Operator

e. Incinerator mailing address.
Street or P.O. Box: _____
City or Town: _____ State: _____ Zip: _____

f. Incinerator location.
Street or Route #: _____
County: _____
City or Town: _____ State: _____ Zip: _____

g. Total dry metric tons of sewage sludge from your facility fired in this sewage sludge incinerator per 365-day period: _____

h. List, on this form or an attachment, the numbers of all other Federal, State, and local permits that regulate the firing of sewage sludge in this incinerator:

Permit Number:	Type of Permit:

Complete Section B.10 if sewage sludge from this facility is placed on a municipal solid waste landfill.

B.10. Disposal in a Municipal Solid Waste Landfill. Provide the following information for each municipal solid waste landfill on which sewage sludge from your facility is placed. If sewage sludge is placed on more than one municipal solid waste landfill, attach additional pages as necessary.

a. Name of landfill: Ordot Solid Waste Landfill

b. Landfill contact. Name: Gov. Guam Dept of Public Works
Title: Director
Phone: (671) 646-3131
Contact is: ✓ Landfill owner ✓ Landfill operator

c. Mailing address for municipal solid waste landfill.
Street or P.O. Box: 542 N. Marine Drive
City or Town: Tamuning State: GU Zip: 96911

d. Location of municipal solid waste landfill.
Street or Route #: Dero Drive
County: Ordot
City or Town: Chalan Pago State: GU Zip: 969

e. Total dry metric tons of sewage sludge from your facility placed in this municipal solid waste landfill per 365-day period: _____

f. List, on this form or an attachment, the numbers of all other Federal, State, and local permits that regulate the operation of this municipal solid waste landfill:

Permit Number:	Type of Permit:

g. Submit, with this application, information to determine whether the sewage sludge meets applicable requirements for disposal of sewage sludge in a municipal solid waste landfill (e.g., results of paint filter liquids test and TCLP test).

h. Does the municipal solid waste landfill comply with applicable criteria set forth in 40 CFR Part 258?

_____ Yes _____ No

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C. LAND APPLICATION OF BULK SEWAGE SLUDGE

Complete Section C for sewage sludge that is applied to the land, unless any of the following conditions apply:

- **The sewage sludge meets the Table 3 pollutant concentrations, Class A pathogen requirements, and one of vector attraction reduction options 1-8 *(fill out B.4 instead)*; or**
- **The sewage sludge is sold or given away in a bag or other container *(fill out B.5 instead)*; or**
- **You provide the sewage sludge to another facility for treatment or placement in a bag or other container *(fill out B.6 instead)*.**

In other words, complete Section C only for the sewage sludge that you reported in Section B.7.

C.1. Identification of Land Application Site.

a. Site name or number: _____

b. Site location.

Street or Route #: _____

County: _____

City or Town: _____ State: ____ Zip: _____

Latitude: _____ Longitude: _____

C.2. Owner Information.

a. Are you the owner of this land application site? ____ Yes ____ No

b. If no, provide the following information for the owner:

Name: _____

Phone: ( ) _____

Street or P.O. Box: _____

City or Town: _____ State: ____ Zip: _____

C.3. Applier Information.

a. Are you the person who applies, or who is responsible for application of, sewage sludge to this land application site? ____ Yes ____ No

b. If no, provide the following information for the person who applies:

Name: _____

Phone: ( ) _____

Street or P.O. Box: _____

City or Town: _____ State: ____ Zip: _____

C.4. Site Type. Identify the type of land application site from among the following:

____ Agricultural land
____ Forest
____ Public contact site
____ Reclamation site
____ Lawn or home garden
____ Other. If other, specify: _____

C.5. Crop or Other Vegetation.

a. What type of crop or other vegetation is grown on this site?

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b. What is the nitrogen requirement for this crop or vegetation?

C.6. Vector Attraction Reduction.

Are any vector attraction reduction requirements met when sewage sludge is applied to the land application site?

____ Yes ____ No

If yes, answer C.6.a and C.6.b:

a. Indicate which vector attraction reduction option is met:

____ Option 9 (Injection below land surface)
____ Option 10 (Incorporation into soil within 6 hours)

b. Describe, on this form or another sheet of paper, any treatment processes used at the land application site to reduce vector attraction properties of sewage sludge:

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C.7. Ground-Water Monitoring.

Are any ground-water monitoring data available for this land application site?

____ Yes ____ No

If yes, submit the ground-water monitoring data with this permit application. Also submit a written description of the well locations, approximate depth to ground water, and the ground-water monitoring procedures used to obtain these data.

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Complete Question C.10 only if the sewage sludge applied to this site since July 20, 1993, is subject to the cumulative pollutant loading rates (CPLRs) in 40 CFR 503.13(b)(2) (see instructions).

C.8. Cumulative Loadings and Remaining Allotments.

a. Have you contacted the permitting authority in the State where the bulk sewage sludge subject to CPLRs will be applied, to ascertain whether bulk sewage sludge subject to CPLRs has been applied to this site on or since July 20, 1993?

____ Yes ____ No

If no, sewage sludge subject to CPLRs may not be applied to this site.
If yes, continue on to the next question.

b. Based upon this inquiry, has bulk sewage sludge subject to CPLRs been applied to this site since July 20, 1993?

____ Yes ____ No

If no, skip the rest of this section.
If yes, answer questions C.8.c - C.8.g.

c. Site size, in hectares: _____

d. Dry metric tons of sewage sludge per hectare from your facility applied to this site, per 365-day period: _____

e. Total dry metric tons of sewage sludge per hectare from your facility applied to this site, over the life of the site: _____

f. Provide the following information for every facility other than yours that is sending, or has sent, bulk sewage sludge subject to CPLRs to this site since July 20, 1993. If more than one such facility sends sewage sludge to this site, attach additional pages as necessary.

