**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

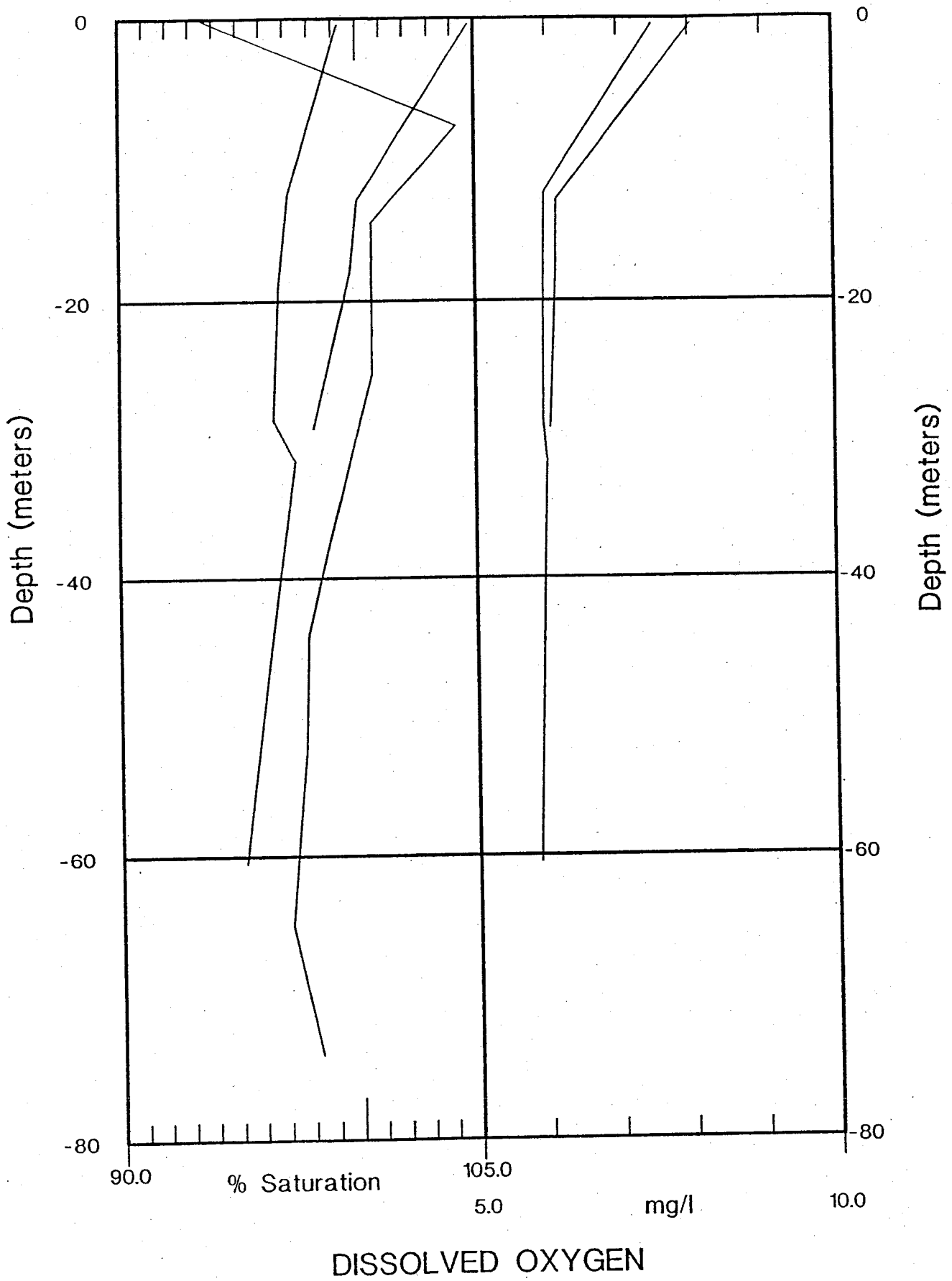
expected at the site was developed from data contained in the Summary of Synoptic Meteorological Observations (SSMO). Preliminary evaluations of monthly typical historic wave conditions at the Agana and Northern District outfall locations showed that May and possibly June are the months with the lowest 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.

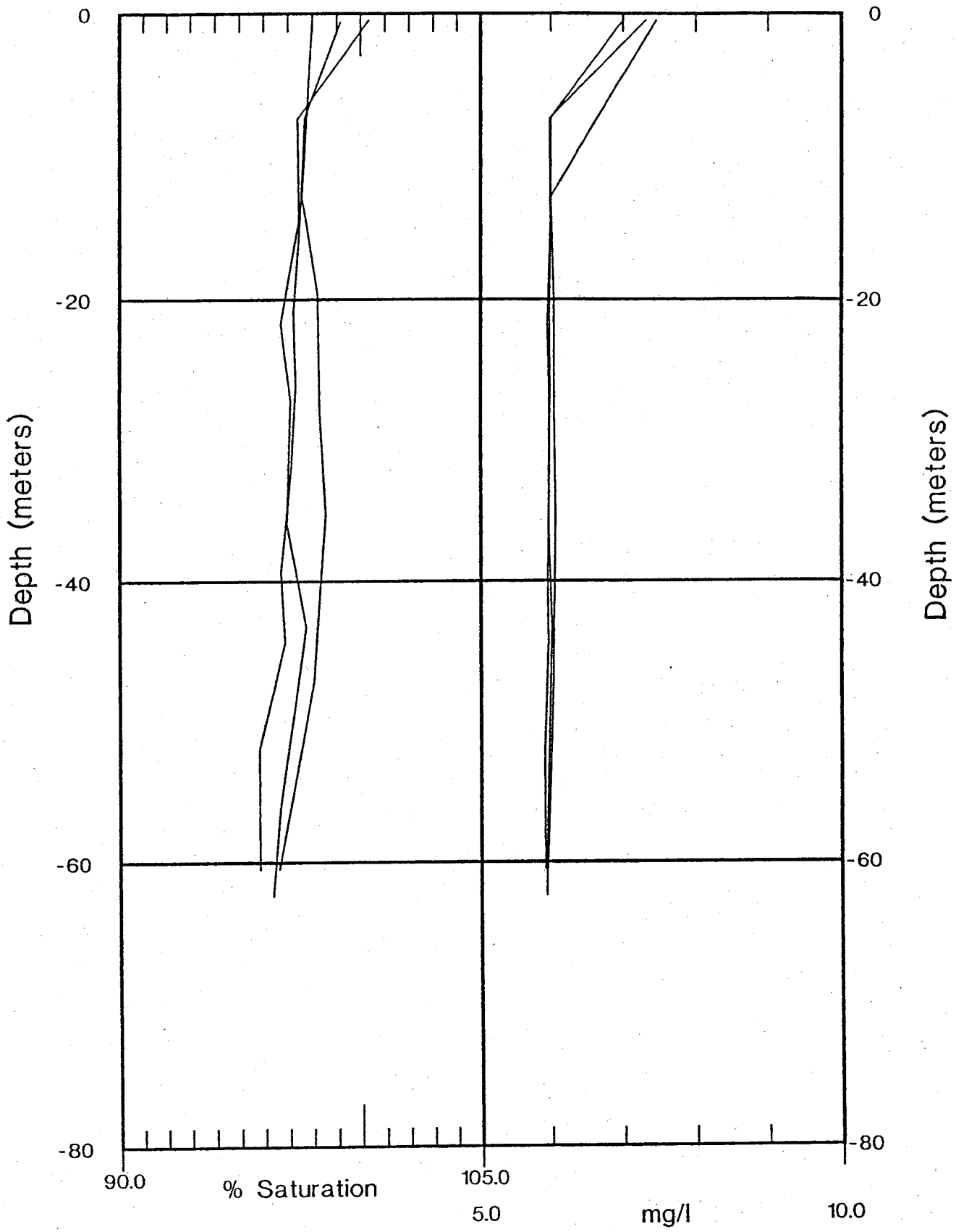
In additon, a wave refraction analysis was performed for each site. A computer wave refraction analysis was performed for periods ranging from 8-16 seconds, and for all possible wave directions. The wave refraction coefficient $K_r$ was determined for each wave period and for various wave approach directions. 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




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




| | | | |
|---|---|---|---|
| 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 | AGM |
| 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 | AGM |
| 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 | AG[illegible] |
| 4 | 3 | 1.02183 | 27.5 | 34.0 | 8 | 81 | Gov. of Guam, Water Quality Data | AG[illegible] |
| 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 |

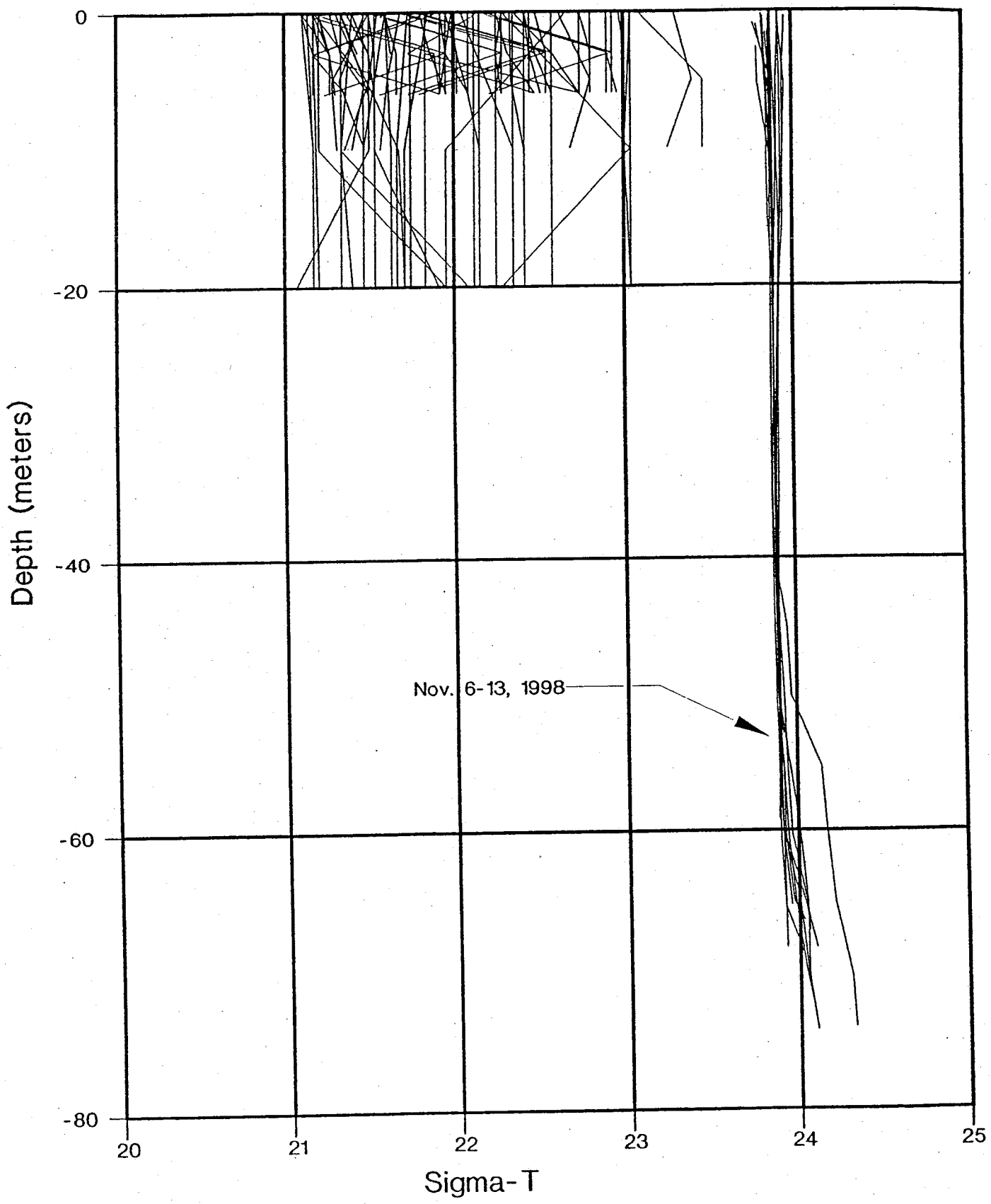
| MONTH | DEPTH (meters) | DENSITY gm/cm^3 | TEMP (C) | SAL 0/00 | DAY | YEAR | DATA SOURCE | STATIC |
|---|---|---|---|---|---|---|---|---|
| 5 | 0 | 1.02160 | 28.2 | 34.0 | 5 | 81 | Gov. of Guam, Water Quality Data | AGMX1 |
| 5 | 3 | 1.02164 | 28.1 | 34.0 | 5 | 81 | Gov. of Guam, Water Quality Data | 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 | AGI |
| 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 | AG |
| 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 | A |
| 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 | AGMX |

| MONTH | DEPTH (meters) | DENSITY gm/cm^3 | TEMP (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 | STATIC |
|---|---|---|---|---|---|---|---|---|
| 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 | AGM |
| 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 | AG |
| 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 | 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 | 1.02195 | 29.4 | 35.0 | 6 | 83 | Gov. of Guam, Water Quality Data | AGMX |
| 9 | 3 | 1.02195 | 29.4 | 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 |

| 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 OBTA ED 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 43.87 |
| 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 50.47 |
| 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 |

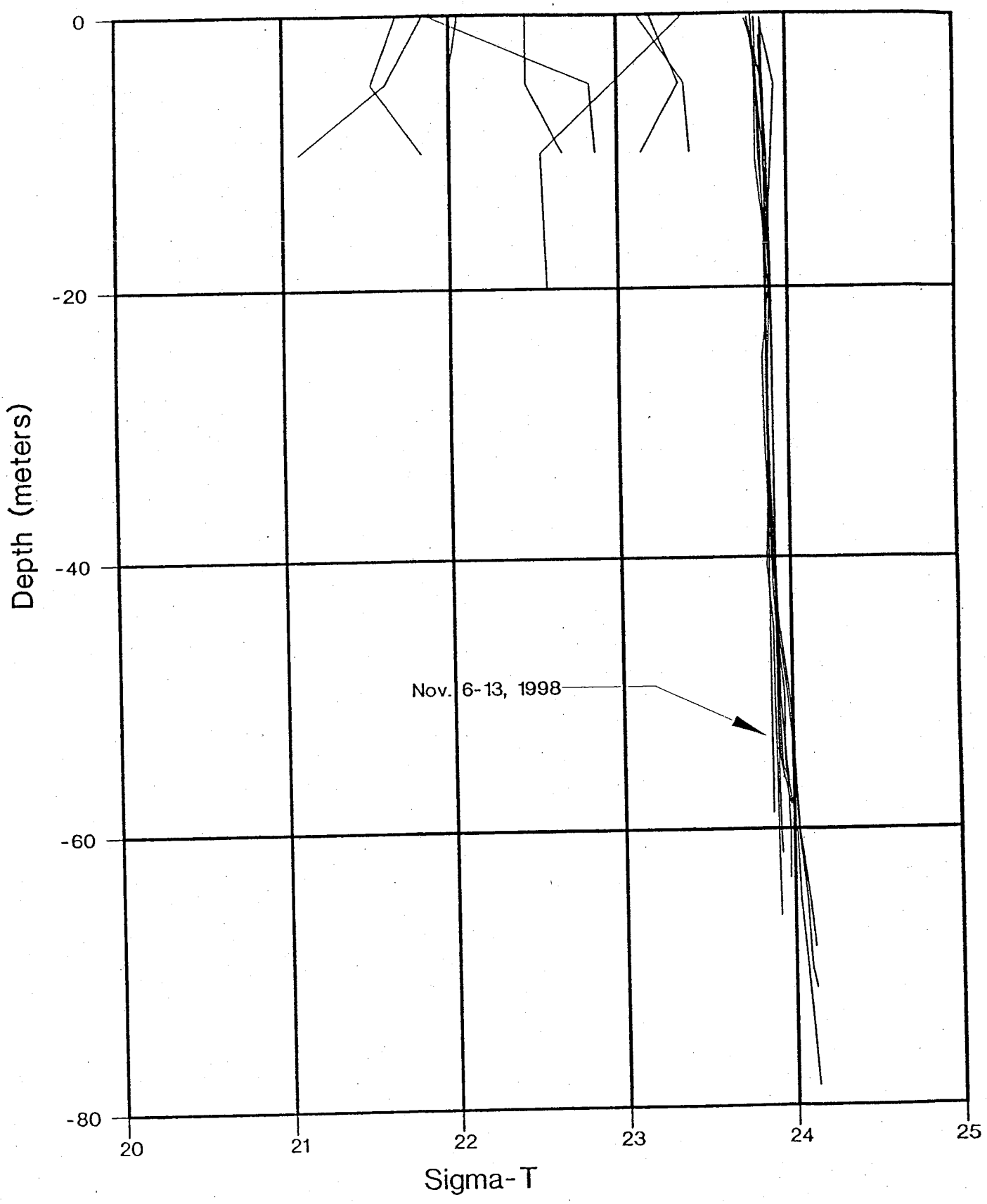
| MONTH | DAY | YEAR | DEPTH (meters) | DENSITY gm/cm^3 | TEMP (C) | SAL 0/00 | c. | Long. |
|---|---|---|---|---|---|---|---|---|
| 11 | 13 | 98 | 40.17 | 1.02389 | 29.01 | 37.43 | 13 29 13.51N | 144 44 54.85E |
| 11 | 13 | 98 | 43.21 | 1.02389 | 29.01 | 37.43 | 13 29 13.51N | 144 44 54.85E |
| 11 | 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 DISSOLVED OXYGEN(DO) PROFILE 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 PLANT OUTFALL EXTENSION | 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 |

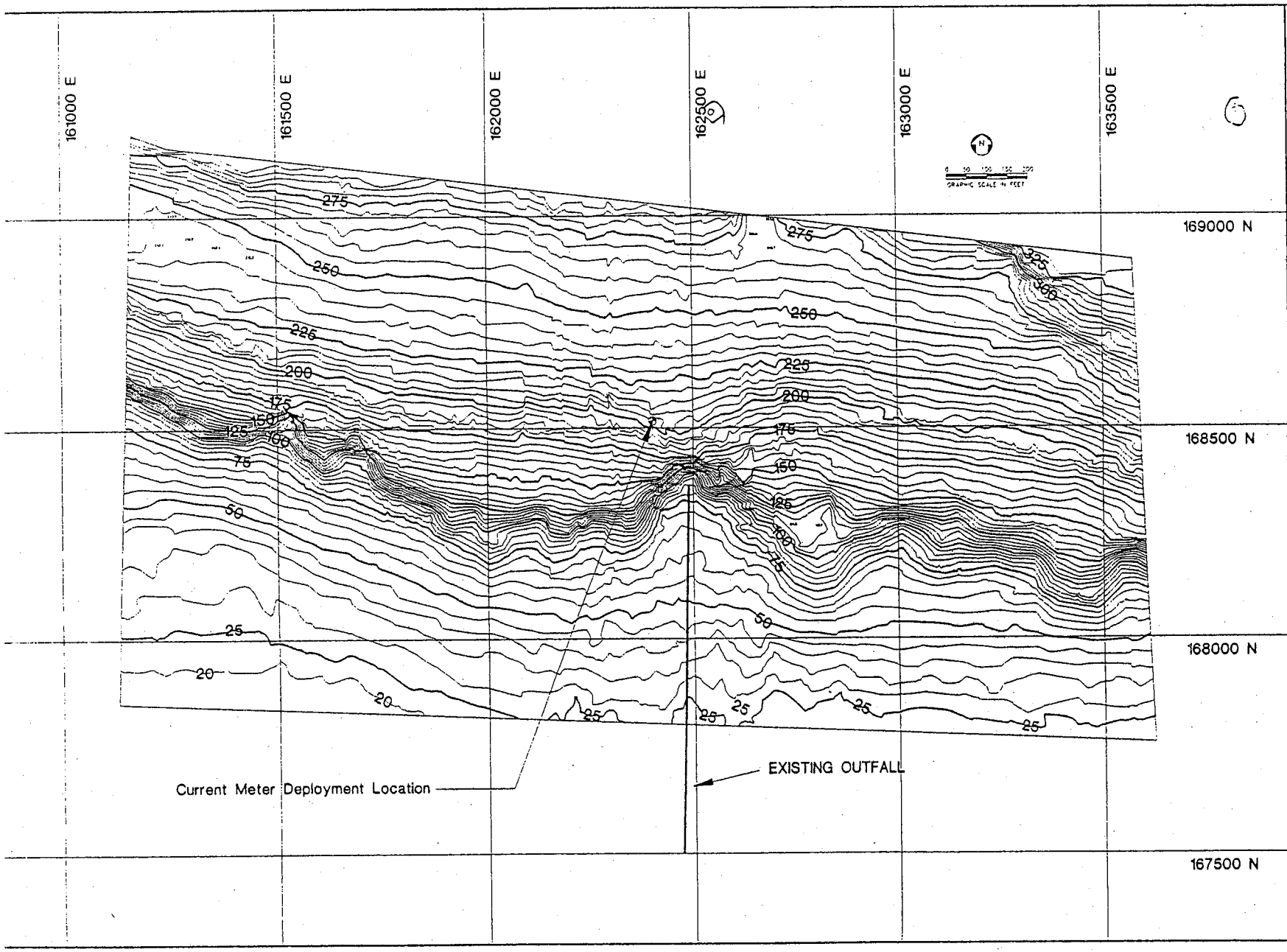
| MONTH | DAY | YEAR | DEPTH (meters) | DENSITY gm/cm^3 | TEMP (C) | SAL 0/00 | | Long. |
|---|---|---|---|---|---|---|---|---|
| 11 | 9 | 98 | 55.11 | 1.02401 | 28.70 | 37.45 | 13 33 16.16N | 144 48 20.25E |
| 11 | 9 | 98 | 60.10 | 1.02403 | 28.65 | 37.46 | 13 33 16.16N | 144 48 20.25E |
| 11 | 9 | 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 |

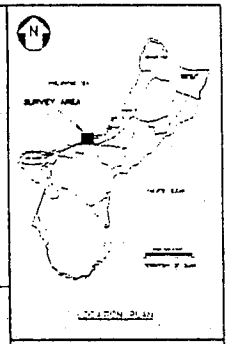
| MONTH | DAY | YEAR | DEPTH (meters) | DENSITY gm/cm^3 | TEMP (C) | SAL 0/00 | Lat. | Long. |
|---|---|---|---|---|---|---|---|---|
| 11 | 10 | 98 | 35.06 | 1.02389 | 29.03 | 37.44 | 13 33 7.57N | 144 48 16.14E |
| 11 | 10 | 98 | 40.17 | 1.02390 | 28.99 | 37.44 | 13 33 7.57N | 144 48 16.14E |
| 11 | 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 OJAM 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-13 DGPS
5. CONTOUR INTERVAL 5 FEET

# AGANA DISTRICT BATHYMETRY SURVEY

EDWARD K. NODA & ASSOCIATES, INC.
615 Piikoi Street #300
Honolulu, Hawaii 96814

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

33 METERS DEPTH

| DIRECTION DEGREES TRUE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 CM/SEC | 0 \| 5 | 5 \| 10 | 10 \| 15 | 15 \| 20 | 20 \| 25 | 25 \| 30 | 30 \| 35 | 35 \| 40 | 40 \| 45 | 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 CM/SEC | 50 \| 55 | 55 \| 60 | 60 \| 65 | 65 \| 70 | 70 \| 75 | 75 \| 80 | 80 \| 85 | 85 \| 90 | 90 \| 95 | 95 \| 100 | >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

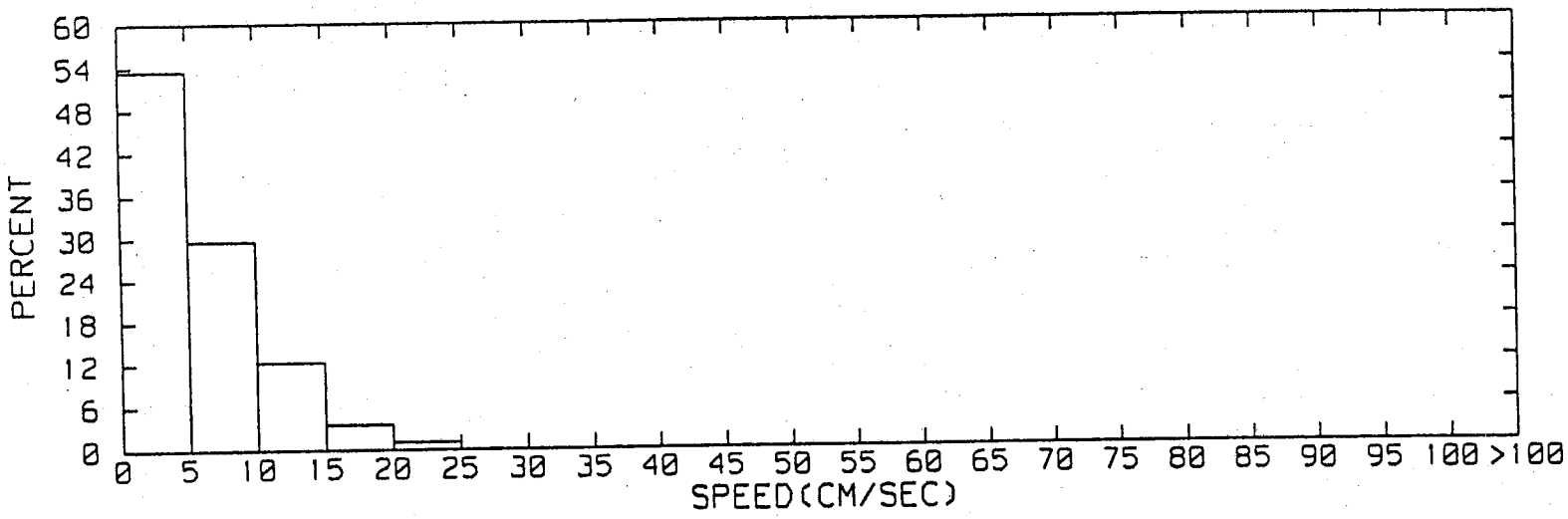
MEAN SPEED = 5.90 CM/SEC

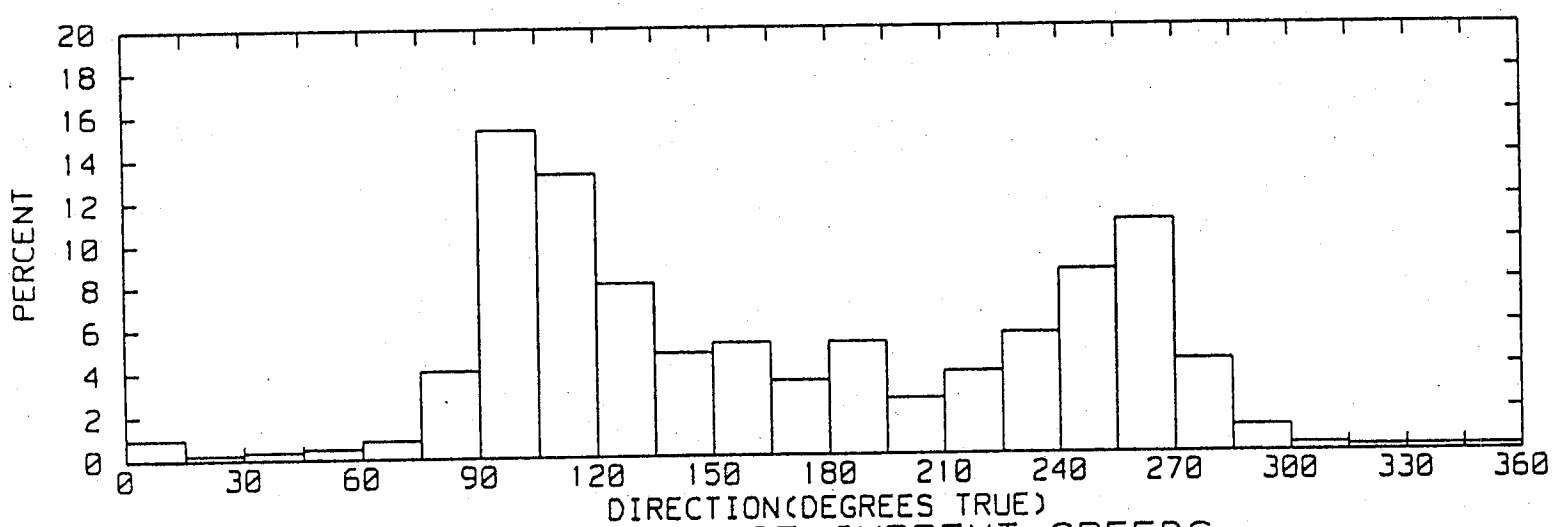
STANDARD DEVIATION = 4.36 CM/SEC

MAXIMUM SPEED = 24.20 CM/SEC

MINIMUM SPEED = 0.00 CM/SEC

RANGE = 24.20 CM/SEC

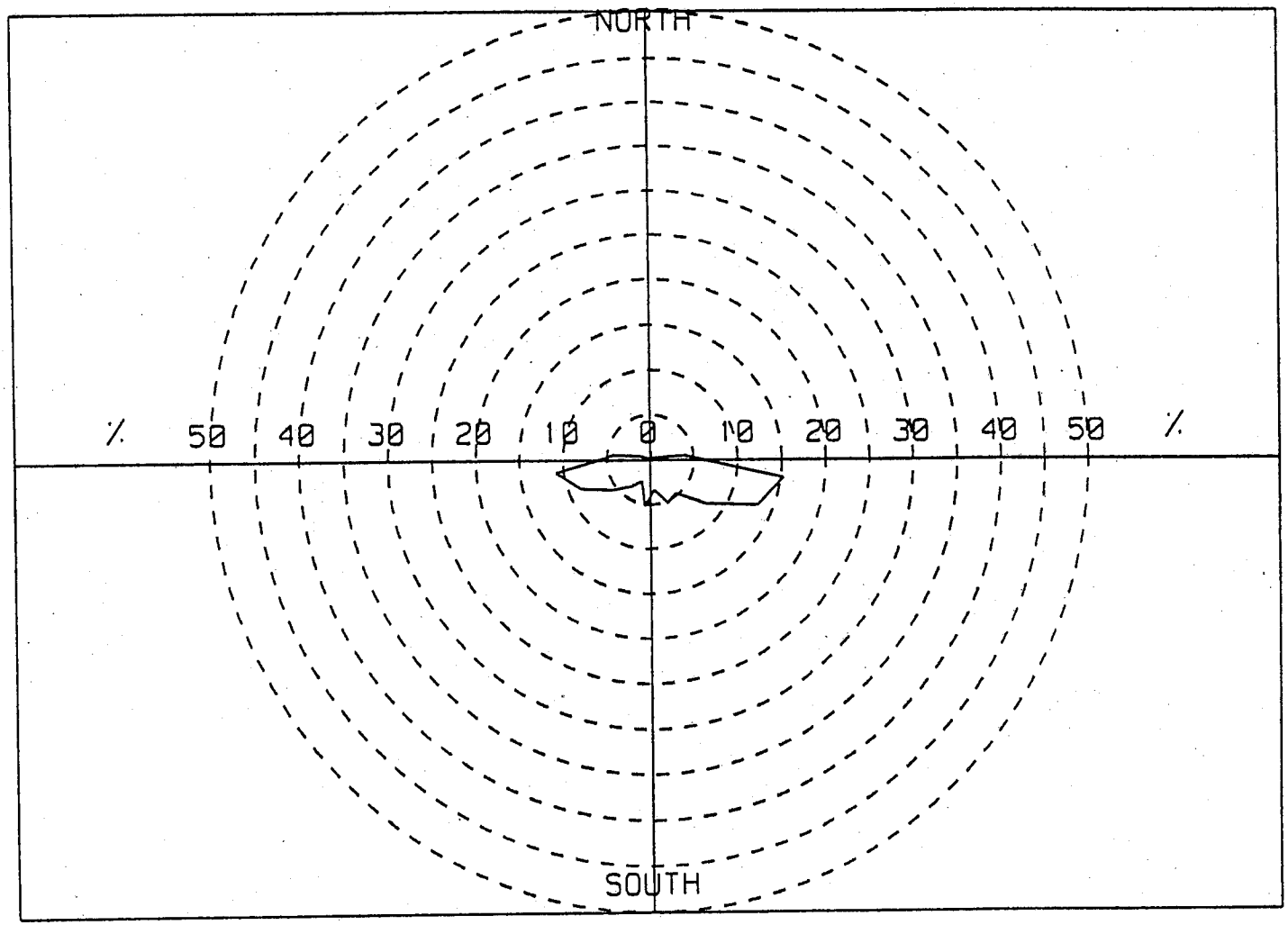



HISTOGRAMS OF CURRENT SPEEDS

(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)

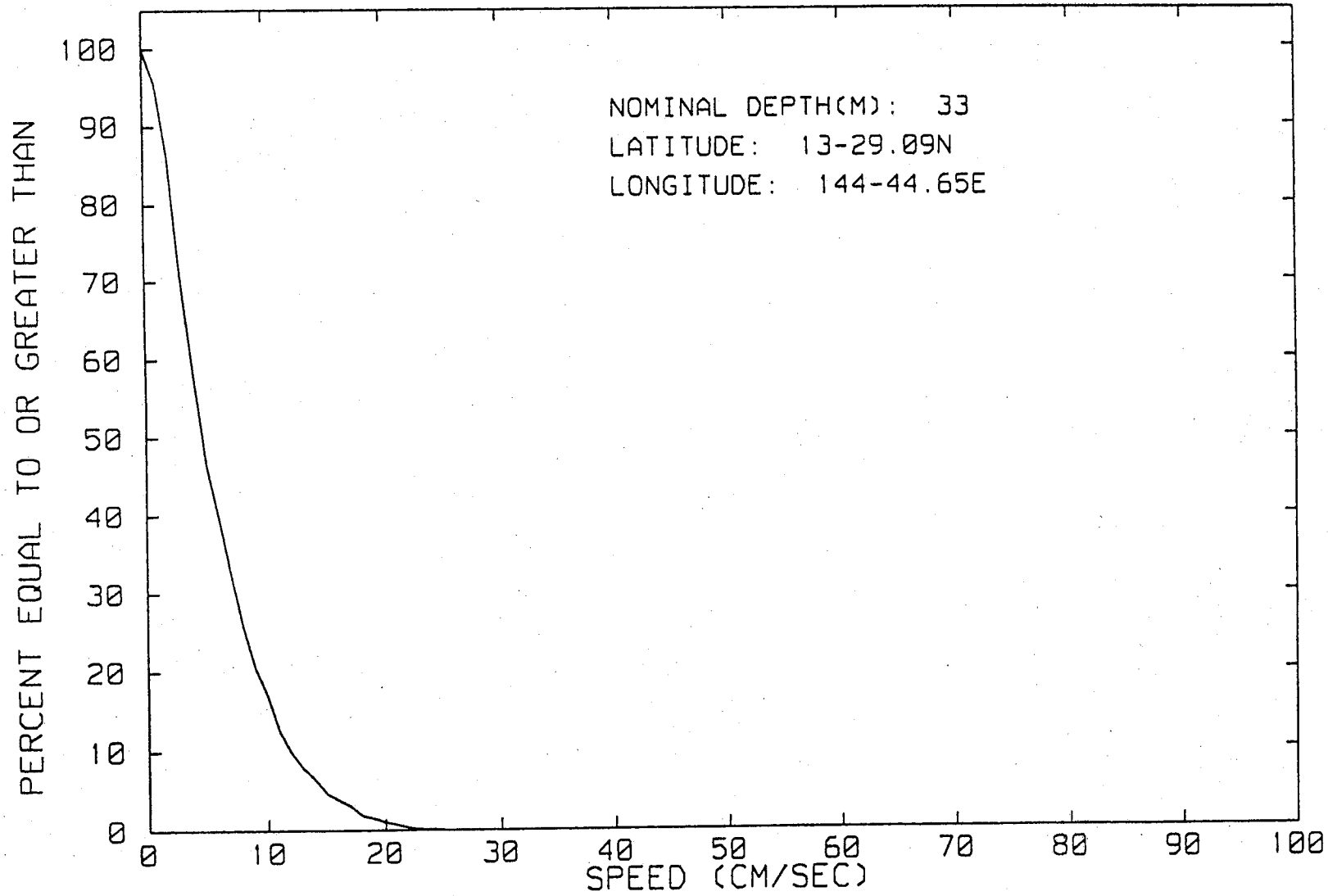
(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998

