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ARMSTRONG LABORATORY

WASTEWATER CHARACTERIZATION SURVEY, CANNON AIR FORCE BASE, NEW MEXICO

Richard P. McCoy, Captain, USAF, BSC

OCCUPATIONAL AND ENVIRONMENTAL HEALTH DIRECTORATE
BIOENVIRONMENTAL ENGINEERING DIVISION
2402 E Drive
Brooks Air Force Base, TX 78235-5114

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Final Technical Report for Period 28 September 1992 - 9 October 1992

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Richard P. McCoy

RICHARD P. McCOY, Capt, USAF, BSC
Consultant, Water Quality Branch

EDWARD F. MAHER, Colonel, USAF, BSC
Chief, Bioenvironmental Engineering Division

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Richard P. McCoy

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13. ABSTRACT *(Maximum 200 words)*
A wastewater characterization survey was conducted at Cannon AFB, New Mexico, from 28 September 1992 - 9 October 1992 by personnel from the Water Quality Branch of Armstrong Laboratory. Extensive sampling of the wastewater lagoon influent, effluent, and sludge was conducted. In addition, 9 industrial sites were sampled in the industrial areas of the base.

The average influent biochemical oxygen demand (BOD) was 197 milligrams per liter (mg/l) and the average chemical oxygen demand (COD) was 436 mg/l. The lagoons removed 63% of the BOD in the wastewater. Low levels of metals were found, but levels of oils and greases, chloride, sulfate, solids, nitrogen, and phosphorus were higher than typical of weak wastewater levels.

Selenium levels in the wastewater were higher than allowed by New Mexico Water Quality Regulations for irrigation. The new wastewater treatment plant to be built must comply with New Mexico standards for discharges of water into or below the surface of the ground.

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WASTEWATER CHARACTERIZATION SURVEY, CANNON AIR FORCE BASE, NEW MEXICO

INTRODUCTION

A wastewater characterization survey was conducted at Cannon Air Force Base (AFB), New Mexico, from 28 September 1992 - 9 October 1992 by personnel from the Armstrong Laboratory Occupational and Environmental Health Directorate (AL/OE) located at Brooks AFB, Texas. This survey was performed by Capt Richard McCoy, 2d Lt Elizabeth Brown, TSgt Mary Fields, and A1C Keanue Byrd in response to a request by the Tactical Air Command (now Air Combat Command) Bioenvironmental Engineer (HQ ACC/SGPB). The request letter is at Appendix A.

Influent and effluent wastewater samples from the sewage lagoons, as well as wastewater samples from various sites in the base cantonment area, were collected and analyzed for various parameters. Sampling at these industrial sites was performed so that Cannon AFB Bioenvironmental Engineering and Civil Engineering personnel could identify, reduce, or eliminate any toxic discharges to their wastewater collection system. The sample results from this survey will be used by the HQ ACC Civil Engineering Technical Services Office (CETSO) for the design of a new wastewater treatment plant (WWTP) at Cannon AFB.

DISCUSSION

Background

Cannon AFB is located in the east central region of New Mexico, near the Texas border. The base lies approximately 10 miles (15 km) west of Clovis, New Mexico. The base is home to the 27th Fighter Wing, which will soon consist of all F-111 aircraft in the Air Force inventory. Currently there are 3 fighter squadrons (the 522d, 523d, and 524th), 1 fighter training squadron (the 428th), and 1 electronic combat squadron (the 430th) which flies the EF-111. Aircraft and personnel assigned to Cannon AFB are capable of worldwide deployment in support of US military operations. As of 11 December 1992, the base population was 11,529, which consisted of 914 active duty personnel living on base, 1,626 dependents living on base, 3,739 active duty personnel living off base, 4,468 dependents living off base, and 782 civilian personnel. The base is in the active stage of building more on-base family housing units for the recent surge in personnel assigned to Cannon AFB as part of its realignment.

To support the mission, several types of industrial facilities are located at the base. These facilities include aircraft and vehicle washracks, aircraft corrosion control facilities, equipment maintenance facilities, and photographic and x-ray facilities.

The existing wastewater facilities at Cannon AFB include a number of oil/water separators, a sanitary sewage collection system that receives some industrial wastewater, several lift stations, and two large sewage lagoons. The sewage lagoons ultimately discharge into a playa lake that is used on an adjacent farm for irrigating cropland. In the past, sludge from the lagoons was periodically removed and disposed of through land application or landfilling. At the time of this survey, Civil Engineering personnel stated that the sludge in the lagoons had not been removed in at least 7 years.

Water Quality Standards

The discharge from the sewage lagoons at Cannon AFB is not currently regulated by a National Pollutant Discharge Elimination System (NPDES) permit. It is assumed that this is because the discharge is not into "waters of the United States."

Excerpts from the New Mexico Water Quality Regulations (1) and Water Quality Standards (2) are contained in Appendix B. A review of these state standards shows that one set of criteria probably currently applies to the discharge from the lagoons. This criteria set is from Section 3-101D of the Water Quality Standards and governs the quality of water used for irrigation. Table 1 lists the criteria irrigation water must meet in accordance with New Mexico law.

Table 1. New Mexico Water Quality Criteria for Irrigation Water.

Pollutant	Discharge Limit (mg/l)
Aluminum	5.0
Arsenic	0.10
Boron	0.75
Cadmium	0.01
Chromium	0.10
Cobalt	0.05
Copper	0.20
Lead	5.0
Selenium	0.13
Selenium*	0.25
Vanadium	0.10
Zinc	2.0

* In the presence of greater than 500 mg/l sulfate.
NOTE: All concentrations refer to the pollutant species in the dissolved state.

Another set of standards that applies to any discharge of water onto or below the surface of the ground is found in Section 3-103 of the Water Quality Regulations, which can also be found in Appendix B. The survey data collected as part of this survey cannot be used to compare the lagoon discharge to these standards because these standards apply to the quality of the receiving groundwater. No information was available on the groundwater quality beneath the playa lake. However, the standards cited in this section of the regulation should be used when designing the new wastewater treatment plant. Since New Mexico has an antidegradation law concerning its groundwater, discharges from the lagoon should not exceed the criteria listed in this standard to insure that the groundwater underlying the playa lake is not impaired.

Sampling Strategy

A presurvey was conducted at Cannon from 5-7 August 1992 by Capt McCoy. During this presurvey, a sampling strategy was developed with the assistance of Cannon AFB Bioenvironmental Engineering and Civil Engineering personnel. A copy of the strategy is included in Table B-1, Appendix B. The formal sampling strategy was forwarded to Cannon Bioenvironmental Engineering Services on 17 August 1992. One requested change that was done after final review by the Chief, Bioenvironmental Engineering Services, was to add an eleventh site at the wastewater lagoon effluent.

The sampling strategy included daily collection of 24-hour time-proportional composite samples from the influent and effluent of the wastewater lagoons and sampling at 9 industrial sites in the base cantonment area for 3 consecutive days. The 9 sites were expected to show the contribution of industrial chemicals into the sewerage system by various shops at Cannon AFB. The samples collected were analyzed for common wastewater pollutant parameters such as chemical oxygen demand (COD), volatile organic chemicals (VOCs), metals, ammonia, cyanide, phenol, phosphorus, oils and greases, total petroleum hydrocarbons, and solids. Table B-2 shows the United States Environmental Protection Agency (USEPA) Methods used to analyze the samples along with holding times and preservation methods.

Figure B-1 shows the general layout of the sanitary sewerage system for Cannon AFB. Figure B-2 shows a close-up view of Sampling Sites 1, 2, and 3. Figure B-3 shows a close-up view of Sites 4, 5, 6, and 7. Figure B-4 shows a close-up view of Site 10, and Figure B-5 shows Site 9, and Sites 8 and 11 at the wastewater lagoons.

Sampling Methods

Procedures used to collect samples during this survey are contained in the Air Force Occupational and Environmental Health Laboratory (AFOEHL) Recommended Sampling Procedures (3). These procedures generally follow guidelines established by the USEPA. Table B-2 summarizes the collection, preservation, and analytical methods used for the parameters analyzed during this survey.

Wastewater samples were typically collected over a 24-hour period as a time-proportional composite (i.e., a composite of 24 samples collected at 1-hour intervals). The automated composite samplers used during this survey contain a 3-gallon glass jar which was packed in ice before each day of sampling. Samples collected for VOCs, oils and greases, and total petroleum hydrocarbons were collected as grab samples. Wastewater pH and temperature were recorded at each site each day during sample collection. Dissolved oxygen readings were taken daily at the wastewater lagoon influent and effluent. Any unusual physical characteristics (odor, color, etc.) of the samples were also noted.

Samples were placed in iced coolers and transported back to the workcenter, the old water laboratory in the Civil Engineering Complex (Bldg 339), for preservation and/or refrigeration until shipment by overnight package service to the Armstrong Laboratory Analytical Services Division at Brooks AFB. Sample preservation was in accordance with the AFOEHL Recommended Sampling Procedures.

In addition to the samples analyzed by Armstrong Laboratory, total toxic organic (TTO) samples of the wastewater lagoon influent, effluent, and sludge were analyzed by one of Armstrong Laboratory's contract laboratories. Datachem Laboratories of Salt Lake City, Utah, was the contract laboratory used for the TTO analyses.

Biochemical Oxygen Demand (BOD) and COD were performed in the field by 2d Lt Brown, an analytical chemist from the Armstrong Laboratory Analytical Services Division. The 5-day BOD tests were performed using procedures outlined in Standard Methods for the Examination of Water and Wastewater (4). Chemical Oxygen Demand was performed using Hach COD digestion vials and a Hach COD reactor. This procedure is described in Standard Methods for the Examination of Water and Wastewater (5).

Sludge samples were collected in both lagoons by Armstrong Laboratory personnel. Approximately 500 ml of sludge was collected from each of the quadrants of each lagoon cell using a sludge judge. A motorboat was used to get to each of the lagoons. Originally, our intent was to sample from the centers of the 4 quadrants of the lagoons. However, the winds were so high during the sampling that maintaining a fixed position was not possible with the anchor provided in the boat. Therefore, 500-ml aliquots were collected in each of the four quadrants, although not necessarily in the centers of the quadrants. The sludge judge had markings for every 6 inches of depth, and depth readings were recorded for the various quadrants.

Quality Assurance/Quality Control

Field Quality Assurance/Quality Control (QA/QC)

A field QA/QC program was used during this survey. The QA/QC program included collection of field equipment and reagent blank, spike, and duplicate samples. Per EPA protocols, 5% of the total number of field samples was collected for each type of QA/QC sample, as appropriate. For the preparation of QA/QC samples, distilled, deionized water was provided by the 27th Medical Group Cli· ical Laboratory.

Field equipment blanks were collected for metals, phenol, cyanide, ammonia, total Kjeldahl nitrogen, nitrate, nitrite, phosphorus, COD, chloride, specific conductance, and sulfate by pumping distilled, deionized water through the Tygon tubing of a composite sampler into the appropriate sample container. Equipment blanks indicate accidental or incidental contamination that may have occurred during the entire sampling process (sampling, transport, sample preservation, and analysis). In particular, field blanks can detect contaminants that may adhere to the inside of the Tygon tubing or the polyethylene strainer and cause cross-contamination of the samples.

Reagent blanks were collected for the same parameters as field blanks except for chloride, specific conductance, and sulfate, which require no preservative. These samples were collected by pouring distilled, deionized water into appropriate sample containers and preserving the samples with the appropriate preservative. Reagent blanks were collected to determine whether the preservative could be a source of sample contamination.

Spike samples were prepared for metals, phenol, cyanide, ammonia, nitrate, COD, total Kjeldahl nitrogen, and phosphorus. Spike samples were made using a commercially-available spike solution (Environmental Resource Associates, Arvada, Colorado) whose concentration of analytical parameters is certified to be within a specified range. Five ml of the spike solution was volumetrically pipetted into a 1-liter volumetric flask and diluted to a final volume of 1 liter. Results of the analyses were then compared to the advisory range of expected concentrations cited by the manufacturer. Results of spike sampling are used to identify field, transportation, and matrix effects. In addition, spikes indicate how closely the analytical laboratory's results approach an expected concentration.

Duplicate samples were collected for all analytical procedures. For composite samples, duplicates were taken from a well-stirred composite sampler collection jar. For grab samples, a clean, stainless steel pitcher was used to collect the sample. The wastewater in the pitcher was well stirred before the sample was poured into the appropriate sample containers.

Duplicate (or replicate) samples reflect the overall precision of the sampling or analytical methods. It should be noted that obtaining truly duplicate samples in the field is very difficult.

Background samples were also taken of the drinking water at Cannon AFB to determine the quality of the potable water that enters the sanitary sewerage system. Background samples were analyzed for all parameters tested during this survey. Background samples are used to determine if sample results at sites of interest are contaminated or truly different from the norm. In the case of this study, the Cannon AFB drinking water is assumed to be uncontaminated when compared to the wastewater.

The QA/QC program for the field COD and BOD analyses consisted of analyzing blank and spike samples with each day's set of samples. For COD analyses, a blank sample prepared with distilled water was used to calibrate (zero) the spectrophotometer. Additional samples were prepared with COD concentrations of 100, 200, and 300 mg/l; their analytical results were used to develop a calibration curve. For the BOD analyses, blank samples were prepared by filling a set of BOD bottles with dilution water, reading the dissolved oxygen content, and incubating the blanks for 5 days with the other samples. The final dissolved oxygen level was then read after the incubation period. Spike samples were prepared by using a standard 2% solution of glucose-glutamic acid, reading the dissolved oxygen, and incubating for 5 days.

Armstrong Laboratory and Datachem Laboratories Internal QA/QC

The Armstrong Laboratory Analytical Services Division Quality Assurance Plan establishes the guidelines and rules necessary to meet the analytical laboratory requirements of 43 states, the USEPA, and private accrediting agencies. Specific QA/QC activities include inserting a minimum of 1 blind sample control for each parameter analyzed on a monthly basis and periodic auditing of the laboratory quality assurance items from each branch. All instruments are calibrated on each day of use, and at least 1 National Institute Standards and Technology/Standard Reference Materials (NIST/SRM) traceable standard and control sample is included with each analytical run. All quality control samples are plotted and tracked by the individual work sections, and corrective action is documented every time a quality assurance parameter is not met. The laboratory participates in numerous proficiency surveys and interlaboratory quality evaluation programs, including the USEPA's Performance Evaluation Study for wastewater. The Study involves analyzing samples provided by the USEPA and reporting the results. By participating in the Study, Armstrong Laboratory's certification in wastewater analysis is implied (6). Armstrong Laboratory is not certified by the State of New Mexico to perform wastewater analyses.

Datachem Laboratories is an EPA-certified laboratory for wastewater analysis and is not certified to perform wastewater analysis in the State of New Mexico, although they have applied for drinking water analysis certification. Armstrong Laboratory performs periodic inspections of the QA/QC program at Datachem Laboratories and verifies all analytical results received from Datachem. Datachem is not certified by the State of New Mexico to perform wastewater analyses.

Site Descriptions

Site 1. Site 1 (see Figure 1) is a manhole across from Building 790, at the corner of Torch Boulevard and Trident Avenue (Manhole #112). Shops that discharge upstream of this site include: the 428th, 522d, and 523d Aircraft Maintenance Units (AMUs), the Explosive Ordnance (EOD) Shop, Survival Equipment, Civil Engineering Power Production, and the Field Training Detachment (FTD). No unusual circumstances were recorded during the 3 days of sampling at this site.

Site 2. Site 2 (see Figure 2) is a manhole across from Building 684, at the corner of Torch Boulevard and Sextant Avenue (Manhole #118). Shops that discharge into the sewerage system immediately upstream of this site include the Fire Department, Fire Extinguisher Maintenance, Fire Truck Maintenance, the Armament Shop, and Secure Systems Shop. No unusual circumstances were recorded during the 3 days of sampling at this site.

Site 3. Site 3 (see Figure 3) is a manhole across from Building 620, along Torch Boulevard (Manhole #138). The manhole is in the parking lot of Bldg 170. Shops that drain into the sewerage system upstream of this site include most Component Repair Squadron Shops (Structural Repair, Machine Shop, Metal Processing, Pneudraulics, Jet Engine Maintenance, Electronic Environmental Systems, Egress, Auto Test Station, and Photo Sensor), Photo Laboratory, Reprographics, and Armament Recording. No unusual circumstances were recorded during the 3 days of sampling at this site.

Site 4. Site 4 (see Figure 4) is a manhole in front of Building 186, at the corner of Torch Boulevard and Eureka Avenue (Manhole #148). The manhole is in the parking lot of Equipment Maintenance. Shops tied into the sewerage system at this site include Repair & Reclamation, Phase Inspection, Non-Destructive Inspection (NDI), and the Precision Maintenance and Electronics Laboratory (PMEL). No unusual circumstances were recorded during the 3 days of sampling at this site.

Site 5. Site 5 (see Figure 5) is a manhole in front of Building 193 (inside the gate), along Torch Boulevard (Manhole #159). The manhole was very deep; its depth was at the maximum limit the composite sampler could pull. Shops that discharge wastewater into the sewerage system at this site include the Wheel & Tire Shop, the 524 AMU, Auto Hobby Shop, and Avionics Ground Equipment (AGE) Servicing. On the first day of sample collection (1 October 1992), the sewage was dark gray; there was a significant amount of black grit in the bottom of the sample collection jar.

Site 6. Site 6 (see Figure 6) is a manhole in the parking lot of the Airmen's Attic (Manhole #198). Most of the Transportation and Civil Engineering Squadron shops discharge into the sewer system upstream of this site. The Transportation Squadron shops include Special Purpose, General Purpose, Refueling Vehicle, and Minor Maintenance, Allied Trades, and Packing & Crating. The Civil Engineering shops include the Water Plant, Carpentry, Plumbing, Paint, Welding, Sheet Metal, Exterior Electric, Heating & Refrigeration, Asbestos Removal, Entomology, Liquid Fuels, and Golf Course Maintenance Shops. The Supply Fuels Laboratory and the Defense Reutilization & Marketing Office (DRMO) also discharge into this sampling site. No unusual visual characteristics were observed during the 3 days of sampling.

Site 7. Site 7 (see Figure 7) is a manhole along Casablanca Avenue (Manhole #154), across the street from the running track, and in front of the baseball field. In the original sampling strategy, Manhole #87 was to be sampled, but this manhole was located on a highly travelled street. Due to safety considerations, Manhole #154 was chosen since it was located downstream and was off the street. The Hospital (including medical and dental X-ray and the Clinical Laboratory), much of military family housing, and several dormitories (Dormitories

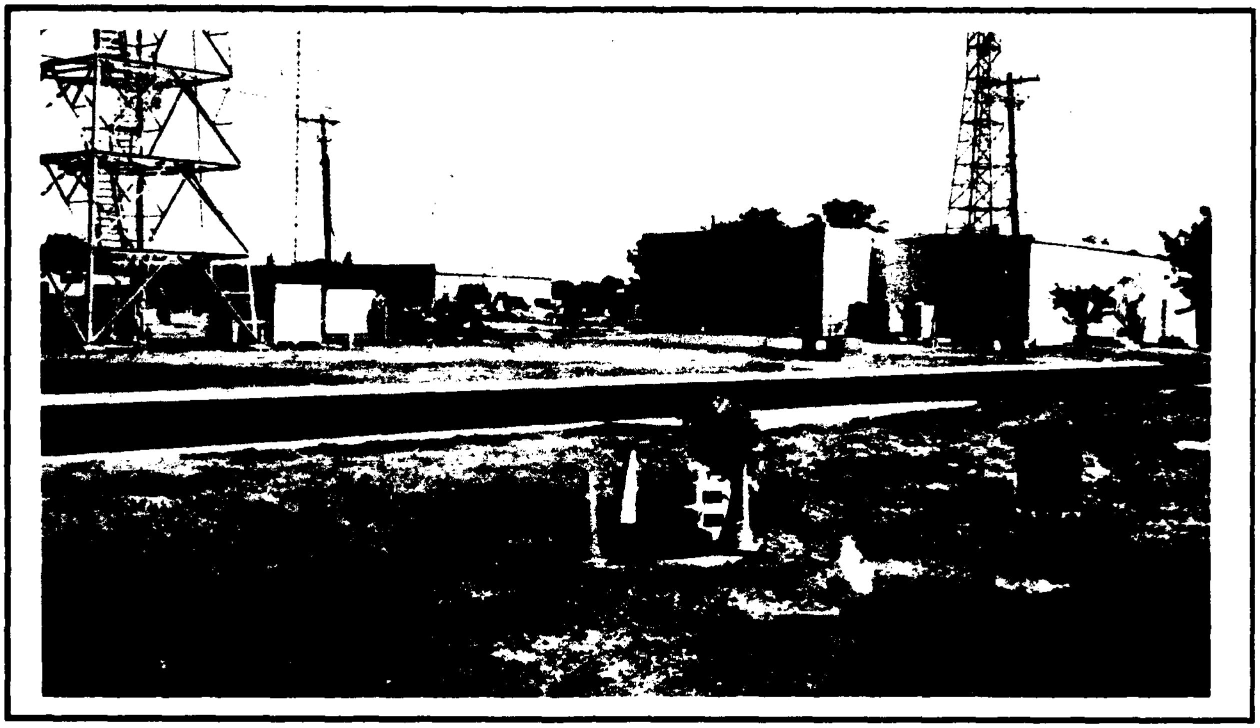

Figure 1. Site 1, Manhole Across from Bldg 790.

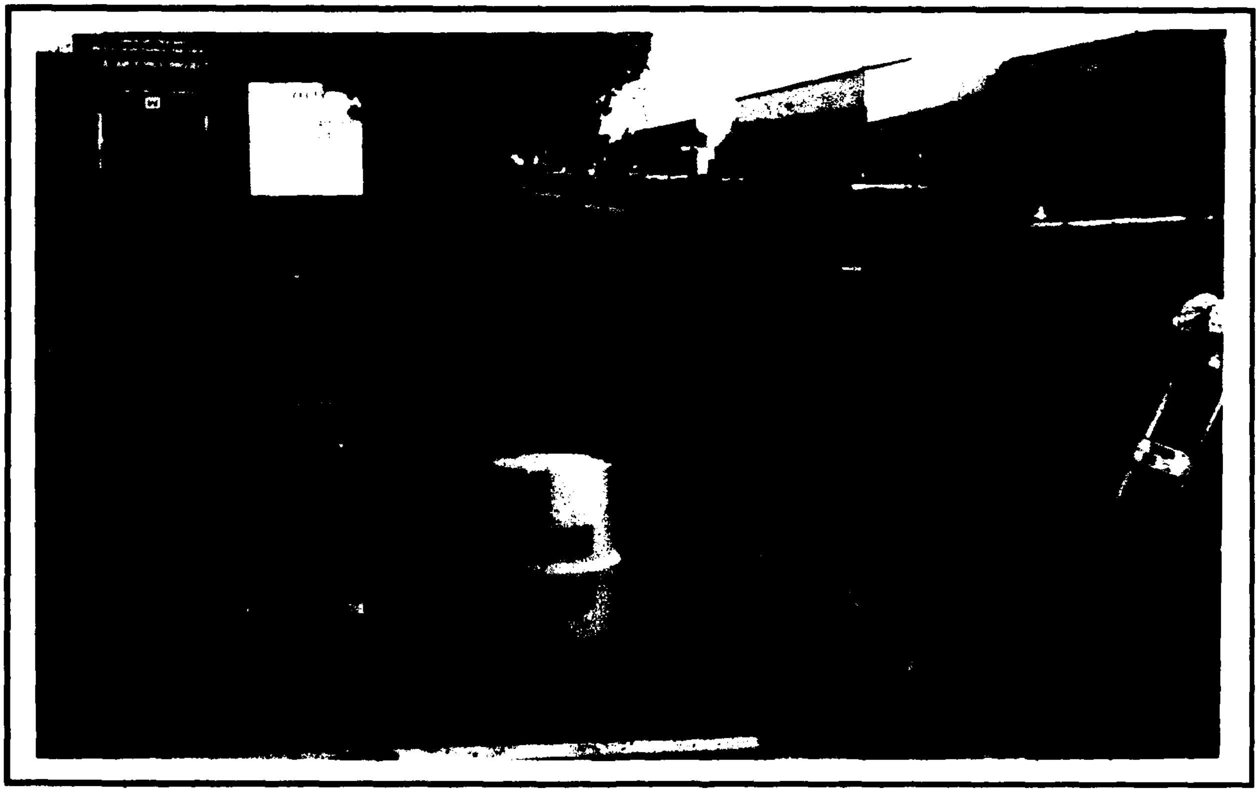

Figure 2. Site 2, Manhole Across from Bldg 684.

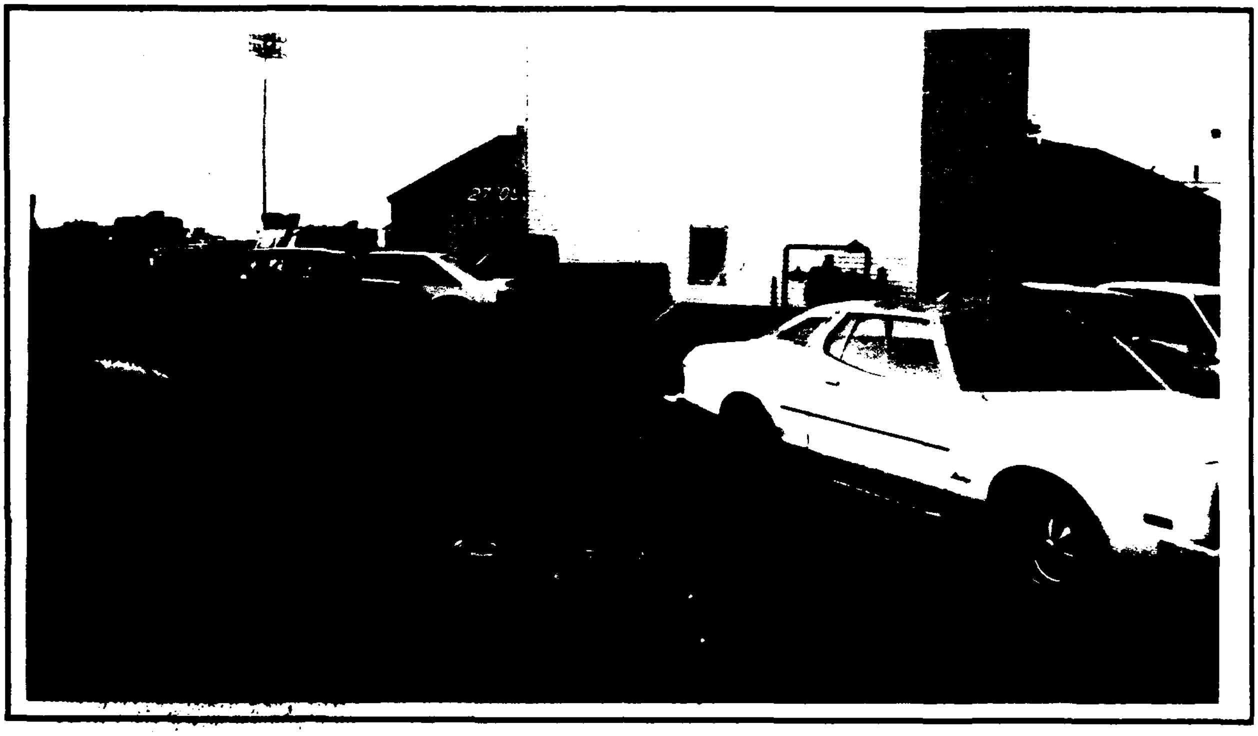

Figure 3. Site 3, Manhole Across from Bldg 620.

