VIII. Discussion of Results.

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B. Correlation of Results to Plant Conditions.
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A. Plant Facility Operation Report

POINT LOMA 2004 ANNUAL FACILITY REPORT
Document prepared under the direction of Plant Superintendent Joe A. Cordova.

The facility reports address Process Control concerns and considerations, and summarize Plant Operations, Engineering, Maintenance, and the Gas Utilization Facility activities.

PROCESS CONTROL: FACTORS IMPACTING PLANT PERFORMANCE 2004

The following information is being reported in an effort to identify some of the factors, operational and otherwise, that may have impacted plant performance during 2004. Much of the information contained herein is based on assumptions regarding plant performance for this period. The main point of this effort is to continue identifying possible factors influencing plant performance which in turn will help to more effectively operate this facility. The information is presented in chronological order when possible. **Please note that the numerical values used here are largely based on analysis performed by Plant staff at the Process Laboratory and have not always been validated for official reporting purposes.**

Areas that will be covered include: rainfall, sludge blanket levels in the sedimentation basins and raw sludge pumping volumes, coagulation chemical application, influent temperature and seasonal impacts, and plant performance related to unknown variables.

RAINFALL

During the period between January 1 and December 31, 2004, the number and severity of rain storms were higher than normal and this was reflected increased plant influent flow rates. October of 2004 was one of the wettest on record, and November had an inordinate amount of rain for this region.

Rainfall for the period from January 1 through December 31.
- Total rainfall for 2000 = 8.76 inches
- Total rainfall for 2001 = 6.39 inches
- Total rainfall for 2002 = 0.96 inches
- Total rainfall for 2003 = 6.27 inches
- Total rainfall for 2004 = 13.30 inches

Average daily flow for the period from January 1 through December 31.
- ADF 2000 = 176.8 MGD
- ADF 2001 = 183.0 MGD
- ADF 2002 = 171.1 MGD
- ADF 2003 = 175.6 MGD
- ADF 2004 = 174.0 MGD

This wet season caused no plant upsets.

SLUDGE BLANKET LEVELS AND RAW SLUDGE PUMPING VOLUMES

In most circumstances it is assumed that maintaining lower sludge blanket levels in sedimentation basins and increased raw sludge pumping will produce a plant effluent with a lower total suspended solids (TSS) concentration. Review of data, for daily average sludge blanket levels and daily average total raw sludge pumped, shows that the averages for the three years were too close to draw any conclusions about the validity of the above assumption.

The average effluent TSS concentration was calculated for 2002, 2003 and 2004. This average was then compared to the average sludge blanket level, for all basins in operation, and the average daily raw sludge pumping volume for this same period. The information below reflects the data gathered for this comparison.

- Average Effluent TSS Concentration (2002) = 43.5 mg/L
- Average Daily Sludge Blanket Level (2002) = 153.5 inches

- Average Daily Raw Sludge Pumping Volume (2002) = 1.14 MGD

- Average Effluent TSS Concentration (2003) = 42.0 mg/L
- Average Daily Sludge Blanket Level (2003) = 158 inches
- Average Daily Raw Sludge Pumping Volume (2003) = 1.15 MGD

- Average Effluent TSS Concentration (2004) = 42.6 mg/L
- Average Daily Sludge Blanket Level (2004) = 168 inches
- Average Daily Raw Sludge Pumping Volume (2004)= 1.09 MGD

COAGULATION CHEMICAL APPLICATION

Data for ferric chloride and anionic polymer doses was reviewed to determine the impact that rates of product application have on plant performance. The average daily dose for each chemical was calculated for the same time period as above and compared to the TSS and BOD concentrations and removal rates.

- Average Daily Dose, Ferric Chloride (2002) = 25.8 mg/L
- Average Daily Dose, Anionic Polymer (2002) = 0.15 mg/L
- Average Daily Dose, Ferric Chloride (2003) = 29.9 mg/L
- Average Daily Dose, Anionic Polymer (2003) = 0.18 mg/L
- Average Daily Dose, Ferric Chloride (2004) = . 29.7 mg/L
- Average Daily Dose, Anionic Polymer (2004) = 0.17 mg

- Average Effluent TSS Concentration (2002) = 43.5 mg/L
- Average Effluent TSS Removal Rate (2002) = 84.9%
- Average Effluent TSS Concentration (2003) = 42.0 mg/L
- Average Effluent TSS Removal Rate (2003) = 85.1%
- Average Effluent TSS Concentration (2004) = 42.6 mg/L
- Average Effluent TSS Removal Rate (2004) = 85.2%

- Average Effluent BOD Concentration (2002) = 93.8 mg/L
- Average Effluent BOD Removal Rate (2002) = 64.7%
- Average Effluent BOD Concentration (2003) = 105.0 mg/L
- Average Effluent BOD Removal Rate (2003) = 61.3%
- Average Effluent BOD Concentration (2004) =101.8 mg/L
- Average Effluent BOD Removal Rate (2004) = 60.2%

A somewhat lower BOD concentration occurred in the effluent in 2004, when compared to the 2003 values. This probably resulted from the large amount of rainfall that diluted the influent BOD. Weaker influent BOD concentrations result in lower effluent BOD values, if the plant is performing correctly.

INFLUENT TEMPERATURE AND SEASONAL IMPACTS

Influent temperature variations at the Point Loma Facility are usually very slight throughout the year. The temperature of the influent flow, for 2004, ranged from 68.7 to 82.6 degrees Fahrenheit. Typically, the influent temperature changes are very subtle as each season progresses. The most pronounced changes in this parameter occur during the winter, after the rainy season begins and during the summer, after periods of sustained warm weather. Temperature changes, related to rain storms, were normal in 2004 even though it was a year with periods of appreciable amounts of rain. The effect of these temperature changes is difficult to judge due to the number of variables affected by the rainfall. The average daily influent temperature was calculated for the same period of time seen previously in this report, and the results are recorded below.

- Average Daily Influent Temperature (2002) = 75.3 degrees Fahrenheit
- Average Daily Influent Temperature (2003) = 75.9 degrees Fahrenheit
- Average Daily Influent Temperature (2004) = 76.7 degrees Fahrenheit

PLANT PERFORMANCE RELATED TO UNKNOWN VARIABLES

BOD and TSS removal rates were acceptable in 2004. This is in large part due to increased treatment at facilities upstream of PLWWTP. However, there exists a fine balance now between four facilities. The startup or cessation of certain activities at either of the upstream or downstream facilities can have a major impact on the PLWWTP.

