VIII. Discussion of Results.

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A. Plant Facility Operation Report

POINT LOMA 2005 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.

a. PROCESS CONTROL: FACTORS IMPACTING PLANT PERFORMANCE 2005

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 2005. 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 (section VIII. A.) are largely based on analysis performed by Plant staff at the Process Laboratory and have not always been validated for official reporting purposes.**

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

RAINFALL

During the period between January 1 and December 31, 2005, the number and severity of rain storms were higher than normal from January to March. The months following March became drier than normal.

Rainfall for the period from January 1 through December 31.
- Total rainfall for 2000 = 8.76 inches
- Total rainfall for 2001 = 6.39 inches
- Total rainfall for 2002 = 0.96 inches
- Total rainfall for 2003 = 6.27 inches
- Total rainfall for 2004 = 13.30 inches
- Total rainfall for 2005 = 14.08 inches

Average daily flow for the period from January 1 through December 31.
- ADF 2000 = 176.8 MGD
- ADF 2001 = 183.0 MGD
- ADF 2002 = 171.1 MGD
- ADF 2003 = 175.6 MGD
- ADF 2004 = 174.0 MGD
- ADF 2005 = 182.7 MGD

This wet season caused no plant upsets.

SLUDGE BLANKET LEVELS AND RAW SLUDGE PUMPING VOLUMES

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

to draw any conclusions about the validity of the above assumption.

The average effluent TSS concentration was calculated for 2002, 2003, 2004 and 2005. This average was then compared to the average sludge blanket level, for all basins in operation, and the average daily raw sludge pumping volume for this same period. The information below reflects the data gathered for this comparison.

- Average Effluent TSS Concentration (2002) = 43.5 mg/L
- Average Daily Sludge Blanket Level (2002) = 153.5 inches
- Average Daily Raw Sludge Pumping Volume (2002) = 1.14 MGD

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

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

- Average Effluent TSS Concentration (2005) = 40.7. mg/L
- Average Daily Sludge Blanket Level (2005) = 159 inches
- Average Daily Raw Sludge Pumping Volume (2005) = 1.11 MGD

COAGULATION CHEMICAL APPLICATION

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

- Average Daily Dose, Ferric Chloride (2002) = 25.8 mg/L
- Average Daily Dose, Anionic Polymer (2002) = 0.15 mg/L
- Average Daily Dose, Ferric Chloride (2003) = 29.9 mg/L
- Average Daily Dose, Anionic Polymer (2003) = 0.18 mg/L
- Average Daily Dose, Ferric Chloride (2004) = 29.7 mg/L
- Average Daily Dose, Anionic Polymer (2004) = 0.17 mg
- Average Daily Dose, Ferric Chloride (2005) = 26.5 mg/L
- Average Daily Dose, Anionic Polymer (2005) = 0.17 mg

- Average Effluent TSS Concentration (2002) = 43.5 mg/L
- Average Effluent TSS Removal Rate (2002) = 84.9%
- Average Effluent TSS Concentration (2003) = 42.0 mg/L
- Average Effluent TSS Removal Rate (2003) = 85.1%
- Average Effluent TSS Concentration (2004) = 42.6 mg/L
- Average Effluent TSS Removal Rate (2004) = 85.2%
- Average Effluent TSS Concentration (2005) = 40.7 mg/L
- Average Effluent TSS Removal Rate (2005) = 85.1%

- 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%
- Average Effluent BOD Concentration (2004) =101.8 mg/L
- Average Effluent BOD Removal Rate (2004) = 60.2%

- Average Effluent BOD Concentration (2005) =104.5 mg/L
- Average Effluent BOD Removal Rate (2005) = 58.4%

A higher BOD concentration occurred in the effluent in 2005, when compared to the 2004 values. This probably resulted from poor quality ferrous and ferric chloride being supplied by the vendor. Subsequently, the product quality has improved. In addition, Pump Station 2 switched to ferric chloride in August 2005; BOD concentrations in the effluent have reduced in strength.

INFLUENT TEMPERATURE AND SEASONAL IMPACTS

Influent temperature variations at the Point Loma Facility are usually minimal throughout the year. The temperature of the influent flow, for 2005, ranged from 67.6 to 83.3 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 2005. The effect of these temperature changes is difficult to judge due to the number of variables affected by the rainfall. The average daily influent temperature was calculated for the same period of time seen previously in this report, and the results are recorded below.