Figure 4. Site 4, Manhole in Front of Bldg 186.

Figure 5. Site 5, Manhole in Front of Bldg 193.

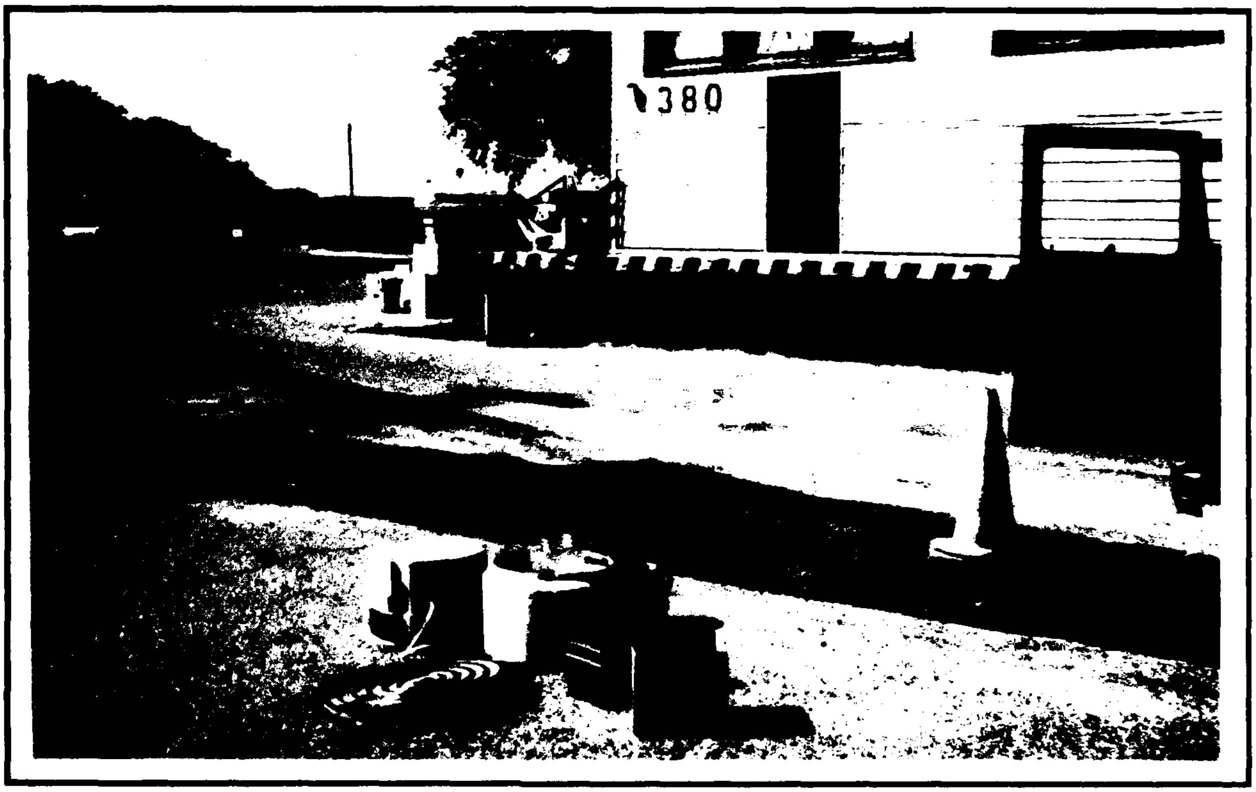

Figure 6. Site 6, Manhole Near Airmen's Attic.

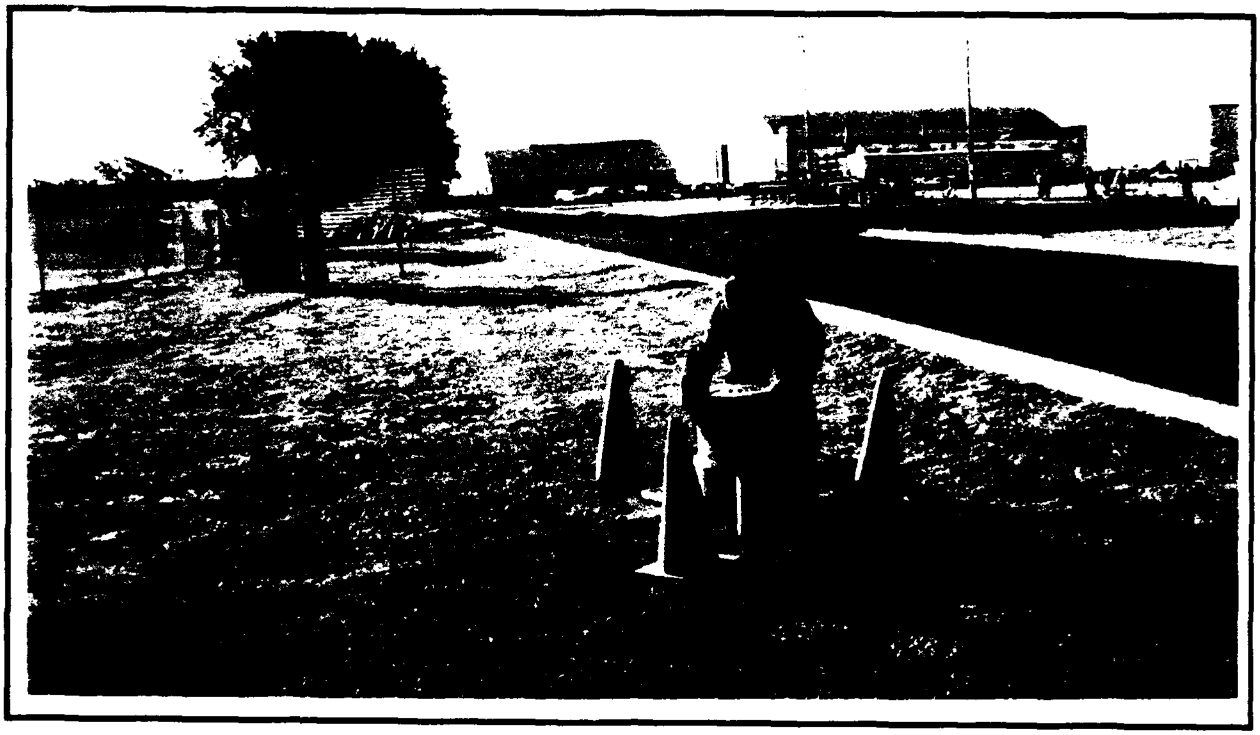

Figure 7. Site 7, Manhole Along Casablanca Ave.

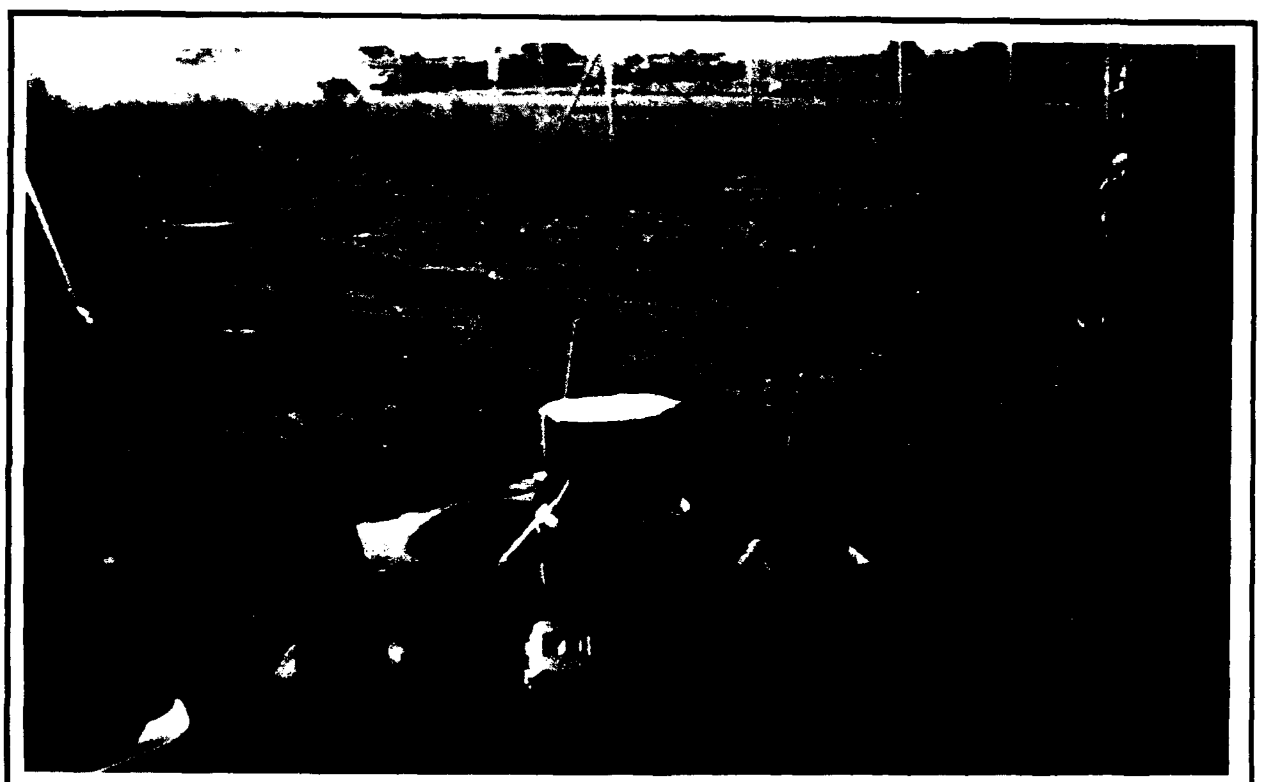

Figure 8. Site 9, Manhole Near Gate into Munitions Maintenance.

1244-1260) discharge into this site. No unusual visual observations were made of the sewage samples collected from this site.

Site 8. Site 8 is the influent to the wastewater lagoons. The sampling at this site was performed just downstream of the bar grates of a recently installed flume. This site receives all wastewater from the base cantonment area and the Fuel Systems Repair and Corrosion Control Shops discharge into the wastewater upstream of this sampling site. No unusual visual observations were made concerning the composite samples taken at this site.

Site 9. Site 9 (see Figure 8) is a manhole near the gate into Munitions maintenance. All buildings in the 2100-series drain into this manhole, which is not designated by a manhole number on the Sanitary Sewerage System map. The flow from this site was so low that the manhole required sandbagging to dam up enough liquid for the composite sampler to pump. No unusual visual characteristics of the sewage were observed at this site.

Site 10. Site 10 is a manhole behind the Hospital upstream from the Lift Station (Manhole #85). This sampling site receives wastewater from the Hospital and from part of military family housing. No unusual visual observations of the sewage collected were made at this site during the 3 days of sampling.

Site 11. Site 11 is the effluent from the wastewater lagoons. At the time of this survey, the wastewater entering the lagoons first entered Lagoon "B" and then flowed into Lagoon "A" (see Figure B-5). The manhole used to sample the effluent was at the southeast corner of Lagoon "A." No unusual visual characteristics of the sewage samples were recorded during the 8 days of sampling at this site.

RESULTS

General

The results discussed in this report reflect the quality of the wastewater during the period of this survey. Any changes that may have occurred to operations, shop practices, chemical usages, base population or mission, etc., since the completion of this survey will change the nature of future discharges to a wastewater treatment plant.

Quality Assurance/Quality Control Results

Results of the QA/QC sampling are contained in Appendix C. Table C-1 shows the results of the background sampling performed on the potable water taken from the former Civil Engineering Water Plant Laboratory. Analytical results of note include an antimony result of 29 µg/l, an arsenic result of 13 µg/l, and a thallium concentration of 16 µg/l. There are currently no established Maximum Contaminant Levels (MCLs) for antimony and thallium under the Safe Drinking Water Act (7). However, the USEPA has proposed regulating antimony at 5 or 10 µg/l and thallium at 1 or 2 µg/l (8). The current MCL for arsenic is 50 µg/l; however, the USEPA has proposed to reduce this MCL to 2 µg/l (9). COD was 17 mg/l; total trihalomethanes in the sample was 7.3 µg/l; it consisted of bromodichloromethane, bromoform, and chlorodibromomethane (the current MCL for trihalomethanes is 100 µg/l).

Table C-2 shows the results of the spike sampling performed. Four of the metals did not fall within the expected concentration range of the standards used. Laboratory recoveries for cadmium and selenium were low, and recoveries of mercury and thallium were high. The recoveries of one cyanide sample and both nitrate, COD, and phosphorus samples were low.

Table C-3 shows the results of the duplicate sample analyses for metals and volatile organic chemicals. In general, duplicate results for these parameters were in good agreement, indicating that a high degree of precision was achieved for these analytical procedures. Results of the duplicates for other analyses were not as good. Poor agreement was noted on one of two sets of duplicates for cyanide, COD, total petroleum hydrocarbons, ammonia, phosphorus, total residue, and total volatile residue. In addition, poor agreement can be seen for both sets of duplicates for oils and greases. As discussed earlier, obtaining truly duplicate samples in the field is not always possible, and this is probably the cause of the poor duplicate results.

Table C-4 shows the results of the equipment and reagent blanks. Results of these analyses were excellent, and show that the equipment and sampling techniques did not introduce cross contaminants or equipment contaminants into the samples. The detectable readings of sodium and specific conductance are probably the result of the blank water used. Low levels of sodium, COD, and total Kjeldahl nitrogen were found, but are comparable to the background levels that were reported.

Results of Sampling of the Wastewater Lagoon Influent, Effluent, and Sludge Beds

Wastewater Lagoon Influent

Figure 9 shows the wastewater lagoon influent sampling point, and Figure 10 shows Captain McCoy performing a field measurement of dissolved oxygen at the lagoon. Results of metals, VOC, and other sampling at the wastewater lagoon influent are contained in Table D-1. Shown in the table are each day's sample concentration as well as the average concentration over the 8-day period. Two days of sampling (5 and 7 October 1992) showed elevated levels of iron. Mercury was detected at 1.8 and 2.3 µg/l on 7 and 8 October 1992, respectively. Silver was detected at 20 µg/l on 2 and 3 October 1992. Volatile organic chemical analyses for the 8 days of sampling showed levels of VOCs were consistently lower than Armstrong Laboratory's quantitative detection limit. Chloroform was detected at 0.1 µg/l on 1 October 1992, but this contaminant is most likely a disinfection by-product. 1,4-Dichlorobenzene, 1,1-dichloroethene, methylene chloride, 1,1,1-trichloroethane, and toluene were detected at levels below the quantitative detection limits. These low levels of VOCs indicate that good shop practices are minimizing the discharge of solvents and other sources of VOCs into the sanitary sewerage system.

Results of the other sampling performed were also averaged and for those contaminants typically found in domestic sewage, the average concentration of the pollutant was compared to values cited by Metcalf & Eddy as typical (10). Table 2 shows these typical values for weak, medium, and strong wastewaters.

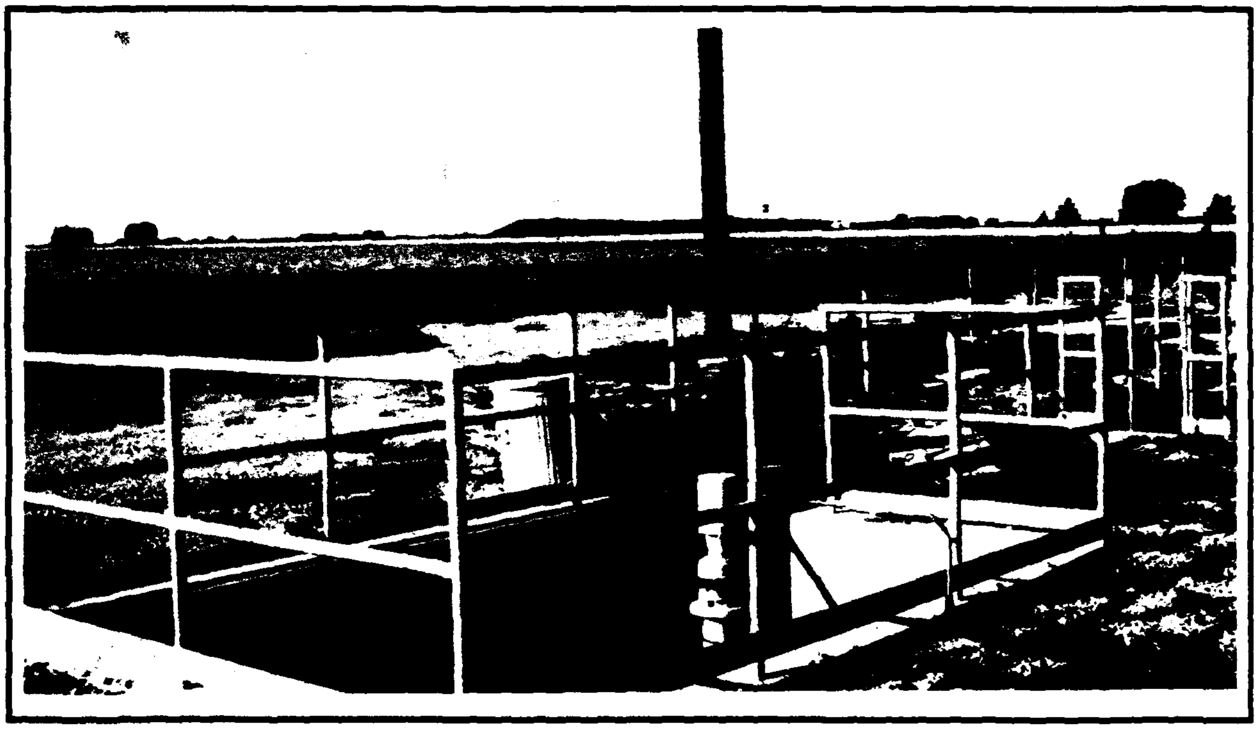

Figure 9. Site 8, Wastewater Lagoon Influent Sampling Point.

Figure 10. Measurement of Dissolved Oxygen in Wastewater Lagoon.

Table 2. Strength of Typical Domestic Sewage Parameters.

Contaminant	Units	Concentration Weak	Medium	Strong
Oil and Grease	mg/l	50	100	150
COD	mg/l	250	500	1000
BOD	mg/l	110	220	400
Ammonia	mg/l	12	25	50
Total Kjeldahl Nitrogen	mg/l	8	15	35
Phosphorus	mg/l	4	8	15
Chloride	mg/l	30	50	100
Sulfate	mg/l	20	30	50
Settleable Solids	ml/l	5	10	20
Total Solids	mg/l	350	720	1200
Filterable Solids	mg/l	100	220	350
Volatile Solids	mg/l	80	165	275

The average influent BOD found during the 5 days of sampling was 197 mg/l. The field COD values averaged 436 mg/l; the Armstrong Laboratory COD values averaged 172 mg/l. Since COD is always higher than BOD, the Armstrong Laboratory COD values are suspect, and the field values appear valid. The BOD and COD values found at the influent would classify the raw wastewater at Cannon AFB as a weak domestic sewage. This is typically the classification applied to wastewater during other wastewater characterization surveys done by the Armstrong Laboratory Water Quality Branch.

As can be seen in Table D-1 (second page), the levels of oil and grease, chloride, sulfate, and solids found in the lagoon influent are typical of strong wastewaters. The concentrations of total Kjeldahl nitrogen, phosphorus, and settleable solids would be typically associated with medium strength wastewaters. These results indicate that these pollutant concentrations are higher than would be expected of a weak wastewater. An average of only 15.8 mg/l of the 185.3 mg/l oil and grease is from petroleum hydrocarbons, indicating that the majority of the oil and grease found is the result of discharges of cooking oils and fats. The large amount of grease balls found floating on the surface of the lagoons is clear evidence that a high amount of oil and grease is entering the lagoons.

Table D-2 shows the results of the Total Toxic Organics (TTO) analysis done on 5 October 1992. The TTO analysis is prescribed by the USEPA Industrial Pretreatment Rules (11) and is used as a gross measure of organic contamination as a result of industrial practices. The TTO analysis is performed using EPA Methods 608, 624, and 625. However, since USEPA Methods 601 and 602 analyze for the same parameters as USEPA Method 624 and have a lower detection limit, these two methods were performed instead of USEPA Method 624. The TTO analysis showed detectable levels of butyl benzyl phthalate (14 μg/l), bis(2-ethylhexyl)phthalate (25 μg/l), and diethyl phthalate (16 μg/l). The USEPA Methods 601 and 602 analyses performed on 5 October 1992 showed no detectable levels for any parameters. The TTO concentration is calculated by adding up all detectable levels of the chemicals analyzed in USEPA Methods 608, 624, and 625. Therefore, the TTO for the wastewater lagoon influent is 0.055 mg/l. The TTO standard cited by the Industrial Pretreatment Standards is 2.13 mg/l.

Table D-3 shows the flow readings during the period of this survey. These readings were obtained by recording hourly readings from the chart recorder at the lagoon influent flume. The average flow during the period of 29 September 1992 to 11 October 1992 was 655,000 gallons per day (gpd) (2,480 m^3 per day). The minimum flow during this period was 100,000 gpd (379 m^3 per day) and the maximum was 1,600,000 gpd (6,057 m^3 per day).

Table D-4 shows the raw data results of the BOD analyses performed at Cannon AFB during this survey. The lightly shaded blocks in the table indicate final dissolved oxygen readings of less than 1 mg/l. Table D-5 shows the results of the QA/QC tests that were run in conjunction with the BOD analyses. The lightly shaded blocks indicate blank samples in which more than 0.2 mg/l dissolved oxygen depletion occurred after the 5-day incubation period, or glucose-glutamic acid solutions in which the final 5-day BOD value did not fall within the prescribed range of 198 ± 30.5 mg/l.

Wastewater Lagoon Effluent

Figure 11 shows the manhole used to access sampling of the lagoon effluent and Figure 12 shows the playa lake that receives the effluent. Table D-6 shows the results of daily and the 8-day average metals, VOCs, and other sampling performed at the effluent from Lagoon "A." Comparison of the effluent metals results to the New Mexico irrigation standards in Table 1 shows that on 4 days of sampling (3-6 October 1992) the levels of selenium exceeded these standards. Also, the 8-day average selenium concentration exceeded the irrigation standard. No other metals exceeded the irrigation standards; however, it should be noted that analyses were not performed for aluminum, cobalt, and vanadium. No quantifiable levels of VOCs were found in the effluent, and this is expected when sampling the discharge from a large, open body of water. One ammonia sample, taken on 8 October 1992, was high compared to the other 7 days of sampling, and is suspect. If this sample result is omitted from the calculation of the average ammonia reading, the 8-day average level of ammonia in the influent is 0.66 mg/l.

The average effluent BOD was 73.2 mg/l, which is higher than that found by the Civil Engineering Water and Waste personnel during their routine analyses (approximately 30 mg/l). The reason for the different results is most likely because the lagoons were being operated in a different flow pattern during this survey. Figures 13 and 14 show the typical flow path for the wastewater and the flow path the wastewater followed during this survey, respectively. As can be seen from Figure 14, short-circuiting was likely occurring near the discharge point for the effluent. To alleviate this problem when the lagoon is discharging from Lagoon "A," the effluent sluice gate should be moved to the area denoted on Figure 14.

Table D-7 shows the results of the effluent TTO analysis done on 5 October 1992. Concentrations of analytes for USEPA Methods 608 and 625 were not detectable; the concentration of analytes for USEPA Methods 601 and 602 (Table D-6) were also not detectable. Therefore, the TTO result for the lagoon effluent was 0 mg/l.

Table D-8 shows the percent reduction of selected analytes for the wastewater lagoons. These reduction values were obtained by taking the difference between the influent and effluent concentrations, dividing by the influent concentration, and multiplying by 100. Iron and zinc are removed in significant percentages by the lagoons. The removal process occurring is most likely oxidation of the iron and zinc and precipitation into the sludge. The removal of oil and grease and total petroleum hydrocarbons is also significant. The oil and grease are most likely agglomerating into the grease balls seen on the surface of the lagoons and in the sludge, and the total petroleum hydrocarbons are probably either removed by volatilization or incorporated into the sludge.

Figure 11. Site 11, Wastewater Lagoon Effluent Sampling Point.

Figure 12. Playa Lake Used for Agricultural Irrigation Water.

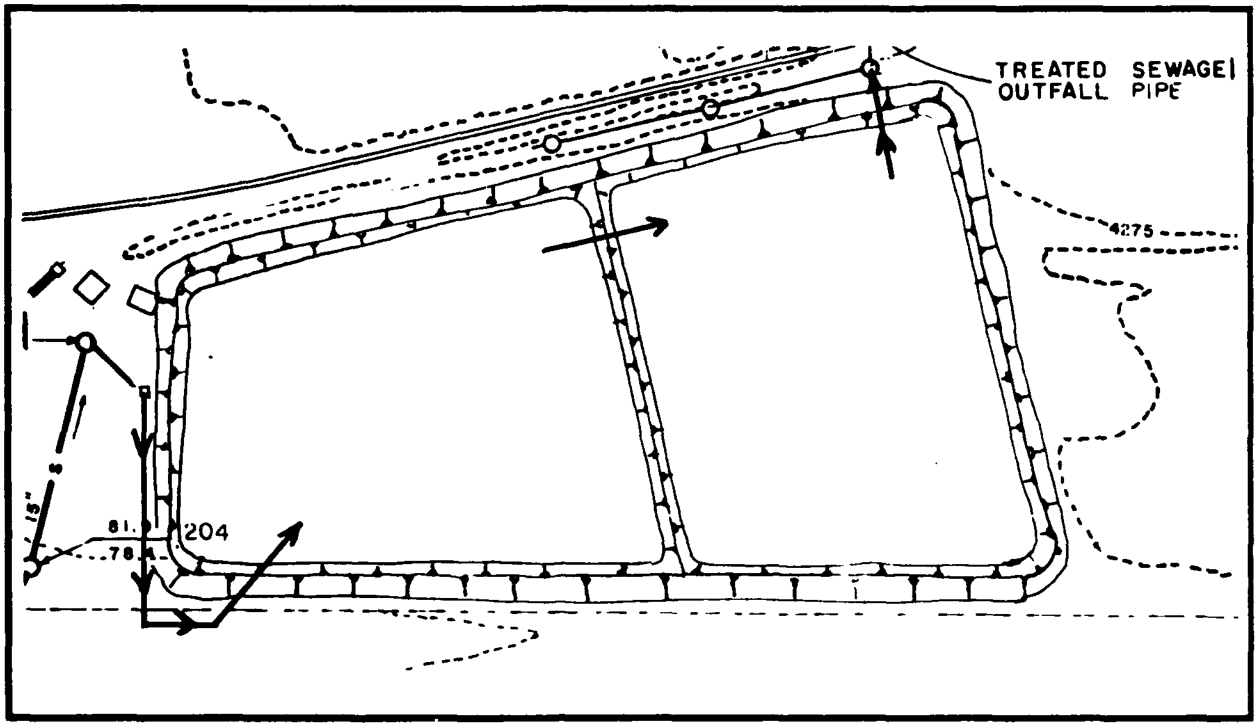

Figure 13. Routine Wastewater Lagoon Flow Pattern.