Name of facility: _____
Facility contact. Name: _____
Title: _____
Phone: ( ) _____
Facility mailing address:
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

g. Provide the total loading and allotment remaining, in kg/hectare, for each of the following pollutants:

	Cumulative loading	Allotment remaining
Arsenic		
Cadmium		
Chromium		
Copper		
Lead		
Mercury		
Molybdenum		
Nickel		
Selenium		
Zinc		

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D. SURFACE DISPOSAL

Complete this section if you own or operate a surface disposal site.

Complete Section D.1 once for each surface disposal site that you own or operate.

D.1. Site Information. Provide the following information for the surface disposal site:

a. Site name or number: _____

b. Are you the owner of this surface disposal site? ____ Yes ____ No

If no, provide the following information:
Name of owner: _____
Facility contact. Name: _____
Title: _____
Phone: ( ) _____

Owner mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

c. Are you the operator of this surface disposal site? ____ Yes ____ No

If no, provide the following information:
Name of operator: _____
Facility contact. Name: _____
Title: _____
Phone: ( ) _____

Operator mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

Facility location.
Street or Route #: _____
County: _____
City or Town: _____ State: ____ Zip: _____

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Complete Sections D.2 - D.6 for each active sewage sludge unit.

D.2. Information on Active Sewage Sludge Units.

a. Unit name or number: _____

b. Total dry metric tons of sewage sludge placed on the active sewage sludge unit per 365-day period: _____

c. Does the active sewage sludge unit have a liner with a minimum hydraulic conductivity of 1 x 10-7 cm/sec? ____ Yes ____ No

If yes, describe the liner (or attach a description):

_____

_____

_____

d. Does the active sewage sludge unit have a leachate collection system? ____ Yes ____ No

If yes, describe the leachate collection system (or attach a description). Also describe the method used for leachate disposal and provide the numbers of any Federal, State, or local permit(s) for leachate disposal:

_____

_____

_____

e. If you answered no to either D.2.c or D.2.d, answer the following question:

Is the boundary of the active sewage sludge unit less than 150 meters from the property line of the surface disposal site? ____ Yes ____ No

If yes, provide the actual distance in meters: _____

D.3. Sewage Sludge from Other Facilities. Is sewage sludge sent to this active sewage sludge unit from any facilities other than your facility? ____ Yes ____ No

If yes, provide the following information for each such facility. If sewage sludge is sent to this active sewage sludge unit from more than one such facility, attach additional pages as necessary.

a. Name of facility: _____

b. Facility contact. Name: _____
Title: _____
Phone: ( ) _____

c. Facility mailing address.
Street or P.O. Box: _____
City or Town: _____ State: _____ Zip: _____

d. List, on this form or an attachment, the facility's NPDES permit number, as well as the numbers of all other Federal, State, and local permits that regulate the facility's sewage sludge management practices:

Permit Number:	Type of Permit:

e. Which class of pathogen reduction is achieved before sewage sludge leaves the other facility?

____ Class A ____ Class B ____ None or unknown

f. Describe, on this form or another sheet of paper, any treatment processes used at the other facility to reduce pathogens in sewage sludge:

_____

_____

_____

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g. Which vector attraction reduction option is achieved before sewage sludge leaves the other facility?

____ Option 1 (Minimum 38 percent reduction in volatile solids)
____ Option 2 (Anaerobic process, with bench-scale demonstration)
____ Option 3 (Aerobic process, with bench-scale demonstration)
____ Option 4 (Specific oxygen uptake rate for aerobically digested sludge)
____ Option 5 (Aerobic processes plus raised temperature)
____ Option 6 (Raise pH to 12 and retain at 11.5)
____ Option 7 (75 percent solids with no unstabilized solids)
____ Option 8 (90 percent solids with unstabilized solids)
____ None or unknown

h. Describe, on this form or another sheet of paper, any treatment processes used at the other facility to reduce vector attraction properties of sewage sludge:

_____
_____
_____

i. Describe, on this form or another sheet of paper, any other sewage sludge treatment activities performed by the other facility that are not identified in (e) - (h) above:

_____
_____
_____

D.4. Vector Attraction Reduction.

a. Which vector attraction reduction option, if any, is met when sewage sludge is placed on this active sewage sludge unit?

____ Option 9 (Injection below land surface)
____ Option 10 (Incorporation into soil within 6 hours)
____ Option 11 (Covering active sewage sludge unit daily)

b. Describe, on this form or another sheet of paper, any treatment processes used at the active sewage sludge unit to reduce vector attraction properties of sewage sludge:

_____
_____
_____

D.5. Ground-Water Monitoring.

a. Is ground-water monitoring currently conducted at this active sewage sludge unit, or are ground-water monitoring data otherwise available for this active sewage sludge unit ?

____ Yes ____ No

If yes, provide a copy of available ground-water monitoring data. Also provide a written description of the well locations, the approximate depth to ground water, and the ground-water monitoring procedures used to obtain these data.

_____
_____
_____

b. Has a ground-water monitoring program been prepared for this active sewage sludge unit?

____ Yes ____ No

If yes, submit a copy of the ground-water monitoring program with this permit application.

c. Have you obtained a certification from a qualified ground-water scientist that the aquifer below the active sewage sludge unit has not been contaminated?

____ Yes ____ No

If yes, submit a copy of the certification with this permit application.

D.6. Site-Specific Limits. Are you seeking site-specific permit limits for the sewage sludge placed on the active sewage sludge unit?

____ Yes ____ No

If yes, submit information to support the request for site-specific pollutant limits with this application.

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E. INCINERATION

Complete this section if you fire sewage sludge in a sewage sludge incinerator.