- Average Daily Influent Temperature (2002) = 75.3 degrees Fahrenheit
- Average Daily Influent Temperature (2003) = 75.9 degrees Fahrenheit
- Average Daily Influent Temperature (2004) = 76.7 degrees Fahrenheit
- Average Daily Influent Temperature (2005) = 76.8 degrees Fahrenheit

PLANT PERFORMANCE RELATED TO UNKNOWN VARIABLES

BOD removal rates declined significantly in 2005. This may have been the result, in part, of ferrous chloride, instead of ferric chloride, application at Pump Station 2 from the beginning of the year until early August of 2005. However, what was also recognized during the period was significant inconsistency in the quality of the ferric and ferrous chloride that was being provided. Since then product quality has improved and Pump Station 2 began dosing Ferric Chloride at 10 ppm. Pump Station 1 continued dosing Ferrous Chloride at approximately 30 ppm. Consistency in the chemical quality and this treatment mode appears to have enhanced the primary treatment at PLWWTP and resulted in a lower dose of ferrous chloride to treat H2S in the PLWWTP digesters. 2006 should be a better year for removing BOD from the plant influent if ferric and ferrous chloride quality is sustained by the vendor and these treatment modes are maintained.

Turbidity testing, at the sedimentation basin effluents, continued in 2005 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 2005 was within permit compliance. The plant capability to treat varying concentrations of H2S in the influent was enhanced by better quality ferrous and ferric chloride being provided by the vendor. In addition, the combination of ferric chloride at Pump Station 2 and Ferrous Chloride at Pump Station 1 appears to have further enhanced sulfide control. Ferrous chloride was applied at the sludge blend tank that feeds the PLWWTP digesters for H2S control in the digestion system. An odor control system pilot study was conducted at PLWWTP that could have allowed idling of the wet scrubbers by utilizing an Ozone/Hydroxyl Ion generator to eliminate H2S in the foul air collected at the headworks and sedimentation basins. This process had the potential of eliminating chemical treatment at the wet scrubbers and reducing H2S loading on the down stream activated carbon vessels to each Odor Control System. However, the San Diego Air Pollution Control District (APCD) conducted a source test on the pilot study process and determined that the process was inconsistent and the data did not support changing to the system.

The focus of the staff, at the Point Loma Facility, for 2006, 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. In addition, a new polymer will be applied in 2006 that may enable us to lower the polymer dose to the sedimentation tanks. When these attempts at lowering doses and subsequent fine-tuning are made, savings in polymer and ferric costs may be realized because ferric doses, on average, are now lower than previous annual averages, going into 2006.

b. OPERATIONS REPORT 2005

Contract Related Activities:

X 07/05 - Digester S1 & S2 rehabilitation in progress. Digesters out of service
X 07/05 - Continuing with VAPEX parallel study
X 11/05 - S1 & S2 Digester seal/performance test in progress.
X 11/04 - Completed the 72 hour shut down for FIRP Pipeline repairs.
X 12/05 - Ceased VAPEX odor system parallel study for ORS.

Operations Activities:

X 07/05 - Operations performing daily jar tests to optimize solids removal performance
X 08/05 - Acid washed wet scrubbers
X 09/05 - Assisted Process Control with polymer trials and jar testing
X 09/05 - N2 grit systems refurbished and line replaced
X 10/05 - Emergency eyewash stations pm'd and refurbished in the ORS 1A/1B areas
X 11/05 - Acid washed wet scrubbers
X 12/05 - Temporary repairs made on NEOC/hydro knife gate
X 01/06 - Emergency eyewash stations pm'd and refurbished in the chemical containment areas
X 01/06 - 2 emergency eyewash being installed in the Abel pump room
X 01/06 - Tracks and curtains installed in FIRP bin room
X 01/06 - Scummed and drained S1 grit tank
X 08/05 - Acid washed wet scrubber 1A
X 02/06 - Scheduled to remove solids from S1 grit tank

c. ENGINEERING REPORT 2005

The following projects were in construction at the Point Loma Wastewater facility during 2005:

DIGESTER S1/S2 REHABILITATION

This project will completely rehabilitate these two digesters. The roofs, digester mixing and heating systems are being replaced with current designs; wall and coating repairs are also being done. This project was awarded in November 2003 and should be completed by April 2006. The cost is estimated to be approximately $12.1 million dollars.

d. MAINTENANCE REPORT 2005

The focus of the Point Loma maintenance staff, for 2005, was to maintain a quality Preventive maintenance program while implementing a new data base for our Computerized Maintenance Management system and dealing with one of the wettest winters in years. The rainy season of November, 2004 thru March, 2005; had high rain totals in October (4.98"), January (4.49"), and February (5.83").