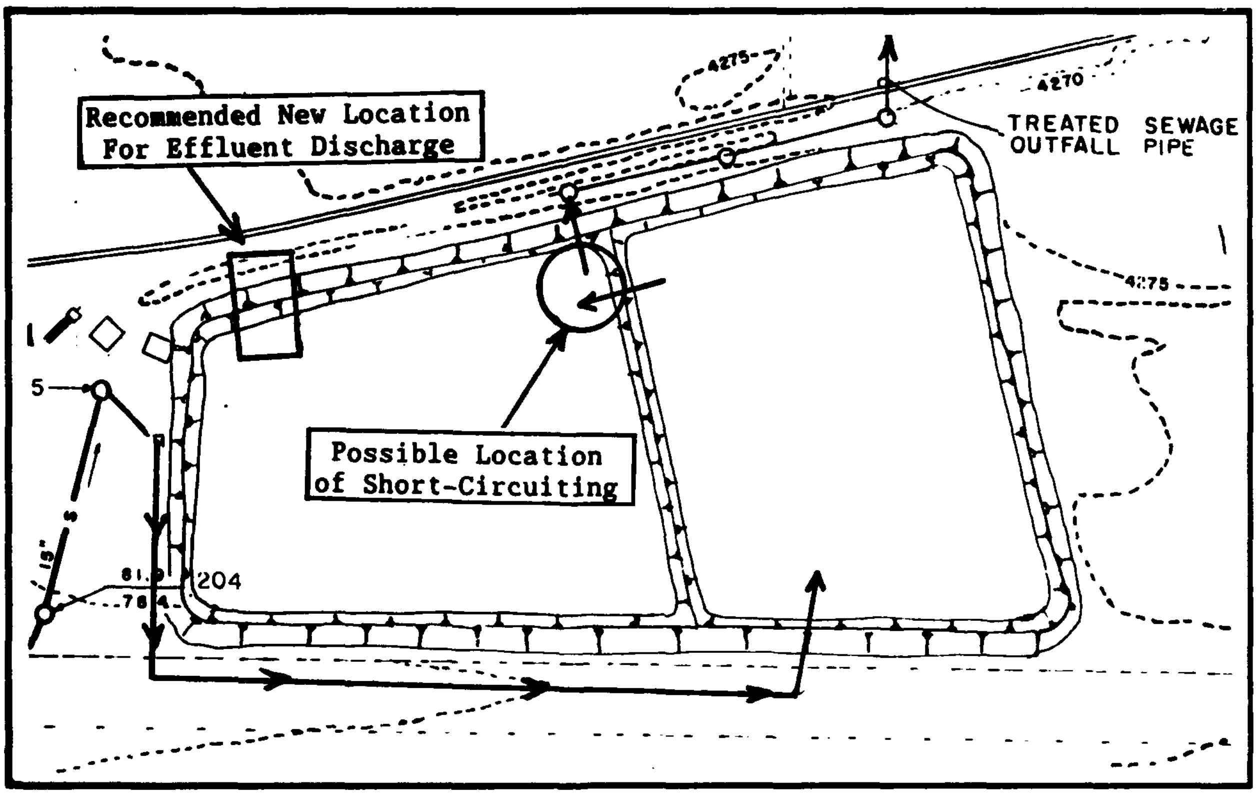

Figure 14. Wastewater Lagoon Flow Pattern During Characterization Survey.

The average BOD reduction was 62.9%, which is low, compared to a reported reduction range of 80-95% for facultative lagoons (12). This result is again likely due to the short-circuiting occurring during this survey. It should be noted that several pollutant parameters are increasing in the lagoons. The concentrations of chloride, specific conductance, sulfate, total residue, filterable residue, and total volatile residue in the lagoon are higher than influent levels due to concentration by evaporation.

Wastewater Lagoon Sludge

Figures 15 and 16 show the collection of sludge samples at the lagoons. The depths of the sludge layer in the various quadrants of the lagoons are shown in Figure 17. Tables D-9 and D-10 show the results of the analyses of the lagoon sludge. Mercury, found at concentrations of 27.1 and 34.4 µg/l, probably entered the lagoons as the result of past and current mercury spills that ultimately end up in the sewer system. As was discussed previously, mercury was detected on 2 days of sampling during this survey. Oil and grease, petroleum hydrocarbons, and phenol also appear to be concentrating in the lagoon sludge. No volatile organic hydrocarbons were detected in the sludge; however, benzoic acid and bis(2-ethylhexyl)phthalate were found in detectable concentrations. These compounds are most likely intermediate or end products of the anaerobic decomposition occurring in the sludge layer.

Results of Sampling at the Industrial Sites

Results of sampling at Site 1 are shown in Table E-1. Pollutant concentrations of note at this site include iron concentrations of 1000 and 2600 µg/l, oil and grease levels of 107.2, 140, and 169.6 mg/l, and ammonia levels of 26.4 and 29.2 mg/l. No quantifiable levels of VOCs were found at this site.

Table E-2 shows the results of the sampling at Site 2. The iron concentrations of 1150 and 1290 µg/l and oil and grease level of 140.8 are noteworthy. Again, no quantifiable levels of VOCs were found.

Table E-3 shows the results of sampling at Site 3. One iron concentration of 1300 µg/l and one zinc concentration of 3000 µg/l appear to be elevated. No quantifiable levels of VOCs were found and one elevated oil and grease level of 243.2 mg/l was found.

Table E-4 shows the results of sampling at Site 4. One iron concentration of 1120 µg/l, a 1,1-dichloroethene level of 10.4 µg/l, an oil and grease reading of 112 mg/l, and 3 days of detectable cyanide readings are significant.

Table E-5 shows the results of sampling at Site 5. One iron concentration of 1800 µg/l, and an oil and grease level of 142.4 mg/l are significant.

Table E-6 shows the results of sampling at Site 6. No significant levels of metals, VOCs, or other sampled pollutants were found at this site.

Table E-7 shows the results of sampling at Site 7. Cadmium was found at 9 and 10 µg/l at this site, as well as one reading of 1.24 µg/l of mercury, and 3 readings of 10 µg/l of silver. Readings of 2.9 and 1.5 µg/l 1,1-dichloroethene were found at the site.

Figure 15. Sampling of Sludge Using a Sludge Judge.

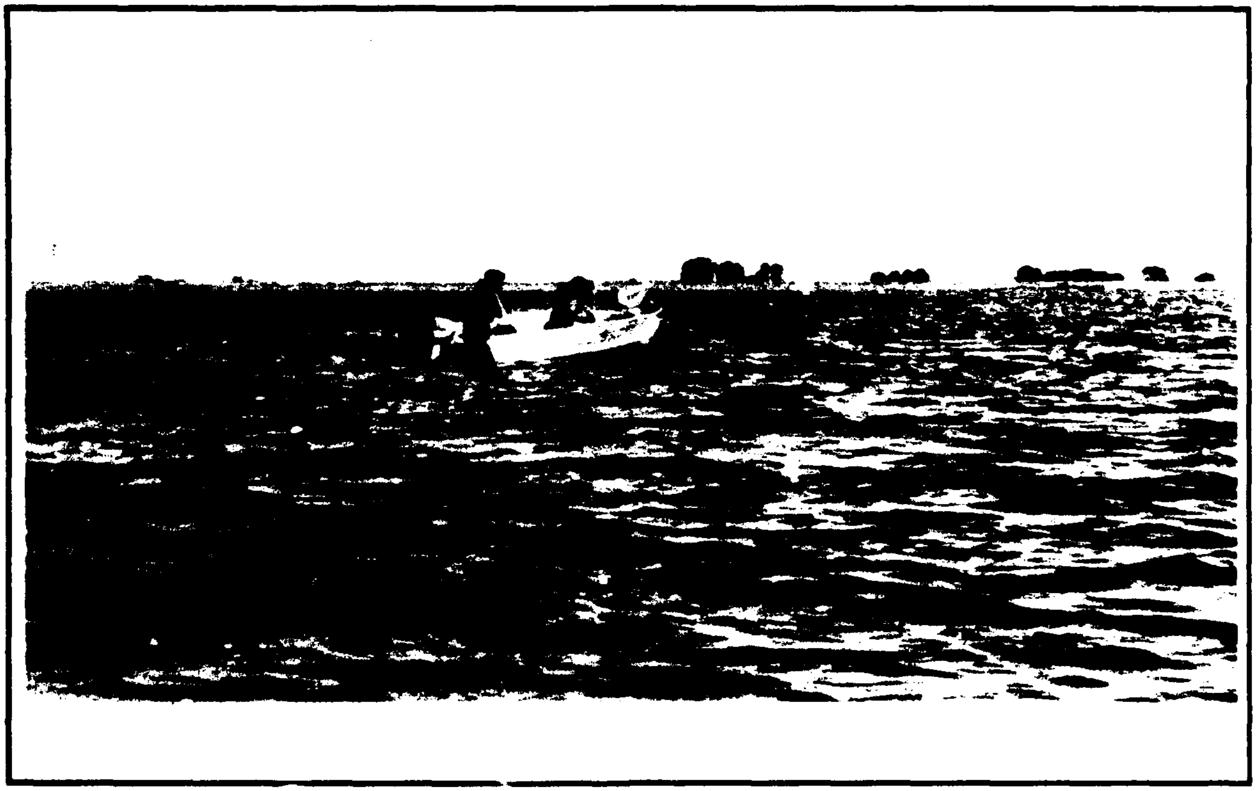

Figure 16. Sludge Sampling Using a Sludge Judge.

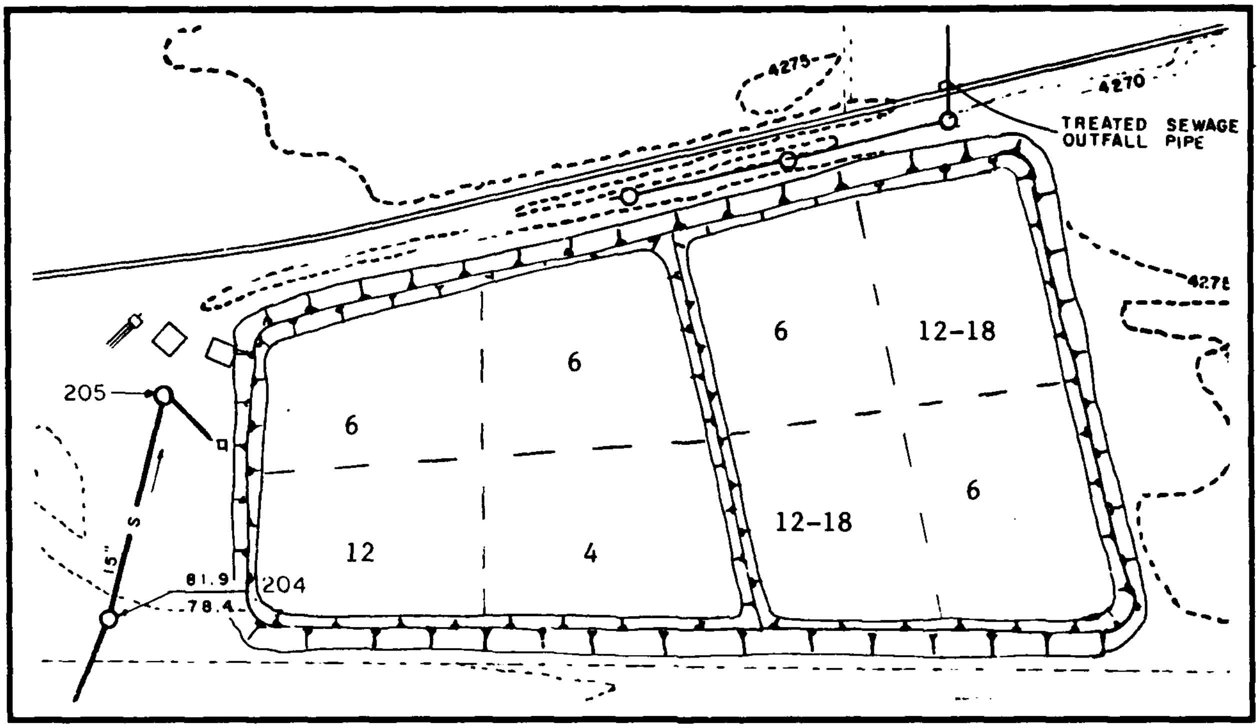

Figure 17. Depths of Sludge Found During the Lagoon Sampling (in inches).

Table E-8 shows the results of sampling at Site 9. Cadmium was discharged from this site at concentrations of 9 µg/l on 2 days of sampling. 1,1-Dichloroethene was found on 2 days of sampling at 4.8 and 27.7 µg/l. Phenol concentrations on all 3 days of sampling exceeded 100 µg/l and were the highest phenol levels found in the industrial sites.

Table E-9 shows the results of sampling at Site 10, the manhole behind the Hospital. Mercury was detected on 1 and 2 October 1992 at levels of 4.2 and 5.4 µg/l and is probably the result of a past spill of mercury into a sink drain. Selenium was found on 1 day of sampling at 184 µg/l, which is the highest level of selenium found in the base industrial areas. Silver was found on all 3 days of sampling ranging in concentration from 20-60 µg/l. The silver is most likely being discharged from the silver recovery unit used for medical/dental X-ray.

CONCLUSIONS AND RECOMMENDATIONS

The QA/QC results showed that recoveries of cadmium and selenium were low and that recoveries of mercury and thallium were high. Agreement between duplicates for metals and VOCs was good, but agreement between replicates for cyanide, COD, total petroleum hydrocarbons, ammonia, phosphorus, total residue, and total volatile residue was poor. Equipment and reagent blanks showed that neither the sampling equipment nor techniques introduced cross contaminants into the samples.

Sampling at the influent to the wastewater lagoons showed elevated levels of iron, mercury, and silver on 2 out of 8 days of sampling (although not the same days). No VOCs were detected in quantifiable levels. The average BOD concentration found in 5 days of testing was 197 mg/l and the average COD was 436 mg/l, characterizing this wastewater as a weak domestic sewage. However, the levels of oil and grease, chloride, sulfate, solids, total Kjeldahl nitrogen, phosphorus, and settleable solids were higher than is typical for a weak domestic sewage. Flow readings at the influent to the lagoon averaged 655,000 gpd (2,480 m^3/d), with a maximum flow reading of 1,600,000 gpd (6,057 m^3/d), and a minimum flow of 100,000 gpd (379 m^3/d).

Sampling at the effluent from the lagoons indicated that short-circuiting may have been occurring during our survey. The average BOD level over 5 days of sampling was 73 mg/l, which is higher than the routine level of 30 mg/l the Water and Waste personnel have found. This short-circuiting is probably due to the flow pattern of wastewater through the lagoon during the survey. It is recommended that the wastewater in the lagoon be routed in its routine pattern, as shown in Figure 13, or if the flow pattern shown in Figure 14 is to be used, the effluent discharge pipe should be moved as indicated in the figure to improve lagoon performance. The average reduction of BOD in the lagoons was 62.9%, which is lower than the 80-95% range that facultative lagoons can typically achieve. Selenium levels exceeded the standard established by New Mexico for irrigation waters. No VOCs were found in quantifiable levels in the effluent.

The sludge depths in the lagoons varied from 4 to 18 inches (10 - 45 cm). Mercury, oil and grease, petroleum hydrocarbons, and phenols were accumulating in the sludge. In addition, benzoic acid and bis(2-ethylhexyl)phthalate were also found.

Sampling at the 9 industrial sites showed that little industrial contamination was entering the sewerage system. Iron was fairly prevalent throughout the system at concentrations greater than 1,000 µg/l. Cadmium, mercury, and silver were found at Site 7, and mercury, selenium, and silver were found at Site 10 (Hospital). 1,1-Dichloroethene was found in quantifiable levels (10 - 27 µg/l) at Sites 4 and 9. The small amount of VOCs emitted from the industrial areas indicates that proper shop practices are being followed by maintenance personnel in preventing the entry of solvents and other synthetic organic chemicals into the sanitary sewerage system.

The new wastewater treatment plant to be built at Cannon AFB should, as a minimum, be designed to meet New Mexico irrigation standards, if the effluent is to continue to be discharged into the playa lake. However, consideration should also be given to meeting the New Mexico standards for discharges onto or below the surface of the ground if future Notices of Violations (NOVs) for groundwater degradation are to be avoided.

REFERENCES

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2. Water Quality Standards For Interstate and Intrastate Streams in New Mexico, Parts 1-100 through 1-106 and 3-100 through 3-101, New Mexico Water Quality Control Commission, Santa Fe, New Mexico. (As published in The Environmental Reporter, Bureau of National Affairs, Washington, DC, pages 856:1001 through 856:1004 and 856:1014 through 856:1017. May 1992.)

3. Air Force Occupational and Environmental Health Laboratory (AFOEHL), AFOEHL Recommended Sampling Procedures. Brooks AFB, TX; March 1989.

4. Standard Methods for the Examination of Water and Wastewater, 17th Edition, Method 5210B, pages 5-4 - 5-10, American Public Health Association, Washington, D.C., 1989.

5. Standard Methods for the Examination of Water and Wastewater, 17th Edition, Method 5220D, pages 5-15 - 5-16, American Public Health Association, Washington, D.C., 1989.

6. Personal telecon with Mr. Gil Valdez, Armstrong Laboratory Analytical Services Division (AL/OEA), QA/QC Branch, Brooks AFB, TX, 31 March 1993.

7. Code of Federal Regulations, Title 40, Parts 141-143, July 1, 1992.

8. SOCs and IOCs, Final Rule, Federal Register, 57:138:31776 (July 17, 1992).

9. Pontius, Frederick W., Federal Drinking Water Regulation Update, Journal American Water Works Association, Volume 85. Issue 2, pages 42-51, February 1993.

10. Metcalf and Eddy, Inc., Wastewater Engineering - Treatment, Disposal and Reuse, 2nd Edition, page 109, McGraw-Hill, New York, 1979.

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APPENDIX A

REQUEST LETTER

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE VA 23665-

REPLY TO ATTN OF: SGPB 11 Dec 91

SUBJECT: Tactical Air Command (TAC) Request for Waste Water and Hazardous Waste Surveys

TO: AL/OEB

1. During a recent TAC Water Quality Working Group meeting, the committee discussed the need and benefit of waste water and hazardous waste studies. Everyone agreed that these surveys are invaluable and that Armstrong Laboratories does an excellent job performing them. As a result, TAC would like to develop a program to have Armstrong Laboratory perform baseline waste water and hazardous waste studies at each TAC base over the next few years. In addition, we are interested in establishing a reoccurring schedule of studies to update the baseline surveys.

2. I have informally discussed this proposal with Maj John Garland and Capt Pat McMullen from your staff to determine the viability of the request. It appears TAC's request is similar to what you are already doing for ATC. Suggest we set-up a meeting to layout the details for this undertaking.

3. Meanwhile, I would like to request three waste water studies be accomplished in the near future. Cannon AFB, Mountain Home AFB, and Langley AFB all have MCP projects scheduled for FY 95 to upgrade their sewage treatment plants. Waste water studies are needed to provide input for their proper design.

4. Please advise me when you would be available to have the requested meeting to develop the TAC survey program. In addition, please indicate when you will be able to perform the three waste water surveys requested in this letter. As always, your assistance and support is greatly appreciated. Please contact me at HQ TAC/SGPB, DSN 574-4611.

David L. Potts

DAVID L. POTTS, Lt Col, USAF, BSC
Command Bioenvironmental Engineer
Office of the Command Surgeon

cc: TAC/DEVC
1 Med Gp/SGPB
27 Med Gp/SGPB
366 Med Gp/SGPB

Readiness is our Profession

APPENDIX B

SAMPLING STRATEGY

TABLE B-1. CANNON AFB WASTEWATER CHARACTERIZATION SURVEY SAMPLING STRATEGY 28 SEPTEMBER - 9 OCTOBER 1992

Site	Manhole	Description	# of Days	Parameters
1	112	Across from B790	3	VOCs, Metals, O&Gs, CN TPH, NH3, COD, Phenol
2	118	Across from B684	3	VOCs, Metals, O&Gs, TPH, COD, Phenol
3	138	Across from B620	3	VOCs, Metals, O&Gs, TPH, COD, Phenol, CN, NH3
4	148	Front of B186	3	VOCs, Metals, O&Gs, TPH, COD, Phenol, CN, NH3
5	159	Front of B193	3	VOCs, Metals, O&Gs, TPH, COD, Phenol
6	198	Near Airman's Attic	3	VOCs, Metals, O&Gs, TPH, COD, Phenol
7	87	Corner Olympic and Casablanca	3	VOCs, Metals, O&Gs, TPH, NH3, COD, Phenol
8	205	WWTP Influent	8	VOCs, Metals, O&Gs, TPH, NH3, TKN, NO3, NO2, P, SVI, BOD, COD, DO, Conductivity, CN, Gross Alpha/Beta, TDS, TSS, VSS, SO4, Phenol, Cl, TTO (1)
9	Manhole Near Gate Into Munitions Maintenance Compound		3	VOCs, Metals, O&Gs, TPH, COD, Phenol
10	85	Behind Hospital	3	VOCs, Metals, O&Gs, TPH, COD, Phenol, CN, NH3

Sampling of sewage lagoons will consist of compositing 4 grab samples from the centers of each lagoon's quadrants. These samples will then be analyzed for: Metals, TKN, NH3, NO2, NO3, SO4, O&Gs, TPH, Sulfides, Phenol, P, and VOCs using EPA Methods 8010, 8020, 8240, and 8270.

TABLE B-1 (cont'd). CANNON AFB WASTEWATER CHARACTERIZATION SURVEY SAMPLING STRATEGY, 28 SEPTEMBER - 9 OCTOBER 1992

NOTES:

VOC: Volatile Organic Chemical Screen (EPA Methods 601 and 602).

Metals: EPA 200-series tests using atomic absorption (Antimony, arsenic, barium, beryllium, boron, cadmium, chromium [Total], copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium and zinc).

O&G: Oil and grease
TPH: Total Petroleum Hydrocarbons (EPA Method 418.1)
NH3: Ammonia
COD: Chemical Oxygen Demand
CN: Cyanide
NO3: Nitrate-nitrogen
NO2: Nitrite-nitrogen
TKN: Total Kejldahl Nitrogen
P: Phosphorus (Total)
SVI: Sludge Volume Index (direct reading)

BOD: 5-Day Biochemical Oxygen Demand (conducted in field laboratory) Note that on two days of sampling four 6-hour composites will be collected and analyzed to determine diurnal variation in flow.

COD: Chemical Oxygen Demand
DO: Dissolved Oxygen (direct reading)
TDS: Total Dissolved Solids
TSS: Total Suspended Solids
VSS: Volatile Suspended Solids
SO4: Sulfates

TTO: Total Toxic Organics (EPA Methods 608, 624, and 625). This analysis will be performed for one sample taken from the WWTP.

TABLE B-2. WASTEWATER ANALYSES AND PRESERVATION METHODS

Analysis	Preservation	EPA Method	Holding Time (days)
Purgeable Aromatics (VOAs)	4°C	602	14
Purgeable Hydrocarbons (VOHs)	4°C	601	14
Total Metals			
Arsenic	HNO_3	206.2	180
Barium	HNO_3	200.7	180
Beryllium	HNO_3	210.1	180
Boron	HNO_3	200.7	180
Cadmium	HNO_3	213.1	180
Calcium	HNO_3	215.1	180
Chromium	HNO_3	218.1	180
Chromium (VI)	HNO_3	218.1	180
Copper	HNO_3	220.1	180
Iron	HNO_3	236.1	180
Lead	HNO_3	239.1	180
Magnesium	HNO_3	242.1	180
Manganese	HNO_3	243.1	180
Mercury	HNO_3	245.1	180
Molybdenum	HNO_3	200.7	180
Nickel	HNO_3	249.1	180
Potassium	HNO_3	258.1	180
Selenium	HNO_3	270.2	180
Silver	HNO_3	272.1	180
Thallium	HNO_3	279.2	180
Zinc	HNO_3	289.1	180
Cyanide	NaOH	335.3	14
Ammonia	H_2SO_4, 4°C	350.1	28
Phenols	H_2SO_4, 4°C	420.2	28
Oils & Greases	H_2SO_4, 4°C	413.2	28
Phosphorus, Total	H_2SO_4, 4°C	365.1	28
Hydrocarbons, Total Petroleum	H_2SO_4, 4°C	418.1	28
Total Toxic Organics	4°C	624	14
Total Toxic Organics	4°C	625, 608	7

NOTES: 4°C = Chilled to 4°C
HNO_3 = Add nitric acid to pH < 2.0
H_2SO_4 = Add sulfuric acid to pH < 2.0
NaOH = Add sodium hydroxide to pH > 12.0

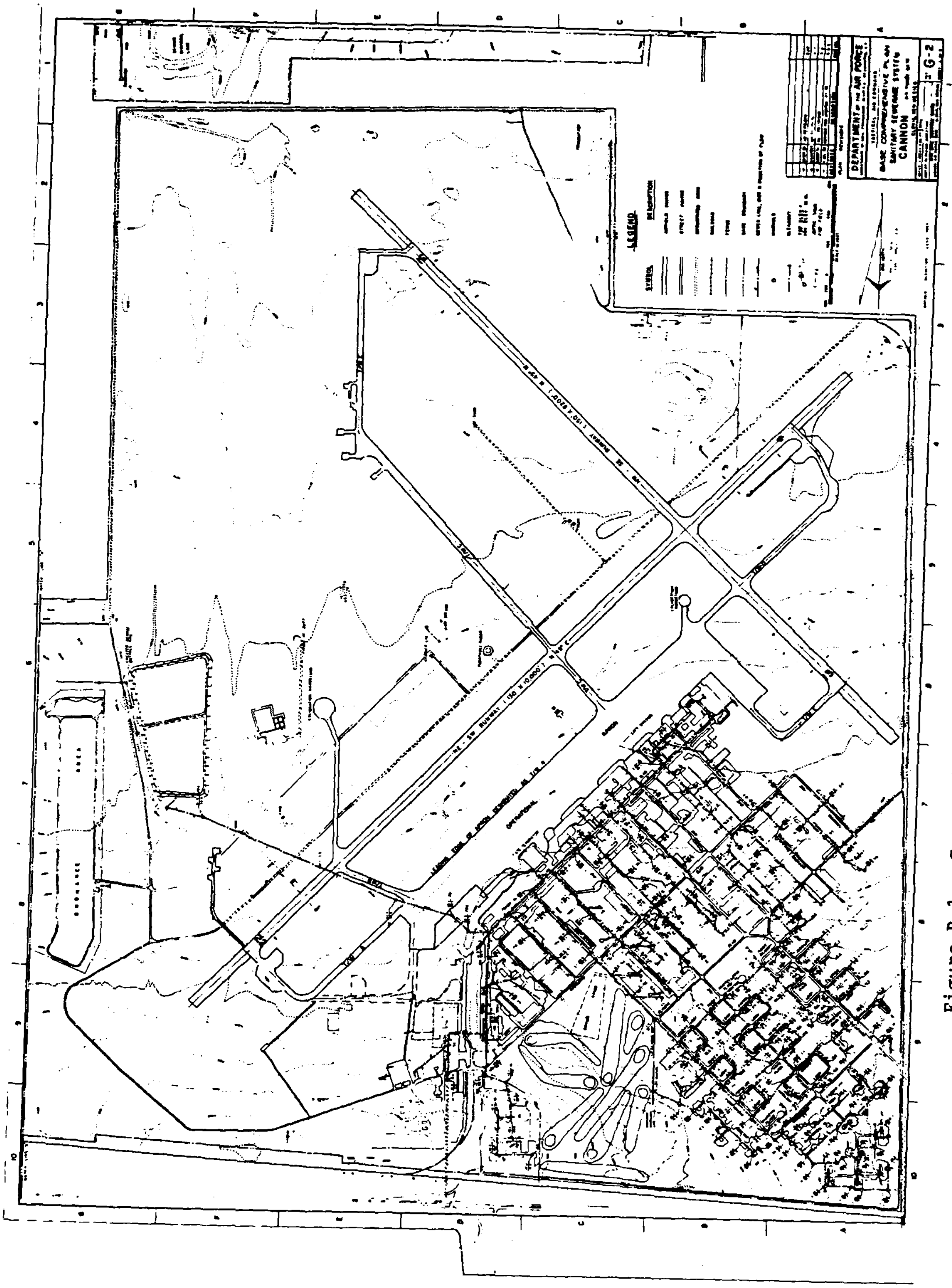

Figure B-1. Cannon AFB Sanitary Sewerage System Map (Tab G-2).