Complete this section once for each incinerator in which you fire sewage sludge. If you fire sewage sludge in more than one sewage sludge incinerator, attach additional copies of this section as necessary.

E.1. Incinerator Identification. Provide the following information for the sewage sludge incinerator:

a. Incinerator name or number: _____

b. Are you the owner of this sewage sludge incinerator? ____ Yes ____ No

If no, provide the following information:
Name of owner: _____
Facility contact. Name: _____
Title: _____
Phone: ( ) _____

Owner mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

c. Are you the operator of this sewage sludge incinerator? ____ Yes ____ No

If no, provide the following information:
Name of operator: _____
Facility contact. Name: _____
Title: _____
Phone: ( ) _____

Operator mailing address.
Street or P.O. Box: _____
City or Town: _____ State: ____ Zip: _____

Facility location.
Street or Route #: _____
County: _____
City or Town: _____ State: ____ Zip: _____

E.2. Amount Fired. Dry metric tons per 365-day period of sewage sludge fired in the sewage sludge incinerator: _____

E.3. Beryllium NESHAP.

a. Is the sewage sludge fired in this incinerator "beryllium-containing waste," as defined in the instructions? ____ Yes ____ No

Submit, with this application, information, test data, and description of measures taken that demonstrate whether the sewage sludge incinerated is beryllium-containing waste, and will continue to remain as such.

b. If the answer to (a) is yes, submit—with this application—a complete report of the latest beryllium emission rate testing and documentation of ongoing incinerator operating parameters indicating that the NESHAP emission rate limit for beryllium has been and will continue to be met.

E.4. Mercury NESHAP.

a. How is compliance with the mercury NESHAP being demonstrated?
____ Stack testing (if checked, complete E.4.b) ____ Sewage sludge sampling (if checked, complete E.4.c)

b. If stack testing is conducted, submit the following information with this application:

- A complete report of stack testing and documentation of ongoing incinerator operating parameters indicating that the incinerator has met, and will continue to meet, the mercury NESHAP emission rate limit.
- Copies of mercury emission rate tests for the two most recent years in which testing was conducted.

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c. If sewage sludge sampling is used to demonstrate compliance, submit a complete report of sewage sludge sampling and documentation of ongoing incinerator operating parameters indicating that the incinerator has met, and will continue to meet, the mercury NESHAP emission rate limit.

E.5. Dispersion Factor.

a. Dispersion factor, in micrograms/cubic meter per gram/second: _____

b. Name and type of dispersion model: _____

c. Submit a copy of the modeling results and supporting documentation with this application.

E.6. Control Efficiency.

a. Control efficiency, in hundredths, for the following pollutants:

Arsenic: _____ Lead: _____
Cadmium: _____ Nickel: _____
Chromium: _____

b. Submit a copy of the results of performance testing and supporting documentation (including testing dates) with this application.

E.7. Risk Specific Concentration for Chromium.

a. Risk specific concentration (RSC) used for chromium, in micrograms per cubic meter: _____

b. Which basis was used to determine the RSC?
___ Table 2 in 40 CFR 503.43
___ Equation 6 in 40 CFR 503.43 (site-specific determination)

c. If Table 2 was used, identify the type of incinerator used as the basis:
___ Fluidized bed with wet scrubber
___ Fluidized bed with wet scrubber and wet electrostatic precipitator
___ Other types with wet scrubber
___ Other types with wet scrubber and wet electrostatic precipitator

d. If Equation 6 was used, provide the following:

Decimal fraction of hexavalent chromium concentration to total chromium concentration in stack exit gas: _____

Submit results of incinerator stack tests for hexavalent and total chromium concentrations, including date(s) of test, with this application.

E.8. Operational Standard for Total Hydrocarbons (THC).

a. Raw value for THC concentration in stack emissions, in ppm: _____
b. Moisture content in stack gas, in percent: _____
c. Oxygen concentration in stack gas, in percent: _____
d. Corrected value for THC concentration in stack emissions, in ppm: _____

e. Submit, with this application, documentation used to derive raw THC concentration, moisture content, oxygen concentration, and corrected THC concentration.

E.9. Operating Parameters.

a. Incinerator type: _____

b. Combustion temperature: _____

Submit, with this application, supporting documentation such as testing date(s), a description of temperature measurement and data recording and handling systems, and a description of how such combustion temperature data have been averaged.

c. Sewage sludge feed rate, in dry metric tons/day: _____

Indicate whether value submitted is:
___ Average use ___ Maximum design

Submit, with this application, supporting documentation describing how the feed rate was calculated.

d. Incinerator stack height, in meters: _____

Indicate whether value submitted is:

_____ Actual stack height _____ Creditable stack height

e. Submit, with this application, information documenting the operating parameters for the air pollution control device(s) used for this sewage sludge incinerator.

E.10. Monitoring Equipment. List the equipment in place to monitor the following parameters:

a. Total hydrocarbons: _____
b. Percent oxygen: _____
c. Moisture content: _____
d. Combustion temperature: _____
e. Other: _____

E.11. Air Pollution Control Equipment. Submit, with this application, a list of all air pollution control equipment used with this sewage sludge incinerator.

OMITTED

FACILITY NAME: AGANA STP	PERMIT NUMBER: GU0020087	EPA ID NUMBER: (for official use only)	Form Approved OMB Number Approval Expires xx-xx-xx

F. CERTIFICATION

All applicants must sign the certification in this section.

Read and submit the following certification statement with this application.

Refer to the instructions to determine who is an officer for purposes of this certification.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Officer: _____

Name of Officer: (typed or printed) _____

Official Title of Officer: _____

Telephone Number: _____

Date Signed: _____

H 11/U-

CARMEN

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

Quanterra Environmental Services

PUAG
50801

February 21, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: E9B120150
PO/CONTRACT: 51801, P.O. # 99-0169

Montgomery Watson Laboratories
555 E. Walnut Street
Pasadena, CA 91101

Dear Ms. Martha Frost:

This report contains the analytical results for one sample received under chain of custody by Quanterra Incorporated on February 11, 1999.