Turbidity testing, at the sedimentation basin effluents, continued in 2004 on a regular basis. This has continued to help identify basins where mechanical or other problems are occurring. Analysis of 24 hour discrete effluent samples, for TSS concentration, has continued on an as-needed basis and is providing data on diurnal variations in plant performance. Data from this analytical work has been and will be used to help develop more effective chemical dosing strategies in the plant.

CONCLUSIONS

Plant performance in the year of 2004 was acceptable. The plant capability to treat varying concentrations of H_2S in the influent was enhanced by the introduction of ferrous chloride at pump stations supplying the plant and at the sludge blend tank that feeds the PLWWTP digesters.
An odor control system is being investigated at PLWWTP that may allow idling off the wet scrubbers at PLWWTP to utilization of the carbon towers on the wet scrubber discharge, only. Sodium Hypochlorite and recirculation water systems currently in service at the wet scrubbers would be placed in hot standby, ready to be placed back in service, if required. Discontinuing use of Sodium Hypochlorite and recirculation water will conserve potable water and reduce plant chemical costs. To date, the new odor control/carbon tower system results look promising. This configuration is being tested on Odor Removal System #4 at PLWWTP. This system receives some of the heaviest H_2S loading incident to PLWWTP.

The focus of the staff, at the Point Loma Facility, for 2005, will be to continue maintaining as high a quality effluent as is possible while incurring the lowest possible chemical costs. In particular, investigation into alternatives to ferric chloride will continue to be pursued. Ferrous Chloride was introduced into the Sludge Blend Tank as required for H_2S concentration control in the digester gas. In addition, a few changes being made to the polymer feed pumps, in 2005, may very well enable us to lower the polymer dose to the sedimentation tanks. When these attempts at lowering doses and subsequent fine-tuning are made, and H_2S removal tests utilizing Hydrogen Peroxide are initiated at the pump stations, some impacts to treatment may occur. However, staff expects such investigative activities will yield more cost effective results without jeopardizing long term plant performance efficiencies.

B. OPERATIONS REPORT 2004

Contract Related Activities:

- 12/04- BAF pilot study completed
- 12/04 - Desalinization project completed.
- 12/04 - S1 & S2 Digester seal test completed.
- 12/04- Digester S1 & S2 rehabilitation in progress. Digesters out of service
- 11/04 - Completed the 72 hour shut down for FIRP Pipeline repairs.
- 11/04 - VAPEX odor system parallel study for ORS 4 initiated.
- 02/04 - BAF pilot study initiated.

Operations Activities:

- 12/04- Industrial water line replacement started for Grit Pump gallery by buildings plumber and plant personnel.
- 11/04 - Completed inspection and rehabilitation of grit tanks N1, N2, C1 & C2. All work completed by plant and central support personnel
- 10/04- 2.3 MG spill at headwork's.
- 10/04 - Exercised digester valves and pumps in anticipation of 72 hr FIRP shutdown. All failures corrected by plant maintenance personnel.
- 09/04- Initiated ferrous chloride feed to digester blend tank.
- 07/04 - FIRP shutdown for initial pipeline inspection.
- 09/04- Shutdown for final FIRP pipeline inspection and Metro Bio-solids Center maintenance.
- 05/04 - Numerous shutdowns for East Portal Project
- 02/04 - N2P digester placed back in service.

C. ENGINEERING REPORT 2004

The following projects were in construction at the Point Loma Wastewater facility during 2004:

DIGESTER S1/S2 REHABILITATION

This project will completely rehabilitate these two digesters. The roofs, digester mixing and heating systems are being replaced with current designs; wall and coating repairs are also being done. This project was awarded in November 2003 and should be completed by August 2005. The cost is estimated to be approximately $12.1 million dollars.

SLUDGE PUMP STATION – FOURTH PUMP

This project will install a fourth pump to sludge to the Metropolitan Bio-solids Center. The current three pumps have been in service since 1998. These are high pressure pumps and are built in Germany. The current three pumps are experiencing normal wear that will require long outages for rebuilding/refurbishing. This fourth pump provides additional redundancy so that we can continue to process sludge in a manner consistent with our permits. This project began in June 2003 and was completed in September 2004. The approximate cost was $5 million.

LOWER HYDROELECTRIC ROAD PIPING PROJECT

This project installed a pump in the effluent sampler manhole and directed various drains to a large sump pump vault. The pump in the manhole will reduce the number of confined space entries into the manhole and redirection of the various drains will result in a safer and more reliable pumping system. This project was complete in February 2004 and the cost was approximately $49,000.

D. MAINTENANCE REPORT 2004

The focus of the Point Loma maintenance staff, for 2004, was to maintain a quality Preventive maintenance program while increasing the corrective maintenance work load. This was necessary due to the downsizing of the Central Support Facility (CSF). Also the return of corrective work orders to the plants through out the department.

In order to accomplish this goal our preventive maintenance (P.M.) program was re-evaluated. Numerous P.M.'s were re-assigned to Operations and Central Facility Maintenance (CFM). This lead to a 45% increase in preventive maintenance work orders being performed by (CFM) compared to last year.

The total number of work orders completed as compared with last year, 11,685 vs. 9,522 show a 19% decrease. This was due to several factors;

1. The suppression of all P.M.'s for digesters S1 and S2, while they are being rehabilitated by contractors.
2. Vacant positions. A 29% reduction in maintenance personnel due to promotions, transfers, and long term disability.
3. The cancellation of P.M.'s in order to complete more time intensive corrective work orders.
4. The consolidation of certain P.M. procedures.

The type of work orders that the Point Loma maintenance crews performed fall under three main categories;

1. Preventive Maintenance work orders.
2. Proactive work orders other than PM.
3. Corrective work orders.

The maintenance crews increased their work performance in all three areas. The P.M. work orders made up 86% of all work performed compared to 79% last year. The corrective work orders made up 12.4% of all work performed compared to 8.9% last year.