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 |

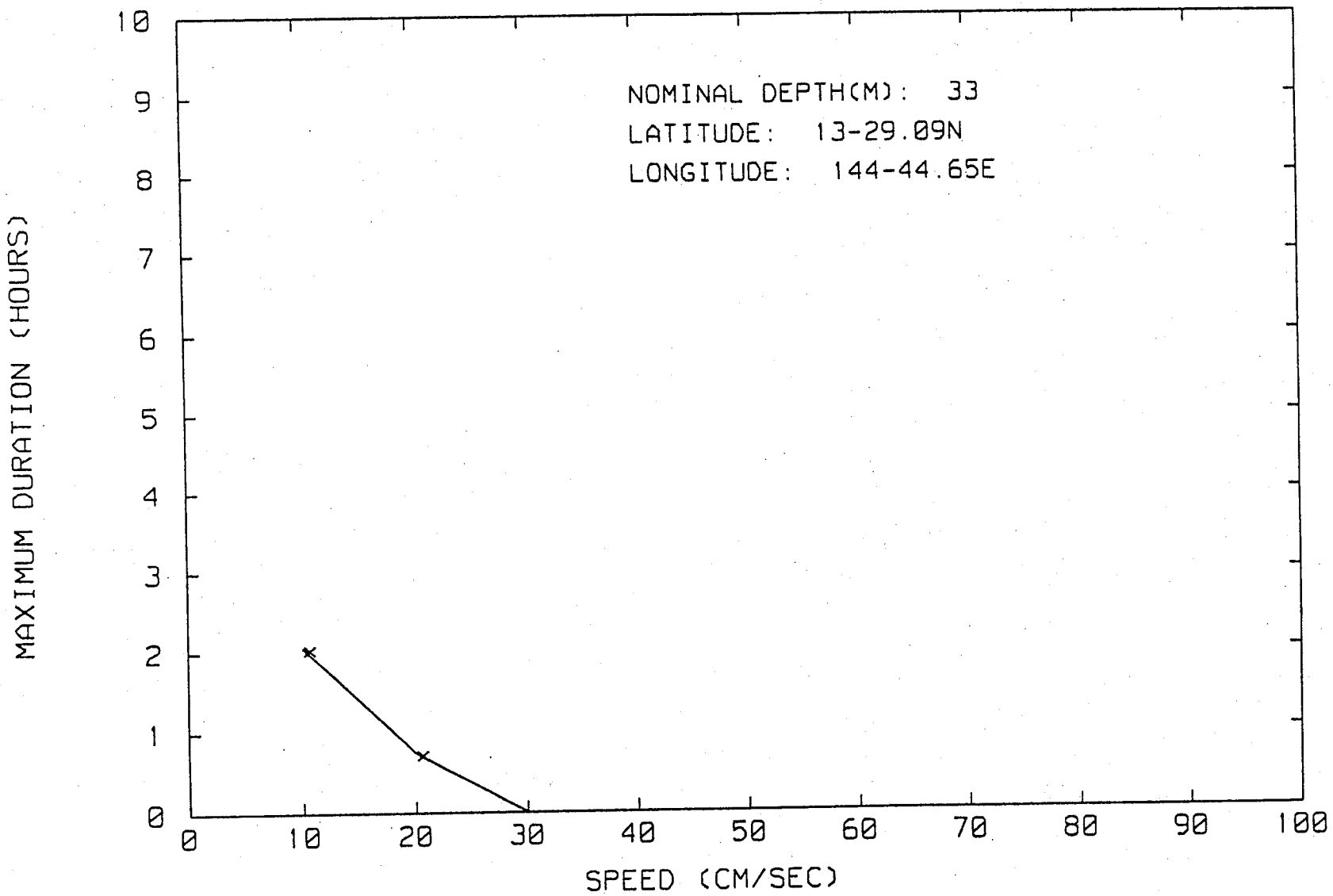



CUMULATIVE OCCURENCE OF CURRENT SPEEDS
(GST) 1545 NOV 7 1998 TO 1215 NOV 13 1998

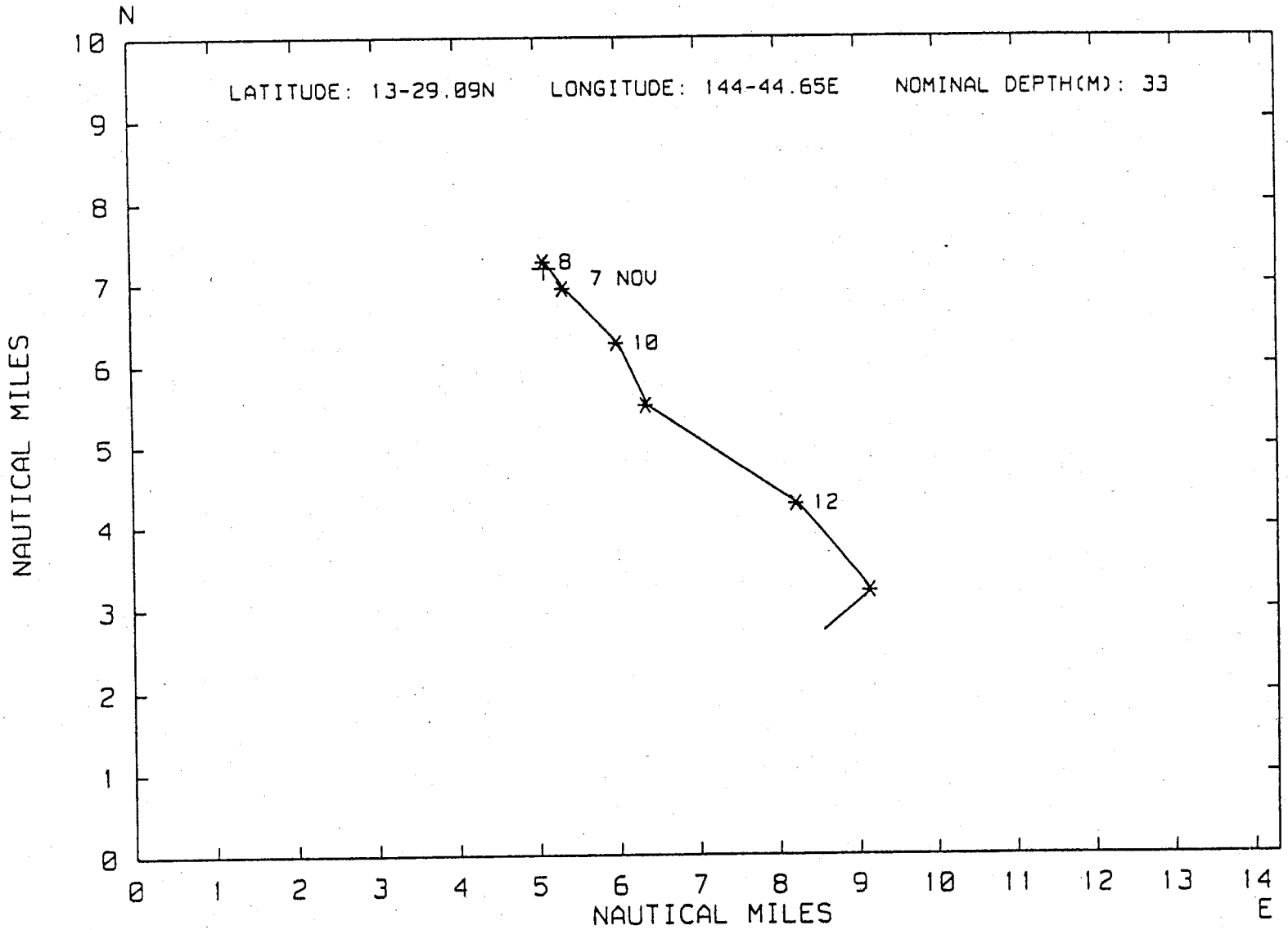
LATITUDE: 13-29.09N
LONGITUDE: 144-44.65E
NOMINAL DEPTH(METERS): 33
TIME SPAN(GST): 1545 NOV 7 1998 TO 1215 NOV 13 1998

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

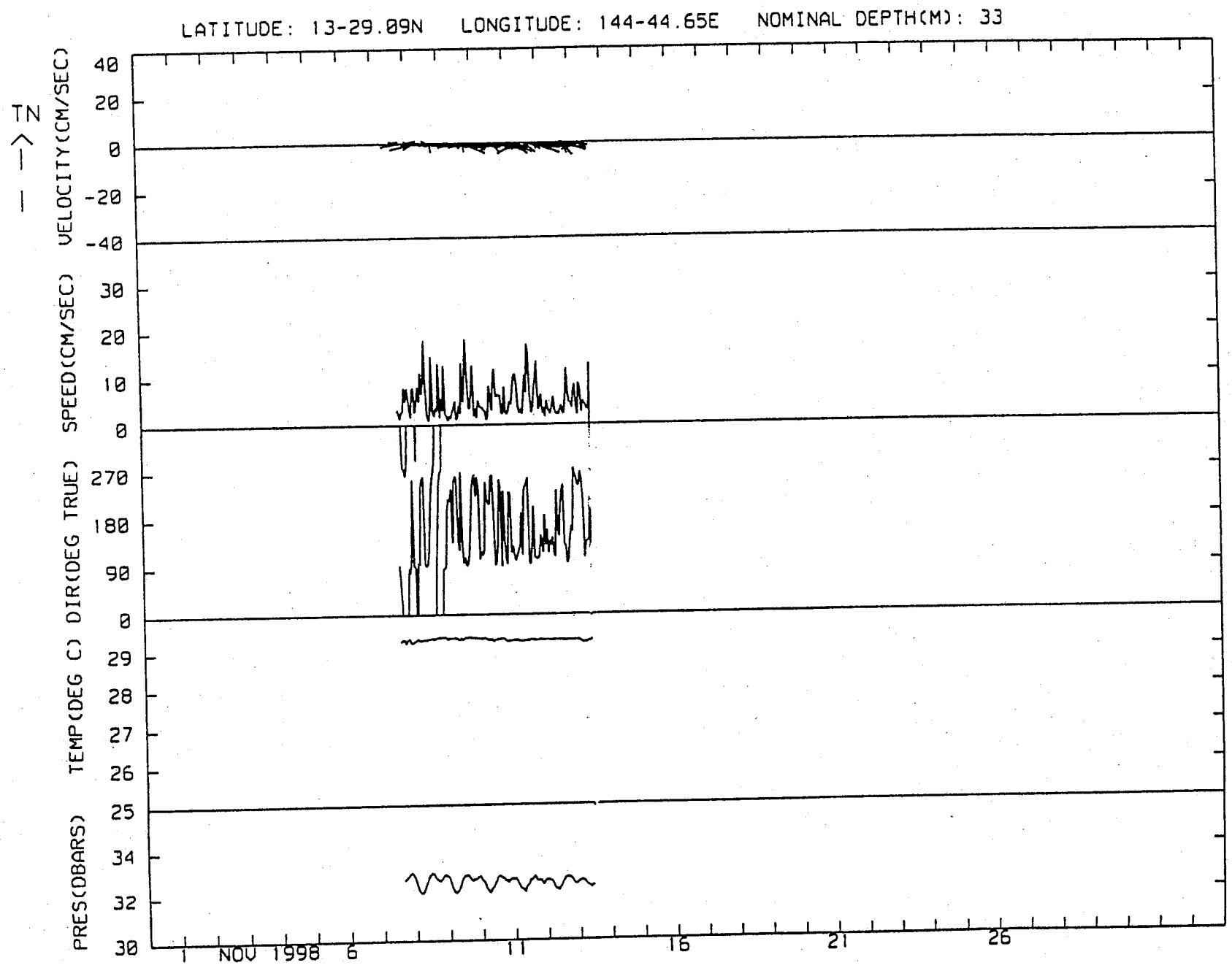
Latitude: 13-29.09N Longitude: 144-44.65E
Meter Depth(m): 33.0 Bottom Depth(m): 61.0

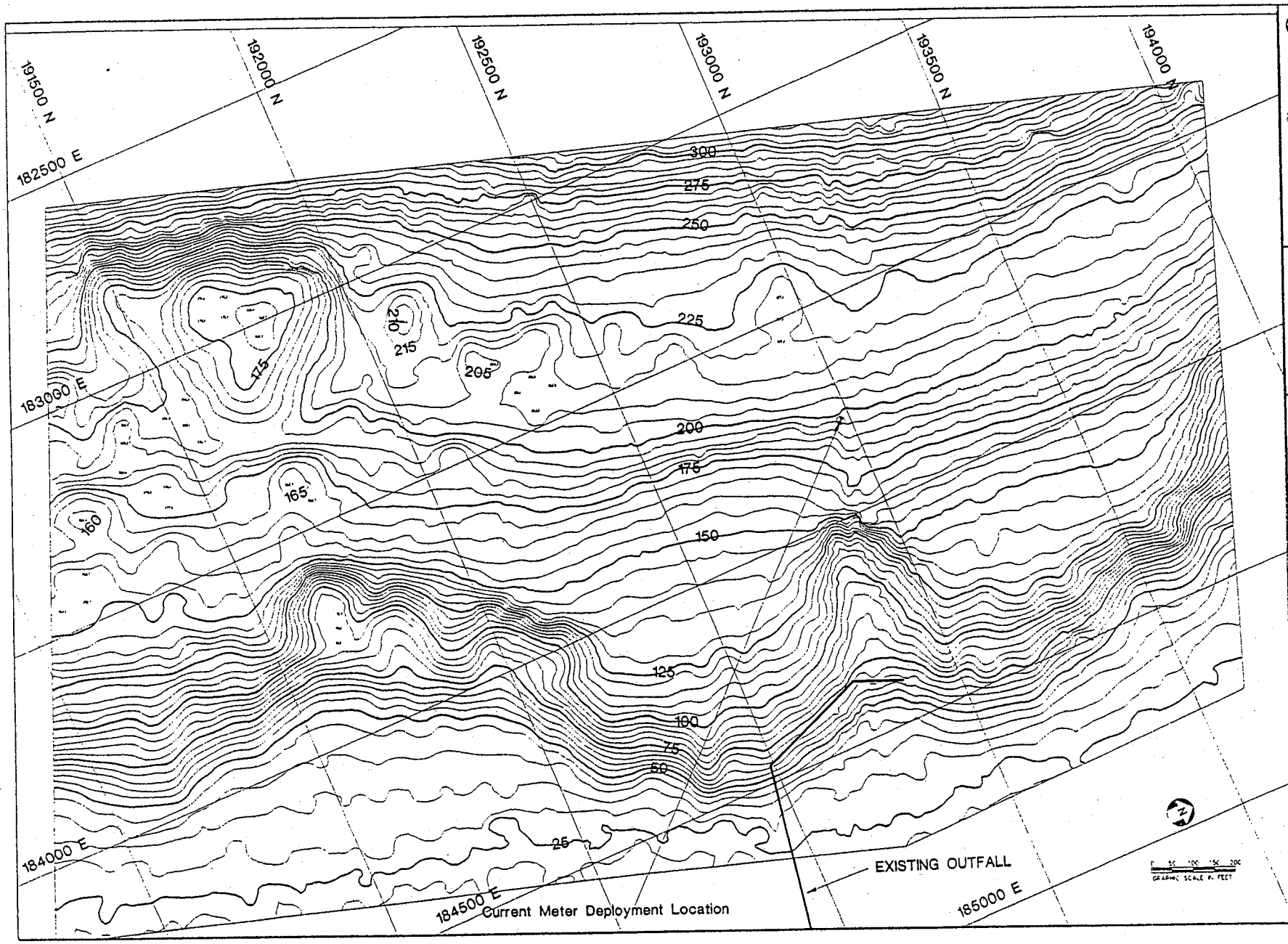
Period: NOVEMBER 1998

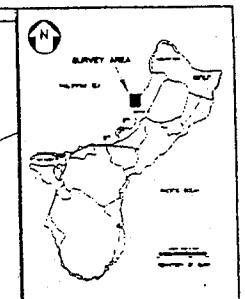
Mean Speed(cm/sec): 5.90
Maximum Speed(cm/sec): 24.20
Standard Deviation: 4.36
Average North Vector Component(cm/sec): -1.63
Average East Vector Component(cm/sec): 1.25
Resultant Magnitude(cm/sec): 2.05
Resultant Direction(°T): 143

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
TN
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




LOCATION PLAN

## 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 KNUDSEN 320B/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.
615 Piikoi Street, #300
Honolulu, Hawaii 96814

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

27 METERS DEPTH

| DIRECTION DEGREES TRUE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 CM/SEC | 0 \| 5 | 5 \| 10 | 10 \| 15 | 15 \| 20 | 20 \| 25 | 25 \| 30 | 30 \| 35 | 35 \| 40 | 40 \| 45 | 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 CM/SEC | 50 \| 55 | 55 \| 60 | 60 \| 65 | 65 \| 70 | 70 \| 75 | 75 \| 80 | 80 \| 85 | 85 \| 90 | 90 \| 95 | 95 \| 100 | >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

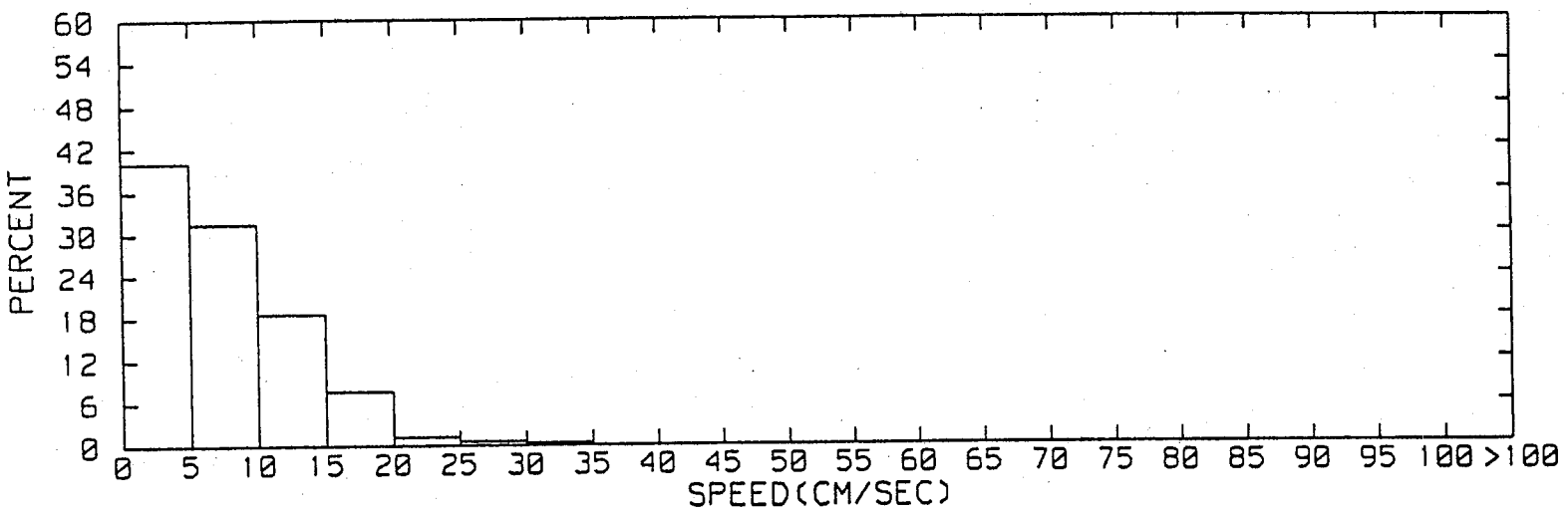
MEAN SPEED = 7.50 CM/SEC

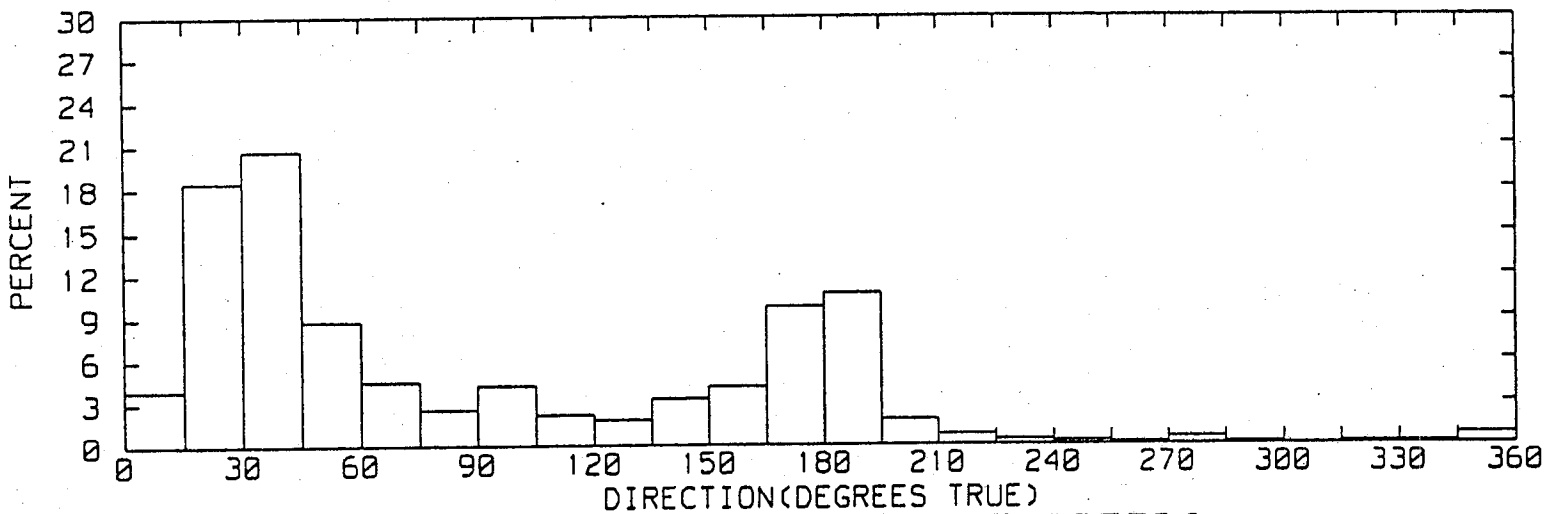
STANDARD DEVIATION = 5.38 CM/SEC

MAXIMUM SPEED = 32.90 CM/SEC

MINIMUM SPEED = 0.00 CM/SEC

RANGE = 32.90 CM/SEC

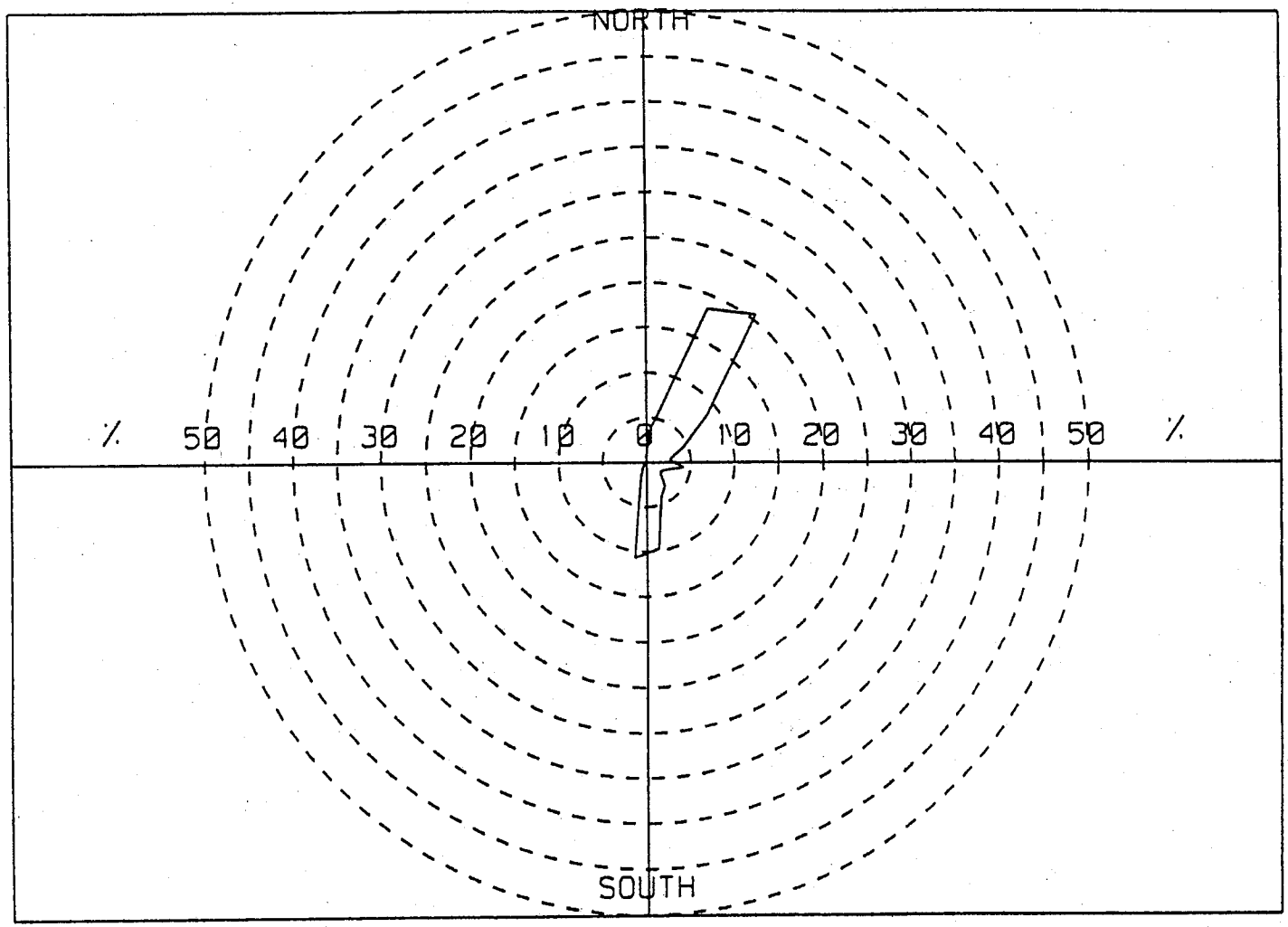



HISTOGRAMS OF CURRENT SPEEDS

(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)

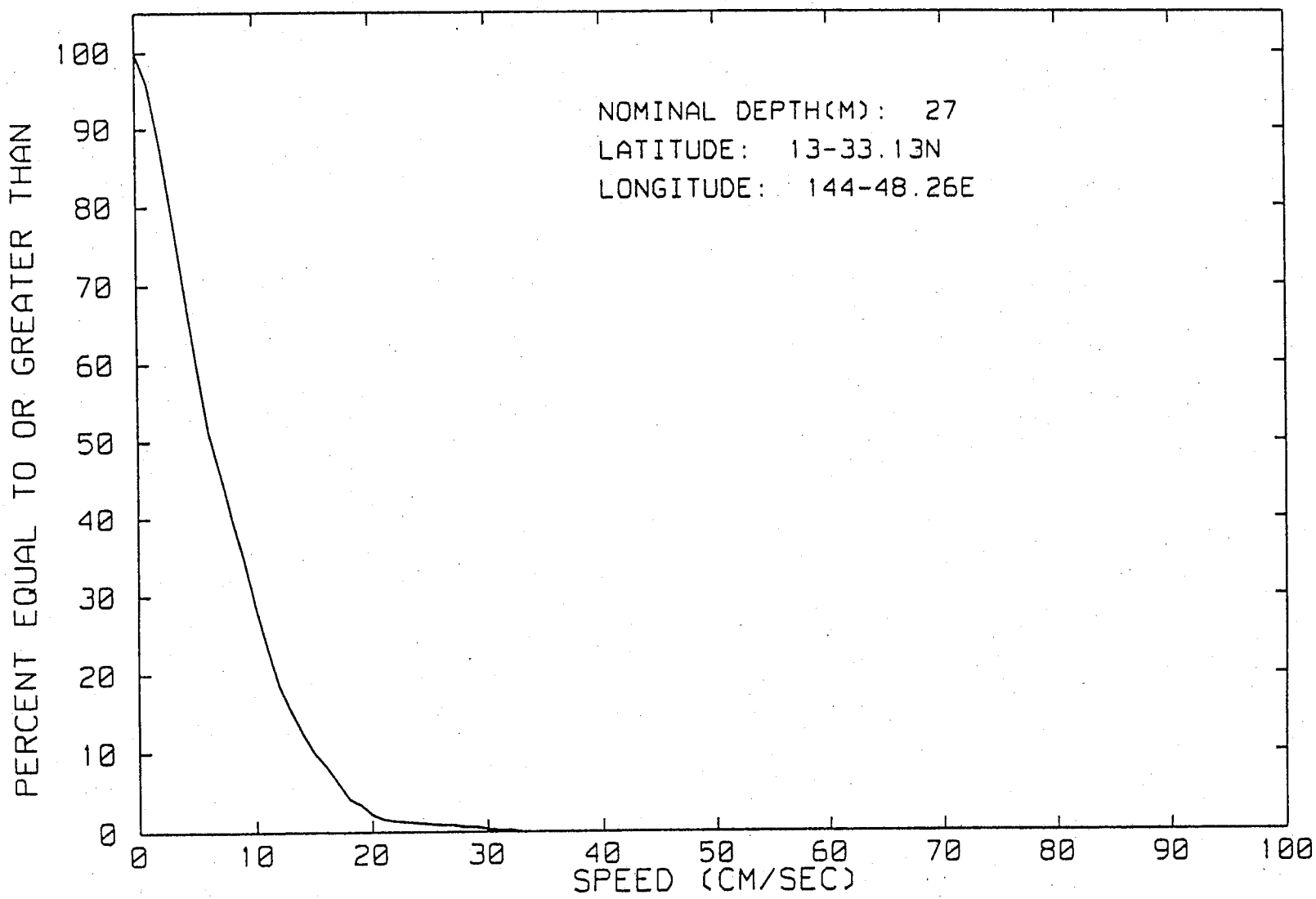
(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998

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 |

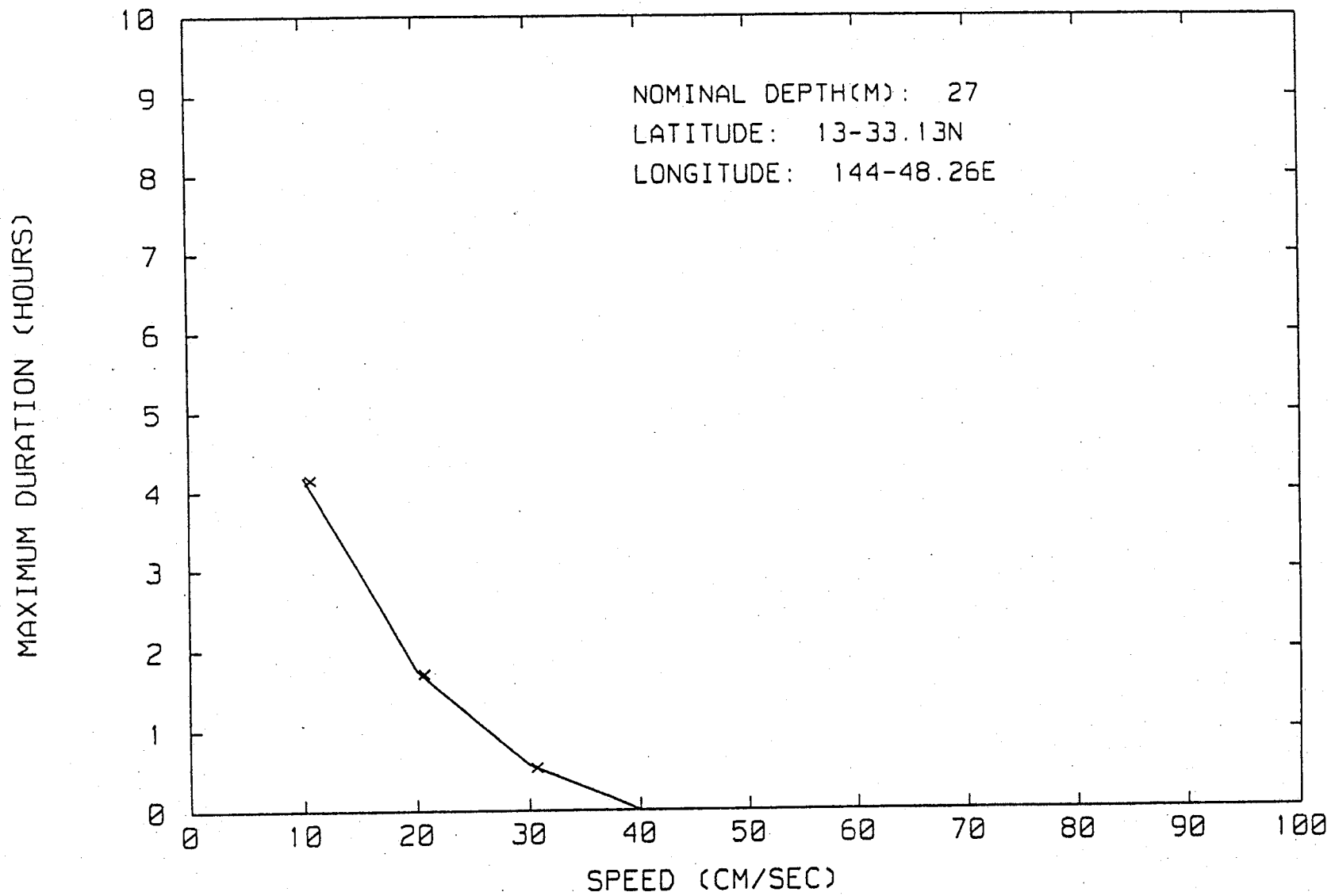



CUMULATIVE OCCURENCE OF CURRENT SPEEDS
(GST) 1715 NOV 7 1998 TO 0935 NOV 13 1998

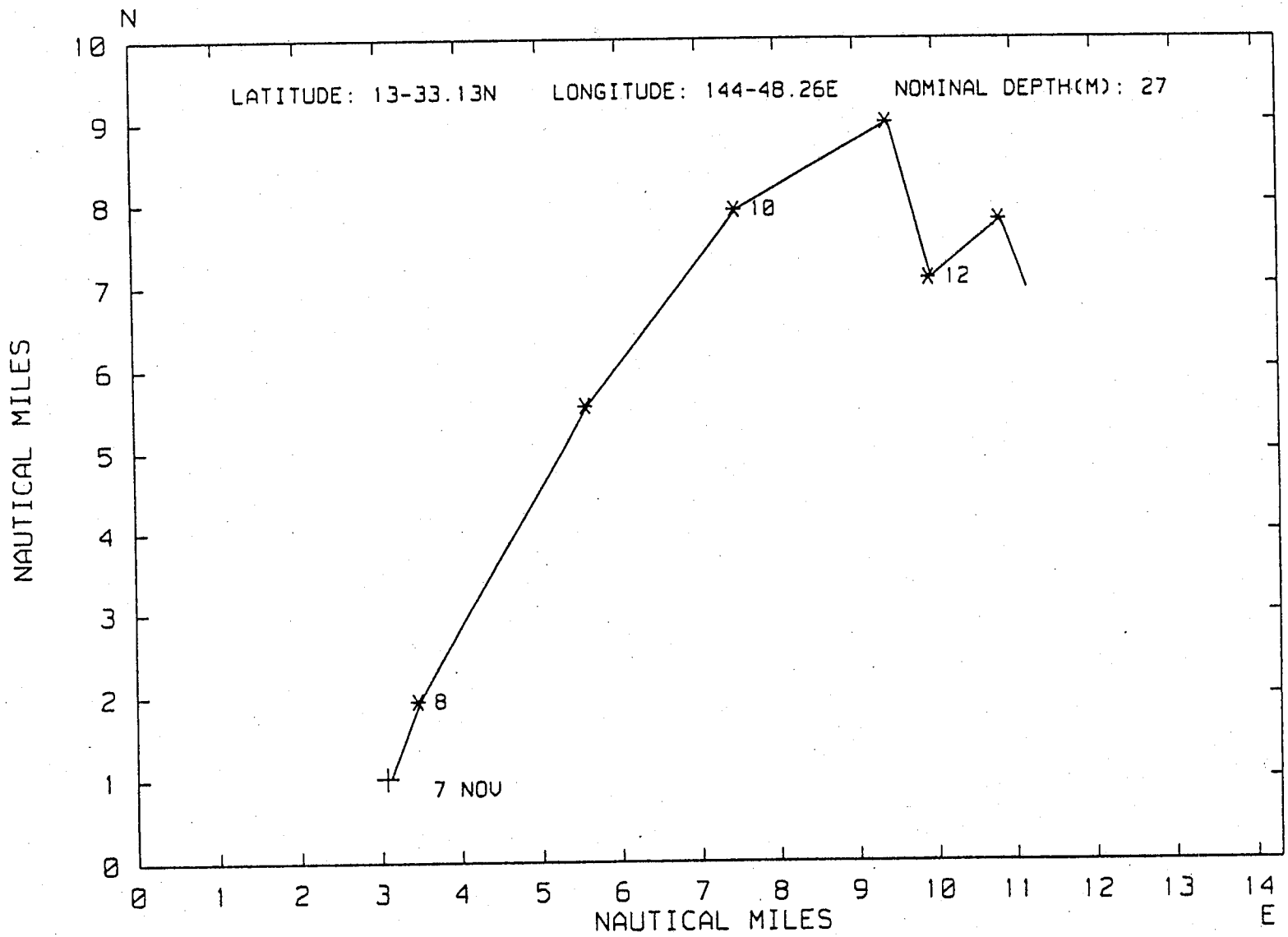
LATITUDE: 13-33.13N
LONGITUDE: 144-48.26E
NOMINAL DEPTH(METERS): 27
TIME SPAN(GST): 1715 NOV 7 1998 TO 0935 NOV 13 1998