The case narrative is an integral part of this report.

Preliminary results were sent via facsimile on February 21, 1999.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Keith Aleckson
Project Manager

TABLE OF CONTENTS

QUANTERRA INCORPORATED PROJECT NUMBER E9B120150

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER E9B120150

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met method-specified acceptance criteria. There were no anomalies associated with this sample lot.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

QUANTERRA INCORPORATED - SANTA ANA
PROJECT RECEIPT CHECKLIST

Project #: E9B120150 Date: 2/12/99
Client Name: Montgomery Labs Project Name: Misc. Proj.
Received by: DMANTIS Date/Time Received: 2/11/99 1450
Delivered by : ☑Client ☐Airborne ☐Fed Ex ☐DHL ☐Ultra-Ex ☐Rey B.
☐Edmund ☐UPS ☐ATD ☐Other _____

Initial / Date

Custody Seal Status: ☑Intact ☐Broken ☐None ..... DM 2/12
Custody Seal #(s): _____ ☐No Seal # .
Sample Container(s): ☑Quanterra ☐Client ☐N/A .....
Temperature(s) (COOLER/BLANK) in °C: 4.0 (CORRECTED TEMP)..
Thermometer Used : ☑IR (Infra-red) ☐Digital (Probe) .....
Samples: ☑Intact ☐Broken ☐Other .....
Anomalies: ☑No ☐Yes (See Anoms) _____ .....
Labeled by .....
Labeling checked by .....

Short-Hold Notification: ☐pH ☐Wet Chem ☐Metals (Filter/Pres) ☐N/A .....
Rush Notification : ☐N/A ☐Extractions ☐LUFT ☐Wet Chem ☐Metals
☐MS/Voa ☐MS/SVoa ☐GC/Voa ☐GC/SVoa .
Outside Analysis(es) (Test/Lab/Date Sent Out) :
TCLP Test. & Herb To WSte .....
2/12/99 .....

•••••• LEAVE NO BLANK SPACES ; USE N/A ••••••

Fraction	-1									pH
VOAh /*										N/A
125CGS	8									N/A

h:HCl s:H2SO4 na:Sodium Hydroxide znna: Sodium Hydroxide + Zinc Acetate n:HNO3 n/f:HNO3 field filtered
* Number VOA's w/ air bubbles present n/f/l:HNO3 Lab filtered

LOGGED BY/DATE: RW 2/12/99 REVIEWED BY/DATE: KMD 2/12/99

C008388

PRC Ver 3 110698

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Laboratory/Client Sample Cross-Reference

Lab Sample ID	Client Sample ID	Date	Matrix
E9B120150-001	990211001 AGANA SEWAGE CAKE	02/09/99	Solid

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Analytical Data Report

Client: MONTGOMERY LABORATORIES

GC/MS Volatiles

Précis
a Quanterra Product

Analytical Data Report

Client: MONTGOMERY LABORATORIES

Client Sample ID: 990211001 AGANA SEWAGE CAKE
Lab Sample ID: E9B120150-001

Volatile Organics, GC/MS (8260B)
TCLP Leachate / Purge-and-Trap

Batch: 9046296
Matrix: Solid
Units: mg/L
Dil. Factor: 25
Method: 8260B
Preparation: 1311/5030B
Date Sampled: 02/09/99
Date Prepared: 02/18/99
Date Analyzed: 02/18/99

Analyte	Result	RL	Qualifier
Benzene	ND	16	
2-Butanone	ND	78	
Carbon tetrachloride	ND	16	
Chlorobenzene	ND	16	
Chloroform	ND	16	
1,2-Dichloroethane	ND	16	
1,1-Dichloroethene	ND	16	
Tetrachloroethene	ND	16	
Trichloroethene	ND	16	
Vinyl chloride	ND	16	

Surrogate	% Rec.	Acceptance Limit	Qualifier
4-Bromofluorobenzene	111	60-140	
,2-Dichloroethane-d4	118	60-140	
Toluene-d8	109	60-140	

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Analytical Data Report

Client: MONTGOMERY LABORATORIES

GC/MS Semivolatiles

Précis
A Quanterra Product

Analytical Data Report

Client: MONTGOMERY LABORATORIES

Client Sample ID: 990211001 AGANA SEWAGE CAKE
Lab Sample ID: E9B120150-001

Base/Neutrals and Acids (8270C)
TCLP Leachate / Sep Funnel Extraction

Batch: 9046301
Matrix: Solid
Units: mg/L
Dil. Factor: 1
Method: 8270C
Preparation: 1311/3510C
Date Sampled: 02/09/99
Date Prepared: 02/16/99
Date Analyzed: 02/17/99

Analyte	Result	RL	Qualifier
m-Cresol & p-Cresol	**0.69**	**0.10**	
1,4-Dichlorobenzene	ND	0.050	
2,4-Dinitrotoluene	ND	0.050	
Hexachlorobenzene	ND	0.050	
Hexachlorobutadiene	ND	0.050	
Hexachloroethane	ND	0.050	
o-Cresol	ND	0.050	
Nitrobenzene	ND	0.050	
Pentachlorophenol	ND	0.25	
Pyridine	ND	0.25	
2,4,5-Trichlorophenol	ND	0.050	
2,4,6-Trichlorophenol	ND	0.050	