In order to accomplish this goal several strategies were implemented. The preventive maintenance (P.M.) program was re-evaluated. Numerous P.M.'s were re-assigned, deleted or consolidated based the analysis of historical data obtain from our Computerized Maintenance Management system (EMPAC). Because of the high rain fall experienced during the region's rainy season; the

preventive maintenance (P.M.) program was put on hold for several weeks. This was done in order to deal with the emergency and corrective work orders generated by the excessive rain storms, and the high flows. The results of such high flows caused excessive debris to enter into the plant. Maintenance spent the dry season removing debris from the grit tanks, channels, and sumps at the plant

The major project for the year was the repair, and replacement of equipment associated with the grit removal facility. The project was necessary due to the postponement of the Grit Improvement Project (GIP). Two grit classifiers on the north side were replaced with new ones. New motors and associated instruments were installed. All lighting fixtures were replaced. The total cost of said project is as follows:

Project Tracking Expenditure Report
Project: 05-00001
Project Name: GRIT REHAB NORTH
Description: GRIT REHAB NORTH
Line Year Current Budget Committed Expenditures **$** 300,000.00
Work Orders

05-021652-000	$ 106,202.09
05-021652-001	$ 34.10
05-021652-002	$ 1,518.79
05-021653-000	$ 90,219.22
05-021653-001	$ 51.15
05-021653-002	$ 1,218.37
05-021713-000	$ 0.00
05-021714-000	$ 5,078.36
05-021715-000	$ 97.29
05-021716-000	$ 457.33
05-021652-003	$ 323.38
05-021653-003	$ 316.80
05-021652-004	$ 169.52

Total for Work Orders $ 205,686.39
Total Variance $ 94,313.61

REPAIR OR REPLACEMENT OF:

- Influent climbing screens 1, 2, 3, 4, 5 installed automatic weir gate openers.
- Influent screen shaft less conveyor
- Grit tanks N1, N2, C1, and C2 were drained, and cleaned of winter debris and grit.
- Main sludge pump #'s 1, 2, & 3 membranes were replaced numerous times.
- Main sludge pump #4 the cylinder housing was replaced.
- Sludge pump # PR-3 had its obsolete gear drive replaced.
- Annual PM on boilers
- Sedimentation Tanks sludge hoppers cleaned of winter debris.
- Sedimentation Tanks- 2 Replaced the main sprocket for the cross collector.
- Sedimentation Tanks 3, 5, 6, Installed baffle extensions in bays 1, 2, & 3.
- Sedimentation Tanks- Overhauled tanks 3, 4 and 12.
- Inspection of the effluent channel was conducted in conjunction with the engineering section.

- Inspection of the influent channel was conducted in conjunction with the engineering section and divers.
- HP Sludge line- Flushed and calibrated all pressure transmitters.

e. GAS UTILIZATION FACILITY REPORT 2005

Unit 1, Unit 2, Unit 3, Unit 4 (PERP/Hydro) and CBF were in service.
GUF staff started the responsibility for maintenance of Engines at Pump Station 2 and other outlying emergency generators in the O&M division.

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 9 burned cylinder heads in unit 2 due to seloxane buildup caused by gas chiller failure.
4) Replaced 4 cylinder heads due to seloxane buildup caused by gas chiller failure.
5) APCD conducted an annual emission test to unit 1, unit 2 & unit 3, all passed.
6) Replaced #1 air compressor used to start generator engines.

The following changes were made to increase the reliability of the engines.
1) Removed water injection due to over buildup of seloxane in the waste gate area causing it to bind.
2) Replaced oxygen analyzer in unit 2 with the same type as installed in all boilers.
3) Redesigned and re-piped all engine cooling systems replacing de-ionized water with engine coolant that has recovery and storage system.

Unit 3, Dual Fuel Gen.
The generator was on line during the high peak months from May to September at the hours of 1400 to 1800.
The new cleaning lifting mechanism for the particulate filter was completed, on site and ready for installation.