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

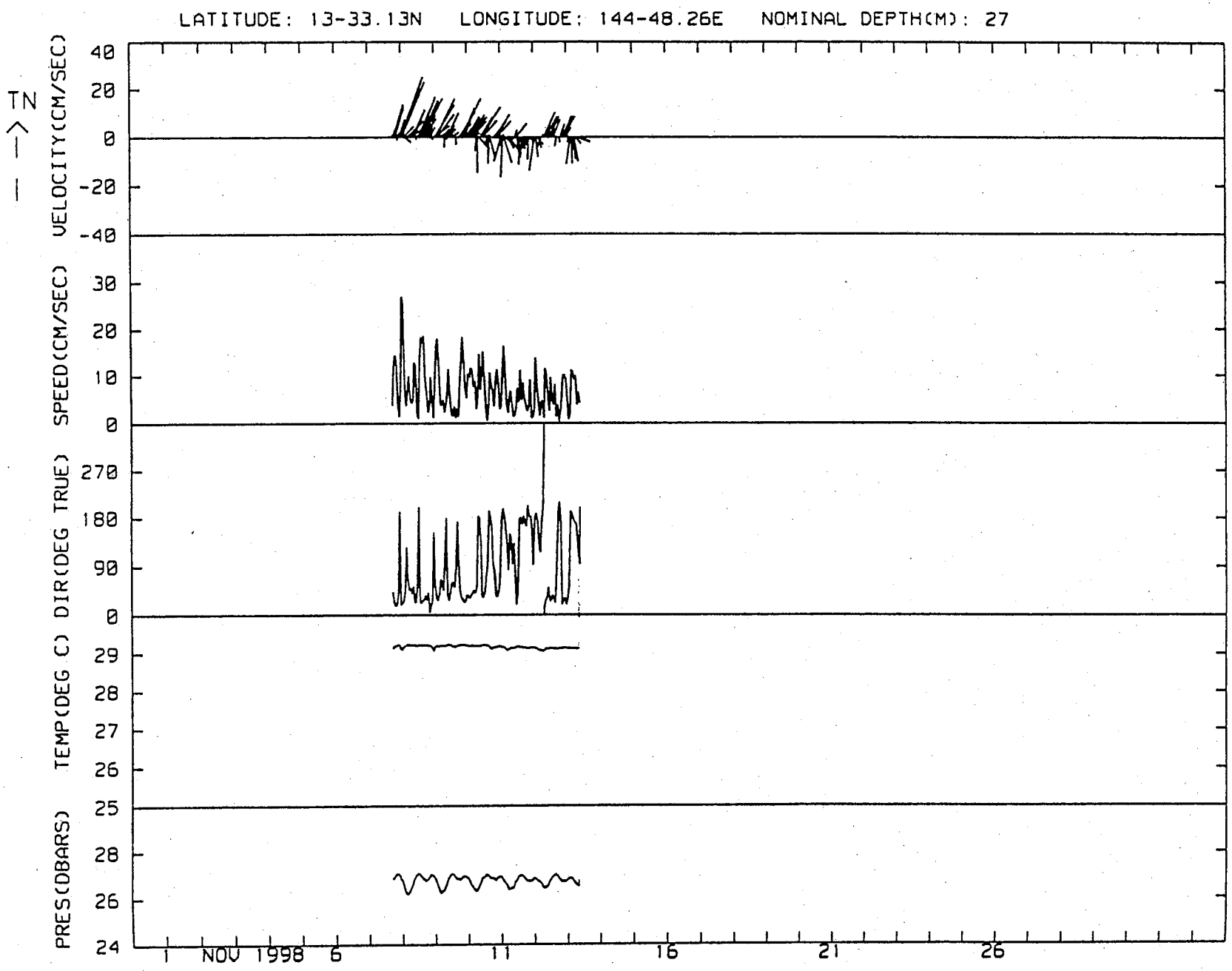
Latitude: 13-33.13N Longitude: 144-48.26E
Meter Depth(m): 27.0 Bottom Depth(m): 58.0

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

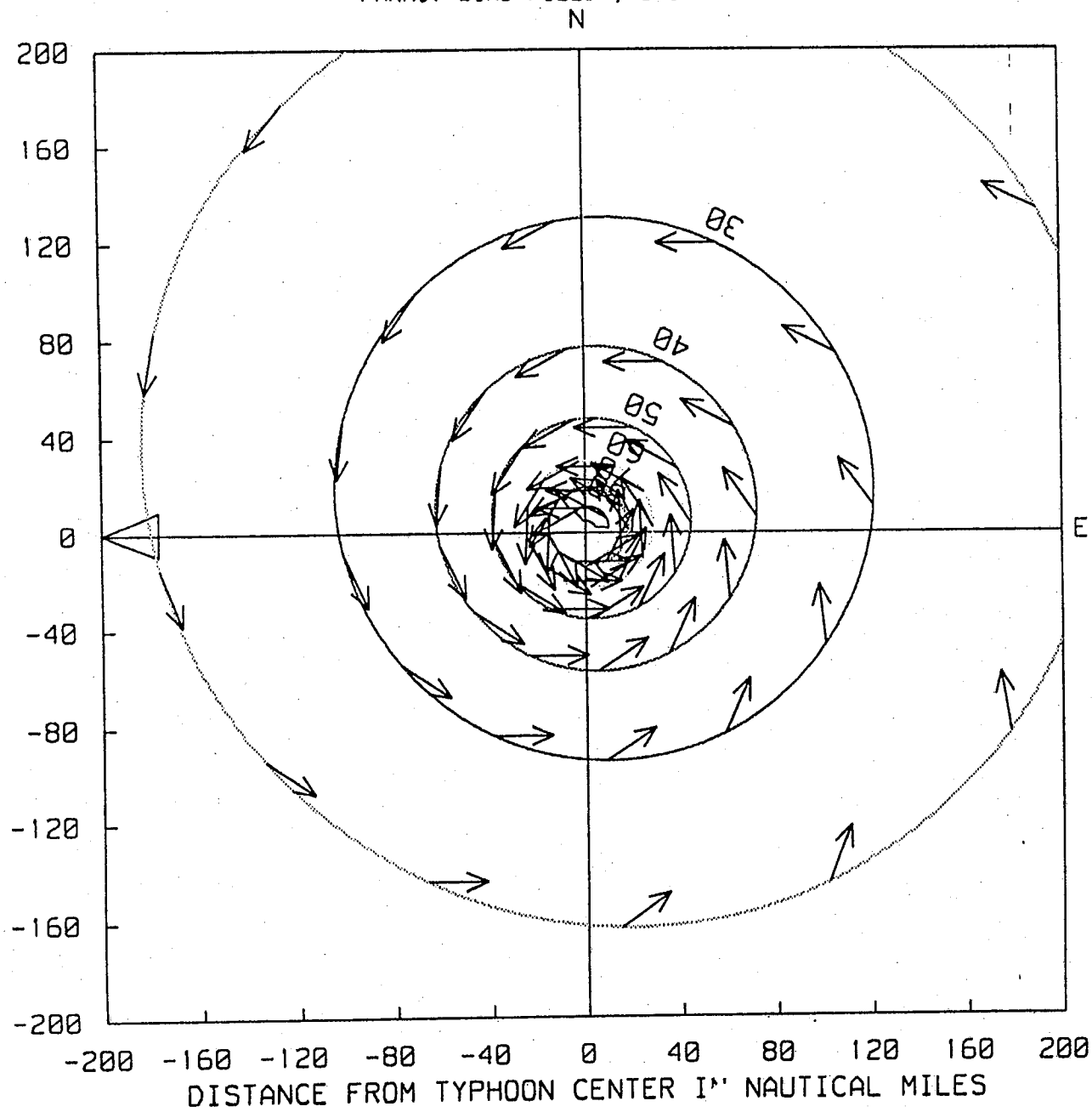
| Day | Maximum Speed | Minimum Temperature | Maximum Temperature |
|---|---|---|---|
| 7 | 16.90 | 29.0 | 29.2 |
| 8 | 32.90 | 29.0 | 29.2 |
| 9 | 22.40 | 29.1 | 29.2 |
| 10 | 17.80 | 29.1 | 29.2 |
| 11 | 21.10 | 29.1 | 29.2 |
| 12 | 19.00 | 29.1 | 29.2 |
| 13 | 15.50 | 29.1 | 29.1 |


LATITUDE: 13-33.13N LONGITUDE: 144-48.26E NOMINAL DEPTH(M): 27
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)
28
26
24
1 NOV 1998 6
11
16
21
26
TN

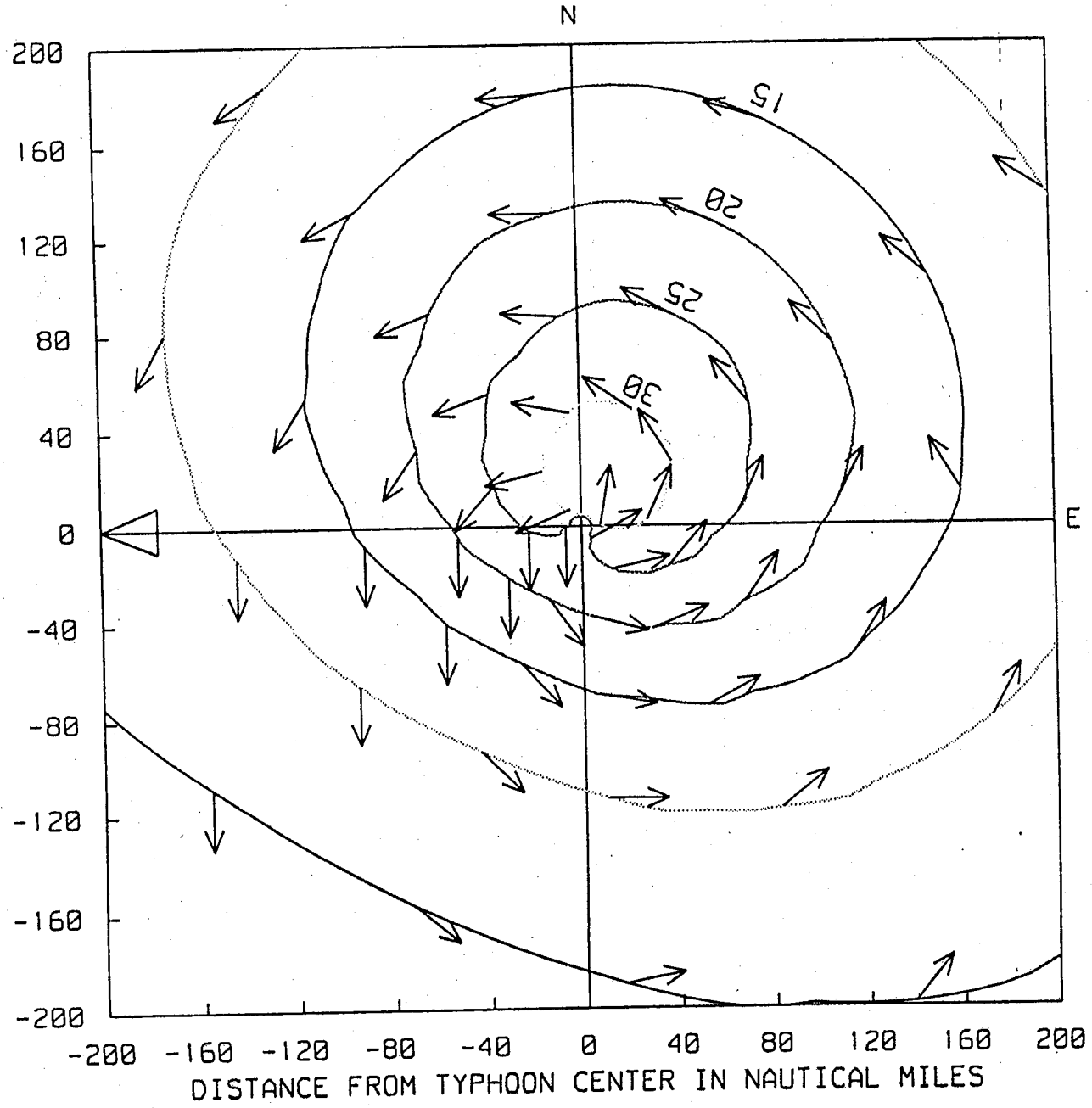
# APPENDIX D:

# WIND AND WAVE ANALYSIS

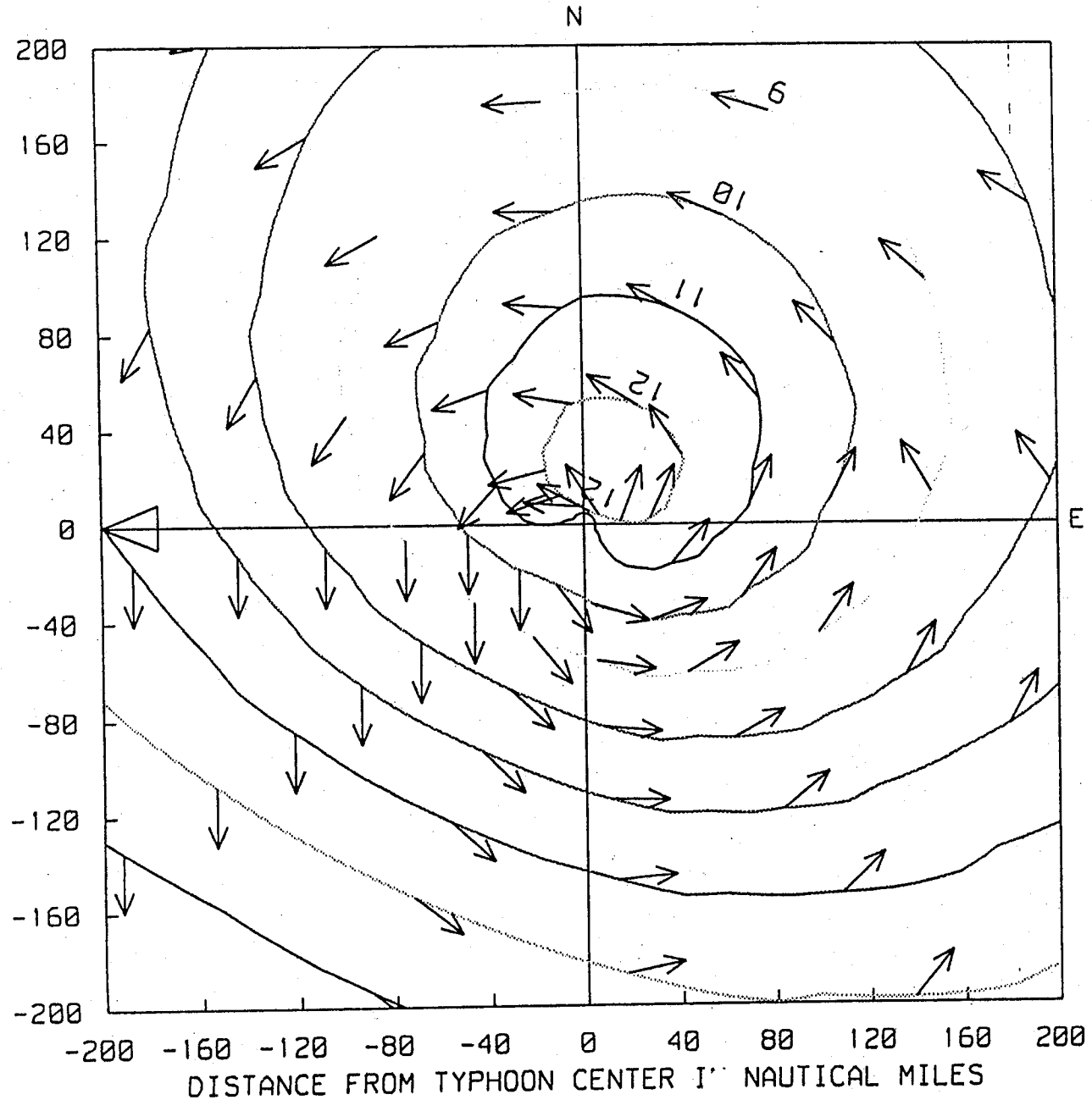
TYPHOON HINDCAST ANALYSIS-AGANA & NORTHERN DISTRICT OUTFALLS GUAM
Lat.=13.7 deg.; Rc=7.17 n.mi.; Po=78 mbs; Vf=9 knts; Dir.=270 deg.
PAKA97 WIND FIELD , Urs (knots)



TYPHOON HINDCAST ANALYSIS-AGANA & NORTHERN DISTRICT OUTFALLS GUAM
Lat.=13.7 deg.; Rc=7.17 n.mi.; Po=78 mbs; Vf=9 knts; Dir.=270 deg.
PAKA97 WAVE FIELD , Hs (feet)

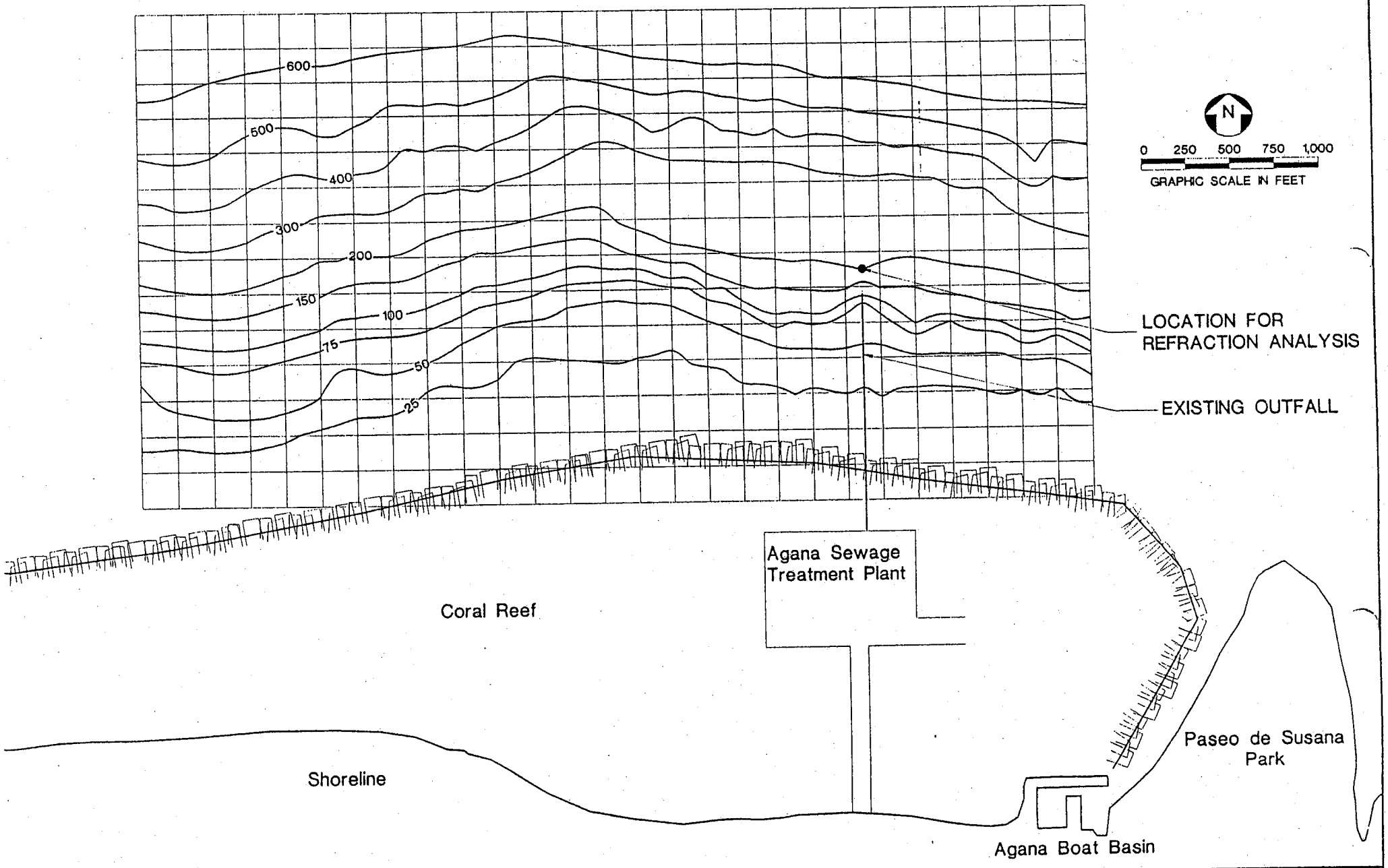


TYPHOON HINDCAST ANALYSIS-AGANA & NORTHERN DISTRICT OUTFALLS GUAM
Lat.=13.7 deg.; Rc=7.17 n.mi.; Po=78 mbs; Vf=9 knts; Dir.=270 deg.
PAKA97 PERIOD FIELD , Ts (sec.)



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

| r N.M. | A0 DEG | Urs KNOTS | Bu DEG | Hs FEET | Bh DEG | Ts SEC. | Tf0 SEC. | Tm 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 |

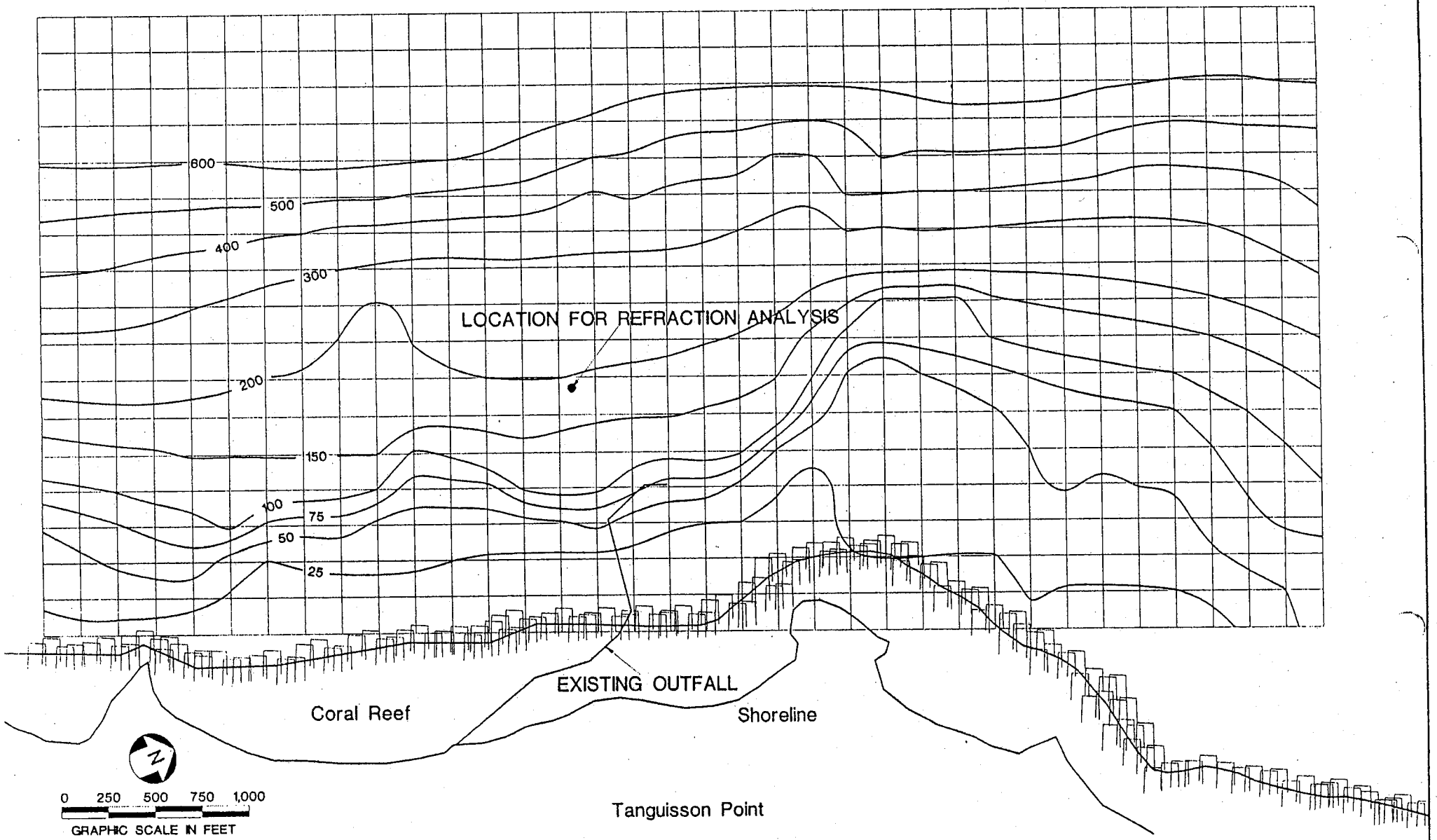



Edward K. Noda
and Associates, Inc.

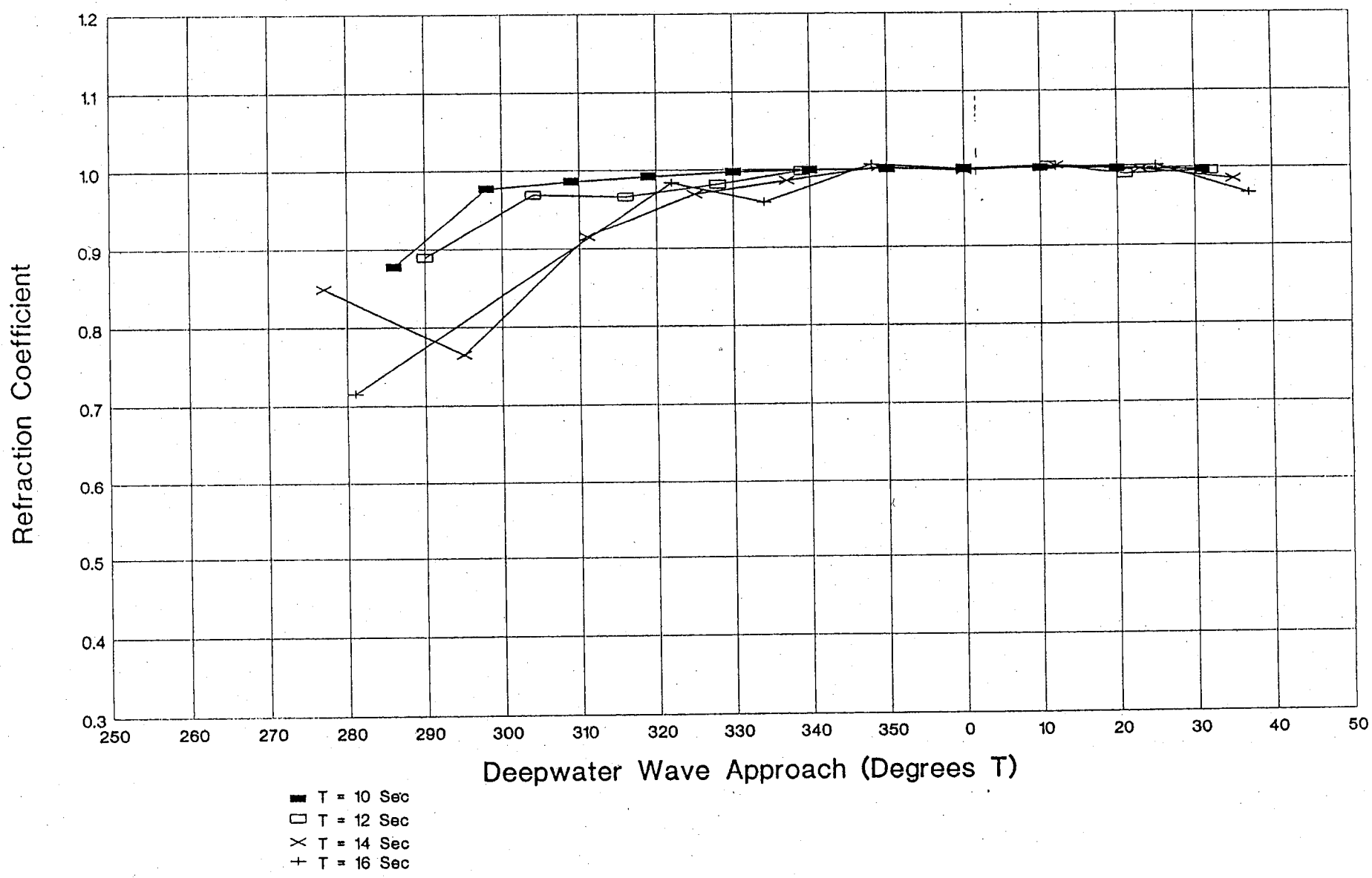
Agana Sewage Treatment
Plant Outfall Extension

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 |

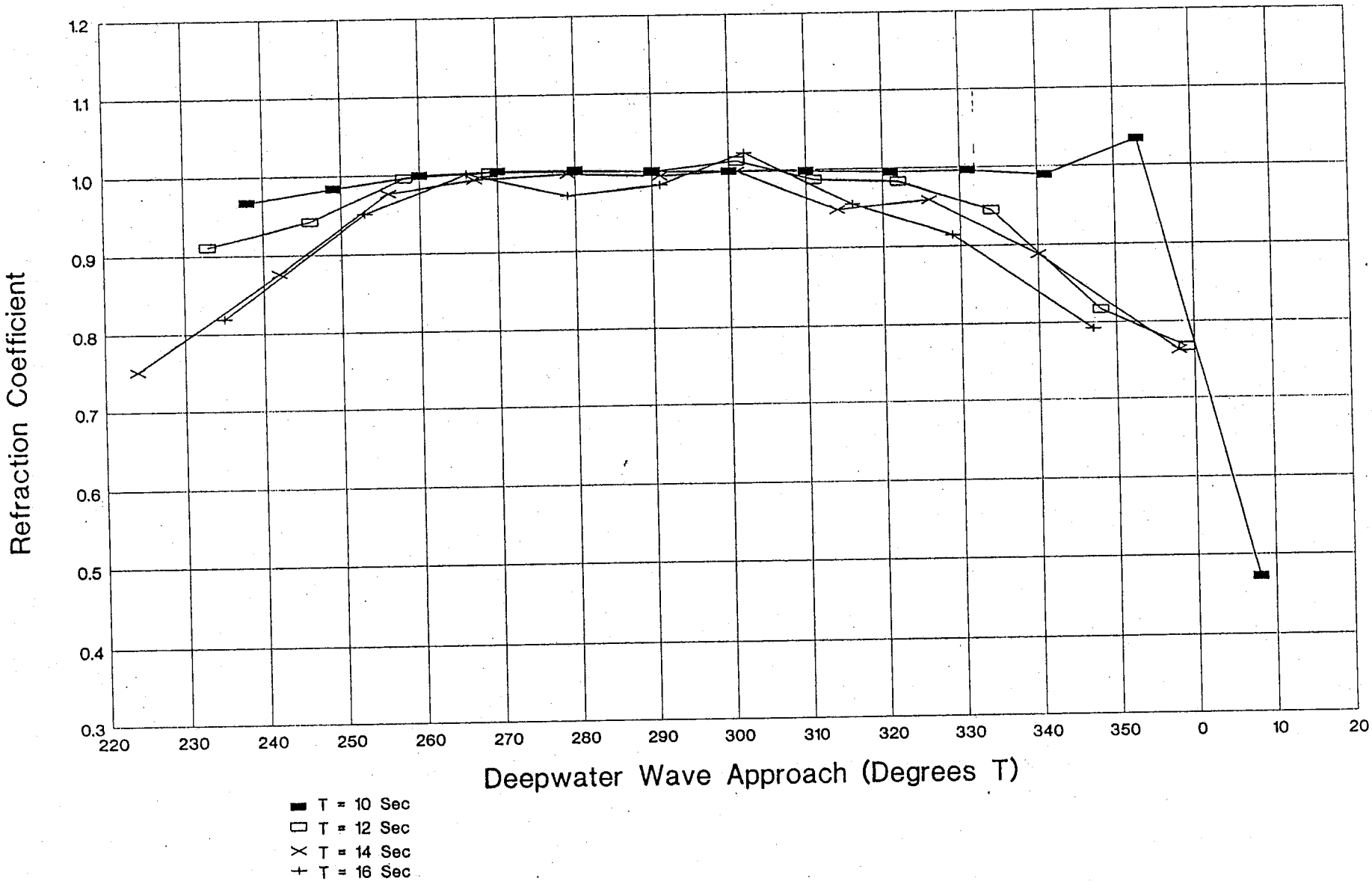



Edward K. Noda & Associates, Inc.

Agana Sewage Treatment Plant Outfall Extension

Wave Refraction Coefficients

FIGURE

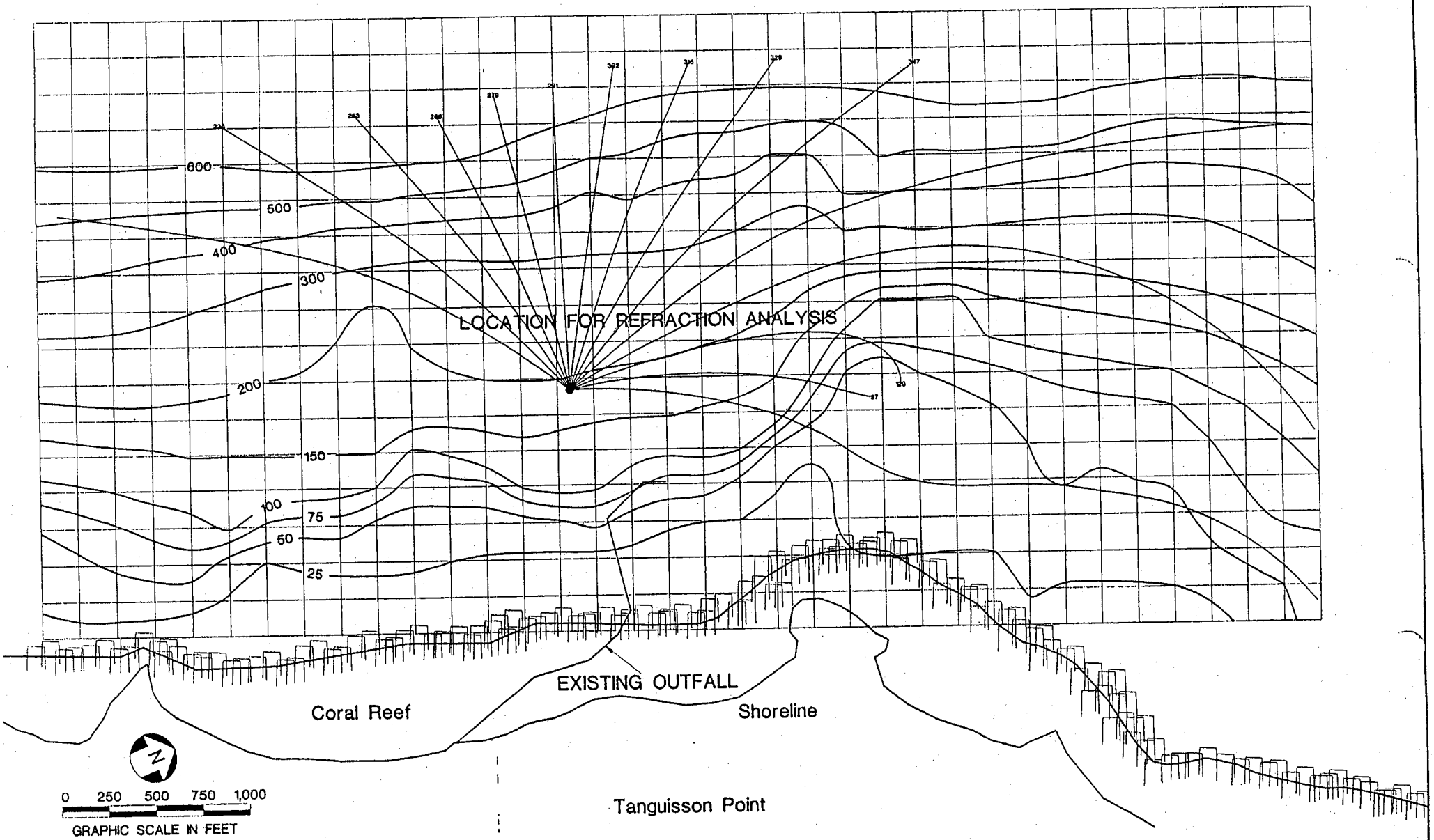



Edward K. Noda and Associates, Inc.

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=655.4B(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

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

# 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 <u>all</u> no, complete Part 1 only (see instructions). If the answer to <u>any</u> of the above questions is yes, complete Part 2 rather than Part 1.

Send the completed application form to:

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| 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.**

   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: _____

OMITTED

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: _____

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|---|---|---|---|

**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:

_____

_____

_____

_____

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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: _____

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## 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).**

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# 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 M07 | 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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**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 | | | | |
| | | | | |
| | | | | |

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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.

**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: _____

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.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)

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**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: _____

OMITTED

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.

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FACILITY NAME: AGANA STP

PERMIT NUMBER: GU0020087

EPA ID NUMBER: (for official use only)

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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: |
|---|---|
| | |
| | |
| | |

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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: _____

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: |
|---|---|
| | |
| | |
| | |

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**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?

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**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: _____

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**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.** omitted

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.

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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.