Surrogate	% Rec.	Acceptance Limit	Qualifier
2-Fluorobiphenyl	82	20-125	
2-Fluorophenol	79	20-125	
Nitrobenzene-d5	90	20-125	
Phenol-d5	75	10-125	
Terphenyl-d14	85	10-125	
2,4,6-Tribromophenol	96	10-125	

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Analytical Data Report

Client: MONTGOMERY LABORATORIES

Metals

Précis
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Analytical Data Report

Client: MONTGOMERY LABORATORIES

Client Sample ID: 990211001 AGANA SEWAGE CAKE
Lab Sample ID: E9B120150-001

Inductively Coupled Plasma (6010B)
TCLP Leachate / Acid Digestion

Batch: 9047310
Matrix: Solid
Units: mg/L
Method: 6010B
Preparation: 1311/3010A
Date Sampled: 02/09/99
Date Prepared: 02/16/99
Date Analyzed: 02/17/99

Analyte	Result	RL	Dil. Factor	Qualifier
Arsenic	ND	0.50	1	
Barium	ND	10.0	1	
Cadmium	ND	0.10	1	
Chromium	ND	0.50	1	
Lead	ND	0.50	1	
Selenium	ND	0.25	1	
Silver	ND	0.50	1	

Client Sample ID: 990211001 AGANA SEWAGE CAKE
Lab Sample ID: E9B120150-001

Mercury (7470A, Cold Vapor) - Liquid
TCLP Leachate / Mercury Preparation

Batch: 9047242
Matrix: Solid
Units: mg/L
Method: 7470A
Preparation: 1311/7470A
Date Sampled: 02/09/99
Date Prepared: 02/16/99
Date Analyzed: 02/17/99

Analyte	Result	RL	Dil. Factor	Qualifier
Mercury	ND	0.0020	1	

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Quality Control Batch Assignment Report

Lab Sample ID	Matrix	Method	Batch ID	MS Run Number
Metals				
E9B120150-001	SOLID	6010B	9047310	9047141
E9B120150-001		7470A	9047242	9047091
GC/MS Semivolatiles				
E9B120150-001	SOLID	8270C	9046301	9047130
GC/MS Volatiles				
E9B120150-001	SOLID	8260B	9046296	9047102

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Quality Control Reports

GC/MS Volatiles

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Quality Control Reports

Batch ID: 9046296

Volatile Organics, GC/MS (8260B)

Method Blank

Lab Sample ID: E9B150000-295B
Matrix: Solid
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
Benzene	ND	16		02/17/99
2-Butanone	ND	78		02/17/99
Carbon tetrachloride	ND	16		02/17/99
Chlorobenzene	ND	16		02/17/99
Chloroform	ND	16		02/17/99
1,2-Dichloroethane	ND	16		02/17/99
1,1-Dichloroethene	ND	16		02/17/99
Tetrachloroethene	ND	16		02/17/99
Trichloroethene	ND	16		02/17/99
Vinyl chloride	ND	16		02/17/99

Surrogate	% Rec.	Acceptance Limit	Qualifier
4-Bromofluorobenzene	113	60-140	
1,2-Dichloroethane-d4	120	60-140	
Toluene-d8	111	60-140	

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Quality Control Reports

Batch ID: 9046296

Volatile Organics, GC/MS (8260B)

Laboratory Control Sample

Lab Sample ID: E9B150000-296C
Matrix: Solid
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Benzene	0.250	ND	93	60-140	
2-Butanone	0.250	ND	117	50-150	
Carbon tetrachloride	0.250	ND	90	60-140	
Chlorobenzene	0.250	ND	91	60-140	
Chloroform	0.250	ND	92	60-140	
1,2-Dichloroethane	0.250	ND	95	60-140	
1,1-Dichloroethene	0.250	ND	83	60-140	
Tetrachloroethene	0.250	ND	82	60-140	
Trichloroethene	0.250	ND	90	60-140	
Vinyl chloride	0.250	ND	68	50-150	
Surrogate					
4-Bromofluorobenzene	0.250	0.268	107	60-140	
1,2-Dichloroethane-d4	0.250	0.282	113	60-140	
Toluene-d8	0.250	0.272	109	60-140	

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Quality Control Reports

Batch ID: 9046296

Volatile Organics, GC/MS (8260B)

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9B120150-001S
Matrix: Solid
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Benzene	ND	0.250	0.222	0.226	89	90	60-140	1.7		
2-Butanone	ND	0.250	0.594	0.608	79	85	50-150	2.2		
Carbon tetrachloride	ND	0.250	0.210	0.226	84	91	60-140	7.4		
Chlorobenzene	ND	0.250	0.223	0.223	89	89	60-140	0.13		
Chloroform	ND	0.250	0.227	0.230	91	92	60-140	1.3		
1,2-Dichloroethane	ND	0.250	0.237	0.236	95	94	60-140	0.67		
1,1-Dichloroethene	ND	0.250	0.187	0.199	75	80	60-140	6.0		
Tetrachloroethene	ND	0.250	0.193	0.201	77	80	60-140	4.0		
Trichloroethene	ND	0.250	0.216	0.226	86	90	60-140	4.5		
Vinyl chloride	ND	0.250	0.148	0.147	59	59	50-150	0.61		
Surrogate										
4-Bromofluorobenzene	0.28	0.250	0.284	0.284	113	113	60-140			
1,2-Dichloroethane-d4	0.29	0.250	0.318	0.330	127	132	60-140			
Toluene-d8	0.27	0.250	0.274	0.265	109	106	60-140			

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Quality Control Reports

GC/MS Semivolatiles

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Quality Control Reports

Batch ID: 9046301

Base/Neutrals and Acids (8270C)