The major project for the year was the repair, and replacement of equipment associated with the grit removal facility. The project was necessary due to the postponement of the Grit Improvement Project (GIP). Four grit classifiers were replaced with new ones. New motors and associated instruments were installed. All lighting fixtures were replaced. The drain catch basin was repaired to prevent leaks. Also, new valves were installed in order to isolate the feeds to the grit classifiers from each grit tank. The total cost of labor was $15,741.06

The fourth Main sludge pump, manufactured by ABEL was commissioned during the year. The start-up and turn over went smoothly from a maintenance stand point.

Modifications to the north and south effluent channel level indicators were made. The bubbler systems were replaced with level transducers.

REPAIR OR REPLACEMENT OF:

- Influent climbing screens 1, 2, 3, 4, 5
- Influent screen shaft less conveyor
- Grit tanks N1, N2, C1, and C2 were drained cleaned and the main piping was replaced.
- Main sludge pump #'s 1, 2, & 3 membranes were replaced numerous times.
- Sludge grinder #1 was removed from service and stored in the warehouse as a spare.
- Sludge pumps # PR-9 and PR-6 had their obsolete gear drives replaced.
- Replaced two obsolete Ferric flow control valves.
- Annual PM on boilers
- Sedimentation Tanks- 4, 7, 8, Installed baffle extensions in bays 1, 2, & 3.
- Sedimentation Tanks- Overhauled tanks 4, 7, 8, 10, and 11.
- Gas mixing compressors for the north and central digesters had their lube oil feed lines replaced.
- Uninterruptible power supplies were replaced in several DPU cabinets.
- HP Sludge line- In vault # 7 the motorized valve controls was replaced.
- HP Sludge line- Flushed and calibrated all pressure transmitters.

GENERAL:

9,522 Total work orders completed within the year at the plant.
7,567 Total work orders completed within the year by plant personnel.
830 Total work orders completed within the year by Central Support Facility.
1,108 Total work orders completed within the year by Central Facility Maintenance.
17 Total work orders completed within the year by other Crews.

- **PLWWTP CREWS**
  - 7,567 Plant Personnel work orders.
    - 6,511 Preventive Maintenance work orders. (86 %)
    - 117 Proactive work orders other than PM. (1.5 %)
      - 56 Mod/Enhance- Proactive
      - 13 Rebuild- Proactive
      - 29 Safety-Proactive
      - 12 Sp Proj/CIP-Proactive
    - 939 Corrective work orders. (12.4%)
      - 293 Emergency-Corrective Unplanned work orders. (3.87%)
      - 561 Routine Repair-Corrective work orders. (7.4%)
      - 50 Safety-Corrective work orders. (.66%)
      - 8 Rebuild-Corrective. (.1%)
      - 26 Calibration-Corrective. (.34%)
      - 1 Accidental-Corrective.
- **CSF CREWS**
  - 830 Central Support Facility work orders.
    - 577 Preventive Maintenance (Insp. Rep.) work orders.
    - 62 Proactive work orders other than PM.
    - 191 Corrective work orders.
      - 27 Emergency-Corrective Unplanned work orders.
      - 148 Repair-Corrective work orders.
      - 9 Safety Corrective.
      - 7 Rebuild /Overhaul.
- **CFM CREWS**

- 1,108 Central Facility Maintenance work orders.
  - 978 Preventive Maintenance (Insp. Rep.) work orders.
  - 15 Proactive work orders other than PM.
  - 115 Corrective work orders.
    - 12 Emergency-Corrective Unplanned work orders.
    - 93 Repair-Corrective work orders.
    - 8 Safety Corrective.
    - 1Rebuild /Overhaul
    - 1Calibration-Corrective.

<u>CONCULSIONS</u>

The Point Loma maintenance staff will continue to provide service and quality to the plant. The focus will be to improve the quality of service though collaboration in the midst of the challenges presented in the up-coming year of 2005.

During the year of 2005 we anticipate some major changes to our Computerized Maintenance Management System known as EMPAC. A new data base will be implemented as of July 1, 2005. The plants asset nomenclature will change. This will assist in aiding our asset maintenance program. We will also combine maintenance crews in the data base.

The maintenance staff looks forward to providing the excellence that the Metro Wastewater Department demands.

E. GAS UTILIZATION FACILITY REPORT 2004

Unit 1, Unit 2, Unit 3, Unit 4 (PERP/Hydro) and CBF were in service.

<u>Major work at the GUF:</u>

Unit 1 & Unit 2
1) Conducted scheduled, planned maintenance to engine generators and auxiliary support equipment.
2) In frame overhaul on unit 2 was conducted by HPS and GUF crew.
3) Replaced exhaust insulations and welded in place the spring support bracket.
4) Unit 1is overdue for top end overhaul, still waiting for a new outside contract.
5) Replaced cylinder head #5 on unit 2.
6) APCD conducted an annual emission test to unit 1, unit 2 & unit 3, all passed.
7) Replaced cooling water common head manifold.

The following changes were made to increase the reliability of the engines.
8) Installed water injection system to unit 2.
9) Modified inlet air filters with top side opening and constructed of stainless steel.
10) Replaced oxygen analyzer in unit 2 with the same type as installed in all boilers.

Unit 3
The generator was on line during the high peak months from May to September at the hours of 1400 to 1800. The new cleaning design was being conducted by EPM group for easy access and cleaning of the particulate filters.

PERP (Hydro)
Operational hours are limited from 0900 to 0100 hours.
Conducted an annual inspection/adjustments of gates, timings and controls.
Replaced and re-routed leaking hydraulic lines for wicket gate valves.
Modified the existing air handler unit with new type of fan and additional supply plenum. Added exhaust fan for resistor bank area.

Central Boiler Facility
Conducted an annual PM and emission test on four boilers. Reprogrammed #3 & #2 VFD controls to main loop pumps due to corrupted program.
Replaced oxygen analyzer for #1 boiler.
Replaced #1 & #2 sub-loop pumps.

<u>Auxiliary and support equipment</u>
Gas compressors and Chiller
Replaced #3 gas compressor.
Replaced all plastic containers with 50 gallon metal type, grounded same to meet the Fire marshal requirements.
Effluent Pump
Replaced #2 & #3 effluent pumps.
The effluent cooling system piping is corroded and leaking. It is being replaced with PVC type.