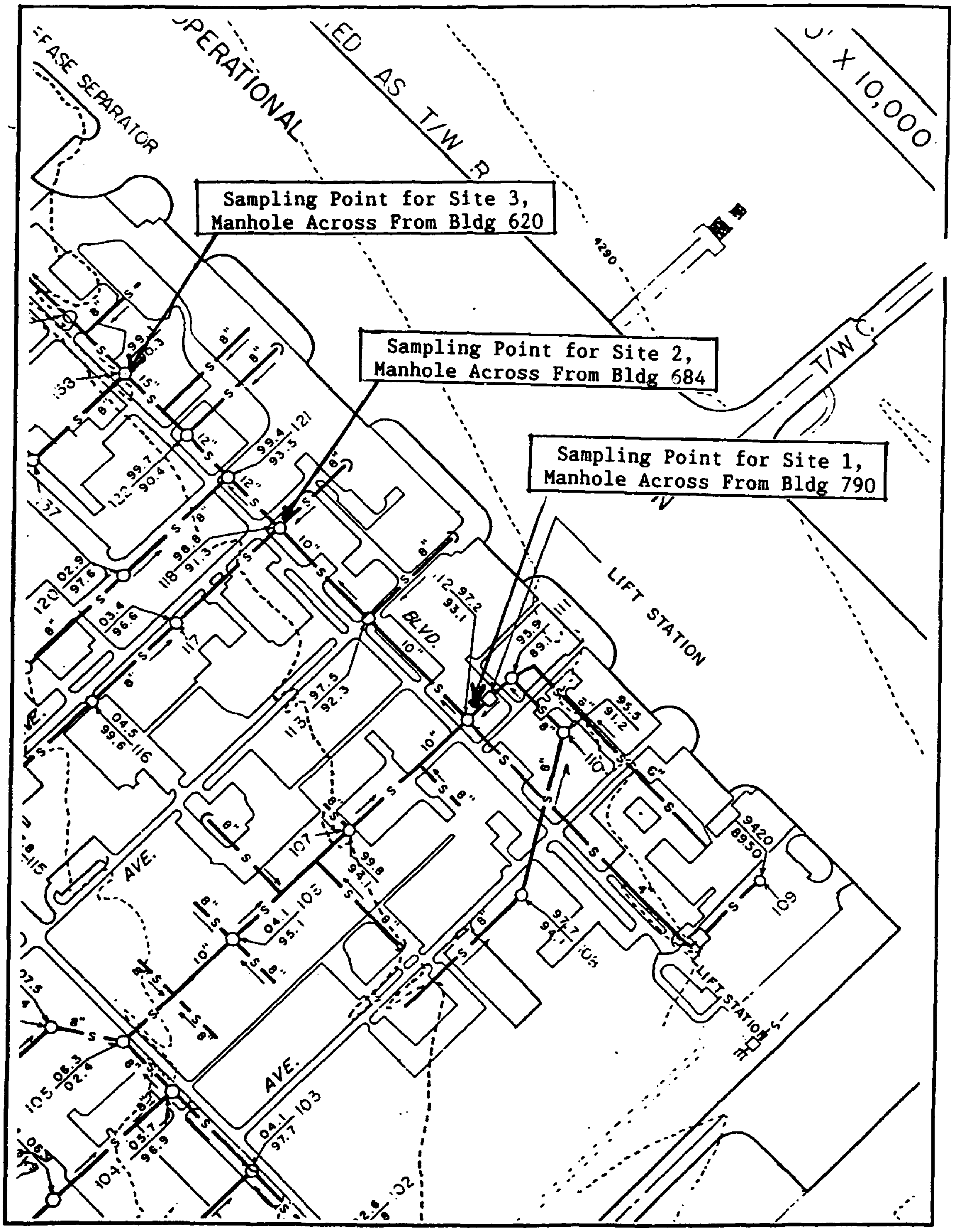

Figure B-2. Blowup of Cannon AFB Sanitary Sewerage System Map Showing Locations of Sampling Sites 1, 2, and 3.

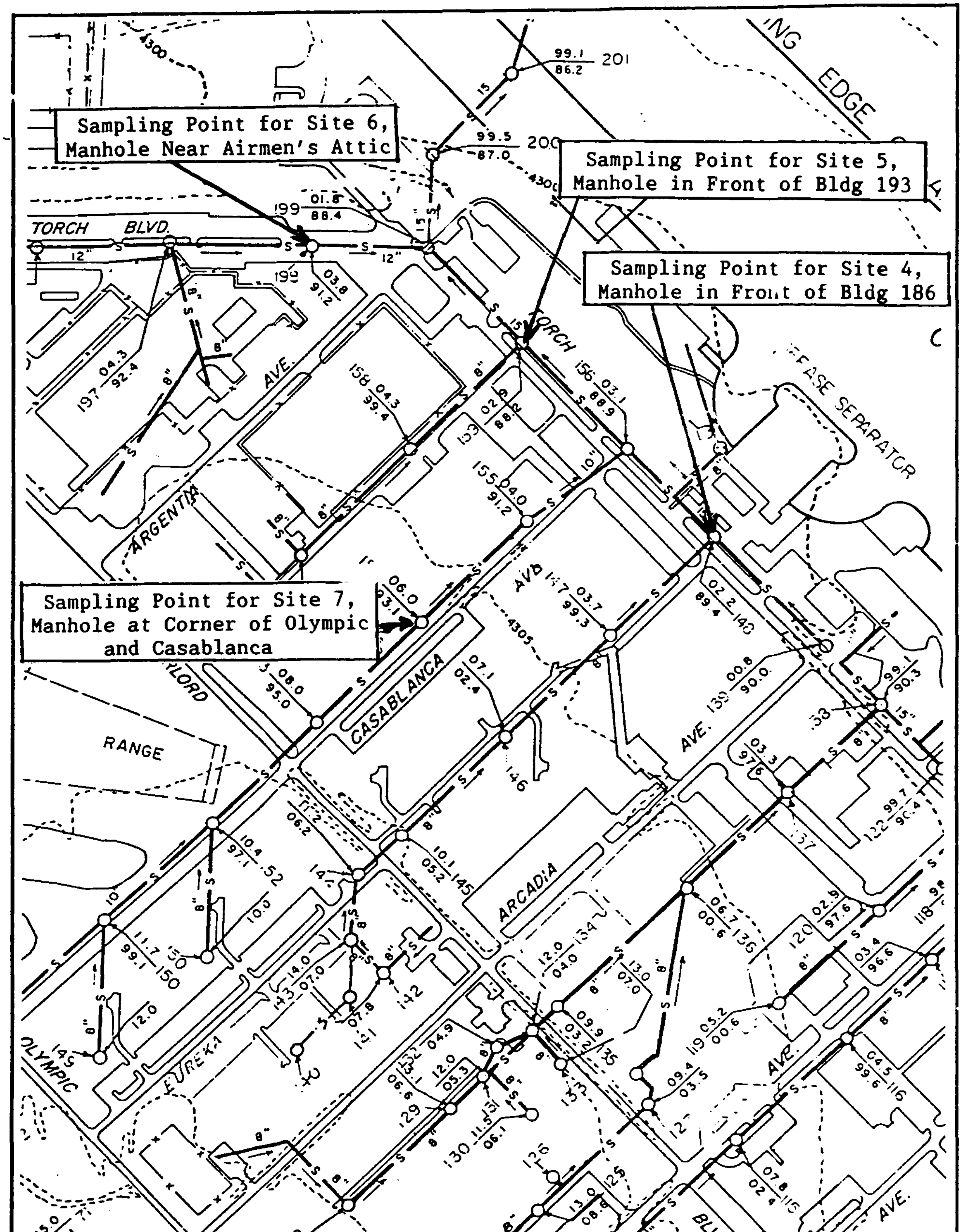

Figure B-3. Blowup of Cannon AFB Sanitary Sewerage System Map Showing Locations of Sampling Sites 4, 5, 6, and 7.

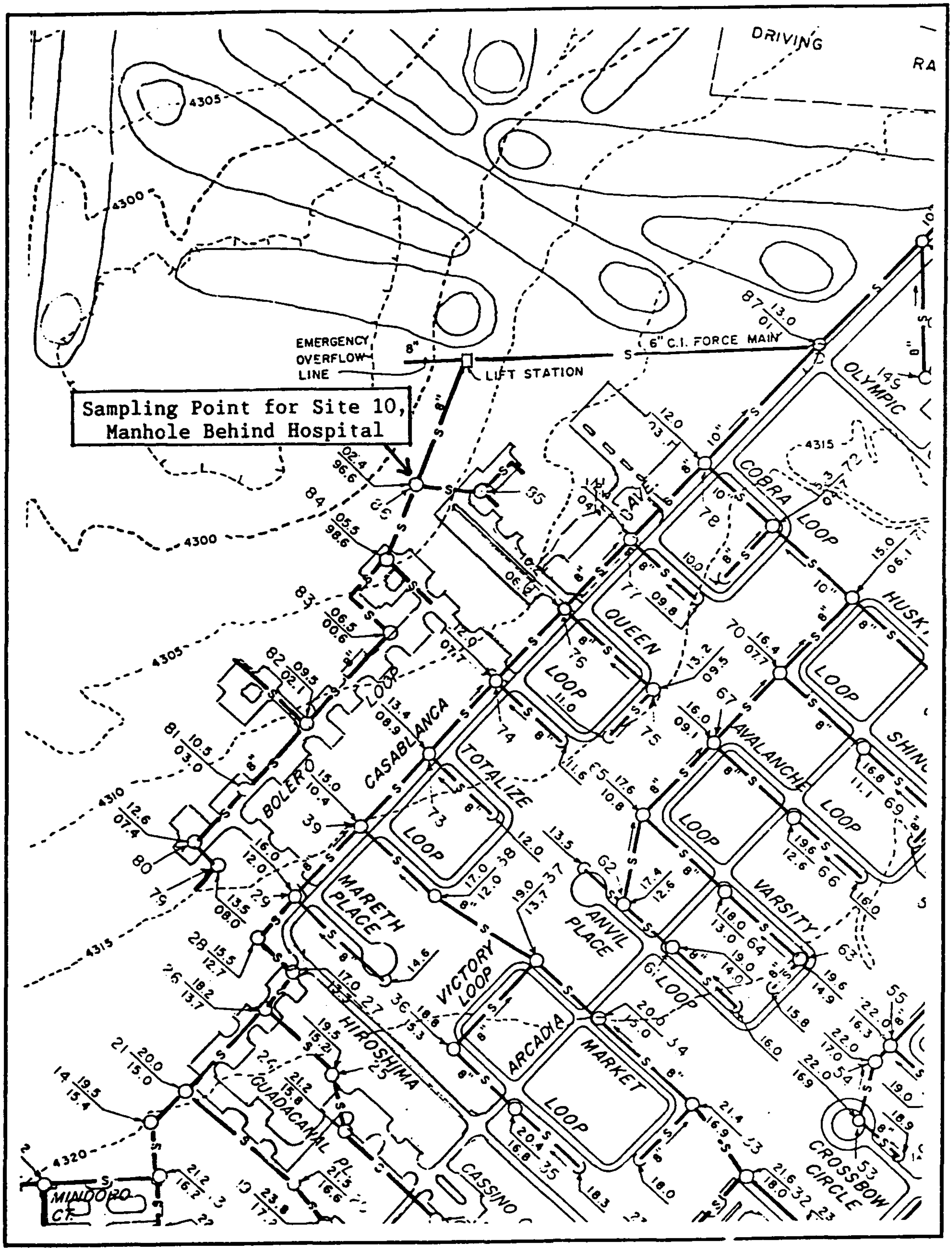

Figure B-4. Blowup of Cannon AFB Sanitary Sewerage System Map Showing Location of Sampling Site 10.

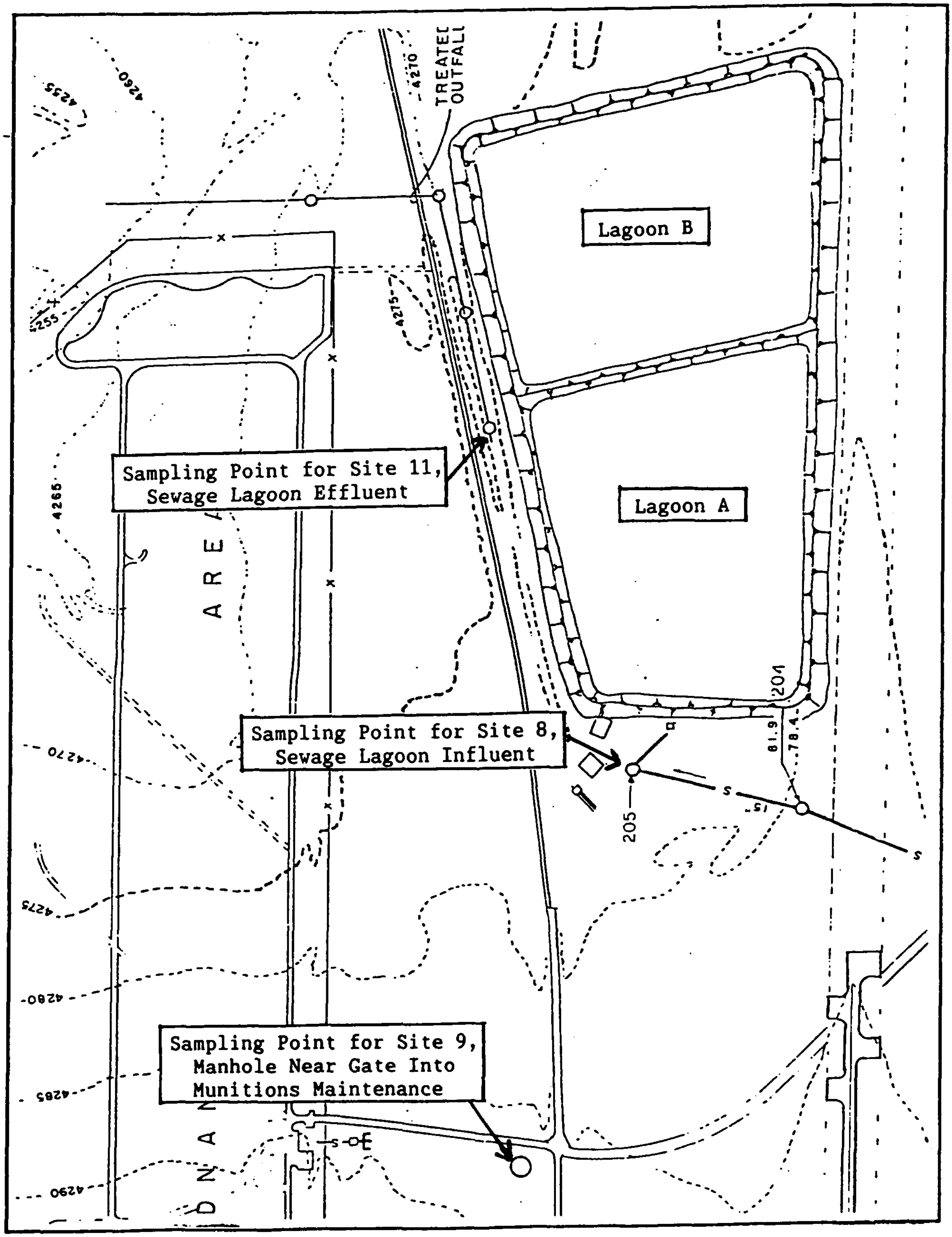

Figure B-5. Blowup of Cannon AFB Sanitary Sewerage System Map Showing Locations of Sampling Sites 8, 9, and 11.

NEW MEXICO WATER QUALITY REGULATIONS

(New Mexico Water Quality Control Commission Regulations; Adopted November 16, 1967; As amended through August 17, 1991)

WATER QUALITY CONTROL COMMISSION REGULATIONS

PART 2

Water Quality Control

2-100. APPLICABILITY OF REGULATIONS.

The requirements of Sections 2-101 and 2-102 of these regulations shall not apply to any discharge which is subject to a permit under the National Pollutant Discharge Elimination System of P.L. 92-500; provided that any discharger who is given written notice of National Pollutant Discharge Elimination System permit violation from the administrator of the Environmental Protection Agency and who has not corrected the violation within thirty days of receipt of said notice shall be subject to Section 2-101 and 2-102 of these regulations until in compliance with the National Pollutant Discharge Elimination System permit conditions; provided further that nothing in these regulations shall be construed as a deterrent to action under Section 74-6-11 NMSA, 1978.

2-101. GENERAL REQUIREMENTS.

A. Except as otherwise provided in Part 2 of these regulations, no person shall cause or allow effluent to discharge to a watercourse if the effluent as indicated by:

1. any two consecutive daily composite samples;
2. more than one daily composite sample in any thirty-day period (in which less than ten [10] daily composite samples are examined);
3. more than ten percent (10%) of the daily composite samples in any thirty-day period (in which ten [10] or more daily composite samples are examined); or
4. a grab sample collected during flow from an intermittent or infrequent discharge does not conform to the following:

Bio-chemical Oxygen Demand (BOD)	Less than 30 mg/l
Chemical Oxygen Demand (COD)	Less than 125 mg/l
Settleable Solids	Less than 0.5 mg/l
Fecal Coliform Bacteria	Less than 500 organisms/100 ml
pH	Between 6.6 and 8.6

B. Upon application, the director of the Environmental Improvement Division may eliminate the pH requirement for any effluent source that the director determines does not unreasonably degrade the water into which the effluent is discharged.

C. Subsection A of this section does not apply to the weight of constituents in the water diverted.

D. Samples shall be examined in accordance with the most current edition of *Standard Methods for the Examination of Water and Wastewater* pulished by the American Public Health Association or the most current edition of *Methods for Chemical Analysis of Water and Wastes* published by the Environmental Protection Agency, where applicable.

2-102. RIO GRANDE BASIN — COMMUNITY SEWERAGE SYSTEMS.

A. No person shall cause or allow effluent from a community sewerage system to discharge to a watercourse in the Rio Grande Basin between the headwaters of Elephant Butte Reservoir and Angostura Diversion Dam as described in Subsection E of this section if the effluent, as indicated by;

1. any two consecutive daily composite samples;
2. more than one daily composite sample in any thirty-day period (in which less than ten [10] daily composite samples are examined);
3. more than ten percent (10%) of the daily composite samples in any thirty-day period (in which ten [10] or more daily composite samples are examined); or
4. a grab sample collected during flow from an intermittent or infrequent discharge does not conform to the following:

Bio-chemical Oxygen Demand (BOD)	Less than 30 mg/l
Chemical Oxygen Demand (COD)	Less than 80 mg/l
Settleable Solids	Less than 0.1 mg/l
Fecal Coliform Bacteria	Less than 500 organisms/100 ml
pH	Between 6.6 and 8.6

B. Upon application, the director of the Environmental Improvement Division may eliminate the pH requirement for any effluent source that the director determines does not unreasonably degrade the water into which the effluent is discharged.

C. Subsection A of this section does not apply to the weight of constituents in the water diverted.

D. Samples shall be examined in accordance with the most current edition of *Standard Methods for the Analysis of Water and Wastewater* published by the American Public Health Association or the most current edition of *Methods for Chemical Analysis of Water and Wastes* published by the Environmental Protection Agency, where applicable.

E. The following is a description of the Rio Grande Basin from the headwaters of Elephant Butte Reservoir to Angostura Diversion Dam as used in this section:

Begin at San Marcial USGS gauging station, which is the headwaters of Elephant Butte Reservoir Irrigation Project, thence northwest to U.S. Highway 60, nine miles ± west of Magdalena; thence west along the northeast edge of the San Agustin Plains closed basin; thence north along the east side of the north plains closed basin to the Continental Divide; thence northerly along the Continental Divide to the community of Regina on State Highway 96; thence southeasterly along the crest of the San Pedro Mountains to Cerro Toledo Peak; thence southwesterly along the Sierra de Los Valles ridge and the Borrego Mesa to Bodega Butte; thence southerly to Angostura Diversion Dam which is the upper reach of the Rio Grande in this basin; thence southeast to the crest and the crest of the Manzano Mountains and the Los Pinos Mountains; thence southerly along the divide that contributes to the Rio Grande to San Marcial gauging station to the point and place of beginning; excluding all waters upstream of Jemez Pueblo which flow into the Jemez River drainage and the Bluewater Lake. Counties included in the basin are:

1. north portion of Socorro County;
2. northeast corner of Catron County;

3. east portion of Valencia County;
4. west portion of Bernalillo County;
5. east portion of McKinley County; and
6. most of Sandoval County.

2-200. WATERCOURSE PROTECTION.
2-201. DISPOSAL OF REFUSE.

No person shall dispose of any refuse in a natural watercourse or in a location and manner where there is a reasonable probability that the refuse will be moved into a natural watercourse by leaching or otherwise. Solids diverted from the stream and returned thereto are not subject to abatement under this section.

PART 3
Water Quality Control

3-100. REGULATIONS FOR DISCHARGES ONTO OR BELOW THE SURFACE OF THE GROUND.
3-101. PURPOSE.

A. The purpose of these regulations controlling discharges onto or below the surface of the ground is to protect all ground water of the state of New Mexico which has an existing concentration of 10,000 mg/l or less TDS, for present and potential future use as domestic and agricultural water supply, and to protect those segments of surface waters which are gaining because of ground water inflow, for uses designated in the New Mexico Water Quality Standards. The regulations are written so that in general:

1. if the existing concentration of any water contaminant in ground water is in conformance with the standard of Section 3-103 of these regulations, degradation of the ground water up to the limit of the standard will be allowed; and

2. if the existing concentration of any water contaminant in ground water exceeds the standard of Section 3-103, no degradation of the ground water beyond the existing concentration will be allowed.

B. Ground water standards are numbers that represent the pH range and maximum concentrations of water contaminants in the ground water which still allow for the present and future use of ground water resources.

C. The standards are not intended as maximum ranges and concentrations for use, and nothing herein contained shall be construed as limiting the use of waters containing higher ranges and concentrations.

3-102. AUTHORITY.

Standards are adopted by the commission under the authority of Section 74-6-4 NMSA 1978 (the New Mexico Water Quality Act, Chapter 326, Laws of 1973, as amended). Regulations are adopted by the commission under the authority of Sections 74-6-4 and 74-6-5 NMSA 1978.

3-103. STANDARDS FOR GROUND WATER OF 10,000 mg/l TDS CONCENTRATION OR LESS.

The following standards are the allowable pH range and the maximum allowable concentration in ground water for the contaminants specified unless the existing condition exceeds the standard or unless otherwise provided in Subsection 3-109.D. or Section 3-110. Regardless of whether there is one contaminant or more than one contaminant present in ground water, when an existing pH or concentration of any water contaminant exceeds the standard specified in Subsection A, B or C, the existing pH or concentration shall be the allowable limit, provided that the discharge at such concentrations will not result in concentrations at any place of withdrawal for present or reasonably foreseeable future use in excess of the standards in this section.

These standards shall apply to the dissolved portion of the contaminants specified with a definition of dissolved being that given in the publication "Methods for Chemical Analysis of Water and Waste of the U.S. Environmental Protection Agency," with the exception that standards for mercury and the organic compounds shall apply to the total unfiltered concentrations of the contaminants.

A. Human Health Standards — Ground water shall meet the standards of Section A and B unless otherwise provided. If more than one water contaminant affecting human health is present, the toxic pollutant criteria of Section 1-101.UU. for the combination of contaminants, or the Human Health Standard of Section 3-103.A. for each contaminant shall apply, whichever is more stringent.

Arsenic (As)	0.1 mg/l
Barium (Ba)	1.0 mg/l
Cadmium (Cd)	0.01 mg/l
Chromium (Cr)	0.05 mg/l
Cyanide (CN)	0.2 mg/l
Fluoride (F)	1.6 mg/l
Lead (Pb)	0.05 mg/l
Total Mercury (Hg)	0.002 mg/l
Nitrate (NO_3 as N)	10.0 mg/l
Selenium (Se)	0.05 mg/l
Silver (Ag)	0.05 mg/l
Uranium (U)	5.0 mg/l
Radioactivity: Combined Radium-226 and Radium-228	30.0 pCi/l
Benzene	0.01 mg/l
Polychlorinated biphenyls (PCB's)	0.001 mg/l
Toluene	0.75 mg/l
Carbon Tetrachloride	0.01 mg/l
1, 2-dichloroethane (EDC)	0.01 mg/l
1, 1-dichloroethylene (1, 1-DCE)	0.005 mg/l
1,1,2,2-tetrachloroethylene (PCE)	0.02 mg/l
1, 1, 2-trichloroethylene (TCE)	0.1 mg/l

ethylbenzene	0.75 mg/l
total xylenes	0.62 mg/l
methylene chloride	0.1 mg/l
chloroform	0.1 mg/l
1,1-dichloroethane	0.025 mg/l
ethylene dibromide (EBD)	0.0001 mg/l
1,1,1-trichloroethane	0.06 mg/l
1,1,2-trichloroethane	0.01 mg/l
1,1,2,2-tetrachloroethane	0.01 mg/l
vinyl chloride	0.001 mg/l
PAHs: total naphthalene plus monomethylnaphthalenes	0.03 mg/l
benzo-a-pyrene	0.0007 mg/l

B. Other Standards for Domestic Water Supply

Chloride (Cl)	250. mg/l
Copper (Cu)	1.0 mg/l
Iron (Fe)	1.0 mg/l
Manganese (Mn)	0.2 mg/l
Phenols	0.005 mg/l
Sulfate (SO_4)	600. mg/l
Total Dissolved Solids (TDS)	1000. mg/l
Zinc (Zn)	10.0 mg/l
pH	between 6 and 9

C. Standards for Irrigation Use — Ground water shall meet the standards of subsections A, B and C unless otherwise provided.

Aluminum (Al)	5.0 mg/l
Boron (B)	0.75 mg/l
Cobalt (Co)	0.05 mg/l
Molybdenum (Mo)	1.0 mg/l
Nickel (Ni)	0.2 mg/l

3-104. DISCHARGE PLAN REQUIRED.

Unless otherwise provided by these regulations, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless he is discharging pursuant to a discharge plan approved by the director. When a plan has been approved, discharges must be consistent with the terms and conditions of the plan. In the event of a transfer of the ownership, control, or possession of a facility for which an approved discharge plan is in effect, the transferee shall have authority to discharge under such plan, provided that the transferee has complied with Section 3-111 of these regulations, regarding transfers.