Unit 4, PERP (Hydro)
Operational hours are limited from 0900 to 0100 hours.
Conducted an annual inspection/adjustment of gates, timings and controls.
Temporarily repaired the TSV body leak, Engineering is looking for valve replacement.
A malfunction of UPS supply unit damaged device 86 in the generator controls, replaced same.

Central Boiler Facility
Conducted an annual PM and emission test on four boilers.
Replaced VFD #2 and 3 control cards to main loop pumps due to corrosion.
Replaced oxygen analyzer on boiler #4.

Auxiliary and support equipment
Gas compressors and Chiller
Replaced #3 gas compressor motor.
Replaced all waste oil plastic containers with permanent double walled Fire marshal approved tanks with level and leak detector sensors.
Lost digester gas chillers on several occasions due to bad compressor, causing the seloxane deposits in the engines.

Generation and gas consumption data:

Total power produced in KWH-------**37,210,761**

Total power used in KWH----------**13,581,975**

Total power sold in KWH----------**23,628,786**

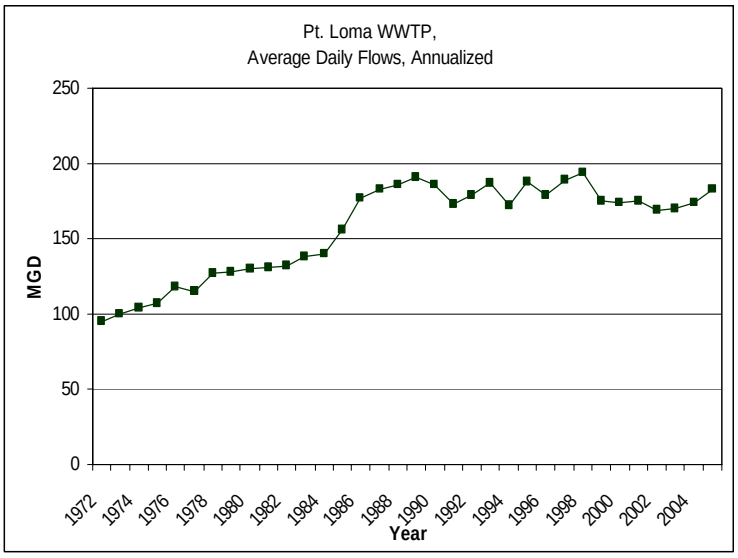
Total digester gas used----------**620 MM cubic feet**

Total natural gas used----------**000 cubic feet**

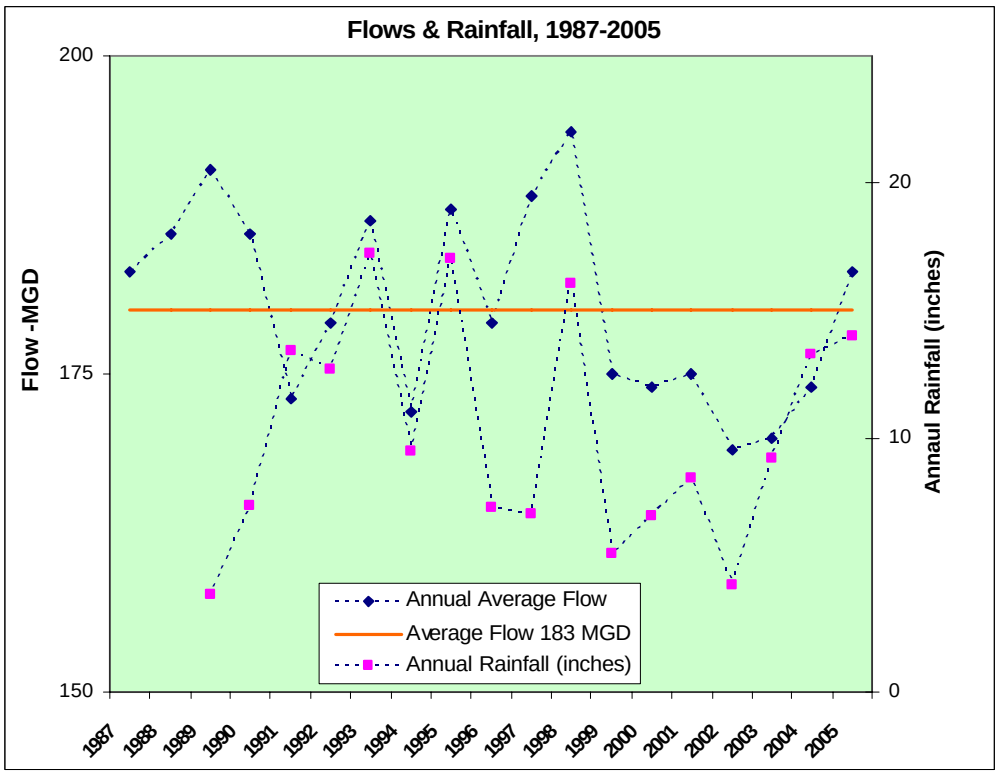
B. Correlation of Results to Plant Conditions.