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|---|---|---|---|
| AGANA STP | GU0020087 | | |

## 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.

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Signature of Officer: _____

Name of Officer: _____
(typed or printed)

Official Title of Officer: _____

Telephone Number: _____

Date Signed: _____

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H 11/U-

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

CARMEN

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

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- Semivolatile GC/MS
- Metals

Laboratory QC Reports
- Volatile GC/MS
- Semivolatile GC/MS
- Metals

# 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: Miscel. Proj.
Received by: RMARTIN 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 ..... RM 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 Pest. & Herb to WSAC
2/12/99

LEAVE NO BLANK SPACES : USE N/A

| Fraction | -1 | | | | | | | | | pH |
|---|---|---|---|---|---|---|---|---|---|---|
| VOAh /* | | | | | | | | | | N/A |
| 125CGS | 8 | | | | | | | | | N/A |
| | | | | | | | | | | |
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h:HCl s:H2SO4 na:Sodium Hydroxide znna: Sodium Hydroxide + Zinc Acetate n:HNO3 n/f:HNO3 field filtered
n/f/l:HNO3 Lab filtered
* Number VOA's w/ air bubbles present

LOGGED BY/DATE: RM 2/12/99 REVIEWED BY/DATE: [signature] 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

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# 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

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# 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

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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 Reports

# 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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# 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 | | |

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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 | | % Rec. | | Control Limits | RPD | Qualifier | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MS | MSD | MS | MSD | | | MS | 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

MONTGOMERY WATSON LABS.
SUBMITTED ON
MAR 30 1999

HDS Hillary Strayer

RECEIVED
5 APRIL 99

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 |

MAR 2 2 RECD

99-0169
PUAG
51801

Quanterra

*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's Quality Assurance Program

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Sample(s): 1
- Sample Data Sheets
- Method Blank Reports
- Laboratory QC Reports

TCLP Herbicides - Method 8150
Sample(s): 1
- Sample Data Sheets
- Method Blank Reports
- Laboratory QC Reports

Quanterra

# 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.

Quanterra

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 |

Quanterra

# 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.
Rev 230787

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

Quanterra

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 | Measured DCS1 | Measured DCS2 | Accuracy (%) DCS1 | Accuracy (%) DCS2 | Limits | Precision (RPD) DCS | 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 | Measured DCS1 | 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.

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# TCLP Herbicides - Method 8150

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TCLP Herbicides
TCLP Leachate
Method 8150

Client Name: Montgomery Watson Laboratories
Client ID: Method Blank
LAB ID: 304187-0001-MB
Matrix: AQUEOUS
Authorized: 13 FEB 99

Sampled: NA
Prepared: 22 FEB 99

Received: NA
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

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 | 8150-TL | 22 FEB 99-11A | 22 FEB 99-11A |
| 304187-0001-SA | LEACHATE | 8150-TL | 22 FEB 99-11A | 22 FEB 99-11A |

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 | 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.

# MAP

1999 DISCHARGE MONITORING REPORTS

7

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 99 | 4 | 1 | TO | 99 | 4 | 30 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.0 | 9.8 | MGD | | | | mgd | 0 | 30/30 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 8754 | 10629 | lbs/day | 110 | 132 | 178 | mg/l | | 4/30 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 4974 | 5912 | lbs/day | 59 | 75 | 99 | mg/l | 0 | 4/30 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 6824 | 11232 | lbs/day | 62 | 103 | 178 | mg/l | | 19/30 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 2915 | 4193 | lbs/day | 22 | 44 | 60 | mg/l | 0 | 19/30 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.3 | 0.5 | ml/l | 0 | 19/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 240 | 240 | lbs/day | 3.6 | 3.6 | 3.6 | mg/l | | 1/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 6.9 | 7.0 | 7.3 | | 12 | 19/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

NAME/TITLE PRICIPLE EXECUTIVE OFFICER

RICHARD A. QUINTANILLA

GENERAL MANAGER, GWA

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

| TELEPHONE | | DATE | | |
|---|---|---|---|---|
| AREA CODE | NUMBER | YEAR | MO | DAY |
| 671 | 479-7844 | | | |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
pH below 7.0 on 12 of 19 dates sample

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF APRIL 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | 7.60 |
| 2 | | | | | | | 7.58 |
| 3 | | | | | | | 8.07 |
| 4 | 7.51 | 78 | | 3.0 | 4996 | | 7.68 |
| 5 | 7.28 | 174 | | 8.0 | 11232 | | 7.74 |
| 6 | 7.43 | 178 | 178 | 8.0 | 10629 | 10629 | 7.16 |
| 7 | 7.27 | 144 | | 10.0 | 9620 | | 8.01 |
| 8 | 7.22 | 120 | | 13.0 | 8387 | | 8.38 |
| 9 | | | | | | | 7.94 |
| 10 | | | | | | | 8.27 |
| 11 | 7.01 | 104 | | 7.0 | 6748 | | 7.78 |
| 12 | | | | | | | 9.80 |
| 13 | 7.01 | 98 | 110 | 5.0 | 6702 | 7523 | 8.20 |
| 14 | 7.20 | 74 | | 3.0 | 5061 | | 8.20 |
| 15 | 7.11 | 84 | | 3.0 | 5752 | | 8.21 |
| 16 | | | | | | | 8.23 |
| 17 | | | | | | | 7.74 |
| 18 | 7.25 | 82 | | 4.0 | 5286 | | 7.73 |
| 19 | 7.21 | 98 | | 3.0 | 6539 | | 8.00 |
| 20 | 7.10 | 96 | 120 | 7.5 | 6813 | 8517 | 8.51 |
| 21 | 7.25 | 90 | | 1.5 | 5900 | | 7.86 |
| 22 | 7.22 | 90 | | 12.0 | 5554 | | 7.40 |
| 23 | | | | | | | 7.94 |
| 24 | | | | | | | 7.59 |
| 25 | 7.10 | 62 | | 5.0 | 4204 | | 8.13 |
| 26 | 7.07 | 82 | | 6.0 | 5704 | | 8.34 |
| 27 | 7.31 | 100 | 119 | 2.5 | 7014 | 8347 | 8.41 |
| 28 | 7.16 | 112 | | 4.0 | 7435 | | 7.96 |
| 29 | 7.13 | 84 | | 3.5 | 6074 | | 8.67 |
| 30 | | | | | | | 8.20 |
| | | | | | | | |
| AVG | 7.20 | 103 | 132 | 5.7 | 6824 | 8754 | 8.04 |
| MIN | 7.01 | 62 | 110 | 1.5 | 4204 | 7523 | 7.16 |
| MAX | 7.51 | 178 | 178 | 13.0 | 11232 | 10629 | 9.80 |
| COUNT | 19 | 19 | 4 | 19 | 19 | 4 | 30 |

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | 7.16 | 28 | | 0.3 | 1793 | | 64% | | | |
| 5 | 7.23 | 60 | | 0.2 | 3873 | | 66% | | | |
| 6 | 7.29 | 50 | 99 | 0.1 | 2986 | 5912 | 72% | 44% | | |
| 7 | 7.16 | 42 | | 0.2 | 2806 | | 71% | | | |
| 8 | 6.91 | 60 | | 0.3 | 4193 | | 50% | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | 6.95 | 46 | | 0.4 | 2985 | | 56% | | | |
| 12 | | | | | | | | | | |
| 13 | 6.99 | 42 | 62 | 0.3 | 2872 | 4240 | 57% | 44% | | |
| 14 | 6.99 | 32 | | 0.3 | 2188 | | 57% | | | |
| 15 | 6.99 | 40 | | 0.2 | 2739 | | 52% | | | |
| 16 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 18 | 7.21 | 38 | | 0.2 | 2450 | | 54% | | | |
| 19 | 6.97 | 46 | | 0.2 | 3069 | | 53% | | 3.6 | 240.192 |
| 20 | 6.89 | 42 | 79 | 0.3 | 2981 | 5607 | 56% | 34% | | |
| 21 | 6.89 | 48 | | 0.1 | 3147 | | 47% | | | |
| 22 | 6.89 | 46 | | 0.5 | 2839 | | 49% | | | |
| 23 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 25 | 6.95 | 22 | | 0.5 | 1492 | | 65% | | | |
| 26 | 7.02 | 56 | | 0.4 | 3895 | | 32% | | | |
| 27 | 6.99 | 52 | 59 | 0.4 | 3647 | 4138 | 48% | 50% | | |
| 28 | 7.00 | 34 | | 0.2 | 2257 | | 70% | | | |
| 29 | 6.99 | 44 | | 0.2 | 3182 | | 48% | | | |
| 30 | | | | | | | | | | |
| | | | | | | | | | | |
| AVG | 7.02 | 44 | 75 | 0.3 | 2915 | 4974 | 56% | 43% | 3.6 | 240.192 |
| MIN | 6.89 | 22 | 59 | 0.1 | 1492 | 4138 | 32% | 34% | 3.6 | 240.192 |
| MAX | 7.29 | 60 | 99 | 0.5 | 4193 | 5912 | 72% | 50% | 3.6 | 240.192 |
| COUNT | 19 | 19 | 4 | 19 | 19 | 4 | 19 | 4 | 1 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PERMIT REQUIRMENTS | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

12th NO SAMPLES AS PLANT ON BYPASS.

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 99 | 5 | 1 | TO | 99 | 5 | 31 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.1 | 9.0 | MGD | | | | mgd | 0 | 31/31 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 8561 | 10909 | lbs/day | 94 | 122 | 150 | mg/l | 0 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 5139 | 6709 | lbs/day | 58 | 73 | 93 | mg/l | 0 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 7219 | 12750 | lbs/day | 64 | 106 | 194 | mg/l | 0 | 21/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 3317 | 5561 | lbs/day | 28 | 49 | 80 | mg/l | 0 | 21/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.3 | 0.8 | ml/l | 0 | 21/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 374 | 374 | lbs/day | 5.4 | 5.4 | 5.4 | mg/l | | 1/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 6.9 | 7.2 | 7.8 | | 7 | 21/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRICIPLE EXECUTIVE OFFICER | | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|---|
| RICHARD A. QUINTANILLA<br>GENERAL MANAGER, GWA | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | | 671 | 479-7844 | | | |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
pH was below 7.0 on 7 sample dates earlier this month. This was corrected and pH has remained above 7.0 since the 16th.

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF MAY 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | 8.35 |
| 2 | 7.19 | 76 | | 3.0 | 4779 | | 7.54 |
| 3 | 7.09 | 68 | | 3.0 | 4350 | | 7.67 |
| 4 | 7.16 | 100 | 133 | 4.0 | 6956 | 9251 | 8.34 |
| 5 | 7.20 | 66 | | 4.0 | 4569 | | 8.30 |
| 6 | 7.38 | 100 | | 3.5 | 7072 | | 8.48 |
| 7 | | | | | | | 8.44 |
| 8 | | | | | | | 8.36 |
| 9 | 7.03 | 80 | | 5.0 | 5264 | | 7.89 |
| 10 | 7.30 | 96 | | 5.0 | 6333 | | 7.91 |
| 11 | 7.24 | 72 | 94 | 10.0 | 4600 | 6005 | 7.66 |
| 12 | 7.18 | 96 | | 10.0 | 5797 | | 7.24 |
| 13 | 7.21 | 104 | | 10.0 | 6800 | | 7.84 |
| 14 | | | | | | | 7.69 |
| 15 | | | | | | | 6.99 |
| 16 | 7.35 | 64 | | 7.0 | 4126 | | 7.73 |
| 17 | 7.54 | 82 | | 3.0 | 5663 | | 8.28 |
| 18 | 7.14 | 156 | 150 | 8.0 | 11345 | 10909 | 8.72 |
| 19 | 7.31 | 122 | | 8.5 | 9167 | | 9.01 |
| 20 | 7.33 | 194 | | 8.5 | 12750 | | 7.88 |
| 21 | | | | | | | 7.69 |
| 22 | | | | | | | 8.62 |
| 23 | 7.27 | 170 | | 7.0 | 12051 | | 8.50 |
| 24 | 7.79 | 150 | | 9.0 | 10821 | | 8.65 |
| 25 | 7.27 | 108 | 112 | 7.5 | 7791 | 8080 | 8.65 |
| 26 | 7.26 | 112 | | 8.0 | 7772 | | 8.32 |
| 27 | 7.36 | 102 | | 7.5 | 6712 | | 7.89 |
| 28 | | | | | | | 8.38 |
| 29 | | | | | | | 8.17 |
| 30 | | | | | | | 8.02 |
| 31 | 7.52 | 102 | | 2.5 | 6882 | | 8.09 |
| AVG | 7.29 | 106 | 122 | 6.4 | 7219 | 8561 | 8.11 |
| MIN | 7.03 | 64 | 94 | 2.5 | 4126 | 6005 | 6.99 |
| MAX | 7.79 | 194 | 150 | 10.0 | 12750 | 10909 | 9.01 |
| COUNT | 21 | 21 | 4 | 21 | 21 | 4 | 31 |

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | |
| 2 | 7.14 | 38 | | 0.5 | 2390 | | 50% | | | |
| 3 | 6.99 | 50 | | 0.4 | 3198 | | 26% | | | |
| 4 | 7.00 | 40 | 59 | 0.3 | 2782 | 4104 | 60% | 56% | | |
| 5 | 6.90 | 40 | | 0.3 | 2769 | | 39% | | 5.4 | 373.799 |
| 6 | 7.04 | 42 | | 0.4 | 2970 | | 58% | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | 6.94 | 44 | | 0.4 | 2895 | | 45% | | | |
| 10 | 6.98 | 56 | | 0.4 | 3694 | | 42% | | | |
| 11 | 6.98 | 28 | 58 | 0.2 | 1789 | 3705 | 61% | 38% | | |
| 12 | 6.98 | 62 | | 0.2 | 3744 | | 35% | | | |
| 13 | 6.99 | 46 | | 0.3 | 3008 | | 56% | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 16 | 7.11 | 40 | | 0.5 | 2579 | | 38% | | | |
| 17 | 7.84 | 28 | | 0.1 | 1934 | | 66% | | | |
| 18 | 7.20 | 62 | 83 | 0.1 | 4509 | 6036 | 60% | 45% | | |
| 19 | 7.39 | 74 | | 0.2 | 5561 | | 39% | | | |
| 20 | 7.30 | 80 | | 0.1 | 5258 | | 59% | | | |
| 21 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 23 | 7.29 | 52 | | 0.7 | 3686 | | 69% | | | |
| 24 | 7.42 | 46 | | 0.3 | 3318 | | 69% | | | |
| 25 | 7.23 | 66 | 93 | 0.3 | 4761 | 6709 | 39% | 17% | | |
| 26 | 7.26 | 52 | | 0.8 | 3608 | | 54% | | | |
| 27 | 7.33 | 40 | | 0.2 | 2632 | | 61% | | | |
| 28 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 31 | 7.26 | 38 | | 0.2 | 2564 | | 63% | | | |
| AVG | 7.17 | 49 | 73 | 0.3 | 3317 | 5139 | 52% | 39% | 5.4 | 373.799 |
| MIN | 6.90 | 28 | 58 | 0.1 | 1789 | 3705 | 26% | 17% | 5.4 | 373.799 |
| MAX | 7.84 | 80 | 93 | 0.8 | 5561 | 6709 | 69% | 56% | 5.4 | 373.799 |
| COUNT | 21 | 21 | 4 | 21 | 21 | 4 | 21 | 4 | 1 | 1 |

| PERMIT REQUIRMENTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 99 | 6 | 1 | TO | 99 | 6 | 30 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 7.9 | 8.6 | MGD | | | | mgd | 0 | 30/30 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 10243 | 13505 | lbs/day | 133 | 153 | 193 | mg/l | | 4/30 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 6478 | 7767 | lbs/day | 91 | 97 | 111 | mg/l | 1 | 4/30 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 8416 | 10374 | lbs/day | 82 | 128 | 152 | mg/l | | 22/30 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 3681 | 6298 | lbs/day | 32 | 56 | 90 | mg/l | 0 | 22/30 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.2 | 0.4 | 1.1 | ml/l | 0 | 22/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | #DIV/0! | 0 | lbs/day | 0 | #DIV/0! | 0 | mg/l | | 1/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.2 | 7.3 | 7.4 | | 0 | 22/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRICIPLE EXECUTIVE OFFICER | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|
| RICHARD A. QUINTANILLA<br>GENERAL MANAGER, GWA | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | 671 | 479-7844 | | | |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

BOD monthly average concentration was exceeded by 17 mg/l. No results were obtainable on the 15th due to technican error in reading samples. Samples were discarded before error was discovered

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF JUNE 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.45 | 124 | 133 | 3.0 | 8108 | 8696 | 7.84 |
| 2 | 7.49 | 98 | | 3.0 | 6465 | | 7.91 |
| 3 | 7.49 | 136 | | 3.5 | 8280 | | 7.30 |
| 4 | | | | | | | 7.79 |
| 5 | | | | | | | 7.48 |
| 6 | 7.53 | 132 | | 3.0 | 8488 | | 7.71 |
| 7 | 7.39 | 130 | | 4.5 | 8186 | | 7.55 |
| 8 | 7.32 | 114 | 136 | 7.0 | 7673 | 9153 | 8.07 |
| 9 | 7.40 | 142 | | 6.5 | 8835 | | 7.46 |
| 10 | 7.47 | 152 | | 7.5 | 9736 | | 7.68 |
| 11 | | | | | | | 8.11 |
| 12 | | | | | | | 8.22 |
| 13 | 7.51 | 138 | | 3.5 | 8620 | | 7.49 |
| 14 | 7.57 | 120 | | 4.0 | 8066 | | 8.06 |
| 15 | 7.51 | 146 | | 3.0 | 10374 | | 8.52 |
| 16 | 7.58 | 130 | | 2.5 | 9031 | | 8.33 |
| 17 | 7.60 | 118 | | 2.0 | 7991 | | 8.12 |
| 18 | | | | | | | 8.39 |
| 19 | | | | | | | 7.98 |
| 20 | 7.36 | 82 | | 6.0 | 5232 | | 7.65 |
| 21 | 7.52 | 126 | | 4.0 | 8333 | | 7.93 |
| 22 | 7.41 | 144 | 193 | 9.0 | 10076 | 13505 | 8.39 |
| 23 | 7.57 | 122 | | 3.0 | 7448 | | 7.32 |
| 24 | 7.42 | 150 | | 11.0 | 10071 | | 8.05 |
| 25 | | | | | | | 8.26 |
| 26 | | | | | | | 7.57 |
| 27 | 7.60 | 100 | | 2.5 | 7097 | | 8.51 |
| 28 | 7.43 | 146 | | 8.5 | 9218 | | 7.57 |
| 29 | 7.41 | 140 | 149 | 3.9 | 9037 | 9618 | 7.74 |
| 30 | 7.43 | 122 | | 7.5 | 8791 | | 8.64 |
| | | | | | | | |
| AVG | 7.48 | 128 | 153 | 4.9 | 8416 | 10243 | 7.92 |
| MIN | 7.32 | 82 | 133 | 2.0 | 5232 | 8696 | 7.30 |
| MAX | 7.60 | 152 | 193 | 11.0 | 10374 | 13505 | 8.64 |
| COUNT | 22 | 22 | 4 | 22 | 22 | 4 | 30 |

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.20 | 48 | 92 | 0.4 | 3139 | 6015 | 61% | 31% | | |
| 2 | 7.23 | 48 | | 0.3 | 3167 | | 51% | | | |
| 3 | 7.26 | 56 | | 0.2 | 3409 | | 59% | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | 7.26 | 52 | | 0.3 | 3344 | | 61% | | | |
| 7 | 7.20 | 58 | | 0.4 | 3652 | | 55% | | | |
| 8 | 7.35 | 88 | 91 | 0.2 | 5923 | 6125 | 23% | 33% | | |
| 9 | 7.31 | 46 | | 0.3 | 2862 | | 68% | | | |
| 10 | 7.29 | 32 | | 0.2 | 2050 | | 79% | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | 7.30 | 54 | | 0.3 | 3373 | | 61% | | | |
| 14 | 7.32 | 54 | | 0.3 | 3630 | | 55% | | | |
| 15 | 7.22 | 56 | | 0.4 | 3979 | | 62% | | | |
| 16 | 7.24 | 50 | | 0.3 | 3474 | | 62% | | | |
| 17 | 7.26 | 38 | | 0.4 | 2573 | | 68% | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | 7.28 | 62 | | 0.5 | 3956 | | 24% | | | |
| 21 | 7.19 | 52 | | 0.5 | 3439 | | 59% | | | |
| 22 | 7.21 | 90 | 111 | 1.1 | 6298 | 7767 | 38% | 42% | | |
| 23 | 7.19 | 66 | | 0.4 | 4029 | | 46% | | | |
| 24 | 7.24 | 56 | | 0.4 | 3760 | | 63% | | | |
| 25 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 27 | 7.33 | 44 | | 0.3 | 3123 | | 56% | | | |
| 28 | 7.30 | 68 | | 0.5 | 4293 | | 53% | | | |
| 29 | 7.32 | 56 | 93 | 0.3 | 3615 | 6003 | 60% | 38% | | |
| 30 | 7.34 | 54 | | 0.3 | 3891 | | 56% | | | |
| 0 | | | | | | | | | | |
| AVG | 7.27 | 56 | 97 | 0.4 | 3681 | 6478 | 55% | 36% | #DIV/0! | #DIV/0! |
| MIN | 7.19 | 32 | 91 | 0.2 | 2050 | 6003 | 23% | 31% | 0 | 0 |
| MAX | 7.35 | 90 | 111 | 1.1 | 6298 | 7767 | 79% | 42% | 0 | 0 |
| COUNT | 22 | 22 | 4 | 22 | 22 | 4 | 22 | 4 | 0 | 0 |

| PERMIT REQUIRMENTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

No results for BOD of samples taken on the 15th due to technician error in analysis.

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 99 | 7 | 1 | TO | 99 | 7 | 31 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.2 | 9.5 | MGD | | | | mgd | 0 | 31/31 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 7494 | 8237 | lbs/day | 95 | 109 | 125 | mg/l | 0 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 5189 | 5491 | lbs/day | 66 | 75 | 84 | mg/l | 0 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 8149 | 12098 | lbs/day | 70 | 120 | 182 | mg/l | 0 | 19/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 3529 | 4363 | lbs/day | 40 | 52 | 64 | mg/l | 0 | 19/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.3 | 0.5 | ml/l | 0 | 19/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 668 | 668 | lbs/day | 10.7 | 10.7 | 10.7 | mg/l | | 1/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.0 | 7.3 | 7.5 | | 2 | 19/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

NAME/TITLE PRICIPLE EXECUTIVE OFFICER

RICHARD A. QUINTANILLA

GENERAL MANAGER, GWA

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

| TELEPHONE | | DATE | | |
|---|---|---|---|---|
| AREA CODE | NUMBER | YEAR | MO | DAY |
| 671 | 479-7844 | | | |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
pH was below 7.0 on 2 sample dates earlier this month. This was corrected and pH has remained above 7.0 since the 8th.

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF JULY 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.35 | 182 | | 10.0 | 12098 | | 7.97 |
| 2 | | | | | | | 8.75 |
| 3 | | | | | | | 8.34 |
| 4 | | | | | | | 7.68 |
| 5 | 7.14 | 130 | | 7.5 | 8717 | | 8.04 |
| 6 | 7.49 | 132 | 125 | 7.5 | 8433 | 7986 | 7.66 |
| 7 | 7.04 | 124 | | 7.5 | 7746 | | 7.49 |
| 8 | 7.60 | 108 | | 9.0 | 7854 | | 8.72 |
| 9 | | | | | | | 7.75 |
| 10 | | | | | | | 9.04 |
| 11 | 7.43 | 70 | | 6.0 | 5108 | | 8.75 |
| 12 | 7.52 | 138 | | 3.0 | 9046 | | 7.86 |
| 13 | 7.51 | 90 | 95 | 2.5 | 6177 | 6521 | 8.23 |
| 14 | 7.59 | 118 | | 3.0 | 7775 | | 7.90 |
| 15 | 7.53 | 120 | | 4.0 | 7466 | | 7.46 |
| 16 | | | | | | | 7.59 |
| 17 | | | | | | | 7.60 |
| 18 | 7.54 | 104 | | 4.0 | 6878 | | 7.93 |
| 19 | 7.56 | 126 | 120 | 2.5 | 8648 | 8237 | 8.23 |
| 20 | | | | | | | 8.64 |
| 21 | 7.53 | 140 | | 3.5 | 9096 | | 7.79 |
| 22 | 7.48 | 122 | | 6.0 | 8058 | | 7.92 |
| 23 | | | | | | | 8.24 |
| 24 | | | | | | | 8.64 |
| 25 | 7.48 | 122 | | 3.5 | 9005 | | 8.85 |
| 26 | 7.47 | 100 | | 3.5 | 6464 | | 7.75 |
| 27 | 7.46 | 90 | 95 | 7.0 | 6853 | 7234 | 9.13 |
| 28 | 7.41 | 142 | | 4.0 | 9676 | | 8.17 |
| 29 | 7.46 | 130 | | 2.5 | 9736 | | 8.98 |
| 30 | | | | | | | 9.49 |
| 31 | | | | | | | 8.36 |
| AVG | 7.45 | 120 | 109 | 5.1 | 8149 | 7494 | 8.22 |
| MIN | 7.04 | 70 | 95 | 2.5 | 5108 | 6521 | 7.46 |
| MAX | 7.60 | 182 | 125 | 10.0 | 12098 | 8237 | 9.49 |
| COUNT | 19 | 19 | 4 | 19 | 19 | 4 | 31 |

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.29 | 56 | | 0.4 | 3722 | | 69% | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | 6.96 | 54 | | 0.2 | 3621 | | 58% | | | |
| 6 | 7.31 | 64 | 84 | 0.4 | 4089 | 5366 | 52% | 33% | | |
| 7 | 6.97 | 50 | | 0.2 | 3123 | | 60% | | 10.7 | 668.39 |
| 8 | 7.41 | 60 | | 0.1 | 4363 | | 44% | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | 7.36 | 40 | | 0.3 | 2919 | | 43% | | | |
| 12 | 7.31 | 64 | | 0.5 | 4195 | | 54% | | | |
| 13 | 7.29 | 44 | 71 | 0.2 | 3020 | 4873 | 51% | 25% | | |
| 14 | 7.24 | 52 | | 0.2 | 3426 | | 56% | | | |
| 15 | 7.27 | 52 | | 0.2 | 3235 | | 57% | | | |
| 16 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 18 | 7.29 | 54 | | 0.2 | 3571 | | 48% | | | |
| 19 | 7.45 | 54 | 80 | 0.2 | 3706 | 5491 | 57% | 33% | | |
| 20 | | | | | | | | | | |
| 21 | 7.25 | 60 | | 0.2 | 3898 | | 57% | | | |
| 22 | 7.24 | 54 | | 0.4 | 3567 | | 56% | | | |
| 23 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 25 | 7.27 | 42 | | 0.4 | 3100 | | 66% | | | |
| 26 | 7.30 | 46 | | 0.3 | 2973 | | 54% | | | |
| 27 | 7.27 | 44 | 66 | 0.3 | 3350 | 5026 | 51% | 31% | | |
| 28 | 7.22 | 48 | | 0.4 | 3271 | | 66% | | | |
| 29 | 7.24 | 52 | | 0.4 | 3894 | | 60% | | | |
| 30 | | | | | | | | | | |
| 31 | | | | | | | | | | |
| AVG | 7.26 | 52 | 75 | 0.3 | 3529 | 5189 | 56% | 30% | 10.7 | 668.39 |
| MIN | 6.96 | 40 | 66 | 0.1 | 2919 | 4873 | 43% | 25% | 10.7 | 668.39 |
| MAX | 7.45 | 64 | 84 | 0.5 | 4363 | 5491 | 69% | 33% | 10.7 | 668.39 |
| COUNT | 19 | 19 | 4 | 19 | 19 | 4 | 19 | 4 | 1 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PERMIT REQUIRMENTS | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

PERMITTEE NAME/ADDRESS (Include facility Name/Location If Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 99 | 8 | 1 | TO | 99 | 8 | 31 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.3 | 9.9 | MGD | | | | mgd | 0 | 31/31 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 6134 | 7455 | lbs/day | 62 | 93 | 117 | mg/l | | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 5185 | 6703 | lbs/day | 68 | 78 | 94 | mg/l | 0 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 8637 | 13656 | lbs/day | 72 | 125 | 198 | mg/l | | 18/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 4030 | 6275 | lbs/day | 36 | 58 | 88 | mg/l | 0 | 18/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.3 | 0.5 | ml/l | 0 | 18/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 961 | 961 | lbs/day | 14 | 14 | 14 | mg/l | | 1/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.0 | 7.2 | 7.5 | | 0 | 18/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRINCIPLE EXECUTIVE OFFICER | | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|---|
| RICHARD A. QUINTANILLA<br>GENERAL MANAGER, GWA | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | | 671 | 479-7844 | | | |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
No violations this month.

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF AUGUST 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.57 | 110 | | 3.0 | 7725 | | 8.42 |
| 2 | 7.34 | 124 | | 8.5 | 10186 | | 9.85 |
| 3 | 7.26 | 128 | 103 | 9.0 | 9127 | 7345 | 8.55 |
| 4 | 7.26 | 90 | | 7.0 | 6365 | | 8.48 |
| 5 | 7.37 | 118 | | 3.0 | 8887 | | 9.03 |
| 6 | | | | | | | 8.78 |
| 7 | | | | | | | 7.90 |
| 8 | 7.49 | 160 | | 3.5 | 10782 | | 8.08 |
| 9 | 7.49 | 102 | | 1.8 | 6899 | | 8.11 |
| 10 | 7.56 | 86 | 62 | 5.0 | 5308 | 3826 | 7.40 |
| 11 | 7.52 | 112 | | 3.0 | 7445 | | 7.97 |
| 12 | 7.44 | 142 | | 3.5 | 9344 | | 7.89 |
| 13 | | | | | | | 8.66 |
| 14 | | | | | | | 7.32 |
| 15 | | | | | | | 7.97 |
| 16 | | | | | | | 8.66 |
| 17 | | | | | | | 8.20 |
| 18 | | | | | | | 8.04 |
| 19 | | | | | | | 8.78 |
| 20 | | | | | | | 8.11 |
| 21 | | | | | | | 8.51 |
| 22 | 7.52 | 198 | | 2.5 | 13656 | | 8.27 |
| 23 | 7.37 | 134 | | 8.5 | 8806 | | 7.88 |
| 24 | 7.56 | 138 | 89 | 2.5 | 9161 | 5908 | 7.96 |
| 25 | 7.26 | 134 | | 8.0 | 9667 | | 8.65 |
| 26 | 7.34 | 132 | | 9.0 | 9567 | | 8.69 |
| 27 | | | | | | | 8.40 |
| 28 | | | | | | | 8.48 |
| 29 | 7.73 | 72 | | 2.5 | 4846 | | 8.07 |
| 30 | 7.42 | 150 | | 3.0 | 10296 | | 8.23 |
| 31 | 7.28 | 116 | 117 | 3.0 | 7391 | 7455 | 7.64 |
| AVG | 7.43 | 125 | 93 | 4.8 | 8637 | 6134 | 8.29 |
| MIN | 7.26 | 72 | 62 | 1.8 | 4846 | 3826 | 7.32 |
| MAX | 7.73 | 198 | 117 | 9.0 | 13656 | 7455 | 9.85 |
| COUNT | 18 | 18 | 4 | 18 | 18 | 4 | 31 |

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.32 | 54 | | 0.2 | 3792 | | 51% | | | |
| 2 | 7.20 | 60 | | 0.4 | 4929 | | 52% | | | |
| 3 | 7.08 | 88 | 94 | 0.3 | 6275 | 6703 | 31% | 9% | | |
| 4 | 7.16 | 54 | | 0.3 | 3819 | | 40% | | | |
| 5 | 7.18 | 48 | | 0.2 | 3615 | | 59% | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | 7.27 | 64 | | 0.4 | 4313 | | 60% | | | |
| 9 | 7.29 | 62 | | 0.2 | 4194 | | 39% | | | |
| 10 | 7.03 | 48 | 68 | 0.3 | 2962 | 4197 | 44% | -10% | | |
| 11 | 7.06 | 54 | | 0.5 | 3589 | | 52% | | | |
| 12 | 7.15 | 62 | | 0.5 | 4080 | | 56% | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 21 | | | | | | | | | | |
| 22 | 7.30 | 88 | | 0.2 | 6070 | | 56% | | | |
| 23 | 7.31 | 66 | | 0.3 | 4337 | | 51% | | | |
| 24 | 7.45 | 60 | 82 | 0.3 | 3983 | 5444 | 57% | 8% | | |
| 25 | 7.15 | 52 | | 0.2 | 3751 | | 61% | | | |
| 26 | 7.33 | 58 | | 0.1 | 4204 | | 56% | | | |
| 27 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 29 | 7.38 | 36 | | 0.3 | 2423 | | 50% | | | |
| 30 | 7.19 | 42 | | 0.3 | 2883 | | 72% | | 14 | 960.93 |
| 31 | 7.14 | 52 | 69 | 0.3 | 3313 | 4397 | 55% | 41% | | |
| AVG | 7.22 | 58 | 78 | 0.3 | 4030 | 5185 | 52% | 12% | 14 | 960.93 |
| MIN | 7.03 | 36 | 68 | 0.1 | 2423 | 4197 | 31% | -10% | 14 | 960.93 |
| MAX | 7.45 | 88 | 94 | 0.5 | 6275 | 6703 | 72% | 41% | 14 | 960.93 |
| COUNT | 18 | 18 | 4 | 18 | 18 | 4 | 18 | 4 | 1 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PERMIT | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| REQUIRMENTS | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) | (17-19) |
|---|---|
| GU0020087 | 001 |
| PERMIT NUMBER | DISCHARGE NUMBER |

| MONITORING PERIOD | | | | | | |
|---|---|---|---|---|---|---|
| | YEAR | MO | DAY | | YEAR | MO | DAY |
| FROM | 99 | 9 | 1 | TO | 99 | 9 | 30 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.2 | 9.5 | MGD | | | | mgd | 0 | 30/30 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 10114 | 11098 | lbs/day | 110 | 144 | 157 | mg/l | | 4/30 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 6343 | 6972 | lbs/day | 71 | 90 | 101 | mg/l | 1 | 4/30 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 8785 | 19015 | lbs/day | 66 | 128 | 240 | mg/l | | 21/30 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 3884 | 5546 | lbs/day | 36 | 57 | 80 | mg/l | 0 | 21/30 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.3 | 1.0 | ml/l | 0 | 21/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 1009 | 1009 | lbs/day | 14 | 14 | 14 | mg/l | | 1/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 6.9 | 7.3 | 7.5 | | 1 | 21/30 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRINCIPLE EXECUTIVE OFFICER | | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|---|
| RICHARD A. QUINTANILLA<br>GENERAL MANAGER, GWA | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | | 671 | 479-7844 | | | |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
BOD monthly average concentration was exceeded by 10 mg/L
pH of effluent was below 7.0 on the 27th.