<u>Generation and gas consumption data:</u>

, Total power produced in KWH
- Unit 1 -------- 19,344,416
- Unit 2 -------- 18,304,365
- Unit 3 -------- 522,421
- Unit 4 -------- 4,798,110

Total 42,969,312

, Total power used in KWH
- Point Loma---------**19,688,084**

, Total power sold in KWH
- SDG&E-------------**23,281,228**

, Total digester gas used:
- No.1 engine--------318 MM cubic feet
- No.2 engine--------305 MM cubic feet

623 MM cubic feet

, Total natural gas used:
- No. 1 engine------- 00000 cubic feet
- No. 2 engine------- 00000 cubic feet

00000 cubic feet

B. Correlation of Results to Plant Conditions.

Flow

Following is a table with past flows back to 1972. New Parshall flumes were installed and calibrated in 1985 and the bugs were worked out over the next year, this accounts for the major jump over the three year period from 1984 to 1986. From 1986 on multiple meters on the flumes have been calibrated yearly and fairly closely match Venturi meter data at Pump Station II (see tables in the Plant Operations section).

YEAR	FLOW (MGD)	YEAR	FLOW (MGD)
1972	95	1989	191
1973	100	1990	186
1974	104	1991	173
1975	107	1992	179
1976	118	1993	187
1977	115	1994	172
1978	127	1995	188
1979	128	1996	179
1980	130	1997	189
1981	131	1998	194
1982	132	1999	175
1983	138	2000	174
1984	140	2001	175
1985	156	2002	169
1986	177	2003	170
1987	183	2004	174
1988	186		

Historically flows had tended to increase 3 or 4 percent a year, with some apparent exceptions in past data probably more due to faulty calculations and metering than fact. It can be seen that this trend continued through 1989. Concern over the drought and the water conservation effort are apparent in the drop in flows in 1990, and especially in 1991, where the drop in flows of 8% was unprecedented as was a drop in flow two years in a row. If we are to assume that the growth of the City continues, then if we continued our past water use patterns, we would have anticipated our average flows would have increased about 3% each year to 197 MGD in 1990, 203 MGD in 1991, 209 MGD in 1992, 215 MGD in 1993, and 221 MGD in 1994. It is notable that the actual flows were reduced to close to the water conservation goals of the respective years. The 186 MGD average flow for 1990 represented a 6% reduction, a bit below the 10% conservation goal for much of that year, the 173 MGD average flow for 1991 was 17% below expected, and would have been even closer to the 20% conservation goal of that year were it not for the high inflow volumes from the heavy rains in March, which caused this to be a significantly above normal year for local rainfall (13.46 inches). The 179 MGD average flow for 1992 represents a 17% reduction from what would be expected, which is consistent with the same 20% conservation goal and a similarly heavy (12.72 inch) rain year. The flow of 187 MGD for 1993 was 15% less than the 215 MGD we would get from the long-term projection, but 4% more than the year before. The drop in flow in 1994 is exceptional. In 1992 and 1993, the historic increase of flow of 3% a year was maintained, but probably was more coincidental than the reflection of a continuation in growth, since San Diego was in an economic downturn with less than normal expansion and population growth. The flow in 1993 would have been boosted by a rainfall that was almost twice normal (17.3 inches) whereas in 1994, it was a near average 9.4 inches. The infiltration from the heavy storms that year probably obscured a major drop in flow from the Tijuana interceptor, which is very apparent in 1994. Since the International Boundary and Water Commission's (IBWC's) flow meter was put on line in June, 1994, it has recorded an average of 2.0 MGD. The City's meter showed 3.2 MGD for the year and 3.8 MGD for the June through December period, which includes flow from the San Ysidro line which joins before the City meter. Past flow readings have been notoriously bad, as mentioned in the Tijuana Interceptor sections of previous Annual Reports. The official City metered flow average for 1993 was 5.6 MGD, which would indicate about a 2 MGD drop in 1994, but the 1993 data is virtually worthless since flow was registered when the pipe was broken and observably dry. Several months had identical daily readings indicating a stuck meter, and the pipe was observed to be surcharged (being run under pressure, rather than as a gravity line, hence sending more flow than the meter was designed to record) when it was operating.

In 1992, an annual average flow of 10.1 MGD was recorded for the Tijuana interceptor by the City meter, so about 2 MGD of that would have been from San Ysidro. The annual average flow from Pump Station I, which received the sewage from the Southbay area, was 72.6 MGD. This was 40.5% of the total flow to Point Loma of 179.2 MGD. In 1993, as we mentioned previously, the City's flow meter for the Tijuana interceptor was not reliable, but the annual average flow through Pump Station I was 69.0 MGD or 36.8% of the flow. Either there was a very uneven distribution of stormwater inflow so that there was a much greater contribution to the northern part of the system, which is quite possible, or the contribution from the Tijuana interceptor dropped significantly. The 1994 flow data from the Tijuana interceptor is far more reliable and confirmed, within the 1 to 3 MGD contribution from the San Ysidro connector, by two meters. The 1994 figures show an annual average of 3.2 MGD from the Tijuana interceptor on the City meter (close to 2 MGD of which would be from the San Ysidro connector). The annual average flow at Pump Station I was 63.7 MGD or 37.1% of the total of 171.7 MGD. The difference between the 1992 and 1994 flows through Pump Station I is about the difference in the flow from the Tijuana Interceptor.

The 1995 average flow of 188 MGD was an increase of 9% above the 172 MGD average for 1994. Since the contribution from the Tijuana interceptor, averaging 1.8 MGD, using the IBWC's meter, or 3.6 MGD using the City's meter that includes about 2 MGD of San Ysidro flow, was inconsequential and similar to 1994, the difference must have come from somewhere else. The percentage of the total flow from the southern portion of the metro service area that goes through Pump Station I declined slightly to 36.1%, perhaps indicating growth in the northern part of the City.

The 1996 average flow of 179 MGD was a 9 MGD or 5% drop from 1995. The Tijuana interceptor flow averaged about the same (2.2 MGD IBWC meter, 4.0 MGD City meter) as 1995, and the average air temperature was unchanged at 64EF. The bulk of the difference can be attributed to the rainfall. The total for 1995 was 17.04 inches, for 1996, it was 7.27 inches, only 43% of 1995. If one drops the January, February and March flows, where 13.8 inches of rain fell, from the 1995 average it drops to 183 MGD. If April, with 0.96 inches more rain on saturated ground, were also dropped, the average is 182 MGD, the resulting 1.69% drop is not explained, but one could consider the flows unchanged within the tolerances of the meters.