Flow

Influent flows to the Point Loma WWTP were up this year at 183 MGD for the daily average. Up somewhat from 2004, but well within a single standard deviation of the 1987-2005 daily average flows. The adjacent graph plots flow (daily average) and rainfall (annual total).



The data shows a continued reduction in the flows vs. what would have been predicted from 1970's and 80's steady increases. It appears that the drought-induced reductions in flows from water conservation efforts, have become permanent. In the past 18-years, there is no discernable increase in flows on a sustained basis. In fact, since 1987 the regression line would show a slight decrease in flow rates. The significant correlation between rainfall and flow rates (below graph) seems to dominate the changes in flows from year-to-year.



In 2005 the average flow, at 183 MGD, returning to levels not seen since 1998. The amount of SBWRP effluent diverted to the South Bay outfall was essentially the same (4.0 MGD). The amount of water reclaimed at the NCWRP was up considerably 3.6 MGD. If the diversion of wastewater to reclaimed use had a relatively significant impact on total plant plows, as was noted in previous years, we should have seen a similar drop in flows. Since the total rainfall in 2004 and 2005 were similar (13.29 and 14.02 inches respectively), we might have expected a drop in flow this year, rather than the increase. Instead, the increase in flow and rainfall total for 2005 are both about 5%.

89% of the annual rainfall occurred in the first 3-months of the year. Without the first 3-months flows the annual average would have been 173.8 MGD, more consistent with the last 6-years' flows.

Historical perspective:

The table on this page shows 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).

Historical Average Daily Flows

YEAR	FLOW (MGD)	YEAR	FLOW (MGD)
1972	95	1989	191
1973	100	1990	186
1974	104	1991	173
1975	107	1992	179
1976	118	1993	187
1977	115	1994	172
1978	127	1995	188
1979	128	1996	179
1980	130	1997	189
1981	131	1998	194
1982	132	1999	175
1983	138	2000	174
1984	140	2001	175
1985	156	2002	169
1986	177	2003	170
1987	183	2004	174
1988	186	2005	183

In the seventies and eighties, 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 not maintained 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[8], 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

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

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

2005 RAINFALL AND AVERAGE MONTHLY SEWAGE FLOW & AIR TEMPERATURE

MONTH 2005	Rainfall (inches)	Total Monthly Flow (MGD - mostly Gould meter flows)	Average Daily Flow (MGD)	AIR TEMPERATURE (°F)
JAN	4.49	6649	214.5	58.8
FEB	5.83	6071	216.8	59.8
MAR	2.12	6328	204.1	61.0
APR	0.59	5418	180.6	61.8
MAY	0.12	5532	178.5	65.5
JUN	0.02	5274	175.8	66.4
JUL	0.01	5362	173.0	70.0
AUG	0	5312	171.4	71.0
SEP	0.01	5119	170.6	68.5
OCT	0.46	5365	173.0	65.9
NOV	0.12	5108	170.3	62.8
DEC	0.25	5249	169.3	58.4
Monthly Average	1.17	5566	183.2	64.2
TOTAL	14.02	66787		

T = Trace

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

The influent suspended solids averaged 274 mg/L this year. Past data, as can be seen in the following table, has shown that influent concentrations tend to range from the mid-200's to around 300. (In the table there is more scatter in the data before 1980 because monthly averages were calculated using only the two suspended solids values done on "complete analysis" days, rather than averaging all of the daily test results).