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF SEPTEMBER 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.67 | 114 | | 2.5 | 7587 | | 7.98 |
| 2 | 7.40 | 78 | | 2.0 | 5165 | | 7.94 |
| 3 | | | | | | | 7.80 |
| 4 | | | | | | | 8.02 |
| 5 | | | | | | | 8.17 |
| 6 | 7.50 | 78 | | 2.5 | 5575 | | 8.57 |
| 7 | 7.52 | 150 | 151 | 2.5 | 10634 | 10704 | 8.50 |
| 8 | 7.52 | 134 | | 2.5 | 8851 | | 7.92 |
| 9 | 7.69 | 108 | | 2.5 | 6800 | | 7.55 |
| 10 | | | | | | | 8.42 |
| 11 | | | | | | | 7.64 |
| 12 | 7.58 | 184 | | 3.0 | 12445 | | 8.11 |
| 13 | 7.64 | 134 | | 2.5 | 9354 | | 8.37 |
| 14 | 7.75 | 240 | 110 | 1.4 | 19015 | 8715 | 9.50 |
| 15 | 7.56 | 104 | | 4.0 | 7494 | | 8.64 |
| 16 | 7.51 | 132 | | 4.0 | 8818 | | 8.01 |
| 17 | | | | | | | 7.93 |
| 18 | | | | | | | 8.39 |
| 19 | 7.51 | 66 | | 4.5 | 4717 | | 8.57 |
| 20 | 7.48 | 112 | | 7.0 | 7762 | | 8.31 |
| 21 | 7.75 | 146 | 156 | 3.0 | 10386 | 11098 | 8.53 |
| 22 | 7.54 | 130 | | 3.5 | 8663 | | 7.99 |
| 23 | 7.63 | 116 | | 3.0 | 7769 | | 8.03 |
| 24 | | | | | | | 8.14 |
| 25 | | | | | | | 7.78 |
| 26 | 7.68 | 120 | | 3.5 | 7706 | | 7.70 |
| 27 | 7.16 | 130 | | 3.5 | 8966 | | 8.27 |
| 28 | 7.63 | 138 | 157 | 5.0 | 8735 | 9938 | 7.59 |
| 29 | 7.58 | 160 | | 3.0 | 10755 | | 8.06 |
| 30 | 7.50 | 104 | | 3.0 | 7286 | | 8.40 |
| | | | | | | | |
| AVG | 7.56 | 128 | 144 | 3.3 | 8785 | 10114 | 8.16 |
| MIN | 7.16 | 66 | 110 | 1.4 | 4717 | 8715 | 7.55 |
| MAX | 7.75 | 240 | 157 | 7.0 | 19015 | 11098 | 9.50 |
| COUNT | 21 | 21 | 4 | 21 | 21 | 4 | 30 |

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.31 | 56 | | 0.2 | 3727 | | 51% | | | |
| 2 | 7.21 | 36 | | 0.2 | 2384 | | 54% | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | 7.45 | 56 | | 0.1 | 4003 | | 28% | | | |
| 7 | 7.13 | 60 | 90 | 0.5 | 4253 | 6380 | 60% | 40% | | |
| 8 | 7.20 | 46 | | 0.3 | 3038 | | 66% | | | |
| 9 | 7.16 | 54 | | 0.2 | 3400 | | 50% | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | 7.26 | 80 | | 0.2 | 5411 | | 57% | | | |
| 13 | 7.35 | 48 | | 0.5 | 3351 | | 64% | | | |
| 14 | 7.45 | 70 | 71 | 0.5 | 5546 | 5625 | 71% | 35% | | |
| 15 | 7.38 | 50 | | 0.4 | 3603 | | 52% | | 14 | 1008.8 |
| 16 | 7.35 | 48 | | 0.3 | 3207 | | 64% | | | |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 19 | 7.31 | 38 | | 0.4 | 2716 | | 42% | | | |
| 20 | 7.30 | 60 | | 0.2 | 4158 | | 46% | | | |
| 21 | 7.49 | 70 | 98 | 0.2 | 4980 | 6972 | 52% | 37% | | |
| 22 | 7.36 | 64 | | 1.0 | 4265 | | 51% | | | |
| 23 | 7.26 | 58 | | 0.2 | 3884 | | 50% | | | |
| 24 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 26 | 7.24 | 72 | | 0.4 | 4624 | | 40% | | | |
| 27 | 6.88 | 54 | | 0.4 | 3724 | | 58% | | | |
| 28 | 7.49 | 72 | 101 | 0.4 | 4558 | 6393 | 48% | 36% | | |
| 29 | 7.38 | 48 | | 0.3 | 3227 | | 70% | | | |
| 30 | 7.25 | 50 | | 0.3 | 3503 | | 52% | | | |
| | | | | | | | | | | |
| AVG | 7.30 | 57 | 90 | 0.3 | 3884 | 6343 | 54% | 37% | 14 | 1008.8 |
| MIN | 6.88 | 36 | 71 | 0.1 | 2384 | 5625 | 28% | 35% | 14 | 1008.8 |
| MAX | 7.49 | 80 | 101 | 1.0 | 5546 | 6972 | 71% | 40% | 14 | 1008.8 |
| COUNT | 21 | 21 | 4 | 21 | 21 | 4 | 21 | 4 | 1 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PERMIT | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| REQUIRMENTS | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

VIOLATIONS
BOD monthly average
pH

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

# NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES)
## DISCHARGE MONITORING REPORT (DMR)

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

MONITORING PERIOD

| | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 99 | 12 | 1 | TO | 99 | 12 | 31 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.3 | 9.5 | MGD | | | | mgd | 0 | 31/31 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 9724 | 10376 | lbs/day | 118 | 144 | 174 | mg/l | | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 6066 | 7101 | lbs/day | 57 | 90 | 106 | mg/l | 1 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 9011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 9717 | 12055 | lbs/day | 60 | 129 | 180 | mg/l | | 18/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 3836 | 5629 | lbs/day | 34 | 56 | 82 | mg/l | 0 | 18/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 6003 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.2 | 0.4 | 1.0 | ml/l | 0 | 19/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 1056 | 1056 | lbs/day | 14 | 14 | 14 | mg/l | | 1/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.1 | 7.3 | 7.5 | | 0 | 19/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRINCIPLE EXECUTIVE OFFICER | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|
| HERBERT J. JOHNSTON Jr.<br>GENERAL MANAGER, GWA<br>ACTING | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | 671 | 479-7844 | [illegible] | [illegible] | [illegible] |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
Suspended solids monthly average concentration exceeded by 10 mg/L

1/21/00

1/21/00 Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF DECEMBER 1999

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.40 | 166 | | 5.0 | 11408 | | 8.24 |
| 2 | 7.50 | 118 | | 4.0 | 7676 | | 7.80 |
| 3 | | | | | | | 8.19 |
| 4 | | | | | | | 9.37 |
| 5 | 7.48 | 108 | | 4.5 | 7287 | | 8.09 |
| 6 | 7.41 | 138 | 143 | 3.0 | 9507 | 9851 | 8.26 |
| 7 | | | | | | | 8.70 |
| 8 | 7.60 | 60 | | 4.0 | 4303 | | 8.60 |
| 9 | 7.55 | 120 | | 4.5 | 9478 | | 9.47 |
| 10 | | | | | | | 8.71 |
| 11 | | | | | | | 8.50 |
| 12 | 7.42 | 76 | | 4.5 | 5369 | | 8.47 |
| 13 | 7.57 | 120 | | 4.5 | 8006 | | 8.00 |
| 14 | 7.55 | 108 | 118 | 2.5 | 8143 | 8896 | 9.04 |
| 15 | 7.63 | ns | | 5.0 | ns | | 8.33 |
| 16 | 7.47 | 150 | | 4.0 | 10508 | | 8.40 |
| 17 | | | | | | | 8.43 |
| 18 | | | | | | | 8.11 |
| 19 | 7.51 | 90 | | 3.5 | 6087 | | 8.11 |
| 20 | 7.54 | 148 | | 3.0 | 8517 | | 6.90 |
| 21 | 7.54 | 146 | 174 | 4.0 | 8706 | 10376 | 7.15 |
| 22 | 7.64 | 168 | | 5.0 | 10677 | | 7.62 |
| 23 | | | | | | | 8.47 |
| 24 | | | | | | | 8.18 |
| 25 | | | | | | | 7.92 |
| 26 | 7.53 | 136 | | 7.0 | 9754 | | 8.60 |
| 27 | 7.63 | 180 | | 6.5 | 12055 | | 8.03 |
| 28 | 7.69 | 132 | 139 | 5.0 | 9280 | 9773 | 8.43 |
| 29 | 7.07 | 152 | | 5.0 | 10154 | | 8.01 |
| 30 | | | | | | | 8.31 |
| 31 | | | | | | | 7.79 |
| AVG | 7.51 | 129 | 144 | 4.4 | 8717 | 9724 | 8.27 |
| MIN | 7.07 | 60 | 118 | 2.5 | 4303 | 8896 | 6.90 |
| MAX | 7.69 | 180 | 174 | 7.0 | 12055 | 10376 | 9.47 |

EFFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.23 | 46 | | 0.3 | 3161 | | 72% | | | |
| 2 | 7.31 | 34 | | 0.3 | 2212 | | 71% | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | 7.37 | 40 | | 0.3 | 2699 | | 63% | | | |
| 6 | 7.12 | 60 | 95 | 0.3 | 4133 | 6544 | 57% | 34% | | |
| 7 | | | | | | | | | | |
| 8 | 7.20 | 34 | | 0.2 | 2439 | | 43% | | | |
| 9 | 7.09 | 70 | | 0.4 | 5529 | | 42% | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | 7.31 | 42 | | 0.7 | 2967 | | 45% | | | |
| 13 | 7.21 | 56 | | 0.3 | 3736 | | 53% | | | |
| 14 | 7.53 | 50 | 57 | 0.5 | 3770 | 4297 | 54% | 52% | 14 | 1055.51 |
| 15 | 7.50 | | | 1.0 | | | | | | |
| 16 | 7.22 | 74 | | 0.2 | 5184 | | 51% | | | |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 19 | 7.36 | 52 | | 0.3 | 3517 | | 42% | | | |
| 20 | 7.39 | 60 | | 0.2 | 3453 | | 59% | | | |
| 21 | 7.33 | 72 | 106 | 0.3 | 4293 | 6321 | 51% | 39% | | |
| 22 | 7.45 | 82 | | 0.5 | 5211 | | 51% | | | |
| 23 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 26 | 7.34 | 56 | | 0.5 | 4017 | | 59% | | | |
| 27 | 7.35 | 70 | | 0.5 | 4688 | | 61% | | | |
| 28 | 7.10 | 46 | 101 | 0.5 | 3234 | 7101 | 65% | 27% | | |
| 29 | 7.07 | 72 | | 0.5 | 4810 | | 53% | | | |
| 30 | | | | | | | | | | |
| 31 | | | | | | | | | | |
| AVG | 7.29 | 56 | 90 | 0.4 | 3836 | 6066 | 55% | 38% | 14 | 1055.51 |
| MIN | 7.07 | 34 | 57 | 0.2 | 2212 | 4297 | 42% | 27% | 14 | 1055.51 |
| MAX | 7.53 | 82 | 106 | 1.0 | 5529 | 7101 | 72% | 52% | 14 | 1055.51 |

| PERMIT REQUIRMENTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

**VIOLATIONS**

BOD

15th composite samples incomplete.

1/14/00

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) | (17-19) |
|---|---|
| GU0020087 | 001 |
| PERMIT NUMBER | DISCHARGE NUMBER |

| MONITORING PERIOD | | | | | | | |
|---|---|---|---|---|---|---|---|
| | YEAR | MO | DAY | | YEAR | MO | DAY |
| FROM | 2000 | 1 | 1 | TO | 2000 | 1 | 31 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 8.4 | 10.8 | MGD | | | | mgd | 0 | 31/31 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 9355 | 11218 | lbs/day | 121 | 138 | 159 | mg/l | | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 8485 | 9172 | lbs/day | 118 | 125 | 131 | mg/l | 2 | 4/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 8806 | 12743 | lbs/day | 64 | 125 | 148 | mg/l | | 21/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 4719 | 9692 | lbs/day | 38 | 66 | 108 | mg/l | 1 | 21/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.4 | 1.1 | ml/l | 0 | 21/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 1239 | 1239 | lbs/day | 17 | 17 | 17 | mg/l | | 1/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.1 | 7.3 | 7.6 | | 0 | 21/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRINCIPLE EXECUTIVE OFFICER | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|
| HERBERT J. JOHNSTON Jr.<br>GENERAL MANAGER, GWA<br>ACTING | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | 671 | 479-7676 ~~479-7844~~ | MAY | 05 | 2000 |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
BOD monthly average concentration was exceeded by 45 mg/l, and monthly average loading by 474 lbs/day
Suspended solids monthly average concentration was exceeded by 6 mg/l, and monthly average loading by 474 lbs/day

5/5/00

4/12/00

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF JANUARY 2000

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | 8.18 |
| 2 | 7.32 | 128 | | 5.0 | 10163 | | 9.52 |
| 3 | 7.63 | 138 | | 5.0 | 9967 | | 8.66 |
| 4 | 7.53 | 138 | | 4.0 | 9438 | | 8.20 |
| 5 | 7.50 | 104 | 130 | 6.0 | 7095 | 8869 | 8.18 |
| 6 | 7.71 | 140 | | 5.0 | 9212 | | 7.89 |
| 7 | | | | | | | 8.74 |
| 8 | | | | | | | 8.35 |
| 9 | 7.55 | 118 | | 8.0 | 7912 | | 8.04 |
| 10 | 7.46 | 116 | | 7.0 | 8088 | | 8.36 |
| 11 | 7.54 | 116 | | 3.0 | 8533 | | 8.82 |
| 12 | 7.66 | 140 | 159 | 5.5 | 9878 | 11218 | 8.46 |
| 13 | 7.61 | 138 | | 3.0 | 9898 | | 8.60 |
| 14 | | | | | | | 8.69 |
| 15 | | | | | | | 8.14 |
| 16 | | | | | | | 8.12 |
| 17 | 7.51 | 134 | | 3.0 | 8773 | | 7.85 |
| 18 | 7.31 | 148 | | 2.5 | 9381 | | 7.60 |
| 19 | 7.39 | 144 | 141 | 2.5 | 9416 | 9219 | 7.84 |
| 20 | 7.70 | 100 | | 3.0 | 7114 | | 8.53 |
| 21 | | | | | | | 8.36 |
| 22 | | | | | | | 7.94 |
| 23 | 7.58 | 64 | | 3.0 | 4868 | | 9.12 |
| 24 | 7.57 | 120 | | 3.0 | 8607 | | 8.60 |
| 25 | 7.59 | 104 | | 3.0 | 7442 | | 8.58 |
| 26 | 7.66 | 136 | 121 | 3.0 | 9119 | 8113 | 8.04 |
| 27 | 7.55 | 122 | | 3.0 | 7865 | | 7.73 |
| 28 | | | | | | | 7.60 |
| 29 | | | | | | | 8.39 |
| 30 | 7.56 | 142 | | 3.5 | 12743 | | 10.76 |
| 31 | 7.53 | 138 | | 4.5 | 9415 | | 8.18 |
| AVG | 7.55 | 125 | 138 | 4.1 | 8806 | 9355 | 8.39 |
| MIN | 7.31 | 64 | 121 | 2.5 | 4868 | 8113 | 7.60 |
| MAX | 7.71 | 148 | 159 | 8.0 | 12743 | 11218 | 10.76 |

EFFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | |
| 2 | 7.21 | 80 | | 0.3 | 6352 | | 38% | | | |
| 3 | 7.14 | 82 | | 0.3 | 5922 | | 41% | | | |
| 4 | 7.27 | 90 | | 0.3 | 6155 | | 35% | | | |
| 5 | 7.26 | 102 | 131 | 0.1 | 6959 | 8937 | 2% | -1% | | |
| 6 | 7.37 | 68 | | 0.2 | 4475 | | 51% | | | |
| 7 | | | | | | | | | 17 | 1239.16 |
| 8 | | | | | | | | | | |
| 9 | 7.23 | 38 | | 0.3 | 2548 | | 68% | | | |
| 10 | 7.22 | 58 | | 0.4 | 4044 | | 50% | | | |
| 11 | 7.23 | 54 | | 0.2 | 3972 | | 53% | | | |
| 12 | 7.22 | 56 | 130 | 0.8 | 3951 | 9172 | 60% | 18% | | |
| 13 | 7.25 | 64 | | 0.2 | 4590 | | 54% | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 17 | 7.25 | 70 | | 0.5 | 4583 | | 48% | | | |
| 18 | 7.21 | 66 | | 0.5 | 4183 | | 55% | | | |
| 19 | 7.08 | 58 | 118 | 0.5 | 3792 | 7716 | 60% | 16% | | |
| 20 | 7.39 | 56 | | 0.6 | 3984 | | 44% | | | |
| 21 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 23 | 7.17 | 40 | | 0.4 | 3042 | | 38% | | | |
| 24 | 7.59 | 48 | | 0.2 | 3443 | | 60% | | | |
| 25 | 7.20 | 40 | | 0.2 | 2862 | | 62% | | | |
| 26 | 7.23 | 58 | 121 | 0.2 | 3889 | 8113 | 57% | 0% | | |
| 27 | 7.17 | 66 | | 0.3 | 4255 | | 46% | | | |
| 28 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 30 | 7.32 | 108 | | 0.6 | 9692 | | 24% | | | |
| 31 | 7.30 | 94 | | 1.1 | 6413 | | 32% | | | |
| AVG | 7.25 | 66 | 125 | 0.4 | 4719 | 8485 | 46% | 8% | 17 | 1239.16 |
| MIN | 7.08 | 38 | 118 | 0.1 | 2548 | 7716 | 2% | -1% | 17 | 1239.16 |
| MAX | 7.59 | 108 | 131 | 1.1 | 9692 | 9172 | 68% | 18% | 17 | 1239.16 |

| PERMIT REQUIRMENTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

VIOLATIONS
BOD
SUSPENDED SOLIDS

4/12/00

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) | (17-19) |
|---|---|
| GU0020087 | 001 |
| PERMIT NUMBER | DISCHARGE NUMBER |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 2000 | 2 | 1 | TO | 2000 | 2 | 29 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 10.0 | 11.4 | MGD | | | | mgd | 0 | 29/29 | HOURLY |
| | PERMIT REQUIREMENT | | 120 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 9378 | 10325 | lbs/day | 101 | 113 | 131 | mg/l | | 4/29 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 8133 | 10018 | lbs/day | 48 | 98 | 122 | mg/l | 2 | 4/29 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 9446 | 21369 | lbs/day | 72 | 116 | 272 | mg/l | | 20/29 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 4881 | 8956 | lbs/day | 32 | 60 | 114 | mg/l | 0 | 20/29 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.2 | 0.6 | 1.2 | ml/l | 0 | 20/29 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 1261 | 1261 | lbs/day | 16 | 16 | 16 | mg/l | | 1/29 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.1 | 7.3 | 7.4 | | 0 | 20/29 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

NAME/TITLE PRINCIPLE EXECUTIVE OFFICER

HERBERT J. JOHNSTON Jr.

GENERAL MANAGER, GWA
ACTING

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

| TELEPHONE | | DATE | | |
|---|---|---|---|---|
| 671 | 479-7844 | MAY | 0 5 | 2000 |
| AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
BOD monthly average concentration was exceeded by 18 mg/l, and monthly average loading by 122 lbs/day

5/5/00

4/12/00

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF FEBRUARY 2000

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.69 | 272 | | 3.5 | 21369 | | 9.42 |
| 2 | 7.57 | 112 | 131 | 4.0 | 8827 | 10325 | 9.45 |
| 3 | 7.58 | 140 | | 5.0 | 9866 | | 8.45 |
| 4 | | | | | | | 10.33 |
| 5 | | | | | | | 10.03 |
| 6 | 7.48 | 94 | | 4.0 | 8130 | | 10.37 |
| 7 | 7.45 | 108 | | 4.0 | 8296 | | 9.21 |
| 8 | 7.48 | 102 | | 2.5 | 8396 | | 9.87 |
| 9 | 7.42 | 98 | 116 | 7.5 | 8230 | 9742 | 10.07 |
| 10 | 7.57 | 86 | | 3.5 | 7194 | | 10.03 |
| 11 | | | | | | | 9.44 |
| 12 | | | | | | | 9.97 |
| 13 | 7.47 | 72 | | 4.0 | 5651 | | 9.41 |
| 14 | 7.59 | 94 | | 4.0 | 7330 | | 9.35 |
| 15 | 7.63 | 110 | | 5.5 | 8358 | | 9.11 |
| 16 | 7.51 | 80 | 101 | 7.0 | 7633 | 9636 | 11.44 |
| 17 | 7.55 | 72 | | 6.5 | 6653 | | 11.08 |
| 18 | | | | | | | 10.79 |
| 19 | | | | | | | 10.20 |
| 20 | | | | | | | 10.57 |
| 21 | 7.74 | 138 | | 4.5 | 12188 | | 10.59 |
| 22 | 7.62 | 118 | | 2.0 | 9398 | | 9.55 |
| 23 | 7.53 | 128 | 102 | 3.5 | 9800 | 7809 | 9.18 |
| 24 | 7.40 | 208 | | 4.0 | 16515 | | 9.52 |
| 25 | | | | | | | 10.39 |
| 26 | | | | | | | 10.13 |
| 27 | 7.42 | 88 | | 3.0 | 6789 | | 9.25 |
| 28 | 7.46 | 90 | | 4.0 | 8467 | | 11.28 |
| 29 | 7.57 | 110 | | 7.0 | 9825 | | 10.71 |
| AVG | 7.54 | 116 | 113 | 4.5 | 9446 | 9378 | 9.97 |
| MIN | 7.40 | 72 | 101 | 2.0 | 5651 | 7809 | 8.45 |
| MAX | 7.74 | 272 | 131 | 7.5 | 21369 | 10325 | 11.44 |

EFFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %removal | BOD %removal | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.33 | 114 | | 1.2 | 8956 | | 58% | | | |
| 2 | 7.27 | 62 | 116 | 0.7 | 4886 | 9142 | 45% | 11% | 16 | 1261.01 |
| 3 | 7.32 | 88 | | 1.1 | 6202 | | 37% | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | 7.14 | 50 | | 0.5 | 4324 | | 47% | | | |
| 7 | 7.19 | 88 | | 0.5 | 6759 | | 19% | | | |
| 8 | 7.12 | 58 | | 0.3 | 4774 | | 43% | | | |
| 9 | 7.11 | 48 | 48 | 0.3 | 4031 | 4031 | 51% | 59% | | |
| 10 | 7.38 | 50 | | 0.5 | 4183 | | 42% | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | 7.36 | 44 | | 0.5 | 3453 | | 39% | | | |
| 14 | 7.40 | 56 | | 0.7 | 4367 | | 40% | | | |
| 15 | 7.41 | 96 | | 1.2 | 7294 | | 13% | | | |
| 16 | 7.29 | 44 | 105 | 0.7 | 4198 | 10018 | 45% | -4% | | |
| 17 | 7.36 | 32 | | 0.2 | 2957 | | 56% | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 21 | 7.30 | 52 | | 0.2 | 4593 | | 62% | | | |
| 22 | 7.36 | 50 | | 0.2 | 3982 | | 58% | | | |
| 23 | 7.34 | 60 | 122 | 0.3 | 4594 | 9340 | 53% | -20% | | |
| 24 | 7.25 | 56 | | 0.2 | 4446 | | 73% | | | |
| 25 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 27 | 7.21 | 46 | | 0.3 | 3549 | | 48% | | | |
| 28 | 7.32 | 50 | | 0.5 | 4704 | | 44% | | | |
| 29 | 7.16 | 60 | | 1.0 | 5359 | | 45% | | | |
| AVG | 7.28 | 60 | 98 | 0.6 | 4881 | 8133 | 46% | 12% | 16 | 1261.01 |
| MIN | 7.11 | 32 | 48 | 0.2 | 2957 | 4031 | 13% | -20% | 16 | 1261.01 |
| MAX | 7.41 | 114 | 122 | 1.2 | 8956 | 10018 | 73% | 59% | 16 | 1261.01 |

| PERMIT REQUIRMENTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

**VIOLATIONS**
BOD

4/12/00

PERMITTEE NAME/ADDRESS (Include facility Name/Location if Different)

NAME: Guam Waterworks Authority
ADDRESS: P.O. Box 3010
AGANA, GUAM 96932

FACILITY: Agana Sewage Treatment Plant
LOCATION: Agana, Guam

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

Form Approved.
OMB No. 2040-0004
Approval expires 9-30-85

| (2-16) PERMIT NUMBER | (17-19) DISCHARGE NUMBER |
|---|---|
| GU0020087 | 001 |

| MONITORING PERIOD | YEAR | MO | DAY | | YEAR | MO | DAY |
|---|---|---|---|---|---|---|---|
| FROM | 2000 | 3 | 1 | TO | 2000 | 3 | 31 |
| | (20-21) | (22-23) | (24-25) | | (26-27) | (28-29) | (30-31) |

NOTE: Read instructions before completing this form.

| PARAMETER (32-37) | | (3 Card only) (46-53) AVERAGE | QUANTITY OR LOADING (54-61) MAXIMUM | UNITS | (4 Card Only) (38-45) MINIMUM | QUANTITY OR CONCENTRATION (46-53) AVERAGE | (54-61) MAXIMUM | UNITS | NO. EX. (62-63) | FREQUENCY OF ANALYSIS (64-68) | SAMPLE TYPE (69-70) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW | SAMPLE MEASUREMENT | 9.7 | 10.9 | MGD | | | | mgd | 0 | 31/31 | HOURLY |
| | PERMIT REQUIREMENT | | 12.0 | | | | | | | | CONTINUOUS |
| INFLUENT BOD | SAMPLE MEASUREMENT | 10598 | 14836 | lbs/day | 88 | 133 | 201 | mg/l | | 5/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT BOD | SAMPLE MEASUREMENT | 8430 | 10301 | lbs/day | 98 | 104 | 113 | mg/l | 2 | 5/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 8011 | 16022 | | | 80 | 160 | | | 1/7 | COMPOSITE |
| INFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 8268 | 10756 | lbs/day | 86 | 102 | 118 | mg/l | | 21/31 | COMPOSITE |
| | PERMIT REQUIREMENT | | | | | | | | | | COMPOSITE |
| EFFLUENT SUSPENDED SOLIDS | SAMPLE MEASUREMENT | 3969 | 5469 | lbs/day | 32 | 49 | 62 | mg/l | 0 | 21/31 | COMPOSITE |
| | PERMIT REQUIREMENT | 6008 | 12016 | | | 60 | 120 | | | 1/7 | COMPOSITE |
| EFFLUENT SETTLEABLE SOLIDS | SAMPLE MEASUREMENT | | | | 0.1 | 0.6 | 3.0 | ml/l | 1 | 21/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | 1.0 | 2.0 | | | 1/7 | DISCRETE |
| EFFLUENT OIL & GREASE | SAMPLE MEASUREMENT | 1367 | 1367 | lbs/day | 15 | 15 | 15 | mg/l | | 1/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | | | | | | 1/30 | DISCRETE |
| EFFLUENT pH | SAMPLE MEASUREMENT | | | | 7.0 | 7.2 | 7.3 | | 0 | 21/31 | DISCRETE |
| | PERMIT REQUIREMENT | | | | 7.0 | | 9.0 | | | 1/7 | DISCRETE |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| NAME/TITLE PRINCIPLE EXECUTIVE OFFICER | | TELEPHONE | | DATE | | |
|---|---|---|---|---|---|---|
| HERBERT J. JOHNSTON Jr.<br>GENERAL MANAGER, GWA<br>ACTING | I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE. 18 USC $1001 AND 33 USC $1319 (Penalties under these statutes may include fines up to $10,000 and or a maximum imprisonment of between 6 months and 5 years) | 671 | 479-7844 | MAY | 0 5 | 2000 |
| TYPED OR PRINTED | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | AREA CODE | NUMBER | YEAR | MO | DAY |

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
BOD monthly average concentration was exceeded by 24 mg/l, and monthly average loading by 419 lbs/day
Settleable solids daily maximum was exceeded on the 30th by 1.0 ml/L.

5/5/00

4/12/00

Explaination of violations attached at end of DMR's

AGANA TREATMENT PLANT WASTEWATER RESULTS
FOR THE MONTH OF MARCH 2000

INFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | FLOW mgd |
|---|---|---|---|---|---|---|---|
| 1 | 7.59 | 118 | 110 | 6.0 | 10756 | 10027 | 10.93 |
| 2 | 7.61 | 92 | | 5.0 | 7987 | | 10.41 |
| 3 | | | | | | | 8.99 |
| 4 | | | | | | | 9.84 |
| 5 | | | | | | | 9.40 |
| 6 | 7.46 | 86 | | 4.0 | 6921 | | 9.65 |
| 7 | 7.49 | 100 | | 4.0 | 7706 | | 9.24 |
| 8 | 7.53 | 104 | 158 | 5.0 | 8517 | 12940 | 9.82 |
| 9 | 7.54 | 94 | | 4.0 | 7761 | | 9.90 |
| 10 | | | | | | | 9.77 |
| 11 | | | | | | | 10.44 |
| 12 | 7.52 | 90 | | 4.0 | 7641 | | 10.18 |
| 13 | 7.45 | 108 | | 3.0 | 9665 | | 10.73 |
| 14 | 7.50 | 102 | | 3.0 | 8532 | | 10.03 |
| 15 | 7.49 | 94 | 88 | 4.0 | 7989 | 7479 | 10.19 |
| 16 | 7.56 | 110 | | 4.0 | 9385 | | 10.23 |
| 17 | | | | | | | 9.82 |
| 18 | | | | | | | 9.90 |
| 19 | 7.44 | 108 | | 3.0 | 8467 | | 9.40 |
| 20 | 7.44 | 114 | | 4.0 | 9070 | | 9.54 |
| 21 | 7.43 | 92 | | 3.0 | 7113 | | 9.27 |
| 22 | 7.49 | 90 | 107 | 9.0 | 6485 | 7710 | 8.64 |
| 23 | 7.50 | 104 | | 0.3 | 8162 | | 9.41 |
| 24 | | | | | | | 9.89 |
| 25 | | | | | | | 8.73 |
| 26 | 7.47 | 116 | | 3.5 | 8717 | | 9.01 |
| 27 | 7.50 | 102 | | 3.0 | 8243 | | 9.69 |
| 28 | 7.46 | 114 | | 3.0 | 9498 | | 9.99 |
| 29 | 7.44 | 100 | 201 | 4.0 | 7381 | 14836 | 8.85 |
| 30 | 7.39 | 106 | | 4.0 | 7629 | | 8.63 |
| 31 | | | | | | | 9.07 |
| AVG | 7.49 | 102 | 133 | 3.9 | 8268 | 10598 | 9.66 |
| MIN | 7.39 | 86 | 88 | 0.3 | 6485 | 7479 | 8.63 |
| MAX | 7.61 | 118 | 201 | 9.0 | 10756 | 14836 | 10.93 |

EFFLUENT

| DATE | pH | SUSP. SOLIDS mg/l | BOD mg/l | SETTL. SOLID ml/l | SUSP. SOLIDS lbs/day | BOD lbs/day | SUSP. SOLIDS %remova | BOD %remova | OIL & GREASE mg/l | OIL & GREASE lbs/day |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.20 | 60 | 113 | 0.6 | 5469 | 10301 | 49% | -3% | 15 | 1367.3 |
| 2 | 7.27 | 50 | | 0.3 | 4341 | | 46% | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | 7.16 | 50 | | 0.5 | 4024 | | 42% | | | |
| 7 | 7.20 | 46 | | 0.4 | 3545 | | 54% | | | |
| 8 | 7.31 | 50 | 110 | 0.4 | 4095 | 9009 | 52% | 30% | | |
| 9 | 7.25 | 46 | | 0.3 | 3798 | | 51% | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | 7.14 | 46 | | 0.2 | 3905 | | 49% | | | |
| 13 | 7.14 | 50 | | 0.3 | 4474 | | 54% | | | |
| 14 | 7.19 | 46 | | 0.2 | 3848 | | 55% | | | |
| 15 | 7.10 | 32 | 98 | 0.2 | 2720 | 8328 | 66% | -11% | | |
| 16 | 7.16 | 48 | | 1.0 | 4095 | | 56% | | | |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 19 | 7.26 | 48 | | 0.5 | 3763 | | 56% | | | |
| 20 | 7.10 | 52 | | 0.4 | 4137 | | 54% | | | |
| 21 | 7.18 | 62 | | 0.1 | 4793 | | 33% | | | |
| 22 | 7.09 | 54 | 101 | 0.3 | 3891 | 7278 | 40% | 6% | | |
| 23 | 7.16 | 50 | | 0.3 | 3924 | | 52% | | | |
| 24 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 26 | 7.12 | 36 | | 0.3 | 2705 | | 69% | | | |
| 27 | 7.16 | 46 | | 2.0 | 3717 | | 55% | | | |
| 28 | 7.09 | 56 | | 0.5 | 4666 | | 51% | | | |
| 29 | 7.03 | 52 | 98 | 0.5 | 3838 | 7233 | 48% | 51% | | |
| 30 | 7.01 | 50 | | 3.0 | 3599 | | 53% | | | |
| 31 | | | | | | | | | | |
| AVG | 7.16 | 49 | 104 | 0.6 | 3969 | 8430 | 52% | 15% | 15 | 1367.3 |
| MIN | 7.01 | 32 | 98 | 0.1 | 2705 | 7233 | 33% | -11% | 15 | 1367.3 |
| MAX | 7.31 | 62 | 113 | 3.0 | 5469 | 10301 | 69% | 51% | 15 | 1367.3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PERMIT REQUIRMENTS | MAX | monthly avg | 7 | 60 | 80 | 1 | 6008 | 8011 |
| | 12 | daily max | 9 | 120 | 160 | 2 | 12016 | 16022 |

**VIOLATIONS**
BOD
SETTLEABLE SOLIDS

4/12/00

INDUSTRIAL USER SURVEY FORM

(Includes 1999 results)

8

# GUAM WATERWORKS AUTHORITY

**Government of Guam**

**Post Office Box 3010, Agana, Guam 96932**

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


**Statement of Veracity**

I certify that under penalty of law that I have personally examined and am familiar with the information submitted in the attached document(s) and, based on my inquiry of those individuals immediately responsible for obtaining the information. I am convinced that the information is true, accurate and correct. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Richard A. Quintanilla
General Manager

# INTRODUCTION

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Please advise me if additional information is needed to complete the application process.

Sincerely,

Richard A. Quintanilla
General Manager

cc: Director, Bureau of Planning
Administrator, Guam EPA
Director, Department of Agriculture

# GUAM WATERWORKS AUTHORITY

**Government of Guam**

**Post Office Box 3010, Agana, Guam 96932**

**Phone: (671)479-7813 Fax: (671)479-7879**


MAR 27 1998

Lily Ning Lee
Guam Program Manager
U.S. Environmental Protection Agency
Pacific Insular Areas Program
75 Hawthorne Street (CMD-5)
San Francisco, Ca. 94105

Re: 301 (h) Modified Permit Application for Northern District STP

Dear Lily:

Enclosed is the Guam Waterworks Authority's 301(h) Modified Permit Application for the Agana Sewage Treatment Plant.

This package contains a certification of veracity, a signed, completed NPDES application and a completed application questionnaire.

Included in the revised application package are the A/E and construction schedules for the Agana STP outfall extension. The A/E work - inclusive of the baseline study - has begun and although, funding has not yet been secured to construct the Agana outfall extension, GWA intends to identify funding sources to keep with the attached construction schedule (Appendix G). GWA is committed to extending the outfall to a point sufficient to demonstrate that no decrease in receiving water quality will occur and that water currents will not carry material back into the inner reef areas or to shore.

Copies of the attached will be forwarded to the local EPA office, Bureau of Planning and Department of Agriculture. These particular agencies oversee programs which may be impacted by GWA's discharge at Tanguisson Point. As such, in sections of the Application Questionnaire where input regarding their programs are requested, reference will be made to these letters of determination and forthcoming comments from these respective agencies.

The results of the Priority Pollutant Scan and the Industrial User Survey will be forwarded to your office as soon as GWA receives them and has completed its review of the resulting data.

# 301(h) MODIFIED PERMIT APPLICATION

## AGANA

## SEWAGE TREATMENT PLANT

END OF REVISED SECTION

# GWA COMMERCIAL WASTEWATER DISCHARGE SURVEY RESULTS

(October 15, 1999)

## I. Points of Interest Regarding the Survey

- The survey questionnaires were mailed out to all GWA commercial wastewater account holders during the first week of April 1999.
- The survey questionnaires were to be completed and mailed back to GWA NLT May 15, 1999; self-addressed, stamped envelopes were provided.
- During the interim, several calls regarding the survey were made to GWA.

## II. Statistical numbers

- Out of the approximately fifteen hundred (1500) surveys mailed out, three hundred sixty-six (366) were returned to GWA.
- When responding to the question "Do you discharge any non-domestic wastewater into the sewer system?" (survey question #5) – question that allowed respondents to forego the remaining survey questions and simply sign the acknowledgement on the last page – three hundred forty-six (346) replied "No" and twenty (20) replied "Yes."