The 1997 average flow of 189 MGD was 6% higher than 1996 but with a comparable rainfall of 7.00 inches. Within the tolerances of the meters, virtually all of the 10 MGD difference between the two years is attributable to the increase in average flow in the Tijuana interceptor from about 2 MGD in 1996 to about 11 MGD in 1997.

The 1998 average flow was less than 3% more than 1997, and the rainfall was over twice as high (16.05 inches). The Tijuana interceptor flow, as registered on the City's meter (including San Ysidro) was virtually unchanged (11.3 MGD in 1998 vs 11.4 MGD in 1977). The IBWC's (International Boundary and Water Commission's) meter showed an average flow of 8.8 MGD, the degree of difference expected to account for the San Ysidro flow. (The matching values in 1997 was an anomaly.) If one drops the flow from February, the highest (7.65 inches) rain month, from the average, the annual average flow drops to 189.4 MGD, virtually the same as 1997 (189.1 MGD). Basically, the flows were unchanged this year except for the exceptional inflows from the storms in February.

The average flow for 1999 of 175 MGD was a surprising 10% or 19 MGD drop from 1998's 194 MGD average. Considering that the flow for 1998 would have been 189 MGD if the exceptionally high rain month of February was dropped. This would still be a major drop of 15 MGD or 8% using that adjusted 1998 flow. The bulk of the drop, about 10MGD, would be due to the International Wastewater Treatment Plant (IWTP) diverting most of the sewage from the emergency connector. The Tijuana flow to the Point Loma Plant averaged about 11 MGD in 1998 and should have been about 1 MGD in 1999. That value was approximate since the International Boundary and Water Commission's meter was generally unmaintained and unreliable that year with long periods where it was not registering or pegged on maximum (0 or 20.888 MGD). The City's TJ1 meter showed an average flow of 2.26 MGD, but that includes a flow of generally over 1 MGD from San Ysidro. A meter, CW01, was installed and started reliable operation in June, measuring the San Ysidro flow. When that contribution was subtracted out, the interceptor flow from June on was 0.86 MGD. Hence 1 MGD is considered a reasonable year long estimate. In 1999 the City's North City Reclamation Plant (NCWRP) ran consistently producing an average of 1.8 MGD of reclaimed water, and 0.7 MGD of water used in the plant. This would account for a reduction of about 2 MGD seen at the Point Loma Plant. Sources of the remaining 3 MGD reduction are not known and reflect a change in water use that had led first to a drop in the annual increase in sewage production, then to the virtually unchanged (except for inflow) 1997-1998 period , and then to this drop.

The annual average flow for 2001 was 175 MGD, virtually unchanged for the past three years (2000, 174 MGD; 1999, 175 MGD). This reflects stable conditions, namely the Tijuana Interceptor was unused for this period[7], the reclaimed water (1.7 MGD in 2001, 1.8 MGD in 1999 and 2000) and plant water (0.6 MGD in 2001, 0.7 MGD in 1999 and 2000) removed from the system by the North City Water Reclamation Plant (NCWRP) remained basically the same, and the effects of development have been minor. The range in rainfall (5.43 inches, in 1997, 9.75 in. In 2000 and 8.47 in 2001) has shown some variation, but winter flows have not. Various pipeline rehabilitation projects and the dry year of 1999 would have reduced infiltration. The near average rain years of 2000 and 2001 would not saturate the soil. In fact the narrow spread between the high and low monthly averages (14 MGD in 2001, about 10 MGD in 1999 & 2000) is notable this period. Although the highest flows were during the rainy season of January through March, there was not a direct correlation between a month's rainfall and flow.

The average flow of 169 MGD for 2002 represented a drop of around 5 to 6 MGD from the previous three years. Most of it can be explained by the startup of the new South Bay Water Reclamation Plant on May 6. The plant processed an average of 4.4 MGD since startup, with the

[7] Except for 8 days in 2000, April 2-27, of about 10 MGD.

secondary effluent it produced going into the South Bay Outfall, and the solids being returned to the sewer going to the PLWTP. The impact on the annual average flow would be 3 MGD. Again this year there was no flow from the Tijuana interceptor and the amount of plant water (0.7 MGD) produced at the NCWRP was about the same. The reclaimed water from the NCWRP was up about 0.5 MGD to 2.3 MGD for the year. The one other factor in the drop in flow to Point Loma would be the extremely low rainfall, totaling only 4.23 inches for the year, about a third of average.

The average flow of 170 MGD for 2003 was almost unchanged from the year before. The rainfall was about normal at 9.18 inches for the year. Over half of it fell in February (4.88 in), which was reflected in the average daily flow for that month being about 10 MGD above the norm for the year, at 181 MGD. March with wet ground and 1.3 inches of rain was almost as high at 178 MGD. Countering the couple of mildly wet months, the NCWRP increased its reclaimed water production about 0.9 MGD to 3.2 MGD. The SBWRP effluent to the Southbay Outfall was about the same at 4.1 MGD.

In 2004 the average flow, at 174 MGD, returned to the level it had held from 1999 through 2001. The amount of SBWRP effluent diverted to the South Bay outfall was essentially the same (4.2 MGD). The amount of water reclaimed at the NCWRP dropped 1.1 MGD to 2.1 MGD. Since that water is used for irrigation and this was an above average rainfall year, that could be expected. The months of high rainfall were the months of low reclaimed water usage. Although not proportional, the high rainfall months were also the high influent flow months for the year, probably from direct inflow sources as well as the reduction in reclaimed water scalping.