SUSPENDED SOLIDS TRENDS
AVERAGE DAILY SOLIDS

Year	Flow, Annual Average Daily (mgd)	Rainfall, Annual Total (inches)	TSS INFLUENT (mg/L)	TSS EFFLUENT (mg/L)	TSS % Removal	TSS Mass Emission (lbs/day)	TSS Mass Emission (metric tons /year)
1972	95		257	135	47	106,600	17,661
1973	100		310	154	50	127,947	21,197
1974	104		346	138	60	119,143	19,739
1975	107		215	115	46	103,135	17,087
1976	118		238	127	46	125,281	20,756
1977	115		273	128	53	123,277	20,424
1978	127		245	151	38	159,428	26,413
1979	128		248	143	43	150,933	25,006
1980	130		255	113	56	121,088	20,061
1981	131		289	114	61	122,705	20,329
1982	132		296	126	57	139,563	23,122
1983	138		310	98	68	110,789	18,355
1984	140		272	90	67	103,175	17,093
1985	156		251	70	72	91,190	15,108
1986	177		261	64	76	94,476	15,652
1987	183		289	67	77	102,257	16,941
1988	186		303	70	77	108,587	17,990
1989	191	3.8	305	60	80	95,576	15,834
1990	186	7.29	307	65	78	101,301	16,783
1991	173	13.46	295	81	73	116,810	19,352
1992	179	12.71	317	72	78	107,903	17,877
1993	187	17.26	298	55	82	88,724	14,699
1994	172	9.43	276	46	83	65,777	10,898
1995	188	17.04	289	43	85	67,492	11,182
1996	179	7.27	295	43	85	64,541	10,693
1997	189	7	284	39	86	61,923	10,259
1998	194	16.05	278	39	86	64,171	10,631
1999	175	5.43	273	38	86	55,130	9,134
2000	174	6.9	278	37	87	54,413	9,015
2001	175	8.45	275	43	85	61,931	10,260
2002	169	4.23	287	44	86	61,493	10,188
2003	170	9.18	285	42	85	59,459	9,851
2004	174	13.29	291	43	85	62,028	10,276
2005	183	14.02	274	41	85	61,768	10,233

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

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

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

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

the slight decrease in removal rate from 87% in 2000 to 84% in 2001 (as calculated using annual average values for influent and effluent suspended solids concentrations. Operations attributed this to the new anionic polymer flocculent that they used that year, that is more efficient at removing BOD and less efficient at removing suspended solids.

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

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

BOD – Biochemical Oxygen Demand

In 2005 the average influent concentration went down a bit to 252 mg/L, as did the effluent concentration (from 94 to 105 mg/L from 2000 through 2002 to 2005). This increase was well within past ranges. The removal rate, that had been rising over the last few years due to an increased rate of soluble BOD removal attributed to the absorptive qualities of a new polymer flocculent, dropped into its previous range at 61%. That corresponded with the drop in the removal rate of soluble BOD from 31% (2001 and 2002) to 19%, which was back in the range of previous years. It is assumed that this was due to a corresponding change in the polymer flocculent usage. In 2004 the influent and effluent concentration levels went back down a bit to 255 ml and 101 mg/L respectively. The soluble influent BOD also went down a bit from 86 to 80 mg/L, with the effluent remaining at 70 mg/L. This lowered soluble BOD removals. BOD in 2005 continued this trend at 252 mg/L and 105 mg/L for influent and effluent respectively. Soluble BOD was up in both influent, at 88 mg/L, and effluent, at 75 mg/L. This helped increase soluble BOD removals to 15% this year.

BOD Concentration mg/L

	Influent	Effluent	% Removal
1995			
Total	273	107	61%
Adjusted Total*	270	107	60%
Soluble	99	79	20%
1996			
Total	285	119	58%
Adjusted Total*	283	119	58%
Soluble	104	89	14%
1997			
Total	258	105	59%
Adjusted Total*	256	105	59%
Soluble	92	79	14%
1998			
Total	246	106	57%
Adjusted Total*	244	106	57%
Soluble	89	81	9%
1999			
Total	247	102	59%
System-wide Total	251	102	59%
Soluble	96	79	18%
2000			
Total	237	94	60%
System-wide Total	248	94	62%
Soluble	84	69	18%
2001			
Total	254	94	63%
System-wide Total	270	94	65%
Soluble	84	58	31%
2002			
Total	266	94	65%
System-wide Total	287	94	67%
Soluble	86	59	31%
2003			
Total	271	105	61%
System-wide Total	292	105	64%
Soluble	86	70	19%
2004			
Total	255	101	60%
System-wide Total	273	101	63%
Soluble	80	70	12%
2005			
Total	252	105	58%
System-wide Total	269	105	61%
Soluble	88	75	15%

*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

On two occasions during 2005, effluent limits on pH were compromised. For short periods pH excursions occurred on May 9 and August 28, 2005. Both occurrences were measured by an in-line pH meter and not by certified laboratory tests.