Method Blank

Lab Sample ID: E9B150000-303B
Matrix: Solid
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
m-Cresol & p-Cresol	ND	0.10		02/17/99
1,4-Dichlorobenzene	ND	0.050		02/17/99
2,4-Dinitrotoluene	ND	0.050		02/17/99
Hexachlorobenzene	ND	0.050		02/17/99
Hexachlorobutadiene	ND	0.050		02/17/99
Hexachloroethane	ND	0.050		02/17/99
o-Cresol	ND	0.050		02/17/99
Nitrobenzene	ND	0.050		02/17/99
Pentachlorophenol	ND	0.25		02/17/99
Pyridine	ND	0.25		02/17/99
2,4,5-Trichlorophenol	ND	0.050		02/17/99
2,4,6-Trichlorophenol	ND	0.050		02/17/99

Surrogate	% Rec.	Acceptance Limit	Qualifier
2-Fluorobiphenyl	78	20-125	
2-Fluorophenol	71	20-125	
Nitrobenzene-d5	78	20-125	
Phenol-d5	67	10-125	
Terphenyl-d14	86	10-125	
2,4,6-Tribromophenol	96	10-125	

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Quality Control Reports

Batch ID: 9046301

Base/Neutrals and Acids (8270C)

Laboratory Control Sample

Lab Sample ID: E9B150000-301C
Matrix: Solid
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
m-Cresol & p-Cresol	0.750	0.612	82	10-150	
1,4-Dichlorobenzene	0.500	0.364	73	50-120	
2,4-Dinitrotoluene	0.500	0.484	97	20-140	
Hexachlorobenzene	0.500	0.487	97	50-125	
Hexachlorobutadiene	0.500	0.382	76	20-150	
Hexachloroethane	0.500	0.329	66	40-120	
o-Cresol	0.750	0.627	84	10-150	
Nitrobenzene	0.500	0.432	86	10-150	
Pentachlorophenol	0.750	0.797	106	30-150	
Pyridine	0.500	0.288	58	1.0-150	
2,4,5-Trichlorophenol	0.750	0.680	91	30-130	
2,4,6-Trichlorophenol	0.750	0.670	89	40-130	
Surrogate					
2-Fluorobiphenyl	0.500	0.425	85	20-125	
2-Fluorophenol	0.750	0.617	82	20-125	
Nitrobenzene-d5	0.500	0.441	88	20-125	
Phenol-d5	0.750	0.566	75	10-125	
Terphenyl-d14	0.500	0.482	96	10-125	
2,4,6-Tribromophenol	0.750	0.751	100	10-125	

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Quality Control Reports

Batch ID: 9046301

Base/Neutrals and Acids (8270C)

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9B120150-001S
Matrix: Solid
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
m-Cresol & p-Cresol	0.69	0.750	1.24	1.09	72	53	10-150	12		
1,4-Dichlorobenzene	ND	0.500	0.363	0.328	73	66	50-120	10		
2,4-Dinitrotoluene	ND	0.500	0.511	0.507	102	101	20-140	0.68		
Hexachlorobenzene	ND	0.500	0.473	0.457	95	91	50-125	3.5		
Hexachlorobutadiene	ND	0.500	0.384	0.347	77	69	20-150	10		
Hexachloroethane	ND	0.500	0.332	0.299	66	60	40-120	11		
o-Cresol	ND	0.750	0.644	0.568	86	76	10-150	12		
Nitrobenzene	ND	0.500	0.436	0.393	87	79	10-150	10		
Pentachlorophenol	ND	0.750	0.776	0.774	104	103	30-150	0.25		
Pyridine	ND	0.500	0.193	0.143	39	29	1.0-150	30		
2,4,5-Trichlorophenol	ND	0.750	0.695	0.666	93	89	30-130	4.2		
2,4,6-Trichlorophenol	ND	0.750	0.723	0.676	96	90	40-130	6.6		
Surrogate										
2-Fluorobiphenyl	0.41	0.500	0.431	0.384	86	77	20-125			
2-Fluorophenol	0.59	0.750	0.581	0.535	78	71	20-125			
Nitrobenzene-d5	0.45	0.500	0.447	0.407	89	81	20-125			
Phenol-d5	0.56	0.750	0.555	0.499	74	67	10-125			
Terphenyl-d14	0.43	0.500	0.504	0.504	101	101	10-125			
2,4,6-Tribromophenol	0.72	0.750	0.748	0.738	100	98	10-125			

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Quality Control Reports

Metals

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Quality Control Reports

Batch ID: 9047310

Inductively Coupled Plasma (6010B)

Method Blank

Lab Sample ID: E9B160000-263B
Matrix: Solid
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
Arsenic	ND	0.50		02/17/99
Barium	ND	10.0		02/17/99
Cadmium	ND	0.10		02/17/99
Chromium	ND	0.50		02/17/99
Lead	ND	0.50		02/17/99
Selenium	ND	0.25		02/17/99
Silver	ND	0.50		02/17/99

Laboratory Control Sample

Lab Sample ID: E9B160000-310C
Matrix: Solid
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Arsenic	1.00	0.958	96	80-120	
Barium	1.00	ND	90	80-120	
Cadmium	1.00	0.905	91	80-120	
Chromium	1.00	0.943	94	80-120	
Lead	1.00	0.869	87	80-120	
Selenium	1.00	0.979	98	80-120	
Silver	1.00	0.795	80	80-120	

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A Quanterra Product

Quality Control Reports

Batch ID: 9047310

Inductively Coupled Plasma (6010B)

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9B120150-001S
Matrix: Solid
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Arsenic	ND	1.00	0.939	0.969	91	94	50-150	3.1		
Barium	ND	1.00	1.74	1.76	101	103	50-150	1.1		
Cadmium	ND	1.00	0.878	0.904	88	90	50-150	3.0		
Chromium	ND	1.00	0.892	0.910	89	91	50-150	2.0		
Lead	ND	1.00	0.847	0.874	85	87	50-150	3.1		
Selenium	ND	1.00	0.980	0.977	98	98	50-150	0.30		
Silver	ND	1.00	0.862	0.872	86	87	50-150	1.1		