2004 RAINFALL AND AVERAGE MONTHLY SEWAGE FLOW & AIR TEMPERATURE

MONTH 2004	Rainfall (inches)	Total Monthly Flow (MGD - mostly Gould meter flows)	Average Daily Flow (MGD)	AIR TEMPERATURE (F)
JAN	0.34	5239	169.0	63.8
FEB	2.81	5209	179.6	63.7
MAR	0.22	5471	176.5	68.4
APR	0.6	5139	171.3	69.5
MAY	T	5191	167.5	73.7
JUN	0	5003	166.8	71.0
JUL	0	5287	170.5	76.5
AUG	0	5223	168.5	74.8
SEP	T	5065	168.8	78.1
OCT	4.98	5797	187.0	69.7
NOV	0.33	5472	182.4	67.0
DEC	4.01	5541	178.7	65.1
Monthly Average	1.11	5303	173.9	70.1
TOTAL	13.29	63636		

T = Trace

Suspended Solids, Volatile Suspended Solids and Percent Suspended Solids Removal:

The influent suspended solids averaged 291 mg/L this year. Past data, as can be seen in the following table, has shown that influent concentrations tend to range from the mid-200's to around 300. (In the table there is more scatter in the data before 1980 because monthly averages were calculated using only the two suspended solids values done on "complete analysis" days, rather than averaging all of the daily test results).

SUSPENDED SOLIDS TRENDS
AVERAGE DAILY SOLIDS

Year	Flow, Annual Average Daily (mgd)	Rainfall, Annual Total (inches)	TSS INFLUENT (mg/L)	TSS EFFLUENT (mg/L)	TSS % Removal	TSS Mass Emission (lbs/day)	TSS Mass Emission (metric tons /year)
1972	95		257	135	47	106,600	17,661
1973	100		310	154	50	127,947	21,197
1974	104		346	138	60	119,143	19,739
1975	107		215	115	46	103,135	17,087
1976	118		238	127	46	125,281	20,756
1977	115		273	128	53	123,277	20,424
1978	127		245	151	38	159,428	26,413
1979	128		248	143	43	150,933	25,006
1980	130		255	113	56	121,088	20,061
1981	131		289	114	61	122,705	20,329
1982	132		296	126	57	139,563	23,122
1983	138		310	98	68	110,789	18,355
1984	140		272	90	67	103,175	17,093
1985	156		251	70	72	91,190	15,108
1986	177		261	64	76	94,476	15,652
1987	183		289	67	77	102,257	16,941
1988	186		303	70	77	108,587	17,990
1989	191	3.8	305	60	80	95,576	15,834
1990	186	7.29	307	65	78	101,301	16,783
1991	173	13.46	295	81	73	116,810	19,352
1992	179	12.71	317	72	78	107,903	17,877
1993	187	17.26	298	55	82	88,724	14,699
1994	172	9.43	276	46	83	65,777	10,898
1995	188	17.04	289	43	85	67,492	11,182
1996	179	7.27	295	43	85	64,541	10,693
1997	189	7	284	39	86	61,923	10,259
1998	194	16.05	278	39	86	64,171	10,631
1999	175	5.43	273	38	86	55,130	9,134
2000	174	6.9	278	37	87	54,413	9,015
2001	175	8.45	275	43	85	61,931	10,260
2002	169	4.23	287	44	86	61,493	10,188
2003	170	9.18	285	42	85	59,459	9,851
2004	174	13.29	291	43	85	62,028	10,276

Metric tons of mass emissions is calculated assuming the density of effluent is 1. These annual mass emissions are calculated by multiplying the average mass emission for each month by the total days in the year. Conversion factor for short tons to metric tons updated in 2003 from 0.9078 (Hoke, Inc. 11/73) to 0.9072 (NIST Special Publication 811, 1995 Edition, Guide for the Use of the International System of Units (SI). Difference is less than 0.07%.

For influent suspended solids from 1980 there was a trend upward that ended in 1984. From about mid-1984 through 1986, the values were lower. The closure of the tuna canneries at that time would be reflected in this drop. The higher annual averages in 1987 and 1988 appear to be due to a major increase in solids loading from the decant of the Fiesta Island Sludge drying facility. This effect was minor in 1989 and 1991, and almost non-existent in 1990, however, the solids levels remained high due to the concentration of the wastewater flow due to drought-induced water conservation. The solids return from Fiesta Island and stormwater sediments during the extremely wet winters of 1992 and 1993 caused the average influent solids values for each of those years to remain in the 300 range.

The drop in influent suspended solids in 1994 appears to be due to two factors. This was a fairly normal rain year with the rainfall distributed over the normal season so there was not a lot of sediment carried into the sanitary sewers from inflow. This is reflected in the consistently high monthly average influent volatile solids percentage. Sediments carried into the sewers lower the percent volatile content. The other factor was the control of the return stream solids from the Fiesta Island Sludge Drying Facility. The use of rental belt filter presses and the lack of heavy rain at the beginning of the year, which allowed staff to maintain good decant quality, kept the monthly average return stream suspended solids between 2000 and 4000 mg/L. The new belt filter press facility was put on line in March, 1994, and, after its proper operation was developed by staff, the return stream suspended solids remained consistently low.

Of the increase in influent solids in 1995 over 1994, about 1% were due to additional decant solids. The solids handling system continued to work well, but increases in plant flow and treatment plant solids removal rates continued to put more solids into the system. The additional suspended solids representing a 3 to 4% (10 mg/L) increase over 1994 were within the normal annual variation one would expect. For 1996 and especially for 1997, the contribution of decant solids to the influent dropped. The fact that both were dry years and had high percent volatile solids indicate that the contribution of solids from storm runoff was negligible.

The influent suspended solids for 1998 averaged 278 mg/L, a 2% drop from 1997. Return stream flows from sludge processing contributed an average of 9.0 mg/L in 1997, and 7.6 mg/L in 1998 to the total influent solids, or less than 3%. The Fiesta Island Sludge Drying Facility (FI) was closed in February 1998, replaced by the Metropolitan Biosolids Center (MBC). Fiesta Island filter press squeezings continued through 2-18-98, centrate came from MBC on 2-6 and 10 (in addition to Fiesta Island “decant”) and was the exclusive return stream starting on 2-19-98. For the first 6-months of 1999 the return stream from the MBC contributed almost 12 mg/L to the influent suspended solids. There were periods, especially in June, the month with the highest contributions of returned solids (26 mg/L) that the return stream included sludge from the North City Water Reclamation Plant (NCWRP), which was in the transition period of shifting from returning all of the solids it removed in reclaiming water to the sewer and sending the solids to the MBC for processing. During the second half of the year the system-wide solids removal calculation was expanded from just subtracting out the solids returned from the sludge handling facility to including the solids removed upstream by the NCWRP. The upstream solids removal could account for the slight reduction in influent suspended solids. The average influent suspended solids for 2001 was 275 mg/L, showing minimal change over the last 4 years, consistent with the minor changes in flow and stability in the treatment system. The average effluent suspended solids was up a bit from 37 mg/L in 2000 to 43 mg/L in 2001. That reflected the slight decrease in removal rate from 87% in 2000 to 84% in 2001 (as calculated using annual average values for influent and effluent suspended solids concentrations. Operations attributed this to the new anionic polymer flocculent that they used that year, that is more efficient at removing BOD and less efficient at removing suspended solids.