> As reported in the May and June 2005 Monthly reports, staff reported that there was a spill of caustic from odor control to effluent that entered the outfall on 9 May 2005. The caustic tank was being washed out with water when 2500 gallons of caustic solution flowed for approximately 20 minutes into the outfall. The pH of the effluent was estimated to reach just above 9 pH units for approximately 8 minutes. All permit related pH tests performed that day were within compliance limits.
>
> On August 28, 2005, there was an unplanned release of ferric chloride into the influent of the treatment plant (ferric chloride is used in the treatment process). This event happened approximately between 0400 and 0900 hours. The process control pH meters indicated that the effluent pH fell below 6.0 pH units at one point during this time. The certified laboratory test taken for reporting purposes was 6.67 pH units that day.

No other reportable events occurred. All other constituents were within limits at all times.

Suspended Solids and BOD

The average annual systemwide BOD removal rate was 61%, ~~well~~ above the 58% limit. The annual average systemwide total suspended solids (TSS) removal rate of 86% was also well above the limit of 80%. The TSS mass emissions to the ocean was 10,371 metric tons, calculated using the year's average effluent TSS concentration and the annual average daily flow rate (or 10,227 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.

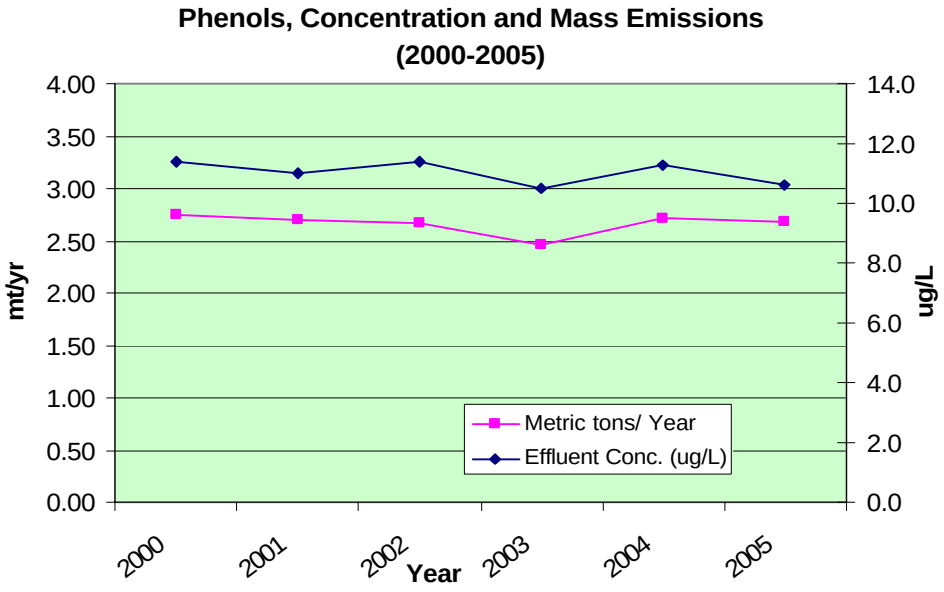
ISO 14001 Certification

Since 2002, the entire Operations and Maintenance Division (including the Point Loma WWTP) and the Monitoring and Reporting Programs operated by the Environmental Monitoring and Technical Services Division has maintained certification and active programs in the International Standards Organization (ISO) 14001, Environmental Management Systems program.