3-105. EXEMPTIONS FROM DISCHARGE PLAN REQUIREMENT.

Sections 3-104 and 3-106 of these regulations do not apply to the following:

A. Effluent or leachate which conforms to all the listed numerical standards of Section 3-103 and has a total nitrogen concentration of 10 mg/l or less, and does not contain any toxic pollutant. To determine conformance, samples may be taken by the agency before the effluent or leachate is discharged so that it may move directly or indirectly into ground water; provided that if the discharge is by seepage through non-natural or altered natural materials, the agency may take samples of the solution before or after seepage. If for any reason the agency does not have access to obtain the appropriate samples, this exemption shall not apply;

B. Effluent which is discharged from a sewerage system used only for disposal of household and other domestic waste which is designed to receive and which receives 2,000 gallons or less of liquid waste per day;

C. Water used for irrigated agriculture, for watering of lawns, trees, gardens or shrubs, or for irrigation for a period not to exceed five years for the revegetation of any disturbed land area, unless that water is received directly from any sewerage system;

D. Discharges resulting from the transport or storage of water diverted, provided that the water diverted has not had added to it after the point of diversion any effluent received from a sewerage system, that the source of the water diverted was not mine workings, and that the director has not determined that a hazard to public health may result;

E. Effluent which is discharged to a watercourse which is naturally perennial; discharges to dry arroyos and ephemeral streams are not exempt from the discharge plan requirement, except as otherwise provided in this section;

F. Those constitutents which are subject to effective and enforceable effluent limitations in a National Pollutant Discharge Elimination System (NPDES) permit, where discharge onto or below the surface of the ground so that water contaminants may move directly or indirectly into ground water occurs downstream from the outfall where NPDES effluent limitations are imposed, unless the director determines that a hazard to public health may result. For purposes of this subsection, monitoring requirements alone do not constitute effluent limitations;

G. Discharges resulting from flood control systems;

H. Leachate which results from the direct natural infiltration of precipitation through disturbed materials, unless the director determines that a hazard to public health may result;

I. Leachate which results entirely from the direct natural infiltration of precipitation through undisturbed materials;

J. Leachate from solids disposed of in accordance with the Solid Waste Management Regulations adopted by the New Mexico Environmental Improvement Board on April 19, 1974;

K. Natural ground water seeping or flowing into conventional mine workings which re-enters the ground by natural gravity flow prior to pumping or transporting out of the mine and without being used in any mining process; this exemption does not apply to solution mining;

L. Effluent or leachate discharges resulting from activities regulated by a mining plan approved and permit issued by the New Mexico Coal Surface Mining Commission, provided that this exemption shall not be construed as limiting the application of appropriate ground water protection requirements by the New Mexico Coal Surface Mining Commission;

M. Effluent or leachate discharges which are regulated by the Oil Conservation Commission and the regulation of which by the Water Quality Control Commission would interfere with the exclusive authority granted under Section 70-2-12 NMSA, 1978 or under other laws, to the Oil Conservation Commission.

3-106. APPLICATION FOR DISCHARGE PLAN APPROVAL.

A. Any person who, before or within 120 days after the effective date of these regulations, is discharging any of the water contaminants listed in Section 3-103 or any toxic pollutant so that they may move directly or indirectly into ground water shall, within 120 days of receipt of written notice from the director that a discharge plan is required, or such longer time as the director shall for good cause allow, submit a discharge plan to the director for approval; such person may discharge without an approved discharge plan until 240 days after written notification by the director that a discharge plan is required or such longer time as the director shall for good cause allow.

B. Any person who intends to begin, more than 120 days after the effective date of these regulations, discharging any of the water contaminants listed in Section 3-103 or any toxic pollutant so that they may move directly or indirectly into ground water shall notify the director giving the information enumerated in Subsection 1-201.B.; the director shall, within 60 days, notify such person if a discharge plan is required; upon submission the director shall review the discharge plan pursuant to Sections 3-108 and 3-109; for good cause shown, the director may allow such person to discharge without an approved plan for a period not to extend beyond one year after the effective date of these regulations; after one year after the effective date of these regulations, for good cause shown the director may allow such person to discharge without an approved discharge plan for a period not to exceed 120 days.

C. A proposed discharge plan shall set forth in detail the methods or techniques the discharger proposes to use or processes expected to naturally occur which will ensure compliance with these regulations. At least the following information shall be included in the plan:

1. quantity, quality and flow characteristics of the discharge;

2. location of the discharge and of any bodies of water, watercourses and ground water discharge sites within one mile of the outside perimeter of the discharge site, and existing or proposed wells to be used for monitoring;

3. depth to and TDS concentration of the ground water most likely to be affected by the discharge;

4. flooding potential of the site;

5. location and design of site(s) and method(s) to be available for sampling, and for measurement or calculation of flow;

6. depth to and lithological description of rock at base of alluvium below the discharge site if such information is available; and

7. any additional information that may be necessary to demonstrate that approval of the discharge plan will not result in concentrations in excess of the standards of Section 3-103 or presence of any toxic pollutant at any place of withdrawal of water for present or reasonably forseeable future use. Detailed information on site geologic and hydrologic conditions may be required for a technical evaluation of the applicant's proposed discharge plan; and

8. Additional detailed information required for a technical evaluation of effluent disposal wells or in situ extraction wells as provided in Part 5 of these regulations.

D. An applicant for a discharge plan shall pay fees as specified in Section 3-114.

3-107. MONITORING, REPORTING, AND OTHER REQUIREMENTS.

A. Each discharge plan shall provide for the following as the director may require:

1. the installation, use, and maintenance of effluent monitoring devices;

2. the installation, use, and maintenance of monitoring devices for the ground water most likely to be affected by the discharge;

3. monitoring in the vadose zone;

4. continuation of monitoring after cessation of operations;

5. periodic submission to the director of results obtained pursuant to any monitoring requirements in the discharge plan and the methods used to obtain these results;

6. periodic reporting to the director of any other information that may be required as set forth in the discharge plan;

7. the discharger to retain for a period of at least five years any monitoring data required in the discharge plan;

8. a system of monitoring and reporting to verify that the plan is achieving the expected results;

9. procedures for detecting failure of the discharge system;

10. contigency plans to cope with failure of the discharge plan or system;

11. measures to prevent ground water contamination after the cessation of operation, including post-operational monitoring.

B. Sampling and analytical techniques shall conform with the following references unless otherwise specified by the director.

1. *Standard Methods for the Examination of Water and Wastewater*, latest editon, American Public Health Association; or

2. *Methods for Chemical Analysis of Water and Waste* and other publications of the Analytical Quality Laboratory, EPA; or

3. *Techniques of Water Resource Investigations of the U.S. Geological Survey.*

4. *Annual Book of ASTM Standards, Part 31, Water*, latest edition, American Society For Testing and Materials; or

5. *Federal Register*, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations; or

6. *National Handbook of Recommended Methods for Water-Data Acquisition*, latest edition, prepared cooperatively by agencies of the United States Government under the sponsorship of the U.S. Geological Survey.

C. The discharger shall notify the director of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants.

D. Any discharger of effluent or leachate shall allow any authorized representative of the director to:

1. inspect and copy records required by a discharge plan;

2. inspect any treatment works, monitoring and analytical equipment;

3. sample any effluent before and after discharge;

4. use monitoring systems and wells installed pursuant to a discharge plan requirement in order to collect samples from ground water or the vadose zone.

E. Each discharge plan for an effluent disposal well or in situ extraction well shall incorporate the requirements of Part 5 of these regulations.

NEW MEXICO WATER QUALITY STANDARDS

(Water Quality Standards for Interstate and Intrastate Streams in New Mexico, New Mexico Water Quality Control Commissions; As amended through November 12, 1991)

PART 1

1-100. PURPOSE AND AUTHORITY.

A. The purpose of these standards is to designate the uses for which the surface waters of the State of New Mexico shall be protected and to prescribe the water quality standards necessary to sustain the designated uses.

B. These standards are consistent with Section 101(a)(2) of the federal Clean Water Act, as amended, (33 U.S.C. 1251 et seq.) which declares that "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983. . . ." Agricultural, municipal, domestic and industrial water supply are other essential uses of New Mexico's water; however, water contaminants resulting from these activities will not be permitted to lower the quality of streams below that which is required for recreation and maintenance of a fishery, where practicable.

C. These standards are adopted by the Water Quality Control Commission under the authority of Paragraph C, Section 74-6-4 of the New Mexico Water Quality Act (NMSA 1978).

D. Part 3 of the Water Quality Control Commission Regulations includes standards to protect ground water and regulations controlling discharges onto or below the surface of the ground.

E. These water quality standards do not grant to the commission or any other entity the power to take away or modify property rights in water.

F. Adopted August 22, 1973; revised September 29, 1975, January 13, 1976, February 8, 1977, March 14, 1978, May 23, 1979, July 8, 1980, April 22, 1981, May 11, 1982, June 8, 1982, November 20, 1984, January 8, 1985, August 18, 1987, March 8, 1988, and May 22, 1991 and October 8, 1991.

1-101. ANTIDEGRADATION POLICY AND IMPLEMENTATION PLAN.

A. *Antidegradation Policy:* Degradation of waters the quality of which is better than the stream standards established by the New Mexico Water Quality Control Commission is not reasonable degradation and is subject to abatement under the authority granted the Commission by the New Mexico Water Quality Act, as amended, unless it is justifiable as a result of necessary economic and social development. Existing instream water uses and water quality necessary to sustain existing uses shall be maintained and protected in all surface waters of the State. No degradation shall be allowed in high quality waters of designated national and state monuments, parks and wildlife refuges including waters designated by the U.S. Congress under the Wild and Scenic Rivers Act, if such degradation would impair any of the qualities which caused designation of these waters, parks and wildlife refuges. To protect the existing quality of water, the Commission under that Act will require the highest and best degree of effluent treatment practicable. In those cases where potential water quality impairment associated with a thermal discharge is involved, this antidegradation policy shall be consistent with Section 316 of the federal Clean Water Act. In implementing this section, the Commission through the appropriate regional offices of the United States Environmental Protection Agency will keep the Administrator advised and provided with such information concerning the waters of New Mexico as he will need to discharge his responsibilities under the federal Clean Water Act.

B. *Implementation Plan:* The New Mexico Environment Department, acting under authority delegated by the Commission, implements the water quality standards, including the antidegradation policy, by establishing and maintaining controls on the discharge of pollutants to surface waters. This stepwise process involves several interrelated programs and is summarized in the following paragraphs. The Department:

1. obtains information pertinent to the impact of the effluent on the receiving water and advises the prospective discharger of requirements for obtaining a permit to discharge;
2. reviews the adequacy of the existing data base and, if needed, obtains additional data by conducting an intensive survey of the receiving water;
3. assesses the probable impact of the effluent on the receiving water relative to its designated uses and numeric and narrative standards;
4. requires the highest and best degree of wastewater treatment practicable and commensurate with protecting and maintaining the designated uses and existing water quality of receiving waters, or at-

tainable uses and existing water quality of unclassified lakes and perennial streams and perennial reaches of interrupted streams;

5. develops water quality based effluent limitations and comments on technology based effluent limitations, as appropriate, for inclusion in any federal permit issued to a discharger pursuant to Section 402 of the Clean Water Act;

6. requires that these effluent limitations be included in any such permit as a condition for state certification pursuant to Section 401 of the federal Clean Water Act;

7. coordinates its water pollution control activities with other constituent agencies of the Commission, and with local, state and federal agencies, as appropriate;

8. develops and pursues inspection and enforcement programs to ensure that dischargers comply with state regulations, and complements EPA's enforcement of federal permits;

9. ensures that the provisions for public participation required by the New Mexico Water Quality Act and the federal Clean Water Act are followed;

10. provides continuing technical training for wastewater treatment facility operators through the utility operators training and certification programs;

11. provides funds to assist the construction of publicly owned wastewater treatment facilities through the wastewater construction program authorized by Section 601 of the federal Clean Water Act, and through funds appropriated by the New Mexico Legislature;

12. conducts water quality surveillance of the waters of the State to assess the effectiveness of water pollution controls and to determine whether water quality standards are being attained;

13. encourages, in conjunction with other state agencies, voluntary implementation of the best management practices set forth in the "State of New Mexico Water Quality Management Plan;" and

14. evaluates effectiveness of best management practices selected to prevent or abate non-point sources of water pollutants.

1-102. GENERAL STANDARDS.

General standards are established to sustain and protect uses which are existing or attainable by flows resulting from point source discharges or the earth's natural hydrologic cycle. These general standards apply at all times, except as otherwise specified in Sections 1-102.F, 1-102.K, 1-105.B, 1-105.E, 3-101 or Part 2, to all surface waters of the State. Watercourses shall be free of any water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or to unreasonably interfere with the public welfare or the use of property. The occurrence of a water contaminant or a deficiency of dissolved oxygen attributable to natural causes or the reasonable operation and maintenance of irrigation and flood control facilities is not subject to these general standards. The foregoing provision does not include major reconstruction of storage dams or diversion dam except for emergency actions necessary to protect health and safety of the public, or discharges from municipal separate storm sewers.

A. *Stream Bottom Deposits:* The stream shall be free of water contaminants from other than natural causes that will settle and adversely inhibit the growth of normal flora and fauna or significantly alter the physical or chemical properties of the bottom. Siltation resulting from the reasonable operation and maintenance of irrigation and flood control facilities is not subject to these standards.

B. *Floating Solids, Oil and Grease:* Receiving water shall be free of objectionable oils, scum, grease and other floating materials resulting from other than natural causes.

C. *Color:* Color-producing materials resulting from other than natural causes shall not create an aesthetically undesirable condition nor should color impair the use of the water by desirable aquatic life presently common in New Mexico waters.

D. *Odor and Taste of Fish:* Water contaminants from other than natural causes shall be limited to concentrations that will not impart unpalatable flavor to fish, or result in offensive odor arising from the stream or otherwise interfere with the reasonable use of the water.

E. *Plant Nutrients:* Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in a dominance of nuisance species in receiving waters.

F. *Hazardous Substances:* Toxic substances such as, but not limited to, pesticides, herbicides, heavy metals, and organics, shall not be present in receiving waters in concentrations which will change the ecological conditions of receiving waters to an extent detrimental to man or other organisms of direct or indirect commercial, recreational, or aesthetic value. Toxicities of substances in receiving waters will be determined by appropriate bioassay techniques, or other acceptable means, for the particular form of aquatic life which is to be preserved with the concentrations of toxic substances not to exceed 5% of the LC-50 (See 3-100.T) provided that: toxic substances which, through uptake in the aquatic food chain and/or storage in plant and animal tissues, can be magnified to levels which are toxic to man or other organisms, shall not be present in concentrations which result in this biological magnification or exceed 1% of the LC-50. Chlorine residual shall not be considered a hazardous substance when discharged to non-perennial streams, provided that such discharge does not reach a perennial stream or perennial reaches of an interrupted stream except in response to direct precipitation or runoff.

G. *Radioactivity:* The radioactivity of surface waters shall be maintained at the lowest practical level and shall in no case exceed the standards set forth in Part 4 of New Mexico Environmental Improvement Board Radiation Protection Regulations, filed March 10, 1989.

H. *Pathogens:* The stream shall be virtually free of pathogens. In particular, waters used for irrigation of table crops such as lettuce shall be virtually free of *Salmonella* and *Shigella* species.

I. *Temperature:* Maximum temperatures for each stream reach have been specified in Part 2 of these standards. However, the introduction of heat by other than natural causes shall not increase the temperature, as measured from above the point of introduction, by more than 2.7 C (5 F) in a stream, or more than 1.7 C (3 F) in a lake or reservoir. In no case will the introduction of heat be permitted when the maximum temperature specified for the reach (generally 20 C (68 F) for coldwater fisheries and 32.2 C (90 F) for warmwater fisheries) would thereby be exceeded. These temperature standards shall not apply to impoundments constructed offstream for the purpose of heat disposal. High water temperatures caused by unusually high ambient air temperatures or the reasonable operation of irrigation and aquacultural facilities are not violations of these standards.

J. *Turbidity:* Turbidity attributable to other than natural causes shall not reduce light transmission to the point that desirable aquatic life presently common in New Mexico waters is inhibited or that will cause substantial visible contrast with the natural appearance of the water. Turbidity attributable to natural causes or the reasonable operation of irrigation and flood control facilities is not subject to these standards.

K. *Salinity:* Where existing information is sufficient numerical standards for total dissolved solids (or conductivity), chlorides and sulfates, have been adopted in Part 2 of these standards.

1. For the tributaries of the Colorado River System, the State of New Mexico will cooperate with the Colorado River Basin States and the federal government to support and implement the salinity policy and program outlined in the report "1990 Review, Water Quality Standards for Salinity, Colorado River System".

2. Numeric criteria for salinity are established at three points in the Colorado River Basin as follows: below Hoover Dam, 723 mg/1; below Parker Dam, 747 mg/1; and at Imperial Dam, 879 mg/1.

3. As a part of the program, objectives for New Mexico shall include the elimination of discharges of water containing solids in solution as a result of the use of water to control or convey fly ash from coal-fired electric generators, wherever practicable.

4. In determining compliance with the numeric criteria hereby adopted, salinity (TDS) is determined by the "calculation method" (sum of constituents) as described in the latest edition of "Techniques of Water-Resources Investigations of the United States Geological Survey, Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases."

L. *Dissolved Gases:* Surface waters shall be free of nitrogen and other dissolved gases at levels above 110% saturation when this supersaturation is attributable to municipal, industrial or other discharges.

1-103. SAMPLING AND ANALYSIS.

A. All methods of sample collection, preservation and analysis used in determining water quality and maintenance of these standards shall be in accordance with currently approved procedures given in the latest edition of:

1. "Standard Methods for the Examination of Water and Wastewater," American Public Health Association; or

2. "Methods for Chemical Analysis of Water and Wastes" and other publications of the Analytical Quality Control Laboratory, EPA; or

3. "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 40 CFR Part 136; or

4. "National Handbook of Recommended Methods for Water-Data Acquisition," U.S. Geological Survey.

B. *Bacteriological Surveys:*

1. The monthly logarithmic mean shall be used in assessing attainment of standards when a minimum of five samples is collected in a 30-day period.

C. *Sampling Procedures:*

1. Streams: Stream monitoring stations below waste discharges shall be located a sufficient distance downstream to ensure adequate vertical and lateral mixing.

2. Lakes: Sampling stations in lakes shall be located at least 250 feet from a waste discharge.

3. Lakes: Except for the restriction specified in Section 103.C.2, lake sampling stations shall be located at any site where the attainment of a water quality standard is to be assessed. Water quality measurements taken at intervals in the entire water column at a sampling station shall be averaged for the epilimnion, or in the absence of an epilimnion, for the upper 1/3 of the water column of the lake to determine attainment of standards, except that attainment of standards for toxic substances shall be assessed during periods of complete vertical mixing, e.g., during spring or fall turnover, or by taking depth-integrated composite samples of the water column.

D. Acute toxicity of effluent to aquatic life shall be determined using the procedures specified in U.S. Environmental Protection Agency "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms" (3rd Ed., 1985, EPA 600/4-85/013), or latest edition thereof, which is incorporated herein by reference. Acute toxicities of substances shall be determined using at least two species tested in whole effluent and a series of effluent dilutions. Acute toxicity due to discharges shall not occur within the wastewater mixing zone in any stream with an existing or designated fishery use.

E. Chronic toxicity of effluent or ambient surface water to aquatic life shall be determined using the procedures specified in U.S. Environmental Protection Agency "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (2nd Ed., 1989, EPA 600/4-89/001), or latest edition thereof, which is incorporated herein by reference. Chronic toxicities of substances shall be determined using at least two species tested in ambient surface water or whole effluent and a series of effluent dilutions. Chronic toxicity due to discharges shall not occur at the critical low flow in any stream with an exiting or designated fishery use more than once every three years.

1-104. REVIEW OF STANDARDS, NEED FOR ADDITIONAL STUDIES.

A. Section 303(c)(1) of the federal Clean Water Act requires that public hearings be held at least once every three years for the purpose of reviewing and proposing necessary revisions of these water quality standards.

B. It is recognized that, in some cases, numeric standards have been adopted which reflect stream use designations rather than existing stream conditions.

Narrative standards are required for many constituents because accurate data on background levels are lacking. More intensive water quality monitoring may identify stream reaches where existing quality is considerably better than the established standards. When justified by sufficient data and need, the stream standards will be modified to reflect true stream conditions.

C. It is also recognized that contributions of water contaminants by diffuse non-point sources of water pollution may make attainment of certain standards difficult. Revision of these standards may be required as new information is obtained on non-point sources and other problems unique to semi-arid regions.

1-105. APPLICABILITY OF WATER QUALITY STANDARDS.

A. The numeric standards for salinity set out in Part 2 shall apply at the downstream point of the reach in question.

B. *Critical Low Flow*: The numeric standards set under Section 1-102.F, Part 2 and Section 3-101 may not be attainable when streamflow is less than the critical low flow of the stream in question. The critical low flow of a stream at a particular site shall be the minimum average four consecutive day flow which occurs with a frequency of once in three years (4Q3). Critical low-flow numeric values may be determined on an annual, a seasonal or a monthly basis, as appropriate, after due consideration of site-specific conditions.

C. *Guaranteed Minimum Flow*: On a case-by-case basis and upon consultation with the Interstate Stream Commission, the Water Quality Control Commission may allow the use of a contractually guaranteed minimum streamflow in lieu of a critical low flow determined under Section 1-105.B. Should drought, litigation or any other reason interrupt or interfere with minimum flows under a guaranteed minimum flow contract for a period of at least thirty consecutive days, such permission may, at the sole discretion of the WQCC, then be revoked. Any minimum flow specified under such revoked permission shall be superseded by a critical low flow determined under Section 1-105.B. A public notice of the request for a guaranteed minimum flow shall be published by the Environment Department at least 30 days prior to scheduled action by the Commission. These water quality standards do not grant to the Commission or any other entity the power to create, take away or modify property rights in water.

D. *Mixing Zones*: A limited mixing zone, contiguous to a point source wastewater discharge, may be allowed in any stream receiving such a discharge. Mixing zones serve as regions of initial dilution which allow the application of a dilution factor in calculations of effluent limitations. Effluent limitations shall be developed which will protect the most sensitive designated or attainable aquatic use of the receiving water.

E. *Limitations*: Wastewater mixing zones, in which the numeric standards set under Section 1-102.F., Part 2 or Section 3-101 may be exceeded, shall be subject to the following limitations:

1. Mixing zones are not allowed for discharges to publicly owned lakes or reservoirs; these effluents shall meet all applicable standards set under Section 1-102.F, Part 2 and Section 3-101 at the point of discharge.

2. The shape and volume of a particular mixing zone will depend on site-specific conditions such as, but not limited to, wastewater flow, receiving water critical low flow, outfall design, channel characteristics and climatic conditions, and shall be determined on a case-by-case basis.

3. All applicable water quality standards set under Section 1-102.F, Part 2 and Section 3-101 shall be attained at the boundaries of mixing zones. A continuous zone of passage through or around the mixing zone shall be maintained in which the water quality meets all applicable standards and allows the migration of aquatic life presently common in New Mexico waters with no effect on their populations.

4. Mixing zones shall be free of substances in concentrations which are acutely toxic to aquatic organisms passing through the zone of mixing. Compliance with this provision shall be determined by performance of the biomonitoring procedures set out in Section 1-103.D, or by demonstration of compliance with acute standards set out in Section 3-101.J and applicable un-ionized ammonia and total chlorine residual standards set out in Sections 3-101.A, 3-101.C, 3-101.E, 3-101.F and 3-101.H.

1-106. COMPLIANCE WITH WATER QUALITY STANDARDS.

A. Compliance with acute water quality standards shall be determined from the analytical results of a single grab sample. Acute standards shall not be exceeded.

B. Compliance with chronic water quality standards shall be determined from the arithmetic mean of the analytical results of a minimum of four samples collected on each of four consecutive days. Chronic standards shall not be exceeded more than once every three years.

C. Compliance with water quality standards for un-ionized ammonia shall be determined by performing the biomonitoring procedures set out in Section 1-103.E, or by attainment of applicable ammonia standards set out in Sections 3-101.A, 3-101.C, 3-101.E, 3-101.F and 3-101.H.

D. *Compliance Schedules*: It shall be the policy of the Commission to allow on a case-by-case basis the inclusion of a schedule of compliance in a National Pollutant Discharge Elimination System (NPDES) permit issued to an existing facility. Such schedule of compliance will be for the purpose of providing a permittee with adequate time to make treatment facility modifications necessary to comply with water quality based permit limitations determined to be necessary to implement new or revised water quality standards. Compliance schedules may be included in NPDES permits at the time of permit renewal or modification and shall be written to require compliance at the earliest practicable time. Compliance schedules shall also specify milestone dates so as to measure progress towards final project completion (e.g., design completion, construction start, construction completion, date of compliance).

PART 3

3-100. DEFINITIONS.

A. "Acute toxicity" means toxicity involving a stimulus severe enough to induce a response in 96 hours of exposure or less. Acute toxicity is not always measured in terms of lethality, but may include other toxic effects that occur within a short time period.

B. "Attainable use" means a use of a surface water of the State which has water quality and all other characteristics necessary to support and maintain the use, as specified in Section 3-101 of these standards, or which would support and maintain the use after the implementation of water quality standards as specified in Section 1-101.B of these standards.

C. "Best management practices" means schedules of activities, prohibitions of certain practices, implementation of maintenance procedures, or other measures or practices selected by the State or a designated management agency to achieve control of non-point sources of water pollutants.

D. "cfs" means cubic feet per second.

E. "Chronic toxicity" means toxicity involving a stimulus that lingers or continues for a relatively long period relative to the life span of an organism. Chronic effects include, but are not limited to, lethality, growth impairment, behavioral modifications, disease and reduced reproduction.

F. "Coldwater fishery" means a stream reach, lake or impoundment where the water temperature and other characteristics are suitable for the support or propagation or both of coldwater fishes such as brown, cutthroat, brook, or rainbow trout.

G. "Designated use" means those uses specified in Part 2 of "Water Quality Standards for Interstate and Intrastate Streams in New Mexico" for each water body or segment whether or not they are being attained.

H. "Dissolved" means a constituent of a water sample which will pass through a 0.45 micrometer pore-size membrane filter under a pressure differential not exceeding one atmosphere. The "dissolved" fraction is also termed "filterable residue."

I. "Domestic water supply" means a surface water that may be used for drinking or culinary purposes after disinfection.

J. "Ephemeral stream" means a stream or reach of a stream that flows briefly only in direct response to precipitation or snowmelt in the immediate locality; its channel bed is always above the water table of the region adjoining the stream.

K. "Existing use" means those uses actually attained in a water body whether or not they are included in the water quality standards.

L. "Fecal coliform bacteria" means the portion of the coliform group which is present in the gut or the feces of warm-blooded animals. It generally includes organisms which are capable of producing gas from lactose broth in a suitable culture medium within 24 hours at 44.5 ± 0.2 C.

M. "Fish culture" means production of coldwater or warmwater fish in a hatchery or rearing station.

N. "Flow," relative to the four definitions of streams herein, means natural flow ensuing from the earth's hydrologic cycle, i.e., atmospheric precipitation resulting in surface and, or, ground-water runoff. Natural, in-stream flow may be interrupted or eliminated by dams and diversions.