The increase in the influent suspended solid concentration in 2002 to 287 mg/L, up from the 273-278 mg/L range of the past few years was mainly due to the South Bay Water Reclamation Plant going online in May. Over the course of 2002 it took an average of 3 MGD of flow out of the system, but returned the solids. That is enough to raise the average solids seen at Point Loma by 2%, or to 280 mg/L. In addition an unknown amount of activated sludge, created from soluble material, was wasted into the system. Were that another 2% increase, the Point Loma influent would be at 286 mg/L, essentially at the level seen. Other factors in the system were fairly constant.

The conditions in 2003 were basically the same as in 2002, with the Tijuana Interceptor offline and the SBWRP and NCWRP running at about the same capacity, and the influent suspended solids at virtually the same level, at 285 mg/L. The effluent flows for the South Bay plant was 4.1 MGD in 2003 and 4.2 2004, still returning the solids. The slight increase in Point Loma influent suspended solids in 2004 to 291 mg/L, a 5 mg/L or 1.7% increase over the average of the proceeding 3 years could be attributed to the higher than normal rainfall, but since no clear seasonal patter is apparent, one could call it normal variation as well.

<u>BOD – Biochemical Oxygen Demand</u>
In 2003 the average influent concentration went up a bit to 271 mg/L, as did the effluent concentration (from 94 to 105 mg/L from 2000 through 2002 to 2003). This increase was well within past ranges. The removal rate, that had been rising over the last few years due to an increased rate of soluble BOD removal attributed to the absorptive qualities of a new polymer flocculent, dropped into its previous range at 61%. That corresponded with the drop in the removal rate of soluble BOD from 31% (2001 and 2002) to 19%, which was back in the range of previous years. It is assumed that this was due to a corresponding change in the polymer flocculent usage. In 2004 the influent and effluent concentration levels went back down a bit to 255 ml and 101 mg/L respectively. The soluble influent BOD also went down a bit from 86 to 80 mg/L, with the effluent remaining at 70 mg/L. This lowered soluble BOD removals.

BOD Concentration mg/L

	Influent	Effluent	% Removal
1995			
Total	273	107	61%
Adjusted Total*	270	107	60%
Soluble	99	79	20%
1996			
Total	285	119	58%
Adjusted Total*	283	119	58%
Soluble	104	89	14%
1997			
Total	258	105	59%
Adjusted Total*	256	105	59%
Soluble	92	79	14%
1998			
Total	246	106	57%
Adjusted Total*	244	106	57%
Soluble	89	81	9%
1999			
Total	247	102	59%
System-wide Total	251	102	59%
Soluble	96	79	18%
2000			
Total	237	94	60%
System-wide Total	248	94	62%
Soluble	84	69	18%
2001			
Total	254	94	63%
System-wide Total	270	94	65%
Soluble	84	58	31%
2002			
Total	266	94	65%
System-wide Total	287	94	67%
Soluble	86	59	31%
2003			
Total	271	105	61%
System-wide Total	292	105	64%
Soluble	86	70	19%
2004			
Total	255	101	60%
System-wide Total	273	101	63%
Soluble	80	70	12%

*Adjusted by subtracting the contribution from the Fiesta Island decant or MBC centrate in previous years.

C. Discussion of Compliance Record

Chemical and Physical Parameters

The average annual systemwide BOD removal rate was 63%, well above the 58% limit. The annual average systemwide total suspended solids (TSS) removal rate of 86% was also well above the limit of 80%. The TSS mass emissions to the ocean was 10,325 metric tons, calculated using the year's average effluent TSS concentration and the annual average daily flow rate (or 10,298 metric tons based on the annual average of the 12 monthly averages of daily mass emissions). Both values are well below the limit of 15,000 metric tons per year.

There were only 3 separate instances of exceeding our permit limits over the course of the year, compounded by the fact that those high values were counted multiple times because they raised the seven day or 30 day moving averages over their limits for a period of time. Although we have not had any other definitive exceedances (although there were some demonstrably dubious dioxin results from contract laboratories before we took that analysis in house) for at least 5 years, over time there has been, and will be, occasional violations. There are well over 8000 "opportunities" a year for a violation with chemical parameters alone, and a number of these, like the chlordane this year, and DDT in the past, can come from mere ounces of material in a daily flow of 170 million gallons.

The settleable solids test is run on grab samples, so an unusual sample can give atypical results. Little background information is available on the sample taken on June 8, 2004, which , at 7.5 ml/L was high enough to raise the 7 day running average to over the 1.5 ml/L limit for the next 6 days. The sample taken on August 21, 2004, which was, at 3.5 ml/L, slightly over the instantaneous limit of 3.0 ml/L, appears to have been due to a short term situation where the effluent screens were being washed and a sedimentation basin was being dewatered. The sampler was unaware that these activities were taking place at the normal sampling period. Suspended solids data from the 24 hour composite were in the normal range indicating this was a short term situation.

The Chlordane violation on July 24th, 2004, was a single sample with at total of 138.5 ug/L (138.5 parts per trillion) of chlordane and related compounds (94.0 ug/L alpha (cis) chlordane and 46.5 ug/L trans (beta) nonachlor) and 44.0 ug/L of heptachlor, another pesticide normally a constituent in technical chlordane pesticide mixtures. The heptachlor was at 130.0 ug/L in the plant but two thirds were removed. That would have represented about 6 ounces of total pesticides in the treatment plant influent and 4 ounces in the effluent. The equivalent of one gallon of pesticide solution with 3% chlordane and 3% heptachlor. The City sponsors household hazardous waste collection events, but there is really no way to prevent this kind of low level dump. Chlordane can no longer be legally sold in the United States, and heptachlor has been restricted to special commercial applications, but they are available in Mexico, and can still be found in the back corners of some garages. This one sample pushed the 30 day running averages for both chlordane and heptachlor over limits for the next 4 weekly samples leading to 8 separate violations.

