VIII. Discussion of Results.

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A. Plant Facility Operation Report

POINT LOMA 2003 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 2003

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 2003. 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 March 31, 2003, the number and severity of rain storms were well below normal and this was reflected in decreased plant influent flow rates.

Rainfall recorded for the period from January 1 through March 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

Average daily flow recorded for the period from January 1 through March 31.
- ADF 2000 = 176.8 MGD
- ADF 2001 = 183.0 MGD
- ADF 2002 = 171.1 MGD
- ADF 2003 = 175.6 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 2001, 2002 and 2003. 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 (2001) = 42.3 mg/L
- Average Daily Sludge Blanket Level (2001) = 151.3 inches
- Average Daily Raw Sludge Pumping Volume (2001) = 1.04 MGD

- 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

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 (2001) = 24.2 mg/L
- Average Daily Dose, Anionic Polymer (2001) = 0.15 mg/L
- 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 Effluent TSS Concentration (2001) = 42.3 mg/L
- Average Effluent TSS Removal Rate (2001) = 84.6%
- 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 BOD Concentration (2001) = 93.6 mg/L
- Average Effluent BOD Removal Rate (2001) = 63.1%
- 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%

The improvements shown in the year 2002, for BOD, were due to continued use of polymer that efficiently removed BOD. In addition, minimization of construction-related impacts and diligent efforts on the part of the PLWWTP staff helped to ensure all permit requirements were met on a daily basis. The increase in ferric chloride dosage was associated with several factors, including pump station flow slowdowns, bringing the South Bay Water Reclamation Plant online, and receiving scum from the South Bay plant. All of these factors contributed to increased sulfide levels and thereby increased levels of ferric needed to ensure that the concentration of H2S in the digesters stayed below the permit limit. On the other hand, a side benefit to increased ferric feed rates is evident in the slight increase in TSS removals in the effluent stream when compared to the 2002 values. A somewhat higher average BOD concentration occurred in the effluent in 2003, when compared to the 2002 values. Historically, the majority of BOD will be in the suspended solids. However, higher BOD concentrations in the effluent in 2003 were a consequence of scum short circuiting in the sedimentation tanks, before effluent baffles were retrofitted in the tanks. In addition, this change was also related to increases in influent soluble BOD concentrations.

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 2003, ranged from 67.8 to 83.7 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 2003 as it was basically a normal winter. 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 (2001) = 75.1 degrees Fahrenheit
- Average Daily Influent Temperature (2002) = 75.3 degrees Fahrenheit
- Average Daily Influent Temperature (2003) = 75.9 degrees Fahrenheit

PLANT PERFORMANCE RELATED TO UNKNOWN VARIABLES

BOD and TSS removal rates were quite consistently high. This is in large part due to a more consistent level of treatment due to much less construction activity. 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 2003 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 2003 was excellent. Various previously discussed factors contributed to this result.
The focus of the staff, at the Point Loma Facility, for 2004, 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 will be introduced into the Sludge Blend Tank as required for H2S concentration control in the digester gas. During the first quarter of 2004, particular attention will be given to the digester chemistry, and appropriate actions will be taken in order to prevent any digester upsets. In addition, with a few more changes to the polymer feed system the dose may very well be able to be lowered significantly. When these attempts at lowering doses and subsequent fine-tuning are made, there may be a slightly negative effect on the removal results until the fine-tuning is completed. However, staff expects such investigative activities will yield more cost effective results without jeopardizing long term plant performance efficiencies.