O. "High quality coldwater fishery" means a perennial stream reach in a minimally disturbed condition which has considerable aesthetic value and is a superior coldwater fishery habitat. A stream reach to be so categorized must have water quality, stream bed characteristics, and other attributes of habitat sufficient to protect and maintain a propagating coldwater fishery (i.e., a population of reproducing salmonids).

P. "Intermittent stream" means a stream or reach of a stream that flows only at certain times of the year, such as when it receives flow from springs, melting snow, or localized precipitation. Syn: temporary stream; seasonal stream.

Q. "Interrupted stream" means a stream that contains perennial reaches with intervening intermittent or ephemeral reaches. Ant: continuous stream.

R. "Interstate waters" means all surface waters which cross or form a part of the border between States.

S. "Intrastate waters" means all surface waters of the State which are not interstate waters.

T. "LC-50" means the concentration of a substance that is lethal to 50% of the test organisms within a defined time period. The length of the time period, which may vary from 24 hours to one week or more, depends on the test method selected to yield the information desired.

U. "Limited warmwater fishery" means a stream reach where intermittent flow may severely limit the ability of the reach to sustain a natural fish population on a continuous annual basis; or a stream where historical data indicate that water temperature may routinely exceed 32.2 C (90 F).

V. "Limiting nutrient" means the nutrient or combination of nutrients available in minimal quantities with respect to the growth requirements of algae and higher aquatic plants and upon which the growth of these organisms is therefore dependent.

W. "Marginal coldwater fishery" means a stream reach, lake or impoundment known to support a coldwater fish population during at least some portion of the year, even though historical data indicates that the maximum temperature in the stream may exceed 20 C (68 F).

X. "Micrograms per liter (ug/l)" means micrograms of solute per liter of solution; equivalent to parts per billion when the specific gravity of the solution = 1.000.

Y. "Milligrams per liter (mg/l)" means milligrams of solute per liter of solution; equivalent to parts per million when the specific gravity of the solution = 1.000.

Z. "Natural causes" means those causal agents which would affect water quality in the absence of man's actions. Natural causes do not include point source discharges, nonpoint source pollution or any other culturally induced impairment of the chemical, physical, biological or radiological integrity of water.

AA. "Nonpoint Source Pollution" means the alteration of surface waters by land management or land-use activities which are not regulated as point sources and which degrade the quality or adversely affects the biological community inhabiting the waters.

BB. "NTU" means nephelometric turbidity units based on a standard method using formazin polymer or its equivalent as the standard reference suspension. Nephelometric turbidity measurements expressed in units of NTU are numerically identical to the same measurements expressed in units of FTU (formazin turbidity units).

CC. "Perennial stream" means a stream or reach of a stream that flows continuously throughout the year in all years; its upper surface, generally, is lower than the water table of the region adjoining the stream. Syn: permanent stream; live stream.

DD. "Picocurie (pCi)" means a measure of radioactivity equal to the quantity of a radioactive substance in which the rate of disintegrations is 2.22 per minute.

EE. "Point source" means any discernible, confined, and discrete conveyance from which pollutants are or may be discharged into a water body, but does not include return flows from irrigated agriculture.

FF. "Primary contact" means any recreational or other water use in which there is prolonged and intimate contact with the water, such as swimming and water skiing, involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard.

GG. "Secondary contact" means any recreational or other water use in which contact with the water may occur and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, commercial and recreational boating and any limited seasonal contact.

HH. "Segment" means a water quality standards segment, the surface waters of which have common hydrologic characteristics or flow regulation regimes, possess common natural physical, chemical, and biological characteristics, and exhibit common reactions to external stresses, such as the discharge of pollutants.

II. "TDS" means total dissolved solids, also termed "total filterable residue."

JJ. "Technology-based controls" means the application of technology-based effluent limitations as required under Section 301(b) of the Clean Water Act.

KK. "Total" means a constituent of a water sample which is analytically determined without filtration.

LL. "Total inorganic nitrogen" means the sum of nitrate nitrogen, nitrite nitrogen, and total ammonia nitrogen.

MM. "Toxic pollutant" means those pollutants, or combination of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will cause death, disease, behavioral malfunctions (including malfunctions in reproduction) or physical deformations in such organisms or their offspring.

NN. "Turbidity" is an expression of the optical property in water that causes incident light to be scattered or absorbed rather than transmitted in straight lines.

OO. "Warmwater fishery" means a stream reach, lake or impoundment where the water temperature and other characteristics are suitable for the support and propagation of warmwater fishes such as large-mouth black bass, small-mouth black bass, crappie, white bass, bluegill, flathead catfish, or channel catfish.

PP. "Water," for purposes of these standards, means all surface waters including water situated wholly or partly within or bordering upon the State, whether public or private, except private waters that do not combine with other surface or subsurface water.

QQ. "Water contaminant" means any substance which alters the physical, chemical or biological qualities of water.

RR. "Watercourse" means any river, creek, arroyo, canyon, draw, or wash, or any other channel having definite banks and beds with visible evidence of the occasional flow of water. Syn: stream.

SS. "Waters of the State" means all interstate and intrastate waters including natural ponds and lakes, playa lakes, reservoirs, perennial streams and their tributaries, intermittent streams, sloughs, prairie potholes and wetlands.

TT. "Water pollutant" means a water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or to unreasonably interfere with the public welfare or the use of property.

UU. "Water quality-based controls" means effluent limitations, as provided under Section 301(b)(1)(C) of the Clean Water Act, which are developed and imposed on point-source dischargers in order to protect and maintain applicable water quality standards. These controls are more stringent than the technology-based effluent limitations required under other paragraphs of Section 301 (b).

VV. "Wetlands" means those areas which are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions in New Mexico.

3-101. STANDARDS[1] APPLICABLE TO ATTAINABLE OR DESIGNATED USES UNLESS OTHERWISE SPECIFIED IN PART 2.

A. *Coldwater Fishery:* Un-ionized ammonia (as N) shall not exceed 0.03 mg/l, dissolved oxygen shall be greater than 6.0 mg/l, temperature shall be less than 20 C (68 F), total chlorine residual shall not exceed 0.004 mg/l, and pH shall be within the rate of 6.6 to 8.8. The acute and chronic standards set out in Section 3-101.J are applicable to this use.

B. *Domestic Water Supply:* Waters designated for use as domestic water supplies shall not contain substances in concentrations that create a lifetime cancer risk of more than one cancer per 100,000 exposed persons. The following numeric standards shall not be exceeded:

Dissolved arsenic	0.05 mg/l
Dissolved barium	1. mg/l
Dissolved cadmium	0.010 mg/l
Dissolved chromium	0.05 mg/l
Dissolved lead	0.05 mg/l
Total mercury	0.002 mg/l
Dissolved nitrate (as N)	10. mg/l
Dissolved selenium	0.05 mg/l
Dissolved silver	0.05 mg/l
Dissolved cyanide	0.2 mg/l
Dissolved uranium	5.0 mg/l
Radium-226 + radium-228	30.0 pCi/l

C. *High Quality Coldwater Fishery:* Dissolved oxygen shall be greater than 6.0 mg/l or 85% of saturation, whichever is greater; temperature shall be less than 20 C (68 F); pH shall be within the range of 6.6 to 8.8; un-ionized ammonia (as N) shall not exceed 0.02 mg/l; total chlorine residual shall not exceed 0.004 mg/l; total phosphorus (as P) shall be less than 0.1 mg/l;[2] total inorganic nitrogen (as N) shall be less than 1.0 mg/l;[2] total organic carbon shall be less than 7 mg/l; turbidity shall be less than 10 NTU (25 NTU in certain reaches where natural background prevents attainment of lower turbidity); and conductivity (at 25 C) shall be less than a limit varying between 300 umhos/cm and 1,500 umhos/cm depending on the natural background in particular stream reaches (the intent of this standard is to prevent excessive increases in dissolved solids which would result in changes in stream community structure). The acute and chronic standards set out in Section 3-101.J are applicable to this use.

D. *Irrigation (or Irrigation Storage):* The monthly logarithmic mean of fecal coliform bacteria shall not exceed 1,000/100 ml; no single sample shall exceed 2,000/100 ml. The following numeric standard shall not be exceeded:

Dissolved aluminum	5.0	mg/l
Dissolved arsenic	0.10	mg/l
Dissolved boron	0.75	mg/l
Dissolved cadmium	0.01	mg/l
Dissolved chromium	0.10	mg/l
Dissolved cobalt	0.05	mg/l
Dissolved copper	0.20	mg/l
Dissolved lead	5.0	mg/l
Dissolved selenium	0.13	mg/l
Dissolved selenium in presence of >500 mg/l SO_4	0.25	mg/l
Dissolved vanadium	0.1	mg/l
Dissolved zinc	2.0	mg/l

E. *Limited Warmwater Fishery:* Standards are the same as for "Warmwater Fishery" except on a case by case basis, the dissolved oxygen may reach a minimum of 4.0 mg/l or maximum temperatures may exceed 32.2 C. The acute and chronic standards set out in Section 3-101.J are applicable to this use.

F. *Marginal Coldwater Fishery:* Standards are the same as for "Coldwater Fishery" except on a case by case basis, the dissolved oxygen may reach a minimum of 5.0 mg/l or maximum temperatures may exceed 25 C, and the pH may range from 6.6 to 9.0. The acute and chronic standards set out in Section 3-101.J are applicable to this use.

G. *Primary Contact Recreation:* The monthly logarithmic mean of fecal coliform bacteria shall not exceed 200/100 ml, no single sample shall exceed 400/100 ml; the open water shall be free of alga in concentrations which cause nuisance conditions or gastrointestinal or skin disorders; pH shall be within the range of 6.6 to 8.8; and turbidity shall be less than 25 NTU.

H. *Warmwater Fishery*: Un-ionized ammonia (as N) shall not exceed 0.06 mg/l, dissolved oxygen shall be greater than 5 mg/l, temperature shall be less than 32.2 C (90 F), and pH shall be within the range of 6.0 to 9.0 and total chlorine residual shall not exceed 0.008 mg/l. The acute and chronic standards set out in Section 3-101.J are applicable to this use.

I. Fish culture and municipal and industrial water supply and storage are also designated in particular stream reaches where these uses are actually being realized. However, no numeric standards apply uniquely to these uses. Water quality adequate for these uses is ensured by the general standards and numeric standards for bacterial quality, pH, and temperature which are established for all stream reaches listed in part 2 of the standards.

J. The following schedule of numeric standards and equations for the substances listed shall apply to the subcategories of fisheries identified in Section 3-101:

[1] For waters with more than a single attainable or designated use the applicable criteria are those which will protect and sustain the most sensitive use.

[2] As the need arises, the State shall determine for specified stream segments or relevant portions thereof whether the limiting nutrient for the growth of aquatic plants is nitrogen or phosphorus. Upon such a determination the waters in question shall be exempt from the standard for the nutrient found to be not limiting. Until such a determination is made, standards for both nutrients shall apply. If co-limitation is found, the waters in question shall be exempt from the total inorganic nitrogen standard. The State shall make available a list of those waters for which the limiting nutrient has been determined.

Chronic Criteria[3]

Dissolved aluminum	87.0	(10^{-3}) mg/l
Dissolved beryllium	5.3	(10^{-3}) mg/l
Total mercury	0.012	(10^{-3}) mg/l
Dissolved selenium	5.0	(10^{-3}) mg/l
Dissolved silver	0.12	(10^{-3}) mg/l
Total cyanide	5.2	(10^{-3}) mg/l
Total chlordane	0.0043	(10^{-3}) mg/l
Dissolved cadmium[5]	e(0.7852[ln(hardness)]-3.49)	(10^{-3}) mg/l
Dissolved chromium[6]	e(0.819[ln(hardness)+1.561)	(10^{-3}) mg/l
Dissolved copper	e(0.8545[ln(hardness)]-1.465)	(10^{-3}) mg/l
Dissolved lead	e(1.273[ln(hardness)]-4.705)	(10^{-3}) mg/l
Dissolved nickel	e(0.846[ln(hardness)]+1.1645)	(10^{-3}) mg/l
Dissolved zinc	e(0.8473[ln(hardness)]+0.7614)	(10^{-3}) mg/l

Acute Criteria[4]

Dissolved aluminum	750	(10^{-3}) mg/l
Dissolved beryllium	130	(10^{-3}) mg/l
Total mercury	2.4	(10^{-3}) mg/l
Dissolved selenium	20.0	(10^{-3}) mg/l
Dissolved silver	e(1.72[ln(hardness)]-6.52)	(10^{-3}) mg/l
Total cyanide	22.0	(10^{-3}) mg/l
Total chlordane	2.4	(10^{-3}) mg/l
Dissolved cadmium	e(1.128[ln(hardness)]-3.828)	(10^{-3}) mg/l
Dissolved chromium[6]	e(0.819[ln(hardness)+3.688)	(10^{-3}) mg/l
Dissolved copper	e(0.9422[ln(hardness)]-1.464)	(10^{-3}) mg/l
Dissolved lead	e(1.273[ln(hardness)]-1.46)	(10^{-3}) mg/l
Dissolved nickel	e(0.76[ln(hardness)]+4,02	(10^{-3}) mg/l
Dissolved zinc	e(0.8473[ln(hardness)]+0.8604)	(10^{-3}) mg/l

K. Livestock and Wildlife Watering: The following numeric standards shall not be exceeded:

Dissolved aluminum	5.0	mg/l
Dissolved arsenic	0.02	mg/l
Dissolved boron	5.0	mg/l
Dissolved cadmium	0.05	mg/l
Dissolved chromium[6]	1.0	mg/l
Dissolved cobalt	1.0	mg/l
Dissolved copper	0.5	mg/l
Dissolved lead	0.1	mg/l
Total mercury	0.01	mg/l
Dissolved selenium	0.05	mg/l
Dissolved vanadium	0.1	mg/l
Dissolved zinc	25.0	mg/l
Radium-226 + radium-228	30.0	pCi/l

[3] The chronic criteria shall be applied to the arithmetic mean of four samples collected on each of four consecutive days. Chronic criteria shall not be exceeded more than once every three years.

[4] The acute criteria shall be applied to any single grab sample. Acute criteria shall not be exceeded.

[5] For numeric standards dependent on hardness, hardness (as mg $CaCO_3$/l) shall be determined as needed from available verifiable data sources including, but not limited to, the U.S. Environmental Protection Agency's STORET water quality database.

[6] The criteria for chromium shall be applied to an analysis which measures both the trivalent and hexavalent ions.

APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) SAMPLING RESULTS

Table C-1, Results of Background Water Analyses for Potable Water Taken from Water Plant Laboratory
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	Units:	Conc.
Antimony	µg/l	29
Arsenic	µg/l	13
Barium	µg/l	<100
Beryllium	µg/l	<10
Boron	µg/l	160
Cadmium	µg/l	<5
Chromium	µg/l	<20
Copper	µg/l	<50
Iron	µg/l	<100
Lead	µg/l	<20
Magnesium	mg/l	40
Manganese	µg/l	<50
Mercury	µg/l	<1.0
Nickel	µg/l	<50
Potassium	mg/l	10
Selenium	µg/l	13
Silver	µg/l	<5
Sodium	mg/l	50
Thallium	µg/l	16
Zinc	µg/l	220

Other Analyses:	Units	Conc.
Chemical Oxygen Demand	mg/l	17
Oil and Grease	mg/l	<0.3
Total Petroleum Hydrocarbons	mg/l	<0.1
Ammonia	mg/l	<0.2
Kjeldahl Nitrogen (total)	mg/l	0.2
Nitrate (as Nitrogen)	mg/l	0.98
Nitrite (as Nitrogen)	mg/l	<0.02
Phosphorus	mg/l	<0.10
Cyanide	mg/l	<0.005
Phenol	µg/l	<10
Chloride	mg/l	45
Residue, Total	mg/l	467
Residue, Filterable	mg/l	610
Residue, Total Volatile	mg/l	70
Specific Conductance	µS/cm	652
Sulfate	mg/l	110

Volatile Organic Hydrocarbon Analysis (EPA Method 601):

	Units:	Conc.
Bromodichloromethane	µg/l	0.5
Bromoform	µg/l	4.6
Carbon Tetrachloride	µg/l	<5
Chlorobenzene	µg/l	<3
Chloroethane	µg/l	<9
Chloroform	µg/l	<3
Chloromethane	µg/l	<8
Chlorodibromomethane	µg/l	2.2
1,2-Dichlorobenzene	µg/l	<5
1,3-Dichlorobenzene	µg/l	<5
1,4-Dichlorobenzene	µg/l	<5
Dichlorodifluoromethane	µg/l	<5
1,1-Dichloroethane	µg/l	<4
1,2-Dichloroethane	µg/l	<3
1,1-Dichloroethene	µg/l	<3
Trans-1,2-Dichloroethene	µg/l	<5
1,2-Dichloropropane	µg/l	<3
Cis-1,3-Dichloropropene	µg/l	<5
Trans-1,3-Dichloropropene	µg/l	<5
Methylene Chloride	µg/l	<4
1,1,2,2-Tetrachloroethane	µg/l	<2
Tetrachloroethylene	µg/l	<6
1,1,1-Trichloroethane	µg/l	<5
1,1,2-Trichloroethane	µg/l	<2
Trichloroethylene	µg/l	<5
Trichlorofluoromethane	µg/l	<4
Vinyl Chloride	µg/l	<2
2-Chloroethylvinyl Ether	µg/l	<2
Bromomethane	µg/l	<9

Volatile Organic Aromatic Analysis (EPA Method 602):

1,3-Dichlorobenzene	µg/l	<5
1,4-Dichlorobenzene	µg/l	<5
Ethyl Benzene	µg/l	<6
Chlorobenzene	µg/l	<3
Toluene	µg/l	<3
Benzene	µg/l	<3
1,2-Dichlorobenzene	µg/l	<5

TABLE C-2, Results of Spike Sample Analyses
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	Advisory Range	5 Oct	5 Oct	6 Oct	6 Oct
Antimony	µg/l	100 - 158	106	103		
Arsenic	µg/l	80 - 125	110	109		
Barium	µg/l	384 - 553	470	480		
Beryllium	µg/l	67 - 96	80	80		
Boron	µg/l	83 - 120	120	110		
Cadmium	µg/l	121 - 174	90	90		
Chromium	µg/l	681 - 980	840	850		
Copper	µg/l	181 - 261	220	220		
Iron	µg/l	125 - 198	170	170		
Lead	µg/l	63 - 90	68	65		
Manganese	µg/l	154 - 222	180	180		
Mercury	µg/l	6.1 - 10	53.7	38.8		
Nickel	µg/l	284 - 409	340	340		
Selenium	µg/l	61 - 96	51	< 10		
Silver	µg/l	73 - 106	100	90		
Thallium	µg/l	35 - 55	60	56		
Zinc	µg/l	82 - 117	90	110		
Other Analyses:						
Phenol	µg/l	260 - 440	345	320		
Cyanide (Total)	mg/l	0.21 - 0.37	0.225	0.188		
Ammonia	mg/l	5.6 - 7.8	7.2	6.2		
Nitrate (as N)	mg/l	9.6 - 12	8.2	8.8		
Chemical Oxygen Demand	mg/l	124 - 168			110	105
Kjeldahl Nitrogen (Total)	mg/l	5.4 - 7.8			7.1	7.7
Phosphorus	mg/l	4.3 - 8.0			3.8	4.15

NOTE: Shaded areas indicate results outside of advisory range.

TABLE C-3, Results of Duplicate Sample Analyses (Page 1 of 2) CANNON AFB WASTEWATER CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992						
Metals Analyses:	Units	Site 4 6 Oct	Site 4 6 Oct		Site 8 6 Oct	Site 8 6 Oct
Antimony	µg/l	33	31		48	39
Arsenic	µg/l	13	12		37	15
Barium	µg/l	<100	<100		160	170
Beryllium	µg/l	<10	<10		<10	<10
Boron	µg/l	310	310		320	355
Cadmium	µg/l	<5	<5		<5	<5
Chromium	µg/l	<20	<20		<20	<20
Copper	µg/l	<50	<50		60	<50
Iron	µg/l	800	770		1070	1390
Lead	µg/l	<20	<20		<20	<20
Magnesium	mg/l	40	40		30	40
Manganese	µg/l	<50	<50		<50	<50
Mercury	µg/l	<1.0	<1.0		<1.0	<1.0
Nickel	µg/l	<50	<50		<50	<50
Potassium	mg/l	20	20		20	20
Selenium	µg/l	32	44		100	60
Silver	µg/l	5	<5		<5	<5
Sodium	mg/l	130	140		310	100
Thallium	µg/l	16	20		30	46
Zinc	µg/l	210	200		190	170
Volatile Organic Hydrocarbon Analysis (EPA Method 601):						
Bromodichloromethane	µg/l	<4	<4		<4	<4
Bromoform	µg/l	<7	<7		<7	<7
Carbon Tetrachloride	µg/l	<5	<5		<5	<5
Chlorobenzene	µg/l	<3	<3		<3	<3
Chloroethane	µg/l	<9	<9		<9	<9
Chloroform	µg/l	<3	<3		<3	<3
Chloromethane	µg/l	<8	<8		<8	<8
Chlorodibromomethane	µg/l	<5	<5		<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5		<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5		<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5		<5	<5
Dichlorodifluoromethane	µg/l	<5	<5		<5	<5
1,1-Dichloroethane	µg/l	<4	<4		<4	<4
1,2-Dichloroethane	µg/l	<3	<3		<3	<3
1,1-Dichloroethene	µg/l	<3	0.3		0.3	0.3
Trans-1,2-Dichloroethene	µg/l	<5	<5		<5	<5
1,2-Dichloropropane	µg/l	<3	<3		<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5		<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5		<5	<5
Methylene Chloride	µg/l	<4	<4		<4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2		<2	<2
Tetrachloroethylene	µg/l	<6	<6		<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5		<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2		<2	<2
Trichloroethylene	µg/l	<5	<5		<5	<5
Trichlorofluoromethane	µg/l	<4	<4		<4	<4
Vinyl Chloride	µg/l	<2	<2		<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2		<2	<2
Bromomethane	µg/l	<9	<9		<9	<9
Volatile Organic Aromatic Analysis (EPA Method 602):						
1,3-Dichlorobenzene	µg/l	<5	<5		<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5		<5	<5
Ethyl Benzene	µg/l	<6	<6		<6	<6
Chlorobenzene	µg/l	<3	<3		<3	<3
Toluene	µg/l	<3	<3		<3	0.5
Benzene	µg/l	<3	<3		<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5		<5	<5

TABLE C-3, Results of Duplicate Sample Analyses (Page 2 of 2) CANNON AFB WASTEWATEr CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992						
Other Analyses:	Units	Site 4 6 Oct	Site 4 6 Oct		Site 8 6 Oct	Site 8 6 Oct
Phenol	μg/l	38	43		39	57
Cyanide (Total)	mg/l	0.15	0.015		**0.175**	**0.006**
Chemical Oxygen Demand	mg/l	300	220		**60**	**230**
Oils and Grease	mg/l	**35.2**	**60.5**		**252.8**	**156.8**
Total Petroleum Hydrocarbons	mg/l	**6.1**	**31.4**		12.2	18.2
Ammonia	mg/l	28.4	28.4		**21.2**	**1.1**
Kjeldahl Nitrogen (Total)	mg/l	NST	NST		29	32
Nitrate (as N)	mg/l	NST	NST		<0.1	<0.1
Nitrite (as N)	mg/l	NST	NST		0.04	0.08
Phosphorus	mg/l	NST	NST		**8.4**	**13**
Chloride	mg/l	NST	NST		83	96
Specific Conductance	μS/cm	NST	NST		1154	1098
Sulfate	mg/l	NST	NST		107	83
Residue (Total)	mg/l	NST	NST		**830**	**1457**
Residue (Filterable)	mg/l	NST	NST		700	525
Residue (Total Volatile)	mg/l	NST	NST		**355**	**886**

NOTE: Shaded values indicate duplicate samples with poor agreement.

TABLE C-4, Results of Equipment and Reagent Blank Sample Analyses CANNON AFB WASTEWATER CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992					
		Equipment Blank	Equipment Blank	Equipment Blank	Reagent Blank
		Site 2	Site 9	Site 8	
Metals Analyses:	UNITS:	6 Oct	6 Oct	7 Oct	6 Oct
Antimony	ug/l	<10	<10	<10	<10
Arsenic	ug/l	<10	<10	<10	<10
Barium	ug/l	<100	<100	<100	<100
Beryllium	ug/l	<10	<10	<10	<10
Boron	ug/l	<100	<100	<100	<100
Cadmium	ug/l	<5	<5	<5	<5
Chromium	ug/l	<20	<20	<20	<20
Copper	ug/l	<50	<50	<50	<50
Iron	ug/l	<100	<100	<100	<100
Lead	ug/l	<20	<20	<20	<20
Magnesium	mg/l	<1.0	<1.0	<1.0	<1.0
Manganese	ug/l	<50	<50	<50	<50
Mercury	ug/l	<1.0	<1.0	<1.0	<1.0
Nickel	ug/l	<50	<50	<50	<50
Potassium	mg/l	<1.0	<1.0	<1.0	<1.0
Selenium	ug/l	<10	<10	<10	<10
Silver	ug/l	<5	<5	<5	<5
Sodium	mg/l	<1.0	<1.0	2	<1.0
Thallium	ug/l	<10	<10	<10	<10
Zinc	ug/l	<50	<50	<50	<50
Other Analyses:					
Phenol	ug/l	<10	<10	<10	<10
Cyanide (Total)	mg/l			<0.005	<0.005
Ammonia	mg/l			<0.2	<0.2
Kjeldahl Nitrogen (Total)	mg/l			0.3	<0.2
Nitrate (as N)	mg/l			<0.1	<0.1
Nitrite (as N)	mg/l			<0.02	<0.02
Phosphorus (Total)	mg/l			<0.10	<0.10
Chemical Oxygen Demand	mg/l	25	18	<10	<10
Chloride	mg/l			<1	
Specific Conductance	uS/cm			2	
Sulfate (Total)	mg/l			<1	

NOTE: Shaded areas indicate results outside of advisory range.