## III. Breakdown of the Principal Service or Product of Business that responded to the survey

Hotel water park
Hemodialysis center
Laundromat
Manufacturer of soft drinks, ice, bottle water
Dental clinic
Wholesale/Retail of Fresh Seafood
Restaurant/Food court (water softener)
Daycare center (water softener)
Newspaper publisher
Commercial building (water softener)
Diagnostic Laboratory
Optical Laboratory
Medical Clinic
Pharmacy

16. STATEMENT OF RESPONSIBILITY:

THIS IS TO CERTIFY THAT THE UNDERSIGNED RESPONSIBLE OFFICIAL REPRESENTING

_____, IS FAMILIAR AND KNOWLEDGEABLE WITH QUESTIONS CONTAINED

(Company)

HEREIN, AND THAT THIS QUESTIONNAIRE HAS BEEN COMPLETED IN ITS ENTIRETY AND IS CERTIFIED TO BE

TRUE AND CORRECT TO THE BEST OF KNOWLEDGE AND ABILITY

NAME: _____

(Please print)

SIGNATURE: _____

DATE: _____

TITLE: _____

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

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

[ ] Acenapthene
[ ] Acenapthylene (PAH)
[ ] Acrolein
[ ] Acrylonitrile
[ ] Aldrin
[ ] Antimony
[ ] Anthracene
[ ] Arsenic
[ ] Asbestos (Halomethanes)
[ ] 1,2 Benzanthracene (PAH)
[ ] Benzene
[ ] Benzidine
[ ] Benzo (A) Pyrene (3,4-Benzo-Pyrene) (PAH)
[ ] 3,4 Benzofluoranthene (PAH)
[ ] Benzo (K) Fluoranthene (PAH)
[ ] 1,12 Benzoperylene (PAH)
[ ] Beryllium
[ ] Bromoform (Tribromomethane)
[ ] Bromomethane (Methyl Bromide)
] 4-Bromophenyl Phenyl Ether
[ ] Cadmium
[ ] Carbon Tetrachloride (Tetrachloromethane)
[ ] Chlordane
[ ] Chlorobenzene (Monochloro-Benzene)
[ ] Chlorodibromomethane (Halomethane)
[ ] 1,2 Dichlorobenzene
[ ] 1,3 Dichlorobenzene
[ ] 1,4 Dichlorobenzene
[ ] 3,3 Dichlorobenzidine
[ ] Dichloroethane 1,1
[ ] Dichloroethane 1,2
[ ] 1,1 Dichloroethylene
[ ] 1,2-Trans-Dichloroethylene
[ ] Dichlorobromomethane
[ ] Dichloromethane (Halomethanes)
[ ] 2,4-Dichlorophenol
[ ] Dichloropropane 1,2
[ ] Dichloropropene 1,3
[ ] Dieldrin
[ ] Dimethylphenol 2,4
Diethylphthalate
Dimethylphthalate
[ ] Dinitrotoluene 2,4
[ ] Dinitrotoluene 2,6
[ ] 2,4 Dinitrophenol

[ ] Dioxine (2,3,7,8-TCDD)
[ ] Diphenylhydrazine 1,2
[ ] Alpha Endosulfan
[ ] Beta Endosulfan
[ ] Endosulfan Sulfate
[ ] Endrin
[ ] Endrin Aldehyde
[ ] Ethylbenzene
[ ] Chlorethane (Monochloroethane)
[ ] Chlorothyl Ether (Bis-2)
[ ] 1 Chloroethoxy Methane (Bis-2)
[ ] 2 Chloroethyl Vinyl Ether
[ ] 4-Chloro-3-Methylphenol
[ ] Chloromethane (Methyl Chloride)
[ ] Chloroform Trichloromethane
[-] 2 Chlorophenol
[ ] Chloroisopropyl Ether (Bis-2)
[ ] 2 Chloronaphthalene
[ ] 4-Chlorophenyl Ether
[ ] Chromium (HEX)
[ ] Chromium (TRI)
[ ] Oil / Grease (animal or vegetable origin)
[ ] Oil / Grease (mineral origin)
[ ] Petroleum or petroleum products
[ ] Chrysene (PAH)
[ ] Copper
[ ] pH decrease
[ ] pH increase
[ ] 4,4 DDT
[ ] 4,4 DDE
[ ] 4,4 DDD
[ ] Dibenzo (a,h) Anthracene (PAH)
[ ] 2 Nitrophenol
[ ] 4 Nitrophenol
[ ] 4, 6-Dinitro-2-Methylphenol
[ ] Nitrosodimenthylamine N
[ ] Nitrosodimenthylamine-N
[ ] Nitrosodi-N-Propylamine-N
[ ] PCB 1242
[ ] PCB 1254
[ ] PCB 1221
[ ] PCB 1232
Temperature decrease
- _____ F
Temperature increase
+ _____ F
[ ] PCB 1248
[ ] PCB 1260
[ ] PCB 1016

[ ] Fluorene (PAH)
[ ] Fluoranthene
[ ] Heptachlor
[ ] Heptachlor Epoxide
[ ] Hexachloroethane
[ ] Hexachlorobenzene
[ ] Hexachlorobutadiene
[ ] Hexachlorocyclohexane (lindane)
[ ] Hexachlorocyclohexane (Alpha)
[ ] Hexachlorocyclohexane (Beta)
[ ] Hexachlorocyclohexane (Delta)
[ ] Hexachlorocyclopentadiene
[ ] Indeno (1,2,3-cd) Pyrene (PAH)
[ ] Isophorone
[ ] Lead
[ ] Mercury
[ ] Naphthalene
[ ] Nickel
[ ] Nitrobenzene
[ ] Di-N-Butyl Phthalate
[ ] Di-N-Octyl-Phthalate
[ ] Pyrene (PAH)
[ ] Selenium
[ ] Silver
[ ] Tetracholoethane 1,1,2,2
[ ] Tetrachloroethylene
[ ] Thallium
[ ] Toluene
[ ] Toxaphene
[ ] 1,2,4 Trichlorobenzene
[ ] Trichloroethane 1,1,1
[ ] Trichloroethane 1,1,2
[ ] Trichloroethylene
[ ] Phenol
[ ] Pentachlorophenol
[ ] Phenanthrene (PAH)
[ ] Bis (2 Ethyl Hexyl)
[ ] Phthalate
[ ] Butyl Benzyl Phthalate
[ ] Trichlorophenol 2,4,6
[ ] Vinyl Chloride (Chloroethylene)
[ ] Zinc

OTHER COMPOUNDS NOT LISTED:
[ ] _____
[ ] _____
[ ] _____
[ ] _____
[ ] _____

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

[ ] CONTINUOUS

AVERAGE DAILY FLOW: _____ GALLONS PER DAY

[ ] INTERMITTENT

AVERAGE QUANTITY PER DISCHARGE: _____ GALLONS

AVERAGE NUMBER OF DISCHARGES PER DAY: _____

[ ] BATCH

AVERAGE QUANTITY PER DISCHARGE: _____ GALLONS

AVERAGE NUMBER OF DISCHARGES PER DAY: _____

11. INDICATE THE APPROXIMATE TIMES THAT DISCHARGES OCCUR:

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

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

14. ADDITIONAL INFORMATION ON YOUR OPERATION:

## COMMERCIAL WASTEWATER DISCHARGE SURVEY

Completion of this questionnaire is required for all GWA commercial account wastewater dischargers. Please mail in the completed form no later than May 15, 1999. A self-addressed, stamped envelope is included.

PLEASE TYPE OR PRINT LEGIBLY. (NOTE: GWA will follow-up incomplete and illegible questionnaires by phone or official letter). Should you have any questions or need assistance in completing this questionnaire, please call GWA's Planning Division at 479-7833 or 479-7605 between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday. Thank you for your cooperation and timely response.

1. NAME OF BUSINESS (as it appears on GWA account): _____

MAILING ADDRESS: _____

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

_____

3. YOUR PRINCIPAL SERVICE OR PRODUCT OF BUSINESS: _____

4. NAME OF INDIVIDUAL (WITHIN YOUR BUSINESS) WHO WE SHOULD CONTACT CONCERNING YOUR WASTEWATER DISCHARGE INTO THE PUBLIC SEWER:

NAME: _____

TITLE: _____

TELEPHONE NUMBER: _____

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

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

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

_____

_____

_____

_____

7. DESCRIBE ANY WATER CONDITIONING PROCESSES USED AT THIS FACILITY (SUCH AS WATER SOFTENING, REVERSE OSMOSIS, FILTRATION):

_____

_____

_____

_____

8. INDICATE (BY CHECKMARK) OPERATION SHIFTS NORMALLY WORKED EACH DAY:

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

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

A

NPDES APPLICATION

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# NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
# APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

## STANDARD FORM A – MUNICIPAL

### SECTION I. APPLICANT AND FACILITY DESCRIPTION

Unless otherwise specified on this form all items are to be completed. If an item is not applicable indicate 'NA.'

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

*Please Print or Type*

| | | |
|---|---|---|
| 1. Legal Name of Applicant (see instructions) | 101 | Public Utility Agency of Guam |
| 2. Mailing Address of Applicant (see instructions) Number & Street | 102a | P.O. Box 3010 |
| City | 102b | Agana |
| State | 102c | Guam |
| Zip Code | 102d | 96910 |
| 3. Applicant's Authorized Agent (see instructions) Name and Title | 103a | |
| Number & Street | 103b | P.O. Box 3010 |
| City | 103c | Agana |
| State | 103d | Guam |
| Zip Code | 103e | 96910 |
| Telephone | 103f | 671 (Area Code) 646-8891-5 (Number) |
| 4. Previous Application If a previous application for a permit under the National Pollutant Discharge Elimination System has been made, give the date of application. | 104 | YR MO DAY |

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete, and accurate.

Joseph F. Mesa
Printed Name of Person Signing

102e Chief Officer, PUAG
Title

Signature of Applicant or Authorized Agent

102f 28 DEC 1990
YR MO DAY
Date Application Signed

*18 U.S.C. Section 1001 provides that:*

*Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and wilfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statement or representation, or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.*

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Received ___ ___ ___
YR MO DAY

OFFICE: ___ EPA Region Number
___ State

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OMB No. 158-R0100

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| | | Number of Discharge Points | | Total Volume Discharged, Million Gallons Per Day |
|---|---|---|---|---|
| To: Surface Water | 107a1 | 1 | 107a2 | |
| Surface Impoundment with no Effluent | 107b1 | N/A | 107b2 | N/A |
| Underground Percolation | 107c1 | N/A | 107c2 | N/A |
| Well (Injection) | 107d1 | N/A | 107d2 | N/A |
| Other | 107e1 | N/A | 107e2 | N/A |
| Total Item 7 | 107f1 | 1 | 107f2 | |
| If 'other' is specified, describe | 107g1 | | | |

If any of the discharges from this facility are intermittent, such as from overflow or bypass points, or are seasonal or periodic from lagoons, holding ponds, etc., complete Item 8.

8. Intermittent Discharges

a. Facility bypass points Indicate the number of bypass points for the facility that are discharge points. (see instructions) — 108a: 1

b. Facility Overflow Points Indicate the number of overflow points to a surface water for the facility (see instructions). — 108b: None

c. Seasonal or Periodic Discharge Points Indicate the number of points where seasonal discharges occur from holding ponds, lagoons, etc. — 108c: None

9. Collection System Type Indicate the type and length (in miles) of the collection system used by this facility. (see instructions) — 109a

- Separate Storm — ☐ SST
- Separate Sanitary — ☒ SAN
- Combined Sanitary and Storm — ☐ CSS
- Both Separate Sanitary and Combined Sewer Systems — ☐ BSC
- Both Separate Storm and Combined Sewer Systems — 109b ☐ SSC
- Length — _____ miles

10. Municipalities or Areas Served (see instructions)

| | Name | | Actual Population Served |
|---|---|---|---|
| 110a | Asan/Piti | 110b | 4,645 |
| 110a | Central Guam | 110b | 43,680 |
| 110a | Tamuning | 110b | 18,500 |
| 110a | Yona | 110b | 3,320 |
| 110a | Military | 110b | 12,700 |
| Total Population Served | | 110c | 82,845 |

| FOR AGENCY USE |
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11. Average Daily Industrial Flow
Enter estimated average daily waste flow from all industrial sources. | 111 | _____ mgd

Note: All major industries (as defined in Section IV) discharging to the municipal system must be listed in Section IV.

12. Permits, Licenses and Applications
List all existing, pending or denied permits, licenses and applications related to discharges from this facility. (see instructions)

| 112 | Issuing Agency (a) | For Agency Use (b) | Type of Permit or License (c) | ID Number (d) | Date Filed YR/MO/DA (e) | Date Issued YR/MO/DA (f) | Date Denied YR/MO/DA (g) | Expiration Date YR/MO/DA (h) |
|---|---|---|---|---|---|---|---|---|
| 1. | | | | | | | | |
| | | | | | | | | |
| 2. | | | | | | | | |
| | | | | | | | | |
| 3. | | | | | | | | |
| | | | | | | | | |

13. Maps and Drawings
Attach all required maps and drawings to the back of this application. (see instructions)

14. Additional Information

| 114 Item Number | Information |
|---|---|
| | |
| | |
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# STANDARD FORM A—MUNICIPAL

## SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each present or proposed discharge indicated in Section I, Items 7 and 8, that is to surface waters. This includes discharges to other municipal sewerage systems in which the waste water does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. Separate descriptions of each discharge are required even if several discharges originate in the same facility. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

| | | |
|---|---|---|
| 1. Discharge Serial No. and Name<br>a. Discharge Serial No. (see instructions) | 201a | 001 |
| b. Discharge Name<br>Give name of discharge, if any (see instructions) | 201b | Agana Sewage Outfall |
| c. Previous Discharge Serial No<br>If a previous NPDES permit application was made for this discharge (Item 4, Section I) provide previous discharge serial number. | 201c | Gu 0020087 |
| 2. Discharge Operating Dates<br>a. Discharge to Begin Date<br>If the discharge has never occurred but is planned for some future date, give the date the discharge will begin. | 202a | 90 (YR) R (MO) |
| b. Discharge to End Date If the discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end. Give reason for discontinuing this discharge in Item 17. | 202b | N/A (YR) (MO) |
| 3. Discharge Location Name the political boundaries within which the point of discharge is located: | | |
| State | 203a | Guam |
| County | 203b | N/A |
| (if applicable) City or Town | 203c | Agana |
| 4. Discharge Point Description (see instructions)<br>Discharge is into (check one) | | |
| Stream (includes ditches, arroyos, and other watercourses) | 204a | ☐ STR |
| Estuary | | ☐ EST |
| Lake | | ☐ LKE |
| Ocean | | ☒ OCE |
| Well (Injection) | | ☐ WEL |
| Other | | ☐ OTH |
| If 'other' is checked, specify type | 204b | |
| 5. Discharge Point — Lat/Long.<br>State the precise location of the point of discharge to the nearest second. (see instructions) | | |
| Latitude | 205a | 13 DEG. 29 MIN. 3.3 SEC |
| Longitude | 205b | 144 DEG. 44 MIN. 37.1 SEC |

Agency Use

| | | |
|---|---|---|
| 203d | | |
| 203e | | |
| 203f | | |

DISCHARGE SERIAL NUMBER

001

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6. Discharge Receiving Water Name
Name the waterway at the point of discharge.(see instructions)

206a Agana Bay (Philippine Sea)

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete item 7.

206b

| For Agency Use | | |
|---|---|---|
| Major | Minor | Sub |
| | | |

206c

| For Agency Use |
|---|
| 303e |
| |

7. Offshore Discharge

a. Discharge Distance from Shore 207a 2,875 feet

b. Discharge Depth Below Water Surface 207b 85 feet

If discharge is from a bypass or an overflow point or is a seasonal discharge from a lagoon, holding pond, etc., complete items 8, 9 or 10, as applicable, and continue with item 11.

8. Bypass Discharge (see instructions)

a. Bypass Occurrence
Check when bypass occurs

Wet weather 208a1 ☒ Yes ☐ No

Dry weather 208a2 ☐ Yes ☒ No

b. Bypass Frequency Give the actual or approximate number of bypass incidents per year.

Wet Weather 208b1 1 times per year

Dry weather 208b2 4 times per year

c. Bypass Duration Give the average bypass duration in hours.

Wet weather 208c1 1-3 hours

Dry weather 208c2 ____ hours

d. Bypass Volume Give the average volume per bypass incident, in thousand gallons.

Wet weather 208d1 ____ thousand gallons per incident

Dry weather 208d2 ____ thousand gallons per incident

e. Bypass Reasons Give reasons why bypass occurs. 208e Heavy Rain, pump repair at Agana Main P.S., renovation of flap valve at Agana T.P. and sometimes due to power outage

Proceed to Item 11.

9. Overflow Discharge (see instructions)

a. Overflow Occurrence Check when overflow occurs.

Wet weather 209a1 ☐ Yes ☒ No

Dry weather 209a2 ☐ Yes ☒ No

b. Overflow Frequency Give the actual or approximate incidents per year.

Wet weather 209b1 N/A times per year

Dry weather 209b2 N/A times per year

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DISCHARGE SERIAL NUMBER

_____

c. **Overflow Duration** Give the average overflow duration in hours.

| | | |
|---|---|---|
| Wet weather | 209c1 | N/A hours |
| Dry weather | 209c2 | N/A Hours |

d. **Overflow Volume** Give the average volume per overflow incident in thousand gallons.

| | | |
|---|---|---|
| Wet weather | 209d1 | N/A thousand gallons per incident |
| Dry weather | 209d2 | N/A thousand gallons per incident |

Proceed to Item 11

10. **Seasonal/Periodic Discharges**

a. **Seasonal/Periodic Discharge Frequency** If discharge is intermittent from a holding pond, lagoon, etc., give the actual or approximate number of times this discharge occurs per year. — 210a — N/A times per year

b. **Seasonal/Periodic Discharge Volume** Give the average volume per discharge occurrence in thousand gallons. — 210b — N/A thousand gallons per discharge occurrence

c. **Seasonal/Periodic Discharge Duration** Give the average duration of each discharge occurrence in days. — 210c — _____ days

d. **Seasonal/Periodic Discharge Occurrence—Months** Check the months during the year when the discharge normally occurs. — 210d

☐ JAN ☐ FEB ☐ MAR
☐ APR ☐ MAY ☐ JUN
☐ JUL ☐ AUG ☐ SEP
☐ OCT ☐ NOV ☐ DEC

11. **Discharge Treatment**

a. **Discharge Treatment Description** Describe waste abatement practices used on this discharge with a brief narrative. (See instructions) — 211a

_____

DISCHARGE SERIAL NUMBER

FOR AGENCY USE

| | | |
|---|---|---|
| b. Discharge Treatment Codes Using the codes listed in Table I of the Instruction Booklet, describe the waste abatement processes applied to this discharge in the order in which they occur, if possible. Separate all codes with commas except where slashes are used to designate parallel operations. | 211b | SC, G, M, C, D, T, VC, X, N |

If this discharge is from a municipal waste treatment plant (not an overflow or bypass), complete items 12 and 13

| | | |
|---|---|---|
| 12. Plant Design and Operation Manuals Check which of the following are currently available | | |
| a. Engineering Design Report | 212a | ☐ |
| b. Operation and Maintenance Manual | 212b | ☒ |
| 13. Plant Design Data (see instructions) | | |
| a. Plant Design Flow (mgd) | 213a | 17.0 mgd |
| b. Plant Design BOD Removal (%) | 213b | 25.40 % |
| c. Plant Design N Removal (%) | 213c | % |
| d. Plant Design P Removal (%) | 213d | % |
| e. Plant Design SS Removal (%) | 213e | 40-60 % |
| f. Plant Began Operation (year) | 213f | 1979 |
| g. Plant Last Major Revision (year) | 213g | N/A |

DISCHARGE SERIAL NUMBER

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14. Description of Influent and Effluent (see instructions)

| Parameter and Code 214 | Influent | Effluent | | | | | |
|---|---|---|---|---|---|---|---|
| | Annual Average Value (1) | Annual Average Value (2) | Lowest Monthly Average Value (3) | Highest Monthly Average Value (4) | Frequency of Analysis (5) | Number of Analyses (6) | Sample Type (7) |
| Flow Million gallons per day 50050 | 8.83 | 8.83 | 7.79 | 9.79 | 7 Day/Wk | 365 | Composite |
| pH Units 00400 | | | 7.00 | 7.30 | 253/365 | | Composite |
| Temperature (winter) °F 74028 | N/A | N/A | | | | | |
| Temperature (summer) °F 74027 | N/A | N/A | | | | | |
| Fecal Streptococci Bacteria Number/100 ml 74054 (Provide if available) | | | | N/A | | | |
| Fecal Coliform Bacteria Number/100 ml 74055 (Provide if available) | | | | N/A | | | |
| Total Coliform Bacteria Number/100 ml 74056 (Provide if available) | | | | N/A | | | |
| BOD 5-day mg/l 00310 | 128 | 79.9 | 58.4 | 107 | 44/365 | | Composite |
| Chemical Oxygen Demand (COD) mg/l 00340 (Provide if available) | N/A | N/A | | | | | |
| OR | | | | | | | |
| Total Organic Carbon (TOC) mg/l 00680 (Provide if available) (Either analysis is acceptable) | N/A | N/A | | | | | |
| Chlorine—Total Residual mg/l 50060 | N/A | N/A | | | | | |

DISCHARGE SERIAL NUMBER

FOR AGENCY USE

14. Description of Influent and Effluent (see instructions) (Continued)

| Parameter and Code 214 | Influent | Effluent | | | | | |
|---|---|---|---|---|---|---|---|
| | Annual Average Value (1) | Annual Average Value (2) | Lowest Monthly Average Value (3) | Highest Monthly Average Value (4) | Frequency of Analysis (5) | Number of Analyses (6) | Sample Type (7) |
| Total Solids mg/l 00500 | N/A | | | | | | |
| Total Dissolved Solids mg/l 70300 | N/A | | | | | | |
| Total Suspended Solids mg/l 00530 | 97.3 | 54.6 | 37.6 | 68.0 | 253/365 | | Composite |
| Settleable Matter (Residue) ml/l 00545 | | 0.76 | 0.58 | 1.0 | 253/365 | | Grab |
| Ammonia (as N) mg/l 00610 (Provide if available) | N/A | | | | | | |
| Kjeldahl Nitrogen mg/l 00625 (Provide if available) | N/A | | | | | | |
| Nitrate (as N) mg/l 00620 (Provide if available) | N/A | | | | | | |
| Nitrite (as N) mg/l 00615 (Provide if available) | N/A | | | | | | |
| Phosphorus Total (as P) mg/l 00665 (Provide if available) | | N/A | | | | | |
| Dissolved Oxygen (DO) mg/l 00300 | | N/A | | | | | |

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15. Additional Wastewater Characteristics
Check the box next to each parameter if it is present in the effluent. (see instructions)

| Parameter (215) | Present | Parameter (215) | Present | Parameter (215) | Present |
|---|---|---|---|---|---|
| Bromide 71870 | | Cobalt 01037 | | Thallium 01059 | |
| Chloride 00940 | | Chromium 01034 | | Titanium 01152 | |
| Cyanide 00720 | | Copper 01042 | | Tin 01102 | |
| Fluoride 00951 | | Iron 01045 | | Zinc 01092 | |
| Sulfide 00745 | | Lead 01051 | | Algicides* 74051 | |
| Aluminum 01105 | | Manganese 01055 | | Chlorinated organic compounds* 74052 | |
| Antimony 01097 | | Mercury 71900 | | Oil and grease 00550 | X |
| Arsenic 01002 | | Molybdenum 01062 | | Pesticides* 74053 | |
| Beryllium 01012 | | Nickel 01067 | | Phenols 32730 | |
| Barium 01007 | | Selenium 01147 | | Surfactants 38260 | |
| Boron 01022 | | Silver 01077 | | Radioactivity* 74050 | |
| Cadmium 01027 | | | | | |

*Provide specific compound and/or element in Item 17, if known.

Pesticides (Insecticides, fungicides, and rodenticides) must be reported in terms of the acceptable common names specified in *Acceptable Common Names and Chemical Names for the Ingredient Statement on Pesticide Labels*, 2nd Edition, Environmental Protection Agency, Washington, D.C. 20250, June 1972, as required by Subsection 162.7(b) of the Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.

DISCHARGE SERIAL NUMBER

16. **Plant Controls** Check if the following plant controls are available for this discharge

Alternate power source for major pumping facility including those for collection system lift stations

Alarm for power or equipment failure

210

☒ APS Some pump stations are provided

☒ ALM

FOR AGENCY USE

17. **Additional Information**

217

| Item Number | Information |
|---|---|
| | |

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# STANDARD FORM A–MUNICIPAL

## SECTION III. SCHEDULED IMPROVEMENTS AND SCHEDULES OF IMPLEMENTATION

This section requires information on any uncompleted implementation schedule which has been imposed for construction of waste treatment facilities. Requirement schedules may have been established by local, State, or Federal agencies or by court action. IF YOU ARE SUBJECT TO SEVERAL DIFFERENT IMPLEMENTATION SCHEDULES, EITHER BECAUSE OF DIFFERENT LEVELS OF AUTHORITY IMPOSING DIFFERENT SCHEDULES (ITEM 1b) AND/OR STAGED CONSTRUCTION OF SEPARATE OPERATIONAL UNITS (ITEM 1c), SUBMIT A SEPARATE SECTION III FOR EACH ONE.

| FOR AGENCY USE |
|---|
| Sched. No. _____ |

1. Improvements Required

a. Discharge Serial Numbers Affected List the discharge serial numbers, assigned in Section II, that are covered by this implementation schedule — 300

b. Authority Imposing Requirement Check the appropriate item indicating the authority for the implementation schedule If the identical implementation schedule has been ordered by more than one authority, check the appropriate items. (see instructions) — 301a: GEPA ____ USEPA ____ ____

| | | |
|---|---|---|
| Locally developed plan | 301b | ☐ LOC |
| Areawide Plan | | ☐ ARE |
| Basin Plan | | ☐ BAS |
| State approved implementation schedule | | ☐ SQS |
| Federal approved water quality standards implementation plan | | ☒ WQS |
| Federal enforcement procedure or action | | ☐ ENF |
| State court order | | ☐ CRT |
| Federal court order | | ☐ FED |

c. Improvement Description Specify the 3-character code for the General Action Description in Table II that best describes the improvements required by the implementation schedule. If more than one schedule applies to the facility because of a staged construction schedule, state the stage of construction being described here with the appropriate general action code. submit a separate Section III for each stage of construction planned. Also, list all the 3-character (Specific Action) codes which describe in more detail the pollution abatement practices that the implementation schedule requires.

| | | |
|---|---|---|
| 3-character general action description | 301c | NEW |
| 3-character specific action descriptions | 301d | PRI / DIS / SLP / SLD / OUT |

2. Implementation Schedule and 3. Actual Completion Dates

Provide dates imposed by schedule and any actual dates of completion for implementation steps listed below. Indicate dates as accurately as possible. (see instructions)

| Implementation Steps | | 2. Schedule (Yr /Mo /Day) | | 3. Actual Completion (Yr /Mo /Day) |
|---|---|---|---|---|
| a. Preliminary plan complete | 302a | 71 / 4 / ___ | 302a | 71 / 4 / ___ |
| b. Final plan complete | 302b | 72 / 5 / 10 | 302b | 22 / 5 / 10 |
| c. Financing complete & contract awarded | 302c | ___ / ___ / ___ | 302c | ___ / ___ / ___ |
| d. Site acquired | 302d | ___ / ___ / ___ | 302d | ___ / ___ / ___ |
| e. Begin construction | 302e | 25 / 10 / ___ | 302e | 76 / 4 / 5 |
| f. End construction | 302f | 78 / 3 / 25 | 302f | 78 / 10 / 31 |
| g. Begin Discharge | 302g | 79 / 8 / ___ | 302g | 79 / 8 / ___ |
| h. Operational level attained | 302h | ___ / ___ / ___ | 302h | ___ / ___ / ___ |

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# STANDARD FORM A—MUNICIPAL

## SECTION IV. INDUSTRIAL WASTE CONTRIBUTION TO MUNICIPAL SYSTEM

Submit a description of each major industrial facility discharging to the municipal system, using a separate Section IV for each facility description. Indicate the 4 digit Standard Industrial Classification (SIC) Code for the industry, the major product or raw material, the flow (in thousand gallons per day), and the characteristics of the wastewater discharged from the industrial facility into the municipal system. Consult Table III for standard measures of products or raw materials. (see instructions)

1. **Major Contributing Facility** (see instructions)

| | | |
|---|---|---|
| Name | 401a | |
| Number & Street | 401b | |
| City | 401c | |
| County | 401d | |
| State | 401e | |
| Zip Code | 401f | |

2. **Primary Standard Industrial Classification Code** (see instructions) — 402 _____

3. **Principal Product or Raw Material** (see instructions)

| | | | | Quantity | | Units (See Table III) |
|---|---|---|---|---|---|---|
| Product | 403a | | 403c | | 403e | |
| Raw Material | 403b | | 403d | | 403f | |

4. **Flow** Indicate the volume of water discharged into the municipal system in thousand gallons per day and whether this discharge is intermittent or continuous.
   - 404a _____ thousand gallons per day
   - 404b ☐ Intermittent (int) ☐ Continuous (con)

5. **Pretreatment Provided** Indicate if pretreatment is provided prior to entering the municipal system — 405 ☐ Yes ☐ No

6. **Characteristics of Wastewater** (see instructions)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 406a | Parameter Name | | | | | | | |
| | Parameter Number | | | | | | | |
| 406b | Value | | | | | | | |



This section contains 1 page.

EPA Form 7550-22 (7-73)
GPO 865-706

# APPLICATION

# QUESTIONNAIRE

# GENERAL INFORMATION

# AND

# BASIC DATA REQUIREMENTS

B

Treatment System Description

## A. Treatment System Description

1. Are you applying for a modification based on a current discharge, improved discharge, or altered discharge as defined in 40 CFR 125.58?

   Guam Waterworks Authority (GWA) is applying for a modification based on the current actual volume, composition, and location of 301(h) discharge for the Agana Sewage Treatment Plant. However, GWA is presently under contract with a local A/E firm to conduct the baseline survey and design a new ocean outfall. The new ocean outfall is schedule for completion by December 30, 2000.

2. Description of the Treatment/Outfall System

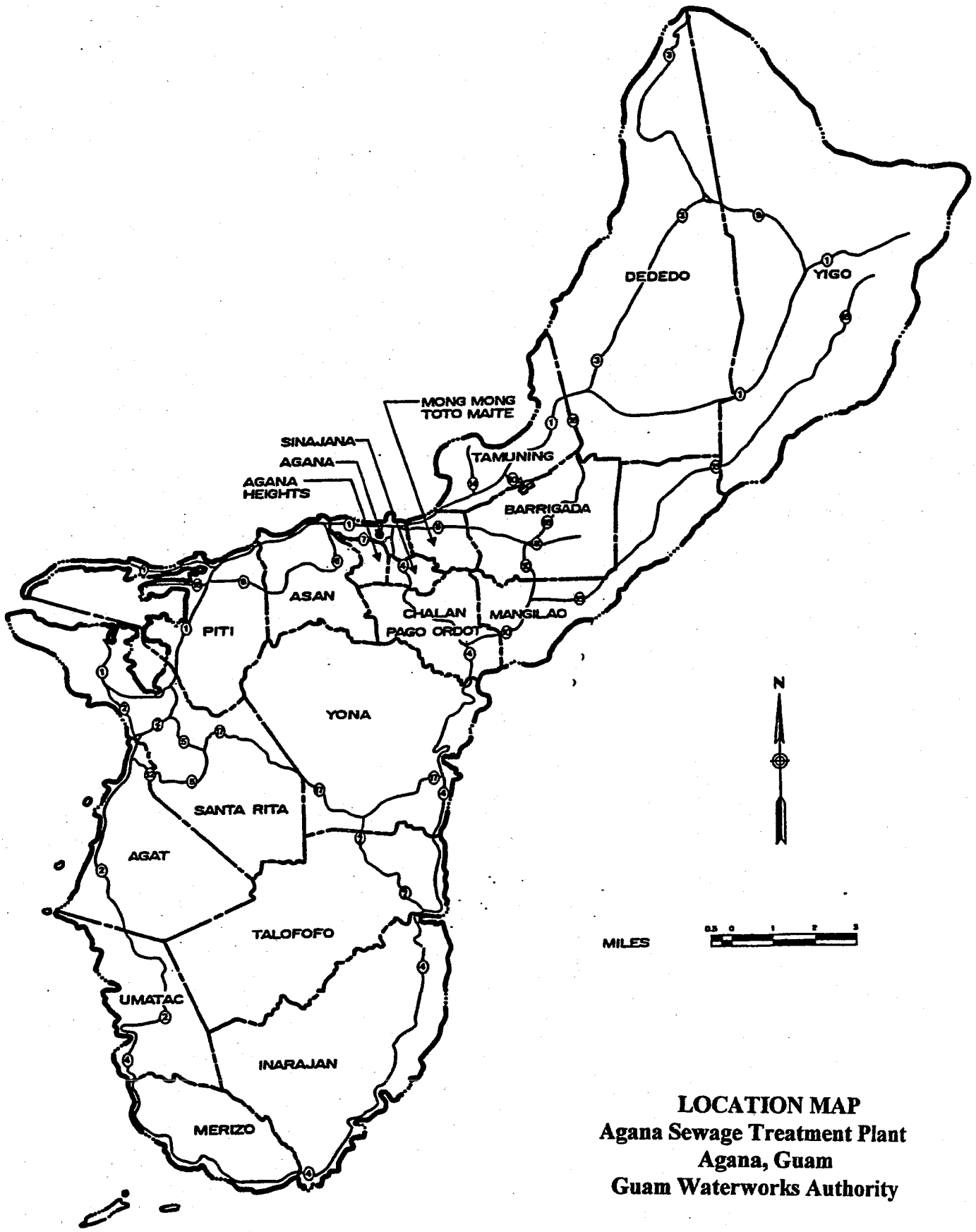
   In the middle of Agana Bay is built a seven acre, 500 by 700 foot primary sewage treatment plant. Figure 1 shows the location of the facility. Figures 2 shows the operating facility layout. Appendix L contains details of the plant's location in the central sewerage system.

   It is designed to treat a daily ultimate average flow of 12 million gallons per day (mgd) and remove 40 to 60 percent of suspended solids (ss) and 25 to 40 percent Biochemical Oxygen Demands (BODs) at a concentration of approximately 207 milligrams per liter (mg/l)ss. The peak design hydraulic capacity of the plant is 21 mgd. Table 1 provides design data for the ASTP.

   The system presently serves the municipalities of Agana, Agana Heights, Asan, Piti, Tamuning, Mongmong-Toto-Maite, Sinajana, Chalan Pago-Ordot and portions of Barrigada, Dededo, Mangilao and Yona. The service area is shown on Figure 3. Appendix L contains the "As Built" record drawing of this sewage collection and disposal system.

   The plant design is intended to satisfy the National Pollution Discharge Elimination System (NPDES) permit and the Water Quality Standards of the Guam Environmental Protection Agency (GEPA). On December 13, 1969, a ruling was approved by the Federal Water Pollution Control Administration (FWPCA) that "The Guam Water Pollution Control Commission in keeping with the policy statements of the Standards of Water Quality for the Waters of the Territory of Guam will accept primary treatment as a minimum for ocean outfalls, provided water current date is available to demonstrate no decrease in water quality will result...The data required will be that which is sufficient to demonstrate that the water currents will not carry material back to shore into the
   inner reef areas."

Figure 1




**LOCATION MAP**
**Agana Sewage Treatment Plant**
**Agana, Guam**
**Guam Waterworks Authority**

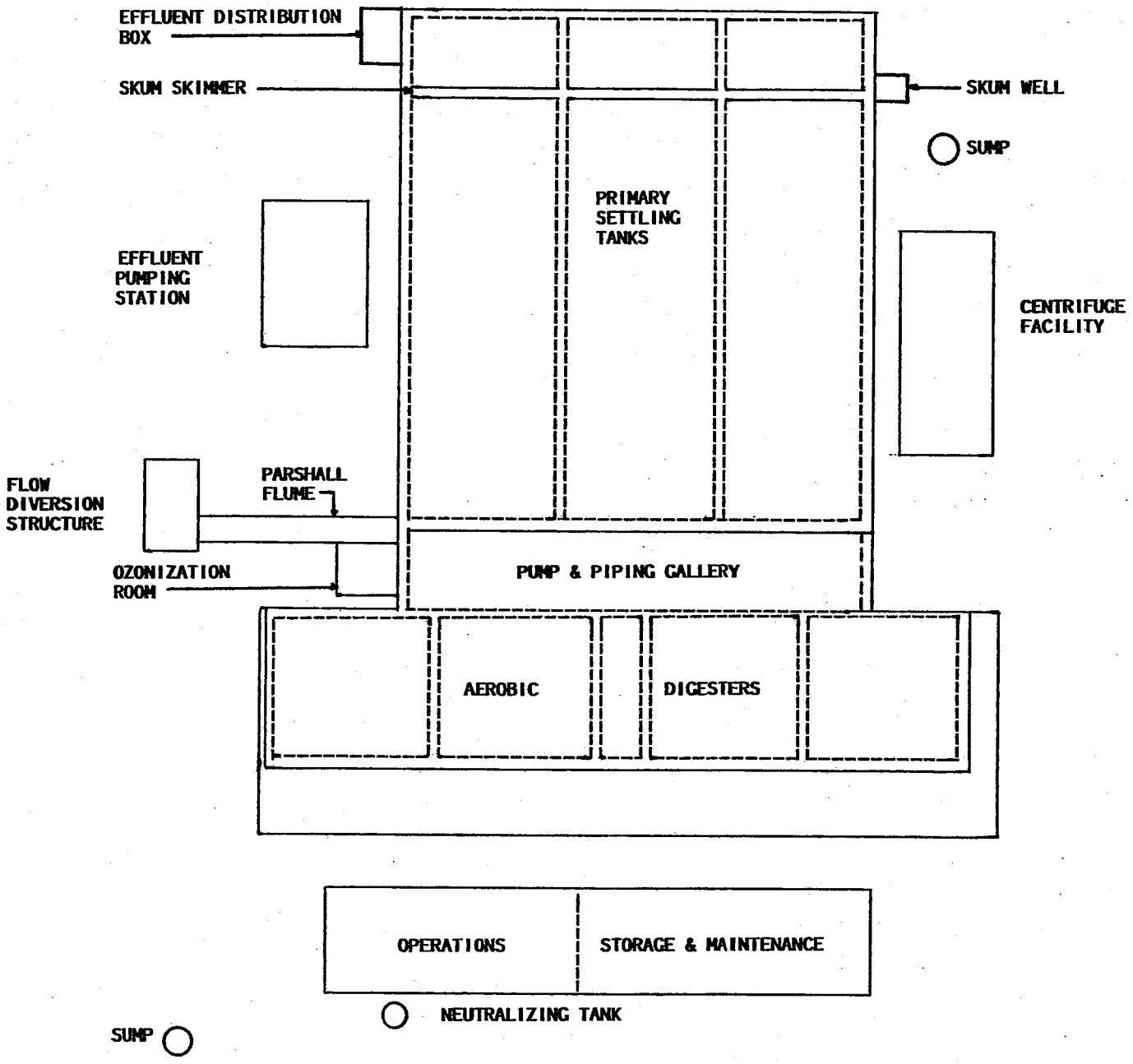
**VILLAGE BOUNDARIES**

## Design Data

## Agana Sewage Treatment Plant

| | |
|---|---|
| Design Flow | 12 mgd average<br>21 mgd maximum |
| Primary Clarifiers | |
| Surface Area | 10,700 $ft.^2$ |
| Volume | 85,700 $ft.^3$ |
| Chlorine Capacity | 3,000 lb./day |
| Effluent Pumping Capacity | 20 mgd |
| Aerobic Digester, Volume | 57,000 $ft.^3$ |
| Mechanical Aerators | 6,000 lb./day |
| Centrifuge | 1,500 lb./hour |

Source: Metcalf and Eddy, Inc.