OPERATIONS REPORT 2003

Contract Related Activities:

- 12/03 - Completed the destruction of the ORS 1, (old system), and replaced it with surfacing that will support vehicle washing, pump rinsing, and grit bin draining as the surface drains directly into the influent channel of the plant.
- 12/03 - Completed the Hydroelectric Road Storm water Diversion Project. This contains drainage or spills from the Gas Utilization Facility, (GUF). It contains first rain drainage from the road, also.
- 12/03 - N1, N2, S1 and S2 Digester Cleaning project completed. N1 and N2 digesters were cleaned as part of normal maintenance and S1 and S2 were cleaned in anticipation of a later project to perform a major upgrade of this equipment.
- 08/03 - N1, N2, S1 and S2 Digester Cleaning project began..
- 01/03- Digester C1 & C2 Rehabilitation Completed. Digesters placed back in service

Operations Activities:

- 12/03 TRIMAX finished cleaning digester N2.
- 11/03 Took N2 digester out of Service for cleaning.
- 11/03 Started seeding digester N1 after cleaning.
- 10/03 TRIMAX began cleaning Digester S2 in preparation for digester rehabilitation.
- 10/03 - FIRP Pipeline placed in fully automatic operation.
- 09/03 - Installed baffles on Sedimentation Basin #9 scum removal system. Scum removal has improved in this basin.
- 09/03 - Approximately 240 cubic yards of grit and sand were removed from the inlet channel in front of Sedimentation Tanks 11 and 12.
- 08/03 - Digester N1 out of service for cleaning by TRIMAX Residuals Co.
- 07/03 - Maintenance replaced rupture disc upstream of the sludge holding tank, to protect the FIRP system from high pressure condition.
- 07/03 - Replaced the discharge valve for Sludge grinder #1.
- 06/03 - Contractor completed measurements on the 120 foot weir. Measurements were for the replacement of the gate upstream of the Hydro Throttling Valve.
- 06/03 - Performed annual pm on sedimentation tank #8. Overhauled bar screen #4.
- 05/03 - Digester S1 out of service for rehabilitation.
- 05/03 - Completed Lithium mixing test on digester C2
- 05/03 - Completed Gerlich Mitchell modifications to the North Scum Concentrator.
- 05/03 - Completed Gerlich Mitchell modifications to the South Scum Concentrator. .
- 03/03 - TCI completed electrical work for C1 and C2.
- 02/03 - Maintenance I & C completed major overhaul on Waste Gas Burner #3.
- 01/03 - Placed C1 and C2 digesters back in service after lengthy rehabilitation period.
- 01/03 - Performed major overhaul on MSP #1.

ENGINEERING REPORT 2003

The following projects were in construction at the Point Loma Wastewater facility during 2003:

DIGESTER C1/C2 REHABILITATION

This project completely rehabilitated these two digesters. The roofs, digester mixing and heating systems were replaced with current designs; wall and coating repairs were also done. This project was in construction during 2002 and the digesters were put into operation in January 2003. The cost was approximately $9 million dollars.

SLUDGE PUMP STATION – FOURTH PUMP

This project will install a fourth pump to transfer 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 will provide additional redundancy so that we can continue to process sludge in a manner consistent with our permits. This project began in June 2003 and should be completed by September 2004. The approximate cost is $5 million.

BIN STORAGE SLAB AND SAMPLING STATION DRAIN

This project demolished the old Odor Removal System No.1 (ORS 1 was enlarged and relocated), and replaced it with a thick sloped concrete slab. This slab drains into the influent channel of the plant. This will enable us to wash vehicles, rinse out pumps, and drain grit safely. In addition a street drain was installed adjacent to the effluent sampler shed to contain any minor spills that might be caused at the sampler. This drain empties into the plant process. This project was constructed to be proactive in the containment of spills and to assist our work at the plant. The project was completed in December 2003 at a cost of approximately $105,000.

HYDRO ELECTRIC ROAD STORMWATER DIVERSION PROJECT

This project constructed an open basin to contain drainage and/or spills out of the Gas Utilization Facility. This is part of PLWWTP's ongoing efforts to contain all spills and "first" rain drainage. First rain drainage normally contains more oil and dirt since it washes the roadway. This project was completed in December 2003 at a cost of approximately $36,000.

LOWER HYDROELECTRIC ROAD PIPING PROJECT

This project installs a pump in the effluent sampler manhole and directs 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 should be completed in February 2004 and the anticipated cost is approximately $49,000.