Précis
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Quality Control Reports

Batch ID: 9047242

Mercury (7470A, Cold Vapor) - Liquid

Method Blank

Lab Sample ID: E9B160000-263B
Matrix: Solid
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
Mercury	ND	0.0020		02/17/99

Laboratory Control Sample

Lab Sample ID: E9B160000-242C
Matrix: Solid
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Mercury	0.00500	0.00554	111	80-120	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9B120150-001S
Matrix: Solid
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Mercury	ND	0.00500	0.00555	0.00558	111	112	80-120	0.53		

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory Report

for

Guam Water Authority
Government of Guam

P.O.Box 3010

Agana, GUAM , USA 96910

Attention: Carmen Sian-Denton
Fax: (671) 637-2592

HDS Hillary Strayer

Report#: 51801
DRINKING

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Report
Comments
#51801

Group Comments

TCLP analysis are submitted by Quanterra. GG 2/22/99.

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory
Report
#51801

Guam Water Authority
Carmen Sian-Denton
Government of Guam
P.O.Box 3010
Agana, GUAM , USA 96910

Samples Received
11-feb-1999 13:05:59

Prepared	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
AGANA SEWAGE CAKE (990211001)			**Sampled on 02/09/99**					
	02/17/99		(ML)	Custom Inorganic Analysis	SubQuant	None	0.0000	1
	02/17/99		( )	GC/MS custom analysis	SubQuant	None	0.0000	1

99-0169
PUAG
51801

MAR 2 2 RECD

Quanterra Incorporated
880 Riverside Parkway
West Sacramento, California 95605

916 373-5600 Telephone
916 372-1059 Fax

March 18, 1999

QUANTERRA INCORPORATED PROJECT NUMBER: 304187
PO/CONTRACT: MWL Project# 51801/Sub PO# 99-0169

Martha Frost
Montgomery Laboratories
555 East Walnut
Pasadena, CA 91101

Dear Ms. Frost,

This report contains the analytical results for the one sample received under chain of custody by Quanterra Incorporated on February 15, 1999. This sample is associated with your 51801 project.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (916)374-4381.

Sincerely,

Jon Gildersleeve
Project Manager

Quanterra

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QUANTERRA INCORPORATED PROJECT NUMBER 304187

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CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 304187

There were no anomalies associated with this project.

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Quanterra - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

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SAMPLE DESCRIPTION INFORMATION
for
Montgomery Watson Laboratories

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
304187-0001-MB	Method Blank	AQUEOUS			18 FEB 99
304187-0001-SA	990211001 AGANA SEWAGE CAKE	AQUEOUS	09 FEB 99		18 FEB 99

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TCLP Chlorinated Pesticides - Method 8080

Quanterra

Chlorinated Pesticides - Toxicity Characteristic List (TCLP)
TCLP Leachate
Method 8080

Client Name: Montgomery Watson Laboratories
Client ID: Method Blank
Lab ID: 304187-0001-MB
Matrix: AQUEOUS
Sampled: NA
Received: NA
Authorized: 13 FEB 99
Leached: 15 FEB 99
Prepared: 22 FEB 99
Analyzed: 03 MAR 99

Parameter	Result	Units	Reporting Limit
gamma-BHC (Lindane)	ND	mg/L	0.00050
Chlordane	ND	mg/L	0.0050
Endrin	ND	mg/L	0.0010
Heptachlor (and its epoxide)	ND	mg/L	0.00050
Methoxychlor	ND	mg/L	0.0050
Toxaphene	ND	mg/L	0.050

Surrogate	Recovery	
Tetrachloro-m-xylene	87	%
Decachlorobiphenyl	82	%

ND = Not detected
NA = Not applicable

Reported By: Marcia Reed
Approved By: Kris Rogers

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Chlorinated Pesticides - Toxicity Characteristic List (TCLP)
TCLP Leachate
Method 8080

Client Name: Montgomery Watson Laboratories
Client ID: 990211001 AGANA SEWAGE CAKE
Lab ID: 304187-0001-SA
Matrix: AQUEOUS

Sampled: 09 FEB 99
Received: 18 FEB 99
Authorized: 13 FEB 99

Leached: 15 FEB 99
Prepared: 22 FEB 99
Analyzed: 03 MAR 99

Parameter	Result	Units	Reporting Limit
gamma-BHC (Lindane)	ND	mg/L	0.00050
Chlordane	ND	mg/L	0.0050
Endrin	ND	mg/L	0.0010
Heptachlor (and its epoxide)	ND	mg/L	0.00050
Methoxychlor	ND	mg/L	0.0050
Toxaphene	ND	mg/L	0.050

Surrogate	Recovery	
Tetrachloro-m-xylene	71	%
Decachlorobiphenyl	32	%

ND = Not detected
NA = Not applicable

Reported By: Marcia Reed
Approved By: Kris Rogers

The cover letter is an integral part of this report.
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Quanterra

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (LCS/BLANK)
304187-0001-MB	LEACHATE	OCP-TL	22 FEB 99-11R	22 FEB 99-11R
304187-0001-SA	LEACHATE	OCP-TL	22 FEB 99-11R	22 FEB 99-11R

METHOD BLANK REPORT
Semivolatile Organics by GC
Project: 304187

Test: 8080CP-OTC-TL
Method: 8080
Matrix: LEACHATE
QC Lot: 22 FEB 99-11R
Analyzed: 03 MAR 99

Chlorinated Pesticides - Toxicity Characteristic List (TCLP)