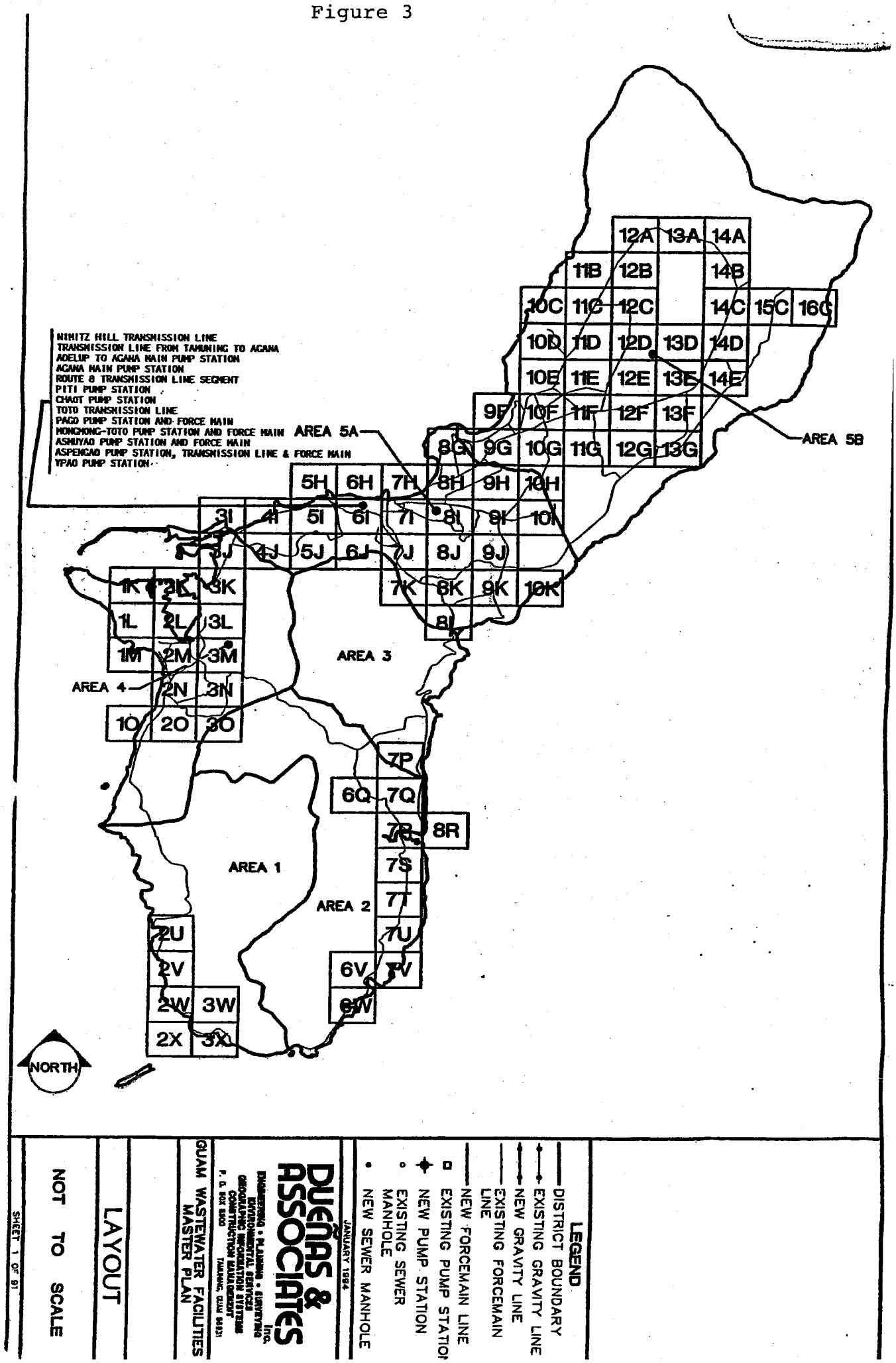



**PLOT PLAN**

**Agana Sewage Treatment Plant**

**Figure 2**

Figure 3


NIMITZ HILL TRANSMISSION LINE
TRANSMISSION LINE FROM TAMUNING TO AGANA
ADELUP TO AGANA MAIN PUMP STATION
AGANA MAIN PUMP STATION
ROUTE 8 TRANSMISSION LINE SEGMENT
PITI PUMP STATION
CHAOT PUMP STATION
TOTO TRANSMISSION LINE
PAGO PUMP STATION AND FORCE MAIN
MONGMONG-TOTO PUMP STATION AND FORCE MAIN
ASHUYAO PUMP STATION AND FORCE MAIN
ASPENGAO PUMP STATION, TRANSMISSION LINE & FORCE MAIN
YPAO PUMP STATION
AREA 5A
AREA 5B
AREA 3
AREA 4
AREA 1
AREA 2
NORTH
LEGEND
DISTRICT BOUNDARY
EXISTING GRAVITY LINE
NEW GRAVITY LINE
EXISTING FORCEMAIN LINE
NEW FORCEMAIN LINE
EXISTING PUMP STATION
NEW PUMP STATION
EXISTING SEWER MANHOLE
NEW SEWER MANHOLE
JANUARY 1984
DUENAS & ASSOCIATES Inc.
ENGINEERING • PLANNING • SURVEYING
ENVIRONMENTAL SERVICES
GEOGRAPHIC INFORMATION SYSTEMS
CONSTRUCTION MANAGEMENT
P. O. BOX 5900 TAMUNING, GUAM 96931
GUAM WASTEWATER FACILITIES MASTER PLAN
LAYOUT
NOT TO SCALE
SHEET 1 OF 91

The treatment process provides comminution of solids, primary sedimentation and pre-chlorination. The treated effluent is discharged through a 3,500 foot log outfall which extends 950 feet beyond the reef to a depth of 85 feet. The sludge collected from the sedimentation tanks undergoes aerobic digestion followed by dewatering in a mechanical centrifuge. The outfall has been operational through the outfall until the Agana treatment facility became operational in 1978.

Between January 1997 and December 1997, an average flow of 8.3 mgd was treated at the Agana treatment plant. Based upon the Bureau of Planning's year 2000 population projections and the data contained in the 1979 Wastewater Facilities Plan, the average daily flow to the Agana facility in the year 2000 is estimated to be 10 mgd. When the proposed "reroute" of the Liguan Terrace; Barrigada Height collector system and Fujita Pump Station was implemented in conjunction with the Sewage Reversion Project, average flows was reduced to 6.0 mgd. It is anticipated that the Agana treatment plant will have ample capacity to treat wastes through the year 2000.

The treatment processes incorporated at this facility include the following:

1. Pretreatment - comminution, screening, grit removal and chlorination.

2. Primary treatment - settling or sedimentation.

3. Sludge treatment - aerobic digesters and centrifugation.

More specifically, the units and facilities provided include:

Two comminutor units, bar screens installed above the comminutors, a grit removal facility, two chlorinators, raw sewage pumps, a parshall flume and a continuous recording device for influent flow measurement, three covered primary rectangular settling tanks for gravity settling of sewage solids, four aerobic digesters, two ozonators to deodorize the air from the settling tanks and aerobic digesters, two centrifuge units with related chemical feed facilities for mechanical dewatering of digested sludge, three effluent pumps, five primary sludge pumps to convey waste sludge from primary settling tanks to digestion tanks, one scum pump to convey scum from the primary settling tanks, and four digester sludge pumps to convey digested sludge to the centrifuge.

Basically, all incoming sewage flows are first passed through the existing comminutors and grit removal units at the existing main pump station. It then flows through a 36-inch pipe into an influent diversion structure. The flow is then measured as it flows through a parshall flume into the primary tanks.

From the primary settling tank the primary treated sewage flows into a pump station where the effluent is pumped into an effluent diversion structure.

The effluent is then discharge through an existing 36-inch outfall for final disposal. The primary sludge collected in the settling tank is pumped to the aerobic digesters. After the sludge is digested, it is dewatered by centrifuges and trucked to a sanitary landfill. Supernatant from the aerobic digester overflow tank and centrate from the centrifuge is returned to the primary settling tanks.

Efficiencies for sewage treatment plants are usually quantitatively assessed by the parameters of suspended solids(ss) and biochemical oxygen demand (BOD). For this plant which employs only primary settling tanks, suspended solids removal of 40 to 60 percent and BOD of 25 to 40 percent may be expected. Flow patterns through the plant is illustrated in Figure 4.

**Outfall System**

On or about January 12, 1988 heavy wave action from Typhoon Roy severely damaged the 36-inch concrete outfall pipe and its protective concrete-armor stone envelop. The major damage done was the complete destruction of a 48-foot section of the pipe at a location about halfway between the reef and the end of the outfall. At other locations, considerable damage was done to the protective envelope constructed around the outfall pipe. Soon thereafter, negotiations were begun with the Federal Emergency Management Administration (FEMA) to obtain the funding to replace the missing segment and repair the protective envelope to prevent future damage. In July 1988, FEMA funds in the amount of $545,000 were committed to the work, with almost and equal amount of local Guam funds stipulated to repair the envelope damage. At the time, work was progressing on the construction plans, and a report in late August 1988 by Guam EPA that the Agana Bay waters had recently become unacceptable polluted (presumably due to the broken outfall) put this regular project on a fast track to completion.

On September 14, 1988 Governor Joseph F. Ada declared a Public Health Emergency clearing the way for expediting of the work. On September 15, a local marine engineering company (J. Agi and Associates) was retained to assist GWA in a review capacity. On September 19 and 20, plans specification and a video take of an inspection dive of the outfall were given to each of six prospective contractors.

On September 22, four proposals were received for the work, and by September 27, a GWA selection committee had finished its evaluation and negotiations with the two contractors submitting the best proposal. The selected contractor was Healy Tibbitts Construction Company from San Francisco and the contract amount was $1,051,800.00.

Figure 4

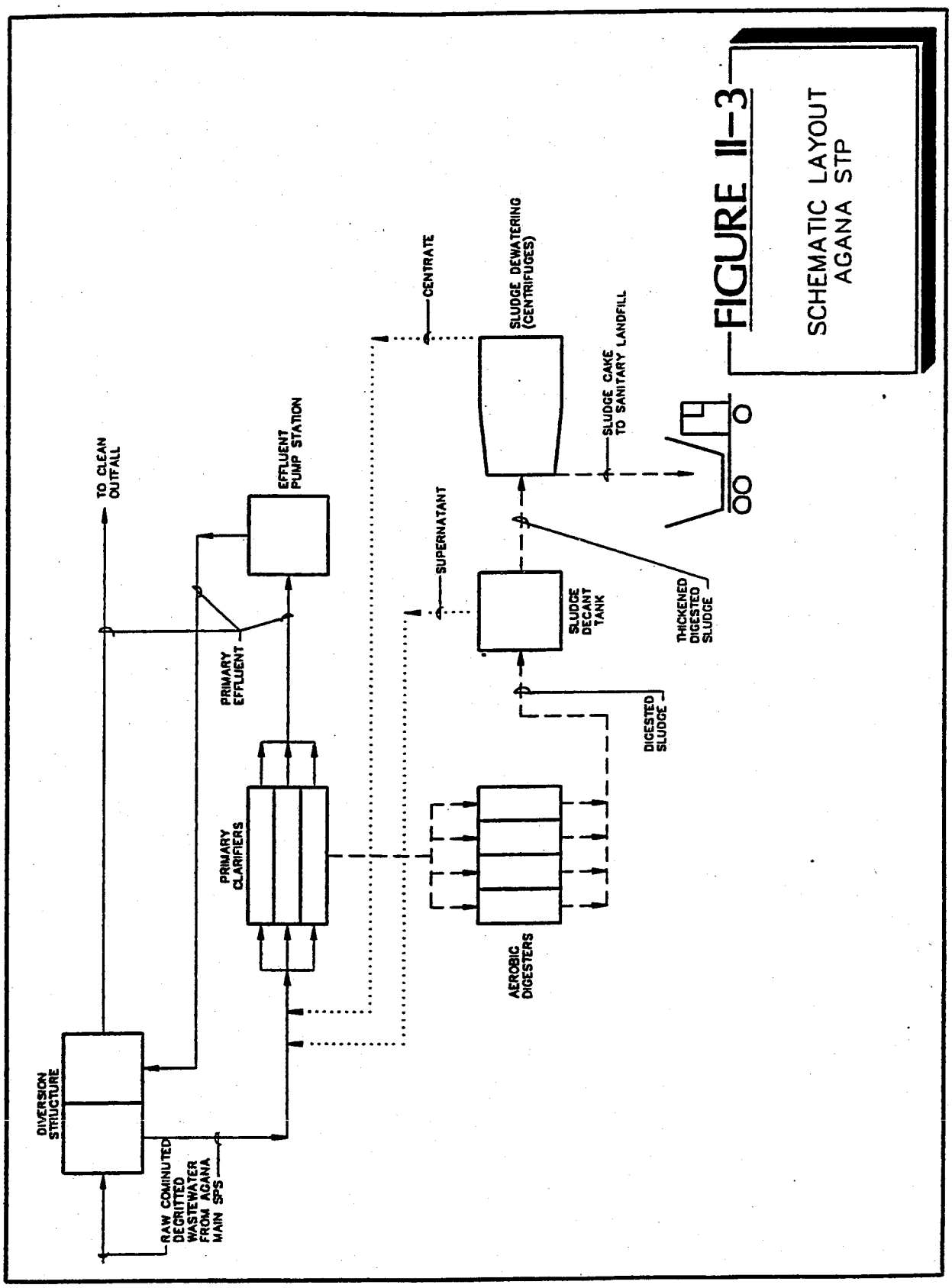


FIGURE II-3
SCHEMATIC LAYOUT
AGANA STP
TO CLEAN OUTFALL
EFFLUENT PUMP STATION
CENTRATE
SLUDGE DEWATERING (CENTRIFUGES)
SLUDGE CAKE TO SANITARY LANDFILL
SUPERNATANT
SLUDGE DECANT TANK
THICKENED DIGESTED SLUDGE
PRIMARY EFFLUENT
DIGESTED SLUDGE
PRIMARY CLARIFIERS
AEROBIC DIGESTERS
DIVERSION STRUCTURE
RAW COMINUTED DEGRITTED WASTEWATER FROM AGANA MAIN SPS

By October 14, contract documents were sufficiently along in the approval process that a Notice to Proceed was also sent by facsimile noting activation on or before October 17, 1988.

Repairs on the outfall were completed on January18, 1989. A joint inspection dive was conducted on January 25 by the construction management firms and the Army Corps of Engineer.

Appendix A contains historic information about the outfall, news clippings and related information about the 1988 repair project. Appendix M provides an engineering plan and profile of the outfall sewer.

The existing outfall is located at latitude 13 degrees 29 minutes 3.3 seconds, longitude 144 degrees 44 minutes 37.1 seconds.

**Changes in Service Area**

The area served by the ASTP is an urban zone which continues to be a region of expansion.

In addition to the civilian population, there are Federal Government installation in the area, including the Naval Hospital facilities and military personnel within the central area.

Sewage flows from Barrigada Heights, Liguan Terrace, and part of Tumon Bay was diverted to the Northern District Sewage Treatment Plant.

The total flows was dip by 2 mgd at the onset. However, with the developments on hold until the completion of the Camp Watkins infrastructure project and additional expansions in the district collector systems, total flows will be back up to the 8 mgd.

Population estimates for the aforementioned areas are listed below:

| Area | Population |
|---|---|
| Asan-Piti | 5,717 |
| Central Guam | 46,572 |
| Tamuning | 20,948 |
| Yona | 6,707 |
| Military | 6,964 |

Figures for the villages were taken from the GWA Rural Islandwide Wastewater Facilities Plan and are the projected population estimates for the year 2000.

The military area population equivalents were calculated based upon an average contribution of 100 gallons per capita per day; military consumption figures (1998) available to GWA were used in this computation. See Appendix B.

## 3. Effluent Limitations and characteristics

GWA is requesting the same effluent limitations which are currently in effect for the ASTP. These are given in Table 12.

Discharge Monitoring Reports (DMRs) for the period January 1997 to December 1997 are attached as Appendix C. These routine compliance reports summarize the quality and/or quantity of GWA's ASTP discharge and compares them with current permit effluent limitation. The results of this report generally show that GWA is in compliance with the effluent limitations set by USEPA. Deviations from the given limits have occurred but GWA is actively taking steps to correct these situations, i.e. down clarifiers, so that limitations can be met.

Samples for the required Toxicity and Priority Pollutant Scan were collected on the 9th of March for the Agana WWTP. The samples were then immediately sent off to the Montgomery & Watson Labs in Pasadena California. GWA has received E-Mail confirmation that the analysis of the samples are presently in progress. Upon receipt of their findings, GWA will forward your office a copy along with the Authority's corresponding responses to the appropriate sections of the application questionnaire.

## 4. Effluent Volume

For the term of the modified permit being requested, the projected effluent flow is 10 mgd, the current flow. Daily and Monthly Flow Reports for the period January 1997 to December 1997 are attached as Appendix D.

## 5. Average Daily Industrial Flow

Wastewaters in this service area are a mixture of industrial, commercial and domestic flows. The industrial contributors are of minor nature and there are presently no existing or known potential users of the systems that could be classified as "significant". As defined by the Federal EPA, these users would have to contribute ten percent or more of the total design hydraulic or pollutant load to the treatment works.

GWA is in the process of mailing out its Industrial Users Survey to all commercial accounts. The results of this survey will then be compiled, analyzed and made public as part of its Public Education Program to help minimize the entrance of

nonindustrial toxic pollutants and pesticides into the island's sewage treatment systems. GWA has developed a plan of action (page M-2) to increase public awareness of the need to properly dispose of waste that may contain toxic substances.

The results of the Industrial Users Survey along with GWA's analysis of its findings will be sent to your office at the earliest.

## 6. Combined Sewer Overflows

The Government of Guam has separate systems for sewage disposal and storm drainage. No combined sewer overflows occur at the plant. However, during the rainy season, infiltration problems do exist especially in the Tamuning district. GWA has ordered "rain catcher" devices which will be installed into manholes to "catch rain or other inflow" to reduce problems in the system.

Smoke testing and televising of sewer lines is another means of identifying inflow/infiltration sources in the system. Although manpower and equipment constraints prevent the implementation of a full scale project of this nature, isolated areas identified as I/I suspect can be scheduled for investigation and subsequent repairs. This is the short-term approach; long term plans include appropriation of funds for a special I/I investigation and repair in the central sewage system.

## 7. Outfall/Diffuser Design

Available data on the existing outfall is provided in Appendix M. However, GWA has recently contracted with a local A/E firm to conduct a baseline study of the area immediately around and beyond the existing ocean outfall as a precursor to either extending the existing outfall or constructing an all-new outfall that is longer and deeper. This phase of the work has started and the resulting optimal design will be an outfall that extends to a point were no decrease in receiving water quality will occur and that water currents will not carry material back into the inner reef areas or to shore. (See Appendices G, H and I)

Receiving Water Description

## *II. B. Receiving Water Description*

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

GWA is applying for a modification based on a discharge to the ocean. The receiving waters are coastal waters off West Agana Bay, on the western coast of Guam.

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

The receiving waters at Agana Bay are not stressed. GEPA's Revised Water Quality Standards 1992, classifies the waters in this area as good marine water (M-2). Water in this category must be sufficient to allow for the propagation and survival of marine organisms, particularly shellfish, corals and other reef related resources. Other important and intended uses include mariculture activities, aesthetic enjoyment and compatible recreation inclusive of whole body contact and related activities.

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

For the island of Guam as with most islands in the Central Pacific, the prevalent northeast tradewinds of the area play a major role in generating the enormous North Equatorial Drift Current that sweeps by Guam from east to west (Jones and Randall 1973). This current is responsible for much of the energy that transports water along the coasts. The North Equatorial Current splits on the northeast corner of the island and streams around the South of Guam at Cocos Island and around the North at Ritidian Point. These two currents then move along the west coast and are joined off Apra Harbor and move out into the Philippine Sea. During the rainy season on Guam, the tradewinds often break down and the strength of the North Equatorial Current may be reduced. The typical tradewinds current pattern for Guam's coastal waters is depicted in Figure 5. Huddell *et al.* 1974, reports that NE tradewinds are dominant in all seasons, but are especially pronounced in the winter (Jan- May). During the summer (July - Oct) the effect of the trade winds are diminished and winds from every direction are not uncommon (Figure 6).

The Agana Bay section of coastline is more somewhat exposed to the NE trades. Waves and surf along this coast are often high during the winter months when the majority of the winds are out of the east and northeast. Offshore currents along this section of the coast move in a net westerly direction.

Jones and Randall 1971, conducted drift cross studies across the first submarine terrace, where the present outfall is located. The drift crosses moved westerly past Adelup Pt. They indicate that the effluent passes well clear of Adelup Pt and moves out into the Philippine Sea (Figure 7). Periodic easterly shifts in direction are caused primarily by tidal changes. The easterly components are usually weak and short in duration. The predominant current movement is to the west. Currents ranged from 0 to 0.75 knots. A current meter was anchored to record current direction and velocity at 16 m (52.5 ft). Continuous tapes recorded over 1100 hrs of sampling time from October 1969 to July 1970. Currents ranged from W and NE trough the south (Figure 8). Generally currents are influenced by tidal phase and are south westerly to westerly on flood tides and easterly on ebb tides. Current velocity ranged from 0 to 0.75 knots, with the normal velocity between 0.2 and 0.4 knots. They also conducted surveys to establish water movement across the reef and in the reef flat itself.

During periods of high or low tides, with high surf conditions, water is transported across the reef flat with each advancing wave. The build up of water on the reef flat sets up current patterns determined by the reef flat topography. Current patterns if the West Agana bay reef flat are shown in Figure 9. They aslo noted the potential for pollution from other sources such as the storm water drains located along the shoreline and the Fonte River.

Jones and Randall 1971, also mention drift bottle studies conducted by Pacific Island Engineers in 1951. They released 278 drift bottles at the outfall site. Of those 84% drifted out to sea and 36% went ashore at Asan Pt, some 2 miles west of the outfall.

The U.S. Navy Hydrographic Office conducted a current study in Agana Bay (Huddell *et al.* 1974.) Three current meters were installed and dye and drouge tracking were used during both the winter and summer season. During the winter survey two meters were installed; one on the bottom in 35 ft of water about 100 yards seaward of the reef margin. The second was installed at a depth of 50 ft. The first meter recorded moderate currents (0.2 kts or 0.23 mph) ranging from east to west. Later a strong southwesterly current persisted and the meter failed. The second meter was run for 25 days. Current speeds had a maximum of 0.5 kts (0.58 mph) and were commonly 0.04 (0.046 mph) to 0.08 kts (0.092 mph). These currents were generally flowing east and northeast. During ebb tides moderate to slight currents flowed northeasterly and during flood tides they flowed northwesterly. There was also a period of two days in which a moderate easterly current was observed. During the summer survey, one current meter was set up in Agana Bay on a bottom stand in 65 ft of water. Current flowed primarily to the Northeast with velocities commonly of 0.01 kts (0.012 mph) to 0.04 kts (0.046 mph), with a maximum of 0.36 kts (0.41 mph). As in the winter months the currents were generally northwesterly with the flood tides and northeasterly with the ebb tides. For the dye studies most of the dye moved either easterly or northeasterly. Only two of 13 dye casts moved to the west or south west.

Hudell et al concluded from information gathered from meters stationed at Cabras Island, Hilaan Point and Orote Point, that an offshore southwesterly flow persists along the western coast of Guam. Nearshore flow is controlled by a complicated series of eddies generated from the offshore flow. The location and shape of the eddies is controlled by several factors; wind speed and direction, tidal phase, configuration of the coastline, topography of the bottom, wave height and direction, and the speed and direction of the offshore flow. The extention of the Agana and Tanguission outfalls farther from shore my reduce the influence of these nearshore eddies on the effluent plume. A series of hydrodynamic studies will be conducted to establish the fate of the effluent plume.

Jones, R. S. and R. H. Randall. 1971. An Annual Cycle Study of Biological, Chemical and Oceanographic Phenomena Associated with the Agana Ocean Outfall. University of Guam the Marine Laboratory Technical Report No. 1.

Jones, R. S. and R. H. Randall. 1973. A Study of Biological Impact caused by Natural and Man-Induced Changes on a Tropical Reef. University of Guam, Marine Laboratory Technical Report No.7.

Huddell, H. D., J. G. Willett and G. Marchand, 1974. Nearshore currents and Coral Reef Ecology of the West Coast Of Guam, Mariana Islands. Naval Oceanographic Office, Washington, D.C.

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

- ***Lowest percentile current speed***
  0.0 knots

- ***Predominant current speed and direction during four seasons***
  Predominant current speeds from the meter anchored in the vicinity of the outfall were recorded as 0.2 to 0.4 knots to the West. With a maximum of 0.75 knots.

- ***Periods of maximum stratification (months)***
  In the ocean waters around Guam there is a year round permanent thermocline, extending from 120m to more than 400m, in which water temperatures drop from 27° to 8° C (Amesbury, S. S. and M. Babin 1990). Water temperature measured at depths of 0m and 50m did not vary from each other, or vary through out the year by more than 1°C (Figure 10). The thermocline is well below the discharge depths, therefore stratification doesn't effect the effluent plume.

Amesbury, S. S. and M. Babin, 1990. Ocean Temperature Structure and the Seasonality of Pelagic Fish Species Near Guam, Mariana Islands. Micronesica 23(2):131-138).

- ***Density profiles during periods of maximum stratification***
  No stratification, see explanation above.

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

The receiving waters for the discharge do contain significant amounts of effluent previously discharged from the treatment works. Water quality standards and water quality criteria are met at and beyond the ZID boundary. However, a reading of greater than >400 fecal coliform/ 100 mL were recorded at site E six out of the 18 times that waters have been sampled since 1989. The effluent currently discharged is rapidly diluted, and ambient water conditions generally occur outside the ZID for those parameters presently monitored. Water quality data will be collected as part of the baseline study in the area of any proposed sites for the extension of the Agana outfall to determine if the waters are impacted by the current discharge.

***II.B.6. Ambient water quality conditions during the period(s) of maximum stratification: at the zone of initial dilution (ZID) boundary, at other areas of potential impact and at control stations.***
***a. Provide profiles with depth on the following for the current discharge location and for the modified discharge location, if different from the current discharge:***

- ***$BOD_5$ (mg/L)*** (not measured)
- ***Dissolved oxygen***
- ***Suspended solids (mg/L)*** (not measured)
- ***pH***
- ***Temperature (°C)***
- ***Salinity***

- ***Turbidity***
- ***Other significant variables***

As explained above there is no period of stratification. The results presented are from semi-quarterly sampling periods, March 1989 to July 1997, Table 1. The minimum, average and maximum values for each parameter are given on the third page of Table 1. Sampling stations are depicted in Figure 11, and locations are described below. The stations, water quality and bacteriological parameters measured were determined, and required, by the USEPA and Guam EPA. Samples were taken at 3 depths, surface, mid, and Bottom. Sample were collected and analyzed by UOG Marine Lab, from March 1989 until December 1989, after which they were collected and analyzed by GWA staff.

RECEIVING WATER SAMPLING STATIONS

Shoreline Stations

Agana A: 13° 29' 27' N x 144° 44' 28" E
shoreline station 0.5 km W of STP access road (surface only)

Agana B: 13° 29' 29' N x 144° 44' 30" E
shoreline station on STP access bridge at the center culvert (surface only)

Agana C: 13° 29' 31' N x 144° 44' 33" E
shoreline station 0.5 km E of STP at the mouth of the Agana boat basin on the Paseo De Susanna side, half way to the channel marker in *ca.* 0.5 m of water.

Offshore Stations

Agana D: 13° 29' 35' N x 144° 44' 30" E
above the diffusers in 95 ft (29m) of water.
Samples taken at surface, mid (14m), and bottom (28m)

Agana E: 13° 20' 33' N x 144° 44' 30" E
100 m S of D, surface, mid (5m), and bottom (10m)

Agana F: 13° 29' 35' N x 144° 44' 44" E
1000 m E of D, surface, mid (8m) and bottom (16m)

From the Jan 1997 these stations were located in waters at the same depth as station D, and samples were taken at surface, mid (5m), and bottom (15m).

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

No.

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

There has been no studies done to date on sediment dissolved oxygen demand.

Figure 5

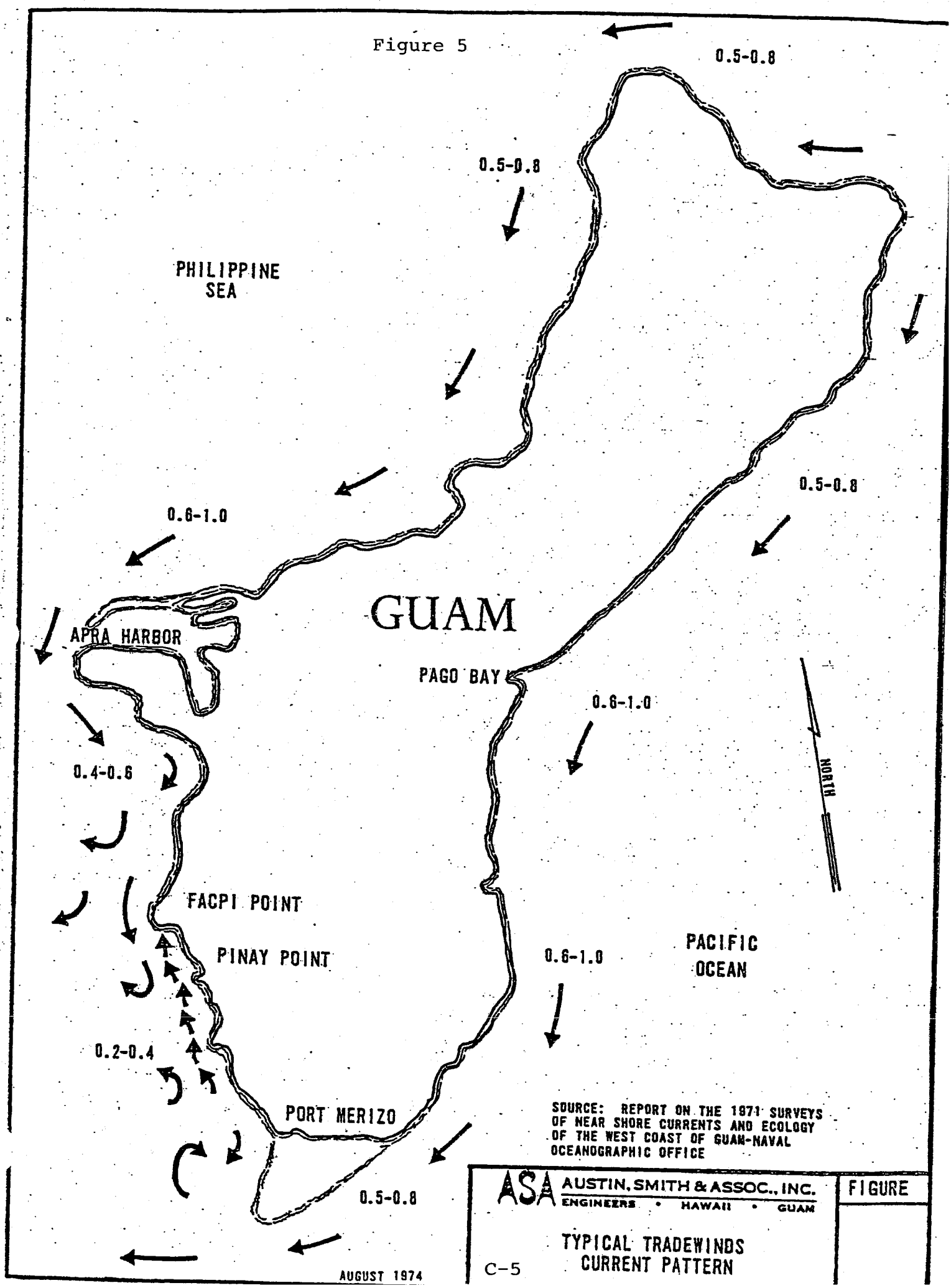
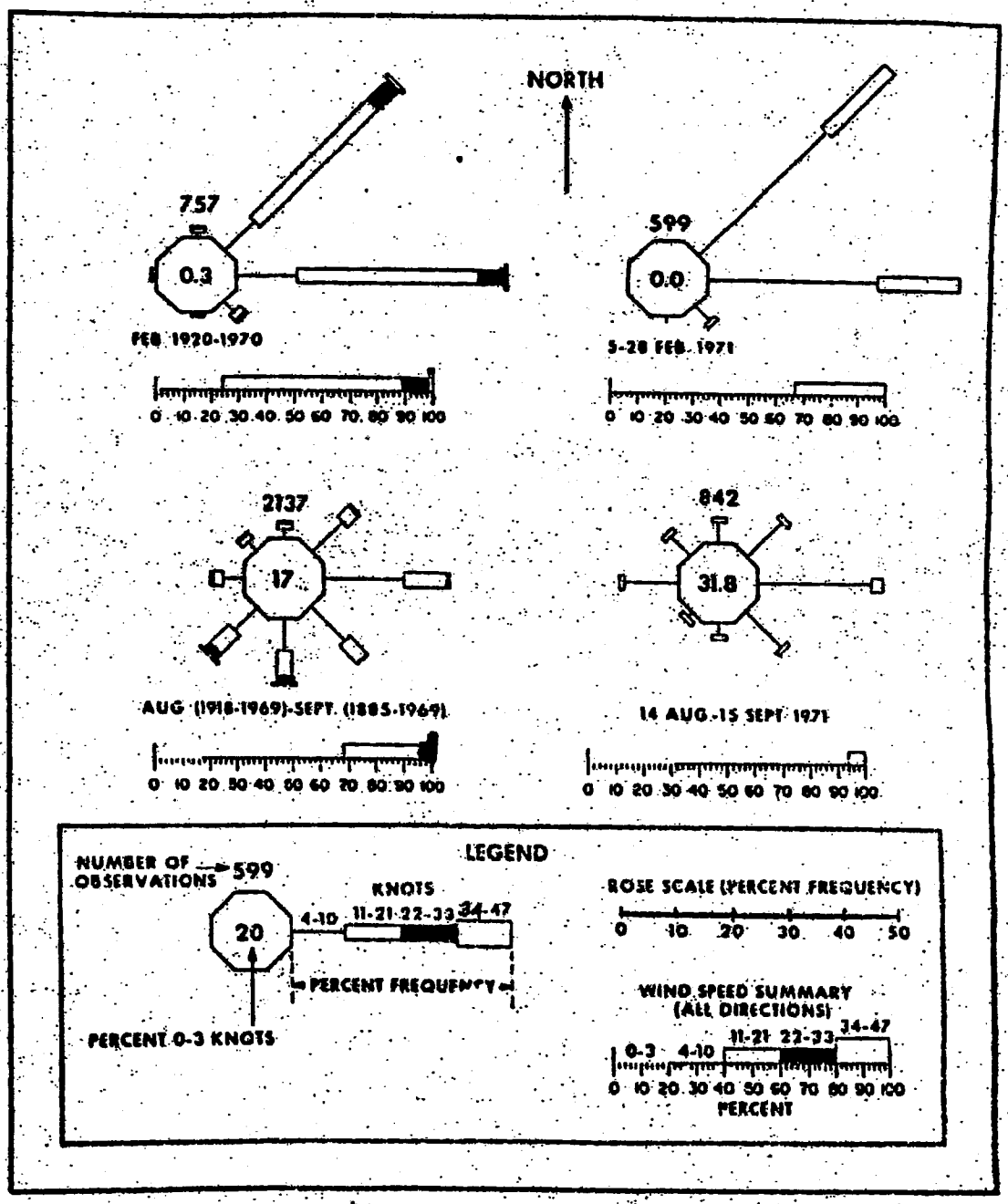
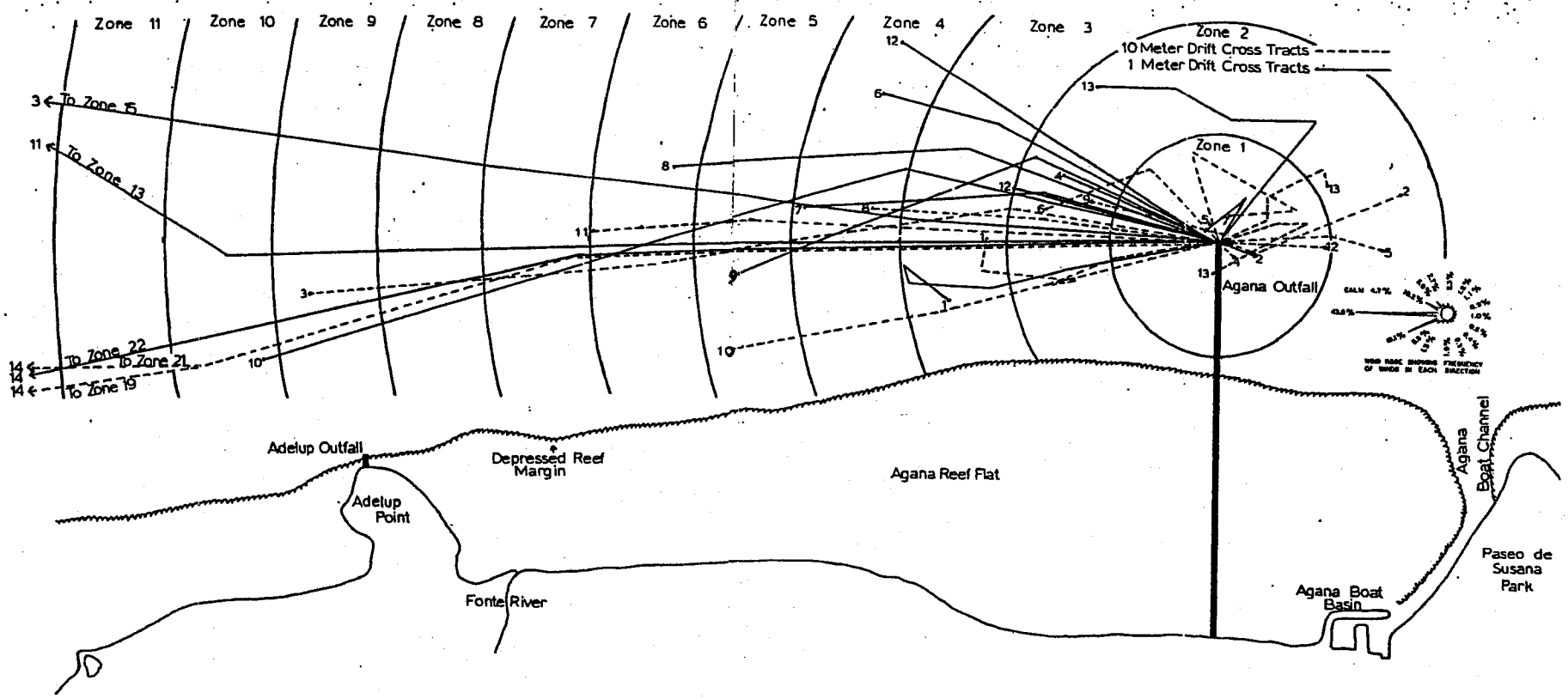

0.5-0.8
0.5-0.8
PHILIPPINE SEA
0.5-0.8
0.6-1.0
GUAM
APRA HARBOR
PAGO BAY
0.6-1.0
NORTH
0.4-0.6
FACPI POINT
PINAY POINT
0.6-1.0
PACIFIC OCEAN
0.2-0.4
PORT MERIZO
0.5-0.8
SOURCE: REPORT ON THE 1971 SURVEYS OF NEAR SHORE CURRENTS AND ECOLOGY OF THE WEST COAST OF GUAM-NAVAL OCEANOGRAPHIC OFFICE
ASA AUSTIN, SMITH & ASSOC., INC.
ENGINEERS • HAWAII • GUAM
FIGURE
TYPICAL TRADEWINDS CURRENT PATTERN
AUGUST 1974

Figure 6



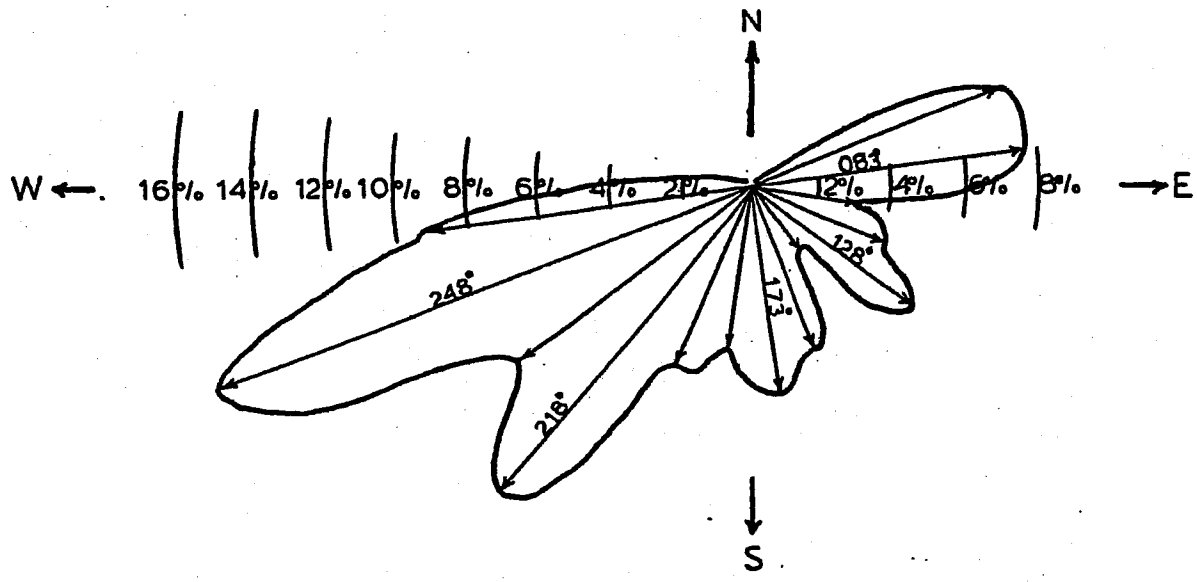

Wind roses of historical data and 1971 data.