N1,N2, S1 AND S2 DIGESTER CLEANING PROJECT

This project cleaned four digesters. N1 and N2 were cleaned as part of our normal cleaning schedule and S1 and S2 were cleaned in anticipation of a later project to perform a major upgrade of the south digesters. This project started in August 2003 and was completed in December 2003. The approximate cost for this project was $3 million.

MAINTENANCE REPORT 2003

GENERAL:

11,685 Total work orders completed within the year at the plant.
- 10,089 Total work orders completed within the year by plant personnel.
- 1,021 Total work orders completed within the year by Central Support Facility.
- 575 Total work orders completed within the year by Central Facility Maintenance.
- " 9,190 Preventive Maintenance work orders. (78.6%)
- " 82 Proactive work orders other than PM. (.7%)
- " 289 Emergency-Corrective Unplanned work orders. (2.47%)
- " 466 Routine Repair-Corrective work orders. (3.9%)
- " 45 Safety-Corrective work orders. (.38%)
- " 8 Rebuild-Corrective
- " 9 Calibration-Corrective
- " 1,021 Central Support Facility work orders. (8.7%)
  - 676 Preventive Maintenance (Insp. Rep.) work orders. (5.7%)
  - 72 Proactive work orders other than PM. (.6%)

        - 36 Emergency-Corrective Unplanned work orders. (.3%)
        - 218 Repair-Corrective work orders. (1.9%)
        - 12 Safety Corrective. (.1%)
        - 7 Rebuild /Overhaul. (.1%)
    - 575 Central Facility Maintenance work orders.
        - 446 Preventive Maintenance (Insp. Rep.) work orders. (3.8%)
        - 25 Proactive work orders other than PM. (.2%)
        - 8 Emergency-Corrective Unplanned work orders. (.1%)
        - 80 Repair-Corrective work orders. (8.6%)
        - 6 Safety Corrective. (.1%)

REPAIR OR REPLACEMENT OF:

- Influent climbing screens 1, 2, 3, 4, 5
- Influent screen shaft less conveyor
- Main sludge pumps # 1, 2, 3 membranes were replaced numerous times.
- Main sludge pump # 2- replaced entire piston housing and cylinder.
- Sludge grinder # 1
- Grit pumps C1-1 & C2-3
- Odor control recirculation pumps
- Annual PM on boilers
- Effluent sampling pumps # 1, 2
- Sedimentation Tanks- 9, 10, 11, 12 Installed baffle extensions in bays 1, 2, & 3.
- Sedimentation Tanks- Overhauled tanks 4,8,9,10,
- N1 & N2 Digester- Complete cleaning and overhaul of digester equipment.
- N1 & N2 Digester- New recirculation pumps SP1, 2, 3, & 4 were installed.
- N1 Digester- The damaged support pipes and brackets for the draw pipe were replaced.
- Gas mixing compressor N1-1- Replaced compressor.
- Influent channel- Grit removed and channel cleaned.
- HP Sludge line UPS's had switching circuitry installed to prevent back feeding to the Utility.
- HP Sludge line- Installed new UPS's at vault # 1, and 2.
- HP Sludge line- Flushed and calibrated all pressure transmitters.
- Replaced, rewired and added "soft-start/soft-stop" controls to all grit pump motors.
- Installed temporary piping and equipment in order to feed ferric to the sludge blend tank.
- Scum concentrators 1, 2
- 12" water line
- GUF effluent cooling pump

GAS UTILIZATION FACILITY REPORT 2003

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

Major work at the GUF:

Unit 1 & Unit 2

1) Conducted scheduled, planned maintenance to engine generators and auxiliary support equipment.
2) In frame overhaul on unit 1 was conducted by HPS and GUF crew.
3) Replaced exhaust insulations and installed support bracket.
4) Unit 2 is overdue on in-frame over-haul, the run time was extended to meet the sales contract with the utility. GUF Maintenance replaced 10 out of 12 cylinder heads.
5) Replaced all spark plugs with the new design and electrode type.

The following changes were made to increase the reliability of the engines.

6) Modified waste gate valve to prevent freezing.
7) Replaced all air starter with turbine type.
8) Installed motorized barring device.