Toxicity Bioassays

RESULTS & DISCUSSION

Acute Bioassays

The City conducted acute bioassays in January 2004 using both the topsmelt *Atherinops affinis* and the mysid *Mysidopsis bahia* as test organisms in accordance with Order No. R9-2002-0025. These results were used in conjunction with the results from the January and July 2003 acute screening events to select the most sensitive species. Based on the findings from all three events, the City elected to use the mysid for all subsequent acute toxicity testing. In July, the City conducted the second and final semi-annual acute bioassay using the mysid. All acute bioassays met the test acceptability criterion of >90% control survival and all tests demonstrated complete compliance with permit standards (Table T.1).

Chronic Bioassays

Chronic bioassays on effluent samples were conducted monthly using both kelp and abalone, since the giant kelp has been the most sensitive species historically, and the red abalone remains ecologically important to the region.

The results from all 2004 giant kelp and red abalone bioassays are summarized in Table T.2. All tests met the acceptability criterion except for the red abalone bioassays conducted in December. Two attempts were made to complete the December 2004 red abalone bioassays. However, due to poor animal quality and lack of alternate animal source, both attempts failed to meet acceptability criterion and were thus declared invalid. All valid chronic bioassays were within compliance limits (Table T.2)

D. Report of Operator Certification.

The following list includes all Wastewater Treatment Plant Operators working for the Metropolitan Wastewater Department and their California State certification status as of **January 2005.**

Operator Certifications:
The following lists all Wastewater Treatment Plant Operators working for the Operating Units of the Metropolitan Wastewater Department and their California State certification status as of January 2005. Name, Certification Grade, Certification Number, and expiration date are shown for each operator. The listing is by facility and classification.

Point Loma Wastewater Treatment Plant

Name	Grade	Cert. No.	Expiration Date
Point Loma Wastewater Treatment Plant Superintendent:			
Cordova, Joe A.	IV	05064	06-30-2006
Sr. Operations Supervisor:			
Cooper, Kip	V	09401	12-31-2005
Operation Supervisors:			
Shankles, Doyle	III	07232	06-30-2006
Mickelson James	III	03790	12-31-2005
Leibenguth, Robert	III	06777	12-31-2005
Creaghe, Joe	III	07280	06-30-2005
Janowicz, Claude	III	05939	06-30-2006
Operators:			
Sanchez, Cesar	V	10083	06-30-2005
Nguyen, Thanh	III	06637	06-30-2005
Parry, Thomas	III	03805	06-30-2005
Evans, Gayle D.	III	09395	12-31-2005
Smith, Dwight	III	09992	12-31-2005
Sackett, Robert	III	10084	06-30-2006
Castillo, Joe	III	09849	06-30-2005
Palestini, Anthony	II	08521	12-31-2005
Reynolds, Benjamin	II	06638	12-31-2005
Wade, Brian	II	09141	12-31-2006
Gross, Allen	II	09264	06-30-2005
Gutierrez, Marlene	II	09636	06-30-2005
Duhamel, Michael	II	09444	06-30-2006
Pizarro, Emiliano	II	09863	06-30-2006
Marlow, David	II	10216	06-30-2006
Millan, Romeo	II	09846	06-30-2006
Saulog, Noel	II	10299	12-31-2006
Rogers, Larry	II	10121	12-31-2005
Process Control:			
Lindsay, Jim	V	01233	12-31-2005
Shankles, Katherine C.	V	06975	06-30-2005
Dornfield, Michael	II	07678	12-31-2006

Report of Operator Certification

The following list includes all Wastewater Treatment Plant Operators working for the Metropolitan Wastewater Department at the Metro Bio-solids Center and their California State certification status **as of January 2005**, Name, Certification Grade, Certification Number, and expiration date are shown for each operator.

Metro Bio-solids Center (MBC)

Name	Grade	Cert. No.	Expiration Date
MBC Superintendent:			
Jack Swerlein	V	5527	06-30-2006
Sr. Operations Supervisor:			
Chuck Lockhart	V	4610	12-31-2006
Barry Ayers	V	9346	06-30-2006
Operation Supervisors:			
Jeff Sprueill	V	8251	06-30-2006
Claude Lovelace	III	3952	06-30-2005
David Huntamer	V	8686	12-31-2005
Kermit Eugene	III	5681	06-30-2006
Warren Wazny	III	4583	06-30-2005
Shannon McKiernan	III	7465	12-31-2005
Javier Zavala	III	9635	06-30-2005
Operators:			
Randy Cook	II	6811	12-31-2005
Roscoe Elkin	II	8428	06-30-2005
Maria LeSire	II	5445	06-30-2005
Sal Lopez	II	8476	06-30-2005
Albert Johnson	III	9638	06-30-2006
Paul Farnsworth	V	9664	12-31-2006
Robert Roderick	III	6169	12-31-2005
George Wendorf	II	9774	12-31-2005
Dedric Evans	II	10196	06-30-2006
Barry Calton	II	10178	12-31-2005
Bill Shannon	II	10371	12-31-2006
Gary Hiatt	III	8350	06-30-2005
Vacant	II		
Vacant	II		
Vacant	II		

E. Status of the Operations and Maintenance Manual

Point Loma WWTP:

The implementation of the Environmental Management System, developed under the guidelines set forth by the International Organization for Standardization (ISO), element 14001, has helped to organize and consolidate facility Standard Operating Procedures (SOP). PLWTP Staff annually review, and modify SOP's on an as needed basis, as well as, generate Standard Operation and Maintenance Procedures for the systems and associated tasks which are outlined in the manuals.

In addition, PLWTP Staff in conjunction with the Safety Personnel continue to work on the redevelopment of the Lock Out/Tag Out Manuals to reflect the changes that have occurred in the facility as a result of new construction and upgrades to various processes. Furthermore, Operations and Maintenance (O&M) Manuals are obtained for all new equipment installations and each process upgrade when project construction has been completed.

F. Annual Flow Calibration Report

The firm of Brown and Caldwell completed the annual Gould Flow Metering System Certification in April 2005.

A copy of their findings, without appendices, follows.