OFFSHORE CURRENT STUDY. Water sample results were averaged in each concentric zone. The numbers at the end of the drift tracks show drift cast dates as follow: (1) January 13, (2) January 27, (3) January 30, (4) February 6, (5) February 16, (6) February 26, (7) March 10, (8) March 16, (9) March 30, (10) April 14, (11) April 28, (12) May 8, (13) May 21, (14) May 26, 1970.

Figure 7

Figure 8




ANALYSIS OF CURRENT DIRECTION. The arrows shows some of the dominant directions of flow. The concentric radii show the percent of the time the current flows in a particular direction. These data are compiled from all the current meter tapes.

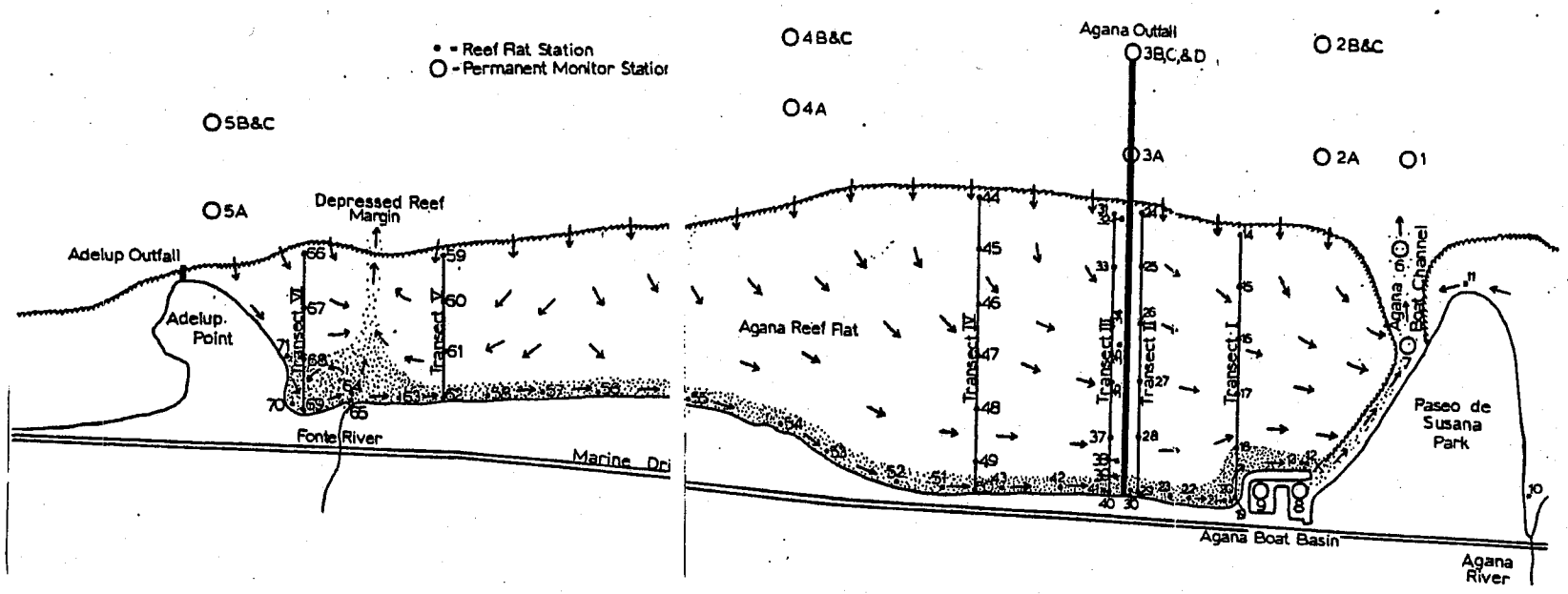
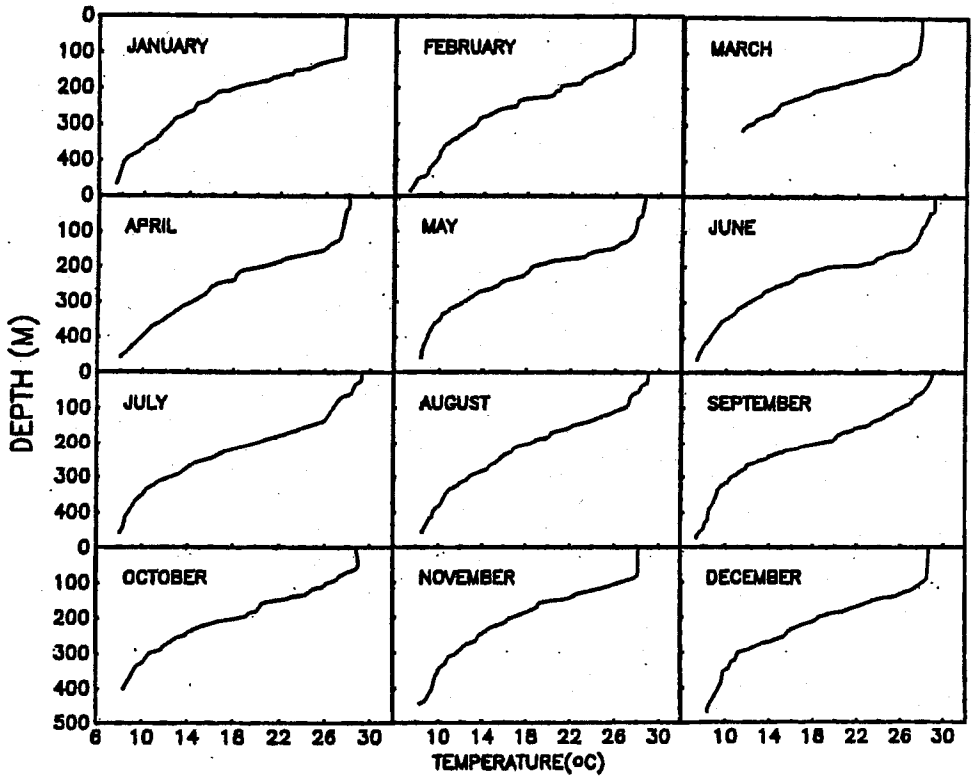



Figure 9

Reef Flat Current Study. The arrows along the reef margins show wave transport of water onto the reef flat platform, the others show the resultant current patterns. The stippled area shows the long shore curren at the beach. Permanent and other monitoring stations are shown

Jones and Randall, 1971.

Amesbury & Babin: Ocean Temperature and Pelagic Fish




Monthly temperature-depth relationships for the ocean waters near Guam. Individual plots are from years with temperature conditions most nearly approximating longterm average conditions for that month: Jan–1972, Feb–1974, Mar–1976, Apr (0–250 m)–1982, Apr (250–475 m) –1981, May–1975, Jun–1970, Jul–1979, Aug–1974, Sep–1974, Oct–1976, Nov–1979, Dec–1971.

Table 1. Water Quality Data for Agana WWTP Receiving waters 1989-1997

| PARAMETER | STATION | DEPTH | DATE SAMPLE COLLECTED | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4/89 | 6/89 | 10/89 | 12/89 | 3/90 | 9/90 | 3/91 | 5/91 | 7/91 | 10/91 |
| Fecal Coliform | D | surface | | <100 | 95000 | | | 0 | 0 | 1 | 20 | 400 |
| FC/100mL * | E | surface | | <10 | 1 | | | 0 | 0 | 0 | 20 | 400 |
| | F | surface | | 0 | 0 | | | 0 | 0 | 0 | 8 | 400 |
| temperature | D | surface | 27 | 27.5 | 29.5 | 31.0 | 27.1 | 29.0 | 26.8 | 27.9 | 27.5 | 28.1 |
| oC | | mid | | 27.3 | | 31.0 | 27.0 | 29.0 | 26.7 | 27.9 | 27.6 | 28.2 |
| | | bottom | | 27.3 | 29.5 | 31.0 | 26.9 | 29.0 | 26.7 | 27.9 | 27.7 | 28.2 |
| | E | surface | 27.2 | 27.5 | 29.6 | 31.0 | 27.1 | 29.5 | 26.7 | 27.9 | 27.6 | 28.3 |
| | | mid | 27.1 | 27.5 | 29.8 | 31.0 | 27.0 | 29.0 | 26.6 | 27.9 | 27.6 | 28.3 |
| | | bottom | 27.1 | 27.8 | 29.8 | 31.0 | 26.9 | 29.0 | 26.6 | 27.9 | 27.5 | 28.2 |
| | F | surface | 27 | 27.3 | 29.2 | 30.5 | 27.1 | 29.0 | 26.6 | 28.6 | 28.1 | 28.1 |
| | | mid | 27 | 27.3 | 29.1 | 30.7 | 27.0 | 29.0 | 26.6 | 28.1 | 28.1 | 27.8 |
| | | bottom | 26.9 | 27.3 | 29.0 | 30.4 | 26.9 | 29.0 | 26.6 | 27.8 | 28.1 | 27.8 |
| salinity | D | surface | 32.0 | 35.6 | 35.5 | 34.7 | 35.5 | 32.0 | 35.0 | 34.0 | 31.0 | 34.0 |
| ppt | | mid | | | | 35.1 | 35.5 | 34.0 | 35.0 | 34.0 | 32.0 | 34.0 |
| | | bottom | | | 35.9 | 35.0 | 35.5 | 34.0 | 34.0 | 34.0 | 32.0 | 33.0 |
| | E | surface | 33.5 | 36.0 | 35.6 | 35.1 | 35.5 | 33.0 | 35.0 | 35.0 | 34.0 | 35.0 |
| | | mid | 33.4 | 36.1 | 35.7 | 34.9 | 35.5 | 33.0 | 35.0 | 35.0 | 34.0 | 35.0 |
| | | bottom | 33.2 | 35.9 | 35.8 | 35.1 | 35.5 | 34.0 | 35.0 | 35.0 | 34.0 | 35.0 |
| | F | surface | 33.6 | 35.8 | 35.8 | 34.9 | 35.5 | 30.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| | | mid | 33.5 | 36.1 | 36.0 | 34.7 | 35.5 | 33.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| | | bottom | 33.4 | 36.1 | 35.8 | 34.6 | 35.5 | 33.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| pH | D | surface | 8.31 | 8.29 | 8.12 | 8.18 | 8.20 | 8.15 | 7.65 | 8.26 | 8.89 | 9.20 |
| | | mid | | | 8.14 | 8.21 | 8.10 | 8.26 | 8.08 | 8.26 | 8.23 | 9.54 |
| | | bottom | | | 8.13 | 8.20 | 8.10 | 8.26 | 8.08 | 8.32 | 8.48 | 9.56 |
| | E | surface | 8.38 | 8.30 | 8.13 | 8.18 | 8.10 | 8.25 | 8.07 | 8.32 | 8.52 | 9.58 |
| | | mid | 8.37 | 8.32 | 8.15 | 8.18 | 8.10 | 8.25 | 8.08 | 8.31 | 8.55 | 9.60 |
| | | bottom | 8.38 | 8.31 | 8.16 | 8.18 | 8.10 | 8.26 | 8.09 | 8.31 | 9.56 | 9.60 |
| | F | surface | 8.38 | 8.29 | 8.16 | 8.17 | 8.20 | 8.21 | 8.38 | 8.20 | 9.44 | 9.66 |
| | | mid | 8.37 | 8.30 | 8.14 | 8.18 | 8.16 | 8.27 | 8.28 | 8.18 | 9.46 | 9.82 |
| | | bottom | 8.37 | 8.30 | 8.16 | 8.20 | 8.15 | 8.28 | 8.00 | 8.18 | 9.48 | 9.88 |
| D. O. | D | surface | | 5.70 | 6.30 | 6.20 | 6.80 | 6.20 | 5.66 | 5.60 | 3.13 | 5.16 |
| mg/L | | mid | | 5.80 | 6.00 | 6.00 | 7.10 | 6.10 | 5.15 | 3.36 | 3.14 | 5.26 |
| | | bottom | | 5.70 | 6.20 | 5.80 | 7.30 | 6.30 | 5.06 | 3.41 | 3.17 | 5.23 |
| | E | surface | | 5.80 | 6.15 | 6.20 | 6.90 | 7.40 | 5.81 | 2.45 | 3.38 | 5.32 |
| | | mid | | 5.80 | 6.20 | 6.20 | 6.20 | 6.40 | 5.60 | 3.54 | 3.28 | 5.33 |
| | | bottom | | 5.90 | 6.20 | 6.20 | 7.20 | 6.80 | 5.23 | 4.00 | 3.22 | 5.41 |
| | F | surface | | 5.85 | 6.09 | 6.00 | 5.90 | 8.40 | 3.09 | 3.21 | 3.23 | 5.12 |
| | | mid | | 5.90 | 6.05 | 5.90 | 5.60 | 5.60 | 4.19 | 3.49 | 3.22 | 5.21 |
| | | bottom | | 5.90 | 6.09 | 5.90 | 5.20 | 6.30 | 4.64 | 3.62 | 3.26 | 5.21 |
| Turbidity | D | surface | 11.00 | 11.00 | 8.00 | 1.80 | 0.25 | 0.25 | 0.38 | 0.40 | 0.25 | 0.45 |
| NTU | | mid | 11.00 | 11.00 | 11.00 | 0.80 | 0.30 | 0.25 | 0.53 | 0.55 | 0.20 | 0.60 |
| except for | | bottom | 11.00 | 11.00 | 4.00 | 0.60 | 0.40 | 0.35 | 0.55 | 0.60 | 0.35 | 0.55 |
| 4/89, 6/89,10/89 | E | surface | 11.00 | 11.00 | 11.00 | 0.50 | 0.16 | 0.20 | 0.20 | 0.40 | 0.20 | 0.40 |
| when secci | | mid | 11.00 | 11.00 | 11.00 | 0.48 | 0.24 | 0.20 | 0.25 | 0.40 | 0.15 | 0.30 |
| disc was used | | bottom | 11.00 | 11.00 | 11.00 | 0.45 | 0.26 | 0.20 | 0.32 | 0.20 | 0.10 | 0.30 |
| | F | surface | 11.00 | 11.00 | 11.00 | 0.35 | 0.15 | 0.70 | 0.30 | 0.25 | 0.15 | 0.20 |
| | | mid | 11.00 | 11.00 | 11.00 | 0.35 | 0.22 | 0.25 | 0.32 | 0.25 | 0.05 | 0.20 |
| | | bottom | 11.00 | 11.00 | 11.00 | 0.40 | 0.66 | 0.25 | 0.32 | 0.20 | 0.05 | 0.20 |
| NOx | D | surface | 0.013 | 0.002 | 0.011 | 0.001 | | | | | | |
| mg/l | | mid | | | 0.007 | 0.000 | | | | | | |
| | | bottom | | | 0.013 | 0.000 | | | | | | |
| | E | surface | 0.013 | 0.007 | 0.013 | 0.004 | | | | | | |
| | | mid | 0.012 | 0.002 | 0.009 | 0.003 | | | | | | |
| | | bottom | 0.101 | 0.003 | 0.015 | 0.003 | | | | | | |
| | F | surface | 0.006 | 0.005 | 0.011 | 0.001 | | | | | | |
| | | mid | 0.005 | 0.001 | 0.019 | 0.001 | | | | | | |
| | | bottom | 0.001 | 0.001 | 0.010 | 0.000 | | | | | | |
| FRP | D | surface | 0.107 | 0.076 | 0.049 | 0.069 | | | | | | |
| mg/l | | mid | | | 0.003 | 0.008 | | | | | | |
| | | bottom | | | 0.028 | 0.020 | | | | | | |
| | E | surface | 0.005 | 0.002 | 0.009 | 0.007 | | | | | | |
| | | mid | 0.008 | 0.001 | 0.002 | 0.022 | | | | | | |
| | | bottom | 0.007 | 0.000 | 0.003 | 0.019 | | | | | | |
| | F | surface | 0.006 | 0.000 | 0.001 | 0.005 | | | | | | |
| | | mid | 0.010 | 0.000 | 0.004 | 0.003 | | | | | | |
| | | bottom | 0.0271 | 0.0118 | 0.0067 | 0.0078 | | | | | | |
| Treatment Plant Average Flow (MGD) | | | | | | | | | | | | |

* values of 400 for fecal coliform represent reports of >400FC/100mL

continued over page

Table 1. Water Quality Data for . Agana WWTP Receiving waters 1989-1997

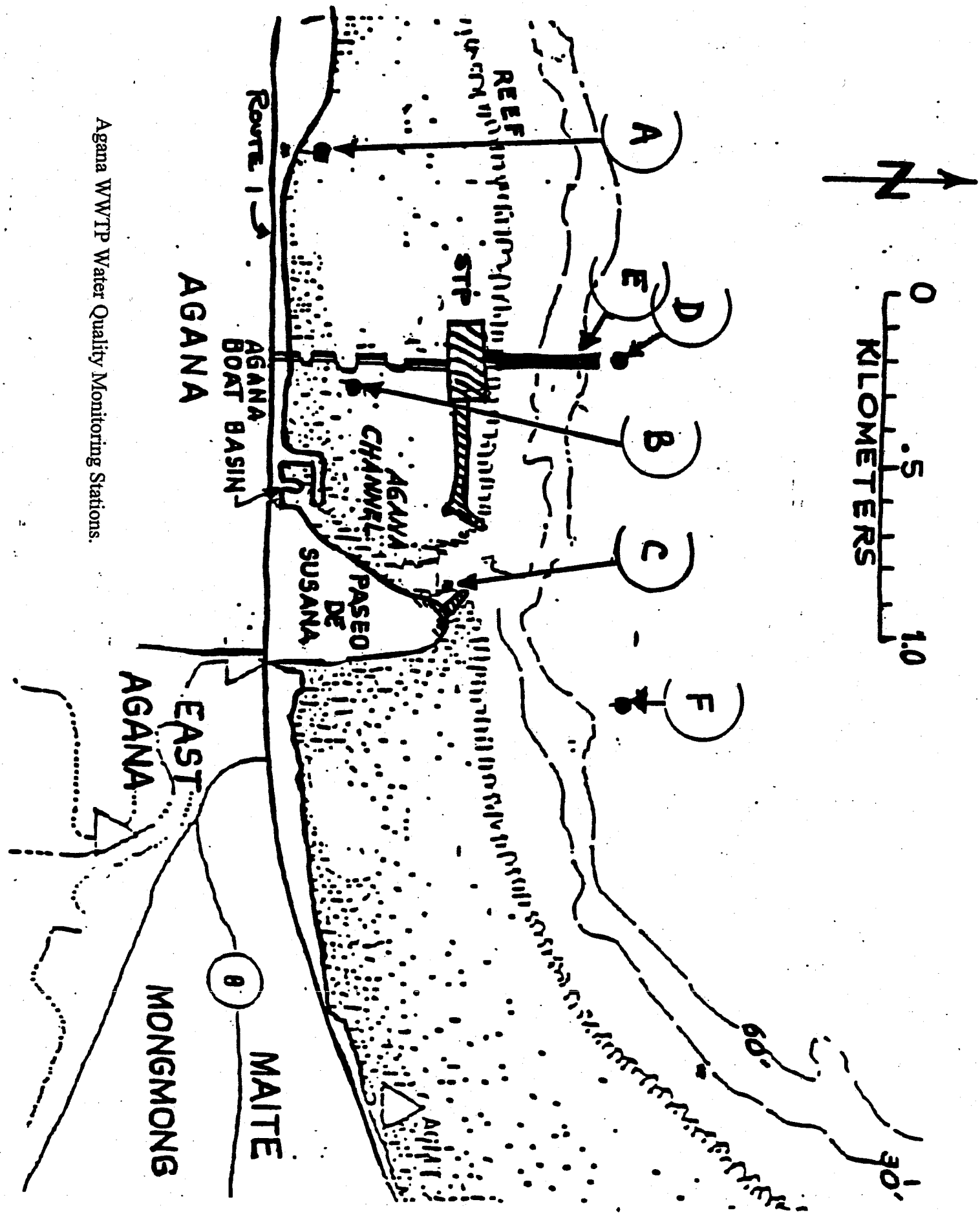
| PARAMETER | STATION | DEPTH | DATE SAMPLE COLLECTED | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2/92 | 8/92 | 3/93 | 4/93 | 9/93 | 10/93 | 6/94 | 7/94 | 1/97 | 5/97 |
| Fecal Coliform | D | surface | 15 | 400 | 400 | 30 | 400 | 400 | 400 | 400 | 400 | 400 |
| FC/100mL * | E | surface | 5 | 40 | 400 | 0 | 400 | 400 | 400 | 0 | 6 | 32 |
| | F | surface | 0 | 0 | | 0 | 2 | 0 | 400 | 0 | 0 | 0 |
| temperature | D | surface | 27.0 | 27.4 | 26.0 | 26.9 | 28.4 | 28.6 | 28.7 | 31.8 | 32.0 | 28.0 |
| oC | | mid | 27.0 | 26.6 | 26.0 | 26.8 | 28.0 | 28.5 | 28.7 | 31.5 | 32.0 | 26.0 |
| | | bottom | 27.0 | 26.6 | 26.1 | 26.8 | 28.1 | 28.5 | 28.7 | 31.5 | 30.0 | 26.0 |
| | E | surface | 27.0 | 26.5 | 26.0 | 26.8 | 28.3 | 28.7 | 28.7 | 31.3 | 31.0 | 27.0 |
| | | mid | 27.0 | 25.5 | 26.0 | 26.6 | 28.3 | 28.5 | 28.7 | 30.7 | | 27.0 |
| | | bottom | 26.9 | 25.9 | 26.1 | 26.8 | 28.3 | 28.5 | 28.7 | 30.7 | | 26.0 |
| | F | surface | 27.0 | 25.8 | 26.0 | 26.8 | 28.3 | 28.6 | 28.8 | 29.8 | 31.0 | 28.0 |
| | | mid | 27.0 | 25.8 | 26.0 | 26.8 | 28.3 | 28.6 | 28.8 | 29.7 | | 28.0 |
| | | bottom | 27.0 | 25.8 | 26.1 | 26.8 | 28.3 | 28.5 | 28.7 | 29.8 | | 28.0 |
| salinity | D | surface | 34.0 | 33.0 | 35.5 | 35.0 | 34.0 | 26.0 | 23.5 | 30.0 | 27.0 | 29.0 |
| ppt | | mid | 34.0 | 33.0 | 35.5 | 35.0 | 34.0 | 27.0 | 23.5 | 31.0 | 27.0 | 30.0 |
| | | bottom | 32.0 | 32.0 | 34.0 | 34.0 | 34.0 | 26.5 | 24.0 | 30.5 | 24.0 | 26.0 |
| | E | surface | 34.0 | 32.0 | 35.5 | 35.0 | 35.0 | 27.5 | 23.5 | 32.0 | 36.0 | 32.0 |
| | | mid | 34.0 | 32.0 | 35.5 | 35.0 | 35.0 | 28.0 | 24.0 | 30.6 | | 31.0 |
| | | bottom | 34.0 | 32.0 | 35.5 | 35.0 | 35.0 | 28.5 | 24.0 | 30.9 | | 31.0 |
| | F | surface | 34.0 | 33.0 | 35.5 | 35.0 | 35.0 | 29.0 | 30.0 | 31.0 | 36.0 | 32.0 |
| | | mid | 34.0 | 33.0 | 35.5 | 35.0 | 35.0 | 29.0 | 30.0 | 30.5 | | 30.0 |
| | | bottom | 34.0 | 33.0 | 35.5 | 35.0 | 35.0 | 29.0 | 30.5 | 31.0 | | 31.0 |
| pH | D | surface | 8.17 | 8.56 | 8.62 | 7.64 | 8.37 | 7.90 | 8.44 | 9.02 | 8.16 | 8.24 |
| | | mid | 8.48 | 8.63 | 8.62 | 8.10 | 8.68 | 8.72 | 8.53 | 9.04 | 8.24 | 8.25 |
| | | bottom | 8.12 | 8.64 | 8.61 | 8.10 | 8.61 | 8.74 | 8.57 | 9.02 | 8.29 | 8.26 |
| | E | surface | 8.08 | 8.61 | 8.34 | 8.07 | 8.56 | 8.41 | 8.50 | 8.93 | 8.29 | 8.27 |
| | | mid | 8.10 | 8.63 | 8.37 | 8.08 | 8.55 | 8.30 | 8.52 | 8.90 | | 8.27 |
| | | bottom | 8.11 | 8.60 | 8.36 | 8.08 | 8.54 | 8.50 | 8.53 | 8.88 | | 8.28 |
| | F | surface | 8.22 | 8.65 | 8.43 | 8.30 | 8.66 | 8.41 | 8.50 | 9.81 | 8.28 | 8.29 |
| | | mid | 8.19 | 8.63 | 8.43 | 8.30 | 8.66 | 8.47 | 8.50 | 8.61 | | 8.29 |
| | | bottom | 8.17 | 8.62 | 8.44 | 8.30 | 8.65 | 8.49 | 8.50 | 8.68 | | 8.30 |
| D. O. | D | surface | 2.46 | 3.17 | 4.85 | 5.68 | 5.67 | 1.22** | 6.40 | 3.02 | 6.90 | 5.80 |
| mg/L | | mid | 4.17 | 3.57 | 4.76 | 5.65 | 5.63 | 1.21** | 6.90 | 2.96 | 5.80 | 5.70 |
| | | bottom | 4.47 | 3.68 | 4.97 | 5.15 | 5.69 | 1.21** | 6.60 | 2.48 | 5.50 | 5.80 |
| | E | surface | 2.64 | 3.42 | 4.97 | 5.18 | 4.64 | 1.19** | 7.95 | 2.98 | 7.20 | 5.80 |
| | | mid | 4.44 | 3.45 | 4.86 | 5.59 | 5.12 | 1.29** | 6.60 | 2.75 | | 6.00 |
| | | bottom | 4.69 | 3.52 | 5.22 | 5.20 | 5.09 | 1.12** | 6.60 | 2.83 | | 5.90 |
| | F | surface | 2.74 | 3.31 | 5.33 | 5.20 | 4.92 | 1.24** | 6.30 | 2.89 | 7.80 | 6.00 |
| | | mid | 4.26 | 3.37 | 4.99 | 5.20 | 5.15 | 1.19** | 7.90 | 2.57 | | 6.00 |
| | | bottom | 4.56 | 3.44 | 5.09 | 5.20 | 5.35 | 1.19** | 6.80 | 2.68 | | 6.00 |
| Turbidity | D | surface | 0.15 | 0.25 | 0.35 | 0.29 | 0.20 | 0.35 | 0.36 | 0.25 | 0.92 | 1.04 |
| NTU | | mid | 0.15 | 0.25 | 0.30 | 0.48 | 0.25 | 0.41 | 0.36 | 0.25 | 0.60 | 0.72 |
| except for | | bottom | 0.25 | 0.70 | 0.30 | 0.48 | 0.35 | 0.45 | 0.85 | 0.35 | 0.54 | 0.96 |
| 4/89, 6/89,10/89 | E | surface | 0.15 | 0.45 | 0.20 | 0.29 | 0.20 | 0.35 | 0.21 | 0.30 | 0.64 | 0.44 |
| when secci | | mid | 0.15 | 0.30 | 0.20 | 0.29 | 0.30 | 0.36 | 0.45 | 0.35 | | 0.64 |
| disc was used | | bottom | 0.25 | 0.45 | 0.20 | 0.29 | 0.30 | 0.44 | 0.33 | 0.25 | | 0.83 |
| | F | surface | 0.15 | 0.50 | 0.30 | 0.29 | 0.25 | 0.40 | 0.30 | 0.16 | 0.51 | 0.46 |
| | | mid | 0.15 | 0.40 | 0.20 | 0.29 | 0.20 | 0.52 | 0.30 | 0.29 | | 0.49 |
| | | bottom | 0.15 | 0.21 | 0.20 | 0.29 | 0.15 | 0.42 | 0.28 | 0.15 | | 0.49 |
| NOx | D | surface | | | | | | | | | | |
| mg/l | | mid | | | | | | | | | | |
| | | bottom | | | | | | | | | | |
| | E | surface | | | | | | | | | | |
| | | mid | | | | | | | | | | |
| | | bottom | | | | | | | | | | |
| | F | surface | | | | | | | | | | |
| | | mid | | | | | | | | | | |
| | | bottom | | | | | | | | | | |
| FRP | D | surface | | | | | | | | | | |
| mg/l | | mid | | | | | | | | | | |
| | | bottom | | | | | | | | | | |
| | E | surface | | | | | | | | | | |
| | | mid | | | | | | | | | | |
| | | bottom | | | | | | | | | | |
| | F | surface | | | | | | | | | | |
| | | mid | | | | | | | | | | |
| | | bottom | | | | | | | | | | |
| Treatment Plant Average Flow (MGD) | | | | | | | | | | | | |

** values not included in calculations or graphs. These values are too low, the control site also has the same low readings. Probably due to incorrect use or calibration of the DO meter.

Table 1. Water Quality Data for Agana WWTP Receiving waters 1989-1997

| PARAMETER | STATION | DEPTH | DATE | STATISTICAL DATA | | |
|---|---|---|---|---|---|---|
| | | | 7/97 | MIN. | AVG. | MAX. |
| Fecal Coliform | D | surface | 400 | | | |
| FC/100mL * | E | surface | 400 | | | |
| | F | surface | 400 | | | |
| temperature | D | surface | | 26.0 | 28.3 | 32.0 |
| oC | | mid | 29.5 | 26.0 | 28.2 | 32.0 |
| | | bottom | 29.0 | 26.0 | 28.1 | 31.5 |
| | E | surface | 29.0 | 26.0 | 28.2 | 31.3 |
| | | mid | 29.0 | 25.5 | 28.0 | 31.0 |
| | | bottom | 29.0 | 25.9 | 27.9 | 31.0 |
| | F | surface | 29.0 | 25.8 | 28.1 | 31.0 |
| | | mid | 29.0 | 25.8 | 27.9 | 30.7 |
| | | bottom | 29.0 | 25.8 | 27.9 | 30.4 |
| salinity | D | surface | 28.5 | 23.5 | 32.1 | 35.6 |
| ppt | | mid | 29.0 | 23.5 | 32.1 | 35.5 |
| | | bottom | 29.0 | 24.0 | 31.5 | 35.9 |
| | E | surface | 28.0 | 23.5 | 33.2 | 36.0 |
| | | mid | 29.0 | 24.0 | 33.1 | 36.1 |
| | | bottom | 28.0 | 24.0 | 33.1 | 35.9 |
| | F | surface | 28.0 | 28.0 | 33.5 | 36.0 |
| | | mid | 29.0 | 29.0 | 33.5 | 36.1 |
| | | bottom | 29.0 | 29.0 | 33.6 | 36.1 |
| pH | D | surface | 8.28 | 7.64 | 8.32 | 9.20 |
| | | mid | 8.29 | 8.08 | 8.44 | 9.54 |
| | | bottom | 8.30 | 8.08 | 8.44 | 9.56 |
| | E | surface | 8.31 | 8.07 | 8.39 | 9.58 |
| | | mid | 8.31 | 8.08 | 8.40 | 9.60 |
| | | bottom | 8.32 | 8.08 | 8.46 | 9.60 |
| | F | surface | 8.30 | 8.16 | 8.52 | 9.81 |
| | | mid | 8.32 | 8.14 | 8.48 | 9.82 |
| | | bottom | 8.32 | 8.00 | 8.47 | 9.88 |
| D. O. | D | surface | 5.90 | 2.46 | 5.29 | 6.90 |
| mg/L | | mid | 5.90 | 2.96 | 5.21 | 7.10 |
| | | bottom | 6.10 | 2.48 | 5.19 | 7.30 |
| | E | surface | 6.30 | 2.45 | 5.29 | 7.95 |
| | | mid | 5.90 | 2.75 | 5.18 | 6.60 |
| | | bottom | 5.90 | 2.83 | 5.28 | 7.20 |
| | F | surface | 6.20 | 2.74 | 5.14 | 8.40 |
| | | mid | 6.20 | 2.57 | 5.04 | 7.90 |
| | | bottom | 6.00 | 2.68 | 5.07 | 6.80 |
| Turbidity | D | surface | 0.22 | 0.15 | 1.82 | 11.00 |
| NTU | | mid | 0.21 | 0.15 | 1.91 | 11.00 |
| except for | | bottom | 0.13 | 0.13 | 1.66 | 11.00 |
| 4/89, 6/89,10/89 | E | surface | 1.04 | 0.15 | 1.87 | 11.00 |
| when secci | | mid | 0.31 | 0.15 | 1.92 | 11.00 |
| disc was used | | bottom | 0.15 | 0.10 | 1.92 | 11.00 |
| | F | surface | 1.95 | 0.15 | 1.92 | 11.00 |
| | | mid | 0.20 | 0.05 | 1.88 | 11.00 |
| | | bottom | 0.21 | 0.05 | 1.88 | 11.00 |
| NOx | D | surface | | | | |
| mg/l | | mid | | | | |
| | | bottom | | | | |
| | E | surface | | | | |
| | | mid | | | | |
| | | bottom | | | | |
| | F | surface | | | | |
| | | mid | | | | |
| | | bottom | | | | |
| FRP | D | surface | | | | |
| mg/l | | mid | | | | |
| | | bottom | | | | |
| | E | surface | | | | |
| | | mid | | | | |
| | | bottom | | | | |
| | F | surface | | | | |
| | | mid | | | | |
| | | bottom | | | | |
| Treatment Plant Average Flow (MGD) | | | | | | |

Figure 11




Agana WWTP Water Quality Monitoring Stations.