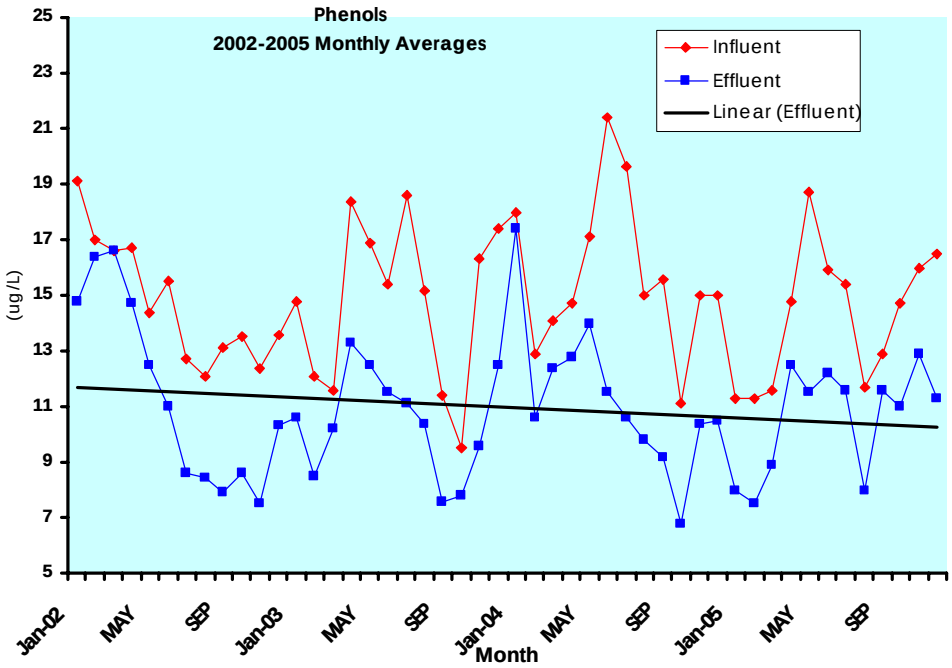
Benchmarks:

Phenols, non-chlorinated

The mass emissions, 2.68 metric tons/year, for non-chlorinated phenols was slightly higher than the bench mark of 2.57 metric tons/year again this year. This was based on a concentration of 10.6 ug/L or an average of 16 pounds per day through the outfall.



This was the second lowest mass emissions and annual average concentration in the last 6-years and maintains the multi-year downward trend in phenol concentrations in effluent. Influent concentration trend is nearly flat, reflecting enhanced removals, possibly due to a readily bound form.



Toxicity Bioassays

DISCUSSION

The results from all 2005 acute and chronic bioassays are presented in Section 2. Influent and Effluent Data Summaries.

Acute Bioassays

In accordance with Order No. R9-2002-0025, the City conducted three side-by-side acute screening bioassays in 2003-2004 using both the topsmelt (*Atherinops affinis*) and the mysid (*Mysidopsis bahia*) as test organisms. Based on the findings from these three events, the City elected to use the mysid, which exhibited greater sensitivity than the topsmelt, for all subsequent acute toxicity testing. In 2005, all acute toxicity test were conducted using the mysid, and all tests met the acceptability criterion of >90% control survival and all tests demonstrated compliance with permit standards.

Chronic Bioassays

Chronic bioassays on effluent samples were conducted monthly using both kelp and abalone, since the giant kelp has been the most sensitive species historically, and the red abalone remains ecologically important to the region. In addition, the sensitivity of the chronic test species (giant kelp, red abalone, and topsmelt) was verified in April 2005 during a biennial screening event. The screening results were consistent with previous findings; therefore, the City will continue to monitor chronic effluent toxicity with both kelp and abalone.

All tests met the acceptability criteria and the compliance limits with the exception of the growth endpoint of the December giant kelp bioassay, which exceeded the compliance limit. In accordance with Order No. R9-2002-0025, the City initiated accelerated testing on a bi-weekly schedule in January 2006.

D. Status of the Operations and Maintenance Manual

Point Loma WWTP:

There is an approved O&M Manual for the PLWWTP. Staff continue to review and update the Manual and SOP's as necessary to keep current with changes in equipment, processes, and standards of practice. New procedures are included as needs are identified. For example, PLWWTP Staff, in conjunction with the Safety Staff, have developed and established a standard Lock-Out/Tag-Out Program to serve all MWWD Facilities.

Plant Personnel continue the ISO certification and operate the PLWTP facility under the guidelines of the Environmental Management System established under our ISO 14001 program. This program has helped to organize and consolidate facility Standard Operating Procedures (SOP), and has been effective in enhancing plant personnel's awareness of industrial and environmental issues as they relate to the work place.

E. Annual Flow Calibration Report

The firm of MWH completed the annual Gould Flow Metering System Certification in March 2006.

A copy of their findings, without appendices, follows.