APPENDIX D

RESULTS OF SAMPLING FOR WASTEWATER LAGOON INFLUENT, EFFLUENT, AND SLUDGE

TABLE D-1, Results of Analyses for
Site 6, Wastewater Lagoon Influent (Page 1 of 2)
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	7 Oct	8 Oct	8-Day Av
Antimony	µg/l	29	39	60	51	20	39	53	50	42.6
Arsenic	µg/l	19	17	17	18	18	15	20	23	18.4
Barium	µg/l	<100	170	100	100	120	170	170	160	136.3
Beryllium	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10
Boron	µg/l	280	470	370	460	199	355	330	351	351.9
Cadmium	µg/l	<5	5	<5	<5	<5	<5	<5	<5	<5
Chromium	µg/l	<50	<50	<50	<50	<20	<20	<20	<20	<50
Copper	µg/l	<50	65	<50	<50	<50	<50	60	50	53.1
Iron	µg/l	530	1000	400	1400	13760	1390	7540	1480	3437.5
Lead	µg/l	<20	<20	<20	<20	<20	<20	27	<20	21.0
Magnesium	mg/l	20	20	30	40	37	40	30	20	29.6
Manganese	µg/l	<50	<50	<50	<50	60	<50	70	<50	53.8
Mercury	µg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.8	2.2	1.3
Nickel	µg/l	<50	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	mg/l	20	20	20	10	17	20	20	20	18.4
Selenium	µg/l	107	80	87	70	66	60	41	28	67.4
Silver	µg/l	<5	20	20	5	<5	<5	<5	5	7.8
Sodium	mg/l	330	300	180	110	96	100	320	210	205.8
Thallium	µg/l	43	40	35	28	32	46	26	24	34.3
Zinc	µg/l	140	170	84	96	300	170	580	290	228.8
Volatile Organic Hydrocarbon Analyses (EPA Method 601):										
Bromodichloromethane	µg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4
Bromoform	µg/l	<7	<7	<7	<7	<7	<7	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9	<9	<9	<9	<9	<9	<9
Chloroform	µg/l	0.1	<3	<3	<3	<3	<3	<3	<3	<3
Chloromethane	µg/l	<8	<8	<8	<8	<8	<8	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,4-Dichlorobenzene	µg/l	0.4	<5	<5	<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	0.2	<3	<3	<3	<3	1.5	<3
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methylene Chloride	µg/l	0.3	0.3	<4	<4	<4	<4	<4	<4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6	<6	<6	<6	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	1	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9	<9	<9	<9	<9	<9	<9
Volatile Organic Aromatics (EPA Method 602):										
1,3-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,4-Dichlorobenzene	µg/l	0.4	<5	<5	<5	<5	<5	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6	<6	<6	<6	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	µg/l	0.3	0.6	<3	<3	<3	0.5	<3	0.3	<3
Benzene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5

NOTE: Shaded areas indicate high concentrations.

TABLE D-1, Results of Analyses for
Site 8, Wastewater Lagoon Influent (Page 2 of 2)
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Other Analyses:	UNITS:	1 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	7 Oct	8 Oct	8-day Av	Character*
Oil and Grease	mg/l	125.6	115.2	60.8	84.8	140.8	156.8	**624**	174	185.3	Strong
Total Petroleum Hydrocarbons	mg/l	28.5	16.4	5.6	13.3	6.1	18.2	20.2	18.2	15.8	
Phenol	µg/l	50	43	25	28	53	57	39	62	44.6	
Armstrong Lab COD	mg/l	240	125	243	157	194	230	<10	175	171.8	Weak
Field COD	mg/l	NST	NST	505	308	360	340	585	515	435.5	Weak
Biochemical Oxygen Demand	mg/l	225	225	200	193	141	NST	NST	NST	196.8	Weak
Ammonia	mg/l	**40**	**40**	20.8	18	**34.8**	1.1	<0.2	24	22.3	Weak
Kjeldahl Nitrogen, Total	mg/l	52.5	49	30	25.5	41	32	0.2	25.5	32.0	Medium
Nitrate (as Nitrogen)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Nitrite (as Nitrogen)	mg/l	0.03	<0.02	<0.02	<0.02	0.05	0.08	<0.02	0.06	0.4	
Phosphorus	mg/l	10.6	7.8	9.6	7.4	6.8	13	<0.1	11	8.3	Medium
Cyanide, Total	mg/l	<0.002	<0.005	<0.005	<0.005	<0.005	0.006	**0.195**	<0.005	0.029	
Chloride	mg/l	300	270	150	110	69	96	83	96	146.8	Strong
Specific Conductance	µS/cm	1872	1708	1294	1096	1032	1098	1152	1116	1296.0	
Sulfate	mg/l	16	29	53	40	74	83	86	100	60.1	Strong
Settleable Solids	ml/l	NST	20	11	8	7.5	16	8	6	10.9	Medium
Residue, Total	mg/l	1368	913	1997	985	737	1457	788	1720	1245.6	Strong
Residue, Filterable	mg/l	550	875	1580	590	575	525	765	945	800.6	Strong
Residue, Total Volatile	mg/l	460	342	350	402	322	886	330	712	475.5	Strong
Gross Alpha	pCi/l	2.5 +/- 1	1.4 +/- 1	<3.7	2.3 +/- 1	4.3 +/- 2	4.2 +/- 2	3.8 +/- 2	2.7 +/- 2	3.1	
Gross Beta	pCi/l	7 +/- 1.6	14.2 +/-	10.5 +/-	12.3 +/-	13.4 +/-	14.7 +/-	17.8 +/-	10.1 +/-	12.5	
Dissolved Oxygen	mg/l	1	0.6	1	1.7	0.6	0.5	0.8	1.4	1.0	
Grab Sample pH		6.3	6.4	6.2	6.4	6.3	6.4	6.4	6.4	6.4	
Grab Sample Temperature	deg C	25	25	20	19	20	24	24	20	22.1	
Time of Collection		1145	0902	0858	1120	0838	0910	0900	0915		

NST = No Sample Taken.
*** Character of wastewater strength as adapted from Metcalf & Eddy (10).**
Shaded blocks indicate high readings.

TABLE D-2, Results of Total Toxic Organics (TTO) Analyses Taken on 5 Oct 92 for
Site 8, Wastewater Lagoon Influent
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992
(All Concentrations in $\mu g/l$)

EPA Method 625:

ANALYTE	Conc	ANALYTE	Conc	ANALYTE	Conc
Aldrin	<300	2-Chlorophenol	<20	di-n-Butyl phthalate	<20
beta-BHC	<300	n-Nitrosodimethylamine	<60	Fluoranthene	<20
delta-BHC	<300	Phenol	21	Benzidine	<60
Chlordane	<600	Dichloroethyl ether	<20	Pyrene	<20
DDD	<300	1,3-Dichlorobenzene	<20	Butyl benzyl phthalate	14
DDE	<300	1,4-Dichlorobenzene	<20	3,3-Dichlorobenzidine	<60
p,p'-DDT	<300	1,2-Dichlorobenzene	<20	Benzo[a]anthracene	<20
Dieldrin	<300	n-Nitrosodi-n-propylamine	<20	Bis(2-ethylhexyl)phthalate	25
Endosulfan I	<300	Hexachloroethane	<20	Chrysene	<20
Endosulfan II	<300	Nitrobenzene	<20	di-n-Octyl-phthalate	<20
Endosulfan sulfate	<300	Isophorone	<20	Benzo[b]fluoranthene	<20
Endrin	<300	2-Nitrophenol	<20	Benzo[k]fluoranthene	<20
Endrin aldehyde	<300	2,4-Dimethylphenol	<20	Benzo[a]pyrene	<20
Heptachlor	<300	Bis(2-chloroethoxy)methane	<20	Indeno(1,2,3-c,d)pyrene	<20
Heptachlor epoxide	<300	2,4-Dichlorophenol	<20	Dibenzo(a,h)anthracene	<20
Toxaphene	<600	1,2,4-Trichlorobenzene	<20	Benzo(ghi)perylene	<20
Aroclor 1016	<600	Naphthalene	<20	Bis(2-chloroisopropyl)ether	<20
Aroclor 1221	<600	Hexachlorobutadiene	<20	p-Chloro-m-cresol	<20
Aroclor 1232	<600	Hexachlorocyclopentadiene	<20	4,6-Dinitro-o-cresol	<50
Aroclor 1242	<600	2,4,6-Trichlorophenol	<20	2,4-Dinitrotoluene	<20
Aroclor 1248	<600	2-Chloronaphthalene	<20	Diethyl Phthalate	16
Aroclor 1254	<600	Dimethyl Phthalate	<20	4-Chlorophenyl phenyl ether	<20
Aroclor 1260	<600	Acenaphthalene	<20	Fluorene	<20
2,4-Dinitrophenol	<50	Acenaphthene	<20	n-Nitrosodiphenylamine	<20
4-Nitrophenol	<50	Pentachlorophenol	<50	4-Bromphyenyl phenyl ether	<20
2,6-Dinitrotoluene	<20	Phenanthrene	<20	Hexachlorobenzene	<20
		Anthracene	<20		

EPA Method 608:

ANALYTE	Conc	ANALYTE	Conc	ANALYTE	Conc
Aldrin	<0.01	Dieldrin	<0.01	Aroclor 1016	<0.5
alpha-BHC	<0.01	Endosulfan I	<0.02	Aroclor 1221	<0.5
beta-BHC	<0.01	Endosulfan II	<0.02	Aroclor 1232	<0.5
delta-BHC	<0.01	Endosulfan sulfate	<0.1	Aroclor 1242	<0.5
Lindane	<0.01	Endrin	<0.01	Aroclor 1248	<0.5
Chlordane	<0.2	Endrin aldehyde	<0.1	Aroclor 1254	<0.5
DDD	<0.02	Heptachlor	<0.01	Aroclor 1260	<0.5
DDE	<0.02	Heptachlor epoxide	<0.01	Methoxychlor	<0.1
p'p-DDT	<0.02	Toxaphene	<1.0		

NOTE: Shaded values indicate detectable concentrations.

Table D-3, Flow Readings Measured at Wastewater Lagoon Influent
29 September 1992 - 11 October 1992
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
(All Readings in Gallons Per Day)

Time	29 Sep	30 Sep	1 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	7 Oct	8 Oct	9 Oct	10 Oct	11 Oct
0000	700,000	500,000	400,000	400,000	500,000	500,000	450,000	550,000	400,000	500,000	450,000	780,000	700,000
0100	300,000	400,000	300,000	300,000	400,000	350,000	400,000	350,000	350,000	350,000	400,000	700,000	700,000
0200	200,000	300,000	250,000	300,000	350,000	200,000	300,000	350,000	200,000	200,000	400,000	650,000	600,000
0300	190,000	350,000	200,000	350,000	300,000	250,000	200,000	350,000	300,000	150,000	300,000	650,000	550,000
0400	180,000	250,000	200,000	200,000	180,000	300,000	200,000	300,000	200,000	100,000	300,000	500,000	520,000
0500	150,000	150,000	150,000	200,000	150,000	100,000	150,000	280,000	100,000	180,000	250,000	450,000	400,000
0600	200,000	180,000	300,000	200,000	100,000	100,000	200,000	280,000	200,000	200,000	300,000	520,000	400,000
0700	500,000	1,000,000	1,000,000	900,000	100,000	150,000	950,000	750,000	900,000	800,000	1,550,000	550,000	550,000
0800	750,000	800,000	700,000	750,000	400,000	200,000	1,600,000	950,000	750,000	700,000	1,000,000	700,000	700,000
0900	600,000	700,000	550,000	600,000	600,000	650,000	1,500,000	700,000	650,000	600,000	1,400,000	1,020,000	900,000
1000	650,000	600,000	600,000	680,000	800,000	600,000	700,000	600,000	600,000	500,000	900,000	1,100,000	1,280,000
1100	800,000	700,000	750,000	750,000	800,000	800,000	650,000	1,000,000	600,000	600,000	900,000	1,300,000	1,350,000
1200	1,600,000	700,000	750,000	600,000	950,000	650,000	700,000	1,300,000	700,000	700,000	1,100,000	1,300,000	1,500,000
1300	1,000,000	700,000	700,000	650,000	800,000	800,000	800,000	800,000	700,000	650,000	1,000,000	1,100,000	1,400,000
1400	800,000	650,000	650,000	600,000	750,000	800,000	750,000	1,300,000	650,000	600,000	800,000	1,150,000	1,100,000
1500	900,000	600,000	500,000	500,000	600,000	700,000	700,000	1,180,000	650,000	650,000	750,000	1,050,000	1,200,000
1600	700,000	650,000	700,000	700,000	500,000	700,000	600,000	1,100,000	680,000	680,000	850,000	1,000,000	1,200,000
1700	700,000	700,000	500,000	700,000	550,000	700,000	650,000	1,000,000	700,000	600,000	900,000	1,000,000	1,100,000
1800	700,000	700,000	650,000	680,000	500,000	600,000	650,000	650,000	600,000	750,000	800,000	1,000,000	1,100,000
1900	700,000	650,000	700,000	650,000	650,000	700,000	600,000	780,000	700,000	580,000	900,000	1,050,000	1,200,000
2000	800,000	800,000	700,000	600,000	600,000	800,000	600,000	800,000	700,000	1,100,000	900,000	1,000,000	1,200,000
2100	700,000	800,000	750,000	650,000	600,000	700,000	700,000	700,000	850,000	1,150,000	820,000	1,080,000	1,200,000
2200	700,000	700,000	700,000	500,000	600,000	700,000	680,000	700,000	1,000,000	1,350,000	780,000	1,000,000	1,100,000
2300	650,000	700,000	650,000	650,000	400,000	550,000	550,000	600,000	500,000	550,000	850,000	800,000	1,100,000
Min Flow	150000	150000	150000	200000	100000	100000	150000	280000	100000	100000	250000	450000	400000
Max Flow	1600000	1000000	1000000	900000	950000	800000	1600000	1300000	1000000	1350000	1550000	1300000	1500000
Avg Flow	632083	595000	556250	546250	507500	525000	636667	723750	570000	593333	775000	893750	960417
Std Dev	316872	211227	217616	192674	227857	241523	344851	309136	233613	305650	331084	246827	330322

Minimum Flow Over Period:	100000	**Average Flow for Period:**	655000
Maximum Flow Over Period:	1600000	Standard Deviation:	307224

Table D-4, Biochemical Oxygen Demand (BOD) Readings For Wastewater Lagoon Influent and Effluent
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

	1 Oct		
Sample	Initial DO	Ending DO	BOD5
Influent, 3 ml	6.4	4.15	225
Influent, 5 ml	6.35	2.6	225
Influent, 8 ml	6.3	0.4	
Avg Infl BOD5			225

	1 Oct		
Sample	Initial DO	Ending DO	BOD5
Effluent, 3 ml	6.4	5.4	100
Effluent, 5 ml	6.45	4.75	102
Effluent, 8 ml	6.5	4.5	75
Avg Effl BOD5			92

	2 Oct		
Sample	Initial DO	Ending DO	BOD5
Influent, 3 ml	6.2	3.9	230
Influent, 5 ml	6.2	2.45	225
Influent, 8 ml	6.2	0.3	
Avg Infl BOD5			227

	2 Oct		
Sample	Initial DO	Ending DO	BOD5
Effluent, 5 ml	6.4	5.05	81
Effluent, 8 ml	6.4	4.35	77
Effluent, 10 ml	6.3	3.45	86
Avg Effl BOD5			81

	3 Oct		
Sample	Initial DO	Ending DO	BOD5
Influent, 3 ml	6.2	4.2	200
Influent, 5 ml	6.15	3.05	186
Influent, 8 ml	6.1	0.4	
Avg Infl BOD5			193

	3 Oct		
Sample	Initial DO	Ending DO	BOD5
Effluent, 5 ml	6.4	4.9	90
Effluent, 8 ml	6.35	3.95	90
Effluent, 10 ml	6.3	3.25	92
Avg Effl BOD5			91

	4 Oct		
Sample	Initial DO	Ending DO	BOD5
Influent, 3 ml	5.8	3.7	210
Influent, 5 ml	5.8	2.45	201
Influent, 8 ml	5.8	1.35	167
Avg Infl BOD5			193

	4 Oct		
Sample	Initial DO	Ending DO	BOD5
Effluent, 5 ml	5.8	4.25	93
Effluent, 8 ml	5.8	4.9	34
Effluent, 10 ml	5.8	4.4	42
Avg Effl BOD5			56

	5 Oct		
Sample	Initial DO	Ending DO	BOD5
Influent, 3 ml	6.5	4.95	155
Influent, 5 ml	6.45	4.15	138
Influent, 8 ml	6.4	2.95	129
Avg Infl BOD5			141

	5 Oct		
Sample	Initial DO	Ending DO	BOD5
Effluent, 5 ml	6.6	4.8	108
Effluent, 8 ml	6.5	4.75	66
Effluent, 10 ml	6.45	4.85	48
Avg Effl BOD5			74

NOTE: *Lightly shaded blocks indicate DO readings outside those recommended by Standard Methods. Darkly shaded blocks indicate no BOD5 reading calculated because of data problems.*

Table D-5, QA/QC Data for Biochemical Oxygen Demand Analyses
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

	1 Oct			
	Blank	Blank	Glucose	Glucose
Initial DO	6.3	6.45	6.35	6.3
Final DO	6.2	6.45	3.5	3.5
Glucose BOD			142.5	140
Blank Depl	0.1	0		
	2 Oct			
	Blank	Blank	Glucose	Glucose
Initial DO	6.8	6.8	6.4	6.2
Final DO	6.4	6.5	2.7	2.7
Glucose BOD			185	175
Blank Depl	0.4	0.3		
	3 Oct			
	Blank	Blank	Glucose	Glucose
Initial DO	6.4	6.4	6.4	6.4
Final DO	6.15	6.1	2.05	1.95
Glucose BOD			217.5	222.5
Blank Depl	0.25	0.3		
	4 Oct			
	Blank	Blank	Glucose	Glucose
Initial DO	6	6.1	5.9	5.8
Final DO	6.15	6.2	2.15	2.05
Glucose BOD			187.5	187.5
Blank Depl	-0.15	-0.1		
	5 Oct			
	Blank	Blank	Glucose	Glucose
Initial DO	6.5	6.5	6.4	6.4
Final DO	6.15	6.3	0.8	1.05
Glucose BOD			280	267.5
Blank Depl	0.35	0.2		

Note: Glucose BOD5s shown in shaded blocks fall outside recommended range of 198 +/- 30.5 in Standard Methods. Blank sample depletions in shaded blocks are greater than 0.2 mg/l or are negative values.

TABLE D-6, Results of Analyses for
Site 11, Wastewater Lagoon Effluent (Page 1 of 2)
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	7 Oct	8 Oct	8-day Av
Antimony	µg/l	61	53	55	55	55	60	58	71	58.5
Arsenic	µg/l	19	19	19	19	15	42	21	36	23.8
Barium	µg/l	<100	<100	<100	<100	<100	<100	<100	<100	<100
Beryllium	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10
Boron	µg/l	520	490	500	490	500	500	505	510	501.9
Cadmium	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chromium	µg/l	<50	<50	<50	<50	<20	<20	<20	<20	<20
Copper	µg/l	<50	<50	<50	<50	<50	<50	<50	170	65.0
Iron	µg/l	140	100	<100	<100	<100	<100	<100	<100	105.0
Lead	µg/l	<20	<20	<20	<20	<20	<20	<20	<20	<20
Magnesium	mg/l	60	60	60	60	60	60	60	60	60.0
Manganese	µg/l	<50	<50	<50	<50	<50	<50	<50	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	mg/l	20	30	20	20	28	30	20	30	24.8
Selenium	µg/l	121	126	295	229	265	163	21	38	157.3
Silver	µg/l	<5	<5	5	<5	<5	<5	<5	<5	<5
Sodium	mg/l	480	510	430	410	610	500	420	630	498.8
Thallium	µg/l	53	56	59	57	76	35	39	42	52.1
Zinc	µg/l	<50	<50	<50	<50	<50	<50	<50	<50	<50
Volatile Organic Hydrocarbon Analyses (EPA Method 601):										
Bromodichloromethane	µg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4
Bromoform	µg/l	<7	<7	<7	<7	<7	<7	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9	<9	<9	<9	<9	<9	<9
Chloroform	µg/l	0.1	<3	<3	<3	<3	<3	<3	<3	<3
Chloromethane	µg/l	<8	<8	<8	<8	<8	<8	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	0.2	<3	<3	<3	<3	<3	<3
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methylene Chloride	µg/l	0.4	<4	<4	<4	<4	<4	<4	<4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6	<6	<6	<6	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9	<9	<9	<9	<9	<9	<9
Volatile Organic Aromatics (EPA Method 602):										
1,3-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6	<6	<6	<6	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5

[ ] - Indicates concentration exceeds New Mexico Irrigation Standards

TABLE D-6, Results of Analyses for
Site 11, Wastewater Lagoon Effluent (Page 2 of 2)
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Other Analyses:	UNITS:	1 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	7 Oct	8 Oct	8 Day Avg
Oil and Grease	mg/l	8.5	15.6	18.7	7.7	7.8	9.9	9.9	11.3	11.2
Total Petroleum Hydrocarbons	mg/l	5.4	9.1	3	1.9	6.1	9.9	7.7	2.9	5.8
Phenol	µg/l	15	11	10	11	11	14	11	11	11.8
Armstrong Lab COD	mg/l	350	81	188	205	160	93	50	78	150.6
Field COD	mg/l	NST	NST	298	308	240	272	277	277	278.7
Biochemical Oxygen Demand	mg/l	100	81	90	38	57	NST	NST	NST	73.2
Ammonia	mg/l	0.66	0.24	0.64	0.72	0.74	0.64	0.38	21.6	3.3
Kjeldahl Nitrogen, Total	mg/l	11	11.5	11.5	11	7.9	8.7	12.5	8.7	10.4
Nitrate (as Nitrogen)	mg/l	0.28	0.4	0.26	0.22	0.56	0.26	0.24	0.3	0.3
Nitrite (as Nitrogen)	mg/l	0.02	0.045	0.03	0.04	0.09	0.08	0.07	0.08	0.1
Phosphorus	mg/l	7.6	7.8	7.2	6.2	6.2	6.2	3.15	6.5	6.4
Cyanide, Total	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloride	mg/l	640	610	650	570	640	670	670	650	637.5
Specific Conductance	µS/cm	2740	2790	2800	2740	2870	2900	2880	2900	2827.5
Sulfate	mg/l	148	150	148	150	144	144	148	144	147.0
Settleable Solids	ml/l	NST	3	1	3	<0.1	16	8	6	5.3
Residue, Total	mg/l	1838	1848	2157	2002	1970	1998	1995	1938	1968.3
Residue, Filterable	mg/l	1700	1710	1495	1595	1540	1795	1955	1825	1701.9
Residue, Total Volatile	mg/l	358	349	547	368	326	278	358	335	364.9
Gross Alpha	pCi/l	<2.5	<3.6	<3.8	<3.6	<3.5	3.2 +/- 2.2	<4.4	4.6 +/- 2.6	3.7
Gross Beta	pCi/l	21.2 +/- 4.3	15.6 +/- 3.2	14.7 +/- 3.4	17.4 +/- 3.4	18.1 +/- 3.3	14.6 +/- 3.2	18.1 +/- 3.3	15.6 +/- 3.2	16.9
Dissolved Oxygen	mg/l	9	5.6	3	1.6	6.6	1.3	5.4	6.1	4.8
Grab Sample pH		6.1	6.3	6.5	6.1	6.1	6	6.1	6.1	6.2
Grab Sample Temperature	deg C	18	18	18	16	18	17	14.5	10	16.2
Time of Collection		1200	0928	0920	0910	0900	0920	0915	0925	

NST = No Sample Taken.
[ ] - Indicates elevated reading.

TABLE D-7, Results of Total Toxic Organics (TTO) Analyses Taken on 5 Oct 92 for
Site 11, Wastewater Lagoon Effluent
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992
(All Concentrations in $\mu g/l$)

EPA Method 625:

ANALYTE	Conc	ANALYTE	Conc	ANALYTE	Conc
Aldrin	<300	2-Chlorophenol	<20	di-n-Butyl phthalate	<20
beta-BHC	<300	n-Nitrosodimethylamine	<60	Fluoranthene	<20
delta-BHC	<300	Phenol	<20	Benzidine	<60
Chlordane	<600	Dichloroethyl ether	<20	Pyrene	<20
DDD	<300	1,3-Dichlorobenzene	<20	Butyl benzyl phthalate	<20
DDE	<300	1,4-Dichlorobenzene	<20	3,3-Dichlorobenzidine	<60
p,p'-DDT	<300	1,2-Dichlorobenzene	<20	Benzo[a]anthracene	<20
Dieldrin	<300	n-Nitrosodi-n-propylamine	<20	Bis(2-ethylhexyl)phthalate	<20
Endosulfan I	<300	Hexachloroethane	<20	Chrysene	<20
Endosulfan II	<300	Nitrobenzene	<20	di-n-Octyl-phthalate	<20
Endosulfan sulfate	<300	Isophorone	<20	Benzo[b]fluoranthene	<20
Endrin	<300	2-Nitrophenol	<20	Benzo[k]fluoranthene	<20
Endrin aldehyde	<300	2,4-Dimethylphenol	<20	Benzo[a]pyrene	<20
Heptachlor	<300	Bis(2-chloroethoxy)methane	<20	Indeno(1,2,3-c,d)pyrene	<20
Heptachlor epoxide	<300	2,4-Dichlorophenol	<20	Dibenzo(a,h)anthracene	<20
Toxaphene	<600	1,2,4-Trichlorobenzene	<20	Benzo(ghi)perylene	<20
Aroclor 1016	<600	Naphthalene	<20	Bis(2-chloroisopropyl)ether	<20
Aroclor 1221	<600	Hexachlorobutadiene	<20	p-Chloro-m-cresol	<20
Aroclor 1232	<600	Hexachlorocyclopentadiene	<20	4,6-Dinitro-o-cresol	<50
Aroclor 1242	<600	2,4,6-Trichlorophenol	<20	2,4-Dinitrotoluene	<20
Aroclor 1248	<600	2-Chloronaphthalene	<20	Diethyl Phthalate	<20
Aroclor 1254	<600	Dimethyl Phthalate	<20	4-Chlorophenyl phenyl ether	<20
Aroclor 1260	<600	Acenaphthalene	<20	Fluorene	<20
2,4-Dinitrophenol	<50	Acenaphthene	<20	n-Nitrosodiphenylamine	<20
4-Nitrophenol	<50	Pentachlorophenol	<50	4-Bromphyenyl phenyl ether	<20
2,6-Dinitrotoluene	<20	Phenanthrene	<20	Hexachlorobenzene	<20
		Anthracene	<20		

EPA Method 608:

ANALYTE	Conc	ANALYTE	Conc	ANALYTE	Conc
Aldrin	<0.01	Dieldrin	<0.01	Aroclor 1016	<0.5
alpha-BHC	<0.01	Endosulfan I	<0.02	Aroclor 1221	<0.5
beta-BHC	<0.01	Endosulfan II	<0.02	Aroclor 1232	<0.5
delta-BHC	<0.01	Endosulfan sulfate	<0.1	Aroclor 1242	<0.5
Lindane	<0.01	Endrin	<0.01	Aroclor 1248	<0.5
Chlordane	<0.2	Endrin aldehyde	<0.1	Aroclor 1254	<0.5
DDD	<0.02	Heptachlor	<0.01	Aroclor 1260	<0.5
DDE	<0.02	Heptachlor epoxide	<0.01	Methoxychlor	<0.1
p'p-DDT	<0.02	Toxaphene	<1.0		

TABLE D-8, Percent Reductions of Selected Analytes for Wastewater Lagoons
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	1 Oct	2 Oct	3 Oct	4 Oct	5 Oct	6 Oct	7 Oct	8 Oct	Average
Iron	73.6	90.0	75.0	92.9	99.3	92.8	98.7	93.2	89.4
Zinc	64.3	70.6	40.5	47.9	83.3	70.6	91.4	82.8	68.9
Other Analyses:									
Oil and Grease	93.2	86.5	69.2	90.9	94.5	93.7	98.4	93.5	90.0
Total Petroleum Hydrocarbons	81.1	44.5	46.4	85.7	0.0	45.6	61.9	84.1	56.2
Phenol	70.0	74.4	60.0	60.7	79.2	75.4	71.8	82.3	71.7
Armstrong Lab COD	-45.8	35.2	22.6	-30.6	17.5	59.6		55.4	16.3
Field COD			41.0	0.0	33.3	20.0	52.6	46.2	32.2
Biochemical Oxygen Demand	55.6	64.0	55.0	80.3	59.6				62.9
Ammonia	98.4	99.4	96.9	96.0	97.9	41.8		10.0	77.2
Kjeldahl Nitrogen, Total	79.0	76.5	61.7	56.9	80.7	72.8		65.9	70.5
Phosphorus	28.3	0.0	25.0	16.2	8.8	52.3		40.9	24.5
Chloride	-113.3	-125.9	-333.3	-418.2	-827.5	-597.9	-707.2	-577.1	-462.6
Specific Conductance	-46.4	-63.3	-116.4	-150.0	-178.1	-164.1	-150.0	-159.9	-128.5
Sulfate	-825.0	-417.2	-179.2	-275.0	-94.6	-73.5	-72.1	-44.0	-247.6
Settleable Solids		85.0	90.9	62.5	100.0	0.0	0.0	0.0	84.6
Residue, Total	-34.4	-102.4	-8.0	-103.2	-167.3	-37.1	-153.2	-12.7	-95.2
Residue, Filterable	-209.1	-95.4	5.4	-170.3	-167.8	-241.9	-155.6	-93.1	-107.1
Residue, Total Volatile	22.2	-2.0	-56.3	8.5	-1.2	68.6	-8.5	52.9	-12.8

NOTE: Negative Values Indicate Percent Increase in Analyte.
-- Indicates Purged Data.