9) Modify actuator shaft to prevent constant breakage and easy maintenance.
10) Replaced rubber expansion joints with stainless steel bellows.
11) Install JW and L/O cooling filter.

Unit 3
Emergency generator was converted to dual fuel, running on 20% diesel and 80% digester gas. Numerous changes were made to the fuel control system and engine loading controls. The generator was on line during the high peak months from May to September at the hours of 1400 to 1800. The minor problem with clogging of the particulate filter was caused by seloxane content of the digester gas fuel.

PERP (Hydro)
Operational hours are limited from 0900 to 0100 hours.
Contractor conducted annual PM's on generator and control systems.
Maintenance replaced leaking hydraulic lines.
The wicket gate where not inspected due to leaking butterfly valve.

Central Boiler Facility
Contractor conducted annual PM's on four boilers. Boiler #1 has a bad oxygen analyzer; boiler is OOS as parts are being ordered in MMS. Reprogram VFD controls to main loop pumps due to corrupted program.

Gas compressors and Chiller
GUF maintenance installed automatic drain on the oily water drainage system.
Maintenance replaced compressor #3 coupling bearings.

Generation and gas consumption data:

, Total power produced in KWH
- ➲ Unit 1 --------16,920,763
- ➲ Unit 2 --------18,149,967
- ➲ Unit 3 -------- 589,385
- ➲ Unit 4 -------- 5,324,624

Total 41,783,940

, Total power used in KWH
- ➲ Point Loma---------**19,881,123**

, Total power sold in KWH
- ➲ SDG&E----------**21,902,817**

, Total digester gas used:
- ➲ No.1 engine 256 MM cubic feet
- ➲ No.2 engine 290 MM cubic feet

546 MM cubic feet

, Total natural gas used:
- ➲ No. 1 engine 7,400 cubic feet
- ➲ No. 2 engine 00000 cubic feet

7,400 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	1987	183
1973	100	1988	186
1974	104	1989	191
1975	107	1990	186
1976	118	1991	173
1977	115	1992	179
1978	127	1993	187
1979	128	1994	172
1980	130	1995	188
1981	131	1996	179
1982	132	1997	189
1983	138	1998	194
1984	140	1999	175
1985	156	2000	174
1986	177	2001	175
		2002	169
		2003	170

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[6], 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

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

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 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 is almost unchanged from the year before. As the table of Rainfall and Average Monthly Sewage Flow and Air Temperature below show, 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.

2003 RAINFALL AND AVERAGE MONTHLY SEWAGE FLOW & AIR TEMPERATURE

MONTH 2003	Rainfall(inches)	Total Monthly Flow (MGD - mostly Gould meter flows)	Average Daily Flow (MGD)	AIR TEMPERATURE (EF)
JAN	.02	5222.2	168.5	61.7
FEB	4.88	5079.7	181.4	59
MAR	1.36	5521.2	178.1	60.3
APR	1.41	5088.3	169.6	59.9
MAY	.3	5223.4	168.5	62.4
JUN	T	4963.5	165.5	64.2
JUL	T	5204.1	167.9	70
AUG	0	5200.2	167.7	72.7
SEP	T	5035.7	167.9	69.9
OCT	T	5146	166	67.7
NOV	.6	5039.7	168	60.8
DEC	.61	5221	168.4	56.9
Monthly Average	1.15	5162.1	169.8	63.8
TOTAL	9.18	61944.9		

T = Trace

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

The influent suspended solids averaged 285 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) 1
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

[1] 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 this year 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.

BOD – Biochemical Oxygen Demand

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 is 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 is back in the range of previous years. It is assumed that this is due to a corresponding change in the polymer flocculent usage.

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%

*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 64%, 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 9,847 metric tons, calculated using the year's average effluent TSS concentration and the annual average daily flow rate, or 9,851 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[7]. All of the other chemical and physical parameters were below discharge limits throughout the course of the year.

Toxicity Bioassays

Acute Bioassays

The City conducted acute bioassays in January and July 2003 using both the topsmelt *Atherinops affinis* and the mysid *Mysidopsis bahia* as test orgasnisms in accordance with Order No. R9-2002-0025. All tests demonstrated complete compliance with the standards (Table T.1).

Chronic Bioassays

Three multiple-species chronic screening tests were conducted to verify sensitivity of the selected test organisms to Point Loma effluent. Giant kelp (*Macrocystis pyrifera)*, red abalone (*Haliotis rufescens*), and topsmelt (*Atherinops affinis*) were tested and the results indicated equal sensitivity among all species. Subsequent chronic bioassays on effluent samples were conducted using both kelp and abalone, since the giant kelp has been the most sensitive species in previous years, and the red abalone remains ecologically important to the region.

The giant kelp, red abalone, and topsmelt chronic toxicity tests conducted during 2003 are summarized in Table T.2. All red abalone and topsmelt tests were within compliance limits throughout the year. In contrast, a single giant kelp growth bioassay exceeded the compliance limit for a sample collected on May 4. Consequently, the City began bi-weekly accelerated testing in May, which continued through August 2003. The results from this accelerated testing schedule and all subsequent kelp tests were within established NPDES limits for the remainder of 2003.

[7] Metric tons of mass emissions is calculated assuming the density of effluent is 1. Conversion factor for short tons to metric tons updated this year 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%.

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 2004.**

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 2002. 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	06-30-2004
Sr. Operations Supervisor:			
Lindsay, Jim	V	01233	12-31-2005
Operation Supervisors:			
Shankles, Doyle	III	07232	06-30-2004
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	06-30-2004
Operators:			
Sanchez, Cesar	V	10083	06-30-2005
Nguyen, Thanh	III	06637	06-30-2005
Parry, Thomas	III	03805	06-30-2005
Gayle D. Evans	III	09395	12-31-2005
Smith, Dwight	III	09992	12-31-2005
Sackett, Robert	III	10084	06-30-2004
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	12-31-2004
Gross, Allen	II	09264	06-30-2005
Gutierrez, Marlene	II	09636	06-30-2005
Duhamel, Michael	II	09444	06-30-2004
Pizarro, Emiliano	II	09863	06-30-2004
Marlow, David	II	10216	06-30-2004
Saulog, Noel	II	10299	12-31-2004
Larry Rodgers	II	10121	12-31-2003
Process Control:			
Andrew Stoecker	V	08310	12-31-2005
Katherine C. Shankles	V	06975	06-30-2005
Mitch Dornfield	II	07678	12-31-2004

Metro Biosolids Center (MBC)

Name	Grade	Cert. No.	Expiration Date
MBC Superintendent:			
Jack Swerlein	V	5527	Jun 2004
Senior Operations Supervisors:			
Chuck Lockhart	V	4610	Dec 2004
Ernesto Molas	V	7227	Dec 2005
Operations Supervisors			
Jeff Sprueill	V	8251	Jun 2004
Carlos Cordova	III	5920	Dec 2005
Claude Lovelace	III	3952	Jun 2005
David Huntamer	V	8686	Jun 2005
Kermit Eugene	III	5681	Jun 2004
Warren Wazny	III	4583	Jun 2005
Barry Ayers	V	9346	Jun 2004
Plant Operators:			
Randy Cook	II	6811	Dec 2005
Jeannie Dantzler	II	5235	Dec 2004
Roscoe Elkin	II	8428	Jun 2005
Maria LeSire	II	5445	Jun 2005
Javier Zavala	III	9635	Jun 2005
Sal Lopez	II	8476	Jun 2005
Shannon McKiernan	III	7465	Dec 2005
Albert Johnson	II	9638	Jun 2004
Paul Farnsworth	V	9664	Dec 2004
Robert Roderick	III	6169	Dec 2005
George Wendorf	II	9774	Dec 2005
Dedric Evans	II	10196	Jun 2004
Barry Calton	II	10178	Dec. 2005
Bill Shannon	II	10371	Dec 2004
Gary Hiatt	III	8350	Jun 2005

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 Pountney & Associates completed the annual Gould Flow Metering System Certification in March 2004.

A copy of their findings, without appendices, follows.