QC Run: 22 FEB 99-11R
Time: 04:21

Analyte	Result	Units	Reporting Limit	Qualifier
gamma-BHC (Lindane)	ND	mg/L	0.00050	
Chlordane	ND	mg/L	0.0050	
Endrin	ND	mg/L	0.0010	
Heptachlor (and its epoxide)	ND	mg/L	0.00050	
Methoxychlor	ND	mg/L	0.0050	
Toxaphene	ND	mg/L	0.050	

Surrogate	% Recovery	Acceptable Range
Tetrachloro-m-xylene	84	30 -150
Decachlorobiphenyl	60	30 -150

ND = Not Detected

DUPLICATE CONTROL SAMPLE REPORT
emivolatile Organics by GC
Project: 304187

Category: OCP-TL Organochlorine Pesticides - TLCP Leachate
Testcode: 8080CP-OTC-TL Method: 8080
Matrix: LEACHATE Concentration Units: mg/L
QC Lot: 22 FEB 99-11R Analyzed Date: 03 MAR 99 Time: 06:13

Analyte	Concentration Spiked	Concentration Measured DCS1	Concentration Measured DCS2	Accuracy (%) DCS1	Accuracy (%) DCS2	Limits	Precision (RPD) DCS	Precision (RPD) Limit
gamma-BHC (Lindane)	0.00250	0.00166	0.00165	66	66	56-103	0.57	23
Heptachlor	0.00250	0.00208	0.00212	83	85	49-101	2.2	24
Aldrin	0.00250	0.00218	0.00222	87	89	48-99	2.1	31
Dieldrin	0.00500	0.00502	0.00494	100	99	60-106	1.6	25
Endrin	0.00500	0.00518	0.00504	104	101	63-118	2.7	24
4,4'-DDT	0.00500	0.00371	0.00360	74	72	55-112	3.0	27

Surrogate	Concentration Spiked	Concentration Measured DCS1	Concentration Measured DCS2	Accuracy(%) DCS1	Accuracy(%) DCS2	Limits
Tetrachloro-m-xylene	0.00020	0.00016	0.00017	82	85	30-150
Decachlorobiphenyl	0.00020	0.00016	0.00016	80	79	30-150

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra

TCLP Herbicides - Method 8150

Quanterra

TCLP Herbicides
TCLP Leachate
Method 8150

Client Name: Montgomery Watson Laboratories
Client ID: Method Blank
LAB ID: 304187-0001-MB
Matrix: AQUEOUS Sampled: NA Received: NA
Authorized: 13 FEB 99 Prepared: 22 FEB 99 Analyzed: 27 FEB 99

Dilution Factor: 1.0

Parameter	Result	Units	Reporting Limit	Qualifier
2,4-D	ND	mg/L	0.010	
2,4,5-TP (Silvex)	ND	mg/L	0.0020	

Surrogate	Recovery	Acceptable Range
2,4-DCAA	65 %	50 - 150

NA = Not Applicable
ND = Not Detected

Reported By: Jon Edmondson Approved By: Rose Harrelson

The cover letter is an integral part of this report.
Rev 230787

Quanterra

TCLP Herbicides
TCLP Leachate
Method 8150

Client Name: Montgomery Watson Laboratories
Client ID: 990211001 AGANA SEWAGE CAKE
LAB ID: 304187-0001-SA
Matrix: AQUEOUS Sampled: 09 FEB 99 Received: 18 FEB 99
Authorized: 13 FEB 99 Prepared: 22 FEB 99 Analyzed: 27 FEB 99

Dilution Factor: 1.0

Parameter	Result	Units	Reporting Limit	Qualifier
2,4-D	ND	mg/L	0.010	
2,4,5-TP (Silvex)	ND	mg/L	0.0020	

Surrogate	Recovery	Acceptable Range
2,4-DCAA	84 %	50 - 150

ND = Not Detected

Reported By: Jon Edmondson Approved By: Rose Harrelson

The cover letter is an integral part of this report.
Rev 230787

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (LCS/BLANK)
304187-0001-MB	LEACHATE	8150-TL	22 FEB 99-11A	22 FEB 99-11A
304187-0001-SA	LEACHATE	8150-TL	22 FEB 99-11A	22 FEB 99-11A

Quanterra

METHOD BLANK REPORT
Semivolatile Organics by GC
Project: 304187

Test: 8150-TCLP-TL TCLP Herbicides
Method: 8150
Matrix: LEACHATE
QC Lot: 22 FEB 99-11A QC Run: 22 FEB 99-11A
Analyzed: 27 FEB 99 Time: 20:23

Analyte	Result	Units	Reporting Limit	Qualifier
2,4-D	ND	mg/L	0.010	
2,4,5-TP (Silvex)	ND	mg/L	0.0020	

Surrogate	% Recovery	Acceptable Range
2,4-DCAA	62	50 -150

ND = Not Detected

Quanterra

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC
Project: 304187

Category: 8150-TL Herbicides, Leachate
Testcode: 8150-TCLP-TL Method: 8150
Matrix: LEACHATE Concentration Units: mg/L
QC Lot: 22 FEB 99-11A Analyzed Date: 27 FEB 99 Time: 21:53

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Accuracy (%) DCS1	Accuracy (%) DCS2	Limits	Precision (RPD) DCS	Precision (RPD) Limit
2,4-D	0.00500	0.00373	0.00375	75	75	50-150	0.62	40
2,4,5-TP (Silvex)	0.00100	0.000851	0.000852	85	85	50-150	0.14	40

Surrogate	Concentration Spiked	Measured DCS1	Measured DCS2	Accuracy(%) DCS1	Accuracy(%) DCS2	Limits
2,4-DCAA	0.0040	0.0036	0.0036	90	89	50-150

Calculations are performed before rounding to avoid round-off errors in calculated results.