TABLE D-9, Results of Analyses for
Wastewater Lagoon Sludge
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	Lagoon A	Lagoon B
Antimony	μg/l	150	94
Arsenic	μg/l	14	15
Barium	μg/l	120	130
Beryllium	μg/l	<10	<10
Boron	μg/l	514	524
Cadmium	μg/l	<5	<5
Chromium	μg/l	<20	<20
Copper	μg/l	<50	<50
Iron	μg/l	<100	<100
Lead	μg/l	<20	<20
Magnesium	mg/l	60	60
Manganese	μg/l	<50	<50
Mercury	μg/l	27.1	34.3
Nickel	μg/l	<50	<50
Potassium	mg/l	20	20
Selenium	μg/l	370	362
Silver	μg/l	<5	10
Sodium	mg/l	490	380
Thallium	μg/l	271	220
Zinc	μg/l	<50	<50

Other Analyses:			
Oil and Grease	mg/l	153.6	366
Total Petroleum Hydrocarbon	mg/l	89.6	280
Phenol	μg/l	61	258
Ammonia	mg/l	14.4	26.8
Kjeldahl Nitrogen, Total	mg/l	47	54
Nitrate (as Nitrogen)	mg/l	0.54	0.34
Nitrite (as Nitrogen)	mg/l	0.39	0.17
Phosphorus	mg/l	7.9	8.2
Sulfate	mg/l	115	49
Sulfide	mg/l	88.5	56.3
Residue, Total	mg/l	15284	9907
Residue, Filterable	mg/l	3100	1600
Residue, Total Volatile	mg/l	4516	3662

Volatile Organic Hydrocarbon Analyses (EPA Method 8010):			
Analyte:	Units	Lagoon A	Lagoon B
Bromodichloromethane	μg/l	<4	<4
Bromoform	μg/l	<7	<7
Carbon Tetrachloride	μg/l	<5	<5
Chlorobenzene	μg/l	<3	<3
Chloroethane	μg/l	<9	<9
Chloroform	μg/l	<3	<3
Chloromethane	μg/l	<8	<8
Chlorodibromomethane	μg/l	<5	<5
1,2-Dichlorobenzene	μg/l	<5	<5
1,3-Dichlorobenzene	μg/l	<5	<5
1,4-Dichlorobenzene	μg/l	<5	<5
Dichlorodifluoromethane	μg/l	<5	<5
1,1-Dichloroethane	μg/l	<4	<4
1,2-Dichloroethane	μg/l	<3	<3
1,1-Dichloroethene	μg/l	<3	<3
Trans-1,2-Dichloroethene	μg/l	<5	<5
1,2-Dichloropropane	μg/l	<3	<3
Cis-1,3-Dichloropropene	μg/l	<5	<5
Trans-1,3-Dichloropropene	μg/l	<5	<5
Methylene Chloride	μg/l	<4	<4
1,1,2,2-Tetrachloroethane	μg/l	<2	<2
Tetrachloroethylene	μg/l	<6	<6
1,1,1-Trichloroethane	μg/l	<5	<5
1,1,2-Trichloroethane	μg/l	<2	<2
Trichloroethylene	μg/l	<5	<5
Trichlorofluoromethane	μg/l	<4	<4
Vinyl Chloride	μg/l	<2	<2
2-Chloroethylvinyl Ether	μg/l	<2	<2
Bromomethane	μg/l	<9	<9

Volatile Organic Aromatics (EPA Method 8020):			
1,3-Dichlorobenzene	μg/l	<5	<5
1,4-Dichlorobenzene	μg/l	<5	<5
Ethyl Benzene	μg/l	<6	<6
Chlorobenzene	μg/l	<3	<3
Toluene	μg/l	<3	<3
Benzene	μg/l	<3	<3
1,2-Dichlorobenzene	μg/l	<5	<5

NOTE: Shaded blocks indicate high concentrations.

TABLE D-10, Results of Total Toxic Organics (TTO) Analyses Taken on 5 Oct 92 for
Wastewater Lagoon Sludge
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992
(All Concentrations in μg/l)

EPA Method 8270:

ANALYTE	Lagoon A	Lagoon B	ANALYTE	Lagoon A	Lagoon B	ANALYTE	Lagoon A	Lagoon B
Aldrin	<300	<300	2-Chlorophenol	<20	<20	di-n-Butyl phthalate	<20	<20
alpha-BHC	<60	<60	n-Nitrosodimethylamine	<60	<60	Fluoranthene	<20	<20
beta-BHC	<300	<300	Phenol	<20	<20	Benzidine	<20	<20
delta-BHC	<300	<300	Dichloroethyl ether	<20	<20	Pyrene	<20	<20
Chlordane	<600	<600	1,3-Dichlorobenzene	<20	<20	Butyl benzyl phthalate	<20	<20
DDD	<300	<300	1,4-Dichlorobenzene	<20	<20	3,3-Dichlorobenzidine	<60	<60
DDE	<300	<300	1,2-Dichlorobenzene	<20	<20	Benzo[a]anthracene	<20	<20
p,p'-DDT	<300	<300	n-Nitrosodi-n-propylamine	<20	<20	Bis(2-ethylhexyl)phthalate	27	48
Dieldrin	<300	<300	Hexachloroethane	<20	<20	Chrysene	<20	<20
Endosulfan I	<300	<300	Nitrobenzene	<20	<20	di-n-Octyl-phthalate	<20	<20
Endosulfan II	<300	<300	Isophorone	<20	<20	Benzo[b]fluoranthene	<20	<20
Endosulfan sulfate	<300	<300	2-Nitrophenol	<20	<20	Benzo[k]fluoranthene	<20	<20
Endrin	<300	<300	2,4-Dimethylphenol	<20	<20	Benzo[a]pyrene	<20	<20
Endrin aldehyde	<300	<300	Bis(2-chloroethoxy)methane	<20	<20	Indeno(1,2,3-c,d)pyrene	<20	<20
Endrin ketone	<60	<60	2,4-Dichlorophenol	<20	<20	Dibenzo(a,h)anthracene	<20	<20
Heptachlor	<300	<300	1,2,4-Trichlorobenzene	<20	<20	Benzo(ghi)perylene	<20	<20
Heptachlor epoxide	<300	<300	Naphthalene	<20	<20	Bis(2-chloroisopropyl)ether	<20	<20
Toxaphene	<600	<600	Hexachlorobutadiene	<20	<20	p-Chloro-m-cresol	<20	<20
Lindane	<60	<60	Hexachlorocyclopentadiene	<20	<20	4,6-Dinitro-o-cresol	<50	<50
Methoxychlor	<60	<60	2,4,6-Trichlorophenol	<20	<20	2,4-Dinitrotoluene	<20	<20
Aroclor 1016	<600	<600	2-Chloronaphthalene	<20	<20	Diethyl Phthalate	<20	<20
Aroclor 1221	<600	<600	Dimethyl Phthalate	<20	<20	4-Chlorophenyl phenyl ether	<20	<20
Aroclor 1232	<600	<600	Acenaphthalene	<20	<20	Fluorene	<20	<20
Aroclor 1242	<600	<600	Acenaphthene	<20	<20	n-Nitrosodiphenylamine	<20	<20
Aroclor 1248	<600	<600	Pentachlorophenol	<50	<50	4-Bromphyenyl phenyl ether	<20	<20
Aroclor 1254	<600	<600	Phenanthrene	<20	<20	Hexachlorobenzene	<20	<20
Aroclor 1260	<600	<600	Anthracene	<20	<20	Benzoic Acid	9.1	<60
2,4-Dinitrophenol	<50	<50	Benzyl Alcohol	<60	<60	2-Methylphenol	<20	<20
4-Nitrophenol	<50	<50	2-Methyl Naphthalene	<20	<20	2,4,5-Trichlorophenol	<50	<50
2,6-Dinitrotoluene	<20	<20	3-Nitroaniline	<50	<50	Dibenzofuran	<20	<20
4-Methylphenol	<20	<20	1,2-Diphenylhydrazine	<60	<60	Acetophenone	<60	<60
4-Chloroaniline	<20	<20	4-Aminobiphenyl	<60	<60	1-Chloronaphthalene	<60	<60
2-Nitroaniline	<50	<50	2,6-Dichlorophenol	<60	<60	7,12-Dimethbenz(a)anthracen	<60	<60
4-Nitroaniline	<50	<50	Ethyl methane sulfonate	<60	<60	1-Naphthylamine	<60	<60
Aniline	<60	<60	3-Methylcholanthrene	<60	<60	Methyl methane sulfonate	<60	<60
Pentachlorobenzene	<60	<60	Pentachloronitrobenzene	<60	<60	Phenacetin	<60	<60
`Pronamide	<60	<60	1,2,4,5-Tetrachlorobenzene	<60	<60	2,3,4,6-Tetrachlorophenol	<60	<60
Dibenz(a,j)acridine	<60	<60	p-Dimethylaminoazobenzene	<60	<60	a,a-Dimethylphenethylamine	<60	<60
2-Naphthylamine	<60	<60	n-Nitroso-di-n-butylamine	<60	<60	n-Nitrosopiperidine	<60	<60
2-Picoline (Synfuel)	<60	<60						

EPA Method 8240:

ANALYTE	Lagoon A	Lagoon B	ANALYTE	Lagoon A	Lagoon B	ANALYTE	Lagoon A	Lagoon B
Acetone	<4.3	<4.3	Chloroethane	<1.4	<1.4	Chlorodibromomethane	<1.4	<1.4
Acrolein	<58	<58	2-Chloroethylvinyl ether	<3.3	<3.3	Vinyl chloride	<1.7	<1.7
Acrylonitrile	<43	<43	Chloroform	<1.8	<1.8	Methylene chloride	<1.6	<1.6
Benzene	<1.6	<1.6	Chloromethane	<1.6	<1.6	Carbon disulfide	<1.6	<1.6
Bromodichloromethane	<1.8	<1.8	1,1-Dichloroethane	<1.2	<1.2	trans-1,2-Dichloroethene	<1.2	<1.2
Bromoform	<1.2	<1.2	1,1-Dichloroethene	<2.1	<2.1	Trichlorofluoromethane	<1.5	<1.5
Bromomethane	<1.5	<1.5	1,2-Dichloroethane	<2.4	<2.4	1,1,1-Trichloroethane	<1.6	<1.6
Carbon Tetrachloride	<1.5	<1.5	1,2-Dichloropropane	<2.0	<2.0	Vinyl acetate	<3.5	<3.5
Chlorobenzene	<1.3	<1.3	Toluene	<1.5	<1.5	cis-1,3-Dichloropropene	<3.1	<3.1
Trichloroethylene	<1.3	<1.3	1,1,2-Trichloroethane	<1.1	<1.1	trans-1,3-Dichloropropene	<2.9	<2.9
Methyl isobutyl ketone	<3.5	<3.5	2-Hexanone	<4.1	<4.1	Tetrachloroethylene	<1.5	<1.5
1,1,2,2-Tetrachloroethane	<2.0	<2.0	Ethyl benzene	<1.4	<1.4	Styrene	<1.2	<1.2
Methyl ethyl ketone	<3.8	<3.8	Xylenes	<1.0	<1.0	Methyl iodide	<1.5	<1.5
Dibromomethane	<2.5	<2.5	t-1,2-Dichloro-2-butene	<1.7	<1.7	1,2,3-Trichloropropane	<2.3	<2.3
Ethyl methacrylate	<1.9	<1.9						

NOTE: Shaded areas indicate detectable concentrations.

APPENDIX E

RESULTS OF SAMPLING AT INDUSTRIAL SITES

TABLE E-1, Results of Analyses for
Site 1, Manhole Across from Bldg 790
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct
Antimony	µg/l	58	33	63
Arsenic	µg/l	19	14	11
Barium	µg/l	110	<100	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	340	280	220
Cadmium	µg/l	<5	<5	<5
Chromium	µg/l	<50	<50	<50
Copper	µg/l	<50	<50	53
Iron	µg/l	2600	690	1000
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	20	20	30
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	20	20	30
Selenium	µg/l	115	48	203
Silver	µg/l	<5	<5	<5
Sodium	mg/l	80	190	590
Thallium	µg/l	25	38	51
Zinc	µg/l	360	140	170
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	0.4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	0.4	0.2	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	2.6	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	<3
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	0.4	0.4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	<3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	140	169.6	107.2
Total Petroleum Hydrocarbons	mg/l	4.6	11.5	6.1
Ammonia	mg/l	26.4	29.2	13.2
Cyanide (Total)	mg/l	<0.005	<0.005	<0.005
Phenol	µg/l	28	40	65
Chemical Oxygen Demand	mg/l	245	265	284
pH		6.3	6.4	6.3
Temperature	deg C	21	21	21
Time of Collection		1000	1100	1018

NOTE: Shaded blocks indicate high concentrations.

TABLE E-2, Results of Analyses for
Site 2, Manhole Across from Bldg 684
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	6 Oct	7 Oct	8 Oct
Antimony	µg/l	43	39	63
Arsenic	µg/l	15	13	29
Barium	µg/l	<100	<100	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	280	205	177
Cadmium	µg/l	<5	<5	<5
Chromium	µg/l	<20	<20	<20
Copper	µg/l	<50	<50	<50
Iron	µg/l	1150	1290	650
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	40	30	30
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	20	20	20
Selenium	µg/l	59	<10	32
Silver	µg/l	<5	<5	<5
Sodium	mg/l	210	120	380
Thallium	µg/l	23	23	35
Zinc	µg/l	180	210	70
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	<3	<3	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	1.5	0.9	0.6
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	1.5
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	<4	<4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	1.5	0.9	0.6
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	<3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	140.8	93.6	50.4
Total Petroleum Hydrocarbons	mg/l	18.2	10.9	5.6
Phenol	µg/l	70	46	70
Chemical Oxygen Demand	mg/l	135	125	100
Residue (Total)	mg/l	929	NST	NST
Residue, Filterable	mg/l	895	NST	NST
Residue, Total Volatile	mg/l	338	NST	NST
pH		6.8	6.8	6.8
Temperature	deg C	19	19	18
Time of Collection		1055	1051	1045

NST = No Sample Taken.
Shaded areas indicate high readings.

TABLE E-3, Results of Analyses for Site 3, Manhole Across from Bldg 620 CANNON AFB WASTEWATER CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992				
Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct
Antimony	µg/l	44	29	58
Arsenic	µg/l	14	22	17
Barium	µg/l	<100	<100	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	490	240	240
Cadmium	µg/l	<5	<5	<5
Chromium	µg/l	<50	<50	<50
Copper	µg/l	<50	72	<50
Iron	µg/l	710	1300	920
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	20	20	40
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	20	30	30
Selenium	µg/l	63	61	191
Silver	µg/l	<5	<5	<5
Sodium	mg/l	170	170	530
Thallium	µg/l	18	37	48
Zinc	µg/l	70	3000	130
Volatile Organic Hydrocarbons (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	<3	0.2	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	<3
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	0.3	0.4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	1.1	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	<3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	38.4	243.2	10.6
Total Petroleum Hydrocarbons	mg/l	7.4	5.4	2.9
Ammonia	mg/l	29.6	44.8	40.8
Cyanide (Total)	mg/l	<0.005	<0.005	0.01
Phenol	µg/l	32	75	57
Chemical Oxygen Demand	mg/l	175	239	390
pH		6.4	6.4	6.1
Temperature	°C	24	28	24
Time of Collection		1030	1110	1033

Shaded areas indicate high concentrations.

TABLE E-4, Results of Analyses for Site 4, Manhole in Front of Bldg 186 CANNON AFB WASTEWATER CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992				
Metals Analyses:	UNITS:	6 Oct	7 Oct	8 Oct
Antimony	µg/l	31	36	50
Arsenic	µg/l	12	13	27
Barium	µg/l	<100	<100	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	310	280	188
Cadmium	µg/l	<5	<5	<5
Chromium	µg/l	<20	<20	<20
Copper	µg/l	<50	50	<50
Iron	µg/l	770	1120	990
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	40	30	20
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	20	20	20
Selenium	µg/l	44	10	31
Silver	µg/l	<5	<5	<5
Sodium	mg/l	140	120	270
Thallium	µg/l	20	21	31
Zinc	µg/l	200	210	130
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	<3	<3	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	0.3	<3	10.4
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	<4	<4	0.5
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	<3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	60.5	112	17.6
Total Petroleum Hydrocarbons	mg/l	31.4	9.1	1.9
Phenol	µg/l	43	43	43
Chemical Oxygen Demand	mg/l	220	180	212
Ammonia	mg/l	28.4	36	29.2
Cyanide (Total)	mg/l	0.015	0.58	0.008
Residue (Total)	mg/l	NST	1007	NST
Residue, Filterable	mg/l	NST	736	NST
Residue, Total Volatile	mg/l	NST	416	NST
pH		6.5	6.1	6.1
Temperature	deg C	21	20	19
Time of Collection		1212	1101	1110

NST = No Sample Taken.
Shaded areas indicate high readings.

TABLE E-5, Results of Analyses for Site 5, Manhole in Front of Bldg 193 CANNON AFB WASTEWATER CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992				
Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct
Antimony	µg/l	38	24	43
Arsenic	µg/l	12	12	16
Barium	µg/l	<100	<100	190
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	460	370	390
Cadmium	µg/l	<5	<5	7
Chromium	µg/l	<50	<50	<50
Copper	µg/l	<50	<50	<50
Iron	µg/l	690	470	1800
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	20	20	30
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	20	20	20
Selenium	µg/l	60	56	58
Silver	µg/l	<5	5	<5
Sodium	mg/l	170	160	140
Thallium	µg/l	28	29	29
Zinc	µg/l	80	100	240
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	<3	0.1	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	0.8	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	0.3
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	0.3	0.4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatics (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	0.8	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	0.3	0.3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	70.4	142.4	80
Total Petroleum Hydrocarbons	mg/l	27.8	34.2	6.1
Phenol	µg/l	36	50	61
Chemical Oxygen Demand	mg/l	165	268	435
Grab Sample pH		6.4	6.4	6.4
Grab Sample Temperature	deg C	26	26	26
Time of Collection		1050	1120	1043

Shaded areas indicate high concentrations.

TABLE E-6, Results of Analyses for
Site 6, Manhole Near Airmen's Attic
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct
Antimony	µg/l	44	25	50
Arsenic	µg/l	17	12	16
Barium	µg/l	<100	<100	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	520	340	390
Cadmium	µg/l	<5	<5	<5
Chromium	µg/l	<50	<50	<50
Copper	µg/l	<50	<50	<50
Iron	µg/l	430	100	160
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	20	20	40
Manganese	µg/l	110	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	10	20	20
Selenium	µg/l	66	53	60
Silver	µg/l	<5	<5	<5
Sodium	mg/l	180	150	100
Thallium	µg/l	28	31	27
Zinc	µg/l	80	54	68
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	0.2	<3	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	0.3
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	0.4	<4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	0.2	<3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	64.4	66.4	86.4
Total Petroleum Hydrocarbons	mg/l	18.2	4.6	9.1
Phenol	µg/l	41	32	32
Chemical Oxygen Demand	mg/l	145	170	177
pH		6.4	6.4	6.4
Temperature	deg C	23	22	23
Time of Collection		1115	1150	1105

TABLE E-7, Results of Analyses for
Site 7, Manhole Along Casablanca Avenue
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	6 Oct	7 Oct	8 Oct
Antimony	µg/l	37	40	49
Arsenic	µg/l	13	25	37
Barium	µg/l	110	120	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	500	550	334
Cadmium	µg/l	<5	9	10
Chromium	µg/l	<20	<20	<20
Copper	µg/l	<50	50	<50
Iron	µg/l	420	530	360
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	40	30	20
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	<1.0	1.24	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	10	10	20
Selenium	µg/l	52	27	35
Silver	µg/l	10	10	10
Sodium	mg/l	120	100	210
Thallium	µg/l	19	19	22
Zinc	µg/l	50	110	110
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	<3	0.5	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	0.3	2.9	1.5
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	<4	0.6	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatics (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	0.3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	54.4	60.8	51.2
Total Petroleum Hydrocarbons	mg/l	3	4.6	2.3
Phenol	µg/l	26	45	37
Chemical Oxygen Demand	mg/l	85	111	230
Ammonia	mg/l	16.8	16.4	17.2
Residue, Total	mg/l	669	938	NST
Residue, Filterable	mg/l	610	720	NST
Residue, Total Volatile	mg/l	202	357	NST
Grab Sample pH		6.6	6.4	6.4
Grab Sample Temperature	deg C	22	20	19
Time of Collection		1135	1120	1120

NST = No Sample Taken.
Shaded areas indicate significant concentrations.

TABLE E-8, Results of Analyses for
Site 9, Manhole Near Gate into Munitions Maintenance
CANNON AFB WASTEWATER CHARACTERIZATION SURVEY
28 SEPTEMBER - 9 OCTOBER 1992

Metals Analyses:	UNITS:	6 Oct	7 Oct	8 Oct
Antimony	µg/l	38	40	43
Arsenic	µg/l	12	21	31
Barium	µg/l	<100	<100	<100
Beryllium	µg/l	<16	<10	<10
Boron	µg/l	145	155	150
Cadmium	µg/l	<5	9.3	9
Chromium	µg/l	<20	<20	<20
Copper	µg/l	<50	90	80
Iron	µg/l	210	590	320
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	30	31	30
Manganese	µg/l	80	<50	<50
Mercury	µg/l	<1.0	<1.0	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	40	12	90
Selenium	µg/l	<10	24	29
Silver	µg/l	<5	<5	<5
Sodium	mg/l	80	80	170
Thallium	µg/l	16	19	27
Zinc	µg/l	110	210	150
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	<3	<3	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	1.1	0.9	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	0.3	4.8	27.7
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	<4	0.4	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	1.1	0.9	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	<3	0.3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	54.4	75.2	15.6
Total Petroleum Hydrocarbon	mg/l	7	15.6	2.9
Phenol	µg/l	125	130	150
Chemical Oxygen Demand	mg/l	88	166	185
Residue (Total)	mg/l	NST	670	NST
Residue, Filterable	mg/l	NST	575	NST
Residue, Total Volatile	mg/l	NST	209	NST
pH		6.8	6.8	6.8
Temperature	deg C	18	19	16
Time of Collection		1150	0945	0945

NST = No Sample Taken.
Shaded areas indicate high readings.

TABLE E-9, Results of Analyses for Site 10, Manhole Behind Hospital CANNON AFB WASTEWATER CHARACTERIZATION SURVEY 28 SEPTEMBER - 9 OCTOBER 1992				
Metals Analyses:	UNITS:	1 Oct	2 Oct	3 Oct
Antimony	µg/l	35	89	79
Arsenic	µg/l	16	19	19
Barium	µg/l	<100	270	<100
Beryllium	µg/l	<10	<10	<10
Boron	µg/l	300	190	290
Cadmium	µg/l	<5	<5	<5
Chromium	µg/l	<50	<50	<50
Copper	µg/l	240	<50	<50
Iron	µg/l	870	490	180
Lead	µg/l	<20	<20	<20
Magnesium	mg/l	20	30	30
Manganese	µg/l	<50	<50	<50
Mercury	µg/l	4.2	5.4	<1.0
Nickel	µg/l	<50	<50	<50
Potassium	mg/l	10	20	20
Selenium	µg/l	57	184	99
Silver	µg/l	20	60	30
Sodium	mg/l	150	870	310
Thallium	µg/l	33	71	45
Zinc	µg/l	80	51	<50
Volatile Organic Hydrocarbon Analyses (EPA Method 601):				
Bromodichloromethane	µg/l	<4	<4	<4
Bromoform	µg/l	<7	<7	<7
Carbon Tetrachloride	µg/l	<5	<5	<5
Chlorobenzene	µg/l	<3	<3	<3
Chloroethane	µg/l	<9	<9	<9
Chloroform	µg/l	0.2	<3	<3
Chloromethane	µg/l	<8	<8	<8
Chlorodibromomethane	µg/l	<5	<5	<5
1,2-Dichlorobenzene	µg/l	<5	<5	<5
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	0.5	<5	<5
Dichlorodifluoromethane	µg/l	<5	<5	<5
1,1-Dichloroethane	µg/l	<4	<4	<4
1,2-Dichloroethane	µg/l	<3	<3	<3
1,1-Dichloroethene	µg/l	<3	<3	0.2
Trans-1,2-Dichloroethene	µg/l	<5	<5	<5
1,2-Dichloropropane	µg/l	<3	<3	<3
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5
Methylene Chloride	µg/l	0.3	0.3	<4
1,1,2,2-Tetrachloroethane	µg/l	<2	<2	<2
Tetrachloroethylene	µg/l	<6	<6	<6
1,1,1-Trichloroethane	µg/l	<5	<5	<5
1,1,2-Trichloroethane	µg/l	<2	<2	<2
Trichloroethylene	µg/l	<5	<5	<5
Trichlorofluoromethane	µg/l	<4	<4	<4
Vinyl Chloride	µg/l	<2	<2	<2
2-Chloroethylvinyl Ether	µg/l	<2	<2	<2
Bromomethane	µg/l	<9	<9	<9
Volatile Organic Aromatic Analyses (EPA Method 602):				
1,3-Dichlorobenzene	µg/l	<5	<5	<5
1,4-Dichlorobenzene	µg/l	<5	<5	<5
Ethyl Benzene	µg/l	<6	<6	<6
Chlorobenzene	µg/l	<3	<3	<3
Toluene	µg/l	<3	<3	<3
Benzene	µg/l	<3	<3	<3
1,2-Dichlorobenzene	µg/l	<5	<5	<5
Other Analyses:				
Oil and Grease	mg/l	39.2	24.8	76
Total Petroleum Hydrocarbons	mg/l	3.3	3.1	32.2
Ammonia	mg/l	10.2	16	15.6
Cyanide (Total)	mg/l	<0.005	<0.005	<0.005
Phenol	µg/l	15	32	57
Chemical Oxygen Demand	mg/l	165	130	165
pH		6.1	6.4	6.4
Temperature	deg C	22	22	23
Time of Collection		0945	1030	1000

Shaded areas indicate high readings.