

VIII. Discussion of Results.

- A. Plant Facility Operation Report
- B. Correlation of Results to Plant Conditions.
- C. Discussion of Compliance Record.
- D. Report of Operator Certification.
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## A. Plant Facility Operation Report

### POINT LOMA 2002 ANNUAL FACILITY REPORT 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 2002**

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 2002. 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, 2002, the number and severity of rain storms were well below normal and this was reflected in decreased plant influent flow rates.

Rainfall 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 = 0.95 inches

Average daily flow for the period from January 1 through March 31.

- ADF 2000 = 176.8 MGD
- ADF 2001 = 183.0 MGD
- ADF 2002 = 171.1 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 two years were too close to draw any conclusions about the validity of the above assumption.

The average effluent TSS concentration was calculated for 2001 and 2002. 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

### **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 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 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%

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 H<sub>2</sub>S in the digesters stayed below the permit limit.

### **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 2002, ranged from 66.6 to 82.4 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 2002 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

### **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 2002 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 2002 was excellent. TSS and BOD removal rates exceeded those of year 2001. Various previously discussed factors contributed to this result.

The focus of the staff, at the Point Loma Facility, for 2003, 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. During the first quarter of 2003, 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 2002**

### **Contract Related Activities**

- C 12/02 - Digester 7 large mixing pumps were both on line. No excessive vibration occurs with both pumps operating.
- C 12/02 - Water in digesters C1 & C2 heated. Seeding of these digesters is planned for the week of 1/06/03.
- C 11/02 - Digester C1 & C2 Rehabilitation Continuing.
- C 08/02 - Thin spots in the Pump Energy Recovery Project (PERP, hydroelectric facility) penstock pipe before and after the repairs. Plant maintenance repaired two isolation valves in the system.
- C 07/02 - Administration Building Upgrade completed. Engineering Section Moved in.
- C 07/02 - Rehabilitation of Sedimentation Tanks 9-12 completed.
- C 06/02 - Received proposal for inspection of PERP Penstock. Inspection scheduled for June 17, 2002.
- C 02/02 - Contractor began preparing effluent channel for resurfacing.
- C 01/02 - Plant received and approved proposal for PERP and penstock inspection

and repairs.

01/02 - 12/02 - Contractor performed various tasks on Digesters C1 and C2 as specified in rehabilitation contracts and specifications.

### **Operations Activities**

C 12/02 - New Fiesta Island Replacement Project (FIRP) pipeline software testing done. Tests went well.

C 12/02 - Replaced the Main Sludge Pump #1 discharge valve.

C 11/02 - Completed repairs on Polymer mix tank #1 discharge valve.

C 11/02 - Acid washed the Odor Removal Systems (ORS).

C 10/02 - Tested Tea Cup and Snail grit system by running in various modes. Optimized it's operation with this test.

C 09/02 - Repaired the ball seat for Main Sludge Pump #1.

C 08/02 - Two members of the Regional Water Quality Control Board and MWWDS director toured the facility.

C 08/02 - Balanced tested the three Main Sludge Pumps. Test went well after software was revised to allow the third pump on line to stop correctly.

C 07/02 - Teacup and Snail system off line for Snail drive motor repair.

C 07/02 - Vendor representative for Teacup and Snail system on site for system inspection and operator training.

C 07/02 - Completed duct work repair on ORS #5.

C 06/02 - Welders repaired the Cyclone grit system hoppers.

C 05/02 - HOG 3R DCS connections completed except for a few valves that are being run in manual.

C 04/02 - Commenced 90 day test for the Central Boiler Facility on April 8, 2002.

C 03/02 - New Ferric Feed System placed in service.

C 02/02 - Placed Digester #8 online.

C 02/02 - New Polymer Feed System was placed online.

C 01/02 - Contractor/Operations tested the sludge system heat loop to the raw sludge blend tank.

01/02 - 12/02 - Ongoing control/communication problems with the sludge pipeline to MBC.

### **ENGINEERING REPORT 2002**

The following major projects were in construction at the Point Loma Wastewater facility during 2002:

#### **DIGESTER 7 & 8**

This project provided for two new digesters, control room and three new digester gas flares. In addition, a large earth berm was constructed at the south end of the plant to mitigate visual impacts to Cabrillo National Monument. The project was complete in September 2000, but plant staff was unable to put the digesters in service due to other projects being delayed. Digester 7 was put in operation in 2001 and digester 8 was brought on line in the first half of 2002. Construction cost was over \$22 million.

#### **CENTRAL BOILER FACILITY AND GALLERY PIPING**

The project provided a central boiler facility to heat sludge in the digesters and upgrades the piping in the main pipe gallery. The facility is complete. There was a major problem with some of the distribution pipe coating which caused over a nine month delay in this project. The pipe had to be dug up and replaced. This project was placed into operation in early 2002. Construction cost was over \$9 million.

#### ENGINEERING BUILDING

The project refurbished the old Administration/Lab building and provides office, meeting and project documentation storage areas for plant engineering and project managers, construction managers from MWWD downtown. This project was complete by September 2002. The cost of this project was approximately \$600,000.

#### 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 will be put in operation in January 2003. The estimated cost is \$9 million dollars.

#### CONCRETE RESTORATION ON SEDIMENTATION BASIN 9-12

This project repaired the concrete and lining in these four basins and the adjacent effluent channel. This action prolongs the life and reliability of these structures. The work began in 2001 and was completed in 2002. The cost for this work was \$800,000.

#### CHEMICAL FEED SYSTEMS UPGRADE

This project upgraded the storage and delivery of our process chemicals, ferric chloride and polymer, and provided for more reliability and control. The project began January 2000 and was complete in 2002. The cost for this work was \$3.2 million.

### **MAINTENANCE REPORT 2002**

#### **GENERAL:**

- 17,005 Total work orders completed within the year.
  - " 14,344 Preventive Maintenance work orders. (84.4%)
  - " 80 Proactive work orders other than PM. (.5%)
  - " 413 Emergency-Corrective Unplanned work orders. (2.4%)
  - " 566 Routine Repair-Corrective work orders. (3.3%)
  - " 85 Safety-Corrective work orders. (.5%)
  - " 6 Miscellaneous.
  - " 1,511 Central Support Facility work orders. (8.9%)
    - 1,038 Preventive Maintenance (Insp. Rep.) work orders. (6.1%)
    - 124 Proactive work orders other than PM. (.7%)
    - 60 Emergency-Corrective Unplanned work orders. (.4%)
    - 256 Repair-Corrective work orders. (1.5%)
    - 20 Safety Corrective. (.1%)
    - 13 Rebuild /Overhaul. (.1%)

#### **REPAIR OR REPLACEMENT OF:**

- Influent climbing screens 1, 2, 3, 4, 5
- Influent screen shaft less conveyor
- Main sludge pumps # 1, 2, 3
- Discharge valves for Able pumps
- Sludge grinder # 1
- Grit pumps C1-1 & C2-3
- Grit augers S-2 & S-4
- Odor control recirculation pumps ORT 2-S, 4-S
- Odor control scrubber blower ORT 2
- Effluent sampling pumps # 1, 2
- Annual PM on boilers
- N1 & 2 Digester recirculation pumps SP1, 3, 4
- Gas mixing compressor N1-2, S2-1
- S2 digester hot water recirculation pump 4
- Influent channel blower 1, 2
- Effluent scum sprayer pump 2
- Raw sludge pumps 1, 3, 4, 10, 13,
- Scum concentrators 1, 2
- Scum pump 10
- Repairs on sedimentation tanks 6, 7, 9, 11
- 12" water line
- GUF effluent cooling pump

## **GAS UTILIZATION FACILITY REPORT 2002**

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

### **Major work at the GUF**

- 1) Conducted scheduled, planned maintenance to engine generators and auxiliary support equipment.
- 2) Replaced cooling tower pump in unit 2.
- 3) Modified diverter valve to exhaust heat recovery system; overhauled rotork actuators.
- 4) Replaced cylinder head # 6; unit 1.
- 5) Replaced North turbo charger; unit 2.
- 6) Replaced cylinder heads # 1, 2, 4, 5, 6, 7, 9, 11, and 12 on unit 2 due to burned exhaust valves.
- 7) Started diesel generator conversion to a dual fuel engine generator.
- 8) Installed coalescing filter for CBF and dual fuel diesel generator.
- 9) Replaced failed electronic control modules; unit 2.
- 10) Replaced all pre-combustion fuel check valves with new self cleaning type units.
- 11) Repaired effluent pump #4.

### **Central Boiler Facility**

Conducted annual PMs on four boilers. Replaced burned out line diodes on VFD controller for main pump #2.

### Gas compressors and Chiller

Replaced by-pass valves on compressor 1 & 3.  
Replaced rotating vanes on compressor #1 & 2.

### PERP (Hydro)

Conducted annual PMs on generator and control systems. Operational hours are limited from 0900 to 0100 hours.

,	Total power produced in KWH	
	☛ Unit 1 -----	16,779,832
	☛ Unit 2 -----	15,211,757
	☛ Unit 3 -----	48,425
	☛ Unit 4 -----	<u>3,345,564</u>
		<b><u>35,385,578</u></b>
,	Total power used in KWH	
	☛ Point Loma-----	<b><u>18,287,249</u></b>
,	Total power sold in KWH	
	☛ SEMPRA-----	<b><u>17,098,329</u></b>
,	Total digester gas used:	
	☛ No.1 engine-----	283 MM cubic feet
	☛ No.2 engine-----	<u>267 MM cubic feet</u>
		<b>550 MM cubic feet</b>
,	Total natural gas used:	
	☛ No. 1 engine-----	2,702,000 cubic feet
	☛ No. 2 engine-----	<u>19,000 cubic feet</u>
		<b>2,721,000 cubic feet</b>

## 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

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 64°F. 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 1997). 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<sup>7</sup>, 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.

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<sup>7</sup> Except for 8 days in 2000, April 2-27, of about 10 MGD.

The average flows of 169 MGD for 2002 represents 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 secondary effluent it produced going into the South Bay Outfall, and the solids being returned to the sewer going to the PLWTP. One can see the impact in the 2002 rainfall and average Monthly Sewage Flow and Air Temperature table below. 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 this year, about a third of average.

**2002 RAINFALL AND AVERAGE MONTHLY SEWAGE FLOW &  
AIR TEMPERATURE**

MONTH 2002	Rainfall(inches)	Total Monthly Flow (MGD - mostly Gould meter flows)	Average Daily Flow (MGD)	AIR TEMPERATURE (EF)
JAN	0.32	5133	171.0	55.7
FEB	0.17	4599	170.4	57.5
MAR	0.46	5326	171.8	57.7
APR	0.63	4971	171.4	59.6
MAY	T	5117	165.1	61.9
JUN	T	5054	168.5	64.7
JUL	0.0	5215	168.2	67.8
AUG	T	5140	165.8	68.9
SEP	0.31	5022	167.4	70.1
OCT	0.04	5163	166.6	64.2
NOV	0.32	5065	168.8	63.4
DEC	1.98	5309	171.3	56.8
Monthly Average	0.08	5,093	168.9	62.4
TOTAL	4.23	61,114		

T = Trace

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

The influent suspended solids averaged 287 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	17,709
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	20,813
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	20,116
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	17,140
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	18,039
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	17,926
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	10,722
1997	189	7.00	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	6.90	278	37	87	54,413	9,039
2001	175	8.45	275	43	85	61,931	10,260
2002	169	4.23	287	44	86	61,493	10,188

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.

#### BOD – Biochemical Oxygen Demand

The year 2002 showed seven higher BOD removal rates than the notable jump in removals in 2001. In the past, the removal rate has been close to the 58% legal limit and was closely tied to the rate of suspended solids removal. In 2001 the solids removal rate went down somewhat and the BOD removal rate rose, largely due to considerably increased removal of soluble BOD at the Point Loma Plant. It was 31% in both 2001 and 2002, well above the 18% of the preceding two years and any annual average before that. The reason for the removal of soluble BOD is not clear. It was thought that some of it was oxidized by the ferric chloride used as a coagulant and some was adsorbed to the floc. Operations staff attribute the increase in BOD removal to a change in the polymer flocculant begun in 2001. This would imply that it creates a floc with a more adsorbant capacity for dissolved organic material. The concentrations of dissolved BOD in the Point Loma influent and effluent was essentially the same in 2002 and 2001, so the increase in total influent BOD was due to an increase in solids. The contribution from the MBC return concentrate remains minimal (~ 1.5%). Most of the higher BOD solid concentrations could be attributable to the return of solids from the South Bay Water Reclamation Plant since it skimmed off 2% of the flow that would have gone to Point Loma in 2002, but returned the solids, plus some waste activated sludge solids. The total effluent BOD remained at 94 mg/L in 2002, as it had in 2001 and 2000. The higher influent BOD levels determining the increased removal rates.

BOD Concentration mg/L

	Influent	Effluent	% Removal
<u>1995</u>			
Total	273	107	61%
Adjusted Total*	270	107	60%
Soluble	99	79	20%
<u>1996</u>			
Total	285	119	58%
Adjusted Total*	283	119	58%
Soluble	104	89	14%
<u>1997</u>			
Total	258	105	59%
Adjusted Total*	256	105	59%
Soluble	92	79	14%
<u>1998</u>			
Total	246	106	57%
Adjusted Total*	244	106	57%
Soluble	89	81	9%
<u>1999</u>			
Total	247	102	59%
System-wide Total	251	102	59%
Soluble	96	79	18%
<u>2000</u>			
Total	237	94	60%
System-wide Total	248	94	62%
Soluble	84	69	18%
<u>2001</u>			
Total	254	94	63%
System-wide Total	270	94	65%
4Soluble	84	58	31%
<u>2002</u>			
Total	266	94	65%
System-wide Total	287	94	67%
Soluble	86	59	31%

\*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 67%, well above the 58% limit, and the third year in a row to break the previous BOD removal record. 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 10,114 metric tons, calculated using the year's average effluent TSS concentration and the annual average daily flow rate, or 10,179 metric tons based on the annual average of the 12 monthly averages of daily mass emissions. Both values are well below the limit of 13,995 metric tons per year. All of the other chemical and physical parameters were below discharge limits throughout the course of the year, although there were some questionable dioxin results.

Again, this year, there were two cases, one in February and one in December when one of two duplicate effluent samples appeared to have dioxin in concentrations that would put us out of compliance. In each case the other sample aliquot showed no dioxin isomers. In both samples the spiked effluent samples did not indicate native material was present, and only a trace of one isomer was seen in the influent. In the February samples the field blank, which is supposed to not show any dioxin isomers if the procedure was properly done, showed contamination. This random pattern of "hits" is characteristic of glassware contamination. Over the years we have found that glassware contamination has been a big problem with our contract laboratories. We have tried to shop around and tightened the bid specifications. However, it seems to be an inherent problem for laboratories that specialize in dioxin. Since they get samples of heavily contaminated materials, these contaminate their equipment to a level that interferes with the environmental samples where any dioxin would be at or around the detection level.

We have spent several years adapting EPA Method SW846 8280A for use with simultaneous electron capture detector and ion trap mass spectroscopy to provide a method that is comparable in practical quantitation levels with our contract laboratory, as demonstrated by split sample results. After a lengthy period of parallel testing, and discussions with Water Quality Control Board staff, we have implemented its use in 2003. This should eliminate contamination issues and, if hits are found, can facilitate finding the source since the turnaround time before we know a sample would have high concentrations of an isomer is shorter. Although we paid the contract laboratory for additional quality assurance samples, like duplicates, spikes, and field blanks, at \$1,300 a sample, being able to run the samples in-house will allow even more checks on data quality.

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### Whole Effluent Toxicity

*(Excerpt from section II.D. of this report)*

## **RESULTS & DISCUSSION**

### **Acute Bioassays**

The City conducted acute bioassays from January to April 2002 using both Fathead minnows (*Pimephales promelas*) and freshwater water fleas (*Ceriodaphnia dubia*) in accordance with Order No. 95-106. One additional *Ceriodaphnia* bioassay was performed in May immediately prior to adoption of Order No. R9-2002-0025. The toxic unit acute (TUa) values for the fathead minnows

averaged 1.2 TUa and were within established NPDES limits throughout 2002 (Table T.2). In contrast, the *Ceriodaphnia* tests averaged 1.3 TUa for the year and exceeded the NPDES permit limits on several occasions, most notably in the 30-day average category (Table T.3). The *Ceriodaphnia* acute toxicity tests were conducted on a weekly basis to better characterize the persistence and source of toxicity. The increased test frequency did not produce a discernable pattern of toxicity as the incidences of toxicity were clearly sporadic and short-lived.

As stated in the City's 2000 receiving water monitoring report (City of San Diego 2001), the State of California has revised acute testing procedures for ocean dischargers. The new California Ocean Plan (COP) requires utilization of marine species instead of freshwater species. The document was approved by the Office of Administrative Law (OAL) and the EPA in December of 2001. The new COP requirements were incorporated into Order No. R9-2002-0025, and the City revised the acute test frequency and duration of the marine species (i.e., topmelt, *Atherinops affinis* and mysid, *Mysidopsis bahia*) in May 2002 in response to the new permit. All tests demonstrated complete compliance with the new standards (Table T.4).

### **Chronic Bioassays**

An annual screening of three species was conducted to verify sensitivity of the selected test organisms to Point Loma effluent. Giant kelp (*Macrocystis pyrifera*), red abalone (*Haliotis rufescens*), and topmelt (*Atherinops affinis*) were screened and the results of these comparative bioassays are summarized in Table T.1. The results indicated equal sensitivity among all species. Subsequent chronic bioassays on effluent samples were conducted using both giant 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 and red abalone chronic toxicity tests conducted during 2002 are summarized in Table T.5. All red abalone tests were within compliance limits. The City began bi-weekly accelerated testing in November 2001 after the giant kelp test exceeded the compliance limit. The bi-weekly testing continued through July 2002 and the results revealed sporadic toxicity which may have been associated with operational reconfiguration of the NPDES sampling location and plant maintenance operations at PLWTP. All kelp tests were within established NPDES limits for the remainder of 2002.

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 2002**.

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.

<b>Point Loma Wastewater Treatment Plant</b>			
Name	Grade	Cert. No.	Expiration Date
<u>Point Loma Wastewater Treatment Plant Superintendent:</u>			
Cordova, Joe A.	IV	05064	06-30-2004
<u>Sr. Operations Supervisor:</u>			
Lindsay, Jim	V	01233	12-31-2003
<u>Operation Supervisors:</u>			
Shankles, Doyle	III	07232	06-30-2004
Mickelson James	III	03790	12-31-2003
Leibenguth, Robert	III	06777	12-31-2003
Creaghe, Joe	III	07280	06-30-2003
Janowicz, Claude	III	05939	06-30-2004
<u>Operators:</u>			
Mursu, Douglas	V	08490	12-31-2003
Sanchez, Cesar	IV	10083	12-31-2004
Nguyen, Thanh	III	06637	06-30-2003
Parry, Thomas	III	03805	06-30-2003
Gayle D. Evans	III	09395	12-31-2003
Smith, Dwight	III	09992	12-31-2003
Sackett, Robert	III	10084	06-30-2004
Palestini, Anthony	II	08521	12-31-2003
Reynolds, Benjamin	II	06638	12-31-2003
Wade, Brian	II	09141	12-31-2004
Gross, Allen	II	09264	06-30-2003
Gutierrez, Marlene	II	09636	06-30-2003
Duhamel, Michael	II	09444	06-30-2004
Pizarro, Emiliano	II	09863	06-30-2004
Castillo, Joe	II	09849	06-30-2004
Marlow, David	II	10216	06-30-2004
Saulog, Noel	II	10299	12-31-2004
Aldridge-Manson, Carol	I-OIT	I	12-01-2002 (Inactive)
<u>Process Control:</u>			
Andrew Stoecker	V	08310	12-31-2003
Katherine C. Shankles	V	06975	06-30-2003
Mitch Dornfield	II	07678	12-31-2004

**Metro Biosolids Center (MBC)**

Name	Grade	Cert. No.	Expiration Date
<u>MBC Superintendent:</u>			
Jack Swerlein	V	5527	June 2004
<u>Senior Operations Supervisors:</u>			
Chuck Lockhart	V	4610	Dec. 2004
Ernesto Molas	V	7227	Dec. 2003
<u>Operations Supervisors</u>			
Jeff Sprueill	V	8251	June 2004
Carlos Cordova	III	5920	Dec. 2003
Claude Lovelace	III	3952	June 2003
David Huntamer	V	8686	June 2003
Kermit Eugene	III	5681	June 2004
Warren Wazny	III	4583	June 2003
Barry Ayers	V	9346	June 2004
<u>Plant Operators:</u>			
Randy Cook	II	6811	Dec. 2003
Jeannie Dantzler	II	5235	Dec. 2004
Roscoe Elkin	II	8428	June 2003
Maria LeSire	II	5445	June 2003
Javier Zavala	III	9635	June 2003
Sal Lopez	II	8476	June 2003
Shannon McKiernan	III	7465	Dec. 2003
Albert Johnson	III	9638	June 2004
Gary Hiatt	III	8358	June 2003
Robert Roderick	III	6169	Dec. 2003
Larry Rodgers	II	10121	Dec. 2003
George Wendorf	II	9774	Dec. 2003
Dedric Evans	II	10196	June 2004
Barry Calton	II	10178	Dec. 2003
Paul Farnsworth	III	9664	Dec. 2003
<u>Trainees:</u>			
Bill Shannon	II	OIT	Dec. 2003

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Laboratory

Konopka, Walter F., Jr	III	1793	06/30/2002
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## 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 continues 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 2002.

A copy of their findings, without appendices, follows. [Not available on this electronic